Transport for NSW

Tuggerah Station Upgrade

Review of Environmental Factors

NSW GOVERNMENT

Artist's impression of the proposed Tuggerah Station Upgrade from the west, subject to detailed design

March, 2022

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Tables

Abbreviations

Term	Meaning
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ASS	Acid Sulfate Soils
BAZ	Boarding Assistance Zone
BCA	Building Code of Australia
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CBD	Central Business District
CCTV	Closed Circuit TV
CEMP	Construction Environmental Management Plan
CERT	Carbon Estimate Reporting Tool
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CNVMP	Construction Noise and Vibration Management Plan
CPTED	Crime Prevention Through Environmental Design
CSR	Combined Services Route
CTMP	Construction Traffic Management Plan
DBYD	Dial Before You Dig
D&C	Design & Construct
DDA	*Disability Discrimination Act 1992* (Cwlth)
DPE	NSW Department of Planning and Environment (current)
DPIE	NSW Department of Planning, Industry and Environment (former)
DSAPT	*Disability Standards for Accessible Public Transport (2002)*
ECM	Environmental Controls Map
EES	NSW Environment, Energy and Science (Division of DPE) (formerly OEH)
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)

Term	Meaning
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
EWP	Elevated work platforms
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
HV	High Voltage
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
IS rating	Infrastructure Sustainability rating under IS Council rating tool (v 1.2)
IS Council	Infrastructure Sustainability Council
kV	Kilovolt
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
LV	Low Voltage
NCA	Noise Catchment Area
NES	National Environmental Significance
NML	Noise Management Level
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	Formerly NSW Office of the Environment and Heritage
OOHW	Out of hours work
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
RailCorp	(former) Rail Corporation of NSW
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)

Term	Meaning
Roads Act	*Roads Act 1993* (NSW)
Roads and Maritime	Formerly NSW Roads and Maritime Services
SCM	Supplementary Cementitious Materials
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
TAHE	Transport Asset Holding Entity of NSW
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TGSI	Tactile Ground Surface Indicators (“tactiles”)
TMP	Traffic Management Plan
TPZ	Tree Protection Zone
UDP	Urban Design Plan
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)
WM Act	*Water Management Act 2000* (NSW)
WMP	Waste Management Plan
WSUD	Water Sensitive Urban Design

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.
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 reference design presented in the REF and completing the detailed design so that it is suitable for construction (subject to TfNSW acceptance). The Contractor is therefore responsible for all work on the project, both design and construction.
Detailed design	Detailed design broadly refers to the process that the Contractor undertakes (should the Proposal proceed) to refine the reference design to a design suitable for construction (subject to TfNSW acceptance).
Disability Standards for Accessible Public Transport **DSAPT**	The Commonwealth *Disability Standards for Accessible Public Transport 2002* ("Transport Standards") (as amended) are a set of legally enforceable standards, authorised under the Commonwealth *Disability Discrimination Act 1992* (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.
Kiss and ride bay	A kiss and ride bay allows for quick entry and exit by vehicles, which helps minimise congestion and risk when used properly. These types of bays operate under the same conditions as no parking zones, which means a customer may stop to drop off or pick up others for a maximum of two minutes. They are required to remain in, or within three metres of their vehicle (Service NSW, 2016).
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.
Out of hours work	Defined as work *outside* standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).

Term	Meaning
Proponent	A person or body proposing to carry out an activity under Division 5.1 of the EP&A Act - in this instance, TfNSW.
Rail possession / shutdown	Shutdown 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.
Reference design	The reference design is the preliminary design presented in this REF, which would be refined by the Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance).
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 Tuggerah 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 5.5 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

The NSW Government is improving accessibility at Tuggerah Station. This project is being delivered as part of the Transport Access Program, a NSW Government Initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure.

As part of this program, the Tuggerah Station Upgrade (the Proposal) would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage.

The Proposal would provide:

- construction of a new pedestrian footbridge north of the existing footbridge with new stairs connecting the Pacific Highway, the commuter car park and the station platforms, with canopies for weather protection over the footbridge and all stairs
- installation of a two-stop lift connecting Platform 1 and the new pedestrian footbridge, and installation of a three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge
- removal of the existing non-compliant ramps, stairs and pedestrian footbridge
- removal of the existing Station Master's office, and construction of a new Station Master's office
- widening and lengthening of Platforms 1 and 2 to achieve compliant platform widths, improve accessibility and space for station customers and allow for future rolling stock
- construction of a family accessible toilet on Platform 1 and a unisex ambulant toilet on Platform 1
- interchange upgrade work including provision of new bike parking facilities at the new station entrances, provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces in the commuter car park, new accessible footpaths on both eastern and western side of the station, and upgrade to the existing Pacific Highway southbound bus stop to be DSAPT compliant
- landscaping work including public domain improvements at the station forecourt areas, new lighting, and enhancement of sightlines between Anzac Road and Bryant Drive
- ancillary work including station power supply upgrade, replacement of existing 11kV and 66kV overhead power lines with underground cables, construction of new equipment room, provision of new or reinstated tactile pavement markings where required and improvements to station communication systems including CCTV and hearing loops.

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

This Review of Environmental Factors (REF) has been prepared to assess all matters affecting or likely to affect the environment by reason of the construction and operation of the Proposal under the provisions of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Subject to approval, construction is expected to commence in mid-2022 and take around 16 months to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF. An overview of the Proposal is shown in Figure ES-1.

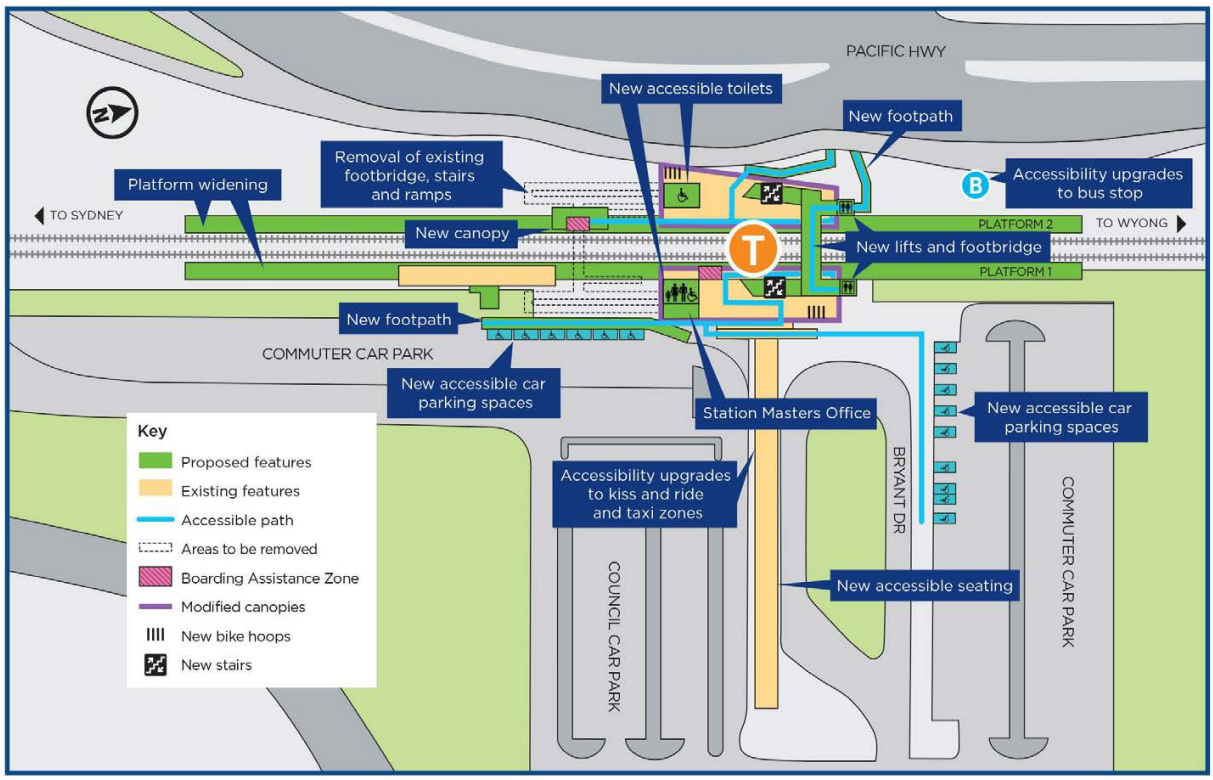


Figure ES-1 Key features of the Proposal (subject to change during detailed design)

Need for the Proposal

The Proposal would ensure that Tuggerah Station would meet legislative requirements under the *Disability Discrimination Act 1992* (DDA) and the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

The Proposal is 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.

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

Community and stakeholder consultation

Community consultation activities for the Proposal would be undertaken during the public display period of this REF with the public invited to submit feedback to help TfNSW understand what is important to customers and the community. The REF would be displayed for a period of three weeks. Further information about these specific consultation activities is included in Section 5.1 of this REF.

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

In accordance with the requirements of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP), consultation is required with local councils and/or public authorities in certain circumstances, including where council managed infrastructure is affected. Consultation has been undertaken internally with Sydney Trains, NSW Trains, Customer Strategy and Technology, Infrastructure and Place, and Regional & Outer Metropolitan representatives within TfNSW during the development of design options and the preferred option. Consultation was also undertaken with Central Coast Council, Department of Planning and Environment, Hunter and Central Coast Development Corporation, and Regional NSW as part of an integrated transport planning initiative, which informed the connectivity objectives in the Tuggerah Station Precinct and the preferred option. Consultation with these stakeholders will continue through the detailed design and construction of the Proposal.

Feedback can be sent to:

- projects@transport.nsw.gov.au
- Transport Access Program – Tuggerah Station Upgrade
  Director Environment and Sustainability (Rail Development and Delivery)
  Transport for NSW
  PO Box K659
  Haymarket NSW 1240

Or submitted:

- via nsw.gov.au/have-your-say/Tuggerah-Station-Upgrade

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 ES-2 shows the planning approval and consultation process for the Proposal.

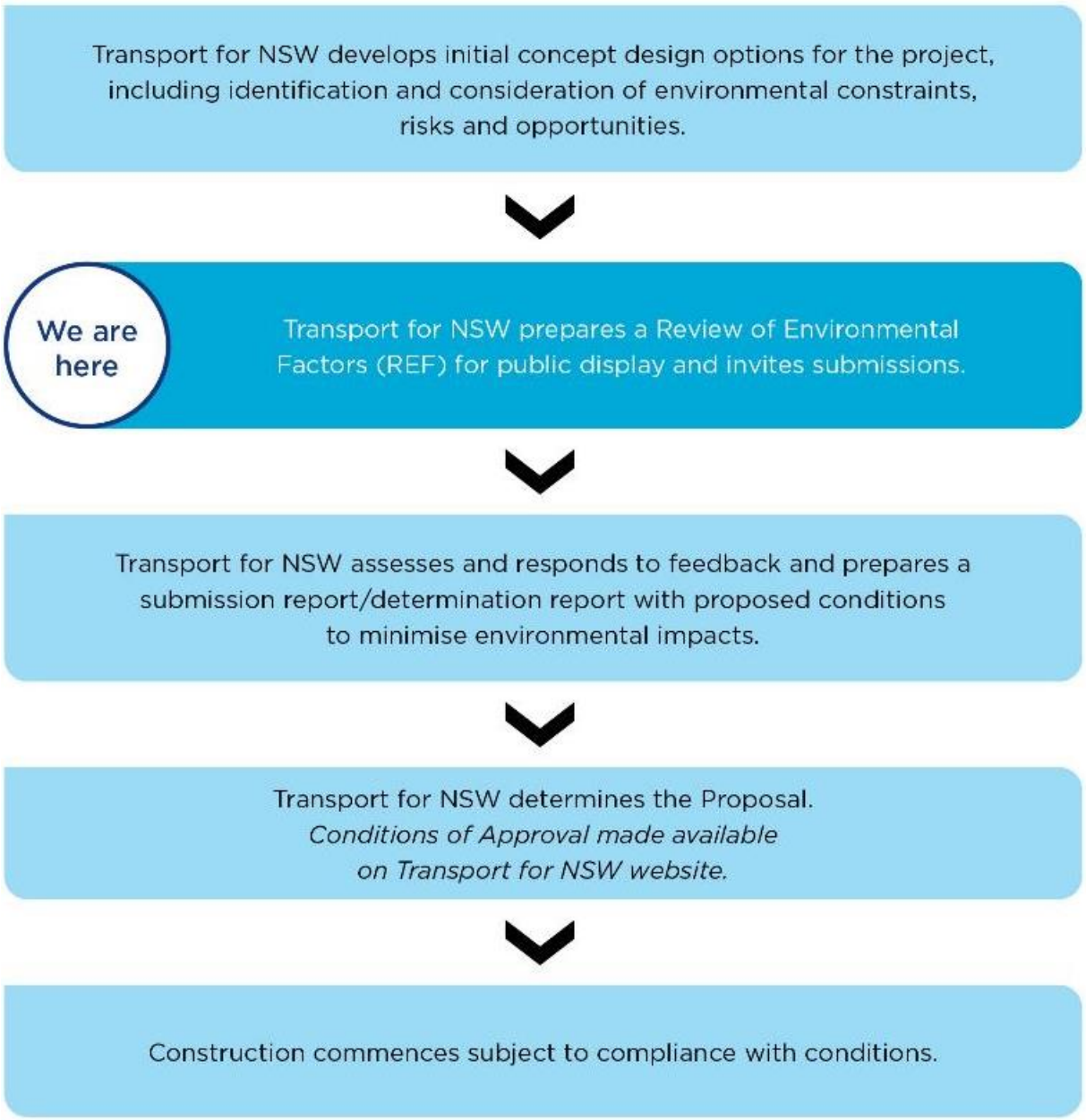


Figure ES-2 Planning approval and consultation process for the Proposal

Environmental impact assessment

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

The Proposal would provide the following benefits:

- improved and equitable access to Tuggerah Station for customers as a result of the installation of lifts and a new footbridge, accessible parking, upgraded accessible paths and boarding assistance zones
- improved station amenity and safety for customers at the station resulting from the installation of the family accessible toilet, unisex ambulant toilet, new lighting and CCTV
- improved safety of the existing platform stairs by installing new tactiles and handrails.

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

- temporary changes to vehicle and pedestrian movements in and around the station during construction, including temporary footpath diversions
- temporary changes to parking arrangements (including temporary loss of parking spaces) in the Bryant Drive commuter car park during construction
- visual changes due to the introduction of elements into the existing built environment including two new lifts and a new footbridge, and the removal of other elements including the existing footbridge, stairs and ramps, and vegetation on the western side of the station
- temporary visual changes during construction due to the introduction of construction compounds and work areas
- temporary noise and vibration impacts during construction.

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

Conclusion

This REF has been prepared having regard to sections 5.5 and 5.7 of the EP&A Act, and clause 228 of the 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 developed in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a) 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.

A photomontage of the Proposal is shown in Figure ES-3.

Figure ES-3 Indicative photomontage, subject to detailed design

1 Introduction

Transport for NSW (TfNSW) is responsible for strategy, planning, policy, procurement, regulation, funding allocation and other non-service delivery functions for all modes of transport in NSW including road, rail, ferry, light rail, point to point, cycling and walking. TfNSW is the proponent for the Tuggerah Station Upgrade (the 'Proposal').

1.1 Overview of the Proposal

1.1.1 The need for the Proposal

The Tuggerah Station Upgrade forms 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.

The NSW Government is committed to facilitating and encouraging the 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 Proposal is needed to improved accessibility of the Tuggerah station in line with the requirements of the *Disability Discrimination Act 1992* (DDA) and the *Disability Standards for Accessible Public Transport 2002* (DSAPT). The proposal is also needed to facilitate future precinct upgrades and proposed development in Tuggerah and improve connectivity between transport nodes to support growing population and economic activity in the local area and the broader regional corridor between Sydney and Newcastle.

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- construction of a new pedestrian footbridge north of the existing footbridge with new stairs connecting the Pacific Highway, the commuter car park and the station platforms with canopies for weather protection over the footbridge and all stairs
- installation of a two-stop lift connecting Platform 1 and the new pedestrian footbridge, and installation of a three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge
- removal of the existing non-compliant ramps, stairs and pedestrian footbridge
- removal of the existing Station Master's office, and construction of a new Station Master's office
- widening and lengthening of Platforms 1 and 2 to achieve compliant platform widths, improve accessibility and space for station customers and allow for future rolling stock
- construction of a family accessible toilet on Platform 1 and a unisex ambulant toilet on Platform 1
- interchange upgrade work including provision of new bike parking facilities at the new station entrances, provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces in the commuter car park, new accessible footpaths on both eastern and western side of the station, and upgrade to the existing Pacific Highway southbound bus stop to be DSAPT compliant

- landscaping work including public domain improvements at the station forecourt areas, new lighting, and enhancement of sightlines between Anzac Road and Bryant Drive
- ancillary work including station power supply upgrade, replacement of existing 11kV and 66kV overhead power lines with underground cables, construction of new equipment room, provision of new or reinstated tactile pavement markings where required and improvements to station communication systems including CCTV and hearing loops.

Subject to planning approval, construction is expected to commence in 2022 and take around 16 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 demolition and upgrade work to Tuggerah Station and associated buildings and infrastructure. Tuggerah Station is located in the suburb of Tuggerah in the Central Coast Council local government area (LGA). The station is on the Central Coast and Newcastle line, about 100 kilometres north of the Sydney Central Business District (CBD). The location of the station and its regional context is shown in Figure 1-1.

The Proposal is bounded by the intersection of Anzac Road and Pacific Highway to the west and a commuter car park at the end of Bryant Drive to the east. The Proposal includes the station structures, footpath/kerb and platform, as well as the commuter car park.

Data sources

Jacobs 2021
Aerometrex 2021
Department Finance, Services and Innovation 2020

Figure 1-1 Regional context

1.3 Existing infrastructure and land uses

1.3.1 Existing access and facilities

Tuggerah Station consists of a two-platform configuration, with the platforms connected to each other, as well as to the station forecourts on both sides via an overhead footbridge, stairs and ramps. The platforms are accessed from the Pacific Highway and a signalised intersection to the west, and from the commuter car park and pedestrian facilities to the east. Trains arriving on Platform 1 proceed towards Sydney via Hornsby and Strathfield, while trains on Platform 2 proceed towards Newcastle. A station building is located near the middle of Platform 1 and contains a ticket booking office/staff office and toilet facilities. Other customer facilities such as Opal card readers, bench seating and passenger information displays are located on each platform. Weather protection is provided across the middle sections of both platforms and across the footbridge, stairs and ramps that connect the two platforms.

Tuggerah Station has a commuter car park including kiss and ride and taxi bays east of the station, which is accessed via Bryant Drive. The existing car park accommodates around 500 cars, and includes 19 accessible spaces. However, these accessible spaces do not comply with DDA requirements.

In addition to the station car parking, there is a substantial supply of on- and off-street parking east of Tuggerah station. There is unrestricted kerbside parking along both sides of Bryant Drive between the Bunnings Warehouse entrance and Lake Road (with some exclusions for bus stops and traffic/road safety provisions). There is also some unrestricted kerbside parking along the south side of Lake Road, east of Bryant Drive. Further, there is a large Council car park on the eastern side of Bryant Drive opposite the Tuggerah Super Centre, and another large (off-street) car park which services the Central Coast Regional Sporting and Recreation Complex, in Lake Road.

There is a bus stop behind the kiss and ride bay within the commuter car park, as well as two bus stops on the Pacific Highway west of the station. There are also bike racks and a secure bike locker in the commuter car park.

The Proposal area is shown in Figure 1-2 and includes the total footprint of proposed work.

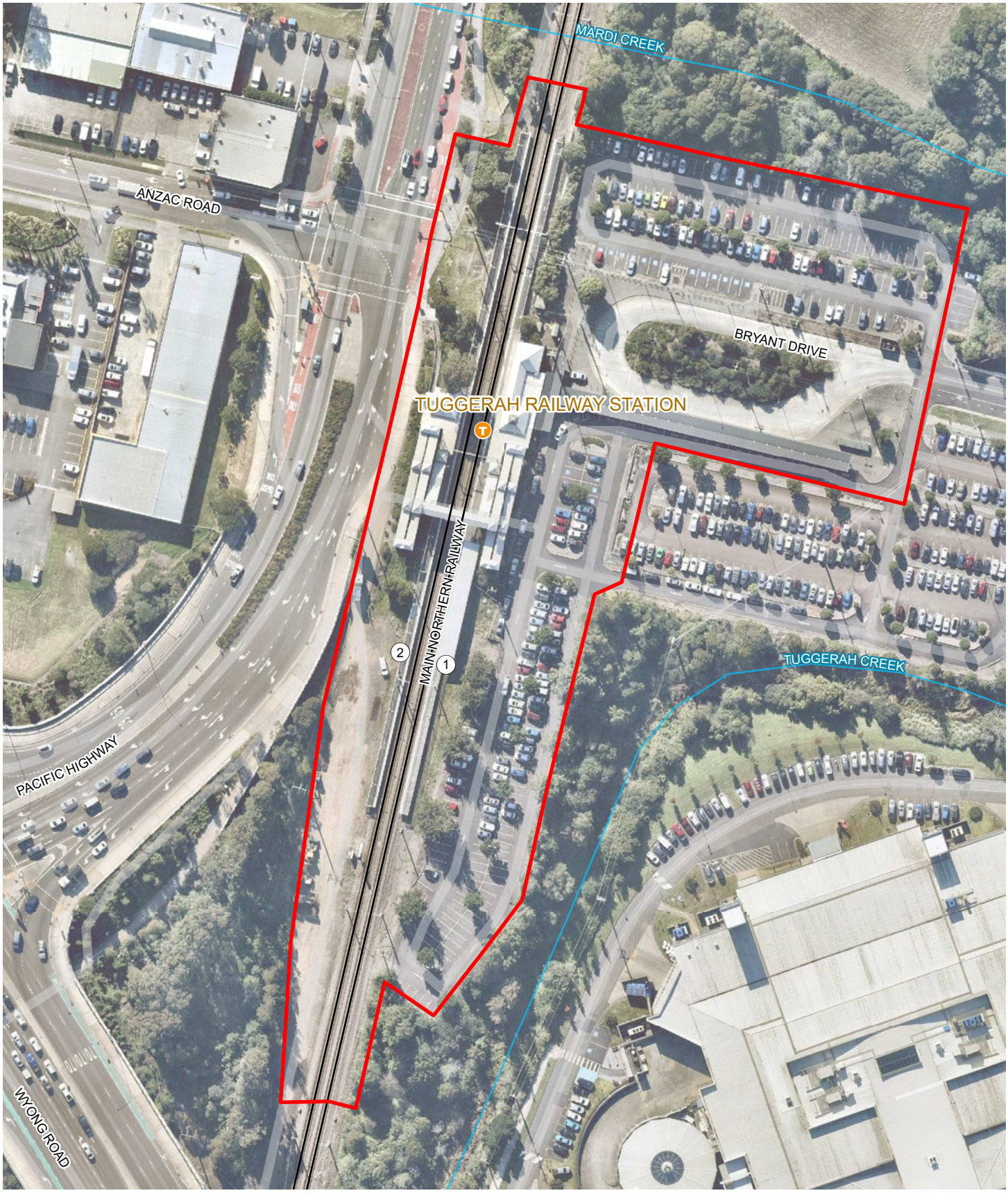


Figure 1-2 Site locality map

1.3.2 Surrounding land use

The Proposal is located on land zoned SP2 Infrastructure: Rail Infrastructure Facility under the Wyong Local Environmental Plan 2013 (Wyong LEP). Tuggerah Station is located about 250 metres east of the Westfield Tuggerah Shopping Centre and about 170 metres north west of the Tuggerah Super Centre. The station is surrounded by urban and natural environments, including the Central Coast Wetlands, Central Coast Regional Sporting and Recreation Complex, and the Tuggerah Business Park on the eastern side of the rail corridor. There are also light industrial, residential, recreational and environmental land uses on the western side of the rail corridor.

Photos of the existing station and surrounding area are shown in Figure 1-3, Figure 1-5 and Figure 1-6.

Figure 1-3 Platform ramps and stairway as viewed from the pedestrian footbridge, facing north

Figure 1-4 Platforms viewed from the existing pedestrian footbridge, facing south

Figure 1-5 Commuter car park with kiss and ride bay and bus stop on Bryant Drive

Figure 1-6 Entry to the station from Pacific Highway, facing south

Figure 1-7 Entry to the station from Pacific Highway, facing north

Figure 1-8 Existing parking on the eastern side of the station, within the commuter car park

Figure 1-9 Pacific Highway station entrance, with existing signage, ramp and canopy

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by Jacobs on behalf of TfNSW to assess the potential impacts of the Tuggerah Station Upgrade. For the purposes of these works, TfNSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this REF is to describe the Proposal, to assess the likely impacts of the Proposal having regard to the provisions of Section 5.5 of the EP&A Act, and to identify mitigation measures to reduce the likely impacts of the Proposal. This REF has been prepared in accordance with clause 228 of the Environment Planning and Assessment Regulation 2000 (EP&A Regulation).

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

Having regard to the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this REF considers the potential for the Proposal to have a significant impact on matters of National Environmental Significance (NES) or Commonwealth land, and the need to make a referral to the Commonwealth Department of the Environment and Energy for any necessary approvals under the EPBC Act. Refer to Chapter 4 for more information on statutory considerations.

2 Need for the Proposal

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

2.1 Strategic justification

Improving transport customer experience is the focus of the NSW Government's transport initiatives. Transport interchanges and train stations are 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 Tuggerah 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.

Table 2-1 provides an overview of NSW Government policies and strategies relevant to the Proposal.

Table 2-1 Key NSW Government policies and strategies applicable to the Proposal

Policy / Strategy	Overview	How the Proposal aligns
Future Transport Strategy 2056 (TfNSW, 2018)	*Future Transport 2056* is an update of NSW's *Long Term Transport Master Plan*. It is a suite of strategies and plans for transport to provide an integrated vision for the state. *Future Transport 2056* identifies 12 customer outcomes to guide transport investment in Greater Sydney. These outcomes include transport providing convenient access, supporting attractive places and providing 30-minute access for customers to their nearest centre by public transport. Other customer outcomes include connecting people and places by providing fast and convenient interchanging, enhancing the liveability of places and delivering transport infrastructure that is fully accessible, affordable and makes the best use of available resources and assets.	The strategy identifies the Transport Access Program as key to delivering the customer outcome of fully accessible transport for all customers, by increasing compliance with the DDA and accompanying disability standards. The Proposal would assist in achieving this customer outcome by increasing the accessibility (new lifts and accessible paths) and connectivity of Tuggerah Station for all customers. The Proposal would also deliver greater safety for all customers and allows greater mobility choices for people with disability or those who find it difficult to access public transport services. Greater accessibility would also mean better connections to places of employment, recreation, and education.

Policy / Strategy	Overview	How the Proposal aligns
Disability Inclusion Action Plan 2018-2022 (TfNSW, 2017)	The *Disability Inclusion Action Plan 2018-2022* was developed by TfNSW in consultation with the Accessible Transport Advisory Committee, which consists of representatives from peak disability and ageing organisations within NSW. The Disability Plan identifies 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 would address disability inclusion by upgrading Tuggerah Station to align with DDA and DSAPT requirements. The Proposal would align with objectives in the Plan by improving accessibility at the Tuggerah Station and between trains and other modes of travelling including bus, taxi and private vehicle.
Building Momentum – State Infrastructure Strategy 2018-2038 (Infrastructure NSW, 2018)	The *State Infrastructure Strategy 2018-2038* makes recommendations for each of NSW's key infrastructure sectors including transport. The strategy identifies the Central Coast as the fastest growing corridor in NSW, and identifies the need to improve passenger rail services to Sydney and Newcastle to allow for access to economic opportunities. A key recommendation in the Strategy is to invest in transport infrastructure that is integrated with land use to create opportunities for agglomeration and enhance productivity, liveability and accessibility.	The Proposal would provide for improved accessibility to and within the Tuggerah train station which is a key transport node in the Central Coast region. The Proposal would also facilitate increased rail use for a wider range of customers including those with accessibility needs.
NSW: Premier Priorities *(NSW Government, 2019)* *https://www.nsw.gov.au/improving-nsw/premiers-priorities/*	In June 2019, 14 new Premier's Priorities were announced that would allow the Government to measure and deliver in areas where NSW can do better. The key policy priorities, include the following: • a strong economy • highest quality education • well-connected communities with quality local environments • putting customer at the centre of everything we do • breaking the cycle of disadvantage A key Premier Priority is the delivery of infrastructure, specifically noting the importance of every NSW community receiving its fair share of local projects and extra services.	The Proposal is aligned with the Premier's Priorities as it seeks to enhance local and regional connectivity, placing customers first and facilitating the growth of economic activity and population in Tuggerah.

Policy / Strategy	Overview	How the Proposal aligns
Central Coast Regional Plan 2036 (Greater Sydney Commission, 2018)	The *Central Coast Regional Plan* is the NSW Government's plan to deliver local employment, housing and improve liveability, the natural environment and public transport. The Plan's vision for Central Coast includes for communities to be better connected by an integrated transport system that prioritises cycling, walking and public transport, and aims to achieve well-connected communities and attractive lifestyles. Direction 17 of the Plan seeks to align land use and infrastructure planning, by maximising use and capacity of existing infrastructure, and ensuring new and intensified development is serviced by enabling and supporting infrastructure. Direction 18 of the Plan seeks to create places that are inclusive, well designed and offer attractive lifestyles.	The Proposal would support the Regional Plan's vision by supporting integrated transport at Tuggerah Station and making it accessible to all community members. The Proposal would align with the Plan's direction to enhance existing infrastructure, which can support a growing population and future development in the Tuggerah town centre precinct. The Proposal would also align with the Regional Plan's direction to provide inclusive places and making places safe and accessible for all.
Draft Central Coast Regional Plan 2041 (NSW Department of Planning, Industry and Environment, 2021)	The *Draft Central Coast Regional Plan 2041* is currently on public exhibition, with public comment being sought until March 4, 2022. The Draft Plan aims to build upon the *Central Coast Regional Plan 2036* and create a sustainable '15-minute region' of connected neighbourhoods, with close access to jobs and services. The Draft Plan aims to encourage increased active transport and public transport use, and to reduce dependency on cars. Key ideas in the Draft Plan includes prioritisation of walking, cycling and public infrastructure.	Tuggerah has been identified as a Regionally Significant Growth Aera subject to growth in urban activation and employment, and quality place outcomes. The Proposal aligns with the aims of the Draft Plan by upgrading and improving public transport infrastructure, through improved accessibility to Tuggerah Station and more accessible connections between the station and surrounding land uses. The Proposal would help to create streets that serve everyone through managing parking, mobility options, and pedestrian connectivity across the station precinct.
Central Coast Regional Plan – Draft Tuggerah to Wyong Corridor Strategy (Central Coast Council, 2019a)	The *Draft Tuggerah to Wyong Corridor Strategy* outlines directions and actions to support the implementation of the *Central Coast Regional Plan*. Action 1.3 include planning for the growth of Tuggerah by resolving connectivity, amenity and flooding constraints. Direction 3 include maximising connectivity between activity nodes and centres to support renewal opportunities	Tuggerah has been identified as a centre with potential areas of growth in the medium to long term through employment, residential and transport development. The Proposal would improve connectivity at the Tuggerah station transport node and establish opportunities for future bus, rail, pedestrian and cycling networks.

Policy / Strategy	Overview	How the Proposal aligns
Central Coast Community Strategic Plan 2018-2020 *(Central Coast Council, 2018)*	The *Community Strategic Plan* sets out key objectives for the Central Coast region, including to: • facilitate economic development to increase local employment opportunities and provide a range of jobs for all residents • improve pedestrian movement safety, speed and vehicle congestion around schools, town centres, neighbourhoods, and community facilities • ensure all new developments are well planned with good access to public transport, green space and community facilities and support active transport • foster creative and performing arts through theatres, galleries and creative spaces, by integrating art and performance into public life.	The Proposal would be consistent with the Community Strategic Plan as it would respond to the key objectives and support actions to promote accessibility to a wider range of customers, provide enhanced connectivity and accessibility to the rail network and the surrounding public spaces.

2.2 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 where it is needed most. The program aims to provide:

- stations that are accessible to those with a disability, limited mobility, parents/carers with prams and customers with luggage
- modern buildings and facilities for all public transport modes that meet the needs of a growing population
- modern interchanges that support an integrated network and allow seamless transfers between all transport 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.

2.3 Objectives of the Proposal

The specific objectives of the Tuggerah Station Upgrade are to:

- provide a station that is accessible to those with a disability, limited mobility, parents/carers with prams and customers with luggage
- improve customer experience (weather protection, better facilities and visual appearance)
- minimise pedestrian conflict and crowding points

- improve integration with surrounding precinct
- improve customer safety
- improve wayfinding in and around the station
- improve customer amenity
- maintain/create cross corridor access/pedestrian links to Tuggerah Town Centre.

2.4 Design development

In 2019, TfNSW conducted a DSAPT audit of Tuggerah Station. The Audit concluded that although the station is currently wheelchair accessible, it requires accessibility upgrades to comply with the DSAPT.

In October 2020, COVID-19 stimulus funding of $80 million was allocated to Tuggerah and Moss Vale Stations to:

- achieve legislated DSAPT compliance requirements
- improve internal pedestrian connectivity
- improve and enhance place-making opportunities to increase customer experience and patronage.

A multi-phase approach was adopted to develop and evaluate potential options for the Project. The Project team reviewed and analysed the option developed for the 2019 Tuggerah Station DSAPT Feasibility Study. A further three options were considered that provides DSAPT and place-making improvements to Tuggerah Station.

The three options underwent a preliminary technical assessment to inform a multi-criteria analysis. Through an Options Assessment workshop, 'Option 3' was determined the preferred option as it provided both DSAPT and place-making improvements to Tuggerah Station. 'Option 3' underwent further investigations and design development by the Technical Advisors.

Options considered for the Proposal are detailed in Table 2-2.

Table 2-2 Alternative options considered

Option	Key features
1	• Two new lifts from the existing footbridge to Platforms 1 and 2 • New family accessible toilet • Upgrade existing toilets to DSAPT compliance • Regrading of existing platforms • New canopy • Upgrades to existing station lighting and furniture • Widening and lengthening of Platforms 1 and 2 in certain locations • New power supply • Relocated combined services route (CSR).

Option	Key features
2	• Demolition of existing footbridge and switch back ramps • New lift and ramps down to Pacific Highway and Bryant Drive commuter car park • Electrical upgrades to station forecourt area. • New pedestrian footbridge (105 metres) across rail and road corridor • Platform toilets relocated • Landing works on Pacific Highway • Improve pedestrian permeability and connectivity • Integration with the local context • Maximise amenity of the public domain • Lighting upgrades to maximise view opportunities.
3 (preferred option)	• Demolish existing footbridge • New pedestrian footbridge across rail corridor only (45 metres with option to extend across the Pacific Highway • Relocation of bus stop on Pacific Highway • Upgrade of intersection on Pacific Highway • Removal of slip lane on Pacific Highway • Station forecourt upgrade • Integration with the local context • Maximise amenity of the public domain • Lighting upgrades to maximise view opportunities.

2.4.1 The 'do-nothing' option

Under a 'do-nothing' option, existing access to the platforms, stairs and ramp would remain the same and there would be no changes to the way the station/interchange/car park currently operates.

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 Tuggerah community.

2.4.2 Assessment of identified options

The design options 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.

2.5 Justification for the preferred option

Option 3 was identified to best meet the specific objectives of the Proposal (as outlined in Section 2.3) and the wider Transport Access Program. The multi criteria analysis showed that Option 2 & 3 scored similarly across the categories of Accessibility, Placemaking, Transport Integration, Customer Experience, Constructability and Environment. However, Option 3 was preferred due to a better Deliverability and Risk score i.e. avoiding underground infrastructure and services relocations.

Option 3, in addition to the base scope, provides precinct enhancement around Tuggerah Station with a new pedestrian bridge spanning over the rail corridor only.

The Proposal subject to this REF is described in Section 3.1.

3 Proposal description

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 reference design and is subject to detailed design.

3.1 The Proposal

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

The Proposal would include the following key elements:

- construction of a new pedestrian footbridge north of the existing footbridge with new stairs connecting the Pacific Highway, the commuter car park and the station platforms with canopies for weather protection over the footbridge and all stairs
- installation of a two-stop lift connecting Platform 1 and the new pedestrian footbridge, and installation of a three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge
- removal of the existing non-compliant ramps, stairs and pedestrian footbridge
- removal of the existing Station Master's office, and construction of a new Station Master's office
- widening and lengthening of Platforms 1 and 2 to achieve compliant platform widths, improve accessibility and space for station customers and allow for future rolling stock
- construction of a family accessible toilet on Platform 1 and a unisex ambulant toilet on Platform 1
- interchange upgrade work including provision of new bike parking facilities at the new station entrances, provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces in the commuter car park, new accessible footpaths on both eastern and western side of the station, and upgrade to the existing Pacific Highway southbound bus stop to be DSAPT compliant
- landscaping work including public domain improvements at the station forecourt areas, new lighting, and enhancement of sightlines between Anzac Road and Bryant Drive
- ancillary work including station power supply upgrade, replacement of existing 11kV and 66kV overhead power lines with underground cables, construction of new equipment room, provision of new or reinstated tactile pavement markings where required and improvements to station communication systems including CCTV and hearing loops.

Figure 3-1 shows the general layout of key elements for the Proposal.

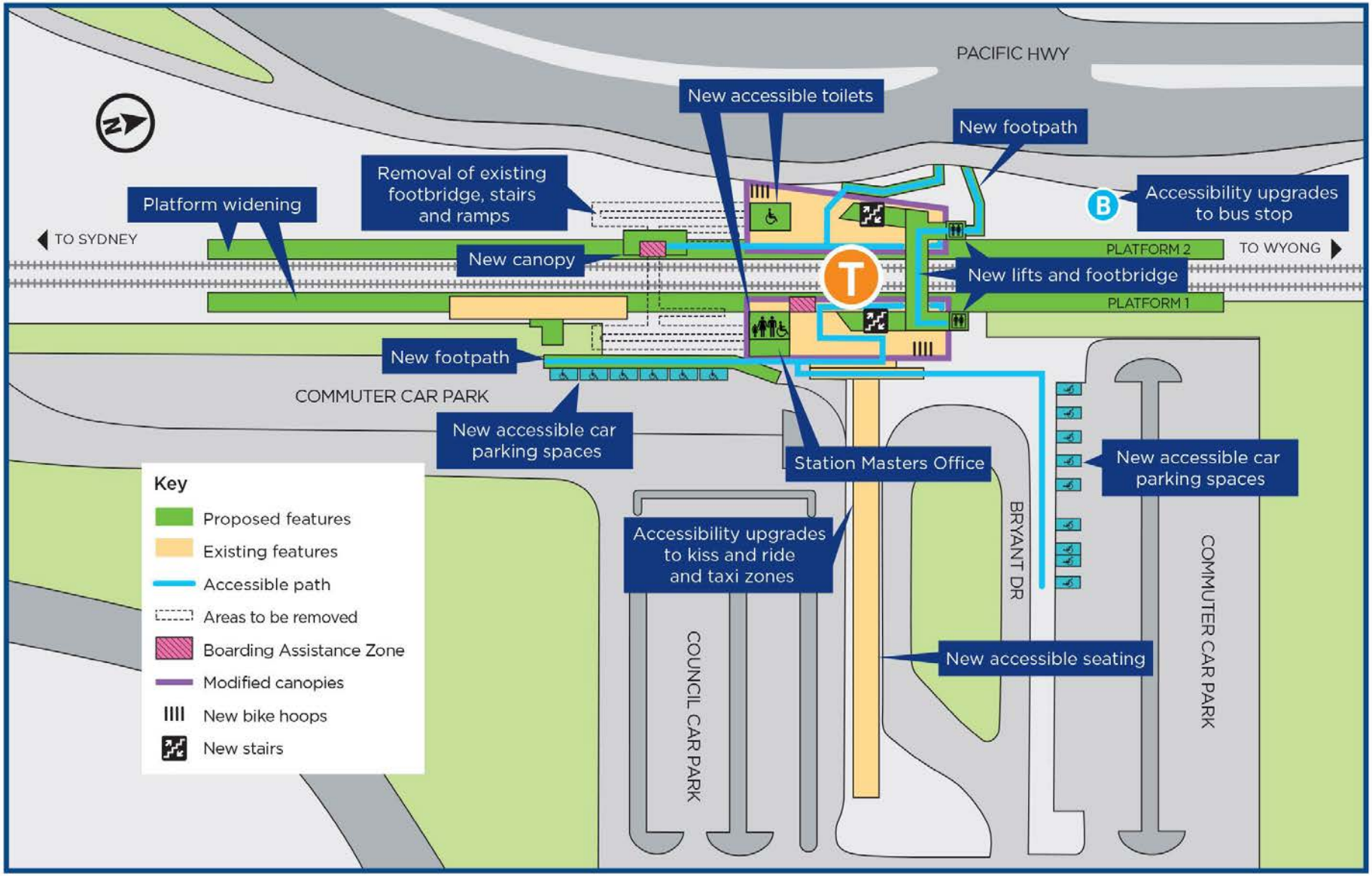


Figure 3-1 Key features of the Proposal (indicative only, subject to detailed design)

3.2 Scope of work

This section provides a more detailed explanation of the scope of the proposal as outlined in Section 3.1.

3.2.1 Station upgrade – main architectural and urban design features

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

- installation of a new covered pedestrian footbridge and stairs connecting Platform 1 and Platform 2
- construction and installation of two new passenger lifts to provide access to the new pedestrian footbridge and platforms. This would include:
  - a new two-stop lift connecting Platform 1 and the new pedestrian footbridge
  - a new three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge
  - lift landings with canopies for weather protection at the waiting areas
- removal of the existing non-compliant ramps, stairs and pedestrian footbridge
- removal of the existing Station Master's office and associated canopy on Platform 1, and construction of a new Station Master's office
- widening and lengthening of Platforms 1 and 2 (where required) to provide compliant platform widths and lengths for future rolling stock
- construction of a family accessible toilet on Platform 1 and a unisex ambulant toilet on Platform 1
- removal of the existing canopy at the Pacific Highway station entrance on Platform 2 and installation of a new canopy extending from the boarding assistance zone (BAZ) on Platform 2 to the station entrance
- installation of new canopies over station entrances and forecourts
- new landscaping and upgrades to the station forecourts, including incorporating water sensitive urban design (WSUD) on both eastern and western sides of the station.

3.2.2 Interchange facilities

Interchange upgrade works to improve connectivity within the station precinct would comprise:

- fifteen accessible (DDA compliant) parking spaces within the existing commuter carpark
- installation of new bicycle hoops near the Pacific Highway station entrance and the commuter carpark station entrance, under cover, with overall provision for 27 bikes
- a new footpath on the eastern side of the station to provide an accessible path of travel from the station entrance to the new accessible parking spaces
- a new footpath on the western side of the station to provide an accessible path of travel from the Pacific Highway station entrance to the new lift and to the Pacific Highway southbound bus stop
- upgrade of the existing Pacific Highway southbound bus stop features to become DSAPT compliant

- new seating next to the existing kiss and ride bays and taxi bays on the eastern side of the station
- regrading of kerb ramps at the existing kiss and ride bays on the eastern side of the station.

3.2.3 Ancillary work

The Proposal would require additional ancillary works within the station precinct including:

- upgrades to the station power supply to cater for the new lifts, comprising:
  - decommissioning of redundant power supply and electrical equipment
  - installation of two padmount transformers within the rail corridor adjacent to the southern end of Platform 1
  - relocation of Sydney Trains 11kV and 66kV feeder to underground supply and decommissioning of existing pole top transformer
- construction of a new Communication Equipment Room (CER) adjacent to Platform 1
- installation of new lighting on station platforms, entrances and walkways, awnings, indoor areas, pedestrian footbridge and accessible parking bays
- improvements to station security and communication systems, including CCTV modifications, public address system upgrades, modification to station passenger information systems and new hearing induction loops within the station platforms
- installation of new tactile pavement markers where required
- landscaping work and adjustments to wayfinding
- new stormwater drainage connections from the new lifts and canopies to the existing Central Coast Council stormwater system
- adjustments to the existing boundary fencing
- provision of portable fire extinguishers throughout all new areas of the station.

3.2.4 Materials and finishes

Each of the upgraded or new facilities would be constructed from a range of different materials, with a different palette for each architectural element. Subject to detailed design, the Proposal would include the following:

- lift shafts – concrete and glass with steel and roof sheeting
- concourse and pedestrian footbridge – concrete base with mesh throw screens, decorative panels and roof
- platform stairs – concrete with mesh throw screens and canopy
- platform canopies – steel frame and lightweight and/or glass infill

The design would be submitted to TfNSW's Design Review Panel at various stages for comment and advice before being accepted by TfNSW.

3.3 Design development

3.3.1 Engineering constraints

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

Existing structures: the placement and integrity of existing structures needed to be considered during the development of the design – these structures included the platforms, station buildings, stairs, ramps and footbridge.

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.

Construction access: Use of a large mobile crane would be required to lift construction materials and equipment to the station from the commuter car park on specified days.

Utilities: A Dial Before You Dig (DBYD) search has identified a number of utilities in the vicinity of the proposed work including (but not limited to):

- Telecommunications
- Sydney Trains signalling services
- Sydney Trains feeders
- Ausgrid feeders.

While the Proposal has been designed to minimise relocation of services, further investigation will be required. It is likely additional services will require relocation and/or the final location of proposed works require adjustment. Such works are unlikely to occur outside the footprint of works assessed in this REF.

Public access: pedestrian access to the station and across the rail corridor would be maintained during construction, except during rail shutdown periods. Use

Other considerations:

- Retention of vegetation within and around the station precinct
- Management of potential flood impacts.

3.3.2 Design standards

The Proposal would be designed having regard to the following:

- DSAPT (issued under the Commonwealth *Disability Discrimination Act 1992*)
- Building Code of Australia
- Relevant Australian Standards
- Asset Standards Branch standards
- Sydney Trains standards
- *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a)
- *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008)
- Crime Prevention Through Environmental Design (CPTED) principles
- Council standards where appropriate
- Other TfNSW policies and guidelines.

3.3.3 Sustainability in design

The development of the reference design for the Proposal has been undertaken in accordance with the project targets identified in TfNSW's Environmental Management System (EMS) and the *NSW Sustainable Design Guidelines - Version 4.0* (TfNSW, 2019a) which groups sustainability into seven themes:

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

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

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

The development of the scoping design for the Proposal has been undertaken in accordance with the project targets identified in the program wide TAP 3 Sustainability Strategy.

The Sustainability Strategy sets targets across the following key issues:

- climate change adaptation and resilience
- renewable energy
- waste
- materials
- supply chain management
- community connection
- social procurement and workforce.

Key design elements and strategies developed during scoping design will be used to further develop the design and construction.

3.4 Construction activities

3.4.1 Construction methodology and schedule

Subject to approval, construction is expected to commence in mid-2022 and take around 16 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 3-1. This staging is indicative and is based on the current reference design and may change once the detailed design methodology is finalised. The staging is also dependent on the Contractor's preferred methodology, program and sequencing of work.

Table 3-1 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works	• establish site compounds at Pacific Highway South, Pacific Highway North and the commuter car park off Bryant Drive (i.e. erect fencing, site offices, amenities and plant/machinery storage areas) • remove trees and vegetation and protect the remaining trees not affected by construction works • install temporary stairs and ramps to both station entrances to include new foundations steel supports adjustments to lighting, CCTV and Opal card readers • install timber hoardings on platforms to segregate passengers from construction works on the platforms • install temporary buildings for station staff and station amenities on the southern side of the station • services relocations • survey investigations.
Construction of pedestrian bridge, lift and stairs	• construction of footings to support a new pedestrian bridge including columns and lift shafts • construction of new pedestrian bridge spanning from Pacific Highway to Bryant Street • construction of retaining walls and stormwater drainage works • construction of lifts (shaft and lift base) • installation of lifts (fit out) • construction of stairs, canopies, balustrades, handrails and anti-throw screens.
Demolish existing station structures	• demolish existing station buildings, footbridge, ramps, canopies and stairs following the completion of the new pedestrian footbridge, unless equivalent temporary facilities are provided (subject to detailed design).
Platform/buildings works & station entry	• construction of new staff operations building to include a new communications equipment room and station amenities on Platforms 1 & 2. • construction of new canopies to platforms and station entry • installation of new fixtures, lighting, Public Address system (PA), Closed Circuit Television (CCTV) • widen and lengthen existing platforms and improve cross falls and drainage • construct new station forecourt to both the Pacific Highway and Bryant Street entries.
Interchange works	• reconfiguration of sections of the southern carpark for improved accessible parking spaces • construction of accessible pathways, ramps, bicycle hoops and landscaping to both sides of the station • installation of new wayfinding signage • construct new electrical power supply for the station.
Testing and commissioning	• various activities to test and commission power supply, lifts, lighting, new/modifications to station services, ticketing systems and communication and security systems.

Stage	Activities
Site demobilisation	• site demobilisation including removal of temporary pedestrian ramps and booking office site facilities including site sheds.

3.4.2 Rail possession periods

Any construction works either within or over the rail corridor, such as platform works and construction of the new overhead footbridge, would be carried out during scheduled possession periods. Possessions are regular track closures that are usually scheduled for weekends when traffic on the rail network is less, and maintenance and/or construction works can continue uninterrupted, around the clock. Working during possession periods ensures worker safety and also means that large items (such as prefabricated steel or concrete girders) can be transported to site by road during periods of reduced road traffic (construction traffic is discussed in detail in Section 6.1.2).

3.4.3 Plant and equipment

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

Hand tools	4 x 10 t dump trucks	Water cart
Demolition saw	30 t truck and trailer	Asphalt trucks
Chainsaw	D4 skid steer loader	10 Tonne Hydreamers
Vacuum truck	Smooth drum roller	300 – 400 t mobile crane
Jack hammer	Crane truck	30 t piling rig
Petrol pressure washer	Telescopic Forklift	20 – 50 t mobile crane
Street sweeper	Articulated dump truck	Concrete boom pump
5 – 30 t excavator	Road sweeper	Demolition wire saw
Concrete trucks and concrete pump	Elevated work platforms (EWP)	Solar/generator powered light towers
35 – 40 t excavator with demolition shear attachment	Concrete ground line pump	Directional bore machine (for HV underground conduits)

3.4.4 Working hours

Work 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.

Work would also occur outside standard hours and would include night work and work during routine rail possessions which are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed and trains are not operating.

Out of hours work is required in some cases to minimise disruptions to customers, pedestrians, motorists, or nearby sensitive receivers; and to ensure the safety of railway workers and operational assets. It is estimated that approximately seven rail possessions would be required to facilitate the following:

- relocation of station services
- platform widening and lengthening works
- installation of a new pedestrian footbridge, lifts and access stairs
- removal of the existing station footbridge, stairs and ramps

Out of hours work may also be scheduled outside rail possession periods. Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in TfNSW's *Construction Noise and Vibration Strategy* (TfNSW, 2019) (refer to Section 6.3 for further details).

3.4.5 Earthworks

Excavations and earthworks would generally be required for the following:

- installation of the foundations for the new pedestrian footbridge, stairs and lifts
- construction of the new lift shafts
- demolition of the existing footbridge, stairs, ramps, canopies and Station Masters building
- construction of new pedestrian footpaths
- trenching activities for High Voltage aerial realignment service adjustments and relocations
- other minor civil work including platform works, footings and foundations for structures, drainage / stormwater work.

It is estimated that approximately 350 cubic metres of excavated material would be generated from the above activities. Excavated material would be reused onsite where possible or disposed of in accordance with relevant legislative requirements. The detailed design would confirm the volume of materials excavated to accommodate the lift pits and foundations, and other ancillary work.

Any fill material that is odorous and suspected of being potentially contaminated would be sampled and treated and/or disposed in accordance with relevant legislative and sustainability requirements. Specific locations for spoil placement would be agreed with TfNSW and the Contractor during the delivery phase.

3.4.6 Source and quantity of materials

The source and quantity of materials would be determined during the detailed design phase of the Proposal, and would consider the requirements of the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a). Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

3.4.7 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:

- temporary loss of commuter parking availability to accommodate the ancillary facility sites
- temporary disruptions to the existing pedestrian facilities surrounding the station, particularly for pedestrians accessing the station when construction work for the lifts, footbridge and footpaths is being undertaken
- a minor increase in traffic on the local road network associated with construction vehicle movements.

A detailed construction methodology, proposed mitigation measures and management plans (such as a Construction Environmental Management Plan (CEMP)) would be developed prior to commencement of construction of the Proposal to manage potential traffic and access impacts.

3.4.8 Ancillary facilities

Four temporary construction ancillary facilities would be required for about 16 months during the construction period, to accommodate a site office, amenities, laydown and storage area for materials (refer to Figure 3-2). All of the land within the four proposed ancillary facility sites is owned by TfNSW. It is anticipated that car parking spaces temporarily used for the ancillary facility sites would be progressively made available throughout the construction period, subject to detailed design.

A brief description of each ancillary facility site is given as follows:

- Pacific Highway South – main ancillary facility, on the western side of Tuggerah Station at the southern end, within the rail corridor. Access would be from the left lane of the Pacific Highway heading south. This area would be used for construction compounds with site sheds.
- Pacific Highway North – on the western side of Tuggerah Station, adjacent to the intersection of Anzac Road and the Pacific Highway. Access would be from the left lane of the Pacific Highway heading south. This area would be used for construction plant and equipment laydown only.
- Bryant Drive South – on the eastern side of Tuggerah Station, at the southern end of the commuter car park area. Site access would be from Wyong Road via Bryant Drive and through the existing bus interchange. This area would be used for construction compounds with site sheds.
- Bryant Drive North – on the eastern side of Tuggerah Station, at the northern end of the commuter car park area. Site access would be from Wyong Road via Bryant Drive and past the existing bus interchange. This area would be used during rail possession weekend periods only.

3.4.9 Public utility adjustments

The Proposal has been designed to avoid relocation of services where feasible. However, some utilities and services relocations, as well as new underground services, are likely to be required. Some services would require relocation, including an 11kV and 66kV overhead feeder, but the relocation would occur within the footprint of the work assessed in this REF. In the event that work would be required outside of this footprint, further assessment would be

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

3.5 Property acquisition

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

3.6 Operation and maintenance

The future operation and maintenance of the station and commuter car park is subject to further discussions with Sydney Trains, TfNSW and Central Coast Council. Structures constructed under this Proposal would be maintained by Sydney Trains. However, it is expected that adjacent garden/landscape areas would continue to be maintained by Central Coast Council.

Proposal area

Site compound and laydown area

Railway Station

1 Platform number

Road

Railway

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

Data sources

Jacobs 2021
Aerometrex 2021
Department Finance, Services and Innovation 2020

Figure 3-2 Ancillary facilities

4 Statutory considerations

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

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

As the Proposal would not or is not likely to have a significant impact on any matters of NES or on Commonwealth land, a referral to the Commonwealth Minister for the Environment is not required.

4.1.2 Other Commonwealth legislation

Other Commonwealth legislation applicable to the Proposal is discussed in Table 4-1.

Table 4-1 Other Commonwealth legislation applicable to the Proposal

Applicable legislation	Considerations
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	There is an obligation on a person who discovers anything which he or she has reasonable grounds to suspect are Aboriginal remains to report that discovery to the Minister, giving particulars of the remains and their location. The Proposal area contains one previously identified Aboriginal site, although this site is assessed to be non-existent (refer Section 6.5). Considerations for unexpected finds further detailed in mitigation measures and applies to this Act.
Disability Discrimination Act 1992 (DDA)	This Act aims to eliminate as far as possible, discrimination against persons on the ground of disability in areas including access to premises and the provision of facilities, services and land. The Proposal would be designed having regard to the requirements of this Act. The key objective of the Proposal is to improve the accessibility of Tuggerah Station which is consistent with the objectives of this Act.
Native Title Act 1983	This Act aims to provide for the recognition and protection of Native Title, how Native Title land is used and establishes a mechanism for determining claims to Native Title. There are no pending or approved Native Title claims over the Proposal area.

4.2 NSW legislation and regulations

4.2.1 Transport Administration Act 1988

The *Transport Administration Act 1988* establishes TfNSW as a public authority who is to exercise its functions in a manner that promotes certain common objectives, including to promote the delivery of transport services in an environmentally sustainable manner.

This REF has been prepared having regard to, among other things, the specific objectives of TfNSW under the *Transport Administration Act 1988*, including:

2A Objects of Act

…

a) to provide an efficient and accountable framework for the governance of the delivery of transport services,

b) to promote the integration of the transport system,

c) to enable effective planning and delivery of transport infrastructure and services,

d) to facilitate the mobilisation and prioritisation of key resources across the transport sector,

e) to co-ordinate the activities of those engaged in the delivery of transport services,

f) to maintain independent regulatory arrangements for securing the safety of transport services.

2B Common objectives and service delivery priorities of public transport agencies

…

(a) ***Environmental sustainability***

To promote the delivery of transport services in an environmentally sustainable manner.

(b) ***Social benefits***

To contribute to the delivery of social benefits for customers, including greater inclusiveness, accessibility and quality of life.

4.2.2 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of Division 5.1 of the EP&A Act. Division 5.1 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which do not require development consent under Part 4 of the Act.

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

Clause 228 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has or is likely to have 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.

The NSW Environmental Planning and Assessment Regulation 2021 was gazetted in December 2021, and comes into force on 1 March, 2022. Of relevance to the Proposal and this REF, clause 228 is replaced in the new Regulation by clauses 170 and 171. Clause 170 now makes allowance for the Planning Secretary to issue specific guidelines in relation to the factors that must be taken into consideration in an REF. As this REF was commenced prior to March 1, 2022, no Secretary's guidelines were prepared in respect of the Proposal.

Two new sub-clauses (q) and (r) have been added to the list of factors to be considered under clause 171 (which replaces clause 228 of the EP&A Regulation 2000). Sub-clauses q and r have been added to the table in Appendix B, such that all of the factors listed under clause 171 have been addressed.

4.2.3 Other NSW legislation and regulations

Table 4-2 provides a list of other relevant legislation applicable to the Proposal.

Table 4-2 Other legislation applicable to the Proposal

Applicable legislation	Considerations
Biodiversity Conservation Act 2016 (BC Act) (NSW)	The Proposal area does not contain suitable habitat for any listed threatened species or community and the Proposal is unlikely to have a significant impact on any threatened species or community (refer to Section 6.7).
Biosecurity Act 2015 (NSW)	Clause 22 requires any person who deals with a biosecurity matter has a duty to ensure that in so far as is reasonably practicable, the potential biosecurity risk is prevented, eliminated or minimised. Appropriate management methods would be implemented during construction if declared noxious weeds in the Central Coast LGA are identified (refer to Section 6.7).
Contaminated Land Management Act 1997 (CLM Act) (NSW)	Section 60 of the CLM Act imposes a duty on landowners to notify the Department of Planning and Environment (DPE), and potentially investigate and remediate land if contamination is above EPA guideline levels. The Proposal area has not been declared under the CLM Act as being significantly contaminated (refer to Section 6.8).
Crown Lands Act 1987 (NSW)	The Proposal does not involve work on any Crown land.
Disability Discrimination Act 1992 (DDA Act) (Cwlth)	The Proposal would be designed having regard to the requirements of this Act.
Heritage Act 1977 (Heritage Act) (NSW)	The following sections of the Heritage Act contain requirements for impacts to heritage listed items or exposure of relics: • 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 would not impact on any listed heritage items.
National Parks and Wildlife Act 1974 (NPW Act) (NSW)	Sections 86, 87 and 90 of the NPW Act require consent from NSW Environment, Energy and Science (Division of DPE) for the destruction or damage of Indigenous objects. However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all work would cease and appropriate advice sought.
Protection of the Environment Operations Act 1997 (POEO Act) (NSW)	The Proposal does not involve a 'scheduled activity' under Schedule 1 of the POEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal. However, in accordance with Part 5.7 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
Roads Act 1993 (Roads Act) (NSW)	Section 138 of the Roads Act requires consent from the relevant road authority for the carrying out of work in, on or over a public road. However, clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require consent for work on unclassified roads. The Proposal would include works on Bryant Drive within the commuter car park on the eastern side of Tuggerah Station. Road Occupancy Licence/s, if required, would be obtained from the relevant roads authority for road work and any temporary road closures. Traffic impacts of the Proposal are discussed further in Section 6.1.
Sydney Water Act 1994 (NSW)	The Proposal would not involve discharge of wastewater to the sewer.
Waste Avoidance and Resource Recovery Act 2001 (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.
Water Management Act 2000 (NSW)	The Proposal would not involve any water use (from a natural source e.g. aquifer, river – only from the network), water management work, drainage or flood work, controlled activities or aquifer interference.

4.2.4 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

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

As of 1 March 2022, the Infrastructure SEPP will be consolidated into the State Environmental Planning Policy (Transport and Infrastructure) 2021. The considerations of the Infrastructure SEPP will remain unchanged.

Division 15, Clause 79 of the Infrastructure SEPP allows for certain types of development to be carried out by or on behalf of a public authority without consent on any land (i.e. assessable under Division 5.1 of the EP&A Act). Specifically, Clause 79(1) of the Infrastructure SEPP states that:

> *'Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land.'*

Clause 78 defines 'rail infrastructure facilities' as including elements such as:

> *(a) 'railway tracks, associated track structures, cuttings, drainage systems, fences, tunnels, ventilation shafts, emergency accessways, bridges, embankments, level crossings and roads, pedestrian and cycleway facilities.'*
>
> *(d) 'railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms'*
>
> *(e) public amenities for commuters*
>
> *(f) associated public transport facilities for railway stations…'*

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

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

Section 5.2 of this REF discusses the consultation undertaken under the requirements of the Infrastructure SEPP.

The Infrastructure SEPP prevails over all other environmental planning instruments except where there is an inconsistency with State Environmental Planning Policy (State Significant Precincts) 2005 or certain provisions of State Environmental Planning Policy (Coastal Management) 2018. The Proposal does not require consideration under these SEPPs and therefore do not require further consideration as part of this REF.

State Environmental Planning Policy 55 – Remediation of Land

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

As of 1 March 2022, the SEPP 55 will be consolidated into the State Environmental Planning Policy (Resilience and Hazards) 2021. The considerations of the SEPP 55 will remain unchanged.

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

Impacts of contaminated lands and potential remediation are documented in Section 6.8.

4.2.5 Wyong Local Environmental Plan 2013

The Proposal is located within the Central Coast LGA. The Infrastructure SEPP prevails over all other environmental planning instruments (such as local environmental plans) except where there is an inconsistency with State Environmental Planning Policy (State Significant Precincts) *2005* or certain provisions of State Environmental Planning Policy (Coastal Management) *2018.* During the preparation of this REF, the provisions of Wyong Local Environmental Plan 2013 (Wyong LEP) were considered (refer to Table 4-3 and Figure 4-1).

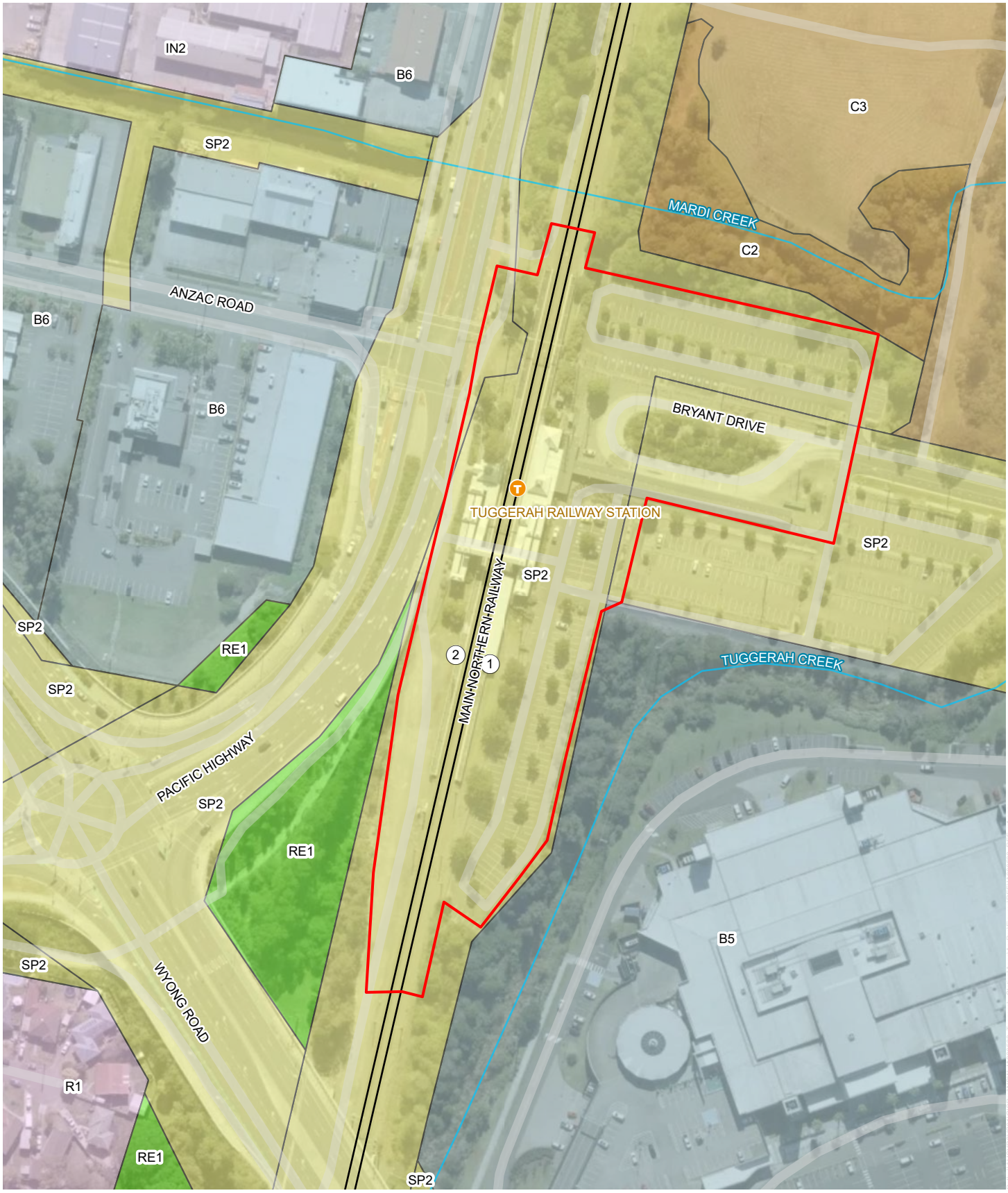
Table 4-3 Relevant provisions of the Wyong LEP

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Table	Under the Wyong LEP: • the Proposal is zoned SP2 – Infrastructure (Rail Infrastructure Facility) in the rail corridor • the Proposal is zoned SP2 – Infrastructure (Road and Traffic Facility) in the commuter car park area north of the kiss and ride bay Land use zoning surrounding the proposal area is shown in Figure 4-1. The Proposal is consistent with the objectives of the SP2 Infrastructure zoning, as it would provide for infrastructure and related uses, would enable future development for railway and associated purposes, and would enable future development for utility undertakings and associated purposes.
Clause 5.10 – Heritage conservation	Clause 5.10 of the Wyong LEP aims to conserve the environmental heritage of Wyong. There are no listed heritage items of local significance near the Proposal and no listed heritage item or conservation area would be impacted by the Proposal.

Provision description	Relevance to the Proposal
Clause 5.21 – Flood planning	Clause 5.21 of the Wyong LEP aims to minimise flood risk to life and property and to avoid adverse or cumulative impacts on flood behaviour and the environment. This clause also aims to enable the safe occupation and efficient evacuation of people in the event of a flood. The Proposal would not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood impacts surrounding the Proposal area. The Proposal would not change the existing elevation of the Tuggerah station platform and that of its entry or exit points. The Proposal would not adversely affect safe occupation and evacuation of people and would not adversely affect the environment or cause associated impacts to riverbanks or watercourses, in the event of a flood.
Clause 7.1 – Acid sulfate soils	The Proposal is located on land classified as Class 4 acid sulfate soil risk under the Wyong LEP, meaning that it is likely found more than two metres below the ground, indicating relatively low risks of encountering acid sulfate soils at the Proposal area. Consideration of the potential effects of acid sulfate soils is provided in Section 6.8.

4.2.6 Draft Central Coast Local Environmental Plan 2018

Under the draft Central Coast LEP, the Proposal would remain consistent with land zoning and other relevant clauses as outlined in Table 4-3 above.



Proposal area

Railway Station

Platform number

Road

Railway

Land zoning

B5 Business Development

B6 Enterprise Corridor

C2 Environmental Conservation

C3 Environmental Management

IN2 Light Industrial

R1 General Residential

RE1 Public Recreation

SP2 Infrastructure

0 25 50 m

1:2,000 at A4

GDA 1994 MGA Zone 55

Data sources

Jacobs 2021
OEH 2021, DCSSS 2021, Department Finance, Services and Innovation 2020

Figure 4-1 Wyong LEP zoning map

4.3 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 Tuggerah Station Upgrade. Section 3.3.3 summarises how ESD would be incorporated in the design development of the Proposal. Section 6 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 reference design

During the development of the reference design and selection of the preferred option consultation was undertaken internally within TfNSW with Sydney Trains, NSW Trains, Customer Strategy and Technology, Infrastructure and Place, and Regional & Outer Metropolitan representatives.

Consultation was also undertaken with Central Coast Council (CCC), Department of Planning and Environment (DPE), Hunter and Central Coast Development Corporation (HCCDC), and Regional NSW as part of an integrated transport planning initiative, which informed the connectivity objectives in the Tuggerah Station Precinct and the preferred option. Consultation with these stakeholders will continue through the detailed design and construction of the Proposal.

The key consultation activities undertaken to date are summarised in Table 5-1.

Table 5-1 Consultation activities carried out for the Proposal

Timing	Activity	Stakeholders
March 2021	Tuggerah integrated transport meeting	CCC, DPE, HCCDC, Regional NSW, TfNSW
March 2021	Tuggerah integrated transport planning workshop 1	CCC, HCCDC, Regional NSW, TfNSW
April 2021	Tuggerah Station Upgrade reference design workshop	Sydney Trains, NSW Trains, TfNSW
May 2021	Tuggerah integrated transport planning workshop 2	CCC, DPE, HCCDC, TfNSW
June 2021	Tuggerah integrated transport planning update	CCC, DPE, HCCDC, Regional NSW, TfNSW

5.2 Consultation requirements under the Infrastructure SEPP

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

Table 5-2 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.

Table 5-2 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 13 | Consultation with Councils – development with impacts on council related infrastructure and services	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 work that would: • disrupt pedestrian and vehicle movements • impact on road pavements under Council's care and control • impact on Council-operated footpaths. Accordingly, consultation with Central Coast Council is required.
Clause 14 | Consultation with Councils – development with impacts on local heritage	Where railway station work: • substantially impact on local heritage item (if not also a State heritage item) • substantially impact on a heritage conservation area.	There is no proposed impact to local heritage/heritage conservation area. Accordingly, consultation with Council is not required. Refer to Section 6.5.
Clause 15 | Consultation with Councils – development with impacts on flood liable land	Where railway station work: • impact on land that is susceptible to flooding – reference would be made to *Floodplain Development Manual: the management of flood liable land.*	The Proposal is located on land that is susceptible to flooding. Accordingly, consultation with Council is required in regard to this aspect. Refer to Section 6.9.
Clause 15A Consultation with Councils – development with impacts on certain land within the coastal zone	Where railway station work: impact on land within a coastal vulnerability area and is inconsistent with certified coastal management program that applies to that land	The Proposal is not located on land within the coastal zone. Consultation is not required regarding this aspect.
Clause 15AA Consultation with State Emergency Service – development with impacts on flood liable land	Where railway station work: impact on flood liable land -written notice must be given (together with a scope of work) to the State Emergency Services and taken into consideration any response to the notice received from the State Emergency Service within 21 days after the notice is given.	The Proposal is located on flood planning areas identified in Central Coast mapping tool. Consultation with State Emergency Service is required.

Clause	Clause particulars	Relevance to the Proposal
Clause 16 | Consultation with public authorities other than Councils	For *specified development* which includes consultation with the DPE for development that is undertaken adjacent to land reserved under the *National Parks and Wildlife Act 1974*, and other agencies specified by the Infrastructure SEPP where relevant. Although not a specific Infrastructure SEPP requirement, other agencies that TfNSW may consult with could include: • Sydney Trains • NSW Trains • DPE.	The Proposal is not located adjacent to land reserved under the *National Parks and Wildlife Act 1974*. Accordingly, consultation with the DPE on this matter is not required.

5.3 Consultation strategy

The consultation strategy for the Proposal was developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the project team, and 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 on the project webpage, with feedback from the community and other stakeholders invited between 16 March and 6 April 2022 (https://www.transport.nsw.gov.au/projects/current-projects/tuggerah-station-upgrade) and installation of information signage at the station with QR codes taking customers to the project webpage
- 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 the REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
- consultation with Central Coast Council, Sydney Trains, NSW 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 between 16 March and 6 April 2022.

The REF would also be available on the TfNSW website[1]. Information on the Proposal would be available through the Project Infoline (1800 684 490) or by email[2].

Feedback can be sent to:

- projects@transport.nsw.gov.au
- Transport Access Program – Tuggerah Station Upgrade

  Director Environment and Sustainability (Rail Development and Delivery)

  TfNSW

  PO Box K659

  Haymarket NSW 1240

Or submitted:

- via nsw.gov.au/improving-nsw/have-your-say/tuggerah-station-upgrade

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 Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the area covered by the Proposal (the area around Tuggerah Station) plus a 200 metre radius, on 17 November 2021. The closest recorded Aboriginal site was 60 metres away in the vicinity of the northern edge of the Bryant Drive commuter car park. However, this item has been assessed as not a site and therefore would not be impacted by the Proposal (refer to Section 6.4).

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. Therefore it was not considered necessary to undertake specific Aboriginal consultation.

[1] http://www.transport.nsw.gov.au/projects-tap
[2] 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 respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal.

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

Should TfNSW determine to proceed with the Proposal, the project team would keep the community, 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

This section provides a high-level assessment of the potential impacts of the Proposal on traffic, transport and accessibility. The assessment of potential impacts included a desktop analysis and based on the findings of the assessment, mitigation measures have been recommended to manage impacts where required.

6.1.1 Existing environment

Tuggerah Station is located on the Central Coast and Newcastle Railway Line in the Central Coast of NSW. This rail line provides services between Sydney Central Station and Newcastle, with Tuggerah situated approximately at the midway point.

The station is located between the Pacific Highway (to the west) and Bryant Drive (to the east) and is accessed by a footbridge between these two roads. The M1 Pacific Motorway is approximately 175 km to the west, and is connected to the Proposal via Wyong Road.

The surrounding land use context is predominantly business and light industrial in nature.

Pedestrian facilities

Pedestrian access to Tuggerah Station is provided via shared paths connecting pedestrians to accessible ramps, stairs and a footbridge within the station vicinity, as well as the commuter car park, bus interchange, taxi ranks and kiss and ride spaces. Signalised crossings are also included at the Pacific Highway/Wyong Road and Pacific Highway/Anzac Road intersections on the western side of Tuggerah Station, providing pedestrians with safe access.

The footbridge provides a permeable street network, allowing pedestrians to cross the rail corridor between the Pacific Highway and Bryant Drive.

Bicycle network and facilities

Tuggerah is a designated ‘established strategic centre’ of regional strategic importance, under the *Central Coast Council Bike Plan 2019-2039* (Central Coast Council, 2019b). The Bike Plan sets priorities for bicycle connections between centres/activity centres, and to public transport. It also highlights the importance of end-of-trip facilities such as secure bicycle parking at stations.

Existing facilities to support cyclists in the vicinity of Tuggerah Station include 16 bicycle lockers as well as hoops for up to 20 bicycles to be secured. A shared pedestrian and cyclist path is provided adjacent to the Pacific Highway on the western side of Tuggerah Station, and on-road cycle lanes are provided in both directions of Bryant Drive near the commuter car park access point on the eastern side. To support cyclist safety, signalised crossings are also included at the Pacific Highway/Wyong Road and Pacific Highway/Anzac Road intersections on the western side of the station.

Surrounding road network

Pacific Highway

The Pacific Highway is a state road and runs parallel to the Central Coast and Newcastle Rail Line on the western side of Tuggerah Station. It runs in a north-south direction and connects Tuggerah with Gosford in the south and Wyong in the north. The carriageway is typically two lanes in each direction in proximity to Tuggerah Station, with short turn bays at key intersections. The Pacific Highway has a sign posted speed of 60 kilometres per hour.

Bryant Drive

Bryant Drive is a local road that provides access to the Tuggerah Station commuter car park and a number of businesses along both sides of the road. Bryant Drive is connected to Wyong Road to the south and runs in a north-south direction, with one traffic lane in each direction and several turning lanes for access to and from the station. Bryant Drive has a speed limit of 50 kilometres per hour.

Wyong Road

Wyong Road is a state road that forms the main traffic artery between the M1 Pacific Motorway, Tuggerah and The Entrance. Wyong Road also provides access to the commuter car park at Tuggerah Station via Bryant Drive. It carries two lanes in each direction with several turning lanes at key intersections. Wyong Road has a sign posted speed of 70 kilometres per hour.

Parking

Car parking facilities are currently provided off Bryant Drive. A dedicated off-street commuter car park is located on the eastern side of the station off Bryant Drive which provides around 500 unrestricted parking spaces for station customers. Nineteen of these spaces are accessible parking spaces.

In addition to the station car parking, there is a substantial supply of on- and off-street parking east of Tuggerah station. There is unrestricted kerbside parking along both sides of Bryant Drive between the Bunnings Warehouse entrance and Lake Road (with some exclusions for bus stops and traffic/road safety provisions). There is also some unrestricted kerbside parking along the south side of Lake Road to the east of Bryant Drive. Further, there is a large Council car park on the eastern side of Bryant Drive opposite the Tuggerah Super Centre, and another large (off-street) car park which services the Central Coast Regional Sporting and Recreation Complex, in Lake Road.

On the western side of Tuggerah Station, there is limited (time-restricted) parking available on the western (i.e. northbound) side of the Pacific Highway, and limited unrestricted kerbside parking on both sides of Anzac Road, to the west of the entrance to the Hungry Jacks fast food restaurant. Given the ready supply of both on- and off-street unrestricted parking available to the east of the station, the street parking on the western side of the station is not considered a realistic choice for commuters or other public transport users.

Rail operation

Tuggerah Station includes two platforms with two tracks and provides services between Sydney, the Central Coast and Newcastle via the Central Coast and Newcastle Line. The frequency of services departing Tuggerah Station are generally higher in the AM peak when compared to the PM peak, while services arriving at Tuggerah Station are more frequent in the PM peak. These services are summarised in Table 6-1.

Table 6-1 Tuggerah Station train services - weekdays

Peak period	Hour commencing	Frequency of services to Newcastle	Frequency of services to Sydney/Central Coast
AM peak Departures from Tuggerah Station	5am	2	4
	6am	2	6
	7am	3	5
	8am	2	2
PM peak Arrivals to Tuggerah Station	4pm	2	2
	5pm	4	2
	6pm	6	7
	7pm	5	4

Weekday services to Sydney depart Tuggerah Station on average every 10 minutes between 6am and 7am. Between 6pm and 7pm, a service arrives at the station from Sydney and the Central Coast on average every 10 minutes.

Bus operation

The following bus routes currently operate through the Tuggerah Station interchange:

- Bus Route 15, 16, 24, 25 and 26 – operates between Wyong and The Entrance
- Bus Route 19 – operates between Gosford and Wyong
- Bus Route 47 – operates between Ourimbah and Tuggerah.

The Tuggerah Station bus interchange, located 20 metres east of the station, has seating, shelter, timetables, rubbish bins and tactile facilities. The number of buses that operate to and from Tuggerah Station during weekdays is provided in Table 6-2.

Table 6-2 Bus services departing Tuggerah Station – weekdays

Route number	Destination	Daily frequency
15	To Wyong	6
	To the Entrance	4
16	To Wyong	5
	To the Entrance	7
19	To Wyong	13
	To Gosford	14
24	To Wyong	6
	To the Entrance	4

Route number	Destination	Daily frequency
25	To Wyong	18
	To the Entrance	17
26	To Wyong	24
	To the Entrance	20
47	To Ourimbah	12
	To Tuggerah	12

6.1.2 Potential impacts

Construction phase

The traffic and transport impacts associated with the Proposal's construction phase are assessed in this section and include the following:

- minor increases in traffic on the local road network associated with construction vehicle movements
- temporary loss of parking in the commuter car park to accommodate construction ancillary facility sites
- temporary disruptions to rail operation, anticipated to occur during weekend rail possessions and scheduled shutdowns, potentially increasing commuter traffic on the local road network.

These impacts are further detailed below as well as the potential mitigation measures.

Traffic access and vehicle movements

During construction, access for construction-related traffic would be via the roads surrounding Tuggerah Station including the Pacific Highway, Wyong Road and Bryant Drive. These roads are all arterial or local roads and would readily accommodate minor increases in traffic resulting from the construction of the project. On the eastern side of Tuggerah Station, Bryant Drive passes a residential area at the intersection with Lake Road. However, the construction access routes would not pass through residential areas, and therefore no impacts are anticipated on these residents or existing property accessibility.

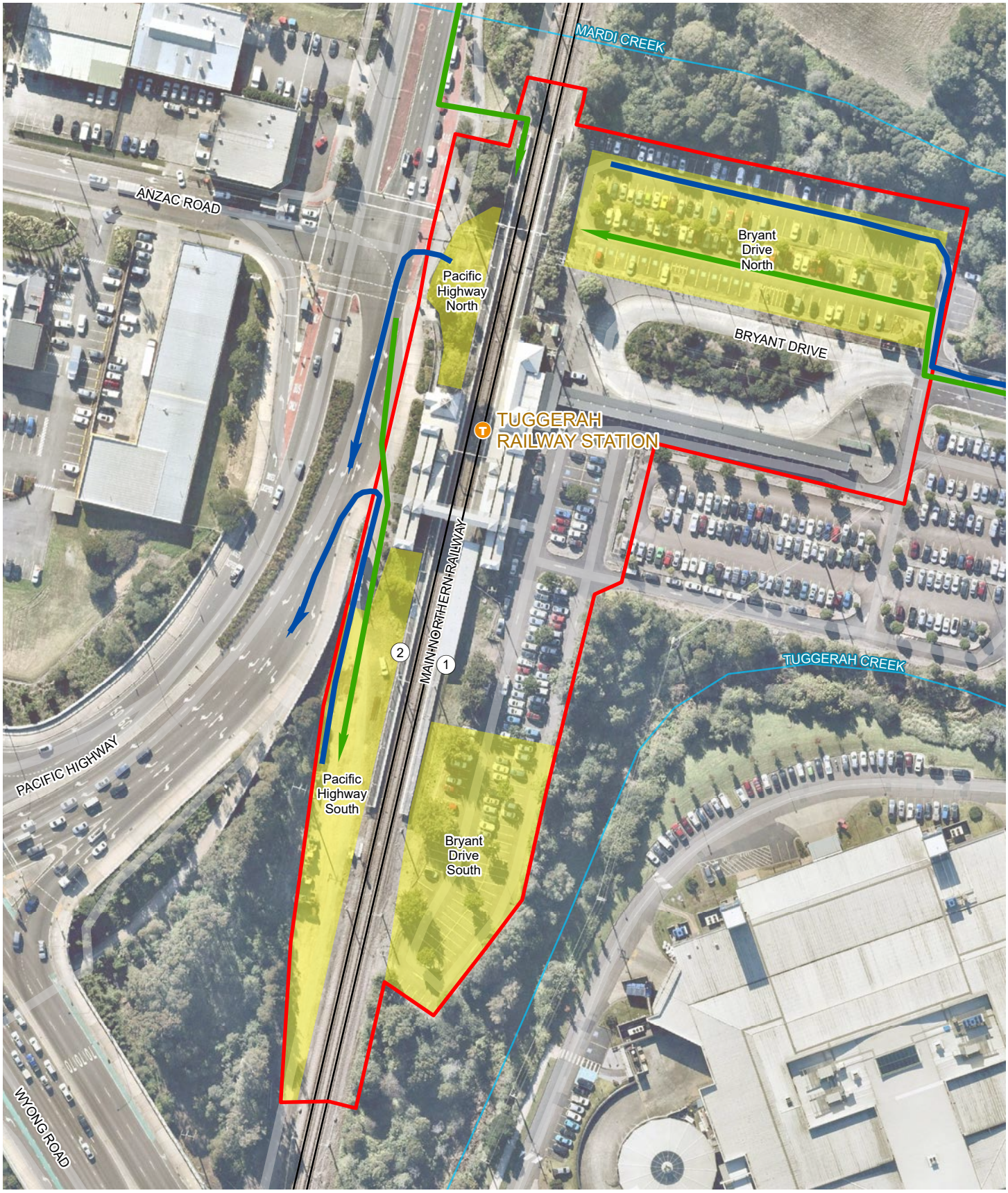
Four temporary ancillary facility sites would be required throughout the expected 16 months of construction, as described in Section 3.4.8. During construction, up to 36 heavy vehicles (in total) are expected to access the four sites each day, which equates to up to three heavy vehicles per hour for a typical construction workday. This volume is expected to increase to up to 75 total heavy vehicles (in total) per day during the weekend rail possession periods. In addition, up to 18 light vehicles (in total) are expected to access the four sites each weekday, with 50 (in total) during the weekend rail possession periods.

As the construction traffic volumes would be distributed across the four ancillary facility sites and due to the relatively small volume of vehicles, it is expected that the construction of the Proposal would have minimal impacts on the performance of the surrounding road network. Light vehicle movements are also expected to occur outside of the typical road network peaks with workers likely to arrive to the ancillary facility sites prior to 7am and leave after 6pm, minimising impacts on road performance. Traffic control measures such as signage would be detailed in a construction traffic management plan (CTMP), to be prepared prior to commencing construction work. These measures would be utilised throughout the work areas

to inform commuters of the construction activities and associated changes to movements and access.

Access for emergency vehicles would be maintained at the station in accordance with emergency vehicle requirements. Emergency services would be advised of all planned changes to traffic arrangements, if any, prior to applying the changes.

Figure 6-1 shows the proposed ancillary facility sites and their associated preferred construction traffic routes.



Proposal area

Site compound and laydown area

Railway Station

Platform number

Road

Railway

Construction vehicles in

Construction vehicles out

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

N

Data sources

Jacobs 2021
Department Finance, Services and Innovation 2020

Figure 6-1 Proposed construction vehicle access routes

Parking impacts during construction

It is expected that five to ten car parking spaces would be progressively unavailable across the commuter car park to accommodate the progressive trenching required for utilities relocation work. This trenching would occur between three to six months with car parking spaces being freed up progressively as trenching moves across the commuter car park.

In the Bryant Drive North ancillary facility site, up to 40 parking spaces would be used during weekend rail possessions only, and minimal disruptions are expected for commuters accessing the car park.

An area with up to 20 parking spaces would be used as the location for a site compound, however this area would most likely be located within the Pacific Highway South ancillary facility site instead of the commuter car park.

Overall it is unlikely that there would be any permanent site compounds in the commuter car park and ancillary facility sites in the car park would only be affected temporarily, mostly during weekend rail possessions.

As discussed in Section 6.1.1, there is a ready supply of unrestricted parking in close proximity to Tuggerah Station, which would provide sufficient capacity as an alternative to the commuter car park if required, including street parking, at the nearby Super Centre and the Central Coast Regional Sporting and Recreation Complex, both are within a two minute drive from the station commuter car park. There is also a readily accessible commuter car park at Wyong Station, 2.5 kilometres to the north of Tuggerah Station. The temporary car park closures and loss of parking spaces during construction would be scheduled only during weekend rail possession periods, when demand is lower than during the working week. During these rail possession periods, the commuter car park would retain sufficient capacity to meet demand.

Construction worker parking would be located in the Pacific Highway South ancillary facility site only and would not displace existing parking in the car park. The existing taxi ranks and kiss and ride facilities are not expected to be impacted by the construction activities.

Pedestrians and cyclists

During construction, pedestrian access to the station would be maintained and pedestrian diversions would be minimised where possible. The existing pedestrian footbridge would not be removed until the proposed new footbridge is operational. Pedestrian access across the railway would be maintained where possible, except for during rail possession periods when pedestrians would be temporarily diverted via the footpath along the Pacific Highway and Wyong Road. However, during rail possession periods when trains are not running, pedestrian traffic across the railway is typically lower and the number of pedestrians likely to be impacted would be low.

The construction works on the western side of Tuggerah Station are not anticipated to have a significant impact on active transport accessibility except for when construction vehicles are entering and exiting the Pacific Highway ancillary facilities. Traffic controls and signage at the access and egress points would be in place to manage construction vehicle traffic and to maintain continuous safe access for pedestrians and cyclists.

Construction activities on the eastern side of the station would have minimal impacts on active transport, and access to the station is likely to remain as per existing conditions. There may be temporary disruptions to pedestrians or cyclists while construction vehicles are entering or exiting the ancillary facilities, although this is expected to be minimal. It is expected that the station interchange facilities, such as bicycle hoops, would be unaffected and kept operational.

Safety for pedestrians and cyclists would be addressed in the CTMP prior to the commencement of works, and temporary signage, markings and hoarding would be installed around the station.

The presence of construction work on the platform would reduce the amount of space available on the platform and temporarily impact pedestrian movements. There potentially

would be a higher level of platform congestion arising from restricted access to certain areas of the platform such as near the lift construction (due to construction work or storage areas), platform widening and lengthening and work at the station entrances and footpaths.

Rail and bus operations during construction

As discussed in Section 3.4.2, certain construction activities can be executed safely only during scheduled rail possession periods. As indicated in Section 3.4, there are seven weekend rail possessions scheduled during the proposed construction period during which Tuggerah Station would be closed to rail passengers, and buses would replace rail services.

To minimise impacts on rail customers, scheduled rail possession periods would be communicated in advance to the community, businesses and local residents. Rail possession periods may result in increased private vehicle usage, although replacement bus services are routinely provided to ensure that rail customers are able to travel. The rail possession periods are expected to have a minor impact on the surrounding road network performance, which would be further addressed within the CTMP.

No impacts on bus operation are expected during the Proposal's construction. The bus interchange within the commuter car park is expected to remain operational in its current configuration during the Proposal. During weekend rail possessions where buses replace trains, the buses would stop and depart from the Pacific Highway side of the station. Bus stop shelters on either side of Tuggerah Station would be unaffected by the Proposal.

Property access

It is expected that all property access would be maintained during construction.

Prior to construction, the construction Contractor would obtain any licences / approvals required for operating a crane within private airspace (if required). Proposed work within private airspace (if required) would be undertaken in accordance with the requirement of any relevant licences / approvals and in consultation with affected property owners and the contactor would adhere to all relevant requirements to ensure the safe operation of the crane.

Operational phase

During operation, the Proposal is expected to provide benefits for commuters, primarily focused on accessibility improvements as outlined in Chapter 1 and Chapter 3. The improved accessibility may result in a slight increase in rail patronage or to the number of rail customers using Tuggerah Station to access Sydney Trains services. However, the Proposal is not intended to result in increased frequency of train services.

Traffic access and vehicle movements

The proposed improvements to the station and the commuter car park may attract additional commuters to the station who would otherwise use alternate travel modes. However, the increase in commuters accessing the station by private vehicles is likely to be minor and is not expected to have a significant impact on the surrounding road environment during operation.

Accessibility and safety

The Proposal would result in improvements to accessibility and commuter safety during operation. With the provision of new lifts, a new footbridge, and improvements to station platforms and entrances, benefits would be achieved for commuter accessibility and safety.

Parking

Fifteen DDA compliant accessible parking spaces would be provided within the commuter car park after the Tuggerah Station upgrade is complete, replacing 19 existing parking spaces which are non-compliant. The provision of these new accessible parking spaces is likely to attract more commuters for rail use who otherwise would continue to use private vehicle modes.

Pedestrians and cyclists

Pedestrians and cyclists would benefit from the Proposal, through the provision of new bicycle facilities (with overall provision for secure storage of 27 bikes), upgraded footpaths, new lifts and additional seating at the bus interchange, taxi ranks and kiss and ride bays.

Rail and bus operations

No impacts to rail or bus operations are expected during the Proposal's operation.

6.1.3 Mitigation measures

To address impacts during the Proposal's construction, a CTMP would be prepared prior to works commencing, outlining mitigation measures to manage potential traffic and pedestrian impacts. These measures would include the following as a minimum:

- staging, or adopting a staggered construction schedule for the works that involve partial closure of the commuter car park, to minimise the number of car parking spaces occupied during construction
- ensuring adequate road signage at construction ancillary facilities to inform commuters and to ensure that the risk of accidents and disruption to surrounding areas is minimised
- providing safe alternate access for pedestrians and cyclists, where required
- ensuring adequate sight lines to allow for safe entry and exit from the ancillary facilities
- maintaining access to and from Tuggerah Station for businesses and residents
- managing impacts and changes to parking and addressing any requirements for temporary replacement provisions
- provision of construction worker parking away from residential areas, and details of how this would be monitored for compliance
- routes used by construction-related heavy vehicles to minimise impacts on businesses and residents
- scheduling of work / deliveries to avoid peak times as much as practicable to limit traffic and parking impacts and maintain customer access to the station
- measures to limit temporary parking loss
- measures for maintaining pedestrian cross corridor connectivity details for relocating rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with Sydney Trains and bus operators
- measures to manage traffic and pedestrian flows around the Proposal area, including regulatory and directional signposting, line marking, variable message signs and all other traffic control devices necessary.

The CTMP would be developed in consultation with the relevant road authorities, and performance of the traffic arrangements would be monitored during the Proposal's construction.

Additional mitigation measures will include the following:

- where feasible, works impeding commuters at Tuggerah Station would be undertaken during scheduled rail possession periods to minimise access, traffic and transport impacts
- public safety would be ensured during construction through the use of traffic controllers, signposting and temporary fencing or hoarding

- TfNSW would communicate regularly with the community, businesses and local residents to inform them of changes to rail services, parking, pedestrian access and traffic conditions, including vehicle movements and anticipated changes to the local road network relating to site works
- Road Occupancy Licences for temporary road closures would be obtained, where required
- station interchange facilities including bicycle hoops and taxi ranks would be kept operational.

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.2 Urban design, landscape and visual amenity

This section provides a summary of the Landscape and Visual Impact Assessment (LVIA) carried out for the Proposal (Iris Visual, 2021). The assessment is based on a viewpoint assessment which identified and assessed views that represent a range of publicly accessible viewpoints of the Proposal.

The assessment also identified existing landscape features, visual characteristics and assessed the impacts of the visual changes that the Proposal would bring and provides photomontages that show an indicative view of these changes. The assessment is carried out in accordance with the *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment* (TfNSW, 2020) and *The Guidance Note for Landscape and Visual Assessment* (GNLVA) (Australian Institute of Landscape Architects Queensland, 2018).

6.2.1 Existing environment

Tuggerah Station in its current form was built in the 1990s. The station is accessed via a footbridge, with ramps and stairs connecting to the eastern and western station entrance, at Bryant Drive and the Pacific Highway. The ramp structure to the west of the station is long and bulky with decorative pitched roof structures adding visual clutter. The station has two platforms, located either side of two tracks. Each platform has a small low set station building with sheltered waiting areas and amenities. The platforms are narrow and include steel fencing securing the rail corridor.

The Pacific Highway is directly west of the station and includes a kiss and ride zone adjacent to the station entrance. This section of the highway is a dual carriageway, with two to three lanes of traffic in each direction. To the south of the station, the highway rises to a bridge structure over Mardi Creek, towards the Wyong Road intersection. There are some blocks of vegetation to the northeast, southeast and southwest of the station, associated with the rail corridor, Tuggerah Creek and Mardi Creek, which provide a leafy setting to the station. A mature tree, located to the west of the station, is a local visual feature, marking the station entry (refer to Figure 6-2).

Figure 6-2 View of Tuggerah Station western entrance from the Pacific Highway

Tuggerah Station is surrounded by a variety of uses including a major sporting and recreational facility to the northeast, retail shopping centres to the southeast and west, and a light industrial area to the northwest. These precincts are separated by existing rail and road corridors which also create barriers for pedestrian and cycle movement between the eastern and western parts of Tuggerah.

At night, areas in the vicinity of the Tuggerah Station, including the Proposal area, are considered to be of medium district brightness (A3) based on AS4282:2019 Control of the obtrusive effects of outdoor lighting. This is due to the combination of surrounding land uses, which includes moderate to high existing light levels. This includes the brightly lit station, the commuter car park, and the Pacific Highway where there are both fixed lights and headlights from moving cars and train vehicles. There are lower light levels in the surrounding retail and commercial areas, parks and reserves.

6.2.2 Potential impacts

Five viewpoints were selected as representative of the range of views to and around Tuggerah Station from key publicly accessible locations:

- Viewpoint 1: View northeast from the Pacific Highway
- Viewpoint 2: View southeast from the corner of Anzac Road and Pacific Highway
- Viewpoint 3: View south from Platform 2
- Viewpoint 4: View southwest from the bus interchange
- Viewpoint 5: View west from the commuter car park.

The location of each viewpoint is shown in Figure 6-3.

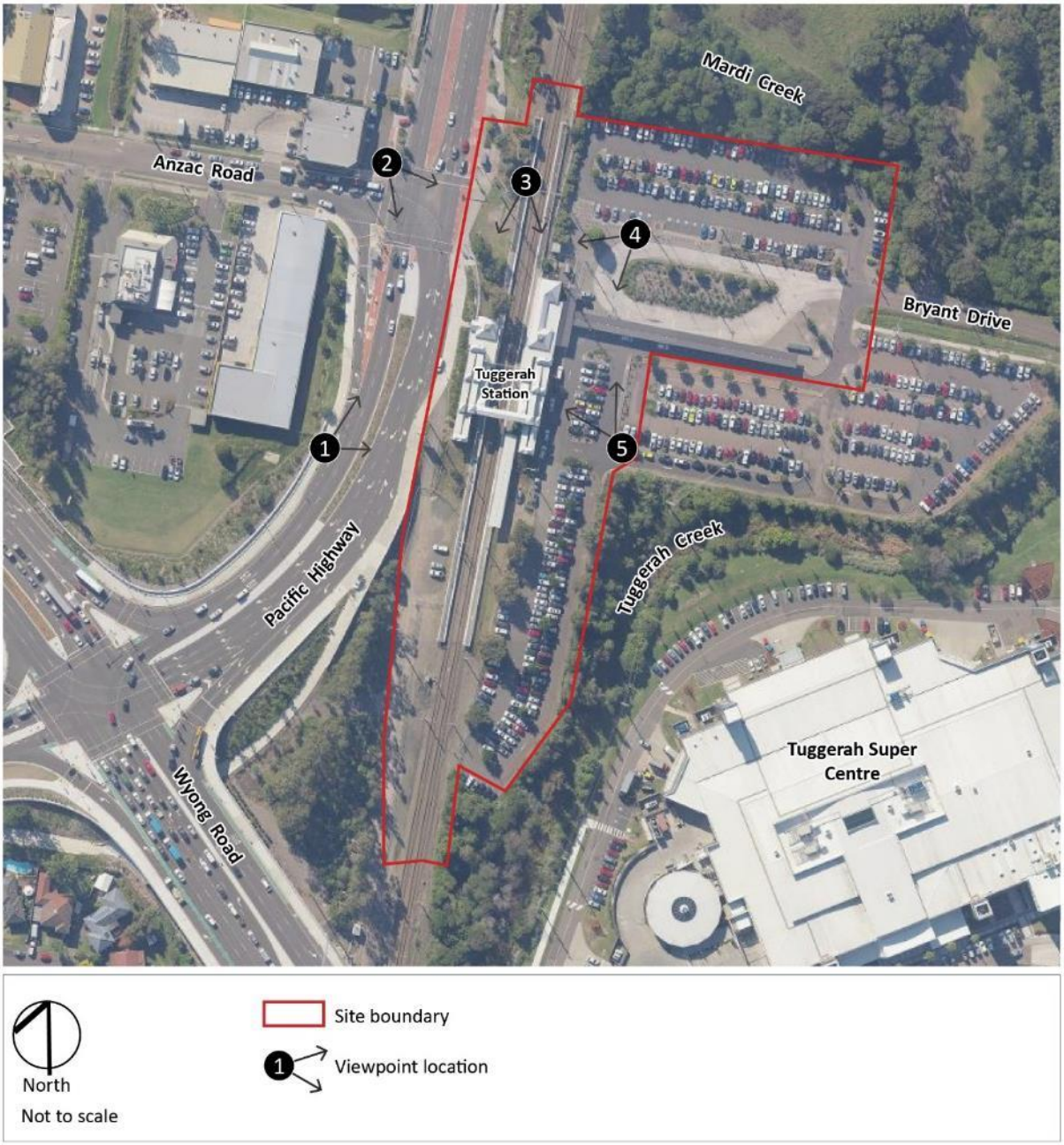


Figure 6-3 Viewpoint location plan

Construction phase

Table 6-3 summarises the daytime visual impacts during operation assessed at each of the representative viewpoint locations.

Table 6-3 Assessment of visual impacts during the construction of the Proposal

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
Viewpoint 1	Local visual sensitivity	A construction site would be established in the middle ground of this view, extending alongside the Pacific Highway and across the rail corridor. The main site compound would be located to the southwest of the station (right of view) and would be partly screened by the Pacific Highway ramp structure and vegetation along the highway. Vehicles would be seen accessing the compound site in the centre of this view, via an existing access road and gates to the rail corridor. Construction work to demolish the western station entrance, footbridge, stairs and ramping structure; the platform buildings; and the removal of the tree beside the western station entrance and the adjacent group of smaller trees would be seen unobstructed in this view. This would include the use of large equipment including cranes and scaffolding. The station would remain open, with temporary fencing enclosing areas required for construction. The construction activity, including use of large-scale machinery, would be prominent in this view. While this work would be seen in the context of a busy road, overall, there would be a considerable reduction in the amenity of this view.	Moderate adverse visual impact
Viewpoint 2	Local visual sensitivity	A construction site, enclosed by temporary fencing, would be established along the eastern side of the Pacific Highway in the middle ground of this view. The verge area beside this intersection (left of view), would be used as a materials laydown area during construction. Construction vehicles would be seen in the background of view, accessing the main site compound from the Pacific Highway, via an existing access road. Construction work to demolish the western station entrance, footbridge, stairs, ramping structures and several existing mature trees would be seen prominently in this view. Following this, two new lift structures and a new bridge would be constructed over the rail corridor in the centre of this view, about 50 metres north of the existing footbridge and closer to this viewing location. This work would include the use of large-scale equipment including cranes and be prominent in this view. Due to the scale and extent of the construction activity, including the removal of several mature trees, there would be a considerable reduction in the amenity of this view.	Moderate adverse visual impact

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
Viewpoint 3	Local visual sensitivity	A construction site would be established to the west of this view, between the platform and the Pacific Highway (right of view), and across part of the commuter carpark north of Bryant Drive (left of view). A construction site would also be established within the station, to the south of this view, in the middle to background. Works to demolish the station buildings, footbridge, stairs and ramping structures would be seen within the station in the background of this view. This would be followed by construction of the new lifts and footbridge over the rail corridor in the middle ground and closer to the viewer. Works to regrade, resurface, widen and lengthen the platforms and install new security fencing along the platforms would also be seen in close proximity to customers from the platforms. This work would be prominent including use of large-scale machinery to install the lifts and footbridge. Overall, there would be a considerable reduction in the amenity of this view.	Moderate adverse visual impact
Viewpoint 4	Local visual sensitivity	A construction site would be established in the middle and background of this view, extending north and south along the rail corridor. The footbridge, stairs and ramping structure and part of the station entry building would be demolished. Several existing trees would be removed, including the mature gum tree to the west (right of view). The area beside this enclosure, extending along the rail corridor would be used as a laydown area during construction. Two new lift structures with a connecting footbridge would be constructed within the rail corridor, in the middle ground and closer to this viewpoint. From this location, the new lift construction would be prominent, with the use of large-scale equipment including cranes. Due to the scale and extent of the construction activity, there would be a considerable reduction in the amenity of this view.	Moderate adverse visual impact

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
Viewpoint 5	Local visual sensitivity	A construction site would be established in the middle ground of this view, extending north and south along the rail corridor. Within this area there would be both demolition and construction work. Works to demolish the existing footbridge and ramping structure would be seen to the south of the station entry (left of view). The removal of this building would open up views to the station platforms where there would be widening, lengthening and resurfacing works. The installation of the boarding assistance zone canopy, at the southern end of Platform 2, may also be seen from this location (left and out of view). There would be construction in the foreground, within the commuter car park, to reconfigure the car parks. The existing car park trees would be protected and retained during construction. There would also be work at the existing station entry building, to demolish part of this building and construct a new Station Master's building and entry. Beyond the station entry, in the middle to background of this view, the new footbridge would be constructed. This would include large scale construction activity including the use of cranes to construct the lifts and stairs extending across the rail corridor. While this construction activity would be seen in the context of a commuter car park, including parked and moving vehicles, the character of the view would be transformed by construction activity. Overall, due to the scale and extent of construction activity that would be seen, there would be a considerable reduction in the amenity of this view.	Moderate adverse visual impact

Operational phase

Table 6-4 summarises the daytime visual impacts during operation assessed at each of the representative viewpoint locations.

Table 6-4 Assessment of visual impacts during the operation of the Proposal

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
Viewpoint 1	Local visual sensitivity	The new footbridge would be a prominent feature in the middle to background of this view, located about 50 metres north of the existing footbridge (left of view). The footbridge would include two glazed lift structures which would rise several storeys above the highway level, one either side of the rail corridor. The lifts would be linked by glazed connections to a bridge extending over the rail corridor that would be enclosed by anti-throw screens. There would be stairs connecting the footbridge to each of the two platforms also enclosed with anti-throw screens. There would be new Station Master's office at the entry and glimpses of the new boarding assistance zone canopy at the southern end of Platform 2. There would be a new canopy over the entrance and connecting to the new footbridge and lift. The removal of	Minor beneficial visual impact

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
		several trees would reduce the leafy character of the station in this view, however, there would be new landscaped areas provided in the vicinity of the station entrance which would improve the amenity of the streetscape and station entrance over time. Overall, the simplified forms of the footbridge and partial transparency of the materials would result in less visual clutter in this view. The proposed structure would also have a reduced footprint, allowing further views to the station platforms and across the rail corridor. This would result in a minor improvement to the amenity of this view.	
Viewpoint 2	Local visual sensitivity	The new footbridge and lift structures would be prominent features in the centre of this view. The top of the footbridge would rise about 10 metres above the existing road level, with the lift shafts rising slightly higher. The footbridge would include glazing and anti-throw screens, providing some transparency to this structure. The entrance would include a wider set of stairs and ramp, linking to the existing footpath and kiss and ride zone along the Pacific Highway. A new canopy structure would extend over the station entrance and concourse and extend to the lift landing. While the scale of this structure would be larger and more prominent in this view, it would mark the entry to the station. The simplified form of the footbridge and partial transparency of the materials would result in less visual clutter. While the loss of the mature trees would reduce the amenity of this view initially, new landscape treatments would provide a new landscape setting for the station entry over time. Overall, there would be a minor improvement to the amenity of this view.	Minor beneficial visual impact
Viewpoint 3	Local visual sensitivity	From this location, the two rectangular shaped lift structures and connecting footbridge would be prominent, rising above the rail corridor and platforms in the middle ground. The top of the footbridge would rise several storeys above the platforms, and the stairs would be seen extending away from the viewer to the south. The footbridge would be enclosed in mesh anti-throw screens and the upper portion of the lift shaft would incorporate glazing, visually lightening these structures somewhat. The platforms would be widened, lengthened and resurfaced, with new security fencing. The new station concourse buildings would be glimpsed beyond the footbridge at the station entrance (left of view). New areas of landscaping along the Pacific Highway and at the station entrances would refresh and contribute to the improvement of the visual appearance of the station. Overall, while the new lifts and footbridge would be taller structures than the former footbridge, and more prominent in this view, this structure would be a simpler structure than the existing footbridge. As this view has the capacity to absorb further infrastructure, there would be a neutral change to the amenity of this view.	Negligible visual impact

Viewpoint	Sensitivity of viewpoint	Assessment of visual impact	Impact rating
Viewpoint 4	Local visual sensitivity	The new lift structures and connecting footbridge would be prominent features in the middle ground of this view. The footbridge would be located about 50 metres north of the former footbridge, bringing it closer to the transport interchange and station entry, seen in the middle ground of this view. The new eastern entrance would include a wider set of stairs and ramp, providing a more spacious entry to the station. A new canopy structure would cover the station entrance and extend to the lift landing. There would be new planting and paving at the station entry that would refresh and improve the visual appearance of the station and entrance. While the new footbridge would be taller, and more prominent in the view from this location, it would have a simplified form and this view has the capacity to absorb a structure of this scale without detracting from the character of the station. Overall, there would be a neutral change to the amenity of this view	Negligible visual impact
Viewpoint 5	Local visual sensitivity	In the foreground of this view the car parking bays would be reconfigured, and the existing trees would remain. To the west (left and out of this view) the view would be opened up to the station platforms where the existing footbridge and ramps were removed. In the centre of this view the eastern station entrance would include a new Station Master's building and wider set of stairs and ramp, providing a more spacious entry to the station. A new canopy structure would extend over the station entrance and link with the lift landing. New paving at the station concourse and entrance would also refresh and improving the visual appearance of the station. The new footbridge would be located about 50 metres north of the former footbridge, visible behind the station entry from this location. The footbridge would rise prominently above the station and have a simpler form than the existing footbridge. As this view has the capacity to absorb a structure of this scale without detracting from the character of the station, there would be a neutral change to the amenity of this view.	Negligible visual impact

Figure 6-4 Viewpoint 1: View looking north-east from the Pacific Highway

Figure 6-5 Indicative photomontage of the Proposal during operation from Viewpoint 1

Figure 6-6 Viewpoint 2: View looking south-east from corner of Anzac Road and Pacific Highway

Figure 6-7 Indicative photomontage of the Proposal during operation from Viewpoint 2

Figure 6-8 Viewpoint 3: View looking south from Tuggerah Station Platform 2

Figure 6-9 Viewpoint 4: View looking southwest from the bus interchange at Bryant Drive

Figure 6-10 Viewpoint 5: View looking west from the Bryant Drive commuter car park

Figure 6-11 Photomontage of the Proposal during operation from Viewpoint 5

Views at night

Construction

The work areas and construction compounds would be lit at night for security. It is unlikely that these areas would be used on an ongoing basis for construction activity during evening hours (other than for specific activities or where works are undertaken during rail possession periods).

Generally, the character of the construction works at the station concourse, platforms and construction compound areas at night would be absorbed into the surrounding brightly lit environment of the station and partially enclosed by the existing vegetation and structures (including highway onramps and viaduct structures) which surround the station.

There may be some lighting visible from nearby roads, footpaths, car parks and retail properties which overlook the site, such as near the Pacific Highway and Anzac Road intersection. Overall, the construction work would result in a neutral change in the amenity of views at night and a negligible visual impact.

Operation

During operation, the station would continue to be brightly lit for security and safe use at night (as is currently experienced). The new footbridge would bring lighting to a higher level and further north but remain within the vicinity of the existing station. This additional lighting would be seen in the context of the existing station, commuter car park and streetlights along the Pacific Highway.

Overall, there is unlikely to be any noticeable additional sky glow above the site due to the new built form. There are no private residences located in the vicinity of the site and therefore there would not be any direct light spill (trespass) onto neighbouring residential properties. This is also the case for the nearby retail and commercial areas which are separated from the station by existing vegetation.

Overall, there would be a neutral change to the amenity of views at night, resulting in a negligible visual impact at night during operation.

Landscape character

Construction

During construction there would be areas of the station and surrounding areas required to support construction activity. This would include areas within the station and also within the four proposed ancillary facility sites. Some vegetation removal would be required within the station, including several mature trees beside the Pacific Highway and Anzac Road intersection. However, there would not be any trees removed to accommodate the compound sites.

The multiple construction sites around the station would reduce the amenity and comfort for pedestrians approaching the station from the east and west, particularly during the civil works and installation of the footbridge, stairs and lifts, due to the use of large-scale machinery.

Overall, there would be a temporary, considerable reduction in the landscape and urban design functionality of the station precinct during construction. This precinct is of local sensitivity and there would be a moderate adverse landscape impact.

Operation

During operation, there would be improvements to the accessibility of the station precinct with the introduction of a new footbridge with lifts, upgrades to the footpaths and station entrances, and improvements to the platform width and surface, and upgrade of facilities along the platform, including boarding assistance zones.

The location of the new footbridge, aligned with the intersection of the Pacific Highway and Anzac Road, would improve the directness of the east west cross corridor route and the reduced complexity and location of the footbridge would open up views to the station platforms from the adjacent footpaths and commuter carpark.

The upgraded station entry plazas, with the removal of the bulky ramping structures and introduction of new paving, furniture and signage, would also improve the appearance and accessibility of the station.

Overall, there would be a noticeable improvement to the urban design functionality and landscape character of the station precinct. The station is of local sensitivity and this would result in a minor beneficial landscape impact during operation.

6.2.3 Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on visual amenity:

- an Urban and Landscape Design Plan (ULDP) would be prepared by the Contractor, in consultation with Central Coast Council, and submitted to TfNSW for endorsement by the Precincts and Urban Design team, prior to finalisation of the detailed design. The ULDP, at a minimum, would address the following:
  - the appropriateness of the proposed design with respect to the existing surrounding landscape, built form, behaviours and use-patterns (including consideration of Crime Prevention Through Environmental Design principles). This is to include but not be limited to:
    - site analysis
    - vision and objectives for the infrastructure
    - strategies that apply to ISC approved guidelines in accordance with Urb-1 (IS Rating Tool V 1.2)
  - connectivity with surrounding local and regional movement networks including street networks, other transport modes and active transport networks. Existing and proposed paths of travel for pedestrians and bicycles would be shown
  - integration with surrounding local and regional open space and or landscape networks. Existing and proposed open space infrastructure/landscape elements would be shown
  - integration with surrounding streetscape including street trees, entries, vehicle cross overs etc
  - integration with surrounding built form (existing or desired future) including building height, scale, bulk, massing and land-use
  - design detail that is sensitive to the amenity and character of heritage items located within or adjacent to the Proposal.
- all permanent lighting would be designed and installed in accordance with the requirements of standards relevant to *AS 1158 Road Lighting* and *AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting*
- the detailed design of the Proposal would comply with Crime Prevention Through Environmental Design principles
- worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations
- temporary hoardings, barriers, traffic management and signage would be removed when no longer required

- during construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.

In addition, the following mitigation measures would be implemented:

- temporary access arrangements would be well signed and provide a visually legible route for pedestrians
- site equipment and facilities would be consolidated to maximise the area of useable public realm and maintain pedestrian access across the road bridge where possible
- trees retained within and adjacent to construction sites would be managed in accordance with *AS 4970 Protection of trees on development sites*.

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.3 Noise and vibration

A Construction Noise and Vibration Impact Assessment (Jacobs, 2021a) has been carried out for the Proposal in accordance with the *TfNSW Construction Noise and Vibration Strategy* (CNVS) (TfNSW, 2019b). Only construction noise and vibration impacts were assessed, as the Proposal does not include any changes to the existing operation of the Sydney to Newcastle railway line, nor to the operation of Tuggerah Station.

This section contains a summary of the assessment, key findings and recommendations, and the management measures to limit the impact of noise and vibration during the Proposal's construction.

6.3.1 Existing environment

The Proposal is located within a developed urban environment influenced by major highways, rail and industrial areas. As such, the existing background noise environment is characterised by typical urban noise sources, with a strong rail influence.

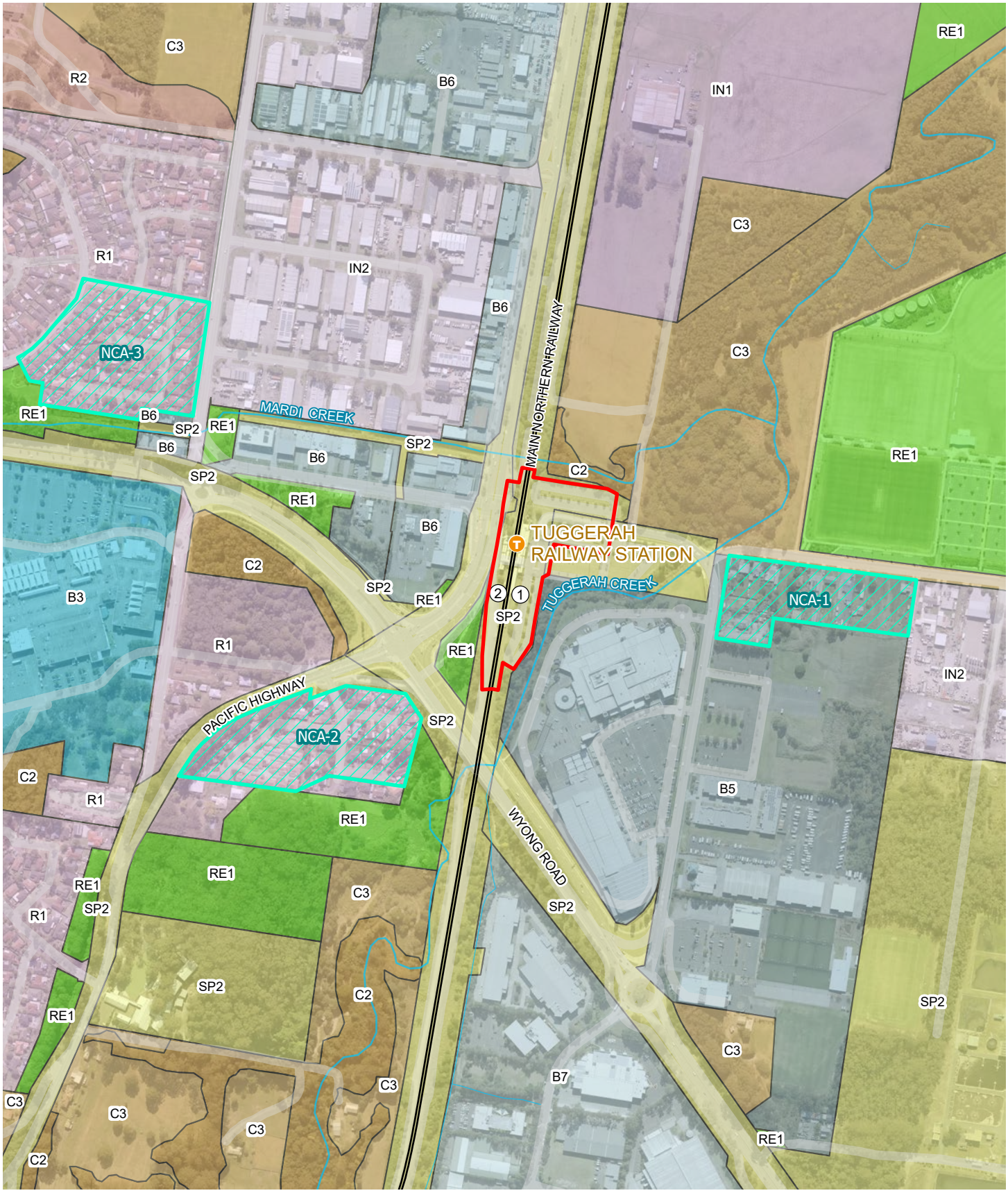
The sensitivity of the existing acoustic environment depends on the land use zone(s) in which receivers are located, the types of receivers, and the background noise levels in those areas at different times of day.

The land use zones immediately surrounding the Proposal are a combination of Infrastructure (SP2), Business Development (B5), Enterprise Corridor (B6), Public Recreation (RE1), Light Industrial (IN2), Environmental Conservation (C2) and Environmental Management (C3). Tuggerah Station is zoned as Infrastructure (SP2).

Residential receivers

The most sensitive receivers potentially impacted by the Proposal are several areas of residential receivers located east, south west and west north west of the Proposal area. The Noise Catchment Areas (NCA) of the three areas containing residential receivers, and their respective land use zones, are shown in Figure 6-12.

Noise Catchment Areas are generally ascribed only to those land use zones containing sensitive receivers, such as residential dwellings, schools or childcare facilities, and hospitals. Other (e.g. non-residential) land uses such as commercial or industrial premises are generally not considered to be receivers for construction noise, unless they accommodate a use that may be sensitive to noise or vibration, such as a recording studio or a laboratory that uses vibration-sensitive instruments.



Proposal area
Railway Station
Platform number
Road
Railway

Noise catchment areas

Land zoning

B3 Commercial Core
B5 Business Development
B6 Enterprise Corridor
B7 Business Park
C2 Environmental Conservation
C3 Environmental Management
IN1 General Industrial
IN2 Light Industrial
R1 General Residential
R2 Low Density Residential
RE1 Public Recreation
SP2 Infrastructure

0 70 140 210 m

1:7,000 at A4

GDA 1994 MGA Zone 56

Data sources

Jacobs 2021
Aerometrex 2021
Department Finance, Services and Innovation 2020

Figure 6-12 Land use zoning and noise catchment areas

Non-residential receivers

Non-residential development in the Proposal area that may also include noise sensitive receivers include commercial and light industrial premises such as the nearby large retail outlets. However, commercial and industrial buildings are generally not considered to be receivers for construction noise impacts unless the building contains sensitive occupancy such as a recording studio. Further, commercial and industrial buildings are also generally not considered to be sensitive receivers in terms of vibration impacts for human comfort unless the occupants are particularly sensitive to vibration e.g. medical surgeries. However, all buildings regardless of occupancy are considered to be valid receivers for the purposes of assessing vibration in terms of potential damage to structural elements.

It is noted from Figure 6-12 that there are several Public Recreation (RE1) areas near the Proposal area. However only the sporting fields on Lake Road opposite NCA-1 would be classified as either Active Recreation or Passive Recreation as defined in the ICNG and/or the CNVS.

As reported in Section 6.5 no heritage structures have been identified in the surrounding area.

6.3.2 Background noise levels

Background noise was measured in accordance with the requirements of the CNVS to quantify the sensitivity of the existing receiving environment. The background noise monitoring locations were selected on the basis that they would be representative of the noise environment throughout the Noise Catchment Areas in which the loggers were placed.

The details of the background noise measurements are shown in Table 6-5, and the measurement locations are shown in Figure 6-13.

Table 6-5 Background noise measurement details

Noise measurement location ID	Measurement location (street address)	Start date/ time	Stop date/ time	Duration	Sampling period
NM-1	25 Lake Road	18 October 2021	25 October 2021	7 Days	15 minutes
NM-2	4 Arunta Road	28 October 2021	4 November 2021	7 Days	15 minutes

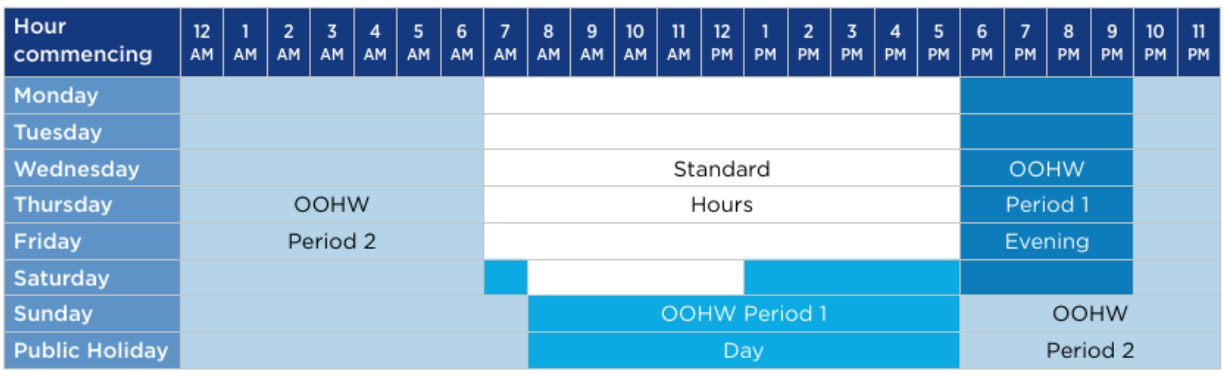
The background noise monitoring location NM-2 is considered to be suitable for the purposes of determining the background noise levels within both NCA-2 and NCA-3, since both Noise Catchment Areas are considered likely to have generally similar acoustic environments due to their proximity to major roads, commercial, or industrial noise sources.

NM-2 is also considered suitable because the monitoring locations need to be representative of a wider cluster of receivers. In some cases, the background noise levels at receivers located in closer proximity to the proposed works may be higher than elsewhere in the cluster, as they may be closer to extraneous noise sources such as a major road. If the background noise were to be measured at those receivers closer to the noise source, the measured background level would erroneously indicate an elevated background level for the entire cluster of receivers, and would therefore result in a higher noise management level (i.e. a more lenient maximum noise goal) for the whole cluster.

The measured background noise levels have been analysed to determine the Rating Background Level (RBL) as defined in the NSW Environment Protection Authority's *Noise Policy for Industry* (NPI) (2017), according to the time periods that are applicable to the assessment of TfNSW construction works as defined in the CNVS. Different RBLs are applied

depending on the time of day in which works are carried out. The time periods defined in the CNVS for the assessment of construction noise and vibration are shown in Table 6-6. Construction hours are defined in the CNVS as either 'standard hours' or several different categories of 'outside of standard hours', as shown in Table 6-6.

Table 6-6 Construction hours defined in TfNSW *Construction Noise and Vibration Strategy*



1. Standard construction hours are defined as: Monday to Friday 7:00am to 6:00pm and Saturdays from 8:00am to 1:00pm.
2. Work outside of standard construction hours is defined as Out-of-Hours Work (OOHW) and can be divided into 2 periods of sensitivity. OOHW Period 1 is defined as Monday to Saturday 6:00pm to 10:00pm (evenings), Saturday 7:00am to 8:00am and 1:00pm to 10:00pm (day & evening) and Sunday and public holidays 8:00am to 6:00pm (days). OOHW Period 2 is defined as Monday to Saturday 10:00pm to 7:00am (nights) and Sundays and public holidays 6:00pm to 8:00am (nights).

A summary of the measured background noise levels is presented in Table 6-7. Detailed noise measurement results are provided in the Construction Noise and Vibration Impact Assessment (Jacobs, 2021a). In preparing the data shown in Table 6-7, the data were analysed in accordance with the CNVS and the NPI, which requires that noise data recorded during periods of unsuitable meteorological conditions be removed from the measured data set. Accordingly, noise data measured during periods of wind exceeding five metres per second and/ or during periods of precipitation were excluded from the measurement data set.

Table 6-7 Rating background noise level measurement results

Noise measurement location	Measurement	Measured noise level – dB(A)		
		Standard hours (7am-6pm Mon-Fri, 8am-1pm Sat)[3]	Out of hours work 1 (6pm-10pm Mon-Fri, 7am-8am & 1pm-10pm Sat, 8am-6pm Sun, pub. holidays)[4]	Out of hours work 2 (10pm-7am Mon-Fri, 10pm-8am Sat, 6pm-7am Sun, pub. holidays)[4]
NM-1 25 Lake Road[1]	L_{Aeq}[2]	48	44	45
	RBL	37	36	35
NM-2 4 Arunta Road	L_{Aeq}[2]	54	50	47
	RBL	45	41	33

Note:

1. NM-1 is considered representative of a wide cluster of receivers, of varying proximity to the proposed works and the source of likely construction noise. In general, locations further away from noise sources will have lower RBLs, leading to a more conservative impact assessment, a lower trigger threshold for noise mitigation, and therefore a better community outcome.
2. L_{Aeq}: The equivalent-continuous noise level, which is the noise level that would have the same average acoustic energy as the fluctuating noise level over the time period. Also called the "energy-average" or "logarithmic average" noise level.
3. As per the NPI, RBL during Standard Hours should not be less than 35 dB(A), and RBL during other time periods should not be less than 30 dB(A).
4. RBL during Outside of Standard hours Period 1 should not be less than RBL during Standard hours, and RBL during Outside of Standard hours Period 2 should not be less than RBL during Outside of Standard hours Period 1.
   That is: $\mathbf{RBL_{Standard\ hours} \geq RBL_{OOHW1} \geq RBL_{OOHW2}}$

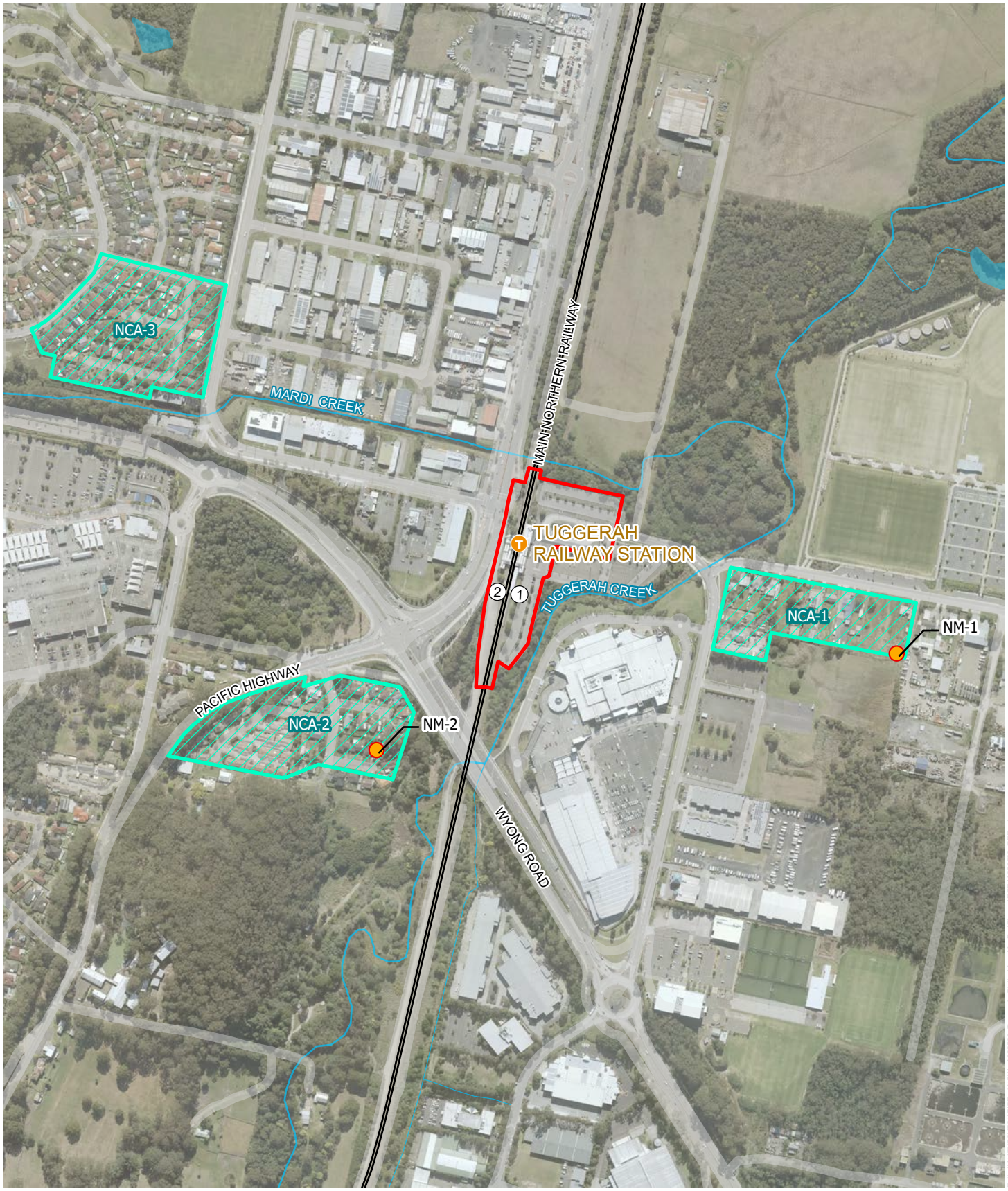


Figure 6-13 Noise catchment areas and noise monitoring locations

6.3.3 Noise management levels and objectives

Airborne noise objectives for residential receivers

Based on the measured RBLs presented above in Table 6-7, the Noise Management Levels (NML) for surrounding residential receivers were derived as shown in Table 6-8.

Table 6-8 Noise management levels at residential receivers in noise catchment areas

Noise Catchment Area	RBL (Background L_{A90})– dB(A)			Noise Management Level – dB(A)			
				Standard Hours		Out of Hours Work 1 (RBL+5)	Out of Hours Work 2 (RBL+5)
	Standard Hours	Out of Hours Work 1	Out of Hours Work 2	Noise Affected (RBL+10)	Highly Noise Affected		
NCA-1	37	36	35	47	75	41	40
NCA-2	45	41	33	55	75	46	38
NCA-3							

Note: $NML_{Standard\ hours} \geq NML_{OOHW1} \geq NML_{OOHW2}$

Sleep disturbance

Where construction works are planned over two or more consecutive nights, the potential for sleep disturbance and awakenings should be considered in the assessment.

For construction noise impacts (except for traffic noise) during the periods outside of standard working hours, the NSW EPA's sleep disturbance screening level is that the $L_{AF1\ (1\ minute)}$ level (equivalent to the L_{Amax}) of a noise event should not exceed the ambient L_{A90} noise level by more than 15 dB.

The sleep disturbance assessment thresholds derived for the NCAs are shown in Table 6-9.

Table 6-9 Sleep disturbance threshold noise levels in Noise Catchment Areas $L_{AF1(1\ minute)}$

Time Period	NCA-1	NCA-2	NCA-3
OOHW1	56 dB(A)	61 dB(A)	61 dB(A)
OOHW2	55 dB(A)	53 dB(A)	53 dB(A)

Airborne noise objectives for other receivers

In accordance with the CNVS, airborne noise objectives at sensitive land uses (other than residential) are as shown in Table 6-10.

Table 6-10 Noise management levels at non-residential receivers

Land Use	Management Level, L_{Aeq}
Classrooms at schools and other educational institutions	Internal noise level 45 dBA
Hospital wards and operating theatres	Internal noise level 45 dBA
Places of Worship	Internal noise level 45 dBA
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dBA

Land Use	Management Level, L_{Aeq}
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dBA
Community Centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

Construction traffic noise objectives

Depending on project-specific factors such as the expected frequency of heavy vehicle movements, the proximity of the project site to receivers and the existing traffic volumes on construction vehicle access routes, it may be sufficient to undertake a qualitative assessment of the potential noise impacts associated with construction traffic movements.

However, if a quantitative assessment is required, construction-related traffic noise objectives should be based on the guidance contained in the *NSW Road Noise Policy* (RNP) (NSW Department of Environment, Climate Change and Water, 2011).

The RNP states that in assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person. For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments (in this case the construction area), any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'without construction' scenario. If the heavy vehicle movements occur during the 10 pm to 7 am night-time period, the noise impacts should also be assessed in terms of the potential for causing sleep disturbance following a suitable methodology such as comparing the number of L_{Amax} noise events above 65 dB(A) from existing traffic against the number of events during the proposed construction works.

Ground borne noise

Ground borne construction noise is usually present on tunnelling projects when equipment such as tunnel boring machines and road headers are operated underground. The ground borne noise inside buildings initially propagates as ground borne vibration before entering the building, causing floors, walls and ceilings to gently vibrate and hence radiate noise. Sometimes the vibration may be perceptible within the building. For some critical spaces such as recording studios and cinemas, which are designed to reduce airborne noise intrusion, an assessment of ground borne construction noise for surface construction may also be required. Ground borne noise is usually not a significant disturbance to building occupants during daytime periods due to higher ambient levels which mask the audibility of ground borne noise emissions. During night-time periods however, when ambient noise levels are often much lower, ground borne noise is more prominent and may result in adverse comment from building occupants.

Vibration objectives

Construction activities that generate vibration may affect receivers through:

Disturbance of human comfort

Guidance in relation to acceptable vibration levels for human comfort are provided in *Assessing Vibration: A Technical Guideline* (NSW Environment Protection Authority, 2006). This document is based on the guidelines contained in British Standard BS 6472-1992.

Detrimentally affecting the contents within a receiver building

Buildings containing vibration-sensitive equipment, such as recording studios, high technology facilities and buildings with scientific equipment can require more stringent objectives than those applicable to human comfort.

Causing minor cosmetic damage or structural damage to the receiver building

The recommended limits (guide values) in the CNVS for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are based on British Standard BS7385, and are presented in Table 6-11. The Standard adopts a conservative approach, with the guide values being based on limits for cosmetic damage, with minor or major structural damage being possible at double, or four times those values respectively.

However, the guide values provided in BS7385 relate mainly to transient vibration in low-rise structures. Where continuous vibration at sufficiently low frequencies has the potential to magnify the resonant response, lower (i.e. more stringent) guide values would apply.

For unreinforced or light framed structures or residential or light commercial type buildings, at frequencies below 4 Hz a maximum displacement of 0.6 mm (zero to peak) is recommended.

Table 6-11 Transient vibration guide values – minimal risk of cosmetic damage

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or Framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Objectives for special structures

Heritage

If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage objective (than that provided in Table 6-11) of 2.5 mm/s peak component particle velocity (from German Standard DIN 4150-3:2016) would be considered.

It is noted that no heritage buildings or structures have been identified in the vicinity of the Proposal, within the minimum working distances for cosmetic damage to buildings.

Buried pipework and services

Structures below ground are known to sustain higher levels of vibration and are very resistant to damage unless in very poor condition (British Standard BS 7385-2:1993). Further guidance is taken from the German Standard DIN 4150-3:2016 *Vibration in Buildings – Part 3: Effects on Structures*, which sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values are reproduced and presented in Table 6-12.

Table 6-12 Guideline values for vibration velocity for buried pipework

Pipe Material	Guideline values for vibration velocity measured on the pipe
Steel (including welded pipes)	100 mm/s
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80 mm/s
Masonry, plastic	50 mm/s

Other vibration sensitive structures and utilities

A receiver structure such as a heritage-protected structure (whether occupied or not), or a buried utility service may be susceptible to cosmetic damage from vibration. A more stringent vibration goal may need to be adopted. Examples of such structures and utilities include:

- tunnels
- gas pipelines
- fibre optic cables.

Specific vibration objectives should be determined on a case-by-case basis. An acoustic consultant may be engaged by the construction contractor to liaise with the structure or utility's owner to determine acceptable vibration levels.

6.3.4 Potential impacts during construction

Noise scenarios

The worst-case noise emission scenarios during construction have been identified, for which the construction activities, duration in weeks and the expected major noise sources are shown in Table 6-13.

Table 6-13 Noise modelling scenarios: noise generating construction activities

Noise modelling scenario	Stage / activity	Possession	Weeks	Expected major noise sources
1 (Enabling works)	Platform station piles foundation supports, columns, capping beam and resurfacing works at the City end of Platforms 1 and 2	Yes (P1)	7-11	• Smooth drum roller • Concrete trucks • Concrete pump • 30 t piling rig • 20 to 50 t mobile crane • Chipping hammer • Percussion drill
2 (Major works)	Platform station piles foundation supports, columns, capping beam and resurfacing works at the Country end of Platforms 1 and 2 Construct pile caps, lift wells, support columns, head stock & stairs on down side	Yes (P3, P4)	30-44	• Smooth drum roller • Elevated work platforms (x3) • Concrete trucks • Concrete pump • 30 t piling rig • 20 to 50 t mobile crane • Percussion drill

Noise modelling scenario	Stage / activity	Possession	Weeks	Expected major noise sources
3 (Major works)	Construct pile caps, lift wells, support columns, head stock & stairs on down side	No	45-62	• Elevated work platforms (x3) • 20 to 50 t mobile crane • Chipping hammer • Percussion drill
4 (Major works)	Removal of slip lane, corner of Anzac Road and Pacific Highway Construct & commission new Station Masters Office and station facilities Complete station entry and forecourt modifications and landscaping	Yes (P6, P7)	66-87	• 5 to 30 t excavator • 35 to 40 t excavator with demolition shear attachment • 4 to 10 t dump trucks • Smooth drum roller • Elevated work platforms • Water cart • Asphalt trucks • Percussion Drill

Predicted noise levels

Sound power levels have been estimated for each item of construction plant and equipment listed in Table 6-13. These sound power levels have been used as the basis for modelling of construction noise for each of the scenarios described above.

Based on these noise sources, predicted noise level contours for each of the four scenarios described in Table 6-13 have been modelled and shown in Figure 6-14, Figure 6-15, Figure 6-16 and Figure 6-17.

Additionally, noise levels have been predicted using the computer noise model at each of the Noise Catchment Areas. The predicted noise levels at the nearby residential noise receivers from the above noise modelling scenarios are shown in Table 6-14.

Table 6-14 Predicted worst-case construction noise levels $L_{Aeq(15\ minute)}$ dB(A)

Noise modelling scenario	Predicted noise levels at Noise Catchment Areas (worst-case, maximum 15-minute L_{Aeq}) dB(A)		
	NCA-1	NCA-2	NCA-3
1	57	52	45
2	53	50	43
3	57	51	44
4	55	53	46

It should be noted that the predicted noise levels shown in Table 6-14 are worst-case noise levels that may occur, as they assume that all noise sources are operating concurrently. It should also be noted that the predicted noise levels shown in Table 6-14 do not include any allowance for special audible characteristics of the noise, as the noise sources included in the modelling scenarios are not expected to include particularly noticeable or annoying audible

characteristics. In practice, if the actual noise sources exhibited tonality, impulsiveness, low-frequency components or intermittency then the noise emissions may attract a penalty adjustment up to a total of 10 dB(A) higher than the noise levels shown in Table 6-14.

Figure 6-14 Predicted Noise Levels – Noise Modelling Scenario 1, worst-case L_{Aeq}(15 minute) dB(A)

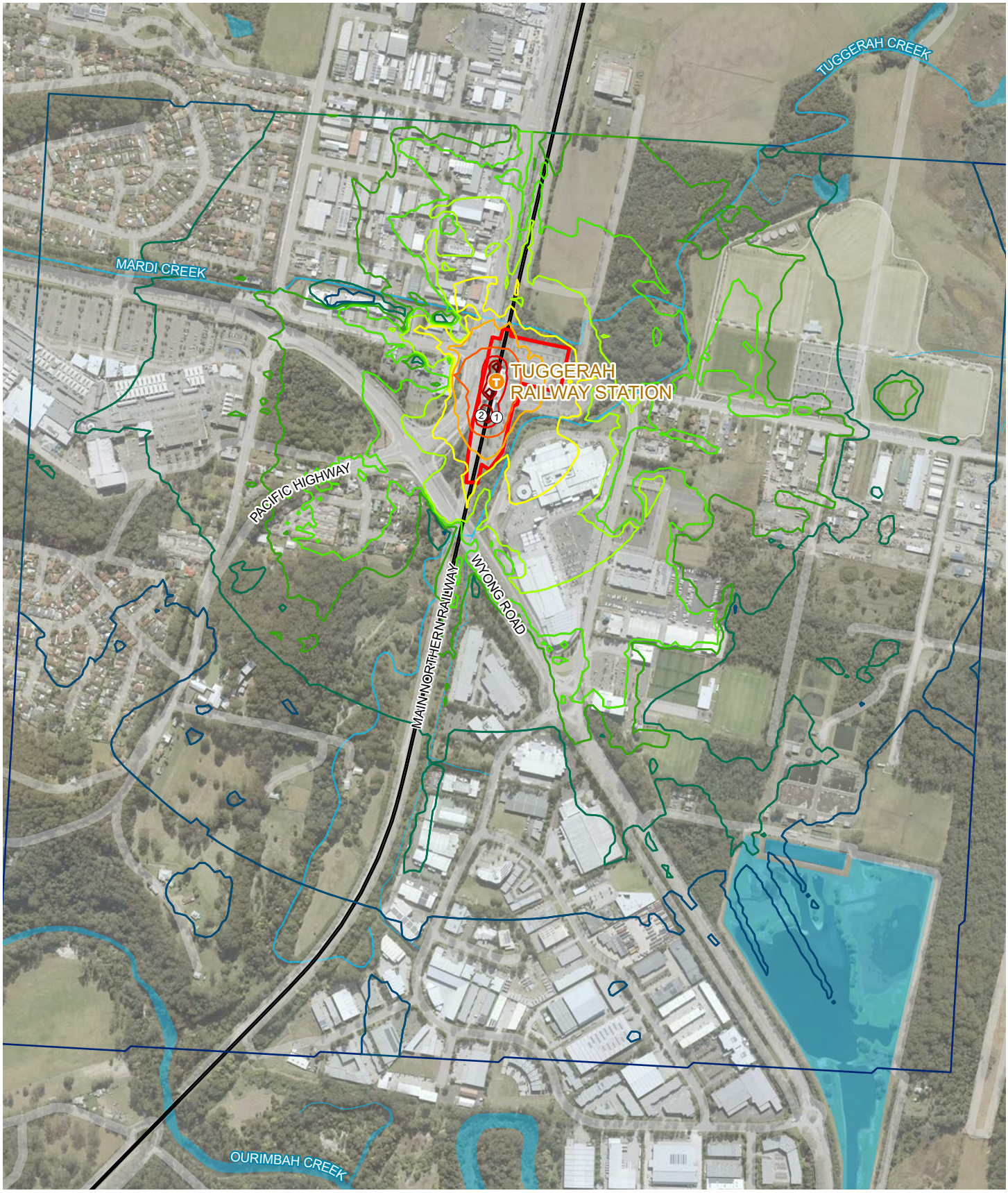


Figure 6-15 Predicted Noise Levels – Noise Modelling Scenario 2, worst-case L_{Aeq}(15 minute) dB(A)

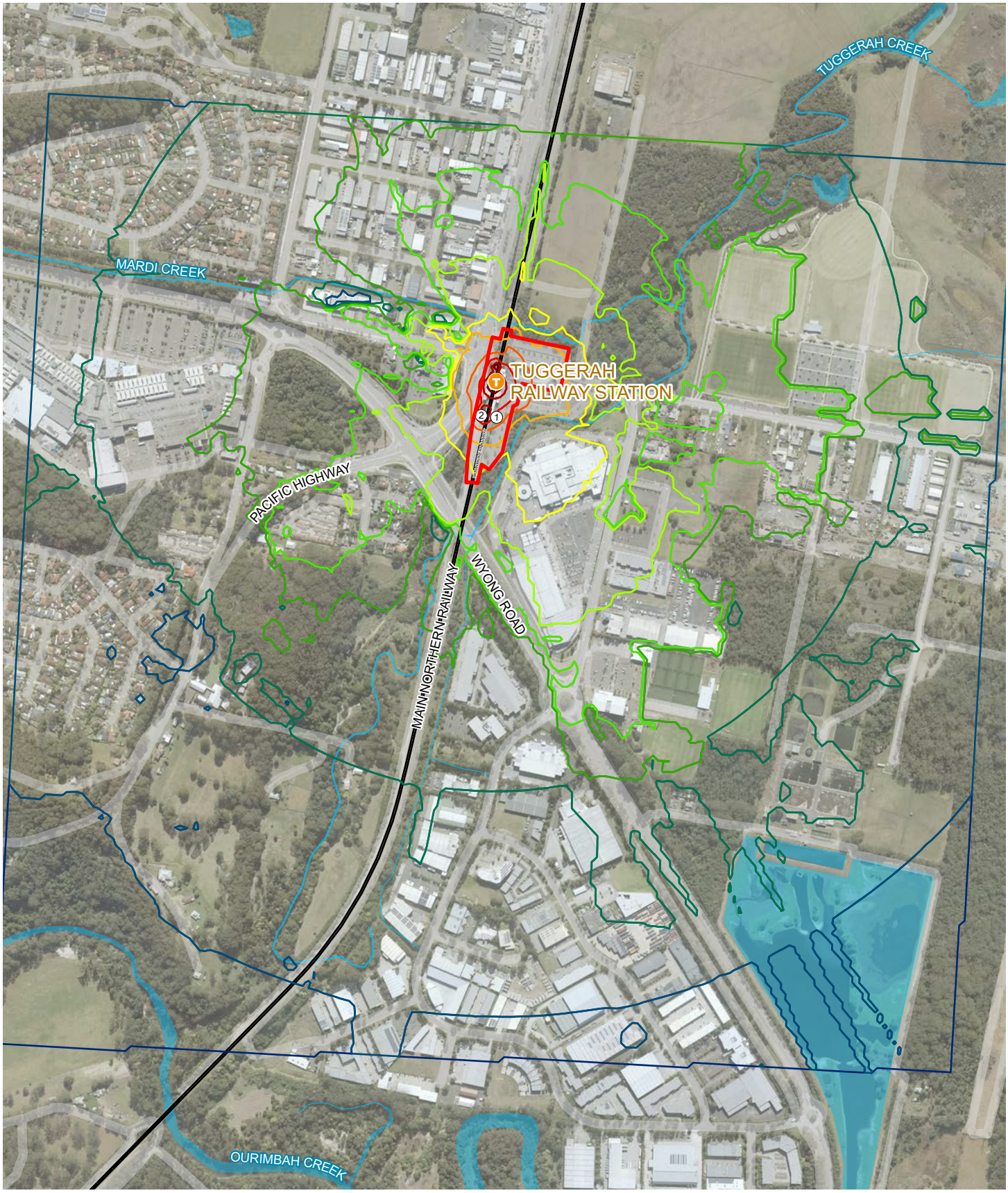


Figure 6-16 Predicted Noise Levels – Noise Modelling Scenario 3, worst-case L_{Aeq}(15 minute) dB(A)

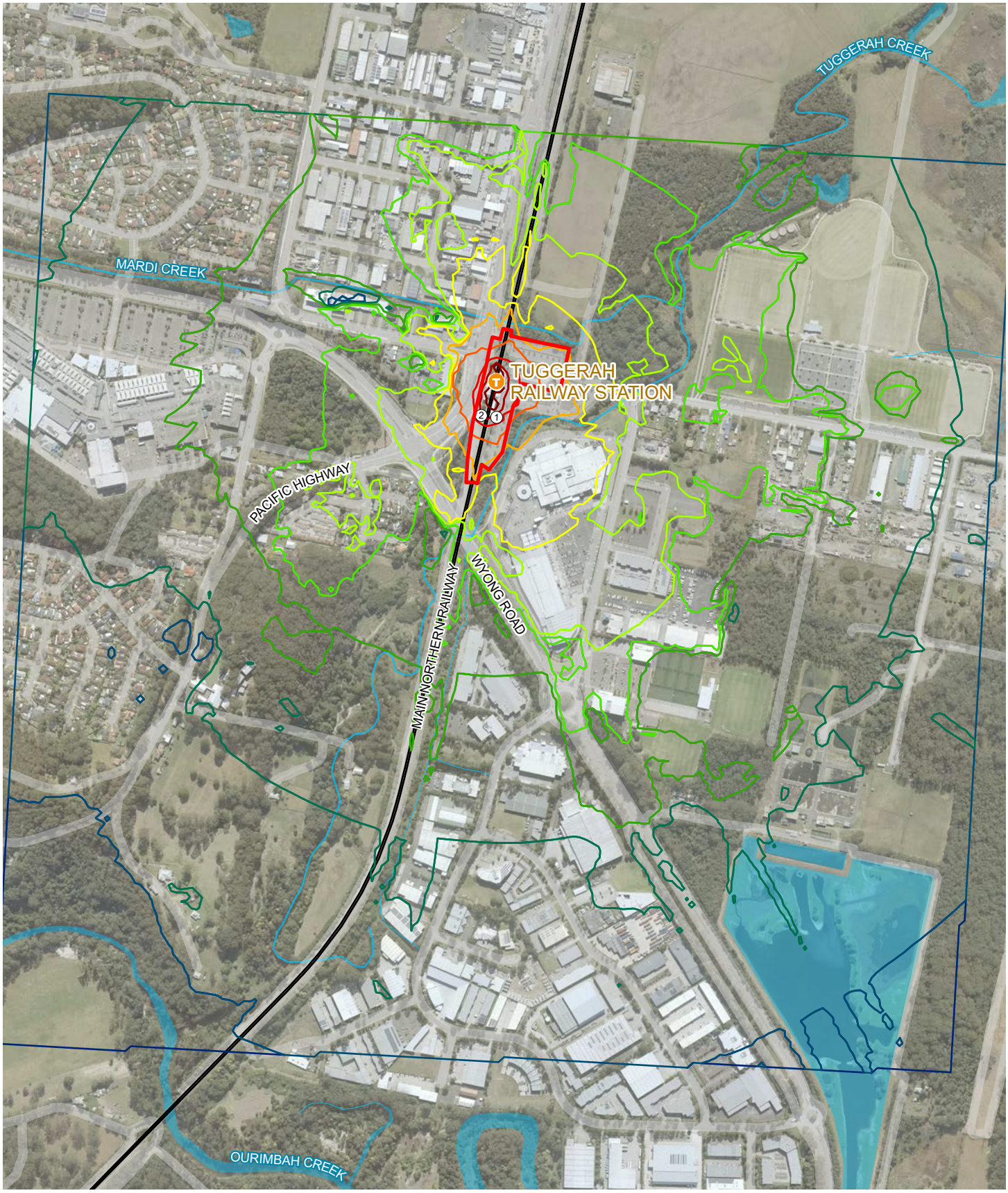


Figure 6-17 Predicted Noise Levels – Noise Modelling Scenario 4, worst-case L_{Aeq}(15 minute) dB(A)

Road traffic noise impacts during construction

The construction traffic associated with the proposal is expected to be minor in comparison to the existing traffic volumes in the area. The road haulage routes described in Section 6.1.2 demonstrate that the proposed traffic routes would utilise main roads to access and depart the Proposal area. The proposed construction ancillary facilities are at/adjacent to the Proposal area, and consequently there would be negligible additional traffic movements and therefore negligible additional traffic noise at any residential receivers.

Predicted vibration levels during construction

The construction equipment to be used on site that may generate high vibration levels are:

- pile borer
- asphalt paver
- smooth drum roller (possibly vibrating-type).

The vibration levels resulting from these types of plant depend on the size and power rating of the plant and the vibration propagation characteristics of the underlying soil material.

Typical vibration levels from these types of plant are provided in the *Construction Noise and Vibration Guideline* (CNVG) (Roads and Maritime Services, 2016). The typical vibration levels are given in terms of minimum working distances from sensitive receivers for typical items of vibration intensive plant as listed in Table 6-15.

Table 6-15 Ground vibration – minimum working distances from sensitive receivers

Plant item	Rating/ Description	Minimum working distance	
		Cosmetic damage[1] (BS 7385)	Human response (AVTG)
Vibratory roller	< 50 kN (Typically 1-2 t)	5 m	15 to 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
	> 300 kN (Typically 13-18 t)	20 m	100 m
	> 300 kN (> 18 t)	25 m	100 m
Small hydraulic hammer	(300 kg – 5 to 12 t excavator)	2 m	7 m
Medium hydraulic hammer	(900 kg – 12 to 18 t excavator)	7 m	23 m
Large hydraulic hammer	(1600 kg – 18 to 34 t excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m
Profiler[2]	Wirtgen W210	4 m	
Asphalt paver[2]	Vogele Super 1800-3	1 m	

Plant item	Rating/ Description	Minimum working distance	
		Cosmetic damage[1] (BS 7385)	Human response (AVTG)
Steel drum roller[2]	Hamm HD70 (Oscillating Mode)	2 m	
Steel drum roller[2]	Hamm HD70 (Static Mode)	1 m	

Note 1: More stringent conditions may apply to heritage or other sensitive structures

Note 2: Minimum working distances for human response for profiler, asphalt paver or steel drum rollers are not provided in the CNET or the CNVG however these plants are assumed to be comparable to a vibratory roller i.e.: worst-case 25 metres for cosmetic building damage and 100 metres for human comfort.

As shown in Table 6-15, the highest values of any of the recommended minimum safe working distances from the proposed vibration-generating plant to be used during the site works is:

- to prevent cosmetic damage to buildings: 25 metres from the smooth drum roller, and
- to prevent human discomfort: 100 metres from the smooth drum roller.

Impact assessment: noise

The predicted worst-case noise levels from the construction works are compared against the noise management level objectives in Table 6-16.

Table 6-16 Assessment of predicted worst-case construction noise levels

Noise modelling scenario	Predicted noise levels at receivers (worst-case, maximum 15-minute LAeq) dB(A)			
	NCA-1	NCA-2	NCA-3	Sporting Fields on Lake Road
1 (Enabling works)	57	52	45	45
2 (Major works – Including P3, P4 Possessions)	53	50	43	43
3 (Major works – non-Possession)	57	51	44	44
4 (Major works – including P6, P7 Possessions)	55	53	46	46
Noise Management Levels (NML, dB(A))				
Standard working hours	47	55	55	65
OOHW1	41	46	46	65
OOHW2	40	38	38	65
OOHW1 Sleep Disturbance $L_{AF1\ (1\ minute)}$ or L_{Amax}	56	61	61	n/a

Noise modelling scenario	Predicted noise levels at receivers (worst-case, maximum 15-minute LAeq) dB(A)			
	NCA-1	NCA-2	NCA-3	Sporting Fields on Lake Road
OOHW2 Sleep Disturbance $L_{AF1\ (1\ minute)}$ or L_{Amax}	55	53	53	n/a

As shown in Table 6-16, the predicted noise levels at NCA-1 exceed the NML during standard hours by up to 10 dB(A) for each of the four noise modelling scenarios. The predicted noise levels at NCA-2 and NCA-3 do not exceed the NML during standard hours any of the four noise modelling scenarios.

However, the predicted noise levels do not exceed the Highly Affected noise objective of 75 dB(A) at any residential receiver during the standard hours.

During the OOHW1 period:

- the predicted noise levels during all modelling scenarios exceed the NML by up to 16 dB(A) at receiver NCA-1, and by up to 6 dB(A) at receiver NCA-2
- the predicted noise levels do not exceed the NML at receiver NCA-3.

During the OOHW2 period:

- the predicted noise levels during all modelling scenarios exceed the NML by up to 17 dB(A) at receiver NCA 1
- the predicted noise levels during all modelling scenarios exceed the NML by up to 15 dB(A) at receiver NCA 2
- the predicted noise levels during all modelling scenarios exceed the NML by up to 8 dB(A) at receiver NCA 3.

As also shown in Table 6-16, the worst-case noise levels are not predicted to exceed the noise management level at the sporting fields on Lake Road at any time.

Predicted exceedances above NML

The assessment indicates that the residential receivers in Noise Catchment Area NCA-1 on Lake Road are likely to experience the highest noise impacts. Noise levels at NCA-1 may exceed the NML during standard construction hours by up to 10 dB(A) during worst-case noise events.

The predictions indicate that even though the worst-case construction noise impacts may exceed the NML at some locations during Standard construction hours, the exceedances are not significant and no additional noise mitigation measures would be required to be implemented.

If the worst-case noise producing construction activities occur during the OOHW1 and/or the OOHW2 time periods, the L_{Amax} noise levels in the locations of the NCA-1 residential receivers may exceed the Sleep Disturbance assessment threshold.

However, if the worst-case construction noise events occur outside of standard construction hours, the predicted noise levels at some or all of the NCAs may exceed the NML sufficient to trigger the requirement to implement additional noise mitigation measures.

Based on the predicted noise levels from the worst-case construction activities, if the worst-case construction noise emissions occur during the OOHW1 or OOHW2 time periods, receivers in Noise Catchment Areas NCA1, NCA2 and NCA3 would become eligible for additional noise mitigation measures as shown in Table 6-17. Detailed descriptions of the

additional mitigation measures listed in Table 6-17 are provided in the Construction Noise and Vibration Impact Assessment (Jacobs, 2021a).

Table 6-17 Additional noise mitigation under worst case construction noise scenario

Noise Catchment Area	OOHW Period 1 (Mon-Fri 6pm – 10pm; Saturday 7am – 8am, 1pm – 10pm; Sunday/Public Holidays 8am – 6pm)	OOHW Period 2 (Mon-Fri 10pm – 7am; Saturday 10pm – 8am; Sunday/Public Holidays 6pm – 7am)
NCA 1	• Project notification • Verification monitoring	• Project notification • Verification monitoring • Specific notification, individual briefings, or phone call • Respite periods • Duration reduction
NCA 2	• Project notification	• Project notification • Verification monitoring
NCA 3		• Project notification • Verification monitoring

Assessment of sleep disturbance

It is expected that the predicted worst-case $L_{Aeq(15\ minute)}$ noise level is approximately the same as the L_{Amax} noise level that may be received at a receiver. In that case, the predicted L_{Amax} noise level would also exceed the objective for prevention of sleep disturbance at the receivers in NCA-1 during both the OOHW1 period and OOHW2 period. However, the predicted noise levels do not indicate potential exceedance of the sleep disturbance objectives during OOHW1 or OOHW2 in either of the receiver clusters in NCA-2 or NCA-3.

Construction traffic noise impacts

The construction traffic associated with the Proposal is expected to be minimal, consequently the construction traffic noise impacts are expected to be negligible at all residential receivers. The potential for construction traffic noise impact at any commercial receivers is also considered to be negligible.

Vibration impacts

Cosmetic damage to buildings

As shown in Table 6-15, the highest value of minimum working distances for human comfort for any of the listed plant is 25 metres.

Since the nearest potentially affected structure is more than 55 metres from the site (the commercial building to the west), and the nearest residential buildings are approximately 190 metres from the site (NCA-2 to the south-west), it is considered that the risk of cosmetic damage to any nearby building as a result of the Proposal's construction is negligible.

Human discomfort

As shown in Table 6-15, the highest value of minimum working distances for human comfort for any of the listed plant is 100 metres. There are two buildings within 100 metres that contain occupants who may potentially be disturbed by vibration from the construction activities on site. These are:

- 2 Anzac Road, Tuggerah [Lot 50, DP1099463] – about 55 m west of the construction works
- 2 Bryant Drive, Tuggerah [Lot 101, DP1209157] – about 80 m south east of the construction works

Both of the above buildings are commercial (retail sales) buildings, which are generally not considered to be sensitive receivers for human comfort due to vibration in assessment of vibration from construction in NSW. Consequently, neither of these buildings is considered to be a receiver for the purposes of this assessment.

There are no other receiver buildings within the 100 metre safe working distance zone from the construction works, therefore the risks associated with construction vibration causing human discomfort at any receiver buildings is assessed to be negligible.

6.3.5 Potential impacts during operation

The Proposal would not result in any change to the operation of the Sydney to Newcastle rail line, or any changes to the nature or frequency of rail services using the railway. Nor is the Proposal likely to result in any changes to road traffic (including bus services to and from Tuggerah Station) that would have any noticeable impact on road traffic noise. Due to the minor to negligible increase in operational noise therefore, operational noise modelling and assessment was not carried out as part of this REF.

6.3.6 Mitigation measures

It is expected that construction works would be required outside of standard hours periods during some of the scheduled rail possession periods. However, works outside of standard hours may also occasionally be required for some construction activities that are not associated with rail possession periods. In either case, noise modelling should be undertaken as part of the approvals process for works outside of standard hours.

Prior to commencement of work, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the CNVS and Table 7-1 of this REF.

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

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.4 Aboriginal heritage

6.4.1 Existing environment

A search for known Aboriginal heritage items in the vicinity of the Tuggerah Station Upgrade Proposal area was carried out on 17 November 2021 using the Aboriginal Heritage Information Management System (AHIMS) database maintained by the Environment, Energy and Science Group of the DPE. The search confirmed there is one recorded Aboriginal heritage item within 100 metres of Tuggerah station, within the Proposal area. This item is located near the

northern edge of the Bryant Drive commuter car park. Further investigation by TfNSW revealed the item to be a non-existent heritage item.

The extensive landscape modification that has occurred across the Proposal area suggests that intact evidence of Aboriginal land use is unlikely to occur. Similarly, the high level of disturbance due to construction of the rail line and platforms, the Bryant Drive bus station and commuter carpark, and the proximity of the Pacific Highway would suggest that the archaeological potential of the area is low.

6.4.2 Potential impacts

Construction phase

Construction of the Proposal would involve minor excavation and other ground disturbance activities, particularly for the foundations and pits for each of the new lifts, additions to the concourse, accessibility ramps, the new overpass structure, utilities and services relocations, and carpark upgrades.

Ground disturbing activities have the potential to impact Aboriginal sites, if present.

One identified Aboriginal heritage item is located within the Proposal area. However, this item is non-existent and, as no significant excavations are proposed, no impacts to Aboriginal heritage are expected due to construction of the Proposal.

Operational phase

It is not expected that there would be any risks to Aboriginal heritage from the operation of the Proposal, particularly as the Aboriginal heritage item is designated as a non-existent heritage item.

6.4.3 Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on Aboriginal heritage (refer to Table 7-1 for a full list of proposed mitigation measures):

- if unforeseen Aboriginal objects are uncovered during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2019c) would be followed, and work within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager
- if human remains are found, work would cease, the site secured and the NSW Police and the Environment, Energy and Science Group of the Department of Planning and Environment notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to work recommencing at the location.

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.5 Non-Aboriginal heritage

6.5.1 Existing environment

A desktop search of non-Aboriginal heritage registers was carried out in December 2021 for the following databases:

- World Heritage List
- Commonwealth Heritage List

- Register of the National Estate (non-statutory archive)
- NSW State Heritage Register
- Section 170 Heritage and Conservation Register (Sydney Trains, WaterNSW, Australian Rail Track Corporation)
- Wyong LEP and draft Central Coast LEP.

No listed heritage items have been identified within the Proposal area. A local heritage item identified being closest to the Proposal is the former Tuggerah Pioneer Dairy, located at 1897 South Tacoma Road, 730 metres north of the Proposal (refer to Figure 6-18).

Figure 6-18 Heritage items near the proposal

6.5.2 Potential impacts

Construction phase

As there are no non-Aboriginal heritage items in close proximity to the Proposal, the ground disturbance and other construction activities are unlikely to damage, displace or destroy an item of heritage value.

Operational phase

No impacts to non-Aboriginal heritage items are expected as a result of the operation of the Proposal.

6.5.3 Mitigation measures

In the event that any unexpected archaeological deposits are identified within the Proposal area during construction, work within the vicinity of the find would cease immediately and the procedures contained in the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2019c) would be followed.

Refer to Table 7-1 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.6 Socio-economic impacts

6.6.1 Existing environment

Tuggerah is a developing strategic centre within the Central Coast LGA. The land uses surrounding the Proposal include commercial and retail services, general manufacturing and industry, recreation and conservation areas and some low density residential areas. The Tuggerah Super Centre and Tuggerah Westfield are both shopping complexes located nearby, to the south and west of the Proposal respectively. The Central Coast Regional Sporting and Recreation Complex is located along Lake Road to the east of the Proposal. Tuggerah Public School is located about 630 metres south west of the Proposal and other community social infrastructure are generally located a further distance away from the Proposal area.

The closest residential receiver is about 270 metres east of Tuggerah Station. The closest commercial building is located 60 metres west of the station, which contains Thai Finesse restaurant, Repco Tuggerah and Petbarn.

Tuggerah Station is next to the Pacific Highway, which runs through the centre of the Tuggerah suburb providing a north-south transport route to Newcastle and Sydney. Along Pacific Highway north of the Tuggerah Station, a large industrial area is located west of the highway and the Central Coast Wetlands are located east of the highway. Similarly south of the Tuggerah Station, large areas of vegetated wetlands and conservation lands lie to the west of the highway, and more industrial and business land uses are located east of the highway.

Demographics

A review of the Australian Bureau of Statistics 2016 census data provides a brief demographic overview. The Statistical Area Level 2 (SA2) area for Tuggerah-Kangy Angy region includes the Tuggerah suburb as well as nearby Mardi, Kangy Angy and Tacoma South suburbs to provide an overview of the locality. This SA2 area has:

- a population of 5,303 people with a median age of 37
- around 75.5 per cent of the population born in Australia
- around 59.1 per cent of the population (over the age of 15) working full time

- most common types of occupation being professionals (17 per cent), technicians and trade workers (15.1 per cent) and clerical and administrative workers (14.7 per cent)
- family households account for 78.2 per cent of all households, while 18.8 per cent of all households are single person households and three per cent are group households
- people aged over 65 account for 15.6 per cent of the population, while 13.9 per cent are aged between 0 and 9 years old
- of employed persons, 8.8 per cent use public transport to travel to work.

Travel behaviours

The Tuggerah Station precinct is low in density and motor vehicle oriented. The Proposal would enable more efficient access to and use of public transport including train and bus services.

According to Opal card data at Tuggerah Station in 2019, the morning peak period during a weekday shows an average of 724 entries and the data indicates the station is predominantly used for outbound journeys during the morning and inbound during the evening. The majority of passengers access Tuggerah Station by car (71 per cent) and other passengers use bus services or walk to the station before riding the trains (28 per cent) (Traffic Impact Assessment Report, Futurerail, 2021).

While trains and public transport options do not currently account for a majority of commuter travel mode to work, this share of public transport users is expected to increase in the future as Tuggerah grows, particularly with the planned development of the Tuggerah Town Centre and expanding population, economy and infrastructure along the Sydney to Newcastle road and rail corridors.

Community Strategic Plan

The Central Coast Community Strategic Plan 2018-2020 outline strategic objectives for the Tuggerah community. Of the objectives for the Central Coast Council, the Proposal would align with the following:

- facilitate economic development to increase local employment opportunities and provide a range of jobs for all residents
- improve pedestrian movement safety, speed and vehicle congestion around schools, town centres, neighbourhoods, and community facilities
- ensure all new developments are well planned with good access to public transport, green space and community facilities and support active transport
- revitalise town centres as key destinations and attractors for businesses, local residents, visitors and tourists
- create adequate, reliable and accessible train services and facilities to accommodate current and future passengers.

6.6.2 Potential impacts

Construction phase

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

- temporary changes to pedestrian access to, through and around the station

- weekend closures of Tuggerah Station to construct new lifts, new footbridge and widen/lengthen platforms (timed to occur during scheduled rail possessions)
- temporary disruptions to local traffic movements near the station
- temporary loss of parking around the station in the Bryant Drive commuter car park
- increased truck movements due to the delivery of materials and equipment and the transportation of waste
- construction noise, vibration, dust and visual impacts.

Access for emergency services would be maintained at all times and it is not anticipated that access to residential or commercial properties would be affected during construction of the Proposal. There is potential for a minor temporary increase in business from construction workers during the construction period.

Construction works would be undertaken to ensure pedestrian and cyclist access to and through the station precinct would be maintained. Where works are carried out that may potentially disrupt the existing pedestrian facilities, appropriate signs or traffic controllers would be positioned to notify pedestrians of the temporary arrangements.

Station access would be maintained for the public, apart from when construction work occurs during a rail service shutdown. The rail shutdowns would occur regardless of the Proposal being carried out.

Disruptions from rail shutdowns (e.g. requirement for replacement buses) would be as per normal TfNSW practice and would occur regardless of the Proposal. There may also be temporary minor disruptions to the availability of commuter car parking as a result of construction workers parking around the Proposal and the use of the commuter car park for ancillary facility sites. There would be sufficient on-street parking and on-premises parking both east and west of the Pacific Highway for local businesses and the community, as well as the existing parking along Bryant Drive associated with the nearby Tuggerah Super Centre.

The relocation of the existing electric cables and associated utilities work would need to be carried out in conjunction with TfNSW/Sydney Trains and the electricity supplier, in order to minimise potential disruptions or impacts.

Operational phase

Operation of the Proposal would provide positive socio-economic benefits to the Tuggerah local community and the wider Central Coast LGA including:

- provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces, and improvements to pedestrian and wheelchair access and safety through providing a dedicated footpath path along the eastern side of the Tuggerah Station
- improved accessibility for customers to and from the Tuggerah Station platforms by providing two new lifts and a new footbridge
- improved customer amenity and facilities at the station including two new accessible toilets, improved weather protection with a new footbridge over the station platform, new wayfinding signage
- potential increased use of public transport to and from Tuggerah
- potential economic improvements to surrounding businesses because of increased patronage to the station as a result of improved access

- additional lighting and closed circuit television (CCTV) would provide positive Crime Prevention Through Environmental Design (CPTED) outcomes for the area.

These features of the Proposal would not only provide benefits to the local community, they would also help to achieve the objectives of key strategic plans including the *Draft Central Coast Regional Plan 2041* (DPIE, 2021), and the *Central Coast Community Strategic Plan 2018-2020* (Central Coast Council, 2018).

6.6.3 Mitigation measures

The following mitigation measures are proposed to manage potential socio-economic impacts:

- feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the Proposal, where practicable
- development of a Community Liaison Management Plan (prior to construction), which would identify potential stakeholders and methods for consultation with these groups during construction
- contact details for a 24-hour construction response line, Proposal Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase
- the community would be kept informed of construction progress, activities and impacts through the TfNSW website.

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.7 Biodiversity

This section provides a summary of the potential biodiversity and tree impacts as a result of the Proposal, and the assessment has been informed by site inspections carried out at and around Tuggerah Station by an ecologist and arborist in November and December 2021. The detailed methodology are provided in the Arboricultural Impact Assessment (Tree Report, 2021) and the Ecological Impact Assessment (Jacobs, 2021) respectively.

6.7.1 Existing environment

Vegetation communities

The Proposal study area is a highly disturbed environment which has been historically cleared to make way for the train station, public roads, carparks and drainage channels. The surrounding land use supports several commercial and industrial properties. Some small areas support vacant modified forested lands including private and crown lands including areas to the east and north east of the rail corridor. The Proposal study area also includes the road reserves of the existing Pacific Highway and Wyong Road which comprise roadside plantings dominated by *Casuarina glauca* (Swamp Oak), *Cupaniopsis anacardioides* (Tuckeroo), *Lophostemon confertus* (Brush Box) and *Melaleuca quinquenervia* (Broad-leaved Paperbark). To the east of the Tuggerah Station most of the land has been paved for road and station infrastructure and the commuter car park and *Cupaniopsis anacardioides* (Tuckeroo) is the dominant planted vegetation in this area. Additionally, opportunistic vegetation (i.e. weeds) has established in the disturbed areas of the rail corridor and road edges.

The planted trees around the train station are a mixture of species commonly planted as street trees in the Central Coast region including *Corymbia maculata* (Spotted Gum), *Callistemon citrinus* (Crimson Bottlebrush) *Casuarina cunninghamiana* (River oak), *Melaleuca linariifolia* (Narrow-leaved Paperbark), *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Melaleuca styphelioides* (Prickly-leaved Tea Tree).

Additionally, native planted trees within the study area, although not native to the Central Coast region, include *Melaleuca bracteata* (Black Tea-tree) and *Lophostemon confertus* (Brush Box).

The ground layer is mulched in sections around the station platform, where vegetation has been planted. However, the remaining understorey vegetation across the study area is exotic. Of the exotic species identified within the study area, six species are classed as a priority weed for the Greater Sydney Region (which includes the Central Coast LGA), including *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal creeper), *Cortaderia selloana* (Pampus), *Lantana camara* (Lantana), *Pennisetum clandestinum* (Kikuyu Grass) and *Solanum mauritianum* (Wild Tobacco Bush). Additionally, *Asparagus asparagoides* (Bridal creeper) and *Lantana camara* (Lantana) are also classified as Weeds of National Significance.

Fauna habitat and trees

Habitat for fauna is largely absent and the study area lacks important features for shelter such as hollow bearing trees, dense litter layer, woody debris or rocks.

A total of 38 trees (all previously planted) were recorded within the study area during the field survey, incorporating the area surrounding Tuggerah Station to the east and the west, as well as within the commuter car park to the east. The location of each tree is outlined in Figure 6-19. As these trees are planted (due to previous landscaping works), they do not form part of any local native vegetation community. Additionally, there were no tree hollows or nests identified during surveys, which would provide fauna habitat.

Threatened ecological communities

A desktop review of previously recorded threatened ecological communities (TEC) in the locality of the Proposal study area was ground-truthed by the field survey carried out during site inspection. It was determined that there were no TECs under either the BC Act or EPBC Act present within the study area.

One endangered ecological community (EEC), Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, listed as Endangered under the BC Act and EPBC Act, was identified adjacent to the southern boundary of the Proposal area (refer to Figure 6-20). The vegetation located to the north of Bryant drive (between Creek Avenue and Lake Road) and the far eastern end of the commuter car park, is also likely to constitute Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC. This area of native vegetation is also potential habitat for threatened *Melaleuca biconvexa* (Biconvex Paperbark) (listed as Vulnerable under the BC and EPBC Acts). Importantly, no *Melaleuca biconvexa* (Biconvex Paperbark) were identified within or adjacent to the Proposal area.

The identified TECs are outside of the Proposal area and would not incur direct impacts from the Proposed works. Therefore, there are no predicted impacts on listed TECs as a result of the Proposal.

Figure 6-19 Recorded trees in the Proposal area

Proposal area

Railway Station

1 Platform number

Road

Railway

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - Endangered Ecological Community

Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - Endangered Ecological Community

0 25 50 m

1:1,500 at A4

GDA 1994 MGA Zone 55

N

Data sources

Jacobs 2021
OEH 2021, DCSSS 2021,
Department Finance,
Services and Innovation 2020
NSW Spatial Services 2021

Figure 6-20 Endangered ecological communities mapped near the Proposal

Threatened flora and fauna

No threatened flora species were located during the site inspection. According to the NSW Bionet Atlas database (EESG, 2020), there are 12 previous records of threatened flora species occurring in the locality (within a 10-kilometre radius of the site). Results from the EPBC Act Protected Matters Search Tool (PMST) include 27 threatened flora species. However, due to the historic disturbance that has occurred in the study area and the lack of suitable habitat for threatened flora species, these species are considered unlikely to occur. *Melaleuca biconvexa* has been recorded approximately 100 metres north-east of Tuggerah station and the Proposal area however none were identified within or adjacent to the Proposal area.

No threatened fauna species or habitat for threatened fauna species were located within the study area during the site inspection. Based on regional records reports, 76 threatened fauna species have been identified within a 10-kilometre radius of the site and a detailed assessment of their likelihood of occurrence in the Proposal area have been outlined in the Ecological Impact Assessment (Jacobs, 2021b).

The Grey-headed Flying-fox (*Pteropus poliocephalus*) has been previously identified within 400 metres of the study area and the Powerful Owl (*Ninox strenua*) has previously been recorded approximately 50 metres south of the study area. Due to the lack of suitable nesting or roosting habitat for both species in the suburban area of Tuggerah, the records would likely have been taken during foraging activities of each species. Given no significant foraging habitat is present and no suitable breeding habitat is present in the Proposal study area, the likelihood of occurrence for the Grey-headed Flying-fox and Powerful Owl within the study area is considered low.

In addition, any Microbat species would likely be deterred from the Proposal study area due to the combination of sound created by train movements at the station and the associated overhead powerlines. Additionally, there are no new trainlines being implemented as part of the Proposal and no further fragmentation would be created. Therefore, the Proposal is unlikely to introduce new impacts on Microbat species.

The fauna habitats in the study area are considered to be of poor quality and there is no habitat present for the threatened species that were identified from the desktop assessment.

6.7.2 Potential impacts

Construction phase

Vegetation and habitat

Direct biodiversity impacts of the works are predicted to be minimal due to the lack of vegetation and remnant vegetation in the study area. No native vegetation communities are present, and the fauna habitat is of poor quality. Vegetation and habitat clearing would be limited to up to seven planted trees for removal and an additional two trees which may require trimming as shown in Figure 6-19.

No impacts to remnant native vegetation or fauna habitat are predicted. Direct impacts to native fauna is expected to be minimal as no habitats would be removed and the area of available foraging habitat within the study area is very small and is considered very low quality. Noise, dust, light and contaminant pollution is predicted to be minimal. The mitigation measures outlined below in Section 6.7.3 would ensure that indirect impacts would be minimised.

Trees

Of the recorded trees in the study area, nine of these trees are likely to be impacted by the proposed works, including seven trees which would require removal and two trees which

would require trimming. The location of trees to be removed or trimmed is outlined in Figure 6-19.

The proposed seven trees to be removed would include one *Callistemon linearis* (Narrow-Leaved Bottlebrush), one *Corymbia maculata* (Spotted Gum), and five *Callistemon salignus* (Willow Bottlebrush). For the two *Acacia floribunda* trees which would be retained, trimming may be required. For all trees being removed, TfNSW would implement vegetation offset to replant trees in accordance with the *TfNSW Vegetation Offset Guide* (TfNSW, 2019d).

There is remnant vegetation, though largely disturbed containing a high abundance of exotic species, adjacent to the fence line surrounding the commuter carpark east of the Proposal area. The native tree species in this area largely consisted of *Eucalyptus amplifolia* (Cabbage Gum), *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca styphelioides* (Prickly-leaved Tea Tree) and *Casuarina glauca* (Swamp She-oak). However, this vegetation is outside of the proposed footprint and would not be impacted by the Proposal.

Weeds of national significance

Proliferation of weed and pest species is an indirect impact (i.e. not a direct result of proposal activities). Proliferation of weeds is likely to occur during construction, although impacts would be greatest due to vegetation clearing during the construction phase. The most likely causes of weed dispersal and importation associated with the Proposal include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery during all phases. Disturbance of native vegetation patch edges may also influence weed proliferation. The Proposal area contains some weed growth and, as such, weeds must be managed during construction. Mitigation measures to limit the spread and germination of weeds are provided in Section 6.7.3.

Operational phase

The operation of the Proposal would not result in any ongoing impacts to vegetation within or around Tuggerah Station.

6.7.3 Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on biodiversity:

- offsets and/or landscaping would be undertaken in accordance with the *TfNSW Vegetation Offset Guide* (TfNSW, 2019d) and in consultation with Central Coast Council. Trees nominated to be trimmed or removed in the biodiversity assessment reports (Jacobs, 2021b; Tree Report, 2021) would be clearly demarcated onsite prior to construction.
- Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the biodiversity assessment reports (Jacobs, 2021b; Tree Report, 2021). Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of TPZs
- Any approved pruning and/or tree removal work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture as per *AS 4970 Protection of Trees on Development Sites*, to oversee and certify that tree protection measures are complied with
- Any approved pruning must be in accordance with *AS 4373-2007 Pruning of Amenity Trees* and with the Safework NSW *Code of Practice: Amenity Tree Industry* (WorkCover NSW, 1998)

- construction of the Proposal would be carried out in accordance with the *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019e) and *Fauna Management Guideline* (TfNSW, 2019f)
- disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal
- lighting would be designed to minimise spill into surrounding areas as far as practical to avoid impacts upon native fauna.
- in the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible
- should the detailed design or onsite work determine the need to remove or trim any additional trees, which have not been identified in the REF, the Contractor would be required to complete TfNSW's *Tree Removal Application Form* and submit it to TfNSW for approval
- weed control measures, consistent with the *Weed Management and Disposal Guide* (TfNSW, 2019g), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015*.

Refer to Table 7-1 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.8 Contamination, landform, geology and soils

6.8.1 Existing environment

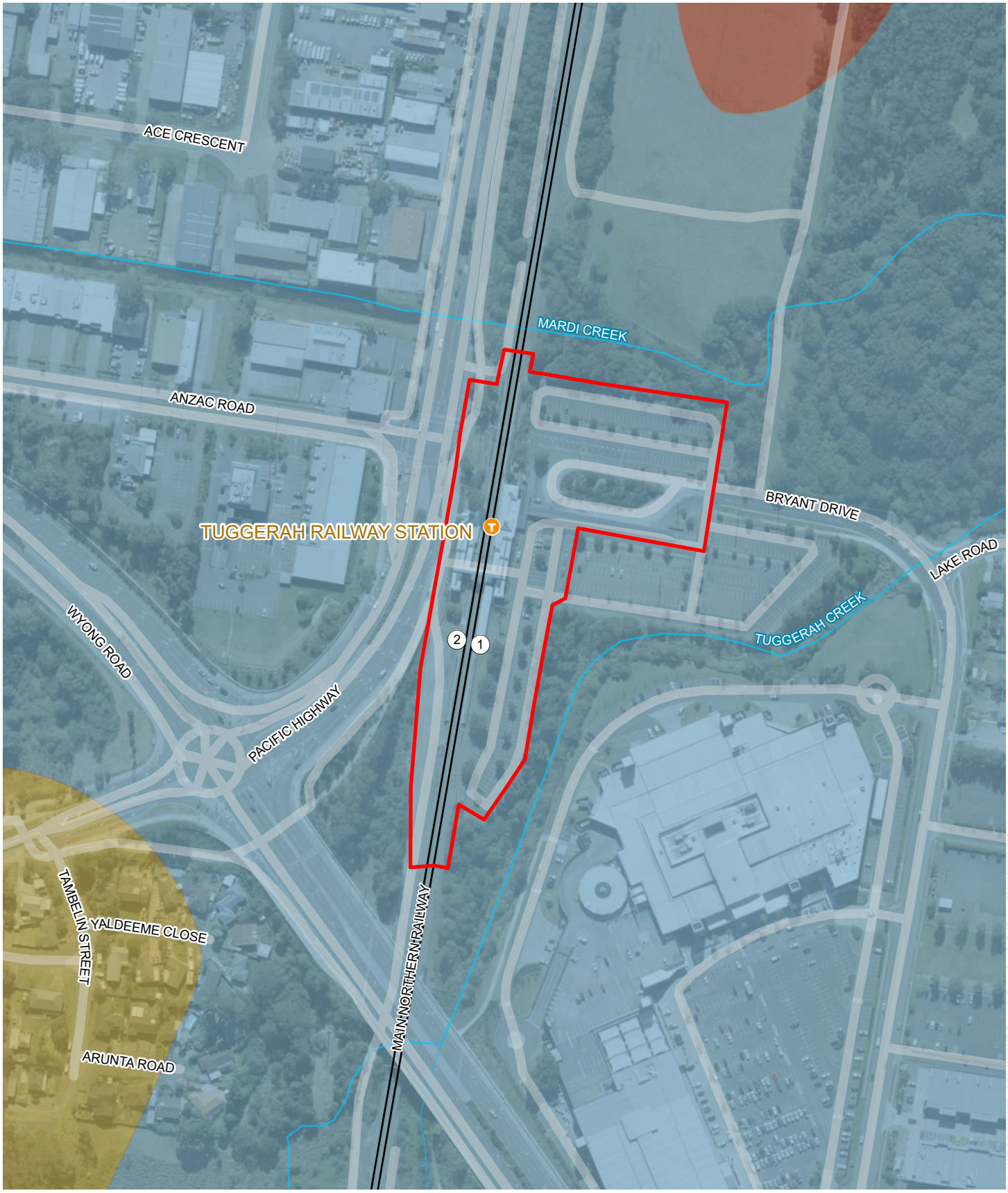
Landform, geology and soils

A search of the 1:100,000 Geology of Gosford-Lake Macquarie Map identifies the regional geology of the area surrounding the Proposal as Alluvial sand and gravel, with pockets of Patonga Claystone and Terrigal Formation (NSW Sharing and Enabling Environmental Data (SEED) Portal, 2021).

A search of the NSW Department of Planning and Environment eSPADE website indicates the area surrounding the Proposal to include Wyong, Woodburys Bridge and Erina soil landscapes, with the soil landscape underlaying the Proposal being associated with Wyong landscape only. This soil landscape is described as broad poorly drained deltaic floodplains and alluvial flats of Quarternary sediments on the Central Coast Lowlands. The deeper soils are Yellow Podzolic Soils (>200 centimetres) and shallower soils include Brown Podzolic Soils, Soloths and some Humus Podzols around lake edges. The soils landscape has no appreciable erosion hazard, except for more significant bank erosion along major drainage channels.

A search of the CSIRO Atlas of Australian Acid Sulfate Soils and Central Coast Council Mapping Tool indicates there is a low probability of acid sulfate soils (Class 4) occurring in the majority of the area surrounding the Proposal (refer to Figure 6-21).

The Proposal's surrounding landscape generally slopes towards Mardi Creek, which flows in an east-west direction north of Tuggerah Station, and Tuggerah Creek, which flows in a north-south direction east of the station.



Proposal area

Railway Station

Platform number

Railway

Road

Acid sulfate soil risk

Class 3

Class 4

Class 5

0 50 100 m

1:3,000 at A4

GDA 1994 MGA Zone 56

N

Data sources

Jacobs 2021
OEH 2021, DCSSS 2021,
Department Finance,
Services and Innovation 2020

Figure 6-21 Mapped acid sulfate soils risk

Contamination

An online search for the NSW EPA contaminated land record database was carried out on the 10 December 2021 for records within the Central Coast Council. The search yielded no records for contaminated land near or within the Proposal (within 200 metres).

An online search for the NSW EPA list of notified sites was carried out on the 10 December 2021 for records within the Central Coast Council. The search identified one site notified to the EPA near the Proposal (within 200 metres). This site is a BP petrol station at 100 Pacific Highway, about 195 metres north of the Proposal and does not require management under the CLM Act.

An online search of the NSW EPA POEO Act register database was undertaken on the 10 December 2021 for records within the Central Coast Council. The search yielded no records for sites in the POEO Act register near or within the Proposal (within 200 metres).

Given the historical use of the station as a rail corridor, there is potential for contaminants to be present within the soils underlying the station. Historic activities associated with rail corridors that have the potential to result in contamination and possible sources of contamination may include fill materials, hazardous materials from structures, leaks and spills of fuels or chemicals, historical use of pesticides and asbestos dust from train brake pads.

There were no sites in the vicinity of Tuggerah Station identified as contaminated to an extent that warrants regulation, however further investigation (including a site inspection and soil sampling) is recommended to identify any potential sources of contamination and assess the extent of soil and groundwater contamination, if present.

6.8.2 Potential impacts

Construction phase

Soils, erosion and sedimentation

The Proposal would require excavation work for the installation of foundations and footings for new lift shafts and lifts. Other trenching or excavation may be required for footpath and road works and relocation of utilities work.

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

- erosion of exposed soil and stockpiled materials
- dust generation from excavation and vehicle movements over exposed soil
- increase in sediment loads entering the stormwater system and/or local runoff.

Such impacts can be a nuisance to community members and/or lead to an adverse environmental impact on biodiversity, for example through the introduction of sediment into waterways. These impacts are expected to be minor due to the limited level of ground disturbance required for the Proposal and the relatively flat topography and stability of the Proposal area.

Erosion risks can be adequately managed through the implementation of standard measures as outlined in *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) (the Blue Book).

In the event that ASS are encountered during excavation, it is possible that sulfuric acid could migrate from the Proposal area and negatively impact downstream receivers Mardi Creek and Tuggerah Creek. The disturbance and mobilisation of ASS has the potential to result in environmental and human health impacts. The likelihood of encountering ASS is considered to be low for the Proposal.

Contamination

Excavation and other earthworks have the potential to expose contaminants, which, if not appropriately managed, can present a health risk to construction workers and the community. Contaminants can also pose an environmental risk if they are released to soils or nearby waterways.

Appropriate mitigation measures would be implemented to manage hazardous substances during demolition works. This would include the removal of hazardous materials from the structure by appropriately licensed hazardous waste removalists.

Potential contamination impacts may also arise from accidental spills of fuels, lubricants and chemicals used for construction plant and equipment. Accidental spills have potential to contaminate soils and waterways. The risk of impacts from contamination from construction activities is considered to be low, if the mitigation measures identified in Table 7-1 are implemented.

Operational phase

There would be no impacts to geology, soils or contamination as a result of the operational phase of the Proposal.

6.8.3 Mitigation measures

The following mitigation measures are to be implemented with respect to potential soil and contamination impacts:

- prior to commencement of construction work, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of works and maintained throughout construction
- erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until the works are complete and areas are stabilised
- vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area
- as there is potential for onsite contamination given historic activities associated with the railway land use, prior to construction commencing, a contamination investigation would be undertaken by a suitably qualified professional to confirm the composition and nature of excavated material
- all spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility
- an unexpected contamination finds protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements
- the handling, storage, transport and disposal of all asbestos and hazardous waste (if identified during construction) would occur in accordance with the requirements

of the POEO Act, *Waste Avoidance and Resource Recovery Act 2007* and other relevant guidelines

- any concrete washout would be established and maintained in accordance with the *Concrete Washout Guideline – draft* (TfNSW, 2015) with details included in the CEMP.

6.9 Hydrology and water quality

6.9.1 Existing environment

The Proposal location is mostly impervious, with the rail corridor, station area and commuter car park runoff generally discharging through local council-maintained infrastructure into nearby Mardi Creek (about 85 metres north east of the station) or Tuggerah Creek (about 50 metres south east of the station). Mardi Creek joins Tuggerah Creek about 350 metres north east of the station and eventually discharges into Wyong River and Tuggerah Lake.

Flooding

The majority of the Proposal including the rail corridor is located in Precinct 1: Probable Maximum Flood (PMF) area, while sections of the commuter car park is mapped as Precinct 2: Flood Planning Area based on the Central Coast Council Online Mapping Tool. The PMF area refers to land that is likely to be flooded during the largest possible flood event, while the Flood Planning Area refers to areas that is affected by a large flood that has a one per cent chance of being reached or exceeded in any one year (1% Annual Exceedance Probability).

Groundwater

The Australian Government Bureau of Meteorology Groundwater Explorer mapping system was used to identify all bores in the vicinity of the Proposal area. There are two groundwater bores within one kilometres of the Proposal, around 600 and 700 metres to the south west. Given the distance of the Proposal from the bores and depth of excavation proposed, it is unlikely that any contamination associated with the station would impact the bores.

A previous geotechnical investigation report (prepared for the previous Tuggerah bus interchange and commuter car parking upgrade (Report No. 08-GO10A, dated October 2008)) included 26 boreholes drilled to a maximum depth of five metres, and excavation of nine test pits to a maximum depth of 1.5 metres. Key findings included groundwater encountered at depths between 1.0 metres and 2.9 metres below existing ground level.

The Proposal would include excavation for lift shafts to depths of around four metres below platform level, with (support) piling excavation proposed to the level of bedrock, at around 22 metres below existing ground level. Therefore it is likely that the Proposal will encounter groundwater during construction, and that groundwater inflows and potential groundwater contamination would need to be managed.

The Wyong soil landscape indicates the Proposal locality would contain poorly drained, impermeable soils of very low fertility with saline subsoils. The low permeability suggests the flow of groundwater between aquifers would be restricted.

Given the limited number of registered bores and the historic use of the Proposal location as a rail corridor, it is considered unlikely that the groundwater in the area would be used for any sensitive purposes such as a source for drinking water due to the potential for groundwater contamination.

6.9.2 Potential impacts

Construction phase

The construction phase of the Proposal has the potential to impact on hydrology and water quality. Excavations to construct the lifts and the new footbridge have the potential to result in the run-off of contaminated sediments into the nearby Mardi Creek or Tuggerah Creek.

Pollutants (fuel, chemicals or wastewater from accidental spills and sediment from excavations) could potentially reach nearby creeks. Activities which would disturb soil during construction work also have the potential to impact on local water quality as a result of erosion and run off sedimentation.

The Bryant Drive commuter car park area and the construction ancillary facility sites can be subject to inundation during heavy rain events. Consideration would be given during detail design and construction planning to the installation of appropriate mitigation measures such as bunds and/or other water control devices during rainfall events.

Additionally, while groundwater levels were not investigated as part of this assessment, previous investigations (referred to above) indicate that groundwater is likely to be encountered at shallow depths, and areas of excavation may need to be locally dewatered as a result of groundwater seepage or rainfall runoff (such as within the vicinity of the new lifts).

Operational phase

The Proposal is unlikely to have a major impact on the hydrology of the surrounding area. The Proposal would not change any elevation or increase permeability of any existing structures and is unlikely to change or contribute to flood risks. Further, the Proposal would not result in any impacts on or changes to local stormwater catchments or flows, and is therefore not likely to impact on stormwater discharge locations, volumes or velocity.

Any minor alterations to the surface water flows would likely be within the capacity of the existing stormwater network and as such, impacts would be minor.

6.9.3 Mitigation measures

A site-specific Erosion and Sediment Control Plan would be prepared and implemented for the Proposal to manage risks to water quality. Additional mitigation measures that would be required for construction include would include:

- during the Proposal's detailed design phase, further groundwater assessment would be carried out as part of detailed geotechnical investigations. Groundwater sampling and testing would be conducted, and any groundwater management or treatment strategies will be determined based on sampling and testing results. Further, the geotechnical investigations will include installation of standpipes, which would allow groundwater flows and quality to be monitored throughout detailed design and construction
- vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area
- all fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and the *Chemical Storage and Spill Response Guidelines* (TfNSW, 2019h)
- 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 *Chemical Storage and Spill*

Response Guidelines (TfNSW, 2019h) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in how to use the kits in the case of a spill

- in the event of a pollution incident, works would cease in the immediate vicinity and the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act
- the existing drainage systems would remain operational throughout the construction phase. Stormwater controls and management of stormwater flows during construction would be detailed in the CEMP.

Refer to Table 7-1 for a full list of proposed mitigation measures.

6.10 Air quality

6.10.1 Existing environment

The existing air quality of the Proposal's surrounding environment is considered characteristic of a suburban environment. Sensitive receivers in the vicinity of the Proposal include staff and customers at Tuggerah Station, users of the commuter car park, and residential properties along Lake Road.

A search of the National Pollutant Inventory database 2019/2020 data was carried out within the vicinity of Tuggerah Station. The closest source is Elgas Wyong, about 840 metres north of the station. Given the distance it is unlikely this source would affect the Proposal study area.

Other contributors to air quality within the local area would include emissions from motor vehicles on the surrounding road network, including Pacific Highway.

Potentially affected receptors within the vicinity of the Proposal area include the following:

- users of the adjacent commercial and recreational areas
- local residents
- pedestrians and commuters within the local area.

6.10.2 Potential impacts

Construction phase

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

Anticipated sources of dust and dust-generating activities include:

- demolition of existing platform structures including stairs and ramp
- construction of a new pedestrian footbridge connecting the two platforms
- movements in the construction compound area
- trenching and excavation for the utilities work
- loading and transfer of material from trucks
- other general construction activities.

The Proposal would have a 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. Standard management measures would be established to manage dust emissions from construction work.

The operation of plant, machinery and trucks would also contribute to exhaust emissions in the local area. However, these impacts would be short-term and minor due to the limited number of plant, machinery and vehicles required.

Operational phase

Overall impacts on air quality during operation would be negligible as the Proposal would not result in a change in land use or introduce activities that impact upon air quality. As the Proposal would increase access to public transport, the use of public transport would be expected to lead to a relative reduction in private vehicle emissions in the long-term, which may contribute to an improvement in local air quality.

6.10.3 Mitigation measures

Table 7-1 includes mitigation measures that are proposed to manage air quality issues during construction. This includes measures regarding maintenance and efficient operation of plant equipment and for dust suppression including watering, covering loads and appropriate management of any tracked dirt/mud on vehicles. These measures would be included in the CEMP.

6.11 Waste

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

- excavated spoil
- asphalt and concrete
- surplus building materials and building waste (metal, timber, plastics, etc.)
- electrical wiring and conduit waste
- hazardous waste (chemicals and potentially asbestos)
- green waste (including weeds)
- general waste, including food scraps 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 to identify all potential waste streams associated with the work 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 the area tidy and free of rubbish.

The handling, storage, transport and disposal of asbestos and hazardous waste (including any lead waste) would be in accordance with the requirements of relevant EPA and Safe Work NSW guidelines. Waste management targets in consideration of the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a) would be developed for the Proposal and would include reuse and recycling.

6.12 Sustainability

The design of the Proposal would be based on the principles of sustainability, including the incorporation of the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a) and the TfNSW *Environmental Management System* (EMS). These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.3.3 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

6.13 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 Central Coast 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 number of hot days per year and combined with reduced tree cover and increased urban development can lead to increased Urban Heat Islanding effects locally. The proposal is attempting to mitigate existing vegetation removal and increase vegetation cover locally.

Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall excepted to occur in a 100-year average recurrence interval flood event would occur more frequently.

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 contains the vegetation buffer zone for nearby bush fire prone land. The Proposal would be designed with appropriate fire protection measures.

The detailed design would consider the impacts of climate change on the Proposal through:

- a hydrological assessment would be undertaken to ensure that the proposed infrastructure would not increase the potential flooding within the Proposal area
- selection of materials for durability in extreme conditions and that minimise heat retention
- incorporate fire resistant/retarding materials wherever practicable
- incorporate engineering and design features to ensure structures are constructed to minimise direct impacts from severe storms and strong winds.
- review the Climate Change Risk Assessment and include Adaptation measures into the design.

6.14 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 a compliant carbon footprinting exercise in accordance with the *Carbon Estimate and Reporting Tool Manual* (TfNSW, 2019i) or other approved modelling tools. The carbon footprint would to be used to inform decision making in design and construction. Greenhouse gas emissions would also be assessed in accordance with IS Council IS Rating Tool V1.2.

Due to the small scale of the Proposal and the short term temporary nature of the individual construction work, 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 7-1.

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 Tuggerah. 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.

6.15 Cumulative impacts

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

A search of the Department of Planning and Environment's Major Projects Register, NSW Planning Portal, and Central Coast Council Development Application Register on 10 December 2021 identified some minor development applications involving residential and business premises and land subdivision. No major projects under planning approvals are proposed within the vicinity of the Proposal and are unlikely to result in cumulative impacts.

During the Proposal's construction, the work would be coordinated with any other construction activities in the area. Consultation and liaison would occur with Central Coast Council, TAHE/Sydney Trains, and any other developers identified, to minimise cumulative construction impacts such as traffic and noise.

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

Based on this assessment, it is anticipated that the cumulative impacts would be minor/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.

The Proposal forms part of the Transport Access Program which 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 cumulative impact of accessible station upgrades in Sydney is more equitable access to infrastructure for people with disability or limited mobility, parents/carers with prams and customers with luggage. The station upgrades also provide a greater incentive for those requiring this access to use public transport.

7 Environmental management

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

7.1 Environmental management plans

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

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed below in Table 7-1. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 7-1 Proposed mitigation measures

No.	Mitigation measure
	General
1.	A Construction Environmental Management Plan (CEMP) would be prepared by the Contractor in accordance with the relevant requirements of *Environmental Management Plan Guideline – Guideline for Infrastructure Projects,* NSW Department of Planning, Industry and Environment, 2020) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout 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.	An Environmental Controls Map (ECM) would be developed by the Contractor in accordance with TfNSW's *Guide to Environmental Controls Map* (TfNSW, 2019j) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.
5.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
6.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.

No.	Mitigation measure
7.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.
	Traffic and site access
8.	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: • staging, or adopting a staggered construction schedule for the works that involve partial closure of the commuter car park, to minimise the number of car parking spaces occupied during construction • 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 would be monitored for compliance • routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses • details for relocating kiss and ride, taxi ranks and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired • measures to manage traffic flows around the area affected by the Proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the TMP. 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.	Where feasible, works impeding commuters at Tuggerah Station would be undertaken during scheduled rail possession periods to minimise access, traffic and transport impacts
10.	Public safety would be ensured during construction through the use of traffic controllers, signposting and temporary fencing or hoarding
11.	TfNSW would communicate regularly with the community, businesses and local residents to inform them of changes to rail services, parking, pedestrian access and traffic conditions, including vehicle movements and anticipated changes to the local road network relating to site works
12.	Temporary parking would be provided on Bryant Drive and/or other suitable locations for construction workers and commuters subject to consultation with relevant road authorities during preparation of the CTMP
13.	Road Occupancy Licences for temporary road closures would be obtained, where required.
14.	Station interchange facilities including bicycle hoops and taxi ranks would be kept operational

No.	Mitigation measure
	Urban design, landscape and visual amenity
15.	The following mitigation measures shall be implemented to reduce the visual impacts of the Proposal: • an Urban and Landscape Design Plan (ULDP) would be prepared by the Contractor, in consultation with Central Coast Council, and submitted to TfNSW for endorsement by the Precincts and Urban Design team, prior to finalisation of the detailed design. The ULDP, at a minimum, would address the following: o the appropriateness of the proposed design with respect to the existing surrounding landscape, built form, behaviours and use-patterns (including consideration of Crime Prevention Through Environmental Design principles). This is to include but not be limited to: ▪ site analysis ▪ vision and objectives for the infrastructure ▪ strategies that apply to ISC approved guidelines in accordance with Urb-1 (IS Rating Tool V 1.2) o connectivity with surrounding local and regional movement networks including street networks, other transport modes and active transport networks. Existing and proposed paths of travel for pedestrians and bicycles would be shown o integration with surrounding local and regional open space and or landscape networks. Existing and proposed open space infrastructure/landscape elements would be shown o integration with surrounding streetscape including street trees, entries, vehicle cross overs etc o integration with surrounding built form (existing or desired future) including building height, scale, bulk, massing and land-use o design detail that is sensitive to the amenity and character of heritage items located within or adjacent to the Proposal.
16.	All permanent lighting would be designed and installed in accordance with the requirements of standards relevant to *AS 1158 Road Lighting* and *AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting*
17.	The detailed design of the Proposal would comply with Crime Prevention Through Environmental Design 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
21.	Temporary access arrangements would be well signed and provide a visually legible route for pedestrians
22.	Site equipment and facilities would be consolidated to maximise the area of useable public realm and maintain pedestrian access across the road bridge where possible.

No.	Mitigation measure
23.	Trees retained within and adjacent to construction sites would be managed in accordance with *AS 4970 Protection of trees on development sites*.
	Noise and vibration
24.	Prior to commencement of work, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009), *Construction Noise and Vibration Strategy* (TfNSW, 2019b) and the Construction Noise and Vibration Impact Assessment (Jacobs, 2021a). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
25.	The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include: • regularly training workers and contractors (such as at the site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise • avoiding any unnecessary noise when carrying out manual operations and when operating plant • ensuring spoil is placed and not dropped into awaiting trucks • avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where practicable • switching off any equipment not in use for extended periods e.g. heavy vehicles engines would be switched off whilst being unloaded • avoiding deliveries at night/evenings 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, no throwing of metal items and slamming of doors.
26.	The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which would be considered, include: • maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances • using the most suitable equipment necessary for the construction work 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 work • use of quieter and less vibration emitting construction methods where feasible and reasonable.
27.	Work would generally be carried out during standard construction hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). Any work outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these work commencing. An Out of Hours Work application form would need to be prepared by the Contractor and submitted to the TfNSW Environment and Sustainability Officer for any work outside normal hours.

No.	Mitigation measure
28.	As per the *Construction Noise and Vibration Strategy* (TfNSW, 2019b), construction activities with special audible characteristics (high noise impact, intensive vibration, impulsive or tonal noise emissions) would be limited to standard hours, starting no earlier than 8am; and to continuous blocks not exceeding three hours each with a minimum respite from those activities and work of not less than one hour between each block, unless otherwise approved by TfNSW.
29.	Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding would take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible.
30.	To avoid structural impacts as a result of vibration or direct contact with structures, the proposed work would be undertaken in accordance with the safe work distances outlined in the Construction Noise and Vibration Impact Assessment (Jacobs, 2021a) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
31.	Vibration (other than from blasting) resulting from construction and received at any structure outside of the project would be managed in accordance with: • for structural damage vibration – British Standard BS 7385-2:1993 *Evaluation and measurement for vibration in buildings Part 2* and German Standard DIN 4150-3:2016 *Vibration in Buildings – Part 3: Effects on Structures* • for human exposure to vibration the acceptable vibration - values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (NSW Environment Protection Authority, 2006) which includes British Standard BS 6472-2:1992 *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).*
	Aboriginal heritage
32.	If unforeseen Indigenous objects are uncovered during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2019c) would be followed, and work within the vicinity of the find would cease immediately. The Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Sustainability Officer so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, Heritage NSW and the Local Aboriginal Land Council.
33.	If human remains are found, work would cease, the site secured and the NSW Police and the Environment, Energy and Science Group of the Department of Planning and Environment notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to work recommencing at the location.
	Non-Aboriginal heritage
34.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2019c) would be followed, and work within the vicinity of the find would cease immediately. The Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Sustainability Officer so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and Heritage NSW. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to work recommencing at the location.
	Socio-economic
35.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.

No.	Mitigation measure
36.	A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
37.	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.
38.	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.
	Biodiversity
39.	Offsets and/or landscaping would be undertaken in accordance with the TfNSW Vegetation Offset Guide (TfNSW, 2019d) and in consultation with Central Coast Council. Trees nominated to be trimmed or removed in the biodiversity assessment reports (Jacobs, 2021b; Tree Report, 2021) would be clearly demarcated onsite prior to construction.
40.	Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the biodiversity assessment reports (Jacobs, 2021b; Tree Report, 2021). Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of TPZs
41.	Construction of the Proposal must be undertaken in accordance with TfNSW's *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019e) and TfNSW's *Fauna Management Guideline* (TfNSW, 2019f).
42.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal.
43.	Lighting would be designed to minimise spill into surrounding areas as far as practical to avoid impacts upon native fauna.
44.	In the event of any tree to be retained becoming damaged during construction, the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Sustainability Officer to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible.
45.	Should the detailed design or onsite work determine the need to remove or trim any additional trees, which have not been identified in the REF, the Contractor would be required to complete TfNSW's *Tree Removal Application Form* and submit it to TfNSW for approval.
46.	Weed control measures, consistent with TfNSW's *Weed Management and Disposal Guideline* (TfNSW, 2019g), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015.*
	Soils and water
47.	Prior to commencement of work, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of work and maintained throughout construction.

No.	Mitigation measure
48.	Erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until the work is complete and areas are stabilised.
49.	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.
50.	As there is potential for onsite contamination given historic activities associated with the railway land use, prior to construction commencing, a contamination investigation would be undertaken by a suitably qualified professional to confirm the composition and nature of excavated material
51.	All spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility
52.	An unexpected contamination finds protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements
53.	The handling, storage, transport and disposal of all asbestos and hazardous waste (if identified during construction) would occur in accordance with the requirements of the POEO Act, *Waste Avoidance and Resource Recovery Act 2007* and other relevant guidelines
54.	Any concrete washout would be established and maintained in accordance with the Concrete Washout Guideline – draft (TfNSW, 2015) with details included in the CEMP.
55.	during the Proposal's detailed design phase, further groundwater assessment would be carried out as part of detailed geotechnical investigations. Groundwater sampling and testing would be conducted, and any groundwater management or treatment strategies will be determined based on sampling and testing results. Further, the geotechnical investigations will include installation of standpipes, which would allow groundwater flows and quality to be monitored throughout detailed design and construction
56.	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
57.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's *Chemical Storage and Spill Response Guidelines* (TfNSW, 2019h).
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 *Chemical Storage and Spill Response Guidelines* (TfNSW, 2019h) 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, work would cease in the immediate vicinity and the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Sustainability Officer. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.

No.	Mitigation measure
60.	The existing drainage systems would remain operational throughout the construction phase. Stormwater controls and management of stormwater flows during construction would be detailed in the CEMP.
61.	Should groundwater be encountered during excavation work, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014) and TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2019k).
	Air quality
62.	Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's *Air Quality Management Guideline* (TfNSW, 2019l).
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. Plant and machinery would be switched off when not in use, and not left idling.
65.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
66.	To minimise the generation of dust from construction activites, the following measures would be implemented: • apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces) • cover stockpiles when not in use • appropriately cover loads on trucks transporting material to and from the construction site and securely fix tailgates of road transport trucks prior to loading and immediately after unloading • prevent mud and dirt being tracked onto sealed road surfaces.
	Waste and contamination
67.	The CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum: • identify all potential waste streams associated with the work and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities • detail other onsite management practices such as keeping areas free of rubbish • specify controls and containment procedures for hazardous waste and asbestos waste • outline the reporting regime for collating construction waste data.
68.	An appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with WorkCover requirements.
69.	All excavated spoil suitable for reuse would be reused on site and distributed as agreed with TfNSW and the Contractor. The reuse of excavated material would be further reviewed and confirmed during construction.

No.	Mitigation measure
70.	All spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
71.	All spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste (*EPA, 2014) prior to disposal.
72.	Any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* – draft (TfNSW, 2015) with details included in the CEMP and location marked on the ECM.
	Sustainability, climate change and greenhouse gases
73.	Detailed design of the Proposal would be undertaken in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2019a).
74.	The detailed design process would undertake a compliant carbon footprinting exercise in accordance with TfNSW's *Carbon Estimate and Reporting Tool Manual* (TfNSW, 2019i) or other approved modelling tools. The carbon footprint would to be used to inform decision making in design and construction.
	Cumulative impacts
75.	The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed in the CEMP, and implemented as appropriate.

8 Conclusion

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

The Proposal would provide the following benefits:

- improved and equitable access to Tuggerah Station for customers as a result of the installation of lifts and a new footbridge, accessible parking, upgraded accessible paths and boarding assistance zones
- improved station amenity and safety for customers at the station resulting from the installation of the family accessible toilet, unisex ambulant toilet, new lighting and CCTV.

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

- temporary changes to vehicle and pedestrian movements in and around the station during construction including temporary footpath diversions
- temporary changes to parking arrangements (including temporary loss of parking spaces) around the in the Bryant Drive commuter car park during construction
- visual changes due to the introduction and removal of elements into the existing environment including two new lifts, a new footbridge and removal of vegetation on the western of the station
- temporary visual changes during construction due to the introduction of construction compounds and work areas
- temporary noise and vibration impacts during construction.

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 and Public Spaces.

The Proposal would also take into account the principles of ESD and sustainability (refer to Section 3.3.3 and Section 4.3. 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?	Nil
Any impact on a National Heritage place?	Nil
Any impact on a wetland of international importance?	Nil
Any impact on a listed threatened species or communities?	Nil
Any impacts on listed migratory species?	Nil
Does the Proposal involve a nuclear action (including uranium mining)?	Nil
Any impact on a Commonwealth marine area?	Nil
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources?	Nil
Additionally, any impact (direct or indirect) on 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.

The table has been revised to address all matters for consideration under clause 171 of the EP&A Regulation 2021.

Factor	Impacts
(a) Any environmental impact on a community? There would be some temporary impacts to the community resulting from increased traffic, noise and reduced visual amenity. Mitigation measures, as outlined in Section 7.2, would be implemented to manage and minimise adverse impacts.	Minor
(b) Any transformation of a locality? The Proposal would introduce new visible elements (including new pedestrian footbridge and two lifts) into the existing landscape. These new elements however would be consistent with the existing use of the station and considered to be common features at railway stations. The Proposal would likely have a positive contribution to the locality as it would deliver an accessible path of travel to and from the station and facilitate better access to the station.	Minor
(c) Any environmental impact on the ecosystem of the locality? Environmental impacts are anticipated to be minor and temporary in nature and would not be expected to result in adverse impacts to the ecosystem of the locality.	Minor
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The Proposal would result in a short-term reduction of the aesthetic of Tuggerah Station due to the presence of construction materials and equipment. The introduction of lifts would result in long-term aesthetic impact, which would be mitigated through lift design. Most of these impacts would be temporary in nature, and all are considered to be minor.	Minor
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposed work would have little or no impact to the historical significance of the station. There would be some impact to the aesthetic of the station, due to the addition of two lifts and other general works. The Proposal is likely to have a positive contribution to the locality by creating equitable access to the station.	Minor
(f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The Proposal is unlikely to impact on the habitat of protected fauna.	Minor
(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 endanger any species of animal, plant or other form of life living on land, in water or in the air.	Minor
(h) Any long-term effects on the environment? The Proposal is unlikely to have any long-term effects on the environment.	Minor

Factor	Impacts
(i) Any degradation of the quality of the environment? The Proposal is unlikely to result in the degradation of the quality of the environment. During construction there would be minor impacts to the environment, primarily from noise and dust emissions and reduction in visual amenity.	Minor
(j) Any risk to the safety of the environment? The Proposal could result in pollution or safety risks to the environment during construction. Provided the recommended management and mitigation measures are implemented, this risk is considered unlikely.	Minor
(k) Any reduction in the range of beneficial uses of the environment? The Proposal would not result in any reduction in the range of beneficial uses of the environment	Nil
(l) Any pollution of the environment? Construction of the Proposal could result in pollution of the environment (e.g. noise and dust emissions), however provided the recommended management and mitigation measures are implemented, this risk is expected to be minor.	Minor
(m) Any environmental problems associated with the disposal of waste? The Proposal in unlikely to result in environmental problems associated with the disposal of waste. Hazardous waste (including asbestos, if found) may be generated by the Proposal. Contamination identification would occur prior to construction to confirm the presence of hazardous materials. All waste would be managed and disposed of with a site-specific waste management plan (WMP) prepared as part of the CEMP. Measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Minor
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is unlikely to increase the demand on resources (natural or otherwise) that are, or are likely to become, in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative environmental effects with other activities are discussed in Section 6.15. Based on the surrounding existing and proposed developments, cumulative effects are expected to be minor and be primarily related to traffic, noise and visual amenity.	Minor
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? As the Proposal is not located within a coastal area, it would not impact on coastal process and/or coastal hazards, including those under projected climate change conditions	Nil
(q) Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act Division 3.1?	Refer to Section 2.1
(r) Other relevant environmental factors	Refer to Section 6

Appendix C Sustainable Design Guidelines checklist

Table 8-1 Sustainable Design Guidelines 4.0 considerations for Tuggerah Station Upgrade

Compulsory requirement	Level agreed	Example supporting initiatives
CR1 Construction GHG Emissions	P2 Reduce construction related GHG emissions by ≥ 10%	Reduce construction related GHG emissions by a minimum 10% from the Project baseline GHG footprint established using the Carbon Estimate Reporting Tool (CERT) Initiatives to be investigated: • use alternative fuels to reduce greenhouse emissions in construction vehicles • preference for local suppliers to reduce material/ product transport distances • source at least 60% of all reinforcing steel that is produced using energy reducing processes in its manufacture • optimise the spacing of structural members in beam and post type designs • apply value engineering principles and processes to design decision making to improve resource and cost efficiencies • where practical, use prefabricated building and civil components to reduce construction waste, material usage, and on-site vehicle/equipment movements. • increasing supplementary cementitious materials (SCM) content in concrete mix design • use of recycled glass to minimise the use of raw materials • use of renewable energy for site-based electricity needs • reuse of construction waste on site (particularly from proposed dismantling works of existing ramps at Tuggerah Station).
CR2 Operational energy	P3 Reduce operational energy consumption by ≥15%	• install a solar PV system on shade structures or existing Station buildings • maximise use of natural ventilation and natural light • ensure equipment and services such as lighting and lifts at the Station meets or exceeds relevant Section J requirements. • optimise the footprint of the Station upgrades to minimise the clearing of existing trees. • landscaping design to incorporate native drought tolerant plants requiring minimal maintenance. • lighting controls with functionality to automatically dim or switch relevant luminaries in response to changing natural light or movement.

Compulsory requirement	Level agreed	Example supporting initiatives
CR3 Climate change risk	P3 Design out all extreme and high risks and 10% of medium risks	A Climate Change Risk Assessment Reports was prepared for Tuggerah Station (TUGST-FURL-TUG-SB-MEM-380003). The key risks to Tuggerah Station identified in the Climate Change Risk Assessments undertaken for the project include: • an increase in extreme rainfall events causing flooding the Station location, increased risk to users, impacts on Station access, drainage blockage and damage to electrical equipment. • increases in extreme heat causing power outages, failure of landscaped areas, accelerated degradation of structures and increased urban heat island effect. • an increase in extreme weather events (e.g. wind, lightning) causing an increase in wind-blown debris and impacts to canopies/structures, blocking of drainage systems and equipment failure due to lightning strikes. • changes in soil moisture due to increased extreme rainfall and heat events which may impact electrical systems and structural components. Key existing controls for risks identified in the Climate Change Risk Assessment include: • AR&R and Climate change factors will be incorporated into the drainage design. • design wind loading for new structures modelled for 48m/s as per AS1170.2, which is above the projected extreme winds under climate change for all time periods. • concrete jointing and structures are designed in accordance with the relevant Australia Standards, which includes requirements for concrete cover • the design will be informed by geotechnical investigations to mitigate risk of foundation/structural damage from slope instability • station assets will be earthed and has lightning discharge paths, earthing clearance to mitigate risk • Lightning Risk Assessment to be undertaken in to assess worst case scenario • Sydney Trains assets are managed under Site Incident Management Plans (SIMPs) and outline the preparation and plans for dealing with incidents arising out of identified hazards at a work location. • procedures would include triggers for Station closure, emergency preparedness, response and evacuation. Proposed mitigation measures for key risks identified in the Climate Change Risk Assessments include: • AR&R and Climate change factors will be incorporated into the drainage design.

Compulsory requirement	Level agreed	Example supporting initiatives
		• incorporate design elements into Station glazing and concourse / bridge façade to mitigate impacts. This can be achieved by selecting materials for shelters, facades, outdoor furniture that reduce heat load impacts. • investigate provision of hydration stations (e.g. water bubblers) for customers • AC in new Station Master Building (for Tuggerah Station) • vertical safety mitigations such as mechanical ventilation of lift shafts and temperature sensors in lift shaft, with automatic return of lift car to entry level at certain threshold (at Tuggerah Station) • electrical system design will be fire-rated • preservation of significant tree near western ramp area (at Tuggerah Station), and consideration of preservation of vegetation where possible will provide ground stabilisation from root systems • avoid or minimise the removal of existing trees/shading vegetation • investigate inclusion of lift shaft/pit design to include an underground sump adjacent to each lift shaft/pit with water level sensors and dual (duty/standby) drainage pumps. Pumps to be safely accessed via the platform for maintenance personnel to avoid entry to confined spaces. • operational procedures would include implementing changed working schedules so staff are not working/are not required to complete outdoor tasks during hotter periods of the day • Inspecting AC condition/performance for potential earlier replacement/upsized where required. • Incorporate energy generation redundancy measures into the design of the asset (e.g. Uninterruptible power supply (UPS) for comms/CCTV) • vertical safety mitigations, including default for lifts is for them to go to ground and open when there is a power failure or when a temperature threshold is exceeded. • investigate plant replacement and landscaping which can complement storm water infrastructure, such as drains • operational procedures to inspect for wear and tear, intermittent inspections to check of condition of asset and slope for signs of movement or deterioration that could cause this risk to eventuate.

Compulsory requirement	Level agreed	Example supporting initiatives
CR4 Waste Diversion	P2 ≥92% Construction and demolition waste (by weight) to be diverted from landfill	• enable on site waste segregation where space permits to maximise reuse opportunities both on and off site. • investigate the reuse of construction wastes on site • retain or refurbish existing structures where possible • selecting waste contractors that have proven waste separation and reporting processes.
CR 7 Construction Water	P2 Potable and non-potable construction water monitored	• monitor and report water consumption during project construction and reduce potable water consumption where practicable • investigate installing rainwater tanks for non-potable water supply to site offices • install water efficient fittings in site offices.
CR 8A Water efficient appliances	P WELS rating specified achieved	• all new water-using appliances, shower heads, taps and toilets must be at least the average Water Efficiency Labelling Scheme (WELS) star rating by product type • appliances and equipment in the following categories with star ratings under the Water Efficiency Labelling Scheme (WELS) must have at least the following star ratings: o showerheads (2 star) o toilets and urinals, washing machines, dishwashers (4 stars) o taps and flow controllers (4.5 stars).
CR9 Low VOC surface coatings	P All surface coatings comply with the APAS VOC Compound Limits	All surface coatings to comply with Australian Paint Approval Scheme (APAS) Volatile Organic Compounds Limits where fit for purpose.
CR10 Pollution Control	P Non-road diesel plant and equipment report conformity with US EPA and EU emissions standards	All mobile non-road diesel plant and equipment (with an engine greater than 19kW) to report engine conformity with relevant United States Environment Protection Agency (US EPA), European Union (EU) or equivalent emission standards and the fitting of any exhaust after-treatment devices. Reporting should be in accordance with the Air Emission Data Workbook 9TP-FT- 439.
CR11 Biodiversity	P Comply with the TfNSW Vegetation Offset Guide	Offset all vegetation impacted by the project in accordance with the TfNSW Vegetation Offset Guide. • Tuggerah Station: Opportunity for design of western ramp to preserve existing significant tree

Compulsory requirement	Level agreed	Example supporting initiatives
CR12 Sustainable procurement	P3 Meet steel and timber sustainable procurement requirements and undertake sustainable procurement training for high impact suppliers	• there is a commitment to require environment and sustainability aspects to be considered in the procurement process • potential suppliers are requested to provide details of their sustainability policy and its implementation • engagement with potential suppliers is undertaken to explain sustainability requirements and expectations • supplier evaluation considers environmental and sustainability aspects through the use of qualitative criteria • supplier evaluation considers sustainability aspects through use of multi criteria analysis or other scored means.
CR13 Urban design	P5 The Urban Design and Landscape Plan incorporates comments made by the Precincts and Urban Design Team	Address the urban design principles in the TfNSW Interim Urban Design Best Practice Guidelines within the urban design and landscaping plan (UDLP). Initiatives could include: • Tuggerah Station: Opportunity for design of western ramp to preserve existing significant tree • increase street tree coverage for pedestrian shade and comfort • maintain or enhance the ecological value of the site including through the retention of existing vegetation in the existing Station area and incorporation of endemic tree species. • lower surface and air temperatures by planting trees and other vegetation. • use light-coloured surfaces to reflect light and heat and reduce urban heat island effect. • investigate the use of permeable surfaces to manage storm-water run-off, reduce water pooling and mitigate urban heat island effect. • investigate the potential to install green roof and/or green walls, maximising the extent of native vegetation
CR14 Innovation and project legacy	P2 Make a contribution to industry and/or the local community	• provide adequate wayfinding signage to assist customer navigation between the Station and the car park and incorporate wayfinding principles such as acoustic, touch, consistent colour palate, lighting and others into design. • investigate the incorporation of placemaking opportunities such as retail (shops, cafes etc.) and community (grassed areas, playgrounds etc) into the design • provide bicycle parking • integrate initiatives which support active transport and integration with other forms of transport. • consider community engagement for public art and other design considerations.