November 2016

B-line

Mona Vale Commuter Car Park and B-Line stops

Review of Environmental Factors

NSW GOVERNMENT Transport for NSW

NSW MAKING IT HAPPEN

Contents

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Tables

Abbreviations

Term	Meaning
AHIMS	Aboriginal Heritage Information Management System
ARI	Average Recurrence Interval
BS 7385	British Standard 7385 Evaluation and measurement for vibration in buildings
CBD	Central Business District
CCTV	Closed Circuit TV
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CNVG	RMS Construction Noise and Vibration Guideline
CNVMP	Construction Noise and Vibration Management Plan
Council	Northern Beaches Council
CPTED	Crime Prevention Through Environmental Design
DBH	Diameter Breast Height
DDA	*Disability Discrimination Act 1992* (Commonwealth)
DECCW	The former NSW Department of Climate Change and Water
DoE	Commonwealth Department of the Environment
DP&E	NSW Department of Planning and Environment
DSAPT	*Disability Standards for Accessible Public Transport (2002)*
ECM	Environmental Controls Map
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence

Term	Meaning
ESD	Ecologically Sustainable Development (refer to Definitions)
Heritage Act	*Heritage Act 1977*
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
kN	kilo Newtons
kg	kilograms
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
mm	millimetres
m	metres
NES	National Environmental Significance
Noxious Weeds Act	*Noxious Weeds Act 1993*
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
PDP	Public Domain Plan
POEO Act	*Protection of the Environment Operations Act 1997*
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	*Roads Act 1993*
RMS	NSW Roads and Maritime Services (formerly Roads and Traffic Authority)
RNP	*Road Noise Policy* (DECCW, 2011)
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
t	tonnes
TfNSW	Transport for NSW
TMP	Traffic Management Plan

Term	Meaning
TPZ	Tree Protection Zone
TSC Act	*Threatened Species Conservation Act 1995*
UDP	Urban Design Plan
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*

Definitions

Term	Meaning
Average Recurrence Interval	The likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood will occur on average once every 100-years.
Asset Standards Authority	The Asset Standards Authority is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets.
Concept Design	The Concept Design is the preliminary design presented in the REF, which would be refined by the Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW and/or RMS acceptance). TfNSW contracts a single entity (the Contractor) to further develop the design to a level suitable for construction. The Contractor therefore becomes responsible for all work on the project.
Disability Standards for Accessible Public Transport	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.
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).
Proponent	A person or body proposing to carry out an activity under Part 5 of the EP&A Act - in this instance, TfNSW.
Reasonable	Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.
Sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.
The Proposal	The conversion and operation of the Mona Vale Commuter Car Park, new northbound and southbound B-Line bus stops and supporting infrastructure. Bus operations are not considered as part of the Proposal.

Term	Meaning
Vegetation Offset Guide	The TfNSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed 'significant' for the purposes of section 111 of the EP&A Act. The Guide provides for planting of a minimum of eight trees for each large tree with a diameter at breast height (DBH) of more than 60 cm, four trees where the DBH is 15-60 cm, or two trees where DBH is less than 15 cm.

Executive summary

Overview

Transport for NSW (TfNSW) is the government agency responsible for the delivery of major transport infrastructure projects in NSW and is the proponent for the Mona Vale Commuter Car Park and B-Line stops (the Proposal).

The Proposal is part of an integrated program of bus and service infrastructure improvements to deliver a new B-Line service – a NSW Government initiative to provide a more frequent and reliable bus service between the Northern Beaches and Sydney CBD. The program includes on-road and off-road infrastructure improvements and enhancements to the broader Northern Beaches bus network. The on-road and off-road elements will be delivered as a number of individual projects primarily by TfNSW and Roads and Maritime Services (RMS).

The new B-Line service is expected to be operational in late 2017.

This Review of Environmental Factors (REF) has been prepared to assess the environmental impacts associated with the construction and operation of the Proposal under the provisions of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Description of the Proposal

The key features of the Proposal include:

- conversion of 74 existing parking spaces in the Beeby Reserve car park adjacent to Barrenjoey Road to unrestricted commuter car parking spaces, including replacing / removing signage
- new northbound and southbound bus stops on Barrenjoey Road, north of Pittwater Road, including weather protection, seating and real-time information
- a northbound bus indent at Village Park on Barrenjoey Road
- a new signalised pedestrian crossing across Golf Avenue at the intersection with Barrenjoey Road
- road works on Pittwater Road, Golf Avenue, Park Street and Barrenjoey Road including kerb and pedestrian island adjustments, a new signalised pedestrian crossing across the slip lane from Pittwater Rd heading north onto Barrenjoey Rd, extension of turning lanes, pedestrian fencing, pavement works and line marking
- relocation of the northbound bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane
- removal of two local bus stops (northbound and southbound) located on Barrenjoey Road, north of Park Street / Golf Avenue and co-location with the new B-Line stops
- removal of approximately 33 trees / shrubs
- new bicycle parking and improvements to bicycle and pedestrian links.

Subject to approval, construction is expected to commence in early 2017 and take up to 8 months to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF.

Need for the Proposal

Improving transport customer experience is the focus of NSW Government transport initiatives. Commuter car parks with efficient interchange to public transport are important gateways to the transport system and as such play a critical role in shaping the customer experience and perception of public transport.

The Proposal is designed to drive a stronger customer experience outcome, to deliver improved travel to and connection between modes and encourage greater public transport use.

Importantly, the Proposal forms part of the bus service and infrastructure improvements to deliver a new B-Line service, which is included in the NSW Government's Northern Beaches Transport Action Plan. The Transport Action Plan, along with other government initiatives and strategies, aims to support forecasted growth in the Northern Beaches region by improving the transport network across the region.

The Proposal would support the new B-Line service by:

- providing a high-quality bus stop precinct for customers
- increasing the number of commuter car parking spaces near bus stops via a new commuter car park
- improving the connection between the bus stop and commuter car park, particularly for people with disabilities, the less mobile and parents/carers with prams
- ensuring bus stops have improved walkway/cycleway design and quality of cycling facilities.

Car park design options considered

Fifteen options were identified for the provision of additional commuter car parking as part of the new B-Line service in Mona Vale and were assessed against criteria including operational efficiency, accessibility, constructability, environmental impact, community and stakeholder benefit, and visual impact as described in Section 2.3.

Option 12 was originally selected as the preferred option as it performed best against multi-criteria assessment. Option 12 involved demolition of the Scout Hall, Guide Hall and Tennis Clubhouse. Following initial consultation with Council and the three impacted stakeholders (Scouts, Girl Guides and Tennis Club), this option was confirmed and presented in consultation with the community in May 2016.

In subsequent discussions with the stakeholder groups involved, one group stated a strong preference to retain their current facility. Several options were presented by community members involved in formal discussions relating to the relocation of community facilities. These options were included in the fifteen options and assessed against the criteria. The feedback was used to re-evaluate the criteria assessment scores and Option 12 was no longer preferred.

Transport for NSW is currently considering parking demand and how this might be influenced by changes to the Northern Beaches bus network and service plan. Consultation on the Northern Beaches Bus Network and Service Plan will be undertaken in coming months and will assist in informing future demand for parking in this area.

A new option which is the subject of this REF has been developed which includes the conversion of the 74 existing parking spaces in the Beeby Reserve car park (around half of which are currently time restricted) to unrestricted commuter car parking spaces. This option is preferred as it reduces the impact on community facilities while retaining the flexibility to respond to investigations into future parking demand.

Bus stop design options considered

Two options for bus stop locations were identified at Pittwater Road, near Waratah Street, and on Barrenjoey Road, near Park Street. The bus stop location on Barrenjoey Road was selected as the preferred option as it would integrate with Village Park whilst providing a link between the retail and civic heart of Mona Vale Town Centre and allow sufficient space for circulation and queueing around the bus stops. This stop location would also facilitate easy transfer between local bus services and the B-Line services.

Once the bus stop location was selected, two options were then considered for the northbound B-Line stop design, either a stop indented into Village Park or a kerbside stop at Village Park. The indented bus stop design was selected as the preferred option as it maintains three northbound lanes between Pittwater Road and Park Street, facilitates extension of the northbound right-turn lane into Golf Avenue and provides a better road safety outcome.

Statutory considerations

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides for the environmental impact assessment of development in NSW. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which do not require development consent under the EP&A Act.

The *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP) is the primary environmental planning instrument relevant to the proposed development.

Clause 94 (1) of the Infrastructure SEPP allows for the development of 'road infrastructure facilities' by or on behalf of a public authority without consent on any land. Clause 93 defines 'road infrastructure facilities' as including elements such as 'bus lanes, transit lanes, rest areas and road related areas', 'associated public transport facilities for roads used to convey passengers by means of regular bus services' and 'bus layovers that are integrated or associated with roads'. Clause 5 defines 'associated public transport facilities' as including car parks intended for use by commuters.

As TfNSW is a public authority and the proposed activity falls within the definition of road infrastructure facilities under the Infrastructure SEPP, the Proposal is permissible without consent. Consequently the environmental impacts of the Proposal are being assessed by TfNSW under Part 5 of the EP&A Act.

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

In accordance with sections 111 and 112 of the EP&A Act, TfNSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Chapter 6 of this REF presents the environmental impact assessment for the Proposal, in accordance with these requirements.

Community and stakeholder consultation

Under the Infrastructure SEPP, consultation is required with local councils or public authorities in certain circumstances, including where Council-managed infrastructure is affected.

Consultation has been undertaken with the former Pittwater Council (now Northern Beaches Council) during the development of design options and the broader community about the preferred option.

A newsletter was distributed to residents and businesses in Mona Vale in late May 2016, and was published to the project website. A community information session was held at the Kitchener Park Sports Hall on Tuesday 31 May 2016. This provided the community with an opportunity to drop in to speak with members of the project team to discuss the proposed works.

Feedback received in response to these activities has been taken on board and addressed in the REF. Refer to Section 5 for details regarding the issues raised and response provided.

TfNSW is also proposing to undertake the following additional community engagement activities for the Proposal:

- direct notification to community stakeholders by newsletter inviting comment
- public display of the REF including a community information session
- shopping centre display
- online discussion forums.

Further information about these specific activities is included in Section 5 of this REF.

The REF will be displayed for a period of two weeks. During this period, the REF will be available for viewing at Northern Beaches Council (Pittwater office), Mona Vale Library and TfNSW Chatswood office. The REF will also be available to download from the B-Line website[1] . Members of the public can make enquiries via phone (1800 048 751) or email (projects@transport.nsw.gov.au).

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

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

[1] http://b-line.transport.nsw.gov.au/environment-and-planning.php

Figure 1 Planning approval and consultation process for the Proposal

Environmental impact assessment

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

During construction, the following key impacts have been identified should the Proposal proceed:

- temporary noise and vibration impacts
- temporary traffic and pedestrian impacts
- vegetation removal
- temporary impacts to community facilities.

These impacts are anticipated to be primarily temporary in nature and can be managed through the implementation of appropriate mitigation measures.

The following key operational impacts have the potential to occur as a result of the Proposal:

- visual impacts
- increase in commuter car parking
- removal of eight on street parking spaces.

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

Conclusion

This REF has been prepared having regard to sections 111 and 112 of the EP&A Act, and clause 228 of the EP&A Regulation, to ensure that TfNSW takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

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

Should the Proposal proceed, any potential 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. Accordingly, an Environmental Impact Statement (EIS) is not required for the Proposal, in accordance with Part 5.1 of the EP&A Act.

1. Introduction

Transport for NSW (TfNSW) is the lead agency for integrated delivery of public transport services across all modes of transport in NSW. TfNSW is the proponent for the Mona Vale Commuter Car Park and B-Line stops (the Proposal).

The Proposal is part of an integrated program of bus service and infrastructure improvements to deliver a new B-Line service – a NSW Government initiative to provide a more frequent and reliable bus service between the Northern Beaches and Sydney Central Business District (CBD).

The new B-Line service is expected to be operational in late 2017.

1.1. Northern Beaches B-Line Program

To deliver transport improvements for the Northern Beaches, the NSW Government is proposing to deliver a program of on-road and off-road infrastructure improvements and enhancements to the Northern Beaches bus network, including the following elements:

- introduction of a new bus service, called B-Line, from Mona Vale to the Sydney CBD. The B-Line would provide more frequent and reliable services, and would generally operate between the hours of approximately 5.30am to 12.30am. Service frequencies during this time would generally be as follows:
  - every five minutes in the weekday southbound morning peak and northbound afternoon peak commute periods
  - every 10 minutes at other times of the day, and on weekends, up to 11pm
  - every 15 minutes between 11pm and 12.30am every day
- a new double decker bus fleet for improved on-board capacity and comfort
- on-road infrastructure improvements, including new bus lanes, bus bays, minor lane widening and other road improvements to support faster and more reliable bus journeys on the north-south corridor
- nine modern B-Line stops at Mona Vale, Warriewood, Narrabeen, Collaroy, Dee Why, Brookvale, Manly Vale, Spit Junction (Mosman) and Neutral Bay, including real-time passenger information and improved facilities for customers
- six new commuter car parks at Mona Vale, Warriewood, Narrabeen, Dee Why, Brookvale and Manly Vale providing around 900 spaces, as well as bicycle parking, to encourage customers to park and ride
- works to ensure integrated pedestrian and bicycle links to commuter car parks and bus stops
- modifications to the bus network to provide for a turn-up-and-go bus service, improved network legibility and better connections between key centres.

Figure 2 provides an overview of the new B-Line service.

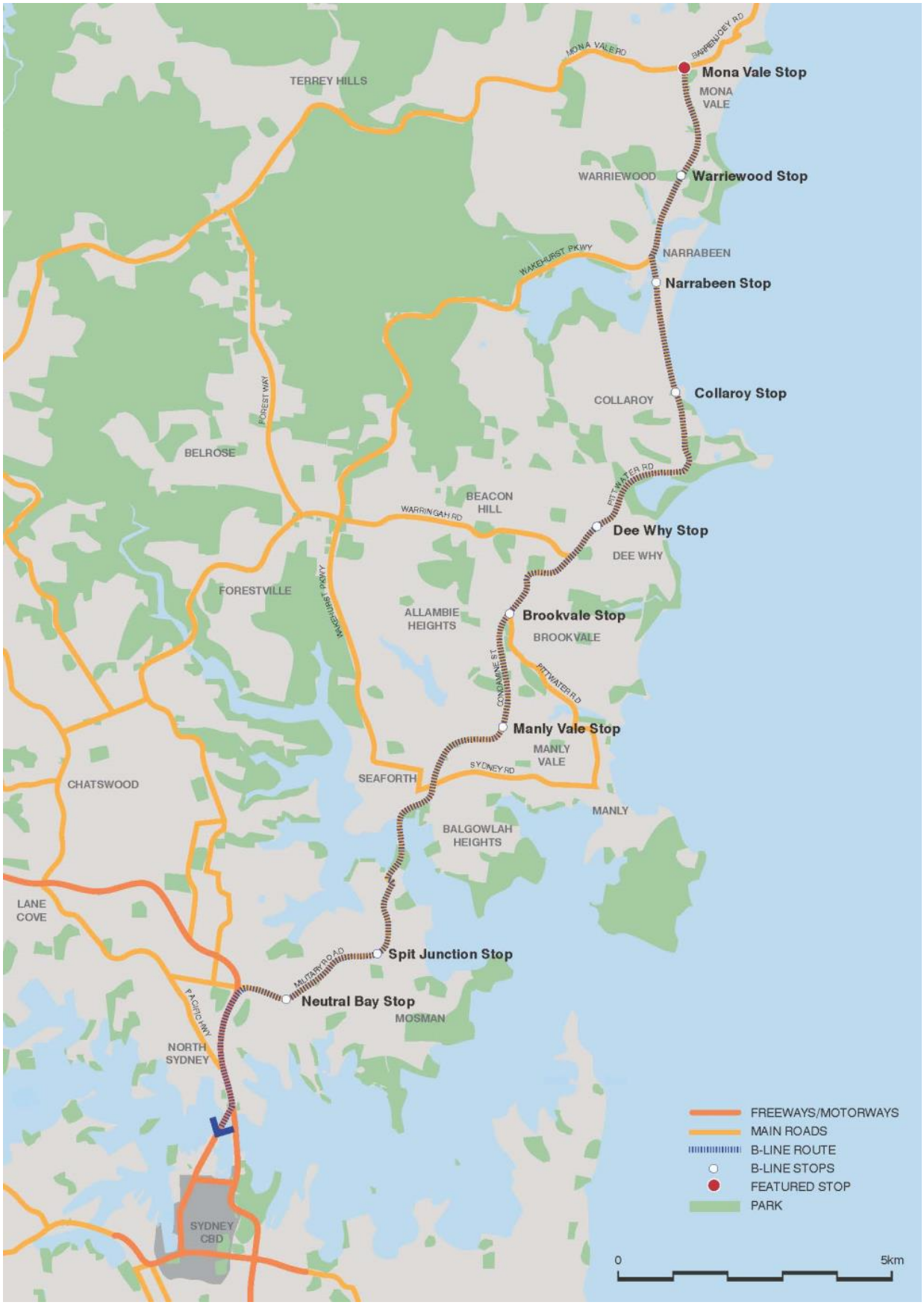

Figure 2 Regional setting

1.1.1. Delivery of the new B-Line service

It is to be noted that the above listed on-road and off-road elements of the program of bus service and infrastructure improvements would be delivered as a number of individual projects primarily by TfNSW and Roads and Maritime Services (RMS).

TfNSW is responsible for the assessment and construction of all B-Line components at four key precincts: Warriewood, Mona Vale, Narrabeen and Manly Vale. The works at these locations would include construction or conversion of the proposed commuter car parks, new B-Line bus stops and associated road works and intersection upgrades.

TfNSW is likely to also be responsible for all other off-road infrastructure beyond these precincts, including the remaining five B-Line bus stops.

RMS is responsible for the assessment and construction of all on-road works between these precincts including provision of new bus lanes and bus bays and other road and traffic management related facilities to improve capacity and traffic flow along the corridor.

Two commuter car parks are to be delivered by third parties, namely:

- Dee Why, which is being delivered by Northern Beaches Council (formerly Warringah Council) as part of the Police Citizens Youth Club (PCYC) development
- Brookvale, which is being delivered by NSW Health Infrastructure as part of the Brookvale Community Heath Centre development.

The various projects which make up the program of bus service and infrastructure improvements to deliver a new B-Line service will be subject to separate environmental impact assessments.

Further detail on the new B-Line service is available at the B-Line website[2].

1.2. Overview of the Proposal

The Proposal has been identified as an element to be delivered as part of the new B-Line service. The Proposal aims to:

- deliver a high-quality bus stop precinct for customers at Mona Vale, by improving the following service attributes:
  - availability of car parking facilities near the bus stop
  - comfort at the bus stop (shelter and seating)
  - availability of arrival information for buses
  - availability of information about service delays
  - ease of finding information (routes, stops, timetables)
- improve connection between the bus stop and commuter car park, particularly for people with disabilities, the less mobile and parents/carers with prams
- ensure bus stops have improved walkway/cycleway design and quality of cycling facilities
- minimise any environmental and visual impacts.

[2] http://b-line.transport.nsw.gov.au/environment-and-planning.php

1.2.1. Key features of the Proposal

The key features of the Proposal are:

- conversion of 74 existing parking spaces in the Beeby Reserve car park adjacent to Barrenjoey Road to unrestricted commuter car parking spaces, including replacing / removing signage
- new northbound and southbound bus stops on Barrenjoey Road, north of Pittwater Road, including weather protection, seating and real-time information
- a northbound bus indent at Village Park on Barrenjoey Road
- a new signalised pedestrian crossing across Golf Avenue at the intersection with Barrenjoey Road
- road works on Pittwater Road, Golf Avenue, Park Street and Barrenjoey Road including kerb and pedestrian island adjustments, a new signalised pedestrian crossing across the slip lane from Pittwater Rd heading north onto Barrenjoey Rd, extension of turning lanes, pedestrian fencing, pavement works and line marking
- relocation of the northbound bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane
- removal of two local bus stops (northbound and southbound) located on Barrenjoey Road, north of Park Street / Golf Avenue and co-location with the new B-Line stops
- removal of approximately 33 trees / shrubs
- new bicycle parking and improvements to bicycle and pedestrian links.

During construction a temporary construction compound, with space for a site office, amenities, laydown and storage for materials would be established within two cleared spaces near Beeby Reserve.

Construction works would be staged to ensure parking spaces are available where possible during the construction phase. However short term partial closures of the existing car park would be required during certain construction phases.

Subject to approval, construction is expected to commence in early-mid 2017 and take approximately 8 months to complete.

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

1.3. Location of the Proposal

The Proposal is located in the Northern Beaches Local Government Area (LGA) approximately 27 kilometres from Sydney's Central Business District (CBD), as shown in Figure 2.

The Proposal site is located along Barrenjoey Road. The site includes an at-grade Council car park at Beeby Reserve which is well used during the week and on weekends (refer to Figure 3).

The Proposal site is bounded by Mona Vale Village Park and commercial centre to the north, Darley Street to the east, and to the south and west are Mona Vale Golf Club, Kitchener Park playing fields, the Scout Hall, Girl Guide Hall and the Tennis Clubhouse. Additional Council car parking is provided to the south-west of the Proposal site at Kitchener Park.

Figure 3 Location of the Proposal site

1.4. Existing infrastructure and land uses

Land use adjacent to the Proposal site predominantly consists of public recreational uses to the immediate north and south (Village Park and Kitchener Park), private recreational uses to the south (Mona Vale Golf Club, Scout Hall, Girl Guide Hall and Tennis Clubhouse), residential uses to the south-east and south-west and mixed uses to the north-west and north-east of the Proposal site.

The Mona Vale civic centre is situated to the north of the Proposal site (north of Village Park) and includes the former Pittwater Council building, Mona Vale Library and restaurants. Pittwater Place Shopping Centre is situated to the north-east of the Proposal site.

The Proposal site accommodates the following elements:

- *Commuter car parking:* The existing at-grade car park in Beeby Reserve consists of 74 off-street parking spaces, approximately half are time restricted and half are unrestricted. Additional off-street parking is provided adjacent to the Tennis Clubhouse and along Pittwater Road in Kitchener Park to the south-west. The majority of the existing off-street parking spaces are unrestricted providing park and ride facilities for commuters. Some of the spaces have time restrictions and may be used by casual users of the adjacent facilities such as the tennis courts, Scout Hall and Girl Guide Hall.

  In the vicinity of the Proposal site, Pittwater Road and Park Street have time restricted parking, mostly providing parking for customers to the retail shops. Golf Avenue has 98 unrestricted parking spaces on both sides of the road. These spaces are likely utilised by residents, commuters and golf course users.

- *Bus services:* The existing site is served by bus stops on the east and west sides of Pittwater Rd. Seventeen routes operate from the stops on the eastern side of Pittwater Road. Fifteen operate southbound (151,155, 156, 184, 187, 190, E84, E86, E87, E88, E89, L60, L84, L87, L90) with buses departing approximately every two to three minutes in the morning peak. Two operate west (196, 197) with buses departing approximately every 10-15 minutes in the morning peak. In the off-peak three routes operate south (155, 156, L90) and one route west (197) services operate approximately every 15 minutes southbound and hourly westbound.

  Twenty routes operate to the northbound stop on Pittwater Road. Nine routes terminate (151, 182, 184, 185, 196, 197, E84, L60, L84). Eight routes operate north (188, 189, E87, E88, E88, L87, L88, L90) and in the morning peak buses operate approximately every 15 minutes. Three routes operate west (155, 156, E86) and in the morning peak buses operate approximately every hour. In the off-peak two routes operate north (L88, L90) and two routes operate west (155, 156). Services operate approximately every 15 minutes northbound and every 30 minutes westbound.

- *Pedestrian facilities:* The following signalised intersections provide signalised pedestrian crossing links:
  - Barrenjoey Road / Park Street / Golf Avenue provides crossings on the northern, eastern and western approaches
  - Barrenjoey Road / Pittwater Road provides crossings on the northern and eastern approaches

- *Community facilities*: a range of community facilities exist within and surrounding the Proposal site and include:
  - a locally listed heritage item – the Great War Memorial on the north-western side of the Proposal site
  - Village Park on the northern side of the Proposal site

- Mona Vale Tennis Clubhouse, Scout Hall and Girl Guide Hall on the southern side of the Proposal site
- Kitchener Park playing fields, tennis courts, skate park and bowling club to the south-west
- Mona Vale Golf Course and club to the south-east.

Images of the existing car park and surrounding land uses are provided in Figure 4 to Figure 8.

Figure 4 View of existing Beeby Reserve car park looking east towards Golf Avenue

Figure 5 View west from Beeby Reserve car park towards the Scout Hall, Girl Guide Hall and Tennis Clubhouse

Figure 6 View west along Barrenjoey Road towards Pittwater Road with the existing southbound bus stop in the foreground

Figure 7 View west towards Kitchener Park, Kitchener Park Sports Centre and parking

Figure 8 View south of Tennis Clubhouse and parking with tennis courts in the background

1.5. Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of the Mona Vale Commuter Car Park and B-Line stops. For the purposes of these works, TfNSW is the proponent and the determining authority under Part 5 of the EP&A Act.

The purpose of this REF is to describe the Proposal, to assess the likely impacts of the Proposal having regard to the provisions of section 111 and 112 of the EP&A Act, and to identify mitigation measures to reduce the likely impacts of the Proposal. This REF has been prepared in accordance with clause 228 of the *Environment Planning and Assessment Regulation 2000* (the EP&A Regulation).

This assessment has also considered the relevant provisions of other relevant environmental legislation, including the *Threatened Species Conservation Act 1995* (TSC Act), *Protection of the Environment Operations Act 1997* (POEO Act) and the *Roads Act 1993* (Roads Act).

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

2. Need for the Proposal

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

2.1. Strategic justification

2.1.1. State Priorities – NSW Making it happen

NSW Making It Happen identified 30 key priorities to grow the economy, deliver infrastructure, and improve health, education and other services across NSW.

'Building Infrastructure' has been listed as one of these key priorities, as our growing population continues to place pressure on our existing infrastructure. Over the next 15 years, NSW will require infrastructure to support 40 per cent more train trips, 30 per cent more car trips and 31 per cent more households.

The new B-Line service has been identified as a key infrastructure project under the 'Building Infrastructure' priority to be delivered in 2016–2019.

The new B-Line service aims to address the immediate issues facing Northern Beaches bus customers by providing a more frequent and reliable bus service between the Northern Beaches and Sydney CBD.

2.1.2. NSW 2021 – A Plan to Make NSW Number One

NSW 2021 is the NSW Government's ten year plan to guide budget and decision making in NSW. *NSW 2021* includes the following goals, targets and priority actions relevant to the Proposal (NSW Department of Premier and Cabinet, 2011):

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

The Proposal, as part of the integrated program of bus service and infrastructure improvements to deliver a new B-line service, aims to meet the above identified goals.

Notably a number of overarching documents underpin the strategic context for the new B-Line service. These documents and their relevance to the Proposal are outlined in Table 1.

Table 1 Strategies and policies applicable to the new B-Line service

NSW 2021: A plan to make NSW No.1
State
The State Infrastructure Strategy 2012 – 2032 (Infrastructure NSW, 2012) • the Strategy recognises that bus rapid transit projects can facilitate high quality connections on some of Sydney's existing corridors at relatively low cost • the Strategy recommends investigating a range of potential enhancements to bus priority on the Northern Beaches corridor to develop a value-for-money improvement plan for the coming decade.
A Plan for Growing Sydney (Department of Planning and Environment, 2014) • this Plan sets a vision for Sydney to be a more compact, networked city with improved accessibility to support jobs, homes and lifestyle opportunities • this plan commits to managing demand on the road network through measures such as investment in strategic road upgrades • identifies improving local opportunities for walking, cycling and using public transport as a key policy • recognises that Pittwater Road is a key corridor in the strategy and is critical over the longer term to ensure a connected city with efficient travel options.
NSW Long Term Transport Master Plan (TfNSW, 2012) • the Master Plan (TfNSW, 2012) sets out the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first • the Master Plan identifies the transport challenges that need to be addressed and identifies a planned and coordinated set of actions • identifies the Northern Beaches corridor (from Mona Vale to the Sydney CBD) as a highly constrained corridor. Bus transport is the only public transport in this region and there is high variability in bus travel times. This unreliability has effects across the bus network, with delays moving along the service chain and holding up the next services • identifies that the level of public transport demand and current operating conditions on the Northern Beaches may support a bus rapid transit system, which would provide congestion relief through provision of better services for customers • lists the Northern Beaches bus rapid transit system, subject to feasibility assessments, as a medium term (5-10 years) action of the Master Plan.
Sydney's Bus Future (TfNSW, 2013b) • aims to deliver a modern and customer focused bus system • identifies a three-tiered network for bus operation. Each tier would deliver a defined level of service consistency and reliability: o rapid service routes o suburban service routes, consisting of a mix of timetabled and frequent, 'turn up and go' type services that do not require timetables o local service routes comprising timetabled services with stops approximately every 400 metres • identifies Mona Vale to the CBD as a rapid bus route.

NSW 2021: A plan to make NSW No.1
Regional
Northern Beaches Regional Action Plan (Department of Premier and Cabinet, 2012) • identifies that residents on Northern Beaches rely heavily on private vehicles and public buses for travel • lists that that a bus rapid transit for the Northern Beaches be investigated.
Northern Beaches Transport Action Plan (NSW Government, 2014) • identifies transport improvements to be delivered to the Northern Beaches, as well as planning for future growth. The plan states that $125 million is being invested to deliver kerbside bus rapid transit on the Northern Beaches.
Local
A number of local strategies, plans and studies are applicable to the Proposal and have been discussed in Section 4.4.

2.1.3. Objectives of the new B-Line service

The new B-Line service aims to address key issues impacting the effectiveness of bus transport on the Northern Beaches, including:

- low peak period bus speeds and long travel times on the north-south corridor
- unreliable bus journey times on the north-south corridor
- uneven passenger loadings on buses on the north-south corridor
- crowding at major bus stops on the north-south corridor
- long wait times for bus services in off-peak periods
- customer dissatisfaction with bus stop amenity
- complex bus network that lacks legibility.

The new B-Line service would provide on-road and off-road infrastructure improvements and enhancements to the broader Northern Beaches bus network. Details of the on-road and off-road infrastructure improvements and enhancements are provided in Section 1.

2.1.4. Objectives of the Proposal

The specific objectives of the Proposal are outlined in Section 1.2 and are consistent with the objectives of the new B-Line service.

2.2. The ‘do-nothing’ option

The NSW Government has identified issues facing Northern Beaches bus customers. The NSW Government aims to deliver a new, more frequent and reliable bus service between the Northern Beaches and Sydney CBD as a priority as part of the Northern Beaches Transport Action Plan.

The ‘do nothing’ option was not considered a feasible alternative as it is inconsistent with NSW Government objectives identified in Section 2.1, and would not provide support to a new, more reliable frequent bus service.

Therefore a number of options were considered for commuter car parking and B-Line bus stops, as outlined in Sections 2.3, 2.4 and 2.5.

2.3. Alternative commuter car park options considered

In 2015, DEM Pty Ltd was engaged to develop a feasibility and optioneering study for a commuter car park at Mona Vale. Through consultation with the former Pittwater Council and other stakeholders various additional options were identified. An updated optioneering study was prepared by DEM in June 2016, and a final report was prepared in September 2016.

A total of fifteen commuter car park design options were assessed in the September 2016 report including options on both sides of Barrenjoey Road, variations such as underground and multi-deck designs as well as three options based on community suggestions. Options were assessed against a range of criteria including operational efficiency, accessibility, constructability, environmental impact, community and stakeholder benefit, and visual impact.

Four of the options which were considered in greater detail and are indicative of the options considered are detailed in Section 2.3.1. Below is a summary of the advantages and disadvantages of those four options.

2.3.1. Assessment of identified options

Option 7

Option 7 (Figure 9) included an enclosed, grass-covered underground car park in Village Park with entry and exit to Pittwater Road.

Advantages:

- located closer to the commercial and civic centre of Mona Vale and has potential to support the *Draft Imagine Mona Vale: Mona Vale Place Plan* (Pittwater Council, 2016)
- fewer mature trees required to be removed than other Village Park option
- provides car parking in the town centre when not in use by commuters
- no impact on community facilities at Beeby Reserve.

Disadvantages:

- location on the northbound side of the B-Line route is less ideal for commuters who generally favour quick transfers in the morning over the evening
- poor value for money compared with the preferred option
- requires substantial modification to site levels
- requires mechanical ventilation
- potential impact on fibre optic, gas, stormwater and sewer services
- exit and entry via Pittwater Road would introduce additional traffic to adjoining local streets due to less direct access route for the majority of the catchment.

Figure 9 Concept design – Option 7 basement plan

Option 12

Option 12 (Figure 10) included an extension of the existing at-grade car park located in Beeby Reserve on Barrenjoey Road. This option involves the provision of a new community facilities building to include spaces for the Tennis Club, Girl Guides and Scouts, and demolition of their existing buildings.

Advantages:

- located adjacent to Barrenjoey Road and the southbound bus stop for direct connectivity to city bound services
- maintains existing vehicle access and egress from Golf Avenue
- minimal modification of existing site levels
- this option would be cost effective with relatively low construction cost
- the link between the proposed Beeby Reserve commuter car park and the existing Kitchener Park at-grade car park would provide a safer and more legible access and egress.

Disadvantages:

- requires new community facilities building and relocation of community groups
- removal of numerous mature trees
- option not supported by one community group.

Figure 10 Concept design – Option 12

Option 14

Option 14 (Figure 11) included an at-grade extension of the existing Beeby Reserve car park to the south into the Mona Vale Golf Course with separated entry and exit to Golf Avenue.

Advantages:

- located adjacent to Barrenjoey Road and near the southbound bus stop for direct connectivity to city bound services
- no direct impact on existing community facilities.

Disadvantages:

- requires modification of Mona Vale Golf Course and involves loss of function of course
- poor value for money compared with the preferred option
- option not supported by Mona Vale Golf Course
- removal of numerous mature trees required.

Figure 11 Concept design – Option 14

Option 15

Option 15 (Figure 12) included a multi-deck car park located on the site of the existing at-grade car park in Beeby Reserve.

Advantages:

- located adjacent to Barrenjoey Road and near the southbound bus stop for direct connectivity to city bound services
- maintains existing vehicle access and egress from Golf Avenue
- no impact on community facilities in operation
- fewer mature trees required to be removed than at-grade extension options.

Disadvantages:

- higher construction cost and longer construction duration than at-grade options
- visual impacts of multi-storey car park structure
- reduced urban amenity.

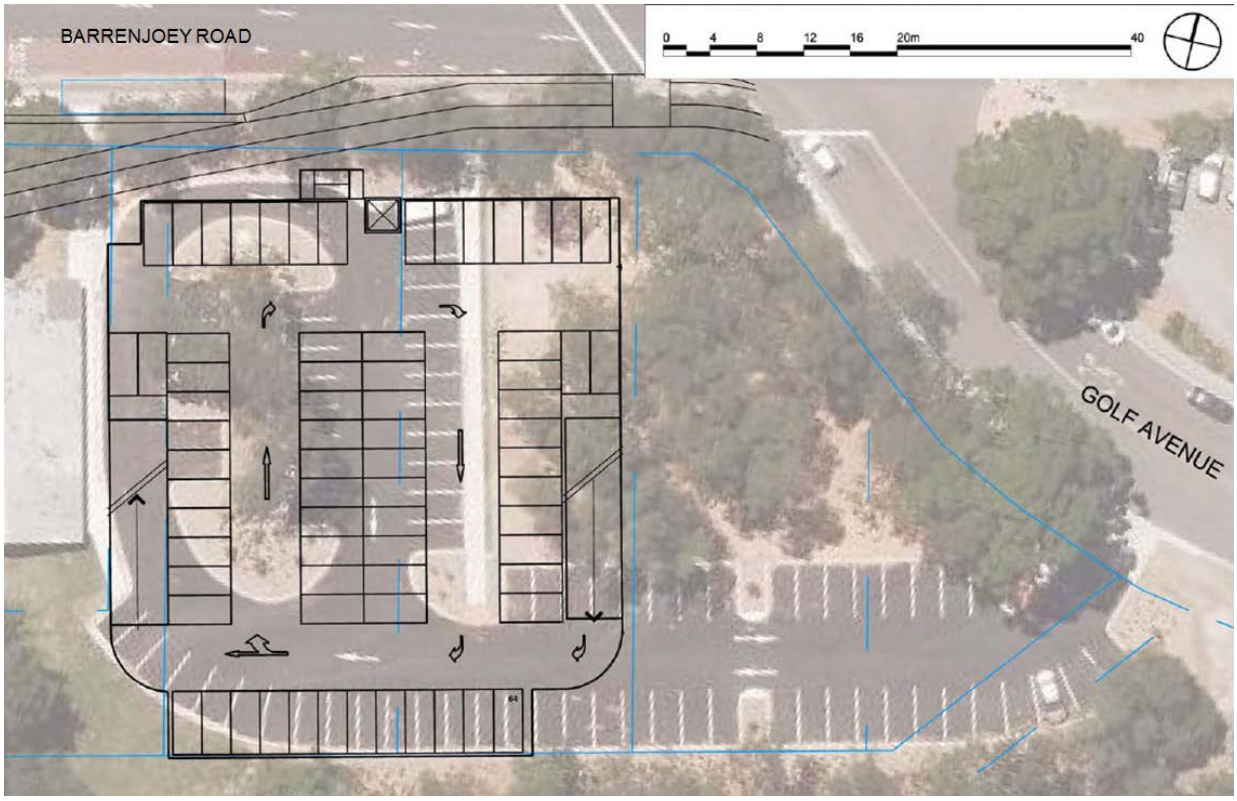

Figure 12 Concept design – Option 15 (lower ground level shown)

2.3.2. Re-evaluation of assessment

Option 12 was originally selected as the preferred option as it performed best against multi-criteria assessment. Following initial support from Council and consultation with the three directly impacted stakeholders (Scouts, Girl Guides and Tennis Club), this option was confirmed and presented in consultation with the community in May 2016.

In subsequent discussions with the stakeholder groups involved, one group stated a strong preference to retain their current facility. Several options were presented by community

members involved in formal discussions relating to the relocation of community facilities. These options were included in the fifteen options and assessed against the criteria.

Community and stakeholder feedback was used to re-evaluate the criteria assessment scores and Option 12 was no longer preferred.

2.3.3. Preferred option

The preferred option (Figure 13) involves conversion of 74 existing parking spaces in the Beeby Reserve car park adjacent to Barrenjoey Road to unrestricted commuter car parking spaces.

Advantages:

- located adjacent to Barrenjoey Road and near the southbound bus stop for direct connectivity to city bound services
- have no direct impact on existing community facilities
- lowest impact on community facilities during construction
- no tree removal required within Beeby Reserve car park
- provides the flexibility to respond to the findings of the investigation into future parking demand.

Disadvantages:

- provides fewer car parking spaces than other options
- requires the conversion of time restricted parking currently used by visitors to community facilities to commuter parking spaces.

Figure 13 Aerial photo – preferred option (conversion to commuter car parking)

Consultation on the Northern Beaches Bus Network and Service Plan will be undertaken in coming months and will assist in informing future demand for parking in this area. Should the investigation into future parking demand identify that additional parking is required at Mona Vale, this would be subject to a separate planning approval process and community consultation.

2.3.4. Justification for the preferred commuter car park option

The preferred option was selected as it provided the greatest advantages and least disadvantages, noting the new strategy for the B-Line program and the views expressed by community groups. In particular, the preferred option would:

- maintain existing pedestrian and vehicle access and egress from Barrenjoey Road
- be located in close proximity to B-Line stops
- have a negligible visual impact on surrounding receivers
- have no direct impact on existing community facilities.

2.4. Bus stop location options

In 2015, Architectus was engaged to develop bus stop locations. Two locations (Figure 14) were assessed, and a brief summary of the advantages and disadvantages of each option is provided below:

- Option 1: Pittwater Road near Waratah Street

  Advantages:

  - located close to the retail core of Mona Vale along Waratah and Bungan streets.

  Disadvantages:

  - limited shopfront footpath space on the northbound side
  - northbound and southbound bus stops would be spatially and visually separated.

- Option 2: Barrenjoey Road near Park Street (preferred)

  Advantages:

  - potential integration with Village Park to provide good amenity, direct pedestrian connections to various key attractors and activation of the park
  - utilises both pedestrian crossings at Barrenjoey / Park and Barrenjoey / Pittwater for direct access between bus services and Mona Vale Town Centre.

  Disadvantages:

  - land acquisition required

The bus stop location on Barrenjoey Road near Park Street (Option 2) was chosen as it maximises the opportunity to link to the retail and civic heart of Mona Vale Town Centre, can integrate with Village Park and allows sufficient space for circulation and queueing around bus stops. The stop location also facilitates easy transfer between local bus services and the B-Line services.

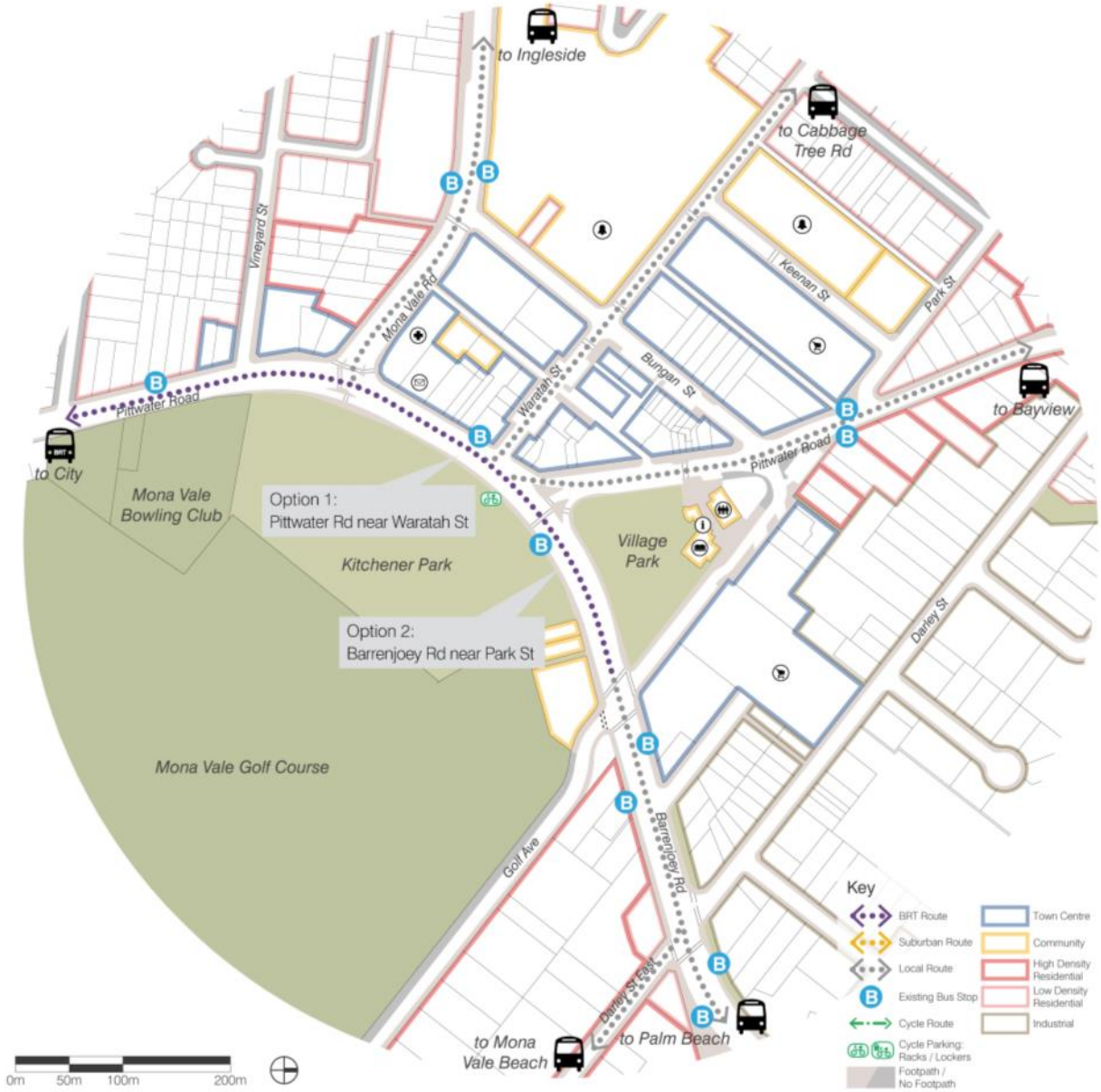

Figure 14 Bus stop location options

2.5. Bus stop layout options

The layout of the northbound B-Line stop has been considered in relation to traffic flow, road safety, existing road capacity and queueing issues. Two layouts were considered, and a brief summary of the advantages and disadvantages of each option is provided below:

- Option 1: Kerbside stop at Village Park

  Advantages:

  - avoids tree removal within Village Park
  - the most cost effective option.

  Disadvantages:

  - insufficient road capacity between Pittwater Road and Park Street to accommodate kerbside stops and maintain three northbound lanes
  - safety issues with merging traffic required to cross directly into middle lane
  - limited storage space for vehicles turning left into Park St in front of bus stops
  - potential to exacerbate known congestion, particularly in the PM peak.

- Option 2: Indented bus stop at Village Park

  Advantages:

  - maintains three northbound lanes between Pittwater Road and Park Street
  - facilitates extension of the northbound right-turn lane into Golf Avenue
  - merging traffic can enter kerbside lane when buses are stopped providing a better road safety outcome.

  Disadvantages:

  - requires the removal of 21 trees within Village Park
  - requires land acquisition within Village Park.

3. Description of the Proposal

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

3.1. The Proposal

The Proposal involves the conversion of the existing at-grade car park to commuter car parking and bus stop infrastructure. The Mona Vale Commuter Car Park and B-Line Stops forms part of the bus service and infrastructure improvements required to support the NSW Government initiative to deliver a new, more frequent and reliable bus service between the Northern Beaches and Sydney CBD. The Proposal would include the following key elements:

- conversion of 74 existing parking spaces in the Beeby Reserve car park adjacent to Barrenjoey Road to unrestricted commuter car parking spaces, including replacing / removing signage
- new northbound and southbound bus stops on Barrenjoey Road, north of Pittwater Road, including weather protection, seating and real-time information
- a northbound bus indent at Village Park on Barrenjoey Road
- a new signalised pedestrian crossing across Golf Avenue at the intersection with Barrenjoey Road
- road works on Pittwater Road, Golf Avenue, Park Street and Barrenjoey Road including kerb and pedestrian island adjustments, a new signalised pedestrian crossing across the slip lane from Pittwater Rd heading north onto Barrenjoey Rd, extension of turning lanes, pedestrian fencing, pavement works and line marking
- relocation of the northbound bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane
- removal of two local bus stops (northbound and southbound) located on Barrenjoey Road, north of Park Street / Golf Avenue and co-location with the new B-Line stops
- removal of approximately 33 trees / shrubs
- new bicycle parking and improvements to bicycle and pedestrian links.

Figure 15 shows the general layout of key elements for the Proposal.

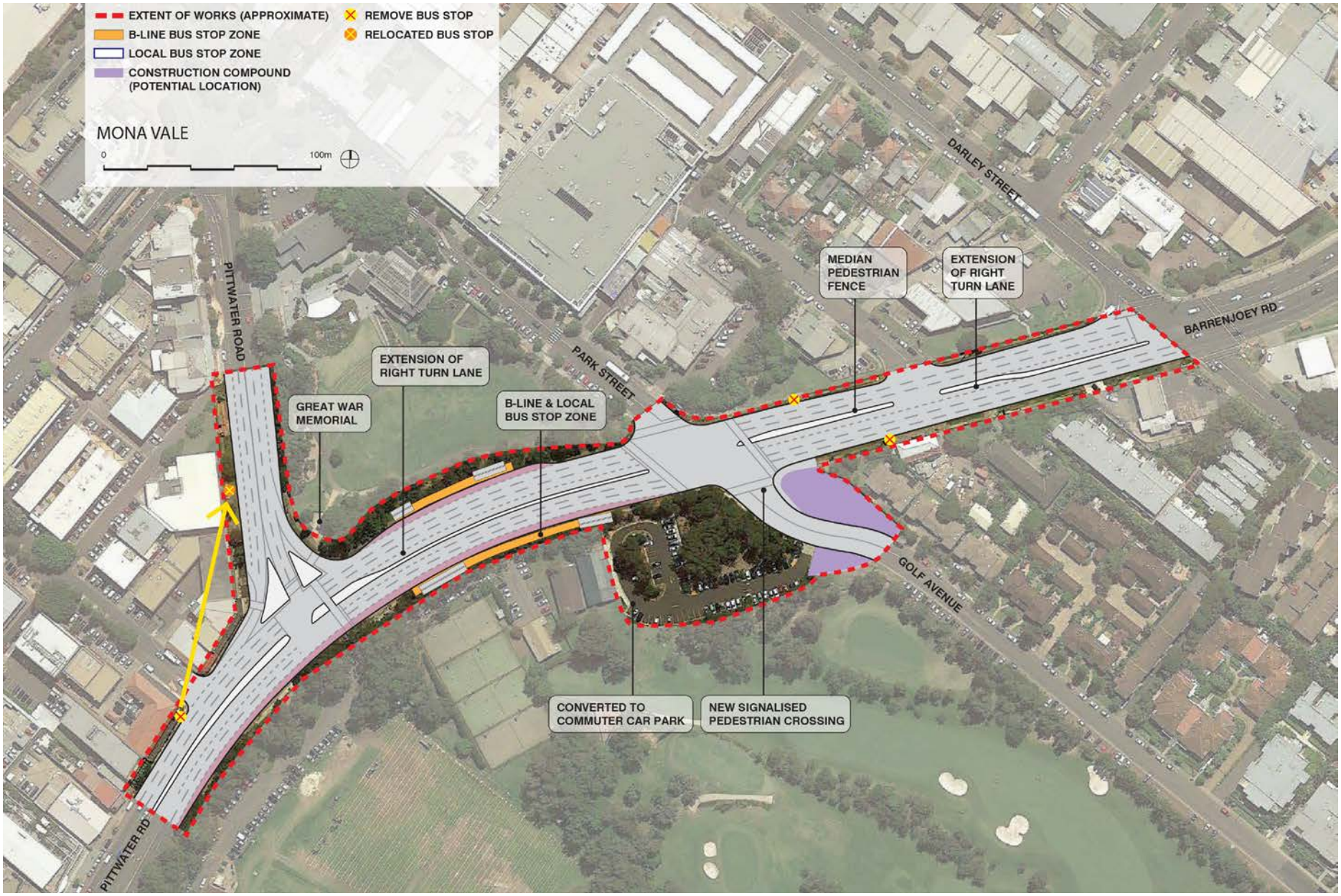

Figure 15 The Proposal

(Indicative only, subject to detailed design)

3.1.1. Design features

The key design features of the Proposal are described in the following sections.

At-grade commuter car park

The existing spaces within Beeby Reserve car park would be converted to commuter car parking. Signage would be installed to indicate this change. The proposed commuter car park includes 74 car parking spaces including 2 accessible spaces. CCTV would be installed within the car park.

The vehicular entry and exit to the car park on Golf Avenue would not be modified.

Bicycle parking is proposed near the southbound bus stop which would connect to the existing pedestrian link along Barrenjoey Road. Clearly visible pedestrian pathways would be available to the car park and bicycle parking, which would link with the existing paths.

B-Line stops

The proposed B-Line stops would be located on Barrenjoey Road north of the Pittwater Road junction, and would provide weather protection (B-Line branded shelter), passenger information display, Opal facilities, help point, seating, CCTV and real-time information.

The northbound B-Line stop would be indented into Village Park, which would involve the removal of the existing berm and a number of trees. The southbound B-Line stop would be in the location of the existing bus stop using the existing bus lane. The existing bus shelter would be removed.

Road works

To improve access to the proposed car park conversion and accommodate the B-Line stops the following road works are proposed:

- a northbound bus indent at Village Park on Barrenjoey Road requiring kerb adjustments and new pavement works, of approximately 70m in length, plus tapered ends
- a new signalised pedestrian crossing across Golf Avenue at the intersection with Barrenjoey Road
- road works at the intersection of Barrenjoey Road / Golf Avenue / Park Street including pedestrian crossing, kerb adjustments, footpath alterations and the removal of one tree and some shrubs
- removal of four on-street parking spaces on Golf Avenue eastbound, to enable passing of vehicles turning right into the car park
- removal of four on-street parking spaces on Pittwater Road northbound, to enable relocation of the bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane
- road works at the intersection of Pittwater Road / Barrenjoey Road including traffic island adjustments, signalised pedestrian crossing and kerb adjustments
- extension of the existing northbound right-turn bay on Barrenjoey Road into Golf Avenue
- extension of the existing southbound right-turn bay on Barrenjoey Road into Park Street
- installation of a pedestrian fence on the Barrenjoey Road median between Park Street and Darley Street with the access gap at Harkeith Street retained for emergency vehicles
- adjustments to the existing pedestrian fence and median on Barrenjoey Road between Pittwater Road and Park Street

- adjustments to the pedestrian fence and median on Pittwater Road, south of Barrenjoey Road
- line marking, asphalting and associated minor works to facilitate the road adjustments.

Materials and finishes

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

Availability and constructability are also important criteria to ensure that materials are readily available and the proposed works can be built with ease and efficiently while meeting requirements.

3.1.2. Engineering constraints

Constraints which have influenced the development of the concept design are detailed below:

- **Heritage** – one locally listed heritage item 'The Great War Memorial' is located within the Proposal footprint (north-western side of the site) as shown on Figure 15. Heritage impacts are described in further detail in Section 6.5.
- **Ecology** – the Proposal aims to minimise vegetation loss as far as practicable. However, the preferred option would require the removal of approximately 33 trees. Ecological impacts are described in further detail in Section 6.7.
- **Community facilities** – Tennis Clubhouse, Scout Hall and Girl Guide Hall are adjacent to the Proposal footprint and access must be maintained. Construction staging is described in further detail in Section 3.2 and environmental impacts in Chapter 6.
- **Soils and contamination** – soil sampling was undertaken at six locations within and nearby the construction footprint. Laboratory results identified that contaminant concentrations were below the applicable assessment criteria.
- **Visual** – the Proposal changes the existing visual environment by removal of vegetation, installation of new bus stops and road works. The visual impacts of the Proposal are described in Section 6.2.
- **Topography** – the Proposal site is relatively level with a slight fall towards the west. The site is flood prone as described in further detail in Section 6.9.
- **Utilities** – a preliminary Dial Before You Dig (DBYD) search has identified a number of utilities in the vicinity of the proposed works including: electricity, stormwater and sewer pipes. Refer to Section 3.2 for further details.

3.1.3. Design standards

The Proposal has been designed having regard to the following:

- *Disability Standards for Accessible Public Transport 2002* (issued under the Commonwealth *Disability Discrimination Act 1992*)
- Building Code of Australia
- relevant Australian Standards and RMS Road Design guideline supplements
- TfNSW Asset Standards Authority standards
- TfNSW Wayfinding Design Guide
- *NSW Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a)

- Crime Prevention Through Environmental Design (CPTED) principles
- Relevant Council codes and standards.

3.1.4. Sustainability in design

The Northern Beaches B-Line Program has an overarching Sustainability Strategy in place. This section outlines how this aspect of the program will address sustainability.

The design of the Proposal has been undertaken in accordance with the project targets identified in TfNSW's *NSW Sustainable Design Guidelines - Version 3.0* (TfNSW, 2013a) which groups sustainability into seven themes:

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

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

- **compulsory** – the initiative is required to be implemented when applicable to the project as they refer to a corporate target, or are fundamental to the delivery of sustainable assets
- **discretionary** – the initiative has benefits to be implemented, however may not be the most appropriate.

The Guidelines also specify a minimum level of compliance within each category: 100 per cent of applicable compulsory initiatives and 50 per cent of the applicable discretionary points are to be explored through each stage of design.

It is currently anticipated that the Proposal would achieve a 'gold' sustainability in design rating. This corresponds with approximately 80 per cent of applicable discretionary points being achieved.

Further assessment of the Proposal against the Guidelines would be undertaken during the detailed design phase. Notably during the detailed design some discretionary initiatives may prove unfeasible, in which case they would be excluded. Refer to Section 6.12.3 for further detail.

3.2. Construction activities

3.2.1. Work methodology

Subject to approval, construction is expected to commence in early-mid 2017 and take approximately 8 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 2. This staging is indicative, is based on the current concept design and may be subject to change once the detailed design methodology is finalised. The staging is also dependent on the Contractor's preferred methodology, utility impacts, program and sequencing of work in consultation with TfNSW.

Table 2 Indicative construction staging for key activities

Phase (duration)	Activities	Plant and Equipment
Phase 1 – Site establishment, (duration approximately two weeks)	Establish site compound. Install hoardings and demarcate site. Utility location works.	Hiab trucks Tipper trucks Generator Small compactors (smooth drum roller) Hand compactors Bobcats Potholing trucks
Phase 2 – Road works. (duration approximately six months)	Road works including: • utility protection / relocation • intersection works at Barrenjoey Road / Pittwater Road and Barrenjoey Road / Park Street / Golf Avenue • indented northbound bus bay • median works including turning lanes and pedestrian fencing • pavement works and line marking.	Excavators with breakers Tipper trucks Demolition saws Generators Hiab trucks / cranes Concrete trucks Small compactors (pad foot/smooth drum roller) Hand compactors Bobcats Jack hammers Small Trench Roller Twin drum rollers Multi tyre rollers Asphalt profiler Asphalt paver Lighting Potholing trucks
Phase 3 – Road works. B-Line stop civil works and fit out. (duration approximately two months)	Car park conversion works / signage installation. Pavement works and line marking. Construct and fit out B-Line stop (temporary southbound bus stop required) and undertake associated landscaping. Commission B-Line stop systems. Relocation of bus stop. Remove redundant bus stop infrastructure. Landscaping. Remove site offices and hoardings.	Tipper trucks Demolition saws Generators Hiab trucks Excavators with breakers Concrete trucks Small compactors (pad foot/smooth drum roller) Hand compactors Bobcats Jack hammers Small Trench Roller Twin drum rollers Multi tyre rollers Asphalt profiler Asphalt paver Lighting

3.2.2. Working hours

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

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturdays
- no work on Sundays or public holidays.

Out of hours works would be required to minimise disruptions to pedestrians, motorists and nearby sensitive receivers. Out of hours works are likely to be required for the road works on Pittwater Road and Barrenjoey Road and the installation of new southbound bus stop infrastructure.

Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in RMS *Construction Noise and Vibration Guideline* (RMS, 2016) (refer to Section 6.3 for further details).

3.2.3. Earthworks

Earthworks would be required to facilitate the following aspects of the Proposal:

- construction of new northbound bus indent at Village Park
- road adjustments and widening
- utilities adjustments.

Excavated material would be reused on site where possible or disposed of in accordance with relevant legislative requirements. Works would be undertaken in accordance with a Construction Environmental Management Plan (CEMP) and appropriate erosion and sediment controls would be installed and maintained in accordance with the requirements of the 'Blue Book' *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

3.2.4. Source and quantity of materials

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

3.2.5. 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 localised closures of Beeby Reserve car park for conversion of parking and signage installation
- localised changes to traffic conditions and lane closures to support road works on Pittwater Road, Barrenjoey Road, Park Street and Golf Avenue. These closures would be coordinated with RMS and undertaken at times that minimise the impact to road users and existing bus services. The works would be staged to progress from west to east, introducing the new lane configuration as the works progress and limiting the period of temporary lane alignments
- access to community facilities would be maintained throughout the duration of the construction and may require temporary pathways during certain construction phases

- minor increase in traffic, including heavy vehicles due to construction traffic.

A detailed construction methodology and associated management plans (including a Traffic Management Plan (TMP)) would be developed during the detailed design phase of the Proposal to manage impacts.

3.2.6. Ancillary facilities

A temporary construction compound would be required to accommodate a site office, amenities, machinery, laydown and storage area for materials. Areas for the construction compound have been proposed in two cleared, hardstand and grassed areas adjacent to the car park and may be relocated within the site during the construction phase to suit the construction staging (refer to Figure 15).

3.2.7. Public utility adjustments

The Proposal has been designed to avoid relocation of services where feasible, however it is likely that some services may require relocation or adjustment and new connections made, including the removal and replacement of existing light poles, adjustments to communications, gas and power services, and connections to stormwater and water supply. Service relocations are unlikely to occur outside of the footprint of the works assessed in this REF.

3.3. Property acquisition

Part of the site for the Proposal is on Crown Land under the management of Northern Beaches Council (formerly Pittwater Council). An agreement would be established between Council, the Crown and TfNSW for the use of the site.

Land acquisition would be required to construct the northbound bus indent. An agreement would be established between Council and TfNSW.

3.4. Operation management and maintenance

The future operation and maintenance of the car park and landscaped area is proposed to be managed by Northern Beaches Council.

The responsibility for the ongoing maintenance of the bus stops is yet to be finalised.

4. Statutory considerations

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

4.1. Commonwealth legislation

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

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

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

4.2. NSW legislation and regulations

4.2.1. Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of Part 5 of the EP&A Act. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which do not require development consent under Part 4 of the Act.

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

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

Chapter 6 of the REF provides an environmental impact assessment of the Proposal and Appendix B specifically responds to the factors for consideration under clause 228.

4.2.2. Other NSW legislation and regulations

Table 3 provides a list of other relevant legislation applicable to the Proposal.

Table 3 Other legislation applicable to the Proposal

Applicable legislation	Considerations
Contaminated Land Management Act 1997 (CLM Act) (NSW)	Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8). Preliminary waste classification indicates that sub surface materials could generally be classified as 'Restricted Solid Waste'. Further sampling and assessment is required during construction to determine the final waste classification. Subsequent to this, any materials classified as Hazardous Waste may require treatment or an immobilisation approval in accordance with Part 10 of the *Protection of the Environment Operations (Waste) Regulation 2014* prior to off-site disposal (refer Section 6.8)
Crown Lands Act 1987 (NSW)	The car park conversion, part of the northbound bus indent and some road works would be undertaken on Crown land. Land acquisition or a Crown land license would be required prior to works commencing. An agreement would be established between Council, the Crown and TfNSW for the use of the site.
Disability Discrimination Act 1992 (DDA Act) (Commonwealth)	The Proposal would be designed having regard to the requirements of this Act.
Fisheries Management Act 1994 (NSW)	Adequate stormwater quality measures would prevent any adverse impacts on any natural watercourse. The Proposal would not affect any listed threatened species, marine vegetation or involve dredging or dam works.
Heritage Act 1977 (Heritage Act) (NSW)	The Heritage Act provides for the conservation of environmental heritage in NSW. Development or activities cannot be carried out without the following: • 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 (consultation) where items listed on a government agency Heritage and Conservation Register are to be impacted. Umwelt has prepared a Heritage Impact Assessment (HIA) for the Proposal, which is provided in Section 6.5. The HIA confirms no State heritage items, Section 170 items, or relics would be affected by the Proposal. The HIA confirms one locally listed item 'Great War Memorial' located within the Proposal footprint. Impacts to the locally listed item are discussed in Section 6.5. No approvals under the Heritage Act are required for the Proposal.
National Parks and Wildlife Act 1974 (NPW Act) (NSW)	Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4). However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease and appropriate advice sought.

Applicable legislation	Considerations
Noxious Weeds Act 1993 (NSW)	Two noxious weeds have been identified in the Proposal site (refer Section 6.7) and would be managed in accordance with the requirements of the Act.
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.
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. Clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require consent for works on unclassified roads. Golf Avenue and Park Street are local, unclassified roads. Consultation with Council regarding the Proposal is ongoing. Pittwater Road and Barrenjoey Road are classified roads. Consent from RMS would be obtained, prior to the construction works for the proposed road works on classified roads. TfNSW is working collaboratively with RMS on the Proposal.
Sydney Water Act 1994 (NSW)	The Proposal would not involve discharge of wastewater to the sewer. The new building and associated amenities would connect to the existing sewer infrastructure, and are not anticipated to add any additional load on the sewer. Therefore the provisions of the Act do not apply.
Threatened Species Conservation Act 1995 (TSC Act) (NSW)	The site does not contain suitable habitat for any listed threatened species or community and is unlikely to have a significant impact on any threatened species or community (refer Section 6.7).
Waste Avoidance and Resource Recovery Act 2001 (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site specific Waste Management Plan would be prepared and implemented during construction as part of the CEMP.
Water Management Act 2000 (NSW)	The Proposal would not involve any water use, water management works, drainage or flood works or aquifer interference. The Proposal would involve work on waterfront land and would therefore comprise a controlled activity. TfNSW is the proponent and determining authority for the Proposal. Subject to Clause 38 of the *Water Management (General) Regulation 2011* a public authority is exempt in relation to all controlled activities that it carries out in, on or under waterfront land (i.e. section 91E (1) of the Water Management Act).

4.3. State Environmental Planning Policies

4.3.1. State Environmental Planning Policy (Infrastructure) 2007

Permissibility

The Infrastructure SEPP is the key environmental planning instrument which determines the permissibility of the Proposal.

Clause 94 (1) of the Infrastructure SEPP allows for the development of 'a road or road infrastructure facilities' by or on behalf of a public authority without consent on any land. Clause 93 defines 'road infrastructure facilities' as including:

> *"(a) tunnels, ventilation shafts, emergency accessways, vehicle or pedestrian bridges, causeways, road-ferries, retaining walls, toll plazas, toll booths, security systems, bus lanes, transit lanes, transitways, transitway stations, rest areas and road related areas (within the meaning of the Road Transport (General) Act 2005), and*
>
> *(a1) associated public transport facilities for roads used to convey passengers by means of regular bus services within the meaning of the Passenger Transport Act 1990, and*
>
> *(a2) bus layovers that are integrated or associated with roads (whether or not the roads are used to convey passengers by means of regular bus services within the meaning of the Passenger Transport Act 1990), and*
>
> *(b) traffic control facilities (as defined by the Transport Administration Act 1988), RTA road safety training facilities and safety works."*

Clause 5 defines 'associated public transport facilities' as including:

> *"(a) car parks intended for use by commuters,*
>
> *(b) public transport interchanges (being locations intended for use by commuters to transfer between and to different kinds of public transport such as buses, trains and ferries),*
>
> *(c) bus bays (being locations that are set aside for buses to stop or park for the purpose of picking up and setting down passengers),*
>
> *(d) bus layovers."*

The Proposal falls within the definition of 'road or road infrastructure facilities' and 'associated public transport facilities' and is therefore permissible without development consent and can be assessed under Part 5 of the EP&A Act.

Consultation Requirements

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 in accordance with the requirements of the Infrastructure SEPP.

The Infrastructure SEPP prevails over all other environmental planning instruments except where *State Environmental Planning Policy (Major Development) 2005*, *State Environmental Planning Policy No 14 – Coastal Wetlands* or *State Environmental Planning Policy No 26 – Littoral Rainforest* applies. The Proposal is not located on land to which these SEPPs apply therefore do not require further consideration as part this REF.

4.3.2. State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) provides development by or on behalf a public authority for the purposes listed in the schedules of the SRD SEPP. State significant infrastructure would require approval from the Minister of Planning under 5.1 of the EP&A Act.

The Proposal does not trigger the State Significant Infrastructure provisions of the SRD SEPP. In addition the Proposal is not listed as State Significant Development under the SEPP.

4.3.3. State Environmental Planning Policy No. 71 - Coastal Protection

SEPP 71 aims to ensure that development in the NSW coastal zone is appropriate and suitably located; that there is a consistent and strategic approach to coastal planning and management; and there is a clear development assessment framework for the coastal zone.

Approval under this SEPP is not required as the Proposal area is not within the coastal zone.

4.3.4. State Environmental Planning Policy 55 – Remediation of Land

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

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

4.4. Local environmental planning instrument and development controls

The Proposal is located within the Northern Beaches LGA (formerly Pittwater LGA). The provisions of the Infrastructure SEPP mean that Local Environmental Plans (LEPs), prepared by councils for an LGA, do not apply. However, during the preparation of this REF, the provisions of the *Pittwater Local Environmental Plan 2014* (Pittwater LEP) and associated strategic plans were considered.

4.4.1. Pittwater Local Environmental Plan 2014

The Pittwater LEP is the governing plan for the LGA including Mona Vale. The Proposal would be undertaken on land zoned RE1 Public Recreation, SP2 Infrastructure and B4 Mixed use.

Figure 16 shows the relevant section of the zoning map from the Pittwater LEP, with the indicative location of the Proposal.

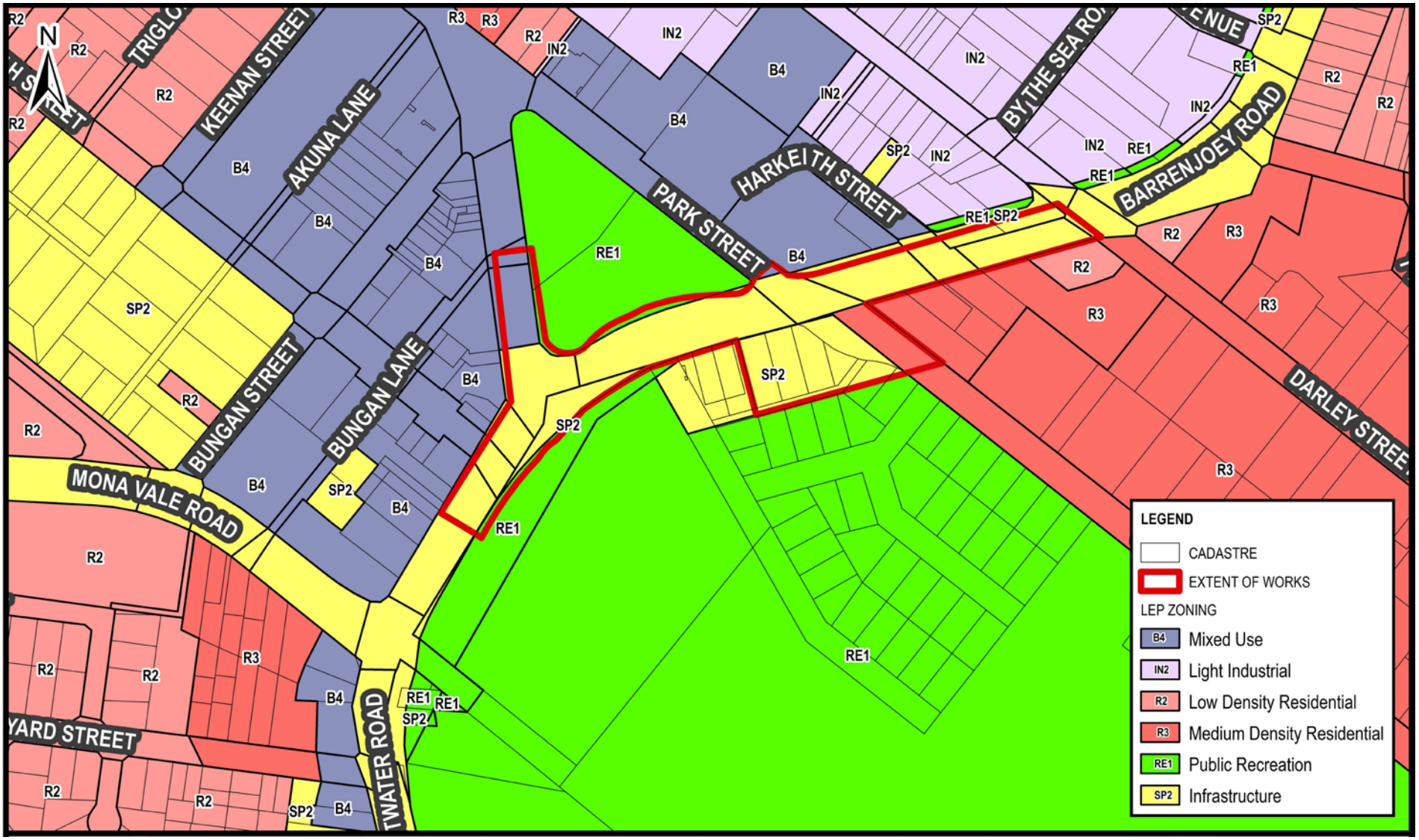

Figure 16 Pittwater LEP zoning map

Table 4 lists the objectives that apply to each zone, and summarises the consistency of the proposal with these objectives.

The zone provisions provide that the proposal would be permitted with consent or would be prohibited, depending on the zone. Clause 5.12 of the LEP states that '…this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under State Environmental Planning Policy (Infrastructure) 2007'.

As the proposal is permitted without consent under the Infrastructure SEPP (refer to Section 4.3.1), the consent requirements of the LEP do not apply.

Table 4 LEP zone objectives

Zone objectives	Consistency with Proposal
RE 1 (Public Recreation)	
To enable land to be used for public open space or recreational purposes.	The northbound bus indent would encroach into Village Park. The Proposal has been designed to minimise impacts to Beeby Reserve, Village Park and Kitchener Park. The area would continue to cater for existing community facilities.
To provide a range of recreational settings and activities and compatible land uses	The Proposal is compatible with adjacent land uses. The Proposal encourages those living in the surrounding residential areas to walk, cycle or drive to use public transport. When not in use by commuters (e.g. evenings, weekends) the car park would provide parking for those using Kitchener Park, community and sporting facilities.
To protect and enhance the natural environment for recreational purposes	The Proposal involves the removal of approximately 33 trees / shrubs, and encroaches onto public recreational space. However vegetation offsets would be provided in accordance with the *Vegetation Offset Guide* (TfNSW, 2013d). The Proposal has been designed to minimise impacts to Kitchener Park, Beeby Reserve, Village Park and the Great War Memorial.
To allow development that does not substantially diminish public use of, or access to, public open space resources.	The Proposal would not substantially diminish public use or access to public space.
To provide passive and active public open space resources, and ancillary development, to meet the needs of the community.	The Proposal would provide additional commuter car parking to support the needs of the community. When not in use by commuters (e.g. evenings, weekends) the car park would provide parking for those using Kitchener Park, community and sporting facilities.

Zone objectives	Consistency with Proposal
SP2 Infrastructure	
To provide for infrastructure and related uses.	The Proposal would provide new road related infrastructure, such as the proposed B-Line stops, intersection improvements and turning lane extensions.
To prevent development that is not compatible with or that may detract from the provision of infrastructure.	The Proposal is compatible with surrounding land uses, and would encourage commuters to use current and proposed public transport services (including B-Line and local buses).
B4 Mixed Use	
To provide a mixture of compatible land uses.	The proposal involves the upgrade of existing infrastructure consistent with the existing land uses, and is consistent with the objectives of this zone.
To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.	The Proposal would encourage commuters to use current and proposed public transport services (B-Line). The Proposal would provide additional commuter parking and bicycle facilities in close proximity to the B-Line stops.
To strengthen the role of Mona Vale as a centre of employment in Pittwater.	The Proposal would provide additional commuter car parking to support the needs of the community. The Proposal supports the improvement of public transport connections to and from Mona Vale via the B-Line service.
To provide healthy, attractive, vibrant and safe mixed use areas.	The proposal involves the upgrade of existing infrastructure consistent with the existing land uses, and is consistent with the objectives of this zone.
To provide an active day and evening economy.	The Proposal would deliver a high quality bus stop precinct for people who live in, work or visit Mona Vale. The Proposal supports the improvement of public transport connections to and from Mona Vale via the B-Line service, including regular services every 10 minutes up to 11pm and every 15 minutes between 11pm and 12.30am every day.
To provide for residential uses above ground level, where they are compatible with the characteristics and uses of the site and its surroundings.	This objective is not applicable to the Proposal.
To encourage retail vitality and provide a high level of amenity for pedestrians and cyclists.	The Proposal provides infrastructure to support surrounding retail and businesses, would improve pedestrian and cycle facilities within the Proposal area and provides new bicycle parking near the southbound B-Line stop. The Proposal would deliver a high quality bus stop precinct for people who live in, work or visit Mona Vale.

4.4.2. Local strategies and plans

A number of local plans and studies within the Northern Beaches (formerly Pittwater) LGA are relevant to the Proposal. These are briefly outlined in Table 5.

Table 5 Additional local plans/strategies

Plan/Strategy	Comment
Kitchener Park Mona Vale Plan of Management and Masterplan	
The aim of the Plan sets out a vision for the future of Kitchener Park as an important regional recreation precinct by creating a more defined sense of place and upgrading public recreational facilities, building a new regional skate park and by improving public access, circulation and parking.	The Proposal is located within the Plan of Management boundary and within Precincts 1, 2 and 3. The Proposal is consistent with the principles for the precincts and has been designed to avoid impacts to the park through the implementation of mitigation measures in Section 7.2.
Draft Imagine Mona Vale - Mona Vale Place Plan, September 2016	
The Plan summarises ideas generated for the Mona Vale Town Centre following community and stakeholder consultation and includes artist's impressions such as Figure 17.	The Proposal forms part of the bus service and infrastructure improvements to deliver the new B-Line service, which is noted in the Place Plan. The Proposal would assist in reducing bus travel times, reduce car reliance and connect higher density areas with other modes of transport.

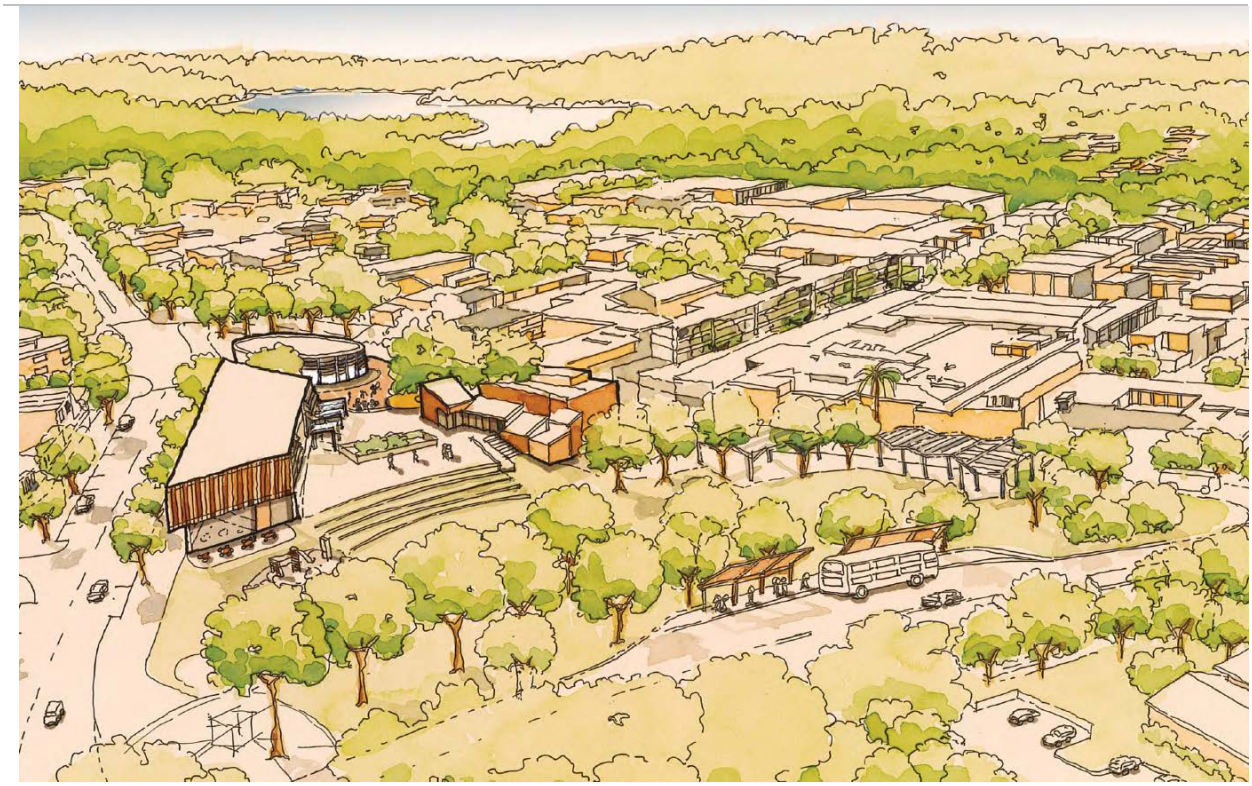

Figure 17 Artist's impression of the future Mona Vale showing Village Park and the northbound bus indent (Source: Draft Imagine Mona Vale Place Plan)

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

The principles of ESD have been adopted by TfNSW throughout the development and assessment of the Proposal. Section 3.1.4 summarises how ESD would be incorporated in the design development of the Proposal. Section 6.12 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, including the consultation strategy adopted for the Proposal and the results of consultation with the community, relevant government agencies and stakeholders.

5.1. Consultation strategy

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

The objectives of the consultation strategy are to:

- provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- raise awareness of the various components of the Proposal and 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 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.

5.2. Consultation during concept design

5.2.1. Engagement activities and tools

Table 6 lists the key engagement activities and tools; outlines their purpose; and describes how each tool/activity has already been used to engage the community and stakeholders.

Table 6 Key community and stakeholder engagement tools and activities

Engagement activity	Purpose and activity
Contact mechanisms	A Project Infoline number (1800 048 751) and email address (projects@transport.nsw.gov.au) was established at the commencement of the Program to enable all stakeholders to provide feedback to the project team. The dedicated website (see below) also includes an engagement portal, which was launched on 9 November 2015, and allows stakeholders to post questions and vote on elements of the project that are important to them. The feedback has been considered during the REF.
Consultation database	A database was established to manage contacts and information received. Since the preferred option for Mona Vale was announced, contact with around 50 stakeholders has been recorded in the stakeholder database relating to the Proposal.
B-Line Program website	Information about the Proposal has been available on the B-Line website (www.b-line.transport.nsw.gov.au) since 25 November 2015. The website was used to advertise the community information sessions. A feedback form was also placed on the website to collect feedback for consideration in the REF. Since the project website was launched, contact with stakeholders relating to the Proposal has also been recorded on the website.
Community newsletter	In November 2015, the first Northern Beaches B-Line Program newsletter was prepared, uploaded to the website and promoted via advertising in the Manly Daily and Mosman Daily. In May 2016, the first community newsletter outlining the preferred options for Mona Vale Commuter Car Park and B-Line stops was prepared and distributed. The newsletter outlined the Proposal and its benefits; explained the next steps; advertised the contact mechanisms and detailed the upcoming engagement activities (including one drop-in community information session). This newsletter was distributed to approximately 6,500 households within an approximate 500 metre radius of the study area.
Stakeholder meetings/briefings	Numerous meetings were held with the former Pittwater Council and Shore Regional Organisation of Councils to develop and discuss options TfNSW considered for the Mona Vale Commuter Car Park and B-Line stops. Regular meetings with Northern Beaches Council are ongoing. Regular meetings have been held with representatives from Girl Guides, Scouts and the Tennis Club to discuss the Proposal.
Community information sessions	One staffed community information session was held to provide opportunities for stakeholders to discuss the preferred options with the project team and ask questions about the proposal. The session was held on Tuesday 31 May at the Kitchener Park Sports Centre Hall from 6pm to 8pm. Issues raised during the evening were noted. Community information sessions will also be held during public display of the REF.

Engagement activity	Purpose and activity
Advertisements	Advertisements were placed in the Manly Daily prior to the community information session. The advertisement notified the community about the proposal and invited people to attend the community information sessions. It included the dates and details of the sessions. Advertisements were also placed in the Manly Daily prior to the display of the REF. The advertisements notified the community of the distribution of a second newsletter, the completion of the REF and display dates and community information session details.

5.2.2. Consultation with government agencies

During preparation of the REF various meetings were held with the then Pittwater Council and Northern Beaches Council to discuss and develop components of the Proposal. A summary of issues raised during these meetings have been detailed below:

- the Proposal's integration with Council's plans for Mona Vale
- replacement of existing community facilities (no longer proposed)
- car park entry and exit arrangements
- how the Proposal would relate to the existing car park
- location of commuter parking spaces and time restricted parking spaces
- method for determining parking demand
- operation and maintenance of the proposed car park
- minimising impacts on current users during construction
- urban design elements, lighting and security
- minimising impacts on flora and fauna
- location of B-Line bus stops
- active transport links being delivered as part of the Northern Beaches B-Line Program and associated with the Proposal
- existing active transport link and potential impacts of the Proposal.

5.2.3. Summary of issues and concerns identified

Initial consultation with the community between December 2015 and May 2016 identified a number of key issues for the community. The top issues for the community were:

- access to the B-Line from north of Mona Vale
- location of the car park
- impacts on existing park
- rebuilding of community facilities
- impact on existing car park users including shoppers and users of Kitchener Park and community facilities
- car park capacity for commuters and recreational users
- safety issues associated with the operation of the car park

- active transport links to local cycle facilities and B-Line bus stops
- impacts on neighbouring properties
- distribution of project information
- the B-Line service and its relationship with local services.

Table 7 provides a summary of the issues and concerns raised by the community and other stakeholders and a summary of how and where these are addressed in the REF.

Table 7 Summary of issues

Category/Issue	REF reference/comment
Proposal need and alternatives • Alternate options • Development process • Location of the car park • Capacity of the car park • B-Line and local services	A total of fifteen commuter car park options in Beeby Reserve and Village Park were assessed against a range of criteria including operational efficiency, accessibility, constructability, environmental impact, community and stakeholder benefit and visual impact. Option 12 was initially preferred and presented to the community. After further community feedback the options were re-evaluated and the Proposal was identified as the preferred option. The Proposal provides 74 commuter spaces, minimises impact on community facilities and provides flexibility to respond to the findings of investigation into future parking demand. The preferred bus stop locations on Barrenjoey Road near Village Park (northbound) and Kitchener Park (southbound) were chosen as they maximise the opportunity to link to the retail and civic heart of Mona Vale Town Centre, can integrate with Village Park and allow sufficient space for circulation and queueing around bus stops. The stop location also facilitates easy transfer between local bus services and the B-Line services. Refer to Sections 1.4, 2.3, 2.4 and 2.5 for further detail.
Noise and vibration • Impacts on neighbouring properties • Noise and vibration during construction • Noise during operation • Construction hours	Mitigation measures would be implemented to minimise construction noise impacts. Surrounding residents, commercial and private recreational users and stakeholders from local community groups based in the area are to be notified. Where feasible Proposal works would be undertaken during standard construction hours. Out of hours works may be required in some cases to minimise disruptions to pedestrians, motorists and nearby sensitive receivers. Approval from TfNSW would be required for any out of hours work. Construction vibration is not anticipated to impact on surrounding receivers. Operational noise impacts are not anticipated. Refer to Section 6.3 for further detail.

Category/Issue	REF reference/comment
Proposal description and design • Urban design • Suggested additional design elements • Graffiti • Safety and security • Active transport connections	The Proposal has been designed to maximise efficiency, whilst minimising environmental impact. The design is subject to detailed design and Urban Design Plan (UDP) and Public Domain Plan (PDP) would be prepared in consultation with relevant stakeholders. Graffiti to be removed during construction in accordance with TfNSW's standard requirements. The Proposal has been designed in regard to Crime Prevention Through Environmental Design (CPTED) principles. As a conversion of an existing at grade car park additional security issues are not anticipated. The future operation and maintenance of the new car park is proposed to be managed by Northern Beaches Council. The responsibility for the ongoing maintenance of the bus stops is yet to be finalised. A range of cycling and walking links have been identified as part of the development phase of the B-Line Program. TfNSW will continue to work with Council to develop these links. Pedestrian and cycle links would be improved within the Proposal site. Refer to Section 3.1 for further detail.
Proposal information • Distribution of information	Various methods of information distribution have been used to notify and engage with stakeholders, as identified in Table 6. Future consultation activities are identified in Sections 5.4 and 5.5.
Community impacts • Impacts on community facilities	The community group facilities including the Scout Hall, Guide Hall and Tennis Clubhouse and courts would be retained and access would be maintained throughout construction. Community groups would experience some temporary noise, visual and parking impacts during construction. Consultation with the local Scouts, Girl Guides and Tennis Club is ongoing. Refer to Sections 3.2, 6.1, 6.2 and 6.3 for further detail.

5.3. 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.

Table 8 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.

Table 8 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 would include works that: • require connections or impacts the stormwater system • temporarily disrupt pedestrian and vehicle movements • impact on road pavements under Council's care and control • impact on Council-operated footpaths. Consultation with the former Pittwater Council has been undertaken and consultation with Northern Beaches Council would continue throughout the detailed design and construction phases.
Clause 14 Consultation with Councils – development with impacts on local heritage	Consultation required where the Proposal would: • substantially impact on local heritage item (if not also a State heritage item) • substantially impact on a heritage conservation area.	There would be no substantial impact to local heritage. The Proposal would involve minor works within the heritage curtilage of the Great War Memorial which would not impact the heritage significance of this item. Accordingly, consultation with Council is not required. Refer to Section 6.5 for further detail.
Clause 15 Consultation with Councils – development with impacts on flood liable land	Consultation required where the Proposal would: • impact on land that is susceptible to flooding – reference would be made to *Floodplain Development Manual: the management of flood liable land.* • change flood patterns other than to a minor extent.	The Proposal is located on land that is susceptible to flooding. By generally maintaining the levels of the existing car park it is anticipated that any change to flood storage or adverse impacts to existing flood behaviour would be negligible. Consultation with the former Pittwater Council has been undertaken and consultation with Northern Beaches Council and would continue throughout the detailed design and construction phases.

Clause	Clause particulars	Relevance to the Proposal
Clause 16 Consultation with public authorities other than Councils	Consultation is required for specified development. 'Specified development' is defined as the following with the relevant authority: • development adjacent to land reserved under the *National Parks and Wildlife Act 1974* – the Department of Environment and Climate Change • development adjacent to a marine park declared under the *Marine Parks Act 1997* – the Marine Parks Authority • development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994* – the Department of Environment and Climate Change • development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Act 1998* – the Sydney Harbour Foreshore Authority • development comprising a fixed or floating structure in or over navigable waters – the Maritime Authority of NSW.	The Proposal is not • adjacent to land reserved under the *National Parks and Wildlife Act 1974* • adjacent to a marine park declared under the *Marine Parks Act 1997* • adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994* • development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Act 1998* • development comprising a fixed or floating structure in or over navigable waters.

5.4. Consultation activities proposed during public display

The REF will be made publicly available for two weeks. During the display period, Government agencies, interested groups and organisations, and the community will be invited to make written submissions in response to the REF. Further community consultation would be undertaken during the public display period to enable the community to comment and ask questions about the proposal.

Planned consultation activities associated with public display will include:

- community information session at Mona Vale Memorial Hall on Tuesday 15 November 2016 4.30pm to 6.30pm
- community information unattended displays at Northern Beaches Council (Pittwater Office), Mona Vale Library and TfNSW Chatswood office
- meetings with stakeholders
- newspaper advertisement – public display notification
- community newsletter – advising of the upcoming public display
- letters to stakeholders who have previously provided feedback
- website information at www.b-line.transport.nsw.gov.au
- Project Infoline 1800 048 751.

5.5. Post display consultation

5.5.1. Submissions/Determination report

Should TfNSW determine to proceed with the Proposal, the Submission/Determination Report would be made available on the B-Line 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.

5.5.2. Construction phase

Should TfNSW proceed with the Proposal, consultation activities would continue prior to and during construction. The consultation activities would ensure that:

- the community and stakeholders have a high level of awareness of all processes and activities associated with the Proposal
- accurate and accessible information is made available
- a timely response is given to issues and concerns raised by the community
- feedback from the community is encouraged
- opportunities for input to the Proposal are provided.

The TfNSW information line and email address would continue to be available during the construction phase. Targeted consultation activities, such as letters, notifications, signage and verbal communications, would continue. The B-Line website would also include frequent updates on the progress of construction.

6. Environmental impact assessment

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

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

6.1. Traffic and transport

A Traffic Impact Assessment has been prepared for the Proposal (Arup, 2016). The findings of this assessment are provided below.

6.1.1. Existing environment

Road network and traffic conditions

The road network in the vicinity of the Proposal site is shown in Figure 3 (Section 1.3) and includes Pittwater Road, Barrenjoey Road, Park Street and Golf Avenue.

The main north-south corridor of the Northern Beaches B-Line Program is known as Barrenjoey Road, Pittwater Road and Condamine Street. Barrenjoey Road is a regional road with three to four lanes in each direction. Within the vicinity of the Proposal, Barrenjoey Road has a two-way average volume of 45,500 vehicles per day.

Pittwater Road is a State road southwest of the intersection with Barrenjoey Road. North of the intersection with Barrenjoey Road, Pittwater Road is a regional road servicing the Mona Vale centre and areas beyond to the north-west. Through the town centre it is generally configured with two traffic lanes in each direction and parking on both sides.

Park Street provides access to a range of retail spaces along the street with time restricted angled parking provisioned on either side of the road. Park Street is a local road and high pedestrian activity area zone with sign posted speed limits of 40 kilometres per hour.

Golf Avenue provides access to the Mona Vale Golf Club and to residential properties along the northern side of Golf Avenue. Golf Avenue is a local road with a peak hour volume of 110 vehicles per hour. The existing car park is accessed from Golf Avenue and this would form the main vehicular access to the expanded car park.

Access to the existing Beeby Reserve car park is via Golf Avenue (left-in and left-out). Access to the Kitchener Park car park south-west of the Proposal site is via Pittwater Road (left-in, left-out, segregated entry and exit).

The roads surrounding the Proposal have their busiest one hour period approximately between 8am and 9am in the morning (morning peak hour) and between 4pm and 5pm in the afternoon (evening peak hour).

Intersection performance

Modelling of the existing signalised intersection of Barrenjoey Road / Park Street / Golf Avenue was undertaken to determine the existing level of service. Based on the analysis, the intersection is performing efficiently during morning and afternoon peak periods. On weekends the intersection is operating near capacity.

Parking

The existing Beeby Reserve at-grade car park consists of 74 parking spaces with approximately half restricted (four hour) and half unrestricted spaces. Kitchener Park car park has unrestricted parking spaces. The majority of the existing off-street parking spaces along Barrenjoey Road are unrestricted, providing park and ride facilities for commuters. Some of the spaces have time restrictions for casual users of the adjacent facilities such as the tennis courts. The existing on-street and off-street car parks in the area are currently used by commuters, visitors to recreational facilities and customers to nearby shops and facilities.

Within the vicinity of the Proposal, Pittwater Road and Park Street have time restricted parking, mostly providing parking for customers to the retail shops. Golf Avenue has unrestricted parking spaces on both sides of the road. These spaces are likely utilised by residents, commuters and users of Mona Vale Golf Course.

Unrestricted and off-street (restricted and unrestricted) parking locations and the approximate number of spaces are shown in Figure 18. There are around 204 off-street parking spaces in the area south of Barrenjoey and Pittwater Road shown on the figure (including Beeby Reserve).

Figure 18 Existing parking spaces in the vicinity of the Proposal (Arup, 2016)

Bus services

The existing site is served by bus stops on the east and west sides of Pittwater Road. Seventeen routes operate from the stops on the eastern side of Pittwater Road. Fifteen operate southbound (151,155, 156, 184, 187, 190, E84, E86, E87, E88, E89, L60, L84, L87, L90) with buses departing approximately every two to three minutes in the morning peak. Two operate west (196, 197) with buses departing approximately every 10 to 15 minutes in the morning peak. In the off-peak three routes operate south (155, 156, L90) and one route west (197) services operate approximately every 15 minutes southbound and hourly westbound.

Twenty routes operate to the northbound stop on Pittwater Road. Nine routes terminate (151, 182, 184, 185, 196, 197, E84, L60, L84). Eight routes operate north (188, 189, E87, E88, E88, L87, L88, L90) and in the morning peak buses operate approximately every 15 minutes. Three routes operate west (155, 156, E86) and in the morning peak buses operate

approximately every hour. In the off-peak two routes operate north (L88, L90) and two routes operate west (155, 156). Services operate approximately every 15 minutes northbound and every 30 minutes westbound.

Existing bus stop locations within the vicinity of the Proposal site are shown in Figure 19.

Figure 19 Existing bus stop locations (Arup, 2016)

Pedestrian accessibility

The following signalised pedestrian crossings provide access to pedestrians on either side of Barrenjoey Road:

- intersection at Barrenjoey Road / Park Street provides signalised pedestrian crossing links on the north, east and west approaches
- intersection at Pittwater Road / Barrenjoey Road provides signalised pedestrian crossings on the north and east approaches.

Cycling facilities

No dedicated cycleway is provided to or within the Proposal site. Bus lanes on Barrenjoey Road provide segregation from traffic and are used by cyclists.

6.1.2. Potential impacts

a) Construction phase

Construction activities would result in the following temporary impacts during construction:

- temporary localised closures of Beeby Reserve car park for conversion of parking and signage installation
- localised changes to traffic conditions and lane closures to support road works on Pittwater Road, Barrenjoey Road, Park Street and Golf Avenue. These closures would be coordinated with RMS and undertaken at times that minimise the impact to road users and existing bus services. The works would be staged to progress from west to

east, introducing the new lane configuration as the works progress and limiting the period of temporary lane alignments

- access to community facilities would be maintained throughout the duration of the construction and may require temporary pathways during certain construction phases
- minor increase in traffic, including heavy vehicles due to construction traffic.

Road works would be undertaken progressively and in the minimum area required to undertake the activity. Signage would be displayed around work areas to inform the public of any diversions.

Access to the community facilities (including the Tennis Clubhouse, Girl Guide Hall and Scout Hall) would be maintained throughout the duration of the construction.

The Proposal would be constructed in five phases to minimise the impact of works on the local community and commuters. This phasing is indicative based on the current preliminary design and may change depending on the detailed design methodology, the Contractor's preferred methodology, program and sequencing of the work. Refer to Section 3.2 for the indicative construction timing and staging.

Construction phasing impacts

Construction Phase 1 (duration: approximately six weeks)

Phase 1 works would require temporary closure of the informal car park on the corner of Golf Avenue and Barrenjoey Road. This would continue throughout the works.

Pedestrian access along Barrenjoey Road and at crossings would not be impacted. Pedestrian access to the Scout Hall, Girl Guide Hall and the Tennis Clubhouse would be maintained.

Bus services (southbound and northbound) and local traffic would operate as usual.

Construction Phase 2 (duration: approximately six months)

Phase 2 consists of utility protection / relocation and road works. This would require temporary changes to traffic conditions, with the works phased to progress across the road from west to east to minimise traffic disruptions. Initial closures of the western (northbound lane) would be required to construct the Barrenjoey Road / Pittwater Road intersection. Following this the northbound bus indent would be constructed with limited impacts on existing road conditions.

Then works would move to the median with adjacent lane closures required to construct the right-turn extensions and adjustments to the Barrenjoey Road / Park Street / Golf Avenue intersection.

All of these partial road closures would be outside of road peak periods. These works may need to be undertaken at night to minimise traffic impacts and due to the limited working hours permitted during the day (outside peak hours).

Bus services and local traffic would operate would operate as usual, with the exception of lane closures of Barrenjoey Road where necessary for minor road works.

Construction Phase 3 (duration: approximately two months)

Phase 3 involves road works, landscaping, construction and fit out of new B-Line stops and removal of temporary hoardings and site offices.

Lane closures would be required to undertake the southbound B-Line stop works during this time and the southbound bus stop would temporarily relocated. Bus services and local traffic would operate as usual. Northbound buses would not be affected.

Construction traffic and deliveries

There would be approximately 15 movements of heavy vehicles per day associated with construction activities during the peak construction phase, namely Phase 2. During Phases 1 and 3 the volume of truck movements would be expected to be around 10 per day.

Throughout all phases, deliveries and movements of construction vehicles would be planned to minimise impacts. Access and egress would be via Pittwater Road and Barrenjoey Road direct to the works location or via Golf Avenue to access the site compound. Deliveries and access to the site compound would be undertaken outside peak hours where practicable to minimise impacts on pedestrians, buses and other traffic. Traffic controls would be in place where necessary.

Construction parking

Limited construction parking would be available within the Proposal site. Construction workers would be encouraged to car pool or use public transport to access the site to minimise the need for construction parking. Approximately ten private vehicles per day are anticipated in addition to the construction traffic and deliveries identified above.

b) Operational phase

One of the key objectives of the proposal is to improve the availability of commuter car parking spaces and provide improved bus facilities for customers at Mona Vale.

The Proposal would provide 74 unrestricted car parking spaces (including two accessible spaces) within Beeby Reserve, new B-line stops and pedestrian and vehicular access improvements as described in the sections below.

Pedestrian and vehicular access

Car park access and layout

Vehicles would access the project using the existing entrance off Golf Avenue. Left and right turns would be maintained into and out of the car park from Golf Avenue. Given the existing low traffic volumes along Golf Avenue, the Proposal is not expected to result in major conflicts with existing surrounding traffic, however four parking spaces on Golf Avenue would be removed to facilitate passing of cars turning right into the car park.

Pedestrian access

The Proposal would improve pedestrian safety by providing new signalised pedestrian crossings across Golf Avenue and a pedestrian fence on the Barrenjoey Road median between Pittwater Road and Darley Street.

The Proposal would also provide new bicycle parking adjacent to the southbound B-Line stop and improvements to bicycle and pedestrian links.

Bus facilities

The following changes to existing bus operations would be provided to increase travel efficiencies along the bus corridor:

- provision of new southbound and northbound B-Line stops with weather protection, seating and real-time information
- removal of two local bus stops (northbound and southbound) currently located on Barrenjoey Road north of Park Street / Golf Avenue and co-location with the new B-Line stops. The proximity of the stops to the new B-Line stops makes their retention unnecessary
- provision of a bus indent in Village Park to support the northbound bus stop

- relocation of the northbound bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane.

Predicted traffic distribution

No additional parking spaces would be constructed under the Proposal, but Beeby Reserve parking spaces would be converted to unrestricted commuter car parking. Approximately half of the existing spaces are time restricted, and it is anticipated that the usage patterns of those car spaces would change.

Traffic surveys of the Warriewood commuter car park were carried out in October 2015 during morning and evening peaks. Peak movements for commuters were observed on weekday mornings between 6.30-7.30am, weekday evenings between 5.30-6.30pm and weekends between 11.30am-12.30pm. It is likely these patterns would be replicated at Mona Vale, which is around two kilometres north of Warriewood and serviced by substantially similar bus services.

Given the small scale of the change relative to the existing traffic movements, operational traffic impacts would be negligible. Accordingly a detailed traffic impact assessment of movements during operation is not required.

Road network impacts

Intersection performance

A Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) analysis, with RMS approved software, was used to assess the performance of the Barrenjoey Road / Park Street / Golf Avenue intersection.

Modelling indicates that the existing intersection is performing efficiently during the AM (level of service C), PM (level of service C) and weekend (level of service D) peak periods.

Modelling identified that the performance of the intersection would improve from existing levels during the AM and weekend peak periods with a moderate reduction in the average delay once the Proposal is operational. The evening peak scenario would remain unchanged from the existing condition, at a level of service C. The roads surrounding the project have AM and PM peak hours between 8:00am-9:00am and 4:00pm-5:00pm respectively, and the weekend peak is 12:00pm-1:00pm.

Table 9 Barrenjoey Road / Park Street / Golf Avenue existing and Proposal

Peak scenario	LoS	AVD (seconds)	Degree of Saturation	Northbound right-turn bay queue	Southbound right-turn bay queue
AM Existing	C	30	0.932	34 m	169 m
AM with Proposal	B	27	0.860	34 m	128 m
PM Existing	C	37	0.980	23 m	147 m
PM with Proposal	C	36	0.980	23 m	147 m
Weekend Existing	D	55	0.994	26 m	221 m
Weekend with Proposal	D	48	0.939	26 m	144 m

*Note: Refers to northbound right-turn bay into Golf Avenue

#Note: Refers to southbound right-turn bay into Park Street

The model does not take into consideration the northbound bus indent which would improve bus pickup and drop-off efficiencies and reduce delays for northbound through traffic along Barrenjoey Road.

Parking impacts

The Proposal would provide additional off-street commuter car parking with the conversion of 74 parking spaces (including two accessible spaces) within Beeby Reserve to unrestricted commuter car parking. Around half are currently time restricted parks which may be used by visitors to community facilities and customers to nearby shops and facilities. During the evenings and weekends, fewer commuters are anticipated to use the commuter car park and those spaces would be available for other users.

Changes to existing on-street parking arrangements are proposed to support the delivery of the Proposal.

To enable eastbound traffic on Golf Avenue to pass vehicles turning right into the car park four on-street parking spaces would be removed. The removal of these spaces is not considered significant as numerous other on-street and off-street parking spaces exist close by as outlined in Section 6.1.1.

To facilitate the relocation of the northbound bus stop from the corner of Pittwater Road / Waratah Street to Pittwater Road south of Bungan Lane four on-street parking spaces would be removed for the new bus zone. The spaces to be removed are not adjacent to active commercial uses. Other parking spaces close by include on-street parking on Pittwater Road and Park Street, and off-street parking spaces at Bungan Lane car park and off Park Street.

6.1.3. Mitigation measures

The following mitigation measures are proposed to manage traffic, transport and access impacts:

- prior to the commencement of works, a Construction Traffic Management Plan (CTMP) would be prepared in consultation with Council and RMS. Specifically the CTMP would address the following aspects:
  - traffic management, including access and egress
  - pedestrian and bicycle management arrangements to be implemented where affected by construction activities (including way finding signage and fencing)
  - construction traffic routes and turning movements of heavy vehicles
  - loading/delivery zones including queuing
  - parking arrangements for construction staff, and management of any changes to existing parking
  - an Emergency Response Plan
  - temporary bus stop arrangement (if required)
- heavy vehicles would be restricted to specified routes, with the aim of minimising impacts on local roads, high pedestrian areas and school zones. Where feasible, route markers would be installed for heavy vehicles along designated routes
- the queuing and idling of construction vehicles in residential streets would be minimised through the staging of deliveries which would be timed to avoid early mornings, peak hours, and peak usage of the adjacent community facilities where practicable
- ongoing consultation would be undertaken with transport service providers including, buses and taxis to ensure any service disruptions are managed and minimised

- communication would be provided to the community and local residents to inform them of impacts to traffic, changes to bus services and anticipated effects on the local road network relating to site works
- should road or pedestrian access closures be required, signage would be erected to clearly delineate alternative access
- pedestrian access to and from the bus stops would be maintained at all times during construction, where practicable
- road occupancy licences for temporary closure of roads would be obtained, where required.

6.2. Urban design, landscape and visual amenity

This section provides a summary of the Visual Impact Assessment (VIA) prepared by RPS, 2016. The assessment was prepared in accordance with the *Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment* (RMS, 2013). The report defines several landscape character zones and assesses the potential landscape character and visual impacts of the proposal. The assessment is based on the sensitivity of a view and the magnitude of the proposal in that view. Sensitivity and magnitude are combined to give a visual impact rating of high, moderate, low or negligible.

6.2.1. Existing environment

The Proposal is located along Barrenjoey Road between Pittwater Road to the west and Darley Street to the east, into Beeby Reserve and Kitchener Park to the south and Village Park to the north. Areas immediately surrounding the site of works contain a diverse range of land uses including residential areas to the east of Golf Avenue, commercial and light industrial to the north and west, civic and recreational uses to the north and recreational (sporting) uses as part of the Mona Vale Golf Course and Kitchener Park to the south.

There is a diversity of built form in the surrounding areas. To the north, east and west built form is predominantly low rise commercial development (in the form of shops and offices). This area exhibits typical qualities of such development: a mixture of building widths, zero building setbacks, extensive signage and external marketing.

To the south, built form and is punctuated by a number of uses, including the Pittwater RSL Football Club building, Mona Vale Tennis Club, Scout and Guide Halls. The Scout Hall, Guide Hall and Tennis Clubhouse buildings immediately south of the Proposal area are one storey structures of block or brick construction. The Scout Hall and Girl Guide Hall building wall facades are brightly painted with murals and graffiti art.

The wider surrounding local area could generally be described as typical suburban development, comprising a range of residential densities (although predominantly low density) interspersed with clusters of commercial, civic, industrial, and recreational facilities.

Existing vegetation surrounding the Proposal site partially or wholly screens views from the surrounding areas. The vegetation is highly fragmented and consists of sparse native and exotic vegetation.

Landscape character zones

The study area, within which the Proposal site is located, transitions through a number of recognisable landscape character zones (LCZs) which are described in Table 10 and shown in Figure 20.

Table 10 Landscape character zones

Landscape character zone	Description	Sensitivity
1 – Pittwater Road Shops	The LCZ comprises the commercial centre to the west of the Proposal site and typically consists of one and two storey buildings with commercial development on the ground level and offices on the second level. Typical commercial uses include cafes and retail shops. Laneways, such as Bungan Lane, support street activity with additional shopping and parking. Vegetation through this LCZ is limited with minimal street verge plantings.	Low
2 – Civic Precinct	The LCZ is defined by civic uses including the former Pittwater Council Customer Service Centre, Mona Vale Library, Village Park and the Great War Memorial. Mature trees and ground level plantings are found throughout the zone framing the open, lawn areas in the park and along street edges. Landscaped berms along Barrenjoey Road also visually separate Village Park from the surrounding roads and areas. A looping path, stepped lawn amphitheatre and Great War Memorial also contribute to the civic character.	Moderate-low
3 – Mona Vale Village	The LCZ is defined by the commercial activities of the Mona Vale Hotel and Pittwater Place shopping centre along Park Street. Although views are oriented towards Park Street, there is lack of visual connection due to building setbacks, level change, vegetation and driveways. Park Street has a civic character which includes street tree row plantings, formal verge plantings, time restricted parking and pedestrian crossings. Areas to the north include retail, commercial and office uses.	Low
4 – Barrenjoey Road	Barrenjoey Road is a six lane main road. The topography and road alignment help create a strong visual connection with adjacent commercial activities to the north and west which generally serve to reinforce the urban character of the road and local area whilst visually disconnecting the road further east and south. Mature tree plantings on both sides of the road soften and frame the road edges, constraining views along the edges of the road corridor. Grassed landscaped berms soften the northern edge of the road and provide visual separation from Village Park.	Low
5 – Kitchener Park and Mona Vale Golf Course	The LCZ is characterised by large, open grassed areas, the sporting fields of Kitchener Park, Mona Vale Golf Course, the Tennis Clubhouse, tennis courts, the Scout Hall and Girl Guide Hall, Beeby Reserve and Kitchener Park car parks and associated access roads. Mature trees frame the perimeter of the area.	Low
6 – Golf Avenue	The LCZ lacks a predominant character and includes a row of two-storey, residential townhouses to the north and the Mona Vale Golf Course to the south. Vegetation in the LCZ is reasonably prominent with a number of large trees along the road and visible trees within the adjoining areas.	Low

Figure 20 Landscape character zones (RPS, 2016)

Viewpoints

Views towards the Proposal site are generally screened by existing landscape elements such as trees, vegetation and landscaped berms which limit the Proposal's visibility.

Visual receivers for the Proposal are expected to include residents, park users, golf course users and transient receivers (such as pedestrians, cyclists and motorists).

The following viewpoints were selected as representative of the range of views to the Proposal:

- Viewpoint 1 – Village Park – including pedestrians, cyclists, tourists and workers looking south. Viewing distances range from approximately 10 to 100 metres.
- Viewpoint 2 – Barrenjoey Road – including pedestrians, motorists and cyclists looking west. Viewing distances range from approximately 10 to 150 metres.
- Viewpoint 3 – Golf Avenue Residences – including receivers at properties on Golf Avenue near the intersection with Barrenjoey Road. Viewing distances range from approximately 50 to 100 metres looking west.

- Viewpoint 4 – Barrenjoey Road (north of Park Street) – including pedestrians, motorists, cyclists and tourists looking west. Viewing distance is approximately 15 to 150 metres.
- Viewpoint 5 – Pittwater Road – including pedestrians, motorists cyclists and workers in adjacent shops looking east. Viewing distances range from approximately 30 to 200 metres.

The location of these viewpoints is shown on Figure 21.

Figure 21 Viewpoint location plan

6.2.2. Potential impacts

a) Construction phase

Construction of the Proposal would result in changes to the landscape primarily through earthworks, removal of existing vegetation and site hoarding. The presence of a site office, amenities, construction vehicles, equipment, fencing, signage, material stockpiling and storage areas and night time lighting for security would also have a temporary visual effect. The majority of materials such as engineering fill, concrete and asphalt would be delivered to site as needed, requiring minimal storage of materials within the compound.

Some construction activities, such as night works, would require temporary lighting for operational, safety and security purposes. Any construction lighting would be positioned away from sensitive receivers. Generally, site lighting at night would be visually absorbed into the surrounding brightly lit environment, resulting in negligible visual impact during construction.

Upon completion of construction the temporary site compound, work areas and any stockpiles would be removed and the site would be cleared of all materials and rehabilitated.

Overall, the potential visual impacts of construction activities are considered to be minimal as the works would be temporary and short-term in nature (with the exception of tree removal which is assessed in the operational phase as it has medium-term impacts). Proposed mitigation strategies for visual impacts are discussed in Section 6.2.3.

b) Operational phase

Landscape character impact

A summary of the landscape character impact is provided in Table 11.

The impacts on landscape character zones 1, 3, 5 and 6 are expected to be of negligible to low significance as the landscape character zones are not particularly sensitive to change and the magnitude of change is expected to be negligible or low.

Impacts on landscape character zones 2 and 4 are expected to be of moderate to low significance primarily due to the proposed vegetation removal.

Table 11 Summary of impacts on landscape character zones

Landscape character zone (LCZ)	Sensitivity	Magnitude	Significance of impact rating
1 – Pittwater Road Shops	Low	Negligible	Negligible
2 – Civic Precinct	Moderate	Moderate-low	Moderate
3 – Mona Vale Village	Low	Negligible	Negligible
4 – Barrenjoey Road	Low	Moderate-low	Moderate-low
5 – Kitchener Park and Mona Vale Golf Course	Low	Negligible	Negligible
6 – Golf Avenue	Low	Low	Low

Visual impact assessment

Table 12 provides the assessment of visual impacts associated with the Proposal from the representative viewpoints. Potential impacts to viewpoints are also illustrated in Figure 22 to Figure 27.

Table 12 Visual impact assessment

Receiver viewpoint	Description of existing view	Receiver Sensitivity	Description of visual impact	Magnitude of visual impact	Visual impact rating
1	Existing views consist of Village Park, surrounding vegetation, grass terraces and Council buildings to the north. Views of Barrenjoey Road are filtered by landscaped berms and existing mature trees along the southern edge of the park. Landscaping around the eastern and western perimeters also provides visual separation between the park and the surrounding areas.	Moderate	The removal of landscaped berms and trees at the southern edge of Village Park would open views of the road corridor and areas to the south (refer to Figure 22). A relatively substantial amount of the landscaped berms and trees would be removed opening views for the mostly transient park users.	Moderate	Moderate
2	Visual receivers are at a slightly higher level relative to a majority of the Proposal thereby allowing increased views of the surrounding areas. Views are primarily of the open and urban Barrenjoey Road corridor with filtered views of the Scout Hall building to the south. There are filtered views of Village Park to the north across the road corridor through the landscaped berms and mature trees on the northern edge of the road corridor.	Low	The most visible elements of the Proposal would be the new bus shelter and bus indent along the northern verge of Barrenjoey Road. The view would include other ancillary urban components such as paving, seating, signage and road changes. The removal of the berm and trees along the northern edge of Barrenjoey Road would open up views to Village Park which may result in a positive or negative change to the visual amenity of the road depending on the visual receiver (refer to Figure 23 and Figure 24).	Moderate-low	Moderate-low
3	Existing views to the south-west consist of the informal car park in the foreground, Golf Avenue and the Beeby Reserve car park entry as well as potential views of Barrenjoey Road with partial views of low hills, trees and development further to the north-west.	Low	A loss of visual amenity may occur due to removal of the large gum tree at the Golf Avenue / Barrenjoey Road intersection. The surrounding tree canopy provides a large degree of visual absorption capacity for the removal of trees for the kerb and footpath works (refer to Figure 25).	Low	Low

Receiver viewpoint	Description of existing view	Receiver Sensitivity	Description of visual impact	Magnitude of visual impact	Visual impact rating
4	Existing views from the crest of the road allow open views of the road corridor which is framed by mature and semi-mature trees and low-level vegetation. Urban development, including commercial buildings, block views further west beyond around 500 metres.	Low	A loss of visual amenity may occur due to removal of the large gum tree at the Golf Avenue / Barrenjoey Road intersection, and trees along Village Park. Removal of the local bus shelters north of Golf Avenue and signage would change the foreground view (refer to Figure 26). Road works including median works and new pedestrian fencing would be consistent with the existing urban road environment.	Low	Low
5	Views include the six lane Barrenjoey Road corridor with a turning lane in the foreground. The road corridor curves and gently rises to a crest in the east and is framed by continuous existing mature tree canopies that filter and block views beyond the road corridor. The view includes signage, traffic islands, traffic and street lights and a median pedestrian fence. The Great War Memorial, framed by plantings, is prominent in the view at the intersection as well as a bus shelter and filtered views of roofs of the Tennis Clubhouse and Girl Guide Hall to the south-east.	Low	New bus shelters and ancillary urban components such as paving, seating and signage on both sides of the road corridor would be noticeable changes in the view. The proposed removal of the landscaped berms and vegetation on the northern verge of Barrenjoey Road would open views of Village Park (refer to Figure 27). The proposed upgrade of the Barrenjoey Road / Pittwater Road intersection would be noticeable, but would have a negligible visual impact on the existing view.	Moderate-low	Moderate-low

Figure 22 Viewpoint 1: View southeast over Village Park towards Barrenjoey Road

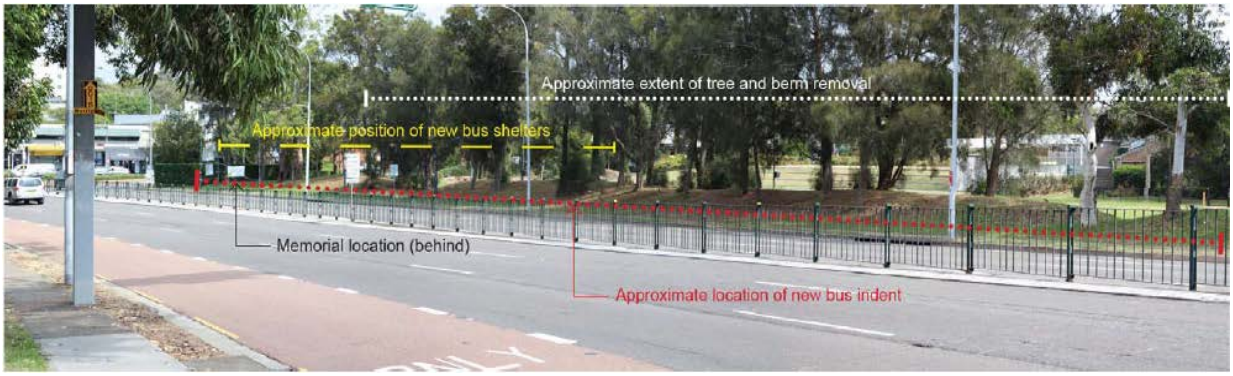

Figure 23 Viewpoint 2: View looking northwest along Barrenjoey Road

Figure 24 Viewpoint 2: View looking west along Barrenjoey Road

Figure 25 Viewpoint 3: View looking west from Golf Avenue

Note that tree removal is indicative only

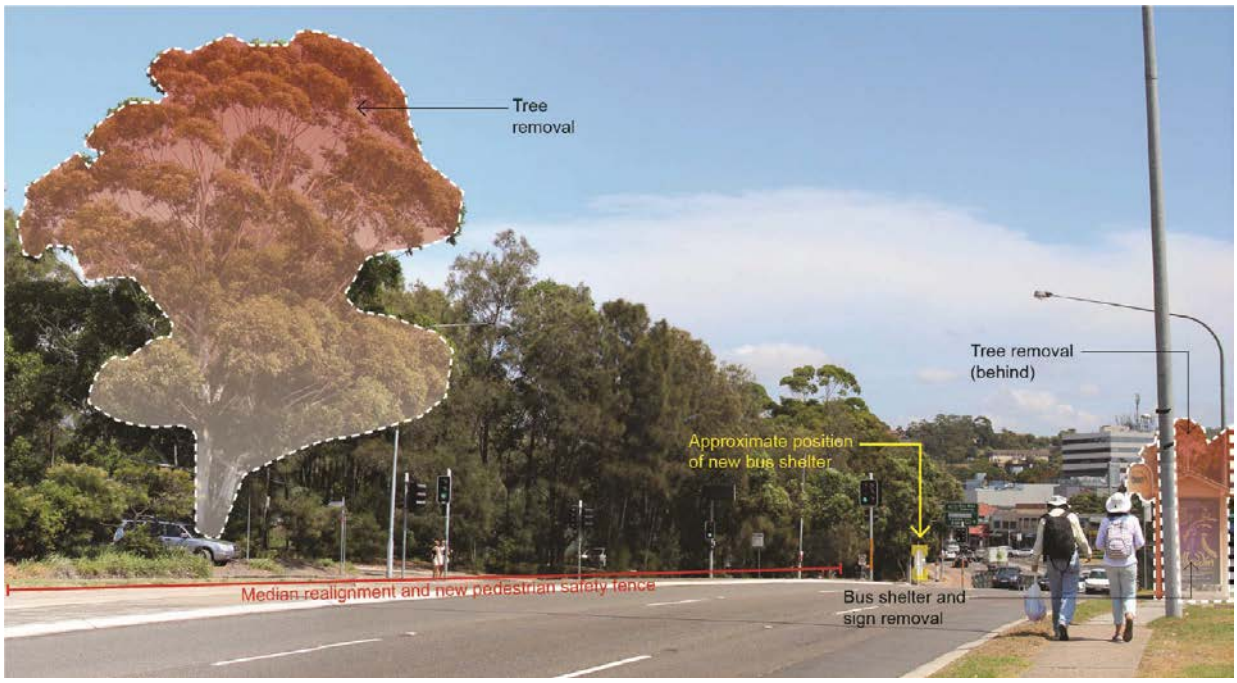

Figure 26 Viewpoint 4: View southwest from Barrenjoey Road near Park Street

Note that tree removal is indicative only

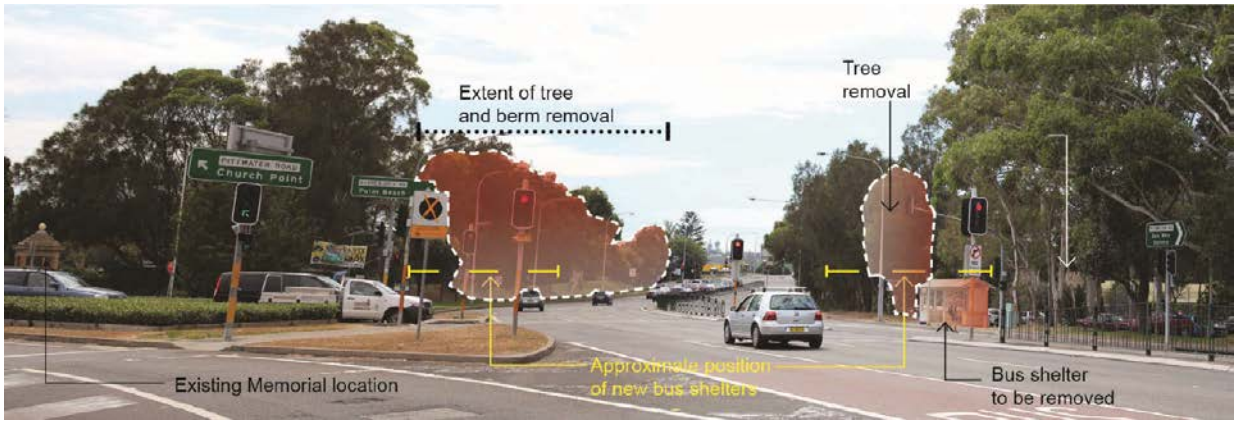

Figure 27 Viewpoint 6: View looking northeast along Barrenjoey Road from Pittwater Road

Note that tree removal is indicative only

The visual impact assessment concluded that most visual receivers have a low to moderate-low visual impact rating with regard to the Proposal.

Viewpoint 1 (Village Park) was assessed to have a moderate visual impact due to the removal of mature trees and landscaped berms for the proposed northbound bus indent on Barrenjoey Road.

Viewpoints 2, 5 and 6 were found to have a moderate to low visual impact rating due to the removal of trees. However, the viewpoints were considered to either have a high visual absorption capacity and/or include views of urban vistas that are not considered to be highly valued by visual receivers.

Viewpoints 3 and 4 were found to have a low visual impact rating due to the minor changes to the amenity of the views.

6.2.3. Mitigation measures

The following mitigation measures are proposed to manage visual impacts:

- the site is to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries
- temporary hoardings, barriers, traffic management and signage to be removed when no longer required
- work/site compounds should be screened, with shade cloth or similar material (where necessary) to minimise visual impacts
- consolidate site equipment and facilities to maximise the area of useable public realm and maintain pedestrian permeability
- graffiti is to be removed during construction in accordance with TfNSW's standard requirements
- lighting set up during construction would minimise light spill to nearby properties and the night sky.restore any areas that are impacted by construction with appropriate landscape treatments
- the detailed design of the Proposal is to consider the following measures to minimise impacts on visual amenity:
    - where landscaped berms and associated trees along Barrenjoey Road are removed, re-establish a continuous low-level visual barrier (of a similar height to

the existing berms) between the road and Village Park while maintaining access points

- use alternative measures other than berms, such as low walls, to limit encroachments on Village Park if practicable
- maintain eye-level visual accessibility between the Barrenjoey Road corridor and Village Park
- integration of the northbound bus indent with the *Draft Imagine Mona Vale - Mona Vale Place Plan* (Pittwater Council, 2016) and the setting of the Great War Memorial
- investigate opportunities to minimise tree removal where practicable.

- utilise finishes and materials of a high standard that are complementary to the existing locality and landscape, and would minimise reflective surfaces with a preferred use of muted, and not bright or reflective, colours
- develop lighting that addresses Australian Standard *AS4282 Control of the Obtrusive Effects of Outdoor Lighting* and consider the use of pole mounted LED luminaries ensuring that all light spill would be contained within the area of the bus stop and car park (if modified)
- an Urban Design Plan and Public Domain Plan would be prepared in consultation with relevant stakeholders, and any new plant species in the landscape design would be sympathetic to the existing character of the site and adjacent parks.

6.3. Noise and vibration

A Noise and Vibration Impact Assessment (NVIA) has been undertaken for the Proposal (SLR, 2016). The findings of this assessment are provided below.

6.3.1. Existing environment

The surrounding area has predominantly commercial, residential, community and recreational uses. The noise environment in the surrounding area is dominated by Barrenjoey Road traffic.

The sensitive receivers immediately surrounding the Proposal are listed in Table 13.

Table 13 Nearest sensitive receivers

Receiver	Address	Description
R1	2 Golf Avenue	Two-storey residential Representative of nearest residential receivers close to Barrenjoey Road
R2	2 Golf Avenue	Two-storey residential Representative of nearest residential receivers set back from Barrenjoey Road
R3	2 Park Street	Mona Vale Hotel (other sensitive receiver)
R4	Mona Vale Golf Course	Outdoor active receiver (other sensitive receiver)
R5	1757 Pittwater Road	Two-storey commercial Representative of nearest commercial receivers on Pittwater Road
R6	6-10 Barrenjoey Road (community facilities)	Other sensitive: Girl Guide Hall, Scout Hall, Tennis Clubhouse

Figure 28 identifies the Proposal site, noise logger and sensitive receiver locations. Receivers are colour coded by type: blue (residential), pink (other sensitive receiver) and yellow (commercial). The Great War Memorial and a local childcare centre (Mona Vale Early Learning Centre) are also identified.

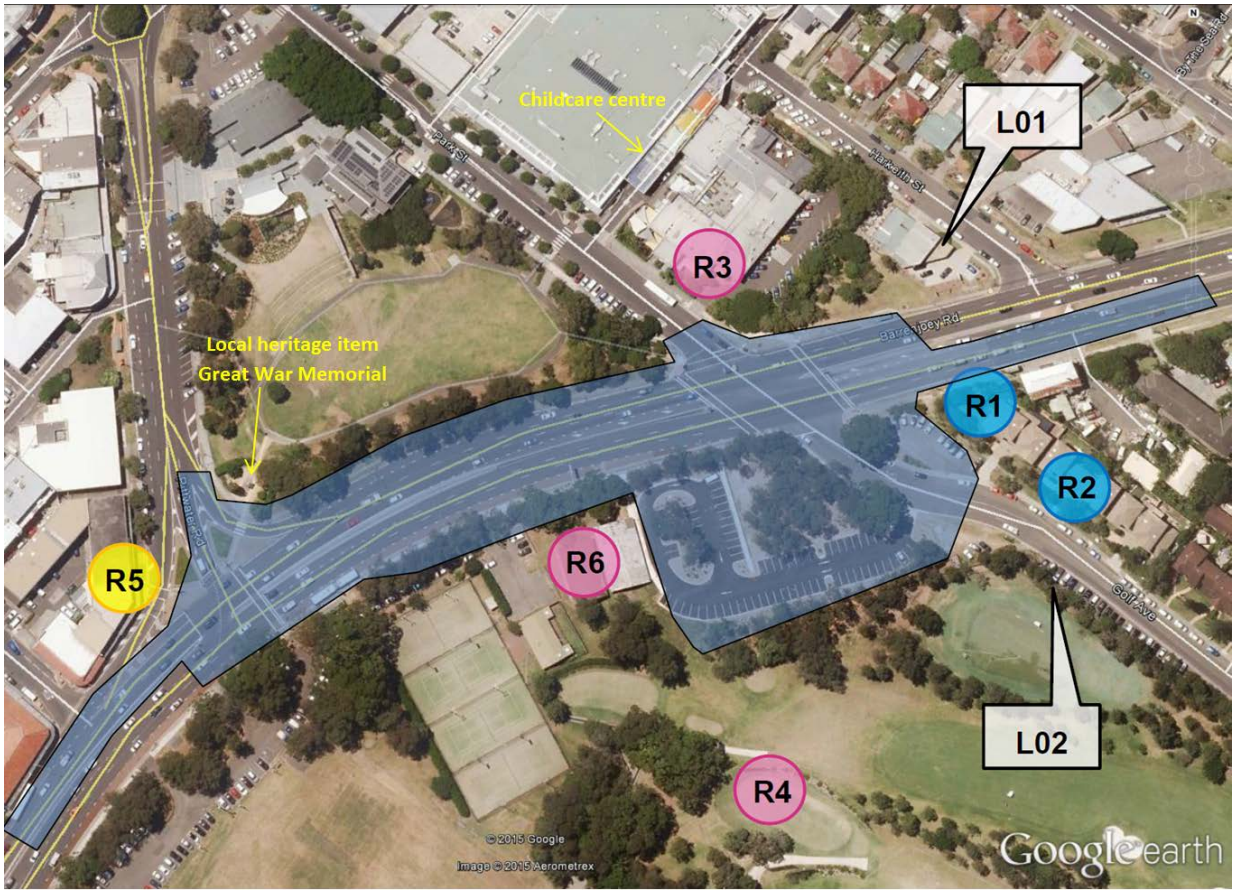

Figure 28 Noise logger and sensitive receiver locations (SLR, 2016)

To characterise the existing noise environment of the area, background noise monitoring was conducted from 2 December to 17 December 2015 at locations identified on Figure 28, being:

- L01 - 17 Barrenjoey Road (north-east of Beeby Reserve car park across Barrenjoey Road)
- L02 - Mona Vale Golf Course (south-east of Beeby Reserve car park along Golf Avenue).

The monitoring results outlined in Table 14 were used to establish the average background noise levels (known as the rating background levels (RBLs)) for the daytime, evening and night time, as well as the shoulder period from 6am to 7am.

Table 14 Unattended noise logger results (L_{A90} and L_{Aeq})

Location	Daytime L_{A90}	Evening L_{A90}	Night L_{A90}	Daytime L_{Aeq}	Evening L_{Aeq}	Night L_{Aeq}
17 Barrenjoey Road	57	53	41	68	67	62
Mona Vale Golf Course	47	47	38	59	57	53

Operator attended ambient noise surveys were undertaken on 2 December 2015. Daytime ambient noise levels were observed to be largely influenced by traffic movements along adjacent roads.

6.3.2. Noise criteria

Construction noise management levels

The *Interim Construction Noise Guideline* (ICNG) provides a framework to consider the impacts of construction noise on residences and other sensitive land uses. The ICNG outlines standard hours for construction activities as:

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

The ICNG construction noise management levels (NMLs) relevant to the Proposal are summarised in Table 15.

Table 15 Construction noise management levels at relevant receivers

Land use	Time of day	Noise Management Level $L_{Aeq(15minute)}$
Residential	Recommended standard hours	Noise affected: RBL plus 10 dB(A) Highly noise affected: 75dB(A)
Residential	Outside standard hours	Noise affected: RBL plus 5 dB(A)
Active recreation	Applies when in use	65 dBA
Commercial (industrial)	Applies when in use	75 dBA (external noise level)

Land use	Time of day	Noise Management Level $L_{Aeq(15minute)}$
Commercial (retail, offices)	Applies when in use	70 dBA (external noise level)
Commercial (hotel)	When in use – bar / lounge Night-time – sleeping areas	50 dBA (internal noise level) 40 dBA (internal noise level)

Based on the ICNG approach for determining noise management levels at residential properties, the construction noise management levels for the Proposal at the nearest sensitive residential receivers are identified in Table 16.

Table 16 Construction noise management levels for sensitive receivers

Location	Daytime (7am-6pm)	Daytime OOHW (weekend)	Evening (6pm-10pm)	Night (10pm -7am)
R1 2 Golf Avenue (A)	67	62	58	46
R2 2 Golf Avenue (B)	57	52	52	43
R3 2 Park Street	70*	70*	70*	60*
R4 Golf Course[#]	65	65	65	n/a
R5 1757 Pittwater Rd	70	70	n/a	n/a
R6 Community Facilities[#]	55	55	55	n/a

**Note: ICNG internal noise level goal + 20dB as fixed window glazing and air conditioning is assumed to provide outside-to-inside attenuation of 20 dB.*

[#]*Note: Applies when in use at nearest façade / fence. Refer below for information on the community facilities.*

From the potential uses considered likely in the Scout Hall and Girl Guide Hall buildings, the use as a teaching space is considered to be most noise-sensitive under Australian Standard *AS2107 Acoustics - Recommended design sound levels and reverberation times for building interiors*. The internal goal shown in Table 17 for this use corresponds to an external noise goal of L_{Aeq} 55 dBA assuming a conservative 10 dB noise reduction between outside and inside.

Table 17 AS2107 Recommended Maximum Internal Noise Levels - Scout Hall and Girl Guide Hall

Land use	Time of day	Noise Management Level $L_{Aeq(15minute)}$
Multi-use Community Centre: Indoor Sports Building With Coaching	When in use	50 dBA (internal noise level)
Multi-use Community Centre: Indoor Sports Building Without Coaching	When in use	55 dBA (internal noise level)
Multi-use Community Centre: Community Centre (Teaching Space)	When in use	45 dBA (internal noise level)

The ICNG and AS2107 do not provide specific guideline noise levels for childcare centres. The most sensitive activity likely at the childcare centre on Park Street is considered to be sleeping

activities. An external NML of 50 dB ($LA_{eq(15minute)}$) is adopted on the assumption that sleeping would be indoors and windows would be open.

The child care centre outdoor area is 70 metres from the closest proposed works, and the nearest wall is around 80 metres, with screening from adjacent buildings (intersection works at Park Street / Barrenjoey Road). The nearest proposed works with line of sight (tree removal and northbound bus indent works in Village Park) are around 150 metres away.

Vibration management levels

When assessing vibration there are two categories of vibration criteria, one related to the impact of vibration on building structures, and one relating to human comfort.

Human comfort

The *Assessing Vibration: A Technical Guideline* (DEC 2006) provides vibration criteria for human comfort. For intermittent vibration (like that which could result from construction machinery) the criteria is based on a concept of a vibration 'dose'. The maximum criteria level is 0.40m/$s^{1.75}$ for residences during the daytime and 0.26 m/$s^{1.75}$ during the night time. For offices, schools, educational institutions and places of worship the maximum criteria level is 0.8 m/$s^{1.75}$ during the daytime and night-time.

Structural damage to buildings

The standards used to determine criteria for vibration are the British Standard *BS7385-Part 2: 1993 Evaluation and Measurement for Vibration in Buildings* and are summarised Table 18.

Table 18 Transient vibration guide values for cosmetic damage

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

In addition, the RMS *Construction Noise and Vibration Guideline* (CNVG) (RMS, 2016) provides guidance in relation to minimum safe working distances for intensive activities, such as, jackhammering. This minimum safe working distance would minimise the risk of cosmetic damage and human discomfort. Recommended distances for work associated with the Proposal are shown in Table 19.

Table 19 Recommended safe working distances for vibration intensive plant

Plant item	Rating/Description	Cosmetic Damage (BS 7385)	Human Response (DEC 2006)
Vibratory Roller	< 50 kN (typically 1-2 tonnes)	5m	15m to 20m
	< 100 kN (typically 2-4 tonnes)	6m	20m
	< 200 kN (typically 4-6 tonnes)	12m	40m

Plant item	Rating/Description	Cosmetic Damage (BS 7385)	Human Response (DEC 2006)
	< 300 kN (typically 7-13 tonnes)	15m	100m
	> 300 kN (typically 13-18 tonnes)	20m	100m
	> 300 kN (> 18tonnes)	25m	100m
Small Hydraulic Hammer	(300kg – 5 to 12t Excavator)	2m	7m
Medium Hydraulic Hammer	(900kg – 12to 18t Excavator)	7m	23m
Large Hydraulic Hammer	(1,600kg – 18 to 13t Excavator)	22m	73m
Jackhammer	Hand held	1m (nominal)	Avoid contact with structure

Heritage buildings

BS 7385 states that "a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive". Heritage buildings are to be considered on a case by case basis. Where a historic building is deemed to be sensitive to damage from vibration (following inspection), it is recommended to reduce the vibration criteria accordingly.

As described in Section 6.5, one heritage listed item, the Great War Memorial, is situated within the Proposal site. As such, the more conservative German Standard *DIN 4150 Structural vibration* superficial cosmetic damage criteria of 2.5 mm/s should be considered as a screening criterion. Where heritage buildings of a typical residential-type construction are not found to be structurally unsound, DIN 4150 superficial cosmetic damage criteria of 5 mm/s may be more suitable as a screening criterion.

Indicatively, with the exception of the vibratory rollers and medium/large rockbreaker, the separation distance between the proposed equipment and the nearest heritage item (Great War Memorial) is likely to be sufficient to mitigate vibration levels such that the DIN4150 criteria is not exceeded. However, this should be confirmed by site measurements at the start of the works. Alternative methods to the medium/large rockbreaker and vibratory roller in this vicinity should be allowed for in the construction planning.

Operational noise goals

Operational noise goals for the car park are based on the Industrial Noise Policy, which identifies both an intrusiveness criteria and amenity criteria.

The intrusiveness criterion is the RBL plus 5dBA measured over a 15-minute period ($L_{Aeq\ 15min}$). The intrusiveness criteria for the Proposal are shown in Table 20.

Table 20 Intrusiveness criterion for residential receivers, $L_{Aeq15min}$ (dBA)

Location	Daytime (7am-6pm)	Evening (6pm-10pm)	Night (10pm -7am)
R1 2 Golf Avenue	62	58	46
R2 2 Golf Avenue	52	52	43

The amenity criterion sets a maximum limit in addition to the intrusiveness criterion, to prevent noise levels increasing indefinitely with each successive development. The Proposal site would be considered a 'suburban' environment and the 'acceptable' amenity criteria for residential receivers are daytime 55dBA, evening 45dBA, and night-time 40dBA.

For other receivers the operational amenity criteria have been adopted from the Industrial Noise Policy as outlined in Table 21.

The 'maximum' amenity criterion is set at 5dBA higher than the 'acceptable' criterion.

Table 21 Amenity criterion for non-residential receivers, $L_{Aeq15min}$ (dBA)

Receiver type	Time of day	Recommended acceptable noise level	Recommended maximum noise level
Active recreation area	When in use	65	70
Commercial premises	When in use	65	70
School classroom (internal)	When in use	35	40

Sleep disturbance screening criteria

In order to minimise the risk of sleep disturbance during night time operation of the Proposal (between 10pm and 7am), sleep disturbance screening criteria have been set which take into account short-term transient noise events that may result from car park activities.

The EPA recommends that sleep disturbance is assessed as the emergence of the $L_{A1,1min}$ noise level above the $L_{A90,15min}$ level at the time. Appropriate screening criteria for sleep disturbance are determined to be an $L_{A1,1min}$ level 15dBA above the RBL for the night time period. Sleep disturbance screening criteria (RBL + 15 dB) at the nearest residential receivers are as follows:

- R1: 56 dBA
- R2: 53 dBA.

In the event that exceedances of this criterion are predicted, sleep disturbance does not necessary result, but the EPA recommends a more thorough approach is investigated.

The *Road Noise Policy* (RNP) (DECCW, 2011), while noting that sleep disturbance is poorly understood, recommends consideration of these points determined from research on sleep disturbance:

- maximum internal noise levels below 50-55dBA are unlikely to cause awakening reactions; and
- one or two noise events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and wellbeing significantly.

Assuming that the typical noise reduction through a bedroom façade with open windows is 10dBA, then an external noise level of 60dBA is unlikely to cause sleep disturbance. This is assessed at the façade.

Operational traffic noise criteria

The RNP sets out criteria for the assessment of noise from vehicles on public roads and is dependent on the road classification (refer Table 22).

Table 22 Road Noise Policy assessment criteria for traffic noise

Road category	Day (7am-10pm)	Night (10pm-7am)
Freeway / arterial / sub-arterial roads	$L_{Aeq,15hr}$ 60 dBA (external)	$L_{Aeq,9hr}$ 55 dBA (external)
Local roads	$L_{Aeq,1hr}$ 55 dBA (external)	$L_{Aeq,1hr}$ 50 dBA (external)

The RNP states that an increase of up to 2dBA represents a minor impact that is considered barely perceptible to the average person.

6.3.3. Potential impacts

a) Construction phase

Noise

In order to assess the potential noise and vibration impacts from the proposed construction works, the three construction phases and associated typical plant and equipment for each phase, as outlined in Section 3.2, were assessed. A summary of the predicted noise levels during construction phases are discussed below. Detailed construction noise assessment results are provided in Appendix C.

The predicted noise levels for each construction phase at the six receivers were modelled assuming that all noise generating equipment are active simultaneously, representing a worst case scenario. Potential exceedances of the NML for receivers R1 to R5 are outlined below:

Phase 1 – standard working hours

- for residential receivers R1 and R2 exceedances of up to 15 dB are predicted
- for receivers R3, R4 and R5 exceedances of up to 3 dB are predicted.

Phase 2 – may require works during the evening or night-time periods

- for residential receivers R1 and R2 the following exceedances are predicted
  - up to 15 dB during daytime roadworks
  - up to 24 dB during evening roadworks
  - up to 36 dB during night-time roadworks
- the sleep disturbance screening criteria is predicted to be exceeded by up to 34 dB during the night-time period during this activity for works nearest to receiver R1
- for receivers R3 and R5 exceedances of up to 16 dB during road works are predicted
- for receiver R4 no exceedances are predicted.

Phase 3 – may require works during the evening or night-time periods

- for residential receivers R1 and R2 the following exceedances are predicted
  - up to 12 dB during daytime roadworks
  - up to 20 dB during evening roadworks
  - up to 32 dB during night-time roadworks
  - up to 7 dB during daytime for other works
  - up to 9 dB during evening for other works
  - up to 18 dB during night-time for other works

- the sleep disturbance screening criteria is predicted to be exceeded by up to 30 dB during the night-time period during this activity for works nearest to receiver R1
- for receivers R3 and R5 exceedances of up to 10 dB during road works are predicted
- for receiver R4 no exceedances are predicted.

The locations of the community facilities are adjacent to the construction site and therefore high noise levels would be anticipated when noise intensive construction works are occurring nearby. The child care centre is 70 metres from the closest proposed works with screening from adjacent buildings and 150 metres from the nearest proposed works with line of sight.

Indicative predicted noise levels at varying distances from the facilities have been outlined in Table 23.

Table 23 Indicative predicted noise levels at varying distances from the works $L_{Aeq(15minute)}$ (dBA)

Phase / Works Reference	25m	50m	100m	150m
Phase 1 – Establish site compound. Install hoardings and demarcate site. Utility location works.	74	68	62	58
Phase 1.2 – Material delivery at site compound.	-	60	54	51
Phase 1.3 – Tree removal.	-	75	69	66
Phase 2.1 – Road works including: Utility protection / relocation Intersection works Barrenjoey / Pittwater and Barrenjoey / Golf / Park Northbound bus indent Median works (turning lanes, pedestrian fencing)	81	75	69	66
Phase 2.2 – Pavement works and line marking	76	70	64	61
Phase 3.1 – B-Line stop civil works	81	75	69	65
Phase 3.2 – Pavement works and line marking	76	70	64	61
Phase 3.3 – Construct and fit out B-Line stop. Associated landscaping. Commission systems. Remove redundant bus stops.	69	63	57	53
Phase 3.4 – Landscaping. Remove site offices and hoardings.	69	63	57	53

Note: "-" indicates works are clearly outside of this distance range

At the community facilities, for works within 25 metres exceedances of up to 26 dB above the NML are anticipated for the noisiest works in Phases 2 and 3, and up to 20 dB in Phase 1. For works within 50 metres exceedances of up to 20 dB above the NML are anticipated. As would be expected, noise levels reduce as the distance between the works area and the receiver increases.

Figure 29 shows a 25 metre and 50 metre radius from the most affected façade of the Tennis Clubhouse (blue) and Scout Hall (red). There are no works proposed within a 25 metre radius of the Tennis Clubhouse, and limited works within a 25 metre radius of the Scout and Girl Guide Halls.

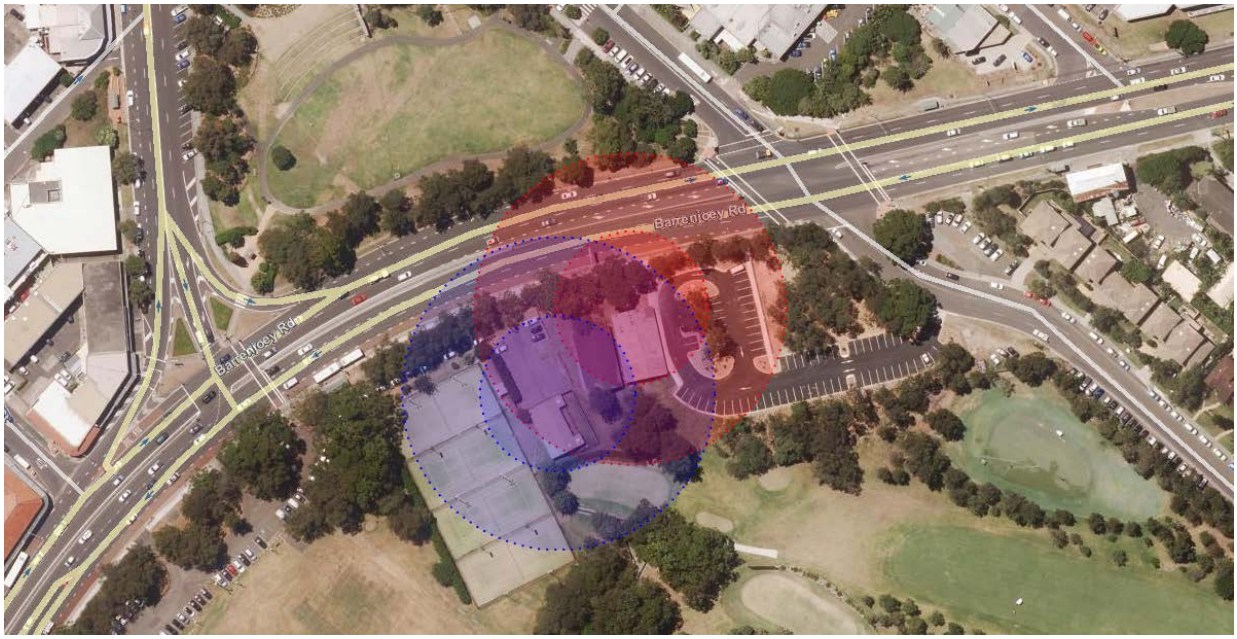

Figure 29 Aerial photo showing 25m and 50m radius from most affected façade of the Tennis Clubhouse (blue) and Scout Hall (red)

Due to the multiple potential uses of the Scout Hall and Girl Guide Hall, and corresponding change of occupants throughout the day, it is considered appropriate that noise impacts associated with this receiver are managed through consultation with the facility groups to inform the works schedule of the proposed use of the hall during the construction phases of the project.

At the child care centre, exceedances of up to 16 dB would be anticipated for tree removal in Phase 1 and construction of the northbound bus indent in Phase 2 as works would be around 150 metres away. Exceedances of up to 19 dB would be anticipated for on-road works during Phase 2 and Phase 3 (if undertaken during the hours of operation of the child care centre).

It is recommended that noise intensive equipment and equipment work zones be scheduled to minimise the noise impacts during sensitive periods of operation of the community facilities and child care centre where practicable.

Vibration

Table 19 shows the recommended safe working distance for various construction machinery. The safe working distances for building damage should be complied with at all times. The distances are noted as being indicative and would vary depending on the particular item of plant and local geotechnical conditions. They apply to addressing the risk of cosmetic (minor – easily reparable) damage of typical buildings under typical geotechnical conditions.

Where vibration intensive works are required to be undertaken within the specified safe working distances, vibration monitoring should be undertaken to ensure acceptable levels of vibration are satisfied.

In relation to human comfort, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are allowed.

Vibration intensive equipment is proposed during the roadworks and demolition scenarios which includes the use of a vibratory roller, jackhammer and rock breaker / hydraulic hammer.

Generally, the separation distance from the nearest receivers is sufficient to mitigate the potential impacts. As such it is considered that structural or cosmetic damage impacts from vibration intensive works are generally unlikely for the majority of the adjacent receivers.

Exceptions to this are identified as follows:

- Commercial receivers on Pittwater/Barrenjoey Road (represented by receiver R05) which fall within the safe working distance of the medium-large hydraulic hammers and medium-large vibratory rollers during adjacent roadworks (new left from Barrenjoey Road in to Pittwater Road)
- Residential receivers on Golf Avenue (represented by receiver R01) which fall within the safe working distance of the medium-large hydraulic hammers and medium-large vibratory rollers during adjacent roadworks
- Guide Hall, Scout Hall and Tennis Clubhouse which may fall within the safe working distance of the large hydraulic hammer and large vibratory roller during adjacent roadworks and bus stop installation

The Great War Memorial is about 8-10 metres from the nearest proposed road works. Indicatively, with the exception of the vibratory rollers and medium-large hydraulic hammer, the separation distance between the proposed equipment and the above heritage item is likely to be sufficient to mitigate vibration levels such that the DIN4150 criteria is not exceeded. However, this should be confirmed by site measurements at the start of the works. Alternative methods to the medium-large hydraulic hammer and vibratory roller in this vicinity should be allowed for in the construction planning.

b) Operational phase

Noise

Operational noise emissions were predicted using the SoundPLAN V7.1 noise modelling software and considers geometric spreading, ground topography and buildings. The assessment has been undertaken on the basis of the calculation method outlined in *ISO 9613.2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*. ISO 9613.2 models noise under weather conditions favourable to the propagation of sound from the source to the receiver. German Standard *ISBN 3-936385-26-2 Parkplatzlärmstudie – 6. revised edition* has been used in the model to predict the noise emissions from the vehicle movements in the carpark.

The predicted noise levels at the five receivers compared with the operational noise criteria are provided in Table 24.

Table 24 Predicted car park noise levels L_{Aeq} (dBA)

Receiver	Period	Criteria	Predicted	Compliance?
R1 (residential)	Night-time	46	31	Yes
	Early morning shoulder period*	54	41	Yes
R2 (residential)	Night-time	43	<30	Yes
	Early morning shoulder period*	48	38	Yes
R3	When in use	65	37	Yes
R4	When in use	55	37	Yes
R5	When in use	65	33	Yes
R6	When in use	55	49	Yes

**Note: 6am to 7am*

The predicted noise levels comply with the operational noise criteria at all times. The operational use of the car park would be fundamentally similar to the existing.

Sleep disturbance assessment

With regard to short-term transient noise events such as door closings, cars accelerating, engine starts etc, spreadsheet noise propagation calculations have been undertaken in order to predict the $L_{A1(60second)}$ noise levels from such activities at the nearest sensitive receivers. The $L_{A1(60second)}$ may be likened to the typical maximum noise level of a particular event. The $L_{A1(60second)}$ or L_{Amax} noise levels are used to determine whether a particular noise event has the potential to cause sleep disturbance.

The receivers most potentially affected by short-term operational noise events from the car park are those on Golf Avenue, which are approximately 45 metres from the nearest car movement area within the proposed car park. The assessment is based on residence R2 which has the lower screening criterion.

Table 25 Typical vehicle noise events $L_{A1(60second)}$ (dBA)

Source	Typical sound power level	Typical sound pressure level at 45m
Car moving	83 – 90	42 – 49
Car door closing	88 – 93	47 – 52
Car starting	91 – 97	50 – 56
Car accelerating	93 – 98	52 – 57

These predicted $L_{A1(60second)}$ noise levels show potential minor exceedances of the 53 dBA sleep disturbance screening criterion at residential receiver R2 for the above noise events.

The RNP provides a review of research into sleep disturbance. From the research to date, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep
- One or two events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

It is generally accepted that internal noise levels in a dwelling with the windows open are 10 dB lower than external noise levels. Based on a worst case minimum attenuation of 10 dB, with windows open, worst-case short term internal noise levels are at a level that according to the RNP review is unlikely to cause awakening reactions.

Therefore the operation of the proposed car park is unlikely to cause a significant adverse noise impact due to maximum noise events at nearby noise sensitive receivers.

It is also noted that the existing car park operates in the same location and the character of noise would be unchanged by the conversion to commuter car park spaces.

Traffic noise assessment

The measured existing traffic noise levels receivers adjacent to the arterial Barrenjoey Road (logger L01) currently exceed the nominated RNP criteria.

With around 45,500 daily traffic movements on Barrenjoey Road, the generated traffic volumes would be one per cent or less of existing vehicle movements (refer to Section 6.1.2). Extra traffic movements would be expected to have an acoustically insignificant effect on the existing road traffic noise levels.

6.3.4. Mitigation measures

RMS' CNVG recognises the potential for a project's construction noise and vibration levels to exceed the objectives. The CNVG outlines a number of standard mitigation measures that should be implemented at all construction sites. If these do not reduce noise to the objective levels, a range of additional mitigation measures may be implemented.

The following additional mitigation measures are recommended for residential receivers R1 and R2:

- for Phase 1:
  - notification by informing the community through letterbox drops or equivalent
  - verification noise monitoring of construction noise levels
- for Phases 2 and 3
  - notification by informing the community through letterbox drops or equivalent
  - verification noise monitoring of construction noise levels
  - individual briefings, phone calls, specific notifications
  - negotiated respite and respite periods.

Offers of alternative accommodation may be recommended at R1 and R2 for Phase 2 and/or 3 roadworks within a close proximity to residences if undertaken during the night time period where applicable thresholds are exceeded.

Due to the potential high noise impacts at other sensitive receiver types it is recommended to undertake letterbox drops at non-residential receivers adjacent the works.

The following mitigation measures are proposed to manage noise and vibration impacts:

- prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of

the Construction Noise and Vibration Guideline (RMS, 2016). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable

- during detailed construction planning a work methodology for works within 50 metres of the Great War Memorial should be developed in order to achieve vibration limits for heritage structures. This may include:
    - consideration of using smaller capacity plant and/or using dampened rockbreaker
    - for construction activities within the safe working distance, vibration monitoring or attended vibration trials at the outset of works to ensure compliance with the relevant criterion
    - if a predicted vibration level exceeding 5 mm/s is identified at the Great War Memorial, an individual structural analysis of the item should be undertaken by a suitably qualified structural engineer in order to identify if the recommended and predicted maximum vibration of 5 mm/s is appropriate for the item and any potential mitigation measures that may be required in terms of its structural stability
- construction noise and vibration impacts on the Girl Guide Hall and Scout Hall are to be managed through consultation with the community groups to inform the works schedule. Works within 50 metres using noise and vibration intensive equipment use shall be planned to minimise the noise and vibration impacts during sensitive periods of operation of the hall as far as practicable
- works would be carried out during normal work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays) where practicable. If any out of hours works are required, further approval would need to be obtained from TfNSW
- high impact noise generating equipment (e.g. rock breaking or hammering, jack hammering, vibratory rolling, cutting of pavement, concrete or steel and any other activities) which result in impulsive or tonal noise generation would not be undertaken for more than three hours, without a minimum one hour respite period
- notification would be provided to the community, local residents and businesses informing them of the nature of works, expected noise levels, duration of works and provision of a point of contact to discuss any potential issues
- to reduce the construction noise impact from human activities, the following reasonable and feasible noise mitigation options would be implemented, including:
    - using only the equipment necessary for the upgrade works at any one time where practicable
    - 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 should be switched off whilst being loaded/unloaded
    - no idling of delivery trucks
    - keeping delivering truck drivers informed of designated vehicle routes, parking locations and permitted delivery hours for the site

- minimising talking loudly; no swearing, unnecessary shouting, or loud stereos/ radios on site. No dropping of materials from height where practicable, throwing of metal items or slamming of doors

- to reduce the construction noise and vibration impacts from mechanical activities, the following reasonable and feasible noise mitigation options would be undertaken wherever practicable:
  - regularly training workers and contractors (such as at toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise
  - maximising the offset distance between noisy plant and adjacent sensitive receivers
  - directing noise-emitting plant away from sensitive receivers
  - installing non tonal reverse alarms, for all construction vehicles and plant regularly used on site (i.e. greater than one day) and for any out of hours work
  - regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc
  - use of quieter and less vibration emitting construction methods where feasible and reasonable
  - 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
  - monitoring of noise and vibration would be undertaken during construction to measure compliance against relevant goals/criteria
  - deliveries and noisy activities would be undertaken during standard hours where practicable.

6.4. Indigenous heritage

6.4.1. Existing environment

The study area forms part of a landscape that was used by the traditional Aboriginal owners, the Guringai people, for many thousands of years prior to European contact and continues to be highly valued by Aboriginal people today.

A search of the Aboriginal Heritage Information Management System (AHIMS) register was undertaken on 22 September 2016 in order to identify if there are any registered Aboriginal sites within the vicinity of the Proposal site. The search identified no sites within 200 metres of the Proposal site.

A search of the National Native Tribunal on 22 September 2016 identified one claim in the former Pittwater LGA (NC2013/002 - Awabakal and Guringai People) which has not yet been determined. The claim area includes a portion of Barrenjoey Road and Village Park which falls within the Proposal site.

The Proposal is located within an area that has been heavily modified. The clear and observable disturbance to the area as a result of previous construction would have resulted in the removal of or significant disturbance to the natural soil profile.

No landscape features likely to indicate the presence of Aboriginal objects were identified in the study area. Therefore the Proposal site has been assessed as having low Aboriginal

archaeological potential in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010.*

6.4.2. Potential impacts

a) Construction phase

The Proposal site has been substantially disturbed as a result of the construction of the existing car park, roadways, community buildings, utilities and landscaping. These previous impacts have resulted in removal or significant disturbance to, the upper layers of the natural soil profile.

Furthermore, as discussed in Section 6.8, preliminary geotechnical studies indicate that fill materials were encountered to a depth of approximately two metres below ground level. Excavations for bus stop footings and service trenches would be required but would not involve excavation to any significant depth within the soil profile.

There is evidence that the area has been subject to clear and observable disturbance with the introduction of fill materials, levelling, installation of services and landscaping.

In accordance with the due diligence code, there is no requirement to undertake further archaeological assessment and the proposed works can proceed with caution.

b) Operational phase

No impact to Indigenous heritage is anticipated during operation of the Proposal.

6.4.3. Mitigation measures

The following mitigation measures are proposed to minimise impacts on Indigenous heritage:

- all construction staff would receive training in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to both the Indigenous and non-Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites
- if previously unidentified Indigenous heritage/archaeological items are uncovered during construction works, all works in the vicinity of the find shall cease and appropriate advice shall be sought from a suitably qualified heritage consultant (and in consultation with the OEH Heritage Branch where appropriate). Works in the vicinity of the find shall not re-commence until clearance has been received from the heritage consultant.

6.5. Non-Indigenous heritage

A non-Indigenous heritage assessment has been undertaken for the Proposal (Umwelt, 2016) and is provided below.

6.5.1. Existing environment

Historical context

The Proposal site is located within a former recreation and camping area which included an area known as The Black Swamp (refer to Figure 30). In the 1890s, subdivision plans were laid out for a village (Village of Turimetta) within the swamp lands.

The Mona Vale Golf Course which is located to the south-east of the Proposal site was originally part of the Brock Estate (Morcombe, 2002). Brock undertook a grand development in the 1900s (the Oaks Polo Pony Stud Farm), a luxurious Riverina style resort which included an

ornate three storey mansion and villas. The estate was eventually subdivided and a three hole golf course was developed in the 1920s. By 1925 the golf course had nine holes and encroached on Kitchener Park (Commonwealth owned land). The golf club was officially established in 1927. Black Swamp was drained in the 1930s and the course was expanded.

The Mona Vale area continued to develop in the inter-war period as access to the location improved, with coastal lands developed into housing estates. Mona Vale also underwent significant residential and commercial development in the post-war years.

When World War II began, many club members enlisted and the Commonwealth exercised its right to establish a camp on part of the course (Morcombe, 2002). The Defence Department also set up camp on the south-eastern corner of Kitchener Park, and several machine gun pits were established on the golf course.

Many of the facilities at Kitchener Park were developed during the mid to late twentieth century including the Scouts and Guides lease (1969 and 1970 respectively), and Pittwater RSL Youth Club (1960s). Between 1981 and 1984, the youth club built Kitchener Park Sports Centre. The skate park was opened in 1988. Sports field floodlights were installed in 1995.

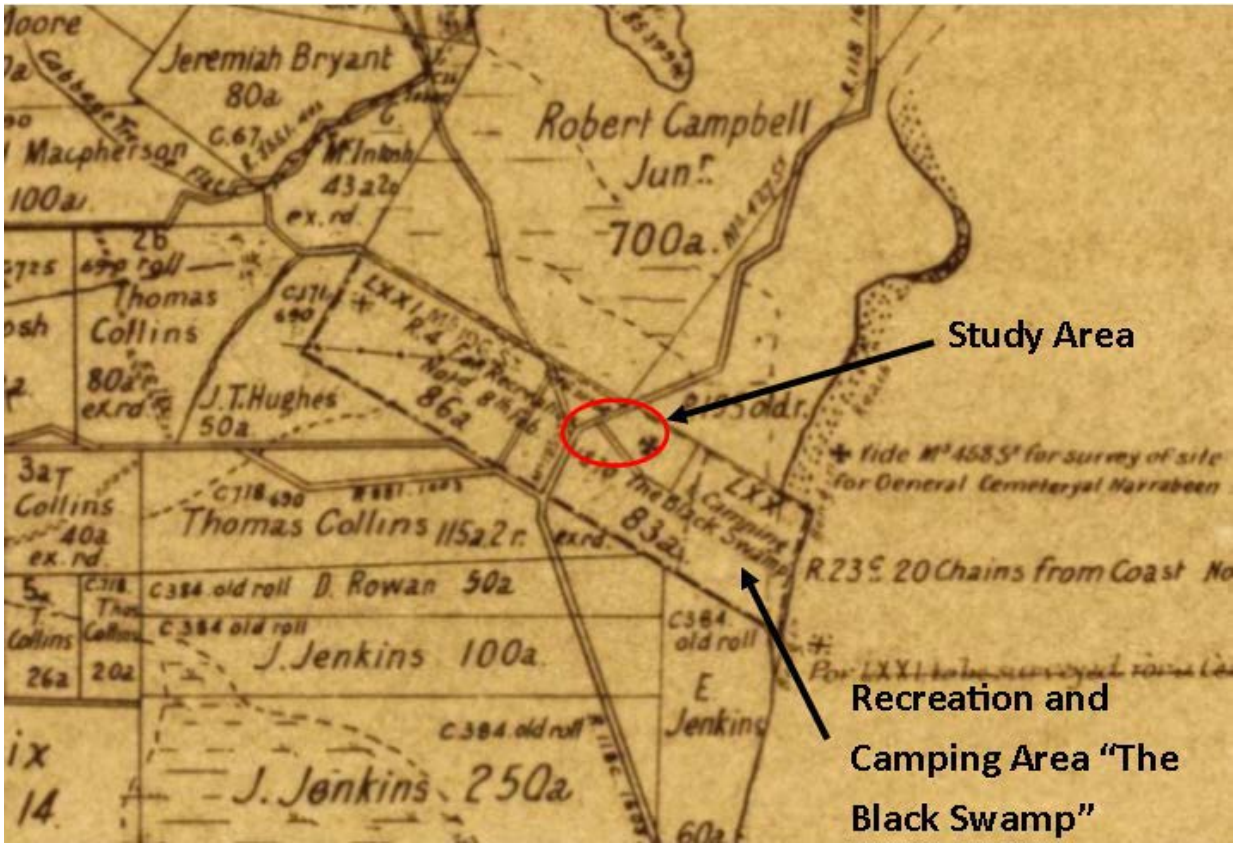

Figure 30 1886 Parish Map of Mona Vale showing approximate location of Proposal site

Archaeological potential

The Proposal site is not directly within an area of known potential historical archaeological resource. A portion of the south-eastern corner of Kitchener Park was utilised during World War II as part of an army camp, with the main area utilised by the army being the Mona Vale Golf Course. The army camp is considered to have been located outside the Proposal site and typically would not leave any archaeological resource of significance.

The Proposal site is within the early Black Swamp recreation and camping area and has been developed through time for recreational activities such as camping; subdivision of the area; establishment of the roads; and construction of tennis courts, community facilities (Scout Hall

and Girl Guide Hall) and the existing car park. There are no indications of any historical utilisation of the study area that would result in the presence of archaeological remains (Umwelt, 2016).

Database searches

A search of NSW State Heritage Register (SHR) and State Heritage Inventory, the Australian Heritage Database (including Commonwealth and National Heritage lists and the Register of the National Estate (RNE)), and local planning instruments (Pittwater LEP 2014) identified 10 heritage items listed in Table 26 within the vicinity of the Proposal site.

Table 26 Listed items within the vicinity of the Proposal site

Name	Heritage listing	Heritage significance	Location in relation to the Proposal site
Great War Memorial	Pittwater LEP 2014 (item 2270020); State Heritage Inventory	Local	Within the study area. Adjacent to proposed road works at the corner of Pittwater Road / Barrenjoey Road and bus indent in Village Park
New Zealand Christmas Bush – Victory Tree (also listed as "Victory Tree" – Holly Oak *Quercus ilex*)	Pittwater LEP 2014 (item 2270058); State Heritage Inventory	Local	Approximately 150 metres north-west of the Proposal site
House – 26 Park Street, Mona Vale	Pittwater LEP 2014 (item 2270169); State Heritage Inventory	Local	Approximately 150 metres north of the Proposal site
The Rock Lily (Part of Façade)	Pittwater LEP 2014 (item 2270002); State Heritage Inventory	Local	Approximately 170 metres south west of the Proposal site
House – 22 Darley Street East, Mona Vale	Pittwater LEP 2014 (item 2270001); State Heritage Inventory	Local	Approximately 170 metres south-east of the Proposal site
"Dungarvon" House – 28 Park Street, Mona Vale	Pittwater LEP 2014 (item 2270006); State Heritage Inventory	Local	Approximately 180 metres north of the Proposal site
Mona Vale Bowling Club	Pittwater LEP 2014 (item 2270482)	Local	Approximately 200 metres south-west of the Proposal site
"Glenroy" House – 1789 Pittwater Road, Mona Vale	Pittwater LEP 2014 (item 2270021); State Heritage Inventory	Local	Approximately 210 metres north-west of the Proposal site
St Johns Anglican Church and gravestones	Pittwater LEP 2014 (item 2270168); State Heritage Inventory	Local	Approximately 240 metres north of the Proposal site

Name	Heritage listing	Heritage significance	Location in relation to the Proposal site
Gravestones – St Johns Anglican Church grounds	State Heritage Inventory	Local	Approximately 240 metres north of the Proposal site
Norfolk Island Pines (*Araucaria heterophylla*)	Pittwater LEP 2014 (item 2270060); State Heritage Inventory	Local	Approximately 260 metres east of the Proposal site

The Proposal encroaches on the heritage curtilage of the Great War Memorial, which is listed on Schedule 5 of the Pittwater LEP 2014.

The Great War Memorial

The Great War Memorial is a sandstone memorial with four Tuscan columns supporting a tiered roof (refer to Figure 15 and Figure 31). In 1996 restoration works were undertaken and sandstone cairn with a bronze inscription plate was added. A single Cypress Pine stands beside the memorial which is described as being in good condition. The State Heritage Inventory listing only identifies the sandstone memorial (and adjacent Cypress Pine) as the item. The Pittwater LEP Plan 2014 Heritage Map illustrates the Great War Memorial heritage item as inclusive of associated parklands (Village Park) on the northern side of Barrenjoey Road which includes ornamental plantings, paths, hedges, tree plantings, and an open grassed area.

The State Heritage Inventory provides the following statement of heritage significance:

> *This sandstone memorial has historical and cultural significance as it commemorates the lives of 35 men who served in World War I. Three of which were killed in action. It was rededicated in 1996 to include World War II, Korean campaign, Malaya, Malaysia, and the Vietnam War.*

Figure 31 View looking north-east towards the war memorial from the pedestrian island at the corner of Pittwater Road and Barrenjoey Road

6.5.2. Potential impacts

a) Construction phase

Built heritage

Direct impacts

The Proposal would involve works on Barrenjoey Road which would encroach on the southern side of the heritage curtilage of the Great War Memorial (approximately 10 metres within Village Park to the north of Barrenjoey Road). The sandstone memorial monument would not be impacted by the Proposal.

Direct impacts on the heritage curtilage of the item would include the removal of approximately 21 trees (within or on the curtilage boundary) and an earth berm along the southern boundary of Village Park. The nearest tree proposed for removal is situated approximately 50 metres east of the memorial monument. Replacement trees could be provided within the Proposal site or adjacent Village Park (subject to consultation with Council) to minimise the impact on the setting of the Great War Memorial.

The proposed road works at the Pittwater Road / Barrenjoey Road intersection would involve the reconfiguration of traffic lanes, modification of traffic islands and kerb realignment outside the heritage curtilage of the heritage item. These works would not impact on the setting of the Great War Memorial as the proposed infrastructure would be similar in scale to the existing infrastructure.

Overall, the Proposal is considered to result in a minor impact on the heritage significance of the Great War Memorial. The implementation of mitigation measures provided in Table 28 would ensure that the heritage value of the site is maintained.

Indirect impacts

Indirect impacts on the heritage listed memorial within the vicinity of construction works such as vibration impacts could occur during vibration intensive activities. Such impacts would be mitigated with the implementation of mitigation measures provided in Table 28. Vibration impacts and safe working distances are discussed further in Section 6.3.

Archaeological heritage

There is very minor potential for any non-Aboriginal archaeological relics to be located within the Proposal site, or for impacts to any archaeological relic to occur during construction of the Proposal.

b) Operational phase

The operation of the Proposal would not present any risks to non-indigenous heritage.

The bus indent into Village Park encroaches into the verge of the heritage curtilage of the Great War Memorial, but would have no direct impact on the locally listed heritage item being the memorial itself. The indent is considered not to have a significant impact on the parklands associated with the Great War Memorial. The detailed design would consider the setting of the Great War Memorial to ensure a sympathetic and appropriate treatment and as outlined in Section 6.2.

6.5.3. Mitigation measures

The following mitigation measures would be implemented:

- the detailed design should consider any works which may affect the structural integrity of the Great War Memorial sandstone monument

- a site specific Environmental Control Map (ECM) would identify measures to ensure that the Great War Memorial is protected from damage and would not be adversely impacted by the Proposal
- all construction personnel would be briefed on the presence and significance of the nearby heritage items, their obligations under the *Heritage Act 1977* and the measures required to ensure the protection of any items of heritage significance for the duration of the works
- an unexpected finds procedure would be developed for the works, including if a previously unidentified non-Indigenous historical relic is discovered, all work in the vicinity which could affect the relic would cease and TfNSW would be notified. Advice would be sought form a suitably qualified archaeologist to identify suitable measures to manage the discovery.

6.6. Socio-economic impacts

6.6.1. Existing environment

The Proposal is located in the suburb of Mona Vale and in the Northern Beaches LGA (formerly Pittwater LGA), which in 2011 had an estimated resident population of 57,155, with the largest age group being 50 to 54 year olds (ABS, 2011).

The Northern Beaches - Pittwater area is bounded by Broken Bay in the north, the Tasman Sea in the east, the Narrabeen Lakes and Deep Creek in the south, and the Warringah area in the south and west. The Pittwater area consists of residential areas, national park (Ku-ring-gai Chase National Park), with some commercial and light industrial areas. It encompasses a total land area of 125 square kilometres, of which nearly half is national park, bushland or reserves, including coastal foreshores, beaches, islands and waterways. Non-residential areas are mainly in the north and north-west.

Land use adjacent to the Proposal site predominantly consists of public recreational uses to the north and south (Village Park and Kitchener Park), private recreational uses to the south (Mona Vale Golf Club), residential uses to the south-east and south-west and mixed uses to the north-west and north-east of the proposal site.

The Mona Vale civic centre is situated to the north of the proposal site (north of Village Park) and includes the former Pittwater Council building, Mona Vale Library and restaurants.

The following community facilities are located within the immediate vicinity of the proposed works:

- a locally listed heritage item – the Great War Memorial monument on the north-western side of the Proposal site
- Village Park on the northern side of the Proposal site
- Tennis Clubhouse, local Scout Hall and Girl Guide Hall adjacent to the Proposal site on the southern side
- Kitchener Park playing fields, tennis courts, skate park and bowling club to the south-west
- Mona Vale Golf Club to the south of the site.

6.6.2. Potential impacts

a) Construction phase

During construction there would be increased noise, traffic/pedestrian and visual impacts in the immediate vicinity of the Proposal site. These impacts have been addressed in Sections 6.1, 6.2 and 6.3 of this REF and are expected to be minor and temporary in nature.

Construction activities would result in temporary impacts to users of the tennis courts and Tennis Clubhouse, Scout Hall and Girl Guide Hall and the adjacent recreational facilities in Kitchener Park and Mona Vale Golf Course. Impacts would include noise and visual impacts and short-term partial car park closures. Safe access would be provided to all community facilities during construction works.

The community would be kept informed of potential construction impacts. Potential impacts, such as the reduction in on-site parking, would be minimised through the implementation of measures with the CEMP and associated sub-plans.

b) Operational phase

The long-term impacts to the community are anticipated to be positive. The Proposal forms part of the bus service and infrastructure improvements to deliver a new B-Line service, which is included in the NSW Government's Northern Beaches Transport Action Plan. The Transport Action Plan, along with other government initiatives and strategies, aims to support forecasted growth in the Northern Beaches region by improving the transport network across the region. Pedestrian and cycle connections would be retained during operation of the Proposal.

No operational impacts on the community facilities buildings are anticipated. However, the conversion of time restricted parking to commuter parking may impact visitors to community facilities and recreational facilities in the area.

Consultation with the community groups is ongoing and would continue through detailed design.

6.6.3. Mitigation measures

In addition to the control measures proposed in the noise and traffic sections, other control measures are outlined below:

- safe access to the Scout Hall, Girl Guide Hall and Tennis Clubhouse is to be provided throughout construction
- the proposed sustainability criteria for the project would encourage the construction contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal
- signage would be installed to notify the public about the works
- appropriate fencing around the proposed works area would help maintain public safety during construction
- the Community Liaison Plan would identify all potential stakeholders and consultation activities with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable
- contact details for a 24-hour construction response line, project infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase

- the community would be kept informed of construction progress, activities and impacts in accordance with a community liaison plan to be developed prior to construction.

6.7. Biodiversity

This section provides a summary of the flora and fauna assessment undertaken for the Proposal by Biosis (2016) which included a desktop assessment and site inspection of the Proposal site.

6.7.1. Existing environment

Threatened species and communities

Background searches identified a number of historical records for threatened fauna and flora listed under the EPBC Act and/or the TSC Act as occurring within a five kilometre radius of the Proposal (OEH 2015a).

A habitat based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (OEH 2015a) or predicted to occur (DoE 2015) within five kilometres of the Proposal. Threatened species considered most likely to have habitat within the locality include: Regent Honeyeater (*Anthochaera Phrygia)*, Barking Owl (*Ninox connivens*), Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Eastern Pygmy-possum (*Cercartetus nanus*), Little Bentwing-bat (*Miniopterus australis*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Little Lorikeet (*Glossopsitta pusilla*), Osprey (*Pandion cristatus*), Powerful Owl (*Ninox strenua*), Swift Parrot (*Lathamus discolour*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Netted Bottle Brush (*Callistemon linearifolius*) and Magenta Lilly Pilly (*Syzygium paniculatum*).

No threatened ecological communities, flora, fauna or migratory species or populations were identified during the site inspection.

Flora

The Proposal site is situated within a highly modified urban environment dominated by planted native vegetation (including landscaped trees) and an exotic mown understorey.

Canopy species include Sydney Blum Gum (*Eucalyptus saligna*), Broad-leaved Scribbly Gum (*Eucalyptus haemastoma*), Broad-leaved Paperbark (*Melaleuca quinquenervia*), Swamp Oak (*Casuarina glauca*) and Swamp Mahogany (*Eucalyptus robusta*). Native species in the mid-storey layer include Crimson Bottlebrush (*Callistemon citrinus*), Broad-leaved Paperbark, Tuckeroo (*Cupaniopsis anacardioides*), Coast Banksia (*Banksia integrifolia*) and Black She-Oak (*Allocasuarina littoralis*).

Planted exotic trees/shrubs recorded within the Proposal site include Chinese Pistachio (*Pistacia chinensis*), Avocado (*Persea Americana*) and Conifer *Cupressus sp*. The regularly mown understorey immediately to the west of the existing car park and adjacent to the northern side of Barrenjoey Road is predominantly comprised of exotic grasses such as Bindii (*Soliva sessilis*), Panic Veldtgrass (*Ehrharta erecta*), Kikuyu Grass (*Pennisetum clