



Transport
for NSW

Jannali Station Upgrade

Review of Environmental Factors





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**Transport Access Program
REF-4423868**

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Abbreviations

Term	Meaning
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ARI	Average Recurrence Interval
ASA	Asset Standards Authority (refer to Definitions)
CCTV	Closed Circuit TV
CEMP	Construction Environmental Management Plan
CLM Act	<i>Contaminated Land Management Act 1997</i>
CNVMP	Construction Noise and Vibration Management Plan
CPTED	Crime Prevention Through Environmental Design
DBH	Diameter Breast Height
DDA	<i>Disability Discrimination Act 1992 (Commonwealth)</i>
DSAPT	<i>Disability Standards for Accessible Public Transport (2002)</i>
ECM	Environmental Controls Map
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
FM Act	<i>Fisheries Management Act 1994</i>
Heritage Act	<i>Heritage Act 1977</i>
ICNG	<i>Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009).</i>
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
LEP	Local Environmental Plan

Term	Meaning
LGA	Local Government Area
LoS	Level of Service
NCA	Noise Construction Area
NES	National Environmental Significance
NML	Noise Management Level
Noxious Weeds Act	<i>Noxious Weeds Act 1993</i>
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
RailCorp	(former) Rail Corporation of NSW
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	<i>Roads Act 1993</i>
Roads and Maritime	NSW Roads and Maritime Services (formerly Roads and Traffic Authority)
SEPP	State Environmental Planning Policy
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TMP	Traffic Management Plan
TPZ	Tree Protection Zone
TSC Act	<i>Threatened Species Conservation Act 1995</i>
UDLP	Urban Design and Landscaping Plan
VAC	Visual Absorption Capacity
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001</i>

Definitions

Term	Meaning
Average Recurrence Interval	The likelihood of occurrence, expressed in terms of the long term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood will occur on average once every 100-years.
Asset Standards Authority	The ASA is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets. Design Authority functions formerly performed by RailCorp are now exercised by the ASA.
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 TfNSW acceptance). TfNSW contracts a single entity (the Contractor) to further develop the 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 TfNSW acceptance) to be suitable for construction. The Contractor is therefore responsible for all work on the project, both design and construction.
Disability Standards for Accessible Public Transport	The Commonwealth <i>Disability Standards for Accessible Public Transport 2002</i> ("Transport Standards") (as amended) are a set of legally enforceable standards, authorised under the Commonwealth <i>Disability Discrimination Act 1992</i> (DDA) for the purpose of removing discrimination 'as far as possible' against people with disabilities. The Transport Standards cover premises, infrastructure and conveyances, and apply to public transport operators and premises providers.
Ecologically Sustainable Development	As defined by clause 7(4) Schedule 2 of the EP&A Regulation. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Feasible	A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.
Interchange	Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.
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).
NSW Trains	From 1 July 2013, NSW Trains became the new rail provider of services for regional rail customers.

Term	Meaning
Opal card	The integrated ticketing smartcard being introduced by TfNSW.
Proponent	A person or body proposing to carry out an activity under Part 5 of the EP&A Act - in this instance, TfNSW.
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. This is necessary to ensure the safety of workers and rail users.
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.
Sydney Trains	From 1 July 2013, Sydney Trains replaced CityRail as the provider of metropolitan train services for Sydney.
Tactiles	Tactile tiles or Tactile Ground Surface Indicators (TGSIs) are textured ground surface indicators to assist pedestrians who are blind or visually impaired. They are found on many footpaths, stairs and train station platforms.
The Proposal	The construction and operation of the Jannali Station Upgrade.
Vegetation Offset Guide	The TfNSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed 'significant' for the purposes of section 111 of the EP&A Act. The Guide provides for planting of a minimum of eight trees for each large tree with a diameter at breast height (DBH) of more than 60 cm, four trees where the DBH is 15-60 cm, or two trees where DBH is less than 15 cm.

Executive summary

Overview

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

The Proposal is part 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 key features of the Proposal are summarised as follows:

- new stairs, lift and upgraded entry plaza on each side of the station
- new pedestrian bridge to provide access to both platforms and across the railway
- new canopies for weather protection above the pedestrian bridge, stairs, lift landings and entry plazas
- new Family Accessible Toilet on Platform 1
- installation of undercover bicycle racks on both sides of the station
- upgraded footpaths/ramps on Jannali Avenue, Mitchell Avenue and Railway Crescent
- bus zone works including construction of a shelter closer to the station entrance on Jannali Avenue and a new bus zone on Mitchell Avenue
- provision of five accessible parking spaces (three upgraded and two relocated), two kiss and ride spaces and vehicle turning area in the Oxley Avenue car park connected to the station by a widened footpath
- provision of up to three part-time kiss and ride spaces in Railway Crescent
- ancillary works, including localised platform regrading (as necessary), adjustments to lighting, improvements to station communication systems with new infrastructure (including CCTV cameras), wayfinding signage, services diversion and/or relocation, station power supply upgrade, and minor drainage works.

Subject to approval, construction is expected to commence in 2016 and is anticipated to take around 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 transport initiatives. Transport interchanges, train stations and commuter car parks are important gateways to the transport system and as such 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 forecasted growth in the region and as such would support growth in commercial and residential development.

The Proposal fulfils the program objectives by proposing to provide:

- improved accessibility for customers at Jannali Station providing an accessible path of travel to the station platforms through the provision of accessible parking, upgraded footpaths, rest points (seats), a new pedestrian bridge and stairs/lifts
- improved customer amenity and facilities at the station including a Family Accessible Toilet, canopies over the pedestrian bridge, stairs, lift landings and entry plazas for weather protection along with new tactiles and wayfinding signage
- improved connections with the bus and pedestrian networks including through the new pedestrian bridge to provide direct access across the railway, new/relocated bus zones closer to the western station entrance and new/upgraded footpath and ramps
- improved transport interchange facilities including kiss and ride areas and bicycle facilities on both sides of the station.

The Proposal is also consistent with 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* (TfNSW, 2012a). The Proposal would also ensure that Jannali Station would meet legislative requirements under the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

Design options considered

Options for improving the access to, and amenity of, Jannali Station were developed following a succession of workshops between TfNSW, relevant stakeholders and the project design team.

Three concept design options were developed to address accessibility and customer experience needs and other design principles. All options included similar interchange improvements, with the key differences focused on alternative pedestrian bridge arrangements. Broadly, these are summarised below:

- Option 1 involved an extension to the existing Railway Crescent road bridge to create a concourse (with lifts/stairs to the platforms) on the northern side however this option was discontinued due to issues with existing clearance levels between the track and bridge and other constructability issues
- Option 2 involved a new central pedestrian bridge (with lifts/stairs to the platforms) extending across the railway from Box Road to the intersection of Jannali Avenue/Mitchell Avenue
- Option 3 was similar to Option 2, except that the new pedestrian bridge would be located further north with the eastern entry located directly off the existing taxi zone in Railway Crescent.

Both Option 2 and Option 3 were further refined and taken to the next phase of assessment to determine a preferred option. More information on these design refinements is included in Section 2.3.

Option 2 was selected as the preferred option to progress to the next phase of design and planning as the central pedestrian bridge allowed for an open entry plaza with a direct connection to Mitchell Avenue/Jannali Avenue which better accommodated pedestrian desire lines and integrated with bus services and the village centre, when compared with Option 3. Option 2 also presented less constructability issues and was considered to have less of a visual impact than Option 3. More information on the options assessment and further design refinements is provided in Section 2.3.

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 TfNSW, which do not require development consent under the EP&A Act.

The *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 TfNSW 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 TfNSW under Part 5 of the EP&A Act.

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).

In accordance with section 111 of the EP&A Act, TfNSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Chapter 6 of this REF presents the environmental impact assessment for the Jannali 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 Sutherland Shire Council and Sydney Trains 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.

TfNSW is also proposing to undertake the following consultation for the Proposal:

- direct notification to community stakeholders
- 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 two weeks. Further information about these specific activities is included in Section 4.5 of this REF.

During this period, the REF would also be available for viewing at Sutherland Library, Sutherland Shire Council Administration Centre, and the TfNSW Community Information Centre at 388 George Street, Sydney. The REF would also be available to download from the [TfNSW website](http://www.transport.nsw.gov.au/projects-tap/current-works/jannali)¹ and a Project Infoline (1800 684 490) would be available for members of the public to make enquiries.

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

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



Figure 1 Planning approval and consultation process for the Proposal

¹ <http://www.transport.nsw.gov.au/projects-tap/current-works/jannali>

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 changes to vehicle and pedestrian movements in and around the station
- temporary parking impacts on local roads and car parks
- net loss of four unrestricted car park spaces, two time-restricted street parking spaces on Jannali Avenue and two unrestricted street parking spaces on Mitchell Avenue
- temporary construction noise, dust and visual impacts
- removal of trees/vegetation that would require planting offsets (with two of the potential six trees to be removed forming part of a local heritage listing)
- introduction of new elements such as the new pedestrian bridge, canopies, lifts, and stairs into the visual environment.

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

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 TfNSW takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The detailed design of the Proposal would also be designed in accordance with the *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a) taking into account the principles of ecologically sustainable development (ESD).

Should the Proposal proceed, any potential associated adverse impacts would be appropriately managed in accordance with the mitigation measures outlined in this REF, and the Conditions of Approval imposed in the Determination Report. This would ensure the Proposal is delivered to maximise benefit to the community and minimise any adverse impacts on the environment.

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

1 Introduction

Transport for NSW (TfNSW) was established in 2011 as the lead agency for integrated delivery of public transport services across all modes of transport in NSW. TfNSW is the proponent for the Jannali Station Upgrade (the Proposal), to be delivered by TfNSW's Infrastructure and Services Division.

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 bicycles, buses and cars.

The Jannali Station and interchange area does not currently meet key requirements of the *Disability Standards for Accessible Public Transport 2002* (DSAPT) or the Commonwealth *Disability Discrimination Act 1992* (DDA).

There is currently partial DDA-compliance to station platforms via stairs/ramps from each side of the railway. However, many of the footpaths around the station that connect to the bus stops, the taxi zone and car parks are non-compliant with steep grades, and do not align with pedestrian desire lines, presenting safety issues and other surveillance issues. In addition, the Railway Crescent road bridge, approximately 50 metres south of the station, is the only place for pedestrians/cyclists to cross the railway via a steep and indirect path.

The Jannali Station Upgrade is required to provide safe and equitable access to both station platforms and across the railway to the surrounding pedestrian network; 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 the station.

The expected increase in customers has been taken into consideration during the design development. The 2014 barrier counts indicated a daily patronage of 5,640 trips which is expected to increase by approximately 23 per cent to 6,938 by 2031. The Proposal has been designed to cater for a daily patronage of 7,979 (which is the 2036 daily patronage + 15 per cent).

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- new stairs, lift and upgraded entry plaza on each side of the station
- new pedestrian bridge to provide access to both platforms and across the railway
- new canopies for weather protection above the pedestrian bridge, stairs, lift landings and entry plazas
- new Family Accessible Toilet on Platform 1
- installation of undercover bicycle racks on both sides of the station
- upgraded footpaths/ramps on Jannali Avenue, Mitchell Avenue and Railway Crescent
- bus zone works including construction of a shelter closer to the station entrance on Jannali Avenue and a new bus zone on Mitchell Avenue

- provision of five accessible parking spaces (three upgraded and two relocated), two kiss and ride spaces and vehicle turning area in the Oxley Avenue car park connected to the station by a widened footpath
- provision of up to three part-time kiss and ride spaces in Railway Crescent
- ancillary works, including localised platform regrading (as necessary), adjustments to lighting, improvements to station communication systems with new infrastructure (including CCTV cameras), wayfinding signage, services diversion and/or relocation, station power supply upgrade, and minor drainage works.

Subject to planning approval, construction is expected to commence in 2016 and is anticipated to take around 18 months to complete.

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

1.2 Location of the Proposal

The Proposal would involve upgrade works to Jannali Station, Oxley Avenue car park (on the north-western side of the station) and surrounding streets/footpaths. The station is located approximately 23 kilometres south of Sydney's Central Station in the suburb of Jannali (refer Figure 2).

Jannali is located within the Sutherland Shire Local Government Area (LGA) and is a mostly residential suburb, bisected by the railway. A mix of shops, small businesses and café/restaurants surround the station on Jannali Avenue and Mitchell Avenue on the western side of the station and Railway Crescent, Box Road and White Street to the east. This area is also known as Jannali Village.

Jannali Station is serviced by the T4 Eastern Suburbs and Illawarra Line and is the 89th busiest station on the Sydney Trains network with an average patronage of 5,640 trips per weekday (NSW Bureau of Transport Statistics barrier counts, 2014).

Jannali Station and the western commuter car parks off Oxley Avenue and Jannali Avenue are located on land owned by RailCorp and operated and maintained by Sydney Trains. The adjacent road/footpath network is located on land owned and managed by Sutherland Shire Council. Sutherland Shire Council is also responsible for bus shelters, pedestrian crossings and landscaped garden beds on Jannali Avenue and Railway Crescent.

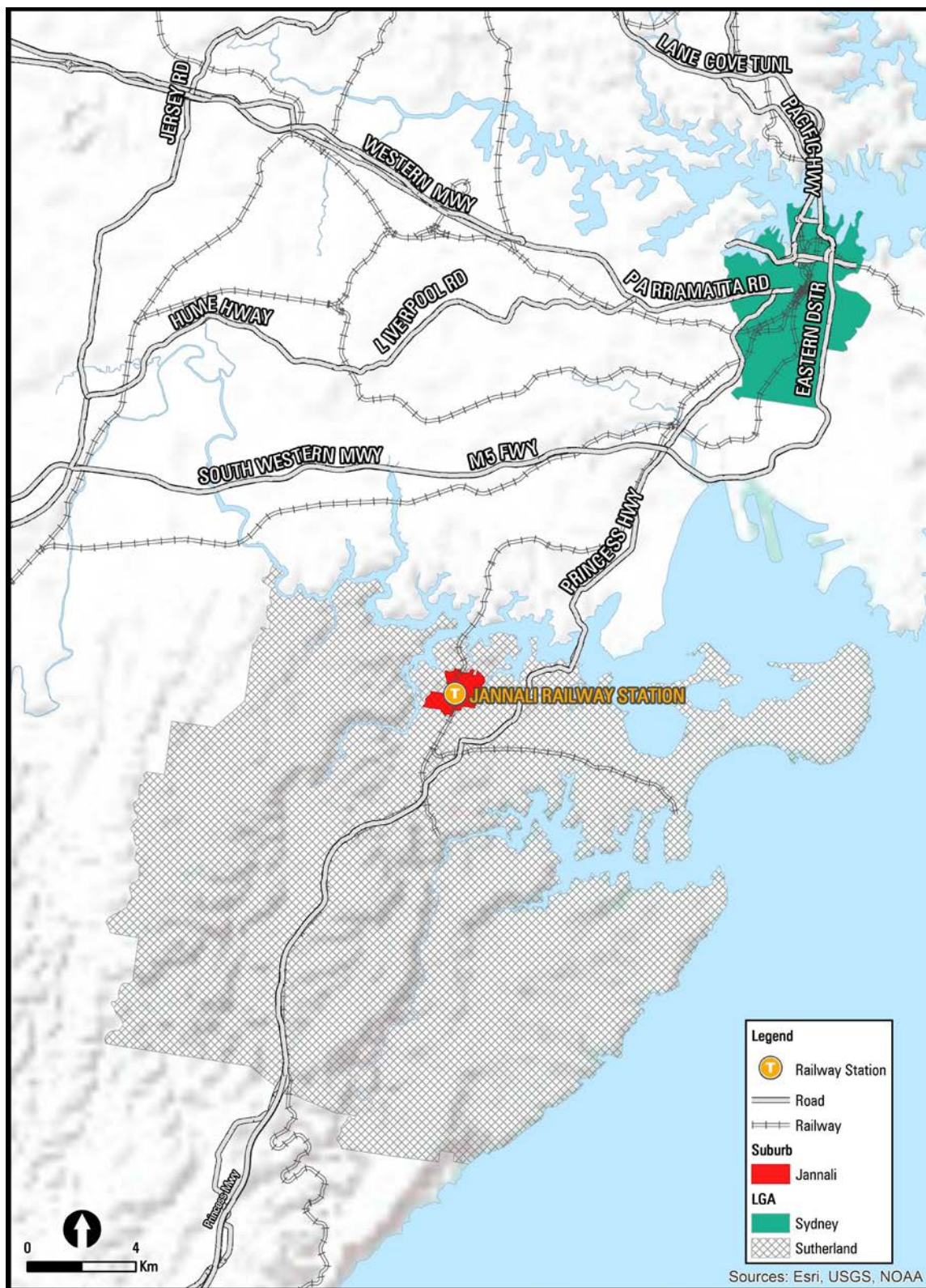


Figure 2 Regional context

1.3 Existing infrastructure and land uses

Land immediately to the north and south of the station is occupied by rail infrastructure, and the Railway Crescent road bridge to the south (which is also where pedestrians and vehicles currently cross the railway line). To the east and west are commercial and residential properties that make up the Jannali Village area. Locally-listed heritage trees line Mitchell Avenue and Jannali Avenue and also provide screening and contribute to the visual character of the area.

Jannali Station comprises two platforms, one on either side of the railway. Trains from Platform 1 include all station and limited stop services northbound to Hurstville, Central and Bondi Junction via Central. Trains from Platform 2 include all station and limited stop services southbound to Sutherland, Cronulla and Waterfall. Throughout the day, a minimum of four trains depart Jannali Station in both directions every hour. In peak periods, the number of trains increases to five to six trains in each direction every hour.

Access to the station is via entry points on Jannali Avenue (to Platform 1) and Railway Crescent (to Platform 2). There is currently no direct access across the railway and those wishing to cross must travel approximately 50 metres south to cross at the Railway Crescent road bridge along a steep path which is not DDA-compliant.

Within the station there are a number of existing facilities for customers including ticket machines, Opal card readers, female and male toilets (non-accessible), and canopies for weather protection on Platform 1 and at the entry to Platform 2.

Existing transport interchange arrangements available at Jannali Station include:

- bicycle racks (with capacity for four bicycles) located at the top of the steps at the western station entrance on Jannali Avenue and bicycle lockers (with capacity for four bicycles) situated on the eastern side on Railway Crescent, approximately 60 metres south of the station entrance
- bus services operated by Transdev along two routes (967 and 968), with bus stops located on Jannali Avenue, Railway Crescent, Box Road and White Street
- a taxi zone (with sheltered seat) on a service road adjoining Railway Crescent on the eastern side, immediately north of the station entrance (the taxi zone and the path to the station are not accessible)
- four commuter car parking areas:
 - o a north-western car park (Oxley Avenue car park) with vehicle access from Oxley Avenue and which has a capacity of 109 parking spaces (including three accessible spaces). However this car park is located over 125 metres from the western entrance and the connecting footpath is not accessible and presents surveillance issues
 - o a south-western car park off Jannali Avenue with a capacity of 69 parking spaces (including two accessible spaces but with similar accessibility and surveillance issues between the car park and station, in particular the steep grade from the car park to the station)
 - o a north-eastern council-owned unrestricted car parking area on Railway Crescent with a capacity of 37 parking spaces mostly likely used by commuters
 - o a south-eastern council-owned car parking area on Railway Crescent with a capacity of 79 parking spaces (15 of which are restricted to one-hour parking).

There are no formal kiss and ride facilities currently provided at Jannali Station. Informal kiss and ride occurs in the taxi zone, in the roadside parking spaces immediately outside the taxi zone and outside the western station entrance on Jannali Avenue/Mitchell Avenue.

Photographs of the existing station are provided in Figure 4 - Figure 7.

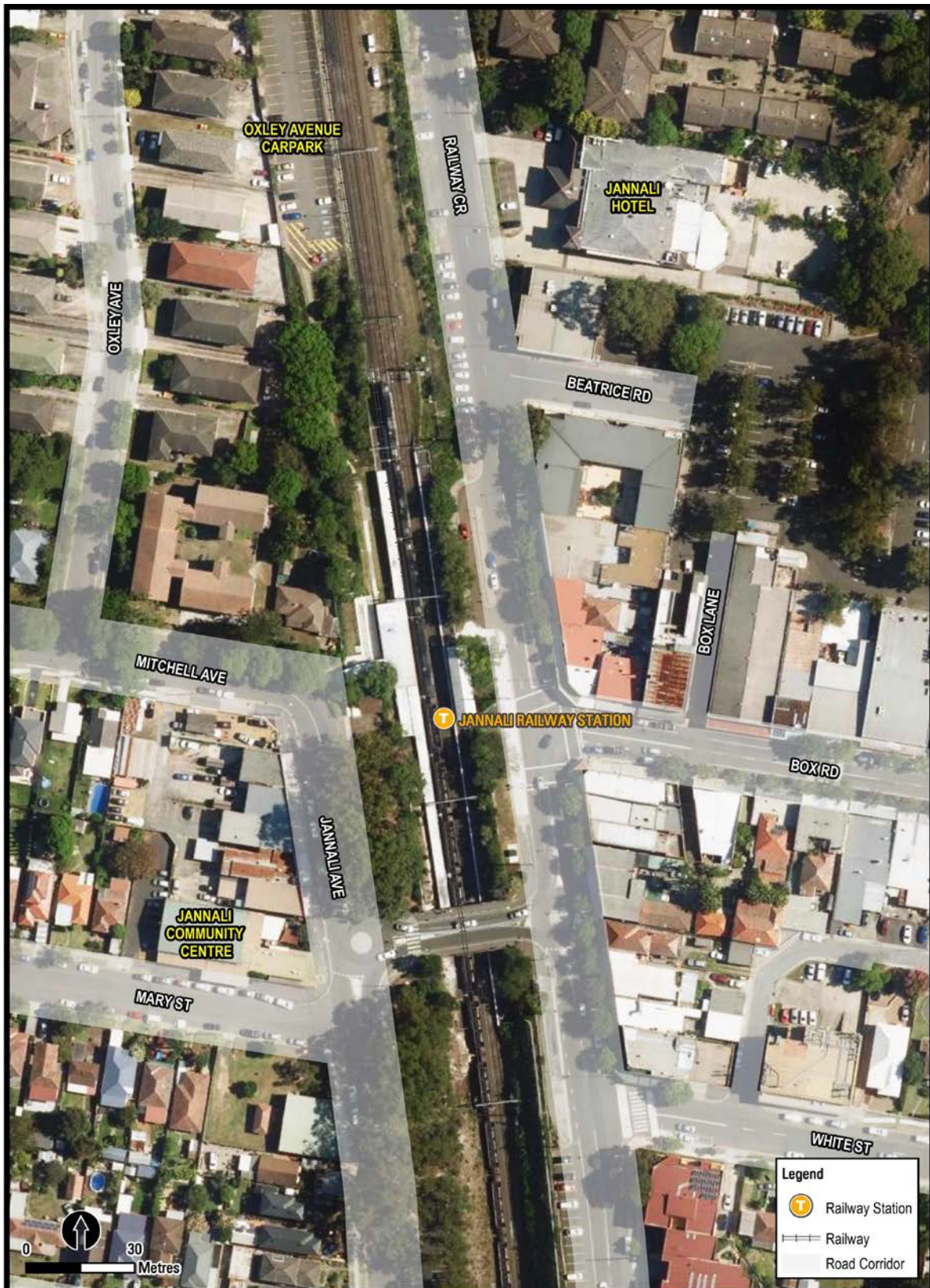


Figure 3 Site locality map



Figure 4 View of Jannali Station platforms from the Railway Crescent road bridge looking north (new pedestrian bridge would extend across the railway)



Figure 5 View of eastern station entrance from the intersection of Box Road and Railway Crescent



Figure 6 View of western station entrance and looking south down Jannali Avenue



Figure 7 View from existing footpath looking north towards the Oxley Avenue car park (footpath to be upgraded and accessible parking/kiss and ride to be provided)

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of the Jannali Station Upgrade. For the purposes of these works, TfNSW 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* (the 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 the 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

2.1.1 Overview

Improving transport customer experience is the focus of the NSW Government's transport initiatives. Transport interchanges and train stations are the 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 Jannali Station Upgrade, the subject of this REF, forms part of the Transport Access Program. This program is designed to drive a stronger customer experience outcome 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
- grow patronage on public transport
- improve public transport reliability
- improve customer experience with transport services.

The NSW Government has developed a *Long Term Transport Master Plan* (TfNSW, 2012a). This plan provides a comprehensive strategy for all modes of transport across NSW over the next 20 years, while also delivering on current commitments.

Data forecasts indicate that there would be significant growth in population and employment from 2006 up to 2036 in the area within the Jannali Station catchment and the proposed upgrade would help to accommodate this growth and changing travel patterns.

The *Disability Action Plan 2012-2017* (TfNSW, 2012b) was developed by TfNSW, in consultation with the Accessible Transport Advisory Committee, which is made up of representative from peak disability and ageing organisations within NSW. The Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job and provide 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.

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.

2.1.2 Objectives of the Transport Access Program

The Transport Access Program 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 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 alarm, 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.

2.1.3 Objectives of the Proposal

The specific objectives of the Jannali Station Upgrade are to:

- provide a station that is accessible to those with a disability, the ageing and parents/carers with prams
- improve customer safety and enhance pedestrian links by providing access to station platforms and across the railway
- improve customer experience and amenity through a new Family Accessible Toilet, canopies for weather protection and wayfinding in and around the station
- improve transport interchange facilities with new/upgraded footpaths, accessible parking, kiss and ride, sheltered bicycle racks and new/upgraded bus zones.

2.2 Design development

Cardno were engaged by TfNSW to develop a concept design for an easy access upgrade at Jannali Station that would improve accessibility in and around the station, and meet key architectural, engineering and urban design objectives. The design development also accommodated the forecast Sydney Trains patronage growth (which is the estimated 2036 daily customer patronage + 15 per cent) and changing travel patterns.

An assessment of Jannali Station and surrounds was undertaken to identify key deficiencies and opportunities with regards to accessibility and customer experience. The findings of the assessment were presented in Cardno's *Jannali Station Precinct Accessibility Upgrade – Concept Design Report* (Cardno, 2015) and are summarised below:

- lack of an accessible path of travel from station entrances to platforms (i.e. partial compliance to Platform 1 and limited access to Platform 2)
- lack of an accessible path of travel from station entrances to other transport modes (i.e. steep gradients and/or non-compliant cross falls, narrow paths, missing path links, no rest points and trip hazards) and some footpaths which do not align with pedestrian desire lines
- no direct crossing over the railway – the Railway Crescent road bridge (approximately 50 metres south of the station) is the only place for pedestrians/cyclists to cross over the railway via a steep and indirect path, and such indirect paths can promote unsafe crossing over railway tracks
- lack of accessible toilet facilities at the station (i.e. no Family Accessible Toilet)
- no formalised kiss and ride area
- opportunity to install additional bicycle facilities on both sides of the station
- opportunity to create open station entrances for increased surveillance
- opportunity to relocate the Jannali Avenue pedestrian crossing and create a new bus zone on Mitchell Avenue to allow for safer path of travel and integration with other modes of transport.

The needs and opportunities for Jannali were then considered in the development of options for the concept design (refer to Section 2.3).

2.3 Alternative options considered

Options for improving the access to, and amenity of, Jannali Station were developed following a succession of workshops between TfNSW, relevant stakeholders (including Sydney Trains and Sutherland Shire Council) and the project design team.

Three concept design options were developed to address accessibility and customer experience needs and other design principles. There were improvements which were common to all options (including new Family Accessible Toilet, upgraded footpaths and access to station and interchange facilities, new kerb ramps, new platform canopies, new bicycle racks and platform regrading), with the key differences focusing on alternate pedestrian bridge and accessible parking arrangements. These are summarised below:

- Option 1 involved an extension to the existing Railway Crescent road bridge to create a concourse (with lifts/stairs to the platforms) on the northern side however this option was discontinued due to issues with existing clearance levels between the track and bridge and other constructability issues
- Option 2 involved a new central pedestrian bridge (with lifts/stairs to the platforms) extending across the railway from Box Road to the intersection of Jannali Avenue/Mitchell Avenue with accessible parking/kiss and ride provided in the existing taxi zone on the eastern side of the station
- Option 3 was similar to Option 2, except that the new pedestrian bridge would be located further north with the eastern entry located directly off the existing taxi zone in Railway Crescent.

Both Option 2 and Option 3 were further refined and taken to the next phase of assessment to determine a preferred option. The key changes included potential new bus stop works on Mitchell Avenue/Jannali Avenue for both options and the addition of a one-way through road from Jannali Avenue to the Oxley Avenue car park with two accessible parking spaces located near the intersection of Jannali Avenue and Mitchell Avenue. Option 3 also retained two accessible parking spaces on the eastern side.

2.3.1 The 'do-nothing' option

Under a 'do-nothing' option, existing access to the station and other transport modes would remain the same and there would be no changes to the way the station and interchange areas currently operate.

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 needs of the Jannali community.

2.3.2 Assessment of identified options

The revised Option 2 and Option 3 designs were assessed in a multi-criteria analysis that included consideration of factors such as customer experience, accessibility, engineering constraints, modal integration and cost to select a preferred option.

2.4 Justification for the preferred option

Based on the multi-criteria analysis, the revised Option 2 received the highest score primarily because the central pedestrian bridge allowed for an open entry plaza with a direct connection to Mitchell Avenue/Jannali Avenue which better accommodated pedestrian desire lines and integrated with bus services and the village centre, when compared with Option 3. Option 2 also presented less constructability issues and was considered to have less of a visual impact than Option 3.

However through the workshops it was identified that the proposed through road from Jannali Avenue (which was included in both revised options) may have adverse traffic impacts and require some property acquisition, and that not all accessibility objectives (such as provision for a kiss and ride area) were met. It was also acknowledged that the gradient issue (steep slope) along Jannali Avenue and Railway Crescent was a constraint to being able to provide an accessible path of travel from parking spaces to the station. These outstanding issues were addressed through further design refinements in a final revised Option 2 (now the preferred concept design) which is outlined in Chapter 3.

3 Description of the Proposal

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

3.1 The Proposal

As described in Section 1.1, the Proposal involves an easy access upgrade of Jannali Station as part of the Transport Access Program, which would improve accessibility and amenities for customers.

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

- new stairs, lift and upgraded entry plaza on each side of the station
- new pedestrian bridge to provide access to both platforms and across the railway
- new canopies for weather protection above the pedestrian bridge, stairs, lift landings and entry plazas
- new Family Accessible Toilet on Platform 1
- installation of undercover bicycle racks on both sides of the station
- upgraded footpaths/ramps on Jannali Avenue, Mitchell Avenue and Railway Crescent
- bus zone works including construction of a shelter closer to the station entrance on Jannali Avenue and a new bus zone on Mitchell Avenue
- provision of five accessible parking spaces (three upgraded and two relocated), two kiss and ride spaces and vehicle turning area in the Oxley Avenue car park connected to the station by a widened footpath
- provision of up to three part-time kiss and ride spaces in Railway Crescent
- ancillary works, including localised platform regrading (as necessary), adjustments to lighting, improvements to station communication systems with new infrastructure (including CCTV cameras), wayfinding signage, services diversion and/or relocation, station power supply upgrade, and minor drainage works.

Figure 8 shows the general layout of key elements of the Proposal.

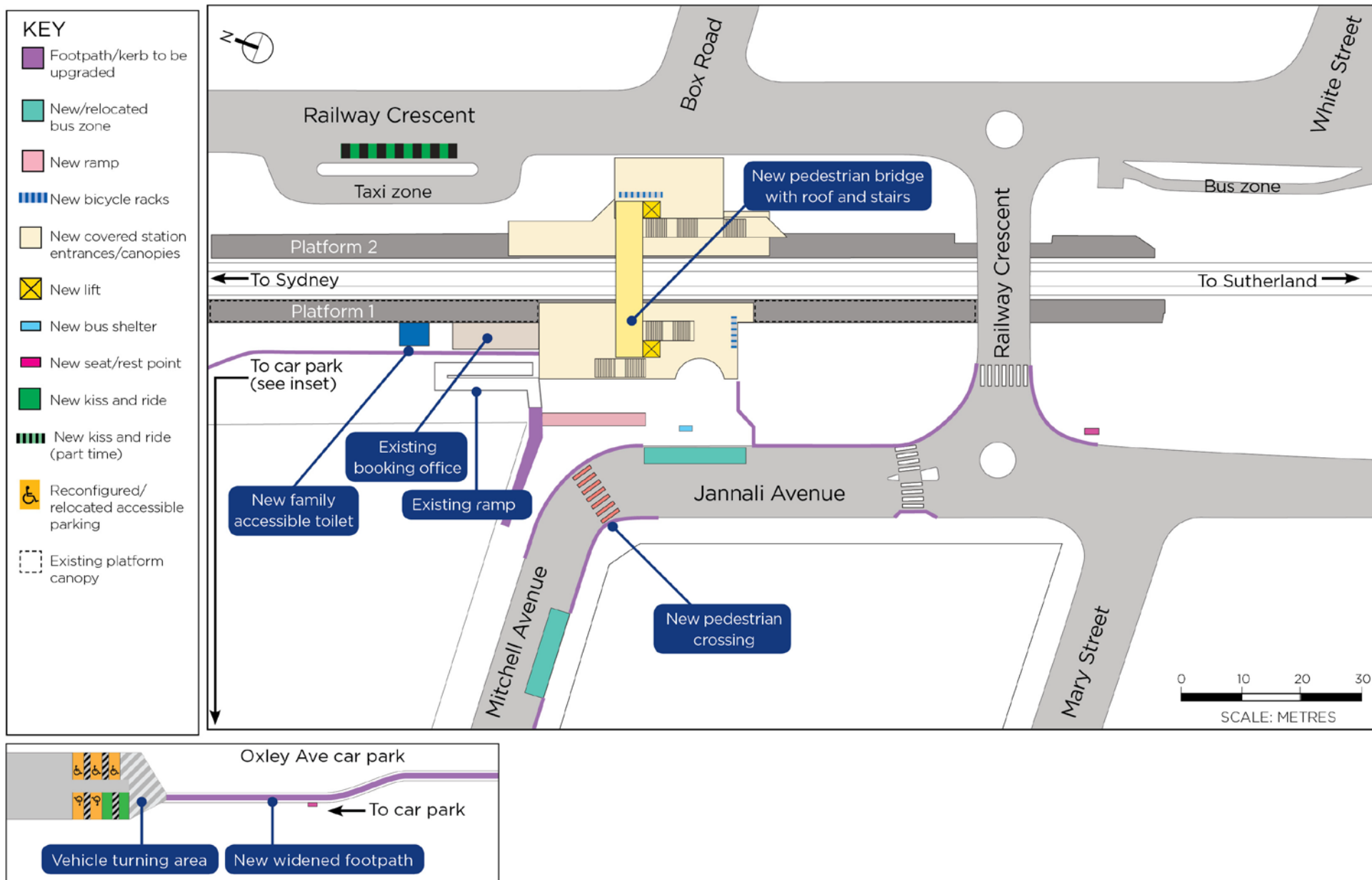


Figure 8 Plan view of the key elements of the Proposal (indicative only, subject to detailed design)



Figure 9 Artist's impression of the Proposal – view from Railway Crescent looking north towards the station entrance
(Indicative only, subject to detailed design – prepared by Studio GL)

3.1.1 Design features

Station upgrade

Details of the proposed works to take place at the station to improve accessibility and customer experience are provided below:

- demolition of existing structures (i.e. waiting room on Platform 1, building immediately west of Platform 1 currently leased by the Red Cross, existing stairs and awnings on both platforms, and the existing bus shelter outside the station on Jannali Avenue) to allow for construction of new facilities
- new pedestrian bridge spanning approximately 17 metres over the railway
- a new lift and stairs on both sides of the station
- upgraded entry plaza at each end of the pedestrian bridge including:
 - o an open concrete area with raised ground level to match the existing ground level at Jannali Avenue on the western side of the station
 - o a new ramp and balustrade from the street to connect to the existing ramp on the western side of the station
 - o modified entry with new balustrade on eastern side of the station (north of the new pedestrian bridge)
- new canopies for weather protection installed above new station entry plazas, pedestrian bridge, stairs and lift landings
- localised regrading of existing platforms to provide compliant crossfalls (i.e. transverse slope) of maximum 1 in 40 (where required)
- other platform modifications, including resurfacing, new tactiles and relocation/replacement of boarding ramps, seats, bins, pay phone and vending machines
- new Family Accessible Toilet on Platform 1, immediately north of the booking office
- services relocation and/or adjustments, including lighting and communications systems (e.g. CCTV), stormwater drainage, retaining walls, and overhead wiring
- station power supply upgrade works, which could include an upgrade to the existing transformer or the installation of a padmount substation, and earthing/bonding provisions (specific power requirements to be determined during detailed design)
- adjustment to station ticketing facilities, including new Opal card readers
- landscaping works
- adjustments to boundary fencing
- temporary works (where required) during construction in order to maintain existing pedestrian 'level of service', such as access provisions
- temporary site compounds for storage of materials and equipment.

Interchange facilities

Details of the proposed works to take place at the interchange to improve accessibility and customer experience are provided below:

- eight bicycle racks (with capacity for 16 bicycles) installed on each side of the station
- relocated post box on western side of the station
- new/upgraded accessible pathways between the western station entrance and:
 - o south to the Jannali Avenue commuter car park (new widened footpath and kerb ramps on the eastern side of the roadway with new seat/rest point)
 - o north to the Oxley Avenue car park (new widened footpath with new seat/rest point)
 - o west to the bus stop on Mitchell Avenue (upgraded footpaths)
- additional facilities in the Oxley Avenue car park, including a vehicle turning area, two kiss and ride areas and five accessible parking spaces (i.e. the three existing accessible spaces to be upgraded and two existing accessible spaces from the Jannali Avenue car park to be relocated which would result in a net loss of four unrestricted parking spaces)
- up to three part-time kiss and ride spaces in Railway Crescent (i.e. the three existing one-hour spaces outside the taxi zone would be altered to kiss and ride during peak hours)
- bus zone on Jannali Avenue relocated to immediately outside the new station entry plaza (with new shelter) and a new bus zone on the southern side of Mitchell Avenue
- raised pedestrian crossing at the junction of Jannali Avenue and Mitchell Avenue and removal of the existing pedestrian crossing (subject to a Road Safety Audit)
- ancillary road works (including drainage modifications, road resurfacing, kerb realignment and driveway works on Jannali Avenue/Mitchell Avenue intersection)
- new wayfinding signage and provision of other signage, including statutory/regulatory signage.

Materials and finishes

Materials and finishes for the Proposal have been proposed, based on the criteria of durability, low maintenance and cost effectiveness, to minimise visual impacts, and to be aesthetically pleasing.

Availability and constructability are also important criteria to ensure that materials are readily available and the structure can be built with ease and efficiency. Materials are also selected for their application based on their suitability to meet any design requirements.

The general design life of the pedestrian bridge would be 100 years, with various parts having various design life periods. Each of the upgraded or new station facilities would be constructed of a range of different materials, with a different palette for each architectural element. Subject to detailed design, these would likely include:

- lifts – precast concrete within a steel frame, with an external glass and cladding finish
- pedestrian bridge and stairs – concrete base with anti-throw screens and corrugated steel sheeting roof
- platform canopies – steel frame and corrugated steel sheeting roof
- Family Accessible Toilet – brick structure with metal roof.

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

3.1.2 Engineering constraints

There are a number of constraints which have influenced the design development 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 included the platforms, station buildings, and the Railway Crescent road bridge.

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

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

- electrical services (aboveground)
- telecommunication services (underground)
- gas
- stormwater
- water and sewer
- rail utilities, including signalling cabling and overhead wiring.

Other considerations:

- natural ground level grades gently from west to east (approximately two per cent crossfall) and steeply down from south to north (approximately 7-10 per cent) – the steep gradients, particularly on the eastern side, are a constraint to providing a compliant accessible path of travel from interchange areas to the station
- in addition the station is located within a partial rail cutting and station platforms are generally lower than street level
- there is limited space immediately around the station to create accessible parking/kiss and ride and/or with an accessible path of travel
- existing obstructions, such as seating on the platforms, and the need to provide a accessible path of travel in and around the station
- proximity of mature locally heritage-listed trees on Jannali Avenue and Mitchell Avenue and the requirement to minimise impacts for placement of new infrastructure.

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 Standards Authority standards

- Sydney Trains standards
- *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a)
- *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008).
- Crime Prevention Through Environmental Design (CPTED) principles
- other TfNSW policies and guidelines.

3.1.4 Sustainability in design

The development of the concept design for the Proposal has been undertaken in accordance with the project targets identified in TfNSW's Environmental Management System (EMS) and the *NSW Sustainable Design Guidelines - Version 3.0* (TfNSW, 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 they refer to a corporate target, or are fundamental to the delivery of sustainable assets)
- **discretionary** – the initiative has benefits to be implemented, however may not be the most appropriate.

A shortlist of compulsory initiatives has been developed by TfNSW specifically for Transport Access Program projects, which includes the Jannali Station Upgrade. These compulsory initiatives have been reviewed and incorporated into the concept design (unless otherwise justified) and documented in a Sustainability Checklist that was approved by TfNSW (a summary of the key initiatives is provided in Appendix C). The Sustainability Checklist and the initiatives contained within would be reviewed again by the Contractor at the detailed design and construction phases, and submitted for approval by TfNSW.

3.2 Construction activities

3.2.1 Work methodology

Subject to approval, construction is expected to commence in 2016 and take around 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 TfNSW.

The proposed construction activities for the Proposal are identified in Table 1. This staging is indicative and is based on the current concept 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 staging for key activities

Stage	Activities
Site establishment and enabling works	• establishment of site compound (erect fencing, tree protection zones, site offices, amenities and plant/material storage areas etc) • removal of identified trees and vegetation • services relocation
Bridge, lift and stairs construction	• demolition of existing structures as required • construction of footings for bridge columns/lift shafts • construction of retaining walls and stormwater drainage works • construction of bridge columns/lift shafts • lifting bridge span into position • construction of stairs, entry plazas, canopies and anti-throw screens • installation of lifts • installation of fixtures, lighting and CCTV cameras for affected areas
Platform/building works	• platform resurfacing and raising/regrading (if required) • construction of Family Accessible Toilet (mechanical/electrical fit out and drainage works) • relocation/replacement of existing facilities such as seats, boarding ramps, bins, Opal card readers etc
Interchange works	• conversion of parking spaces to accessible parking spaces and new kiss and ride/turning area in the Oxley Avenue car park and Railway Crescent • upgrade of existing footpath from Oxley Avenue car park to station • construction of raised pedestrian crossing at the junction of Mitchell Avenue and Jannali Avenue • construction of new bus zone with shelter on Jannali Avenue, new bus zone on Mitchell Avenue and associated footpath and kerb alignment works
Finalisation	• electrical and power supply upgrade works • installation of new bicycle racks on both sides of the station • installation of wayfinding signage • replanting/landscaping and fencing adjustments/bollards
Testing and commissioning	• various activities to test and commission power supply, lifts, lighting, new/modifications to station services, ticketing systems, communication and security systems

3.2.2 Plant and equipment

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

- trucks
- chainsaw
- mulcher
- generator
- bobcat
- excavators
- demolition saw
- jackhammer
- grinder
- piling rig
- concrete pump
- concrete trucks
- crane
- manitou
- scissor lift
- franna crane
- paving machine
- wacker packer
- vibratory roller
- trench compacter
- balloon wheel dump trucks
- hi rail
- coring machine
- rattle gun/nail gun
- hand tools
- lighting towers.

3.2.3 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 may need to occur outside standard hours and would include night works 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.

Out of hours works are required in some cases to minimise disruptions to customers, pedestrians, motorists and nearby sensitive receivers; and to ensure the safety of railway workers and operational assets. It is estimated that at least five to six track possessions (including a longer possession exceeding 48 hours) would be required to facilitate the following:

- detailed site survey, services investigations and/or geotechnical investigations within and around the tracks
- demolition of existing structures including the waiting room on Platform 1, existing stairs and awnings on both platforms,
- construction works including site establishment, excavation and installation of lift shafts, piling/footings for pedestrian bridge and lifting in of bridge span (via crane), installation of anti-throw screens/canopies, stormwater/drainage works, service relocations, platform resurfacing/regrading and trenching in platform
- platform resurfacing and raising/regrading
- testing and commissioning/cutover of new lifts and upgraded power supply.

Out of hours works may also be scheduled outside track possession periods, for example for road works on Jannali Avenue and Mitchell Avenue which is likely to be undertaken during the evening and/or night time to minimise impacts to traffic. Approval from TfNSW would be

required for any out of hours work and the affected community would be notified as outlined in TfNSW's *Construction Noise Strategy* (TfNSW, 2012c) (refer to Section 6.3 for further details).

3.2.4 Earthworks

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

- the pits for the proposed lift shafts which would require open cut excavation through the station platforms and excavation into soils/fill and sandstone rock up to a depth of approximately five metres
- the footings for the columns of the pedestrian bridge and stairs
- upgraded footpath areas, entry plaza areas and kerb realignment works
- other minor civil works including footings and foundations for structures, drainage/stormwater works (including retaining walls), 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.

3.2.5 Source and quantity of materials

The source and quantity of materials would be determined during the detailed design phase of the Proposal, and would consider the requirements of the *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a). Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

3.2.6 Traffic access and vehicle movements

Traffic and transport impacts associated with the Proposal are assessed in Section 6.1 of this REF. The potential traffic and access impacts expected during the construction of the Proposal include:

- minor disruptions to pedestrian/cyclist movements in and around the station and car parks
- construction vehicle movements and access arrangements which may interrupt traffic flow on Jannali Avenue/Mitchell Avenue and Railway Crescent
- temporary loss of parking on Jannali Avenue, Mitchell Avenue and Railway Crescent, Jannali Avenue car park and Oxley Avenue car park
- potential temporary changes to bus and taxi operations.

3.2.7 Ancillary facilities

A temporary construction compound would be required to accommodate a site office, amenities, laydown and storage area for materials. A construction compound would likely be established in the north-west area of the station or within a small section of the Oxley Avenue car park which is owned by RailCorp and managed by Sydney Trains. These locations are within the study area for the Proposal (refer Figure 16, page 83) and impacts associated with utilising this area have been considered in the environmental impact assessment, including requirements for rehabilitation.

3.2.8 Public utility adjustments

An upgraded electrical supply is required to accommodate new infrastructure (e.g. new lifts) - two options have been considered and would be further investigated during detailed design. The two options proposed in the Concept Design Report included either an upgrade to the existing transformer in the rail corridor (located off Railway Crescent) or the installation of a padmount substation.

Some drainage works would also be required to establish new drainage outlets on both sides of the station to connect to the existing stormwater pits (that are part of Sutherland Shire Council's stormwater system). Construction of new retaining walls at the entry plazas to both of the stations is also proposed.

A range of other utilities are located on or adjacent to the Proposal site. A utility investigation has been undertaken during the concept design stage and is discussed in Section 3.1.2. The Proposal has been designed to avoid relocation of services where feasible, however further investigation may be required.

It is likely some services may require relocation, including existing electrical infrastructure or rail utilities, but such relocation is unlikely to occur outside of the footprint of the works assessed in this REF (i.e. within the study area shown in Figure 16). In the event that works would be required outside of this footprint, further assessment would be undertaken. The appropriate utility providers would be consulted during the detailed design phase.

3.3 Property acquisition

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

3.4 Operation management and maintenance

The future operation and maintenance of the upgraded station and surrounds is subject to further discussions with Sydney Trains, TfNSW and Sutherland Shire Council. Structures constructed under this Proposal and the Oxley Avenue car park would be maintained by Sydney Trains. It is expected that adjacent garden/landscape areas, pedestrian crossings and bus zones/shelters would continue to be maintained by Sutherland Shire Council.

4 Statutory considerations

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

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

The Proposal would not impact on any matters of NES or on Commonwealth land. Therefore a referral to the Commonwealth Minister for the Environment is not required.

4.2 NSW legislation and regulations

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of 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 TfNSW, which do not require development consent under Part 4 of the Act.

In accordance with section 111 of the EP&A Act, TfNSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Proposal.

Clause 228 of the *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 the REF provides an environmental impact assessment of the Proposal in accordance with clause 228 and Appendix B specifically responds to the factors for consideration under clause 228.

4.2.2 Other NSW legislation and regulations

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

Table 2 Other legislation applicable to the Proposal

Applicable legislation	Considerations
<i>Contaminated Land Management Act 1997</i> (CLM Act) (NSW)	Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8).
<i>Crown Lands Act 1987</i> (NSW)	The Proposal does not involve works on any Crown land.
<i>Disability Discrimination Act 1992</i> (DDA) (Cwlth)	The Proposal would be designed having regard to the requirements of this Act.
<i>Heritage Act 1977</i> (Heritage Act) (NSW)	- Sections 57 and 60 (approval) where items listed on the State Heritage Register are to be impacted. - Sections 139 and 140 (permit) where relics are likely to be exposed. - Section 170 where items listed on a government agency Heritage and Conservation Register are to be impacted. The Proposal site is not located within an area that is listed on the State Heritage Register and while the station is listed as an archaeological site on the Sutherland Shire LEP, the heritage assessment concluded that there is a low risk of the proposed works to expose historical archaeological relics and that no archaeological approvals under the Heritage Act would be required (Umwelt, 2015). Refer to Section 6.5 for more information.
<i>National Parks and Wildlife Act 1974</i> (NPW Act) (NSW)	Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4). However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease and appropriate advice sought.
<i>Noxious Weeds Act 1993</i> (NSW)	There are four noxious weeds that have been identified in the Proposal area. Appropriate management methods would be implemented during construction (refer Section 6.7).
<i>Protection of the Environment Operations Act 1997</i> (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 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Contractor.

Applicable legislation	Considerations
<i>Roads Act 1993</i> (Roads Act) (NSW)	Section 138 of the Roads Act requires consent from the appropriate 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. The Proposal would involve works on Jannali Avenue, Mitchell Avenue and Railway Crescent all of which are local roads under the control of Sutherland Shire Council. Consent under the Roads Act is not required however Road Occupancy Licence/s would be obtained from council for temporary road closures. Refer to Section 6.1 for more information. Operational changes (such as changes to pedestrian crossings, parking/kiss and ride changes, bus zones, signage etc) to Jannali Avenue, Mitchell Avenue and Railway Crescent would be undertaken with approval from the appropriate road authority.
<i>Sydney Water Act 1994</i> (NSW)	The Proposal would not involve discharge of additional wastewater to the sewer.
<i>Threatened Species Conservation Act 1995</i> (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).
<i>Waste Avoidance and Resource Recovery Act 2001</i> (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.
<i>Water Management Act 2000</i> (NSW)	The Proposal would not involve any water use (from a natural source e.g. aquifer, river – only from the network), 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 do not require further consideration as part of this REF.

4.3.2 State Environmental Planning Policy 55 – Remediation of Land

SEPP 55 provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment. While consent for the Proposal is not required, the provisions of SEPP 55 have been considered in the preparation of this REF.

Section 6.8 of this REF contains an assessment of the potential contamination impacts of the Proposal. It is unlikely that any large-scale remediation (Category 1) work would be required as part of the Proposal. The proposed land use does not differ to the existing use and is, therefore, unlikely to be affected by any potential contaminants that exist within the rail corridor.

4.4 Local environmental planning instrument and development controls

The Proposal is located within the Sutherland Shire LGA. The provisions of the Infrastructure SEPP mean that Local Environmental Plans (LEPs) prepared by councils for an LGA, do not apply. However, during the preparation of this REF, the provisions of the recently gazetted *Sutherland Shire Local Environmental Plan 2015* have been considered.

4.4.1 Sutherland Shire Local Environmental Plan 2015

The *Sutherland Shire Local Environmental Plan 2015* (Sutherland Shire LEP) is the governing plan for the Sutherland Shire LGA, including Jannali. Table 3 summarises the relevant aspects of the Sutherland Shire LEP applicable to the Proposal.

Figure 10 shows the relevant section of the zoning map from the Sutherland Shire LEP, with the indicative location of the Proposal.

Table 3 Relevant provisions of the Sutherland Shire LEP 2015

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Table	Under the Sutherland Shire LEP: - the rail corridor is zoned SP2 Infrastructure – Railway - shops and businesses along Jannali Avenue/Mitchell Avenue and Railway Crescent are zoned B2 Local Centre - the area north-west and north-east of the station is zoned R4 High Density Residential - beyond the station further to the west and east is land zoned R2 Low Density Residential The Proposal is consistent with the objectives of the SP2 Infrastructure and B2 Local Centre zone.
Clause 5.9 – Preservation of trees or vegetation	Clause 5.9 is aimed at the preservation of trees and development consent is required for tree removal in most instances. However by virtue of clause 5(3) and 79 of the Infrastructure SEPP, the clearing of vegetation for the Proposal is permissible without development consent and would be approved under Part 5 of the EP&A Act. Tree replanting is discussed in Section 6.7.
Clause 5.10 – Heritage conservation	The Sutherland Shire LEP aims to conserve heritage significance of heritage items within the LGA. The Jannali Railway Station and immediate surrounds is listed as an archaeological site under Schedule 5 – Environmental Heritage of the LEP. Other heritage items within the Proposal area include a stand of mature trees and cultural planting along Jannali Avenue and Mitchell Avenue. A discussion of potential impacts to local heritage is discussed in Section 6.4 and Section 6.5.

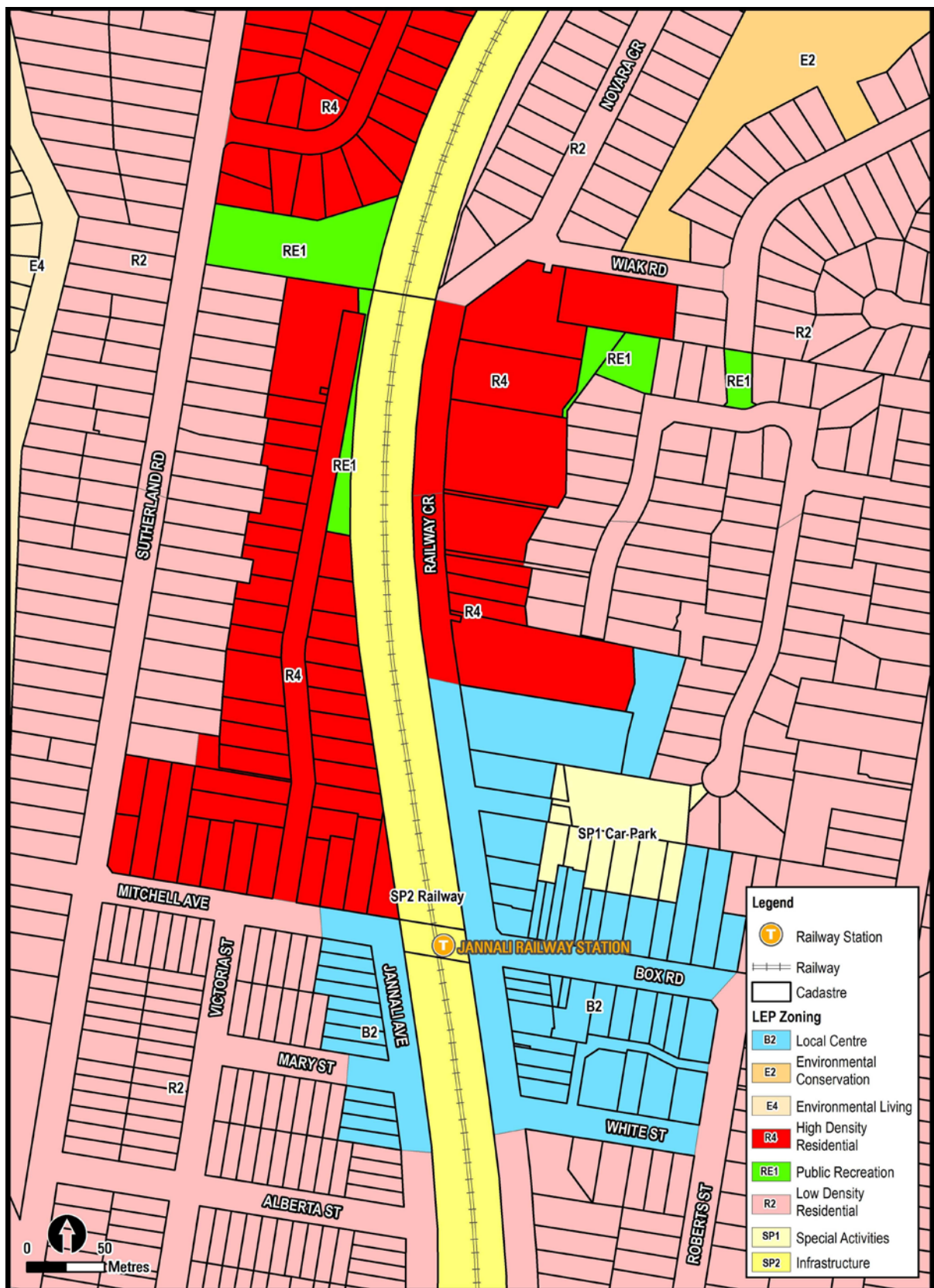


Figure 10 Sutherland Shire LEP 2015 zoning map

4.5 NSW Government policies and strategies

Table 4 provides an overview of other NSW Government policies and strategies

Table 4 NSW Government policies and strategies applicable to the Proposal

Policy/Strategy	Commitment	Comment
NSW 2021 – A Plan to Make NSW Number One (Department of Premier and Cabinet, 2011)	<i>NSW 2021 – A Plan to Make NSW Number One</i> is a ten-year plan developed in 2011 and outlines the high level strategic priorities and associated goals for government and its respective agencies. A key aspect in the transport strategy includes: - the return of quality transport and community services - building infrastructure that improves people's lives and - strengthening our local environments. 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.	The Proposal is consistent with the NSW Government's commitment to: - grow patronage on public transport, and - improve customer experience with transport services. And in particular is consistent with <i>Goal 7 – Reduce travel times</i>, and <i>Goal 20 – Build liveable centres</i>. The Proposal also contributes to <i>Goal 14 – Increase opportunities for people with a disability, by improving transport access</i>. The Proposal also supports active transport by contributing to the development of bicycle facilities as part of an integrated local network.

Policy/Strategy	Commitment	Comment
NSW Long Term Transport Master Plan (TfNSW, 2012a)	The <i>NSW Long Term Transport Master Plan</i> identifies a planned and co-ordinated set of actions to address transport challenges and will guide the NSW Government's transport funding priorities over the next 20 years. The Master Plan would meet a number of challenges to building an integrated transport system for Sydney and NSW, including: - customer-focussed integrated transport planning - integrated modes to meet customer needs - getting Sydney Moving Again - sustaining Growth in Greater Sydney. The Master Plan links to NSW 2021, the Metropolitan Strategy for Sydney, the State Infrastructure Strategy, regional and sub-regional strategies, and national plans.	The Proposal implements the following key themes in the Master Plan: - improving customers' journey experience - making better use of existing assets - providing accessible transport to help address social exclusion.
Disability Action Plan 2012-2017 (TfNSW, 2012b)	The <i>Disability Action Plan 2012-2017</i> was developed by TfNSW in consultation with the Accessible Transport Advisory Committee, which is made up of up of representatives from peak disability and ageing organisations within NSW. The 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 with consideration of the objectives outlined in this Plan and seeks to improve and provide equitable access to public transport facilities.
Sydney's Walking Future - Connecting people and places (TfNSW, 2013b)	<i>Sydney's Walking Future</i> outlines the NSW government's efforts to: - promote walking for transport - 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 cross-corridor access from the Jannali Avenue to Railway Crescent and associated footpath upgrades.

Policy/Strategy	Commitment	Comment
Sydney's Cycling Future - for everyday transport (TfNSW, 2013c)	<i>Sydney's Cycling Future</i> 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 bike 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. Undercover racks for 16 bicycles would be provided on each side of the station (total capacity for 32 bicycles), in addition to retaining the existing bicycle locker facilities.
Rebuilding NSW – State Infrastructure Strategy 2014 (NSW Government, 2014)	<i>Rebuilding NSW</i> is a plan to deliver \$20 billion in new productive infrastructure to sustain productivity growth in our major centres and regional communities. <i>Rebuilding NSW</i> 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.	The Proposal supports investment in rail infrastructure, and aligns with the reservation of \$8.9 billion for urban public transport to support Sydney's population, that is expected to reach almost six million by 2031.
A Plan for Growing Sydney (Department of Planning and Environment, 2014)	<i>A Plan For Growing Sydney</i> superseded the draft <i>Metropolitan Strategy for Sydney 2036</i> . The Plan provides information on the strategies to accommodate an additional 664,000 homes and 689,000 jobs by 2031, which in part will be helped by a more integrated transport network. The Proposal is located in the South subregion and the priorities relevant to the Jannali area include a potential urban renewal corridor along the railway down to Sutherland (including Jannali).	The Proposal would be consistent with the aims of <i>Goal 1 – A competitive economy with world-class services and transport</i> and <i>Goal 3 – A great place to live with communities that are strong, healthy and well connected</i> . And in particular, <i>Direction 3.3 -creating healthy built environments</i> that aims to encourage walking and cycling to public transport and local centres through improved footpath connections (new pedestrian bridge across the railway) and additional bicycle racks.
Our Shire, Our Future (Sutherland Shire Council, 2011)	This Plan provides the long term vision and a set of desired futures for the Sutherland Shire which the local community aspires to achieving. It includes integrated transport and improved opportunities to get around on foot and bike.	The Proposal is consistent with the objectives of this Plan and would deliver improved and accessible footpath connections from the station to interchange facilities. Bicycle parking for 32 bicycles would also be provided at station entrances.

4.6 Ecologically sustainable development

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

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

The principles of ESD have been adopted by TfNSW throughout the development and assessment of the Jannali 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

Chapter 5 discusses the consultation undertaken to date for the Proposal and the consultation proposed for the future. This chapter discusses the consultation strategy adopted for the Proposal and the results of consultation with the community, relevant government agencies and stakeholders.

5.1 Stakeholder consultation during concept design

As part of the development of concept design options, TfNSW consulted with Sydney Trains and Sutherland Shire Council. Sydney Trains were involved in the TfNSW workshops to identify key issues and decide on a preferred option.

A meeting was held with Sutherland Shire Council on 3 November 2014 and the following key issues were raised by the Council for consideration during the development of the preferred option:

- a pedestrian bridge opposite Box Road was preferred
- a higher demand for kiss and ride exists on the eastern side of the station
- opportunity for relocated pedestrian crossing on Jannali Avenue to accommodate key pedestrian desire lines, and a need to improve connections to the station more generally
- end of trip facilities for cyclists
- some existing drainage issues on the western side of the station
- heritage-listed trees are located on western side of the station
- other observations and information on security, traffic flows and parking demand.

The preferred option incorporates many of these considerations, including a pedestrian bridge option that links with the Box Road intersection, new kiss and ride, new bicycle racks and CCTV/lighting to improve surveillance and security. Other improvements to pedestrian access would be investigated at detailed design.

A second meeting was held with Sutherland Shire Council on 15 October 2015 to provide a project update, and issues relating to existing parking overflow, the urban design of the town centre (and Proposal) and the need for drainage analysis for the new ramps were raised.

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

Table 5 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 13 Consultation with Councils – development with impacts on council related infrastructure and services	Consultation is required where the Proposal would result in: - substantial impact on stormwater management services - generating traffic that would place a local road system under strain - involve connection to or impact on a council owned sewerage system - involve connection to and substantial use of council owned water supply - significantly disrupt pedestrian or vehicle movement - involve significant excavation to a road surface or footpath for which Council has responsibility.	The Proposal includes works that would: - require connections or impacts the stormwater system - disrupt pedestrian and vehicle movements - impact on road pavements under Council's care and control - impact on Council-operated footpaths. Consultation with Sutherland Shire Council would be undertaken concurrently with the REF public display, and would continue throughout the detailed design and construction phases.
Clause 14 Consultation with Councils – development with impacts on local heritage	Where railway station works: - substantially impact on local heritage item (if not also a State heritage item) - substantially impact on a heritage conservation area.	Jannali Railway Station and immediate surrounds is listed as an archaeological site in the heritage schedule of the Sutherland Shire LEP. Mature street trees on Jannali Avenue and Mitchell Avenue are also listed on the heritage schedule and are located within the Proposal area. Consultation with Sutherland Shire Council would be undertaken concurrently with the REF public display, and would continue throughout the detailed design and construction phases.
Clause 15 Consultation with Councils – development with impacts on flood liable land	Where railway station works: impact on land that is susceptible to flooding – reference would be made to <i>Floodplain Development Manual: the management of flood liable land</i>.	The Proposal is not located on land that is susceptible to flooding. Accordingly, consultation with Sutherland Shire Council is not required under this clause.
Clause 16 Consultation with public authorities other than Councils	For <i>specified development</i> which includes consultation with the OEH for development that is undertaken adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i>, and other agencies specified by the Infrastructure SEPP where relevant. Although not a specific Infrastructure SEPP requirement, other agencies TfNSW may consult with could include: - Roads and Maritime - Sydney Trains - OEH.	The Proposal is not located adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i>. Accordingly, consultation with the OEH on this matter is not required.

5.3 Consultation strategy

A consultation strategy for the Proposal has been developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the project team. The consultation strategy that 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 various locations
- distribution of a project update at the station, and to local community and rail customers outlining the Proposal and inviting feedback on the REF
- advertisement of REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
- consultation with Sutherland Shire Council, Sydney Trains, and other non-community stakeholders.

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

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

1. Sutherland Library, 30-36 Belmont Street, Sutherland
2. Sutherland Shire Council Administration Centre, Eton Street, Sutherland
3. Transport for NSW Community Information Centre, Ground Floor, 388 George Street, Sydney.

The REF would also be available on the [TfNSW website](http://www.transport.nsw.gov.au/projects-tap/current-works/jannali)². Information on the Proposal would be available through the Project Infoline (1800 684 490) or by [email](mailto:projects@transport.nsw.gov.au)³. During this time feedback is invited. Following consideration of feedback received during the public display period, TfNSW would determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

5.5 Aboriginal community involvement

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken in May 2015 and a basic search in December 2015 in order to gain information on the archaeological context of the station (and a minimum 200 metre buffer area), and to ascertain whether there are any previously recorded Indigenous items/sites.

No Aboriginal items/sites have been recorded within or in the vicinity of the Proposal area, and the Proposal is not located within a landscape feature likely to indicate the presence of Aboriginal objects in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects In New South Wales* (OEH, 2010).

The extensive landscape modification that has occurred across the Proposal area suggests that intact evidence of Aboriginal land use is unlikely to occur within the boundaries of the Proposal area. Similarly, the high level of disturbance would suggest that the archaeological potential of the area is low (Umwelt, 2015). Therefore it was not considered necessary to undertake specific Aboriginal consultation.

² <http://www.transport.nsw.gov.au/projects-tap/current-works/jannali>
³ projects@transport.nsw.gov.au

5.6 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respective respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal (refer Figure 1, page 12).

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

Should TfNSW determine to proceed with the Proposal, the project team would keep the community, councils 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 to be developed prior to the commencement of construction.

6 Environmental impact assessment

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

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

6.1 Traffic and transport

A Traffic, Transport and Access Impact Assessment was prepared by Cardno for the Proposal (Cardno, 2015). The assessment included a desktop analysis and site inspection. Detailed traffic counts or modelling were not considered necessary as the Proposal is focused on the station area and is unlikely to have major impacts to the surrounding road network during operation. The findings of the assessment are summarised in this section.

6.1.1 Existing environment

Jannali Station

Jannali Station is located between Como Station and Sutherland Station on the Sydney Trains T4 Eastern Suburbs and Illawarra Line. It is the 89th busiest station within the Sydney Trains network, with approximately 5,640 trips per weekday (NSW Bureau of Transport Statistics barrier counts, 2014).

Jannali Station comprises two platforms, one on either side of the railway. Trains from Platform 1 include all station and limited stop services northbound to Hurstville, Central and Bondi Junction via Central. Trains from Platform 2 include all station and limited stop services southbound to Sutherland, Cronulla and Waterfall. Throughout the day, there is a minimum of four trains departing Jannali Station in both directions every hour. In peak periods, the number of trains increases to five to six trains in each direction every hour.

Within the station area there are a number of existing facilities for customers including ticket machines, Opal card readers, female and male toilets (non-accessible) and canopies for weather protection on Platform 1, and at the entry to Platform 2.

Customer and public access

The walking catchment of the station includes the Jannali Village, which comprises retail and commercial land uses, particularly to the east of the station. Access to the station is via entry points on Jannali Avenue (ramps/stairs to Platform 1) and Railway Crescent (ramps to Platform 2).

The station and railway bisect the village and there is currently no direct access across the railway from the platforms. The limited crossing facilities create circuitous paths of travel (e.g. customers that live/park north-east of the station but who need to access Platform 1 on the western side must walk past the station south, across the Railway Crescent road bridge and then north to the western entrance) and such extended distances can then encourage illegal crossing of the railway or discourage use of public transport. Signage that advises that crossing is unsafe and prohibited is present at the station.

Zebra crossing facilities are provided to the south-west of the station to cross Jannali Avenue and further south at the Railway Crescent road bridge but do not accommodate key pedestrian

desire lines. Signalised crossing facilities are provided at the intersection of Railway Crescent/Box Road adjacent to the eastern station entrance.

Road network and traffic

Jannali Station is flanked by Jannali Avenue to the west and Railway Crescent to the east. These roads are classified as 'distributors', linking various local access roads. Jannali Avenue then curves around into Mitchell Avenue which follows a westbound alignment and provides access to other local access roads and the suburb of Bonnet Bay. Mitchell Avenue terminates as a cul-de-sac approximately 350 metres west of the interchange.

To the east is Box Road, which is also a distributor that intersects Railway Crescent opposite the eastern entrance to Jannali Station. From this intersection, the road extends eastwards for approximately 950 metres to intersect with several local access roads.

These four roads, in the vicinity of the station, are single-carriageway undivided two-lane road with a speed limit of 50 km/hr. They are managed by Sutherland Shire Council and restrictions include no B-double trucks or vehicles with a height greater than 4.5 metres.

To the north-east of the station, Railway Crescent runs parallel to the railway line and leads into several local access roads. The road is eventually curtailed by the Georges River. To the south of the station, both Jannali Avenue and Railway Crescent ultimately intersect with the Princes Highway, which is a major arterial road that serves Wollongong and the M1 motorway to the south, and the M4 and M5 motorways to the north. These roads also form an important link for through traffic travelling east-west through Sutherland Shire.

Parking

There are four commuter car parking areas around Jannali Station:

- a north-western car park (Oxley Avenue car park) with vehicle access from Oxley Avenue and which has a capacity of 109 parking spaces (including three accessible spaces). However this car park is located over 125 metres from the western entrance and the connecting footpath is not accessible and presents surveillance issues
- a south-western car park off Jannali Avenue with a capacity of 69 parking spaces (including two accessible spaces but with similar accessibility and surveillance issues between the car park and station, in particular the steep grade from the car park to the station)
- a north-eastern council-owned unrestricted car parking area on Railway Crescent with a capacity of 37 parking spaces mostly likely used by commuters
- a south-eastern council-owned car parking area on Railway Crescent with a capacity of 79 parking spaces (15 of which are restricted to one-hour parking).

In addition, unrestricted on-street car parking is available on the south side of Mitchell Avenue, both sides of Oxley Avenue, the eastern side of Jannali Avenue and most of Railway Crescent. There is time-restricted parking on Box Road, and sections of Railway Crescent and Jannali Avenue.

Taxi/kiss and ride facilities

A sign-posted taxi zone (with sheltered seat) is located on the eastern side, immediately north-east of the station on a service road adjoining Railway Crescent. There is no accessible path of travel from the taxi zone to the station due to the existing steep gradient.

There are no formal kiss and ride facilities currently provided at Jannali Station. Informal kiss and ride occurs in the taxi zone, in the roadside parking spaces immediately outside the taxi zone and outside the western station entrance on Jannali Avenue/Mitchell Avenue.

Bus operations

Transdev provide bus services along two routes (967 and 968) in the local area with five bus stops/zones located in proximity to the station on Jannali Avenue, Railway Crescent, Box Road and White Street. The existing bus zone for services travelling to Miranda is located approximately 40 metres south of the western station entrance on Jannali Avenue, and the outbound 'paired' bus stop is located in Railway Crescent, just south of the Railway Crescent road bridge.

Bus routes operate on low to moderate service frequencies (one to four buses per hour on each route) and the daily service spans for each route are generally between 11-13 hours/day.

Bicycle facilities

There are currently no formal designated bicycle paths or bicycle crossings in the vicinity of the station, with the exception of a short stretch of on-road bicycle paths on the western side of Railway Crescent, running from close to Buller Street to immediately south of the Railway Crescent road bridge.

Bicycle racks (with capacity for four bicycles) are located at the top of the steps at the western station entrance on Jannali Avenue and bicycle lockers (with capacity for four bicycles) is situated on the eastern side on Railway Crescent, approximately 60 metres south of the station entrance.

6.1.2 Potential impacts

a) Construction phase

Customer and public access impacts

Construction work is expected to have a minor impact to pedestrians and customers given the restricted space in which construction works are to be carried out. There may be changes to accessing the station platforms, interchange facilities and adjacent footpaths which could also result in longer walking distances and/or higher levels of congestion during peak periods. There may also be an increase in road safety risks associated with changed traffic conditions.

Access to the station would be maintained during construction and any works to be undertaken in close proximity to existing footpaths would be managed and controlled at all times to ensure that there is no impact to public safety. Suitable detours would be provided as part of the traffic control measures.

Construction routes

The Proposal area is surrounded by local roads that serve property accesses, residential dwellings and commercial premises, with many roads restricting access to vehicles over three tonnes. Deliveries to the site would likely arrive and depart via the south along The Grand Parade/Princes Highway which are approved routes for B-double trucks. Figure 11 illustrates the likely access routes to each side of the station.

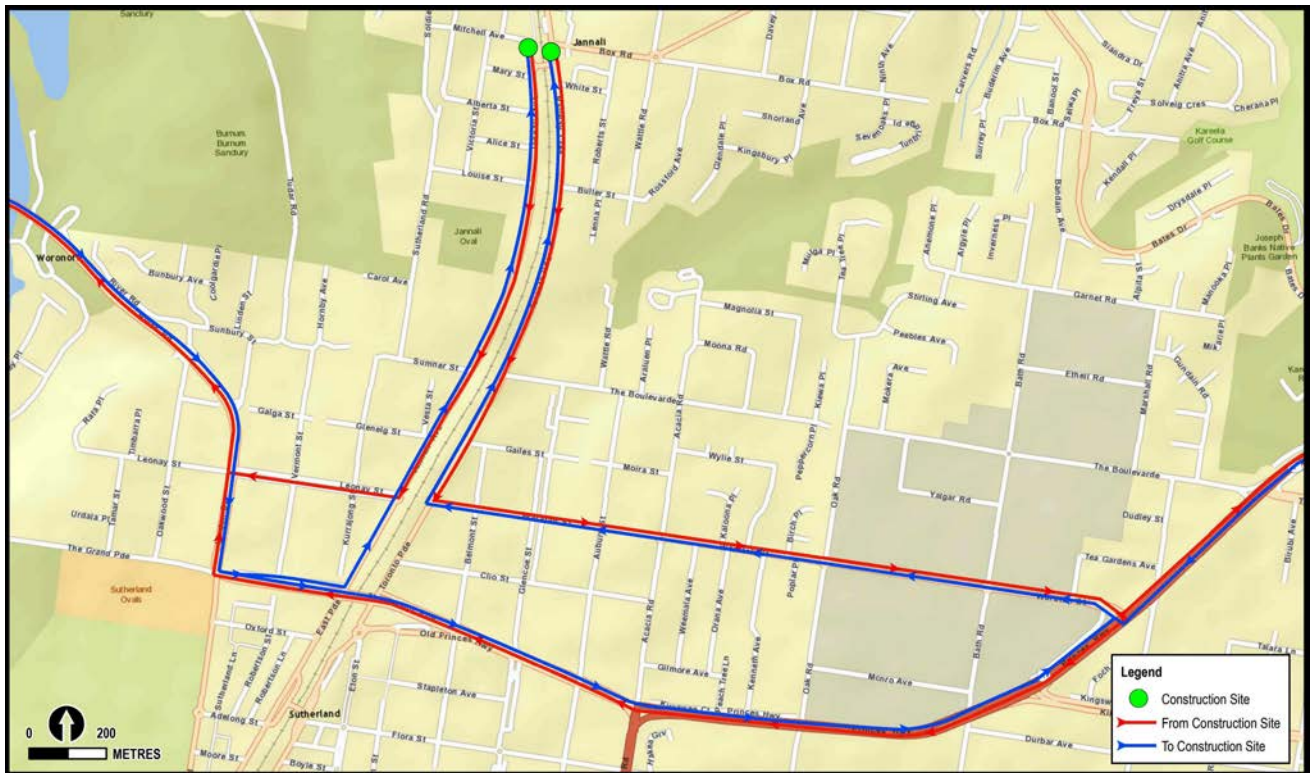


Figure 11 Potential construction vehicle routes (Cardno, 2015)

Traffic impacts

Traffic generated by the construction of the Proposal would include light vehicles for construction personnel as well as heavy vehicles for the periodic delivery and removal of materials, plant and equipment. Vehicle types and sizes would vary depending on the required use, although heavy vehicles would generally be restricted to semi-articulated vehicles given the layout of the external road network. Heavy vehicles (e.g. crane delivery and removal) would be restricted to non-peak periods where possible, to minimise disruptions and delays to the traffic flow of vehicles travelling in close proximity.

Given the limited space surrounding the station, it is likely that interruptions to the traffic flow along Jannali Avenue/Mitchell Avenue and Railway Crescent would be required from time to time as a result of construction vehicles manoeuvring in and out of the construction site, and during times where works are required to extend into the road carriageway.

The traffic generated by construction activities is anticipated to be manageable (i.e. unlikely to exceed ten vehicles per hour), with a minor impact on existing traffic conditions. Site observations indicated that the traffic flow on Railway Crescent and Jannali Avenue/Mitchell Avenue generally operates at a good level with minimal delays and queues.

Overall, if the proposed traffic management measures are implemented, the likely impact to traffic is expected to be manageable and would not have a major impact on the level of service of the surrounding road network.

Parking

There is likely to be some temporary loss of parking on Jannali Avenue, Mitchell Avenue and Railway Crescent to allow for construction works/compounds or to maintain traffic flow. The number and type of parking spaces to be impacted would be dependent on the nature of the works but could affect time-restricted parking spaces on Jannali Avenue/Mitchell Avenue and unrestricted street parking spaces south of the station on Jannali Avenue (likely to be used by rail customers) and would likely be most affected during weekend track possessions when major construction works would be undertaken.

There is also likely to be temporary loss of a small number of parking spaces in the Jannali Avenue car park (to allow for the reconfiguration of the existing accessible parking spaces to standard parking spaces) and in the Oxley Avenue car park (to allow for reconfiguration of new kiss and ride/accessible parking spaces, and potential construction compound). The number of parking spaces to be affected by construction would be minimised as much as practicable and staged where possible – for example the Jannali Avenue car park could be reconfigured prior to works commencing in the Oxley Avenue car park. The timed-restricted parking area in Railway Crescent may also be temporarily affected to allow for the reconfiguration of the kiss and ride.

Given that parking is generally in high demand in the area around the station, construction workers would be encouraged to carpool and make use of the available public transport for travel to and from the Proposal site.

Kiss and ride/taxi operations

The existing taxi zone on Railway Crescent may be impacted during some periods to allow for works on the eastern side of the station, however this would be avoided/minimised where possible, or an alternate location for taxis would be arranged.

Bus operations

Most of the local bus zones are located outside of the potential construction works area, with the exception of the existing bus zone and shelter located immediately south of the western station entrance on Jannali Avenue. The existing bus stop would be retained in its current position or at a temporary location nearby (to allow for construction works) until the new bus zone (and shelter) outside the western station entrance is operational.

Bicycle facilities

It is not anticipated that the existing bicycle lockers on Railway Crescent would be affected during construction. There would be a temporary reduction in bicycle parking with the removal of the existing bicycle racks which are to be replaced with new racks on either side of the station.

Property access

Works required in Jannali Avenue and Mitchell Avenue may require short-term temporary access changes to nearby properties and/or out of hours works to ensure access is maintained. However access to all private properties and businesses adjacent to the works would be maintained, unless otherwise agreed by the relevant property owners.

b) Operational phase

It is not considered that the Proposal would have significant impacts on bus or rail operations and would likely bring about positive impacts in terms of contributing towards making railway transport more accessible to the community. A summary of the operational traffic, transport and access impacts is summarised below.

Customer and public access

As part of the design development process, it was identified that connections to shops, the taxi zone and bus zones are generally not currently accessible and that improving access is difficult due to the space constraints and the steep grades. However the Proposal would provide the following access improvements:

- the new station entry plazas would address the existing grade (steepness) issues which currently contribute to difficult and uncomfortable manoeuvres for customers
- the new pedestrian bridge (with lifts/stairs) would provide an accessible path of travel to the station platforms and across the railway and would remove the need for pedestrians and cyclists to travel south and cross at the Railway Crescent road bridge
- a new widened footpath with rest point (seat) would provide an accessible path of travel from the station/bus zone to the Oxley Avenue car park with accessible parking spaces
- the proposed pedestrian crossing would accommodate a key pedestrian desire line
- other minor works on Jannali Avenue/Mitchell Avenue including footpath widening, new kerb ramps and rest point (on the corner of Railway Crescent road bridge and Jannali Avenue) would improve access from local surrounds to the station/bus zones
- localised platform resurfacing and raising/regrading (if required) would improve uneven surfaces and manoeuvrability.

The proposed relocation of the pedestrian crossing to the intersection of Jannali Avenue/Mitchell Avenue would provide a safe crossing point and accommodate a key pedestrian desire line for those wishing to travel from the station/bus zone to their homes or shops on the western side of the station. The relocation of the pedestrian crossing would need to be further investigated during detailed design and would be subject to a Road Safety Audit (which would include an assessment of sight lines), and agreement from the appropriate road authority.

The Proposal has been designed to cater for a daily patronage of 7,979 (which is the estimated 2036 daily patronage + 15 per cent) and which represents a 43.5 per cent increase from the 2013 barrier counts of 5,560 customers per weekday. Therefore, a focus of the Traffic, Transport and Access Impact Assessment was to consider if the proposed upgrade would adequately cater for the projected increase in customers in terms of pedestrian flows.

To assess the pedestrian Level of Service (LoS), the Traffic, Transport and Access Impact Assessment adopted Fruin's Pedestrian Flow Rate criteria, which is the number of pedestrians moving through the space per minute per effective metre width, at a particular location. For the Jannali assessment the LoS for the platforms, stairs, station entrances and pedestrian access to the station was calculated. The LoS is expressed as a ranking from 'A' (best level) to 'F' (worse level).

The LoS assessment of the station's critical areas indicated that there is sufficient capacity to accommodate the 2036 +15 per cent customer volumes within the existing layout and overall an average LoS 'C' would be achieved during the busiest AM peak period. However, if ticket purchases were to comprise greater than 10 per cent of future customer volumes, then

arrangements may need to be made to separate ticketing facilities away from main thoroughfares, although this is expected to be less with the roll out of the Opal ticket system.

It is also expected that train frequencies would be increased to accommodate future demand, therefore spreading demands over a greater time period and reducing the passenger density of the busier Platform 1.

Traffic generation and road safety

The Proposal is not anticipated to have a direct increase in traffic generation. Instead, it is expected that access to and from the station would be slightly shifted towards active forms of transport given the upgrade and increase in infrastructure surrounding the interchange, which would aim to encourage safe and easy walking and cycling alternatives over vehicle transport modes. There may also be some diversion of existing kiss and ride movements from Jannali Avenue to the new kiss and ride area in the Oxley Avenue car park.

As a result, future traffic increase on the external road network as a result of the Proposal is expected to be minimal and would have a negligible impact on the external road network level of service, given the generally free-flowing nature of the traffic on the surrounding roads.

A Road Safety Audit is a formal examination of a future road/traffic project or an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance. A Road Safety Report was prepared as part of the Concept Design Report for the Proposal to provide recommendations to be considered during detailed design. Most of the recommendations were for low risk issues, with the exception of the proposed pedestrian crossing which requires additional consideration with regards to approach sight distances and would be investigated further during detailed design in consultation with the appropriate road authority.

Parking

The relocation of the existing accessible parking spaces in the Jannali Avenue car park to the Oxley Avenue car park would alleviate the existing deficiencies in regards to non-compliant paths of travel to the station.

The Traffic, Transport and Access Impact Assessment considered the reconfiguration of the Oxley Avenue car park to accommodate the five accessible parking spaces and two kiss and ride spaces, which would result in a loss of six unrestricted parking spaces, however the assessment noted that an additional two unrestricted parking spaces would be added to the Jannali Avenue car park, so there would be an overall net loss of four unrestricted parking spaces which is anticipated to be absorbed by other parking areas.

Other parking impacts of the Proposal include a net loss of two time-restricted street parking spaces and two unrestricted street parking spaces on Jannali Avenue and Mitchell Avenue, respectively, which are expected to be absorbed by other parking areas but which may also lead to extended walking distances to access the nearby Oxley Avenue and Jannali Avenue car parks (i.e. approximately 125 metres). There would also be a partial loss of the three time-restricted spaces in Railway Crescent during peak hours to allow for kiss and ride.

Taxi/kiss and ride operations

There are no proposed changes to the taxi zone.

The Proposal would provide two formalised kiss and ride spaces at the Oxley Avenue car park connected to the station by a widened footpath. The Traffic, Transport and Access Impact Assessment noted that the new kiss and ride in the Oxley Avenue car park were outside the general travelling path of vehicles, and that some informal kiss and ride activity may still occur on Jannali Avenue. It is also proposed to provide up to three part-time kiss and ride spaces on Railway Crescent which would help service the eastern catchment and busy village area.

Options for the management of informal kiss and ride at Jannali Avenue or the potential to create a suitable kiss and ride on Jannali Avenue would be investigated during detailed design.

Bus operations

The Proposal would involve the relocation of the Jannali Avenue bus zone (and shelter) closer to the station adjacent to the western entrance. It is also proposed to provide a new bus zone on the south side of Mitchell Avenue which would serve bus routes that currently stop on Railway Crescent, just south of the Railway Crescent road bridge (i.e. 967 and 968). It is envisaged that these new bus stops would help encourage connections to the other modes of transport as there would be an accessible path of travel from the station platforms to both bus zones.

Bicycle facilities

The existing bicycle racks would be removed and new bicycle racks (with capacity for 16 bicycles) would be installed underneath the sheltered canopies of the station entrances on both sides.

In total, bicycle racks for 32 bicycles to accommodate current and future demand would be provided as part of the Proposal. The existing bicycle lockers (with capacity for four bicycles) would remain in its present location, south of the station entrance on Railway Crescent.

Property access

The proposed bus zone on Mitchell Avenue would require shortening of the existing driveways of the Jannali Car Clinic, however it is envisaged that the dual access arrangement would be retained. Additional investigation is required during detailed design to ensure the proposed operation of the new bus zone (and driveway/s) meets the various standards (e.g. swept path analysis to ensure sufficient space for safe vehicle manoeuvres).

No residential property access is anticipated to be affected by operation of the Proposal.

6.1.3 Mitigation measures

This assessment has identified the need for further investigation into some aspects of the Proposal to ensure that safe and viable facilities are provided, consistent with the Proposal objectives. In particular, the detailed design of the Proposal would involve the following (in consultation with the appropriate road authority):

- completion of a Road Safety Audit for the Proposal which would include, but not limited to, an assessment of the proposed pedestrian crossing at Jannali Avenue/Mitchell Avenue with respect to approach sight lines
- confirmation of the arrangements for the proposed part-time kiss and ride in Railway Crescent during peak periods
- investigation of feasible options for a kiss and ride in Jannali Avenue
- investigation into the proposed bus zones on Jannali Avenue/Mitchell Avenue in terms of road safety and driveway modifications, which would be progressed in consultation with bus operators and planners
- confirmation that the proposed ticket facilities are adequate to meet the 2036 + 15 per cent patronage and are appropriately located to ensure clear paths of travel.

A construction Traffic Management Plan (TMP) would be prepared by the Contractor in consultation with TfNSW, and provided to Sutherland Shire Council (and Roads and Maritime as required). The construction TMP would be the primary management tool to manage potential traffic impacts associated with construction. The construction TMP, at a minimum, would include a description of:

- procedures for preparing and implementing Traffic Control Plans (TCPs) and in particular for detours and traffic control to manage temporary road disruptions on local roads
- measures including, but not limited to, :
 - o maintain customer access to and from the station at all times
 - o limit temporary parking losses
 - o manage changes to bus/taxi operations and liaison with Transdev and the NSW Taxi Council
 - o maintain private property access unless otherwise agreed
- final construction traffic approach and departure routes
- location of access to and from the local road network and contractor parking
- scheduling of works/deliveries to avoid peak times (e.g. construction of pedestrian crossing at night and generally limiting works in the road carriageway as much as practicable)
- details of construction signage, traffic controllers and other community notification.

Refer to Table 12 for a list of proposed mitigation measures.

6.2 Urban design, landscape and visual amenity

A Visual Impact Assessment was undertaken by Green Bean Design (GBD) for the Proposal (GBD, 2016). The findings of this assessment are summarised in this section. The assessment included desktop analysis, site inspection and creation of photomontages. The photomontages provide an indication of what the Proposal may look like from representative viewpoints once complete, in terms of the bulk and scale, noting that the materials and finishes are indicative only and would be further investigated during detailed design.

6.2.1 Existing environment

The urban landscape character surrounding Jannali Station is typical of both a residential suburban setting and that of local road corridor with mixed commercial development that combine to create a local village atmosphere.

Residential areas within the viewshed extend to the west of Jannali Station along Mitchell Avenue, Jannali Avenue and Mary Street. These residential areas are largely defined by mostly single storey detached dwellings with front and rear gardens. Dwellings are set back from street frontages with mature tree avenue planting along the nature strips. Residential areas north of Mitchell Avenue also include small multi storey developments.

The character of the Railway Crescent corridor comprises a moderately busy traffic corridor with street access to adjoining residential areas beyond the viewshed. The commercial strip located along Railway Crescent, and opposite the station continues along Box Road, consists of mostly one to two storey buildings. The Jannali Village centre (focused on Box Road) terminates at Jannali Station, making the station a key focal point for the area. Temporary receivers around the station include rail customers, pedestrians and motorists.

The existing station comprises a number of visual elements:

- railway lines, electrical conductors and steel gantries
- two side platforms
- station buildings, ticket office and canopies
- on-street parking and car parks around the railway
- utility poles and wires
- security and safety fencing
- signage.

The station precinct and adjoining road corridors contain mature indigenous and non-indigenous trees which provide a high degree of screening within proximity to, and beyond the station. These trees also contribute to the streetscape and visual character of the area, in particular the Brush Box and Blackbutt trees on Jannali Avenue and Mitchell Avenue which are also listed on the heritage schedule of the Sutherland Shire LEP. Tree planting continues along local residential street nature strips and throughout residential garden areas.

6.2.2 Potential impacts

a) Construction phase

While construction activities would tend to be more visible than the operational stage of the Proposal, the construction activities would be temporary and transient in nature. Views toward construction activities would be partially restricted by existing tree cover surrounding the station precinct. Temporary elements likely to be introduced into the visual environment include:

- fencing and hoardings
- scaffolding
- road barriers and signage
- cranes and other construction plant
- site office/compound and amenities.

Some construction activities, such as night works, would require lighting for operational, safety and security purposes. Lighting installations would be placed in order to limit light spill to adjoining road corridors and residential areas.

b) Operational phase

Urban landscape effects

Visual Absorption Capability (VAC) is a classification system used to describe the relative ability of the urban landscape to accept modifications and alterations without the loss of character or deterioration of visual amenity. In essence the VAC indicates the ability of an urban landscape setting to 'hide' development.

The VAC of an urban landscape is largely determined by inherent physical factors which include:

- the degree of visual penetration (view distance without obstruction) through surrounding buildings and tree cover
- the complexity of the urban landscape through bulk, scale, form and line.

Urban landscapes with a low visual penetration will have higher visual absorption capability values. Complex urban landscapes which include a mix of scale, form and line (together with some degree of vegetative screening) will also have high visual absorption capability values. The VAC of the urban landscape surrounding the Jannali Station and the area of proposed works exhibits a relatively high VAC.

To consider the potential visual impacts, digital photographs were taken during the course of the fieldwork from various receiver locations to illustrate existing views in the vicinity and combined into a panorama. Panoramic photographs from two locations (R2 - Box Road and R11 - Mitchell Avenue, refer Figure 14) were then annotated to show what the Proposal may look like once complete. In particular, the photomontages aim to demonstrate the likely bulk and scale of the Proposal, noting that detailed design typically results in refinements related to architectural elements, and also to the materials and finishes. The photomontages for the Proposal are included as Figure 12 and Figure 13.

With respect to overall visual character, new elements to be constructed as part of the Proposal (i.e. pedestrian bridge, lifts, stairs and station entrance canopies) would form a visible element within the surrounding landscape. However these are unlikely to constitute a marked effect on existing views, given the Proposal would complement the scale, landform and pattern of the surrounding urban landscape – for example the height of the lifts and pedestrian footbridge would be of a height that is consistent with the heights of other buildings in the area.

The Proposal would also be partially screened by existing mature tree planting within the station precinct as well as tree cover extending alongside the rail corridor. The Proposal would require the removal of at least three mature trees on Jannali Avenue. However it is proposed to provide replacement tree planting and therefore tree removal is unlikely to have a major impact on the visual character.

The Proposal is considered to result in an overall beneficial visual outcome where contemporary design, modern materials and sympathetic colours to the existing station precinct would combine to enhance the station's presentation to the streetscapes creating a greater degree of visual clarity and assist with wayfinding.



Existing panorama photograph V5 - Existing view looking west from Box Road



Photomontage V5 - Proposed view looking west from Box Road

Note: The photomontage is indicative only and is based on a concept design

Photomontage V5

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Figure 12 View from Box Road looking west (GBD, 2016)

Note: Indicative only – subject to detailed design



Photomontage V11 - Existing view looking east from Mitchell Avenue



Photomontage V11 - Proposed view looking east from Mitchell Avenue
Note: The photomontage is indicative only and is based on a concept design

Photomontage V11

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Figure 13 View from Mitchell Avenue looking east (GBD, 2016)

Note: Indicative only – subject to detailed design

Viewshed and potential impacts to receivers

The viewshed for the Proposal comprises residential, commercial and temporary receivers within an approximate 100 metre radius of the station. Within this viewshed, 19 representative viewpoints were selected for the visual impact assessment (refer Figure 14).

The assessment considered the visual sensitivity (i.e. the number and type of receivers, and how sensitive the existing character of the setting is to the proposed change) and the visual magnitude (i.e. the bulk and scale of the proposed change) at each viewpoint to determine the overall visual impact which can range from negligible, low, moderate to high. The visual impact assessment for the Proposal is summarised in Table 6.

One receiver viewpoint on Mitchell Avenue (R12) would likely experience an overall moderate-high impact and five receiver viewpoints (R1, R2, R9-R11) would likely experience an overall moderate visual impact, which would result from their proximity to the Proposal (within 50 metres) and the subsequent direct views with only partial screening or filtering from trees and vegetation. The remaining receiver viewpoints would likely experience negligible to low impacts.

Other impacts

The Proposal would include the installation of lighting for operational, safety, security and maintenance purposes. Night lighting would include building and pole mounted directional spot lighting and pole mounted pedestrian lighting. The majority of infrastructure areas associated with the Proposal would be unlikely to require additional lighting, or lighting that would result in a direct line of sight from surrounding view locations. Light installations would be installed in accordance with the *AS 4282:1997 Controlling the Obtrusive Effects of Outdoor Lighting*, and avoid light spill to adjoining road corridors and residential areas.

The location of proposed works in relation to the offset distance to public domain, road corridors and residential areas, would result in shadows cast by the Proposal infrastructure being largely contained within the station precinct boundary. The Proposal is unlikely to create any significant cumulative shadowing in addition to existing shadowing from mature tree plantings adjoining the station precinct.

6.2.3 Mitigation measures

The overall visual impacts of the Proposal have been determined to range from negligible moderate-high for surrounding receiver locations, and as such mitigation measures should be considered to minimise the level of residual visual impacts.

The detailed design of the Proposal would be undertaken with reference to the recommendations included in the Visual Impact Assessment (GBD, 2016) which is included in the list of proposed mitigation measures in Table 12, which includes the planting of at least one advanced tree at the western entrance on Jannali Avenue and tree planting for potentially impacted residential receivers on Mitchell Avenue.

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 12 for a list of proposed mitigation measures.



Source: Google Earth Pro 2015, Aeromex

Legend

	Proposed works		Rail corridor		Commercial or workplace		Open space
	Tree cover with screening potential		Residential dwelling		Road corridor		Receiver location

Receiver locations

0m 25m



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Figure 14 Receiver locations for the Visual Impact Assessment (GBD, 2016)

Table 6 Visual impact assessment matrix (GBD, 2016)

Receiver viewpoint	View distance	Description	Sensitivity	Magnitude	Significance
R1 Box Road and Railway Crescent intersection	Within 50 m	Pedestrian and motorist views towards station.	Moderate	Moderate	Moderate
R2 Box Road corridor (refer Figure 12)	Within 50 m	Pedestrian and motorist views towards Jannali Station from the Box Road streetscape corridor are framed by commercial development along north and south road frontage (refer PM1).	Moderate	Low	Moderate - Low
R3 Commercial buildings	Within 50 m	Primarily ground level views towards Jannali Station are direct with some partial tree screening on either side of the Railway Crescent road corridor.	Low	Low	Low
R4 Commercial buildings (Box Road north)	Between 50 and 100 m	Ground and first storey views towards Jannali Station are indirect and generally contained within the Box Road streetscape view corridor. Visible portions of the existing station and associated infrastructure are largely restricted to the east and extent of Platform 2.	Negligible	Low	Negligible
R5 Commercial buildings (Box Road south)	Between 50 and 100 m	Ground and first storey views towards Jannali Station are indirect and generally contained within the Box Road streetscape view corridor. Visible portions of the existing station and associated infrastructure are largely restricted to the east and extent of Platform 2.	Negligible	Low	Negligible
R6 Commercial buildings (along Railway Crescent)	Between 50 and 100 m	Ground and first storey views towards Jannali Station are largely screened and filtered by existing trees along the rail corridor.	Low	Low	Low

Receiver viewpoint	View distance	Description	Sensitivity	Magnitude	Significance
R7 Railway Crescent and White Street intersection	Between 50 and 100 m	Pedestrian and motorist views towards Jannali Station are partially screened by trees along the rail corridor and station precinct. Views are largely restricted to the Railway Crescent road corridor.	Low	Low	Low
R8 Public reserve	Between 50 and 100 m	Street level views towards Jannali Station from the public reserve on the corner of Jannali Avenue and Mary Street are largely screened by commercial properties along Jannali Avenue and partially filtered and screened in places by trees along Jannali Avenue.	Low	Low	Low
R9 Commercial properties	Within 50 m	Ground and first storey views towards Jannali Station extend directly and proximately across the Jannali Avenue corridor.	Moderate	Moderate	Moderate
R10 Jannali Avenue (refer Figure 13)	Between 50 and 100 m	Street level views towards Jannali Station from the Jannali Avenue corridor north of the Railway Crescent road bridge extend directly toward the station precinct, with medium distance views, south of the road bridge, partially screened and filtered by trees.	Moderate	Moderate	Moderate
R11 Mitchell Avenue	Between 50 and 100 m	Pedestrian and motorist views toward Jannali Station from the Mitchell Avenue corridor are partially filtered and screened in places by trees along the road corridor and within the station precinct.	Moderate	Moderate	Moderate
R12 Residential dwelling	Within 50 m	Views toward the Jannali Station are direct and proximate to the dwelling location. Existing plantings within, and surrounding, the dwelling provide some screening and partial filtering of views in and out of, the dwelling.	High - Moderate	Moderate	Moderate - High
R13 Multi storey residential dwellings	Between 50 and 100 m	Ground – third storey views towards Jannali Station from the residential apartments along (and east of) Oxley Street are generally screened and/or filtered by trees between the dwellings and the rail corridor.	Low	Low	Low
R14 Multi storey residential dwellings	Between 50 and 100 m	Ground – third storey views towards Jannali Station from the residential apartments along (and east of) Oxley Street are generally screened and/or filtered by trees between the dwellings and the rail corridor.	Low	Low	Low

Receiver viewpoint	View distance	Description	Sensitivity	Magnitude	Significance
R15 Residential dwellings north of Mitchell Avenue	Between 50 and 100 m	Views towards Jannali Station from residential dwellings set back (and north) from Mitchell Avenue are screened by existing residential development and trees on Mitchell Avenue.	Negligible	Negligible	Negligible
R16 Residential dwellings Mitchell Avenue (south)	Between 50 and 100 m	Views towards Jannali Station from residential dwellings set back from south of Mitchell Avenue are indirect and partially screened by adjoining commercial development to the east of the dwellings.	Negligible	Negligible	Negligible
R17 Residential dwellings Mary Street (north)	Between 50 and 100 m	Views towards Jannali Station from residential dwellings set back from north of Mary Street are screened by adjoining commercial development along Jannali Avenue, to the north-east of the dwellings.	Negligible	Negligible	Negligible
R18 Residential dwellings Mary Street (south)	Between 50 and 100 m	Views towards Jannali Station from residential dwellings set back from the south of Mary Street are screened by residential dwellings and commercial development to the east of the dwellings.	Negligible	Negligible	Negligible
R19 Railway Crescent (north)	Between 50 and 100 metres	Pedestrian and motorist views towards Jannali Station are partially screened and filtered by trees along the rail corridor.	Low	Low	Low

6.3 Noise and vibration

An environmental Noise and Vibration Impact Assessment has been undertaken by AECOM for the Proposal (AECOM, 2016). The findings of the assessment are summarised in this section.

6.3.1 Existing environment

While the NSW Government is working with freight operators to reduce noise at its source, adjacent Jannali residences are subject to high levels of freight noise from the T4 Eastern Suburbs and Illawarra Line, generally during the middle of the day and at night. Properties in Railway Crescent have recently received noise reduction treatment under the Freight Noise Attenuation Program, as part of the TfNSW's *Strategic Noise Action Plan* (TfNSW, 2014).

Two noise catchment areas (NCA) have been identified for the Proposal (refer Figure 15). The acoustic environment for NCA 1, which is located on the western side of the station, is characterised by local traffic, trains passing on the southern line of the railway and natural sounds such as birds. NCA 2, located to the east of the station, is similar to NCA 1 – suburban area characterised by local traffic flows and activity associated with local retail. Additionally, transient receivers (such as rail customers and pedestrians) travelling along adjacent streets would also have the potential to be impacted for short periods by construction noise.

Receiver types in NCA 1 comprise residential receivers (single storey and multi-storey residential houses), a small cluster of commercial receivers to the west of the station and a community centre to the south-west on Jannali Avenue. Also included at the furthest extent of the catchment is a primary school and community college.

For NCA 2 receiver types include residential receivers (single storey and multi-storey residential houses), a large group of commercial receivers to the east, the Jannali Medical Centre on Railway Crescent, and the Jannali Anglican Church and Jannali Uniting Church located to the east of the station.

One residential receiver from each NCA was selected as an appropriate location to undertake noise monitoring to qualify and quantify the existing noise environment in the vicinity of the Proposal (refer Figure 15). AECOM then conducted continuous unattended noise monitoring for a period of a week in July 2015. The noise measurements taken at these locations were considered representative of the background noise level for neighbouring residential receivers and these levels have been used to inform the construction noise assessment.

As per the procedures outlined in the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009), background noise monitoring results were used to establish a Rating Background Level (RBL) for the day, evening and night time periods, which was then used for noise assessment purposes (refer Table 7). 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.

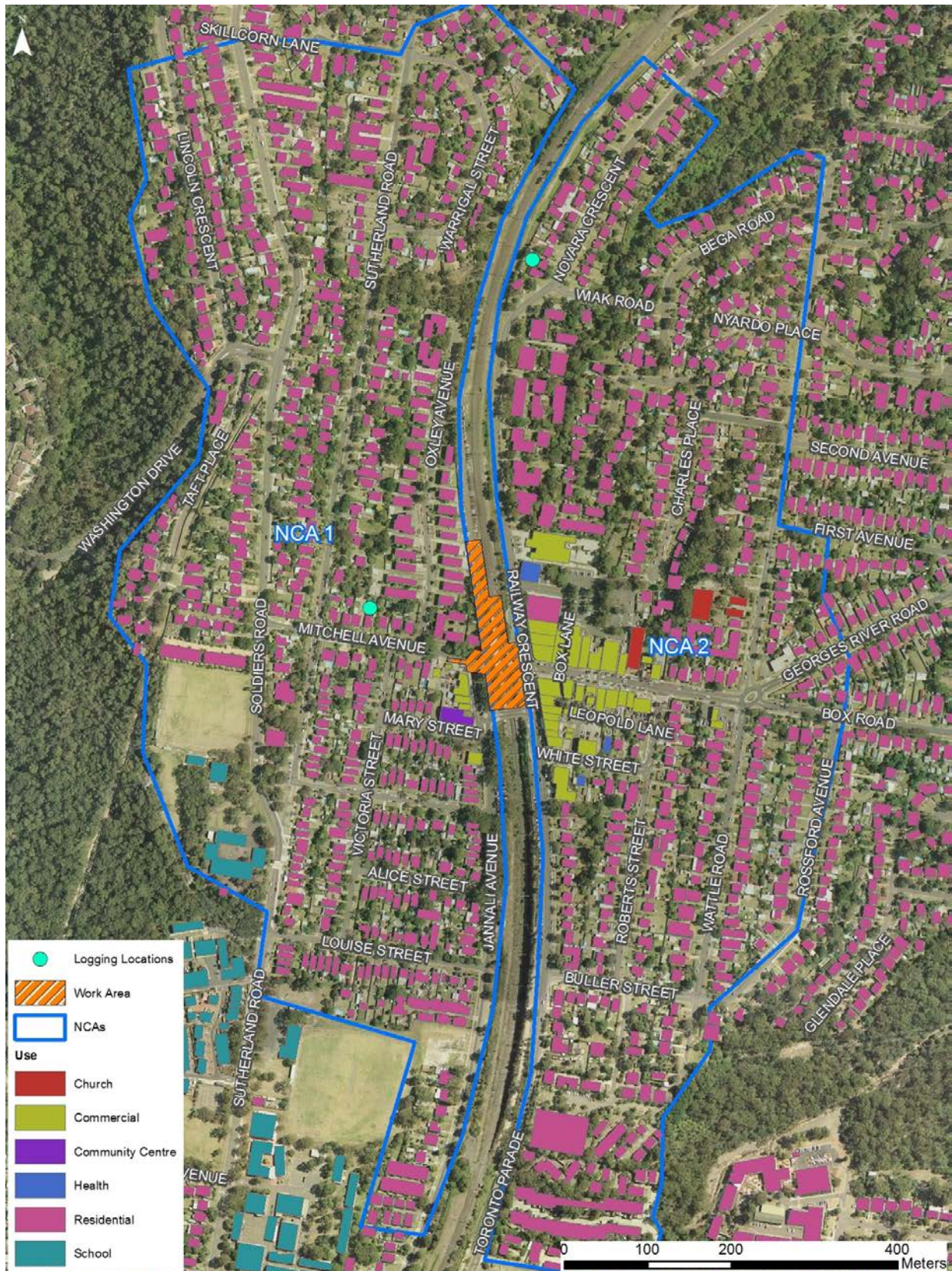


Figure 15 Noise catchment areas and monitoring locations (AECOM, 2016)

Table 7 Existing background and ambient noise levels

Location/NCA	Period	Rating Background Level (L_{A90})	Ambient noise level (L_{Aeq})
17 Mitchell Avenue – NCA 1	Daytime	40 dBA	52 dBA
	Evening	37 dBA	46 dBA
	Night time	30 dBA	44 dBA
169 Novara Crescent – NCA 2	Daytime	39 dBA	59 dBA
	Evening	35 dBA	59 dBA
	Night time	30 dBA	60 dBA

Note: Daytime 7am to 6pm (or 8am to 6pm Sundays and public holidays), Evening 6pm to 10pm and Night 10pm to 7am (or 10pm to 8am Sundays and public holidays).

6.3.2 Potential impacts

a) Construction phase

Noise

Noise management levels

Noise management levels (NML) have been determined for receivers as per the procedures in the ICNG. The ICNG prescribes noise management levels for non-residential receivers such as commercial, schools and places of worship, while noise management levels for residential receivers are calculated based on the RBL + 10 dBA (for daytime periods) or the RBL + 5 dBA (for evening and night time periods). In addition, a 'highly noise affected' level of 75 dBA for residential receivers represents the point above which there may be strong community reaction to noise. The NML for the Proposal are outlined in Table 8 and Table 9.

Sleep disturbance noise goals have also been established for residential receivers which are based on the *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011). Based on the Policy, the sleep disturbance criteria for both NCA are a screening level of 45 dBA $L_{A1(1 \text{ minute})}$ and an awakening reaction at 60-65 dBA $L_{A1(1 \text{ minute})}$.

For traffic noise, the criterion applied on public roads generated during the construction phase of a project is an increase in existing road traffic noise of no more than 2 dBA.

Table 8 Construction noise management levels – residential receivers

NCA	Period	Standard hours NML ($L_{Aeq, 15 \text{ min}}$)	Out of hours NML ($L_{Aeq, 15 \text{ min}}$)
NCA 1	Daytime	50 dBA	45 dBA
	Evening	N/A	42 dBA
	Night time	N/A	35 dBA
NCA 2	Daytime	49 dBA	44 dBA
	Evening	N/A	40 dBA
	Night time	N/A	35 dBA

Table 9 Construction noise management levels – non-residential receivers

Receiver type	NML- when in use ($L_{Aeq, 15 \text{ min}}$)
Classrooms at schools/other education institutions, places of worship, medical centres/hospitals, and community centres	55 dBA*
Commercial premises (including office, retail outlets)	70 dBA

*Management levels are based on a 45 dBA internal noise management level and a 10 dB reduction through an open window.

Noise modelling

Construction of the Proposal would be undertaken over a period of around 18 months in various stages (refer Chapter 3 for more detail). Modelling of noise sources (trucks, excavators, grinders etc) for the most intensive construction activity for each of the five overarching stages was undertaken by AECOM to allow for a 'worse-case' scenario.

The modelling takes into account the likely construction staging of when certain construction plant may be operational and the known Sound Power Levels for each item of plant to calculate a predicted noise level at a receiver location. The predicted noise level is then compared with the NML for that receiver to determine whether there might be exceedances during construction.

However, during construction, it is unlikely that all machinery would be operational at the same time during a particular stage or activity (like the modelling assumes), but taking a 'worse case' scenario approach helps to identify where noise impacts are likely to be a concern and assists in the formulation of mitigation measures.

Summary of noise impact during standard hours

From the assessment, it is likely that there would be exceedances of the daytime NML for receivers in both NCAs at various stages of the Proposal for works undertaken during standard construction hours, however, with the exception of demolition works at the closest residential receiver on Jannali Avenue, noise levels are expected to be below the highly noise affected level of 75 dBA.

Site establishment, vegetation removal, demolition of existing structures and platform works have been identified as the most noise-intensive activities during standard hours and were modelled for the assessment. For a worse-case scenario, it was identified that there would be potential for highly intrusive or moderately intrusive noise impacts at up to 15 residential

receiver locations along Mitchell Avenue, Oxley Avenue and Railway Crescent. Noise impacts for other construction activities during standard hours would likely be less than for these activities.

There would also be exceedances of the NML for some of the non-residential receivers:

- up to seven commercial receivers along Jannali Avenue, Railway Crescent and Box Road would experience noise levels above 70 dBA during a worse-case scenario for vegetation removal and demolition works, other less noise-intensive stages are likely to fall within the NML
- the community centre on Jannali Avenue and the Jannali Medical Centre on Railway Crescent would experience exceedances of the NML for a worse-case scenario for the most noise-intensive stages, it is likely that the potential noise impacts for other stages of works would be less, but may still exceed the NML
- there would be no exceedances of the NML for the churches, school or community college.

In relation to construction traffic noise, the construction movements associated with the Proposal are considered to be an insignificant additional contribution to the ambient noise environment.

Summary of noise impacts during out of hours

Out of hours construction activities would be required for works needing to be undertaken during track possessions, which typically occur for 24-hours a day over a weekend. It is estimated that at least five to six track possessions would occur during the construction period and would be utilised for a number of construction activities which are listed in Section 3.2.3, Works outside standard hours may also be undertaken to minimise traffic impacts on Jannali Avenue/Mitchell Avenue.

The following out of hours construction scenarios were modelled as part of the Noise and Vibration Impact Assessment:

- lifting of new pedestrian bridge into place
- construction of new bus zones
- construction of pedestrian crossing on Jannali Avenue
- finalisation works (installation of signage, fencing etc, power supply upgrade works).

The modelling has indicated that there would be exceedances of the out of hours NML at residential receivers in both NCAs. In total there are likely to be up to 22 residential receivers who may experience highly intrusive or moderately intrusive noise for evening works, and up to 84 residences who may experience highly intrusive or moderately intrusive noise for night time works. There would be no exceedances of the NML for the nearby churches which are likely to be in use during some out of hours periods.

It is important to note that such out of hours works would only comprise a number of weekends or evening/night time periods over the construction period and are required for rail safety, constructability and traffic reasons. Most works would be undertaken during standard hours.

The most affected receivers would be those on Mitchell Avenue located in close proximity to the proposed bus zones and pedestrian crossing works, which would be undertaken over a number of days and during out of hours periods which may result in noise levels above the highly affected noise level of 75 dBA (i.e. exceedances of 43 dBA above the night time NML), and management measures such as alternate accommodation would be considered in accordance with TfNSW's *Construction Noise Strategy* (TfNSW, 2012c). A range of other notification methods would be implemented for other receivers likely to be affected by noise.

Any out of hours works would be assessed in more detail and subject to approval by TfNSW along with appropriate community notification and mitigation measures in place, in accordance with TfNSW's *Construction Noise Strategy* (TfNSW, 2012c).

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* (Department of Environment and Conservation, 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 $0.4 \text{ m/s}^{1.75}$ for residences during the daytime and $0.26 \text{ m/s}^{1.75}$ 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 recommended vibration velocity of 5 mm/s, and for commercial buildings a maximum recommended vibration velocity of 20 mm/s.

The Noise and Vibration Impact Assessment provided safe working distances for a vibratory roller, jack hammer and auger bored piling rig which would be used for the construction of the pedestrian bridge and station entrances – these distances are displayed in Table 10. The assessment concluded that if the safe working distances are complied with then no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic damage (AECOM, 2016).

Table 10 Safe working distances of vibration intensive equipment

Plant	Rating/description	Safe distance for cosmetic damage (residential)	Safe distance for human response
Vibratory roller	< 50 kn (typically 1-2 t)	5 m	15-20 m
	< 100 kn (typically 2-4 t)	6 m	20 m
	< 200 kn (typically 4-6 t)	12 m	40 m
	< 300 kn (typically 7-13 t)	15 m	100 m
Jack hammer	Hand held	1 m (nominal)	Avoid contact with structure
Auger bored piling rig	≤ 800 mm	2 m	2 m

b) Operational phase

Operational activities at Jannali Station are not proposed to significantly change and as a result the existing noise and vibration levels are unlikely to change.

Plant expected to be associated with the operation of the Proposal would include two lifts, modifications to the PA system, lighting and electrical equipment including security cameras. Mechanical plant required for operation of the lifts would be identified during detailed design and would be selected in order to achieve the acceptable noise levels identified in the *NSW Industrial Noise Policy* (EPA, 2000) and would be free from annoying sound characteristics such as tonality, low frequency, impulsive and intermittent noise.

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* (TfNSW, 2012c) and the Noise and Vibration Impact Assessment (AECOM, 2016).

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 TfNSW approval for out of hours works.

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.

Refer to Table 12 for a list of proposed mitigation measures.

6.4 Indigenous heritage

An Aboriginal Heritage Due Diligence Assessment has been prepared by Umwelt for the Proposal in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010). The assessment included a desktop analysis including review of existing databases, past reports and aerial imagery. The findings of the assessment are summarised in this section (Umwelt, 2015).

6.4.1 Existing environment

The Jannali area forms part of a landscape that was used by the Dharawal People, for many thousands of years prior to European contact. An extensive search of the Aboriginal Heritage Information System (AHIMS) database was undertaken by Umwelt on 15 May 2015 for a 500 metre radius of the Proposal site, and a revised basic search was conducted by TfNSW on 14 December 2015 for a 200 metres radius of the Proposal area in order to gain information on the archaeological context of the area, and to ascertain whether there are any previously recorded Indigenous sites.

No Aboriginal sites have been recorded within 200 metres or in the vicinity of the Proposal site, and the Proposal site is not located within a landscape feature likely to indicate the presence of Aboriginal objects in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010).

In addition, the clear and observable disturbance to the area as a result of previous construction and use of the station including the platforms, stairs, services, footpaths and adjacent street would have resulted in the removal/significant disturbance to, the natural soil profile and thus the loss of any soil profile integrity. Therefore the Proposal site has been assessed as having low Aboriginal archaeological potential (Umwelt, 2015).

6.4.2 Potential impacts

a) Construction phase

Construction of the Proposal would involve earthworks and other ground disturbance activities which has the potential to impact Indigenous sites, if present. A due diligence assessment has been undertaken which has determined that there are no known Indigenous sites or areas where Indigenous objects are likely to occur beneath the ground surface. As such, there is a low risk/low likelihood that the Proposal would result in harm to Indigenous objects.

The Proposal would impact areas of previously covered land and/or areas where Indigenous objects are unlikely to occur beneath the ground surface (low potential). As such, it is not anticipated the construction of the Proposal would have an impact on Indigenous heritage.

b) Operational phase

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

6.4.3 Mitigation measures

All parties involved in the works would be made aware that it is an offence under section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an Aboriginal Heritage Impact Permit.

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

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

Refer to Table 12 for a list of proposed mitigation measures.

6.5 Non-Indigenous heritage

6.5.1 Existing environment

A search of heritage registers including the National Heritage List, the Commonwealth Heritage List, the Register of the National Estate (non-statutory archive), the NSW State Heritage Register and the heritage schedule of the Sutherland Shire LEP was undertaken for the Proposal area and surrounds and the results are displayed in Table 11.

In addition, a desktop review of existing parish maps, aerial photography and other historical records was undertaken by Umwelt to make an assessment of the archaeological potential of the Proposal site (Umwelt, 2015). A summary of the history of the Proposal site is summarised below.

The early parish maps indicate that the Proposal site was located within property owned by Thomas Holt, who purchased his estate of approximately 12,000 acres (that included the Proposal area and Captain Cook's landing place in Botany Bay), in 1861.

Samuel Gray then purchased several lots of land in 1878 along what would become part of a proposed railway line. Gray then sold the land to the Intercolonial Investment Land and Building Company when it was formed in 1885. The first estate created by the Intercolonial Company, in 1887, was known as the Queen's Jubilee Township Como, on the western side of the railway line and a temporary platform was erected by the company near to the present-day station to encourage potential buyers.

The line between Como and Sutherland was started in late 1883 and officially opened on 26 December 1885. This included the establishment of two signal boxes named Jannali and Jubilee, and the construction of a deep cutting, commonly called Jubilee cutting.

Despite the land releases there was little settlement in the area until after 1910. In 1925 the railway commissioner proposed to build a platform near the existing Jannali signal box but residents later lobbied for a platform between the Jannali and Jubilee signal boxes and for a road bridge to be constructed over the line. Later in February 1931, Jannali Station and the Railway Crescent road bridge were officially opened.

Table 11 Heritage items/areas in the vicinity of the Proposal

Heritage item	Address	LEP listing
Jannali Railway Station and immediate surrounds (archaeological site)	Jannali Avenue and Railway Parade	A2104
Stand of <i>Eucalyptus pilularis</i> (Blackbutt)	Jannali Avenue between Mitchell Avenue and Louise Street	2101
Cultural planting, comprising <i>Lophostemon confertus</i> (Brush Box)	Mitchell Avenue, corner of Oxley Avenue.	2102

6.5.2 Potential impacts

a) Construction phase

Archaeological potential

There is no known potential archaeological resource in the Proposal area which is outside any known earlier development other than the establishment of the existing suburb and town plan and construction of the railway line and station.

An 1887 auction sale plan indicates the former location of the 1887 constructed temporary platform is likely immediately adjacent to the railway line approximately opposite the corner of present day Mitchell and Jannali Avenues. However this temporary platform (possibly timber construction) was likely to have been removed when the current station was constructed, if not before, and as such is unlikely to have survived. From the available information it is also not clear if the pre-1925 signal box is still standing and if it is within the Proposal area and this would require further investigation. Despite the local heritage listing, the assessment concluded that there was a low risk of encountering archaeological items/deposits and that the proposed works are unlikely to expose historical archaeological relics (Umwelt, 2015).

Heritage-listed trees

The heritage-listed Blackbutt and Brush Box trees provide amenity and aesthetic value contributing to the leafy landscape feel of the Jannali Village. Three trees, located on RailCorp land, would need to be removed as part of the proposed works and includes two of the LEP heritage-listed Brush Box trees from Mitchell Avenue (trees 22 and 23 in Figure 16, page 83) and one non-heritage listed Coastal Myall tree from Jannali Avenue (tree 20). Three other non-heritage listed trees (Coast Banksia tree, Smooth-barked Apple tree and Hackberry tree – trees 19, 21 and 48) may also potentially need to be removed. The existing heritage-listed Blackbutt trees on Jannali Avenue would be retained, where practicable.

The area of trees to be impacted by the Proposal has been kept to a minimum, where practicable, but given the existing space constraints, the removal of two Brush Box trees from Mitchell Avenue is required to allow for the new stairs and accessible ramp at the western station entry plaza. However, a mitigation measure has been included that at least one advanced tree would be established in the same area to help maintain the landscape character that the existing trees provide, without compromising safety and visibility around the station. This would also ensure that the key views from Mitchell Avenue and Jannali Avenue are maintained. Overall, it is considered that the removal of the two Brush Box trees would have a minor impact to the heritage values of Jannali Avenue and Railway Crescent.

b) Operational phase

The operation of the Proposal does not present any risks to non-Indigenous heritage.

6.5.3 Mitigation measures

Further assessment is recommended during detailed design to determine the location/former location of the original pre-1925 signal box and whether it is within the Proposal area, as the specific location and its intactness was not clear from a review of available information.

Potential impacts to non-Indigenous heritage would be managed through the implementation of the CEMP prepared by the Contractor, that would map and protect nearby non-Indigenous heritage items, including trees to be retained along Jannali Avenue/Mitchell Avenue, and which would prescribe management measures to ensure these items are not affected. The CEMP would also specify requirements for heritage inductions to be undertaken by all staff, and procedures for unexpected finds in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2015a).

Refer to Table 12 for a list of proposed mitigation measures.

6.6 Socio-economic impacts

6.6.1 Existing environment

Jannali Station is located in the Sutherland Shire LGA and serviced by the T4 Eastern Suburbs and Illawarra Line. It is the 89th busiest station on the Sydney Trains network with an average patronage of 5,640 trips per weekday (NSW Bureau of Transport Statistics barrier counts, 2014).

The land use around the station comprises a mostly residential suburb, bisected by the railway. A mix of shops, small businesses and café/restaurants surround the station on Jannali Avenue/Mitchell Avenue on the western side of the station and Railway Crescent, Box Road and White Street to the east. This area is also known as Jannali Village.

In particular, the Jannali Community Centre is located approximately 30 metres south-west of the station entrance on Jannali Avenue and the Jannali Hotel is located approximately 100 metres to the north off Railway Crescent (refer Figure 3, page 18). The closest residential properties are adjacent to the station on Jannali Avenue/Oxley Avenue (within 10 metres).

Other receivers in the catchment include educational facilities and places of worship. Jannali Public School and St George and Sutherland Community College are located approximately 320 metres south-west of the station. Jannali Uniting Church is located approximately 130 metres east on Box Road and Jannali Anglican Church is approximately 300 metres east of the station on Wattle Road.

There are some existing CPTED considerations around the station, including that there are sections of Railway Crescent that is poorly lit, while the existing path from the station to the Oxley Avenue car park has areas of dense vegetation on to the west which could provide hiding places for offenders.

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 changes to vehicle and pedestrian movements in and around the station
- changes to bus operations including the potential to temporarily relocate the existing bus zone on Jannali Avenue
- temporary parking impacts on local roads and car parks
- increase in truck movements delivering site materials, plant and equipment
- construction noise, dust and visual impacts.

Access for emergency services would be maintained at all times. Access to all private properties and business adjacent to the works would be maintained during construction, unless otherwise agreed by the relevant property owners. There is likely to be some short-term access changes for the Jannali Car Clinic as a result of the proposed bus zone and associated driveway modifications.

b) Operational phase

To allow for the new station entry plazas, lifts/stairs and pedestrian bridge, it is proposed to demolish the existing waiting room on Platform 1 and the building currently leased by the Red Cross on the western side of the station. Weather protection offered by the existing waiting room would instead be provided by the proposed sheltered entry plazas, and via the existing canopies along the Platform 1 (with additional seating). With regards to the tenanted building, TfNSW and RailCorp would discuss finalisation of the lease with the tenant.

The proposed bus zone on Mitchell Avenue would also require shortening of the existing driveways of the Jannali Car Clinic, however it is envisaged that the dual access arrangement would be retained. Additional investigation is required during detailed design to ensure the proposed operation of the new bus zone (and driveway/s) meets the various standards (e.g. swept path analysis to ensure sufficient space for safe vehicle manoeuvres).

The additional lighting and CCTV that would be installed in and around the station would provide positive CPTED outcomes for the area. The new station entry plaza on the western side would also raise the entrance to street level and open up the area, allowing for increase natural surveillance.

Overall, the Proposal would provide positive socio-economic benefits to Jannali and the Sutherland Shire LGA, including:

- improved accessibility for customers at Jannali Station providing an accessible path of travel to the station platforms through the provision of accessible parking, upgraded footpaths, rest points (seats), a new pedestrian bridge and stairs/lifts
- improved customer amenity and facilities at the station including a Family Accessible Toilet, canopies over the pedestrian bridge, stairs, lift landings and entry plazas for weather protection along with new tactiles and wayfinding signage
- improved connections with the bus and pedestrian networks including through the new pedestrian bridge to provide direct access across the railway, new/relocated bus zones closer to the western station entrance and new/upgraded footpath and ramps
- improved transport interchange facilities including kiss and ride areas and bicycle facilities on both sides of the station
- potential increased use of public transport to and from Jannali.

6.6.3 Mitigation measures

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

Table 12 provides a number of environmental safeguards to minimise these potential impacts with a particular focus on keeping the community informed and includes the following:

- sustainability criteria for the Proposal would be established to encourage construction personnel to purchase goods and services locally helping to ensure the local community benefits from the construction of the Proposal
- the Community Liaison Plan (to be developed by the Contractor prior to construction) 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
- 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

An Ecological Impact Assessment has been prepared by Jacobs for the Proposal which included a desktop assessment, literature review and site inspection of the study area (shown in Figure 16) which was undertaken by an ecologist on 18 June 2015. The findings of the assessment are summarised in this section.

6.7.1 Existing environment

Threatened species and communities

The results of the database searches indicate that the following threatened biota previously recorded or predicted to occur in the locality of the Proposal (up to five kilometre radius):

- 22 threatened ecological communities listed under the TSC Act/EPBC Act
- 21 threatened flora species and one endangered plant population listed under the TSC Act/EPBC Act
- 60 threatened fauna species listed under the TSC Act, FM Act and/or EPBC Act
- 31 migratory species listed under the EPBC Act.

No threatened flora, fauna or migratory species were identified during the survey. The study area also does not contain any native remnant vegetation communities; or threatened or endangered ecological communities. While fauna habitats are generally considered to be of poor quality, the desktop review identified that the Grey-headed Flying-fox was considered to have a high chance to occur in the area and further assessment for this species has been considered in Section 6.7.2.

Flora

The study area is part of a highly modified urban environment in the suburb of Jannali within the Sutherland LGA. The vegetation within the study area is largely a mixture of large remnant trees (including Blackbutt trees), landscape plantings, street trees and opportunistic vegetation (i.e. weeds) that have established in the disturbed areas of the rail corridor (particularly the slopes). The vegetation in the western side of the rail corridor is mapped as Urban Exotic/Native (OEH, 2013) and was verified during the site inspection.

Fifty seven trees were recorded in the study area during the field survey. These trees range from very large examples of mature Blackbutt and Brush Box to smaller shrubs and trees re-sprouting from previous trimming works within the rail corridor. The most significant trees are located along Jannali Avenue and Mitchell Avenue. These trees are large and contribute considerably to the local character of the area and provide important visual amenity (and are listed as heritage trees under Schedule 5 of the Sutherland Shire LEP).

The location of each tree within the survey area is outlined in Figure 16. An assessment of each tree including suggested Tree Protection Zones according to the *AS 4970-2009 for the Protection of Trees on Development Sites* is provided in Appendix C of the Ecological Impact Assessment (Jacobs, 2016).

Four noxious weeds, including Lantana, were identified in the study area and all were classified as Control Class 4 – locally controlled weeds.

Fauna

The habitat that the existing vegetation provides for fauna is limited and generally of low quality. However, the large Blackbutt trees are likely to provide some habitat for birds and mammals and due to their size may provide an important fauna refuge in the urban environment. No obvious hollows were observed in these trees during the site survey. Overall, the habitat within the study area lacks important features such as hollow bearing trees, dense litter, and abundant woody debris.



JACOBS NSW SPATIAL - GIS MAP file: I4078900_GIS_JA_F003_r2v1 | 12/01/2016

Legend

- Study area
- Tree canopy
Refer to Appendix C
of Ecological Impact
Assessment for
tree details
- Area of works

0 30 60m



Data sources

Jacobs 2015
Ausimage 2014

Figure 16 Location of trees within study area (Jacobs, 2016)

6.7.2 Potential impacts

a) Construction phase

Threatened species and communities

As noted in Section 6.7.1, no threatened flora species or ecological communities were identified during the survey and while there is limited potential for threatened fauna to be present, a significance assessment has been conducted for the Grey-headed Flying-fox as this species is considered to have a high likelihood of occurring in the study area due to the presence of suitable foraging habitat and close proximity to known roost camps.

Considering the potential presence of Grey-headed Flying-fox the EP&A Act requires a 7-part test to assess the likelihood of a significant impact occurring. As this species is also listed under the EPBC Act, a significance assessment was also completed by Jacobs in accordance with *the Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of the Environment, 2013).

Other potentially occurring threatened fauna species subject to significance assessments which have a moderate potential to occur intermittently in the study area to forage in habitats include the Powerful Owl, Eastern Bentwing Bat, Yellow-bellied Sheath-tail-bat, Eastern Freetail-bat and Greater Broad-nosed Bat. Assessments of significance for these species were also prepared by Jacobs.

The outcome of these assessments was that there is unlikely to be a significant impact to any threatened species due to the minimal impacts predicted from the Proposal. The works would not result in the removal of any high quality habitat or breeding habitat for these species and they would be able to persist in the study area after the works have been completed. The habitat would remain in a similar state after the proposed works have been completed.

Direct impacts

Direct biodiversity impacts of the Proposal are predicted to be minimal due to the disturbed nature of vegetation in the study area and the nature of the construction methods. Vegetation and habitat clearing would be minimal and no impacts to native vegetation or high quality fauna habitat are predicted.

However, to construct the new entry plaza on the western side of the station, the Coastal Myall tree (referred to as tree 20 in Figure 16) would need to be removed. Additionally, two Brush Box trees (22 and 23) would be removed and replaced with at least one new tree. Additional offset planting would also be required.

Direct trauma to native fauna is expected to be minimal, as no high quality habitats would be removed.

Indirect impacts

Other trees identified in the assessment at risk from indirect impacts (and potential removal) during construction are a Coast Banksia tree (Tree 19), a Smooth-barked Apple tree (Tree 21) and a Hackberry tree (Tree 48) which is also classified as a noxious weed (and therefore would not require offsetting, if removed). Trees 19 and 21 however would be retained where practicable, and if removal is required would be offset in accordance with the *TfNSW Vegetation Offset Guide* (TfNSW, 2013d). Some exotic shrubs that form a hedge adjacent to the eastern station entrance may also need to be removed.

Proliferation of weed species is likely to be the main potential impact of the works. Without appropriate management strategies, construction activities have the potential to disperse weeds including species listed as noxious under the *Noxious Weeds Act 1993*. Construction activities also have the potential to import new weed species into the study area.

The most likely causes of weed dispersal and importation associated with the works include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery. There is also the chance of the introduction and spread of *Phytophthora cinnamomi* (Root Rot) from machinery which could detrimentally affect the vegetation along the rail corridor. The mitigation measures outlined in Section 6.7.3 and Table 12 would ensure that weed and pathogen importation and spread is minimised.

Noise, dust, light and contaminant pollution is predicted to be minimal. The mitigation measures outlined in Table 12 would ensure that these indirect impacts would be minimised.

b) Operational phase

Operational activities at Jannali 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 Contractor would be required to undertake the detailed design and construction of the Proposal having regard for the trees on Jannali Avenue and Mitchell Avenue, and to avoid impacts to any trees/vegetation beyond which that which is assessed in this REF and the supporting Ecological Impact Assessment (Jacobs, 2016).

Tree Protection Zones (TPZs) would be established as per the recommendations in the Ecological Impact Assessment (Jacobs, 2016) to protect trees during construction. An arborist would be engaged to advise on excavation around tree root zones and inspect trees that are potentially at risk prior to and during high risk works. Should any works potentially impact on the root zones of trees to be retained, the arborist would provide further advice on risk reduction and remedial actions in relation to the trees.

TfNSW has prepared a *Vegetation Offset Guide* (TfNSW, 2013d) to provide a framework for a consistent approach to offset impacts to vegetation on applicable TfNSW projects and allows for appropriate offsets to be applied for one tree or a group of trees that do not form part of a vegetation community, regardless of whether they are native or not.

As three trees have been identified for removal on the western side (two medium and one small), the Ecological Impact Assessment has recommended that a minimum of eight trees be planted to meet TfNSW's offset ratios. Should the two (medium) trees identified for potential removal need to be removed they would also require offsetting with at least eight trees. The third tree (Hackberry) that may potentially need to be removed is a noxious weed and therefore would not require offsetting.

Any additional trees that are found to require removal during construction would also need to be approved by TfNSW for removal and offset. Such measures and procedures for tree assessment and removal would be included and implemented as part of the CEMP for the Proposal. This would also include checking trees for active nests, prior to their removal.

The CEMP would be developed in accordance with the recommendations of the Ecological Impact Assessment (Jacobs, 2016) and would include a range of other weed control, tree protection, and erosion and sedimentation control measures. Refer to Table 12 for a list of proposed mitigation measures.

6.8 Contamination, landform, geology and soils

A geotechnical desktop assessment, and site walkover was undertaken as part of the development of the concept design (Cardno, 2015). The findings of these investigations are summarised in this section.

6.8.1 Existing environment

Geology and soils

A review of the soil landscapes of the *Soil Landscapes of the Wollongong-Port Hacking 1:100,000 Sheet* (Hazelton and Tille, 1990) indicates that the Proposal is located within the boundaries of the Gynea soil landscape and are characterised by localised steep slopes, high soil erosion hazard and rock outcrops.

Reference to the *Wollongong-Port Hacking 1:100,000 geological map* (Stroud et al, 1985) indicates that the site is underlain by Hawkesbury Sandstone formation of the Winamatta Group which is known to comprise medium to coarse grained quartz sandstone with very minor shale and laminate lenses.

A review of Acid Sulfate Soil risk maps within the NSW Natural Resources Atlas (accessed 18 March 2015) indicates Jannali Station is not mapped as having an Acid Sulfate Soil Risk (Cardno, 2015).

Following the desktop review and site inspection, Cardno made the following observations for the Proposal site:

- topographically, Jannali Station is located along the north facing slopes of north-east south-west trending ridgeline with elevations ranging from approximately from 70 metres (Australian Height Datum - AHD) within the southern portion of the station to 65 metres (AHD) within the southern portion of the station
- the majority of the southern portion of the station is located within a cutting through mainly residual soils and rock with depths ranging from approximately three metres to the south (Railway Crescent road bridge) to relatively at-grade at the northern end of the station platform
- rock formation is apparent along the cut faces around north of the Railway Crescent comprising thinly to medium bedded sandstone
- pale grey residual clays/extremely weathered sandstone were observed at the shorter cut faces to the north of the Railway Crescent road bridge with apparent thickness of up to two metres. This residual cover is expected to be underlain by sandstone bedrock
- based on the visual assessment, the near horizontally bedded sandstone bedrock is assessed to be extremely weathered to distinctively weathered.

Contamination

The AS 4482.1-2005 - *Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds* lists the chemicals used by specific industries. The Standard lists the following chemicals that are commonly associated with railway yards:

- hydrocarbons
- arsenic
- phenolics
- heavy metals
- nitrates and ammonia.

Other potential contaminants associated with railways include organochlorine and organophosphate pesticides, which were commonly used for herbage control in the rail industry and asbestos which was historically used as a component in train braking systems.

Review of the contaminated land registers and the PoEO public register suggests Jannali Station is not listed as a contaminated site, nor has the site been subject to regulation under the *Contaminated Land Management Act 1997*. Potential nevertheless exists for the presence of site contamination at Jannali Station, due to:

- the history of railway land uses at the site
- the potential for on-site migration of contaminants from a nearby potentially contaminated site (a former service station).

6.8.2 Potential impacts

a) Construction phase

The Proposal would require some excavation work for the installation for the foundations and footings for the pedestrian bridge, lift shaft pits, stairs, canopies and Family Accessible Toilet. Other trenching or excavation may be required for footpath and road works, relocation of services, drainage works, retaining walls and tree removal. There would also be earthworks required to build up existing levels so that new station entry plazas are at street level.

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-moderate, given the existing slope of the area however 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 Guidelines* (Landcom, 2004).

In addition, given the past land use and findings of the geotechnical assessment, 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 controls 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.

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

Refer to Table 12 for a list of proposed mitigation measures.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface water and ground water

The ground elevations around the station fall from south-north towards Carina Creek. Carina Creek is part of the Georges River Catchment and is approximately 500 metres north-east of the Proposal site and flows in a northerly direction. Sutherland Shire Council conducts water quality testing at the creek further north at Como, and this site has scored Fair for all of the five years of monitoring which have been conducted (Sutherland Shire Council, 2015).

Within the station there is existing track drainage which leads to an existing open channel to the north of the station. The open channel then drains via a culvert to an existing pit along Railway Crescent and then into the Council's drainage systems. There is no drainage from the platforms with runoff flowing directly onto the railway track.

Sutherland Shire Council's drainage systems comprise a trunk main along Railway Crescent (draining to the north) with a drainage pit located on the footpath outside the eastern entrance to the station. On the western side there is also a trunk main with drainage pit located next to the ramp outside the western entrance.

The NSW Office of Water groundwater database holds records of licenced groundwater bores throughout NSW. A search of the database indicates eleven groundwater monitoring bores are situated in relatively close proximity to Jannali Station. These monitoring bores are clustered within a former service station, located at 121 Georges River Road (approximately 300 metres from the station). Groundwater at this location is recorded at a depth of 1.5 metres, within an unconfined sand aquifer. Given the station and surrounds are situated on the elevated ground, the local groundwater flow direction could not be inferred. The Proposal is not mapped as groundwater sensitive in Sutherland Shire Council's mapping.

Flooding

The one hundred year Average Recurrence Interval (ARI) storm event flood maps prepared as part of the Sutherland Shire LEP have been reviewed. The mapping indicates that the Proposal area and adjacent streets are not located on flood prone land.

In 2004, Bewsher Consulting Pty Ltd undertook an Initial Subjective Assessment of Major Flooding study for Sutherland Shire Council (Bewsher, 2004). The study analysed the likely

areas affected by a 100 year ARI flood event and an extreme flood event. The results of the study indicated flooding from trunk drainage networks does not occur in the vicinity of Jannali Station.

Another source of potential flooding to the station is due to local overland flows (i.e. flooding from runoff of local catchment areas, not inundation due to overflow from creeks and trunk drainage channels). The potential extent of inundation on the Proposal site from overland flows is not available however a preliminary review of the topography of the vicinity indicates that a significant area grades towards and across the railway line towards Railway Crescent. The Proposal site may therefore be susceptible to flooding by overland runoff generated from the southern and western parts of the catchment.

6.9.2 Potential impacts

a) Construction phase

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

Activities which would disturb soil during construction work have the potential to impact upon local water quality as a result of erosion and run off sedimentation.

Groundwater is present in the area and may be encountered for deeper excavation (e.g. for the lift pits) or as a result of rainfall runoff and may need to be dewatered. Incorrect dewatering can pose risks to nearby waterways and maybe in contravention with associated legislation.

b) Operational phase

The Proposal is unlikely to have a major impact upon the hydrology of the Proposal site or the surrounding area and the detailed design would take stormwater management into consideration. New eaves and gutters would be installed for new canopies and roofs to connect to existing station drainage, along with new drainage outlets established on both sides of the station to connect to the existing stormwater pits which are part of Council's stormwater system (subject to detailed design). Runoff from the upgraded parking/kiss and ride would continue to drain to the existing street drainage system. New water supplies and sewer connections may also be required for new amenity areas such as the Family Accessible Toilet. All works would be designed and undertaken in accordance with the relevant standards and requirements.

6.9.3 Mitigation measures

As noted in Section 6.8.3, an Erosion and Sediment Control Plan 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 TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2015b).

Operational risks associated with drainage and localised flooding would be addressed during detailed design of the Proposal.

Refer to Table 12 for a list of proposed mitigation measures.

6.10 Air quality

6.10.1 Existing environment

Based on a review of the existing land uses surrounding the Proposal, the existing air quality is considered to be characteristic of an urban environment (e.g. localised vehicle emissions) and would also be susceptible to air quality impacts from bushfires given the presence of nearby bushland. Sensitive receivers in the vicinity of the Proposal include staff and customers at Jannali Station and residential and commercial properties around the station.

The OEH undertakes air quality monitoring for five key air pollutants: ozone (O₃), nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂) and particulates less than 10 micrometres in diameter (PM₁₀), as well as providing an hourly and daily regional air quality index (which is calculated using a formula that accounts for the various pollutant types). A national air quality goal has also been set for each of the pollutants that prescribe a maximum number of days that a concentration of a particular pollutant type may be exceeded.

The *NSW Air Quality Statement 2014* (OEH, 2015) reports on exceedances of pollutants against the National Environment Protection Measures (NEPM) goals for NSW in 2014. While levels of nitrogen dioxide, sulfur dioxide and carbon monoxide continued to be below national standards – levels of ozone and particles (PM₁₀ and PM_{2.5}) did exceed the standards from time to time.

The Sutherland Shire LGA forms part of the Sydney East monitoring region with air quality monitored from five fixed sites at Chullora, Rozelle, Lindfield, Randwick and Earlwood. The nearby Illawarra region has air quality monitoring stations located at Albion Park, Kembla Grange and Wollongong. A search of the daily regional air quality index for the Sydney East region for the last year (July 2014 to June 2015) showed that the region experienced:

- very good air quality on 8.2 per cent of days
- good air quality on 76.4 per cent of days
- fair air quality on 13.7 per cent of days
- poor air quality on 0.8 per cent of days
- very poor air quality on 0.3 per cent of days
- hazardous air quality on 0.5 per cent of days.

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, SO₂, PM₁₀, 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 foundations and footings for the pedestrian bridge, lift shaft pits, stairs, canopies and Family Accessible Toilet
- other trenching or excavation may be required for footpath and road works, relocation of services, drainage works, retaining walls and tree removal
- earthworks required to build up existing levels so that new station entry plazas are at street level

- 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 12 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 through direct impact from excavation activities or 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 3.1.2. In addition an upgraded electrical supply is required to accommodate new infrastructure (e.g. new lifts) and two options have been considered and would be further investigated during detailed design. The two options proposed in the Concept Design Report included either an upgrade to the existing transformer in the rail corridor (located off Railway Crescent) or the installation of a padmount substation.

Some drainage works would also be required, (for example rebuilding the stormwater pit at the intersection of Jannali Avenue and Mitchell Avenue, and adjustments to the existing stormwater drain outside the western station entrance) and construction of new retaining walls at the entry plazas to both of the stations.

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, bricks, plastics, concrete, carpeting etc)
- bus shelter and bicycle racks (to be salvaged if possible)
- 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 *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a) would also result in waste management targets to be developed for the Proposal and would include reuse and recycling.

6.12 Cumulative impacts

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

A search of the Department of Planning and Environment's Major Projects Register, Sydney East Joint Regional Planning Panel Development and Planning Register, and Sutherland Shire Council's Development Application Register on 16 December 2015 identified a number of major developments in the LGA such as Cronulla Sutherland Leagues Club and the Kirrawee Brick Pit both of which involve mix-use development to be developed over the next few years. Within Jannali, a proposal for a new seniors living development (with 24 apartments) approximately 850 metres from the station was approved in July 2015 while a development application has been lodged which comprises an mixed use development at the Jannali Hotel site, approximately 100 metres from the station and would include 88 residential apartments.

During construction, the works would be co-ordinated with any other construction activities in the area, where required. Consultation and liaison would occur with Sutherland Shire Council, RailCorp/Sydney Trains, and any other developers identified to minimise cumulative construction impacts such as traffic and noise, where practicable.

Traffic associated with the construction work is not anticipated to have a significant impact on the surrounding road network. Operational traffic and transport impacts would have a minimal impact on the performance of the surrounding road network.

Based on this assessment, it is anticipated that the cumulative impacts would be negligible, provided that consultation with relevant stakeholders and mitigation measures in Chapter 7 are implemented.

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.

6.13 Climate change and sustainability

6.13.1 Greenhouse gas emissions

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

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

Due to the small scale of the Proposal and the short term temporary nature of the individual construction works, it is considered that greenhouse gas emissions resulting from the construction of the Proposal would be 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 12.

It is anticipated that, once operational, the Proposal may result in an increase in use of public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Jannali. A modal shift in transport usage may reduce the amount of fuel consumed by private motor vehicles with a corresponding 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 the changes in climate and understand the limitation of adaptation. The effects of climate on the Sydney region can be assessed in terms of weather changes, storm intensity, flooding and increased risk of fire.

Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall expected to occur in a 100-year average recurrence interval flood event would occur more frequently. Such changes in weather in the region are unlikely to impact on the operation of the Proposal (for more information on flooding refer to Section 6.9).

Climate change could lead to an increase in frequency and severity in bushfires. The Proposal is not situated on land mapped as bush fire prone, 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 incorporation of the *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a) and the TfNSW *Environmental Management System* (EMS). These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.1.4 for more information regarding the application of these guidelines.

Further positive impacts in relation to climate change and sustainability associated with the Proposal include encouraging a reduction in private vehicle use and increase the 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 TfNSW's EMS. The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the Proposal would be managed, and outline a framework of procedures and controls for managing environmental impacts during construction.

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed below in Table 12. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 12 Proposed mitigation measures

No.	Mitigation measure
General	
1.	An Environmental Controls Map (ECM) would be developed by the Contractor in accordance with TfNSW's <i>Guide to Environmental Controls Map</i> (TfNSW, 2015c) for approval by TfNSW, prior to the commencement of construction for implementation for the duration of construction.
2.	A project risk assessment including environmental aspects and impacts would be undertaken by the Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.
5.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.
6.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.

No.	Mitigation measure
Traffic and site access	
7.	The detailed design of the Proposal would involve the following (in consultation with the appropriate road authority): • completion of a Road Safety Audit for the Proposal which would include, but not limited to, an assessment of the proposed pedestrian crossing at Jannali Avenue/Mitchell Avenue with respect to approach sight lines • confirmation of the arrangements for the proposed part-time kiss and ride in Railway Crescent during peak periods • investigation of feasible options for a kiss and ride in Jannali Avenue • investigation into the proposed bus zones on Jannali Avenue/Mitchell Avenue in terms of road safety and driveway modifications, which would be progressed in consultation with bus operators and planners • confirmation that the proposed ticket facilities are adequate to meet the 2036 + 15 per cent patronage and are appropriately located to ensure clear paths of travel.
8.	Prior to the commencement of construction, a Traffic Management Plan (TMP) would be prepared as part of the CEMP and would include at a minimum: • ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised • maximising safety and accessibility for pedestrians and cyclists • ensuring adequate sight lines to allow for safe entry and exit from the site • ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made) • managing impacts and changes to on and off street parking and requirements for any temporary replacement provision • parking locations for construction workers away from stations and busy residential areas and details of how this will be monitored for compliance • routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses • details for relocating kiss and ride, taxi ranks and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus operator. Particular provisions should also be considered for the accessibility impaired • measures to manage traffic flows around the area affected by the Project, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the TMP. Consultation with the relevant roads authorities would be undertaken during preparation of the construction TMP. The performance of all project traffic arrangements must be monitored during construction.
9.	Communication would be provided to the community and local residents to inform them of impacts to vehicle movements and anticipated effects on the local road network relating to site works.
10.	Access to all private properties and businesses adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners.
11.	Road Occupancy Licences for temporary road closures would be obtained, where required.

No.	Mitigation measure
12.	Relevant authorisation(s) from the appropriate road authority would be obtained for the proposed operational changes to Jannali Avenue, Mitchell Avenue and Railway Crescent such as the parking changes, pedestrian crossing, bus zone/s and signage changes etc, as necessary.
Urban design, landscape and visual amenity	
13.	The detailed design of the Proposal would be undertaken with reference to the recommendations in the Visual Impact Assessment (GBD, 2016) and in particular should consider: • screen planting for the residential receivers on Mitchell Avenue • at least one new advanced tree to be established in the western station entrance area to help maintain the landscape character provided by existing trees.
14.	An Urban Design and Landscaping Plan (UDLP) would be prepared by the Contractor, in consultation with Sutherland Shire Council, and submitted to TfNSW for approval, prior to finalisation of the detailed design. The UDLP, at a minimum, would address the following: • the appropriateness of to the proposed design with respect to the existing surrounding landscape, built form, behaviours and use-patterns • materials, finishes, colour schemes and maintenance procedures including graffiti control for new walls, barriers and fences • location and design of pedestrian and bicycle pathways, street furniture including relocated bus and taxi facilities, bicycle storage (where relevant), telephones and lighting equipment • landscape treatments and street tree planting to integrate with surrounding streetscape • design detail that is sympathetic to the amenity and character of heritage items located within or adjacent to the Proposal site • opportunities for public art created by local artists to be incorporated, where considered appropriate, into the Proposal • total water management principles to be integrated into the design where considered appropriate • design measures included to meet the <i>NSW Sustainable Design Guidelines – Version 3.0</i>.
15.	All permanent lighting would be designed and installed in accordance with the requirements of standards relevant to <i>AS 1158 Road Lighting</i> and <i>AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting</i> .
16.	Light spill from the construction area into adjacent visually sensitive properties would be minimised by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution.
17.	The detailed design of the Proposal would comply with Crime Prevention Through Environmental Design (CPTED) principles.
18.	Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.
19.	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
20.	During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.

No.	Mitigation measure
Noise and vibration	
21.	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 <i>Interim Construction Noise Guideline</i> (Department of Environment and Climate Change, 2009), <i>Construction Noise Strategy</i> (TfNSW, 2012c) and the Noise and Vibration Impact Assessment prepared for the Proposal (AECOM, 2016). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
22.	The CNVMP would outline measures to reduce the construction noise impact from human activities. Reasonable and feasible noise mitigation options which should be considered, include: - 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 - avoiding any unnecessary noise when carrying out manual operations and when operating plant - ensuring spoil is placed and not dropped into awaiting trucks - avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where possible - switching off any equipment not in use for extended periods e.g. heavy vehicles engines should be switched off whilst being unloaded - avoiding deliveries at night/evenings wherever practicable - no idling of delivery trucks - keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site - minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite; no dropping of materials from height where practicable, throwing of metal items and slamming of doors.
23.	The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which should be considered, include: - maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances - using the most suitable equipment necessary for the construction works at any one time - directing noise-emitting plant away from sensitive receivers - regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc - using non-tonal reversing/movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), and for any out of hours works - use of quieter and less vibration emitting construction methods where feasible and reasonable.
24.	Works would generally be carried out during normal work hours (i.e. 7.00 am to 6.00 pm Monday to Friday; 8.00 am to 1.00 pm Saturdays). Any works outside these hours may be undertaken if approved by TfNSW. An Out of Hours Work application form would need to be prepared by the Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.

No.	Mitigation measure
25.	Where the $L_{Aeq(15\text{minute})}$ construction noise levels are predicted to exceed 75 dBA at nearby affected sensitive receivers, respite periods would be observed, where practicable and in accordance with TfNSW's <i>Construction Noise Strategy</i> (TfNSW, 2012c). This would include restricting the hours that very noisy activities can occur.
26.	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.
27.	To avoid structural impacts as a result of vibration or direct contact with structures, the proposed works would be undertaken in accordance with the safe work distances outlined in the Noise and Vibration Assessment (AECOM, 2016) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
28.	Vibration resulting from construction and received at any structure outside of the project would be managed in accordance with: - for structural damage vibration - German Standard DIN 4150: Part 3 – 1999 <i>Structural Vibration in Buildings: Effects on Structures</i> - for human exposure to vibration the acceptable vibration - values set out in the <i>Environmental Noise Management Assessing Vibration: A Technical Guideline</i> (Department of Environment and Conservation, 2006).
29.	Property conditions surveys would be completed prior to piling, excavation of bulk fill or any vibratory works including jack hammering and compaction for all buildings/structures/roads with a plan distance of 50 metres from the works and all heritage listed buildings and other sensitive structures within 150 metres of the works (unless otherwise determined following additional assessment they are not likely to be adversely affected).
Indigenous heritage	
30.	All construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to both the Indigenous and non-Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
31.	If unforeseen Indigenous objects are uncovered during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2015a) would be followed, and work would cease in the vicinity of the find. The Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in coordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council. If human remains are found, work should cease, the site secured and the NSW Police and the OEH notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained before works recommence.

No.	Mitigation measure
Non-Indigenous heritage	
32.	Further assessment would be undertaken to determine the location/former location of the original pre-1925 signal box and determine whether it is within the Proposal area. Should the signal box be located within the Proposal area then an assessment of the significance and integrity of the signal box would also be undertaken in consultation with the relevant stakeholders.
33.	The detailed design and construction of the Proposal should be undertaken with regard for the locally heritage-listed trees in Jannali Avenue/Mitchell Avenue, with the number of trees to be removed limited to those identified in this REF, as far as practicable.
34.	Sutherland Shire Council would be notified of the proposed works as Jannali Station is listed as an archaeological site on the heritage schedule of the Sutherland Shire LEP, along with trees on Jannali Avenue/Mitchell Avenue.
35.	The Contractor would be required to prepare a CEMP that specifically addresses the heritage impacts and required mitigation measures (e.g. Tree protection measures must be implemented during construction to ensure that trees to be retained are adequately protected). Heritage items, including locally listed heritage trees, must be identified and on the ECM.
36.	A heritage induction would be provided to workers prior to construction, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction.
37.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2015a) would be followed, and works within the vicinity of the deposit would cease immediately. The Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in coordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where it is required further, archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
Socio-economic	
38.	Sustainability criteria for the Proposal would be established to encourage the Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
39.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where possible.
40.	A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where possible.
41.	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.
42.	The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan to be developed prior to construction.

No.	Mitigation measure
Biodiversity	
43.	Construction of the Proposal must be undertaken in accordance with TfNSW's <i>Vegetation Management (Protection and Removal) Guideline</i> (TfNSW, 2015d) and TfNSW's <i>Fauna Management Guideline</i> (TfNSW, 2015e).
44.	All workers would be provided with an environmental induction prior to commencing work onsite. This induction would include information on the protection measures to be implemented to protect vegetation, penalties for breaches and locations of areas of sensitivity.
45.	A suitably qualified ecologist would be present to check for fauna during the removal of any hollow bearing trees.
46.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees 20, 22 and 23 that have been nominated for removal in the Ecological Impact Assessment (Jacobs, 2016) would be clearly demarcated onsite prior to construction, to avoid unnecessary vegetation removal. Trees 19 and 21 identified for potential removal would be retained, where practicable. Tree 48 is a weed and may be removed if required. All other trees to be retained would be protected through temporary protection measures discussed below.
47.	Tree Protection Zones (TPZs) should be established around trees to be retained, as nominated in the Ecological Impact Assessment (Jacobs, 2016). Tree protection should be undertaken in line with <i>AS 4970-2009 Protection of Trees on Development Sites</i> and should include exclusion fencing of TPZs.
48.	An arborist would be engaged to advise on excavation around tree root zones and inspect trees that are potentially at risk prior to and during high risk works. Should any works potentially impact on the root zones of trees to be retained, the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager and seek the advice of the arborist in relation to risk reduction and remedial actions.
49.	Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF (i.e. in addition to trees 19, 20, 21, 22, 23 and 48, the Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval.
50.	Offsets and/or landscaping would be undertaken in accordance with <i>TfNSW's Vegetation Offset Guide</i> (TfNSW, 2013d) and in consultation with the relevant council, and/or the owner of the land upon which the vegetation is to be planted. The three trees nominated for removal should be offset with a minimum of eight trees as advised in the Ecological Impact Assessment (Jacobs, 2016). Any additional clearing would also require tree offset planting.
51.	For new landscaping works, mulching and watering would be undertaken until plants are established.
52.	Weed control measures, consistent with TfNSW's <i>Weed Management and Disposal Guideline</i> (TfNSW, 2015f), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal in accordance with the <i>Noxious Weeds Act 1993</i> .

No.	Mitigation measure
Soils and water	
53.	Prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' <i>Managing Urban Stormwater: Soils and Construction Guidelines</i> (Landcom, 2004). The Erosion and Sediment Control Plan would be implemented prior to and throughout construction and be updated and managed throughout as relevant to the activities during the construction phase.
54.	Erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be left in place until the works are complete and areas are stabilised.
55.	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area.
56.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards and EPA Guidelines.
57.	An environmental risk assessment is to be undertaken prior to construction and must include a section on contamination as per the TfNSW Standard Requirements.
58.	Adequate water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2015g) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in how to use the kits in the case of a spill.
59.	In the event of a pollution incident, works would cease in the immediate vicinity and the EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
60.	The existing drainage systems would remain operational throughout the construction phase.
61.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the <i>Waste Classification Guidelines</i> (EPA, 2014) and TfNSW's <i>Water Discharge and Reuse Guideline</i> (TfNSW, 2015b).
Air quality	
62.	Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's <i>Air Quality Management Guideline</i> (TfNSW, 2015h).
63.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
64.	Plant and machinery would be regularly checked and maintained in a proper and efficient condition.
65.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.

No.	Mitigation measure
66.	To minimise the generation of dust from construction activities, the following measures would be implemented: • apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces) • cover stockpiles when not in use • appropriately cover loads on trucks transporting material to and from the construction site and securely fix tailgates of road transport trucks prior to loading and immediately after unloading • prevent mud and dirt from being tracked onto sealed road surfaces.
Waste and contamination	
67.	The CEMP (or separate Waste Management Plan, if necessary) must address waste management and should at a minimum: • identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities • detail other onsite management practices such as keeping areas free of rubbish • outline the reporting regime for collating construction waste data.
68.	The existing bicycle racks and bus shelter on Jannali Avenue should be salvaged, if possible, for reuse.
69.	An appropriate Unexpected Finds Protocol, incorporating asbestos containing materials and other potential contaminants, would be included in the CEMP. This would include procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements.
70.	All spoil to be removed from site would be tested to confirm presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
71.	All spoil and waste must be classified in accordance with the <i>Waste Classification Guidelines Part 1: Classifying Waste</i> (EPA, 2014) prior to disposal.
72.	Any concrete washout should be established and maintained in accordance with TfNSW's <i>Concrete Washout Guideline</i> – draft (TfNSW, 2015i) with details included in the CEMP and location marked on the ECM.
Climate change and sustainability	
73.	The detailed design process would include a Greenhouse Gases (project level) compliant carbon footprinting exercise in accordance with AS14064-2 and TfNSW's <i>Greenhouse Gas Inventory Guide for Construction Projects</i> (TfNSW, 2013e). The carbon footprint would then be used to inform decision making in design and construction.
74.	The detailed design process would undertake a climate change impact assessment with reference to the <i>Climate Change Impacts and Risk Management: A Guide for Business and Government</i> (Department of the Environment and Heritage, 2006) and the <i>ISCA Guidelines for Climate Change Adaptation</i> (AGIC, 2011) 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.

No.	Mitigation measure
75.	Detailed design of the Proposal would be undertaken in accordance with the <i>NSW Sustainable Design Guidelines – Version 3.0</i> (TfNSW, 2013a) with a view to obtaining a Silver rating or better.
Cumulative impacts	
76.	The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed in the CEMP, and implemented as appropriate.

8 Conclusion

This REF has been prepared in accordance with the provisions of section 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 at Jannali Station providing an accessible path of travel to the station platforms through the provision of accessible parking, upgraded footpaths, rest points (seats), a new pedestrian bridge and stairs/lifts
- improved customer amenity and facilities at the station including a Family Accessible Toilet, canopies over the pedestrian bridge, stairs, lift landings and entry plazas for weather protection along with new tactiles and wayfinding signage
- improved connections with the bus and pedestrian networks including through the new pedestrian bridge to provide direct access across the railway, new/relocated bus zones closer to the western station entrance and new/upgraded footpath and ramps
- improved transport interchange facilities including kiss and ride areas and bicycle facilities on both sides of the station.
- potential increased use of public transport to and from Jannali.

The likely key impacts of the Proposal are as follows:

- temporary changes to vehicle and pedestrian movements in and around the station
- temporary parking impacts on local roads and car parks
- net loss of four unrestricted car park spaces, two time-restricted street parking spaces on Jannali Avenue and two unrestricted street parking spaces on Mitchell Avenue
- temporary construction noise, dust and visual impacts
- removal of trees/vegetation that would require planting offsets (with two of the potential six trees to be removed forming part of a local heritage listing)
- introduction of new elements such as the new pedestrian bridge, canopies, lifts, and stairs 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 6, Appendix A and Appendix B). 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.

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Appendix A Consideration of matters of National Environmental Significance

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

Matters of NES	Impacts
Any impact on a World Heritage property? There are no World Heritage properties in the vicinity of the Proposal.	Nil
Any impact on a National Heritage place? There are no National Heritage places in the vicinity of the Proposal.	Nil
Any impact on a wetland of international importance? The Proposal site is located with 10 kilometres of the Towra Point Nature Reserve which is listed as a wetland of international importance. However due to the proximity, scale and nature of the works it is unlikely that the Proposal would have any significant impact to the wetland.	Nil
Any impact on a listed threatened species or communities? The Grey-headed Flying-fox, which is a listed threatened species, is considered to have a high likelihood of occurring in the study area due to the presence of suitable foraging habitat and close proximity to known roost camps. Other potentially occurring threatened fauna species which have a moderate potential to occur intermittently in the study area to forage in habitats include the Powerful Owl, Eastern Bentwing Bat, Yellow-bellied Sheath-tail-bat, Eastern Freetail-bat and Greater Broad-nosed Bat. An assessment of significance was conducted for each of the above species and determined that there is unlikely to be a significant impact to any threatened species due to the minimal impacts predicted from the Proposal. The works would not result in the removal of any high quality habitat or breeding habitat for these species and they would be able to persist in the study area after the works have been completed. The habitat would remain in a similar state after the proposed works have been completed.	Nil
Any impacts on listed migratory species? It is unlikely that the development of the Proposal would significantly affect any listed migratory species.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? There are no Commonwealth marine areas in the vicinity of the Proposal.	Nil

Matters of NES	Impacts
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? 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? The Proposal would not be undertaken on or near any Commonwealth land.	Nil

Appendix B Consideration of clause 228

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

Factor	Impacts
(a) Any environmental impact on a community? There would be some temporary impacts to the community during construction, particularly in relation to noise, traffic and access and visual amenity. Mitigation measures outlined in Chapter 7 would be implemented to manage and minimise adverse impacts.	Minor
(b) Any transformation of a locality? The western side of the station is characterised by mature street trees, and while some tree removal is required efforts have been made during the development of the concept design to minimise the area of trees to be removed so to maintain the visual character of the area (refer to Section 6.5 for more detail). The Proposal would have a positive contribution to the locality by creating a new, open and accessible entrance to the station (with at least one replacement tree) and also facilitating public access across the railway through the new pedestrian bridge.	Minor
(c) Any environmental impact on the ecosystem of the locality? The Proposal would require removal of three street trees but given the Proposal's location within an urbanised environment and the low habitat value of the trees to be removed, impacts to biodiversity and ecosystems are expected to be negligible.	Nil
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be some temporary impacts during construction particularly in relation to noise, traffic and access and visual amenity. Three trees would need to be removed from the western station entrance, but the number of trees to be removed has been minimised as far as possible given that the trees have a high aesthetic value contributing to the landscape character of the area. At least one tree would be replanted at the western station entrance which has been designed to be a more open and attractive entry plaza.	Minor

Factor	Impacts
(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? The western side of the station is characterised by mature street trees which are listed on the heritage schedule of the Sutherland Shire LEP, and while some tree removal is required, efforts have been made during the development of the concept design to minimise the area of trees to be removed to maintain the visual character of the area (refer to Section 6.5 for more detail). The detailed design and construction of the Proposal would be undertaken with regard for the heritage-listed trees to minimise impacts, as much as practicable. The Proposal would have a positive contribution to the locality by creating a new, open and accessible entrance to the station (with at least one replacement tree) and also facilitating public access across the railway through the new pedestrian bridge. A desktop archaeological assessment has been undertaken which determined that there is a low risk of encountering archaeological items/deposits and that the proposed works are unlikely to expose historical archaeological relics.	Minor
(f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)? The Proposal is unlikely to have any impact on the habitat of protected fauna.	Nil
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The Proposal is unlikely to have any impact on endangering 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? The Proposal is unlikely to have any long term effects on the environment.	Nil
(i) Any degradation of the quality of the environment? The Proposal is unlikely to have any degradation on the quality of the environment.	Nil
(j) Any risk to the safety of the environment? The Proposal is unlikely to cause any pollution or safety risks to the environment provided the recommended mitigation measures are implemented.	Nil
(k) Any reduction in the range of beneficial uses of the environment? The Proposal is unlikely to have any reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The Proposal is unlikely to cause any pollution or to the environment provided the recommended mitigation measures are implemented.	Nil

Factor	Impacts
(m) Any environmental problems associated with the disposal of waste? The Proposal is unlikely to cause any environmental problems associated with the disposal of waste. All waste would be managed and disposed of with a site-specific Waste Management Plan. Mitigation measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Nil
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is unlikely increase demands on resources that are or are likely to become in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative effects of the Proposal are described in Section 6.12. Where feasible, environmental management measures would be co-ordinated to reduce any cumulative construction impacts. The Proposal is unlikely to have any significant adverse long term impacts.	Nil
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal would not affect or be affected by any coastal processes or hazards.	Nil

Appendix C Sustainable Design Guidelines checklist

Initiative	Theme	Description	Applied to Reference Design	Reference Design – Comments
C.11 Reduce cement	Materials and waste	Reduce the absolute quantity of Portland cement by at least 30 per cent, as an average across all concrete mixes, by substituting it with supplementary cementitious materials (such as a fly ash, ground granulated blast furnace slag or alkali activated cements) subject to meeting strength and durability requirements.	Yes	This initiative is related to Design and Construction stages of the project. Structural design and construction team to reduce cement use where possible in compliance with credit criteria.
C.13 Heritage conservation and enhancement	Biodiversity and heritage	100 per cent of significant heritage items are identified during project development and design and are protected or beneficially reused where practical. This will require consultation with all relevant Indigenous Heritage groups (where applicable).	Yes	This initiative is related to Design stage of the project. Where applicable, all significant heritage items are identified and are protected or reused where feasible and in compliance with credit criteria.
C.16 Water efficient fittings	Water	Ensure onsite amenities using potable water comply with the following criteria: Toilets to be WELS (max 4.5/3 L/min) dual flush toilets; Urinals to be waterless; All taps to be WELS (max 7.5 L/min); (see Green Star Office v3). Any other water fixtures should achieve at least a 5 star WELS rating.	Yes	This initiative is related to Design and Construction stages of the project. Where applicable Toilets, Urinals and Taps to comply with compliance criteria provided.
C.17 Water efficient controls	Water	Specify sensors, timers or spring loaded devices for taps where possible to reduce water loss from taps that are left running.	Yes	This initiative is related to Design and Construction stages of the project. Water efficient control initiatives to be incorporated into the design where applicable.

Initiative	Theme	Description	Applied to Reference Design	Reference Design – Comments
C.20 Noise management	Pollution control	Project to comply with <i>Transport Projects Construction Noise Strategy</i> and related conditions of approval.	Yes	All design and construction work to comply with Transport Projects Construction Noise Strategy and related conditions of approval as outlined by TfNSW. This initiative is related to both Design and Construction stages of the project.
C.23 Crime Prevention Through Environmental Design (CPTED)	Community benefit	Incorporate CPTED principles during design. This may include natural observation and use of CCTV. Natural observation is achieved through fence, landscape, streetscape and open space design in public or staff supervised areas. This is achieved by minimising narrow corridors, hidden corners and through the use of lighting.	Yes	All design and construction work to comply with Crime Prevention Through Environmental Design (CPTED) requirements. This initiative is related to both Design and Construction stages of the project.
3.14 Sustainable structural steel	Materials and waste	Source at least 60 per cent of structural steel (by weight) from a steel fabricator/contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute.	Yes	This initiative is related to Construction stage of the project only. The construction team are encouraged to source at least 60 per cent of structural steel (by weight) from a steel fabricator/contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute.
3.15 Lower embodied energy bar and mesh	Materials and waste	Source at least 60 per cent of bar and mesh that is produced through energy reduction processes such as Polymer Injection Technology.	Yes	The construction team are encouraged to source at least 60 per cent of bar and mesh that is produced through energy reduction processes such as Polymer Injection Technology. This initiative is related to Construction stage of the project only.
3.16 Optimal preassembly of reinforcing steel	Materials and waste	Source at least 15 per cent of reinforcing steel from suppliers that use optimal off site fabrication techniques such as engineered reinforcing bar carpet, engineered/customised mesh or prefabricated reinforcing cages.	Yes	This initiative is related to both Design and Construction stages of the project. Where practical, the design and construction team are required to source at least 15 per cent of reinforcing steel from suppliers that use optimal off site fabrication techniques.

Initiative	Theme	Description	Applied to Reference Design	Reference Design – Comments
3.17 Low VOC paints and finishes	Materials and waste	Specify low volatile organic compound (VOC) paints and finishes. Refer to Green Star – Office Interiors v1.1 available online.	Yes	Where applicable the design and construction team are required to use low volatile organic compound (VOC) paints and finishes in compliance with Green Star Interior v1.1 credit criteria. This initiative is related to both Design and Construction stages of the project.
3.18 Low VOC adhesives and sealants	Materials and waste	Specify all adhesives and sealants as low VOC. Refer to Green Star – Office Interiors v1.1 available online.	Yes	Where applicable the design and construction team are required to use low VOC adhesives and sealants in compliance with Green Star Interior v1.1 credit criteria. This initiative is related to both Design and Construction stages of the project.
3.29 Segregation of waste	Materials and waste	Enable waste segregation in the design process by including space for the collection and segregation of waste with appropriate marking (e.g. signage) and controls (e.g. lockable lids), located away from sensitive receptors (e.g. water courses). During construction, use facilities and procedures that maximise on-site separation of waste to maximise reuse/recycling.	Yes	To encourage materials and waste minimisation, where applicable, the design team is required to allow for waste segregation by including space for the collection and segregation of waste. The construction team is required to use facilities and procedures that maximise on-site separation of waste to maximise reuse/recycling. This initiative is related to both Design and Construction stages of the project.
7.16 Enable easy and intuitive navigation	Community benefit	Devise efficient pedestrian movement routes, and make sure that exits and entries are readily identifiable by sight without any reliance upon signage (e.g. arrows on directional floor tiling to direct to exits).	Yes	Where practical, the design is required to devise efficient pedestrian movement routes, and make sure that exits and entries are readily identifiable. This initiative is related to Design stage of the project.
7.18 Enhance access and public amenity	Community benefit	Develop a coordinated strategy between agencies to make sure that modal interchanges are accessible and seamless.	Yes	In order to enhance access and public amenity, the design is required to develop a coordinated strategy between agencies to make sure that modal interchanges are accessible and seamless. This initiative is related to Design stage of the project.

Initiative	Theme	Description	Applied to Reference Design	Reference Design – Comments
7.19 Kiss and ride	Community benefit	Provide for kiss and ride at the station.	Yes	Where applicable, the design is required to provide for kiss and ride at the station. This initiative is related to Design stage of the project.
7.20 Sheltered taxi stands and bus stops	Community benefit	Provide shelter for nearby taxi stands and bus stops.	Yes	Where applicable, the design is required to provide shelter for nearby taxi stands and bus stops. This initiative is related to Design stage of the project.
7.31 Wide footpaths	Community benefit	Design wider than minimum footpaths to enhance safety and service, keep corners clear of obstructions and improve intersections	Yes	Where applicable the design team is required to allow for wider than minimum footpaths to enhance safety and service, keep corners clear of obstructions and improve intersections. This initiative is relevant to design stage of the project.
7.32 Easy pathways	Community benefit	Make sure that pathways consider topography; minimising steep slopes and provide alternatives to steps.	Yes	To enhance accessibility, the design team is required to make sure that pathways consider topography; minimising steep slopes and provide alternatives to steps. This initiative is applicable to Design stage of the project.
7.33 Safe pedestrian movement	Community benefit	Make sure that safe movement is promoted for pedestrians and cyclists by minimising vehicle crossings of paths, providing clear signage, and providing freedom from obstacles such as poles, trees etc.	Yes	Where applicable the design team is required to ensure safe movement is promoted for pedestrians and cyclists by minimising vehicle crossings of paths, providing clear signage, and providing freedom from obstacles such as poles, trees etc. This initiative will be further detailed as part of the detailed design stage of the project.

Initiative	Theme	Description	Applied to Reference Design	Reference Design – Comments
7.47 Comfortable pedestrian and cyclist movement	Community benefit	Make sure that interchange is designed to promote pedestrian activity and bicycle use by considering the comfort and amenity of users (e.g. including a buffer zone between the roadway and the walking area, avoid placing pedestrian and cycling crossing points at busy intersections, locate pedestrian and cycle crossings as close to the direct line of travel as possible, make sure that there are clear views of traffic at crossing points, provide kerb ramps, provide alternatives to pedestrian and bicycle crossings at roundabouts).	Yes	This initiative is relevant to design stage of the project. Where applicable, the design team is required to make sure that interchange is designed to promote pedestrian activity and bicycle use by considering the comfort and amenity of users.
7.50 Shading	Community benefit	Provide shade through vegetation or structures over platform, concourse, car parks and pedestrian pathway areas and work/lunch areas.	Yes	Where practical, provide shade through vegetation or structures over platform, concourse, car parks and pedestrian pathway areas and work/lunch areas. This initiative is relevant to design stage of the project.
7.51 Asset vegetation	Community benefit	Provide vegetation to reduce heat islanding and increase visual attraction.	Yes	Where applicable, it is required to provide vegetation to reduce heat islanding and increase visual attraction. This initiative is related to both Design and Construction stages of the project.
7.52 Heat islands	Community benefit	Use light coloured materials on roofs and pavements to both shade from and reflect sunlight, in order to decrease heat islanding.	Yes	In order to minimise Heat Island effect, it is required to use light coloured materials on roofs and pavements to both shade from and reflect sunlight. This initiative is related to both Design and Construction stages of the project.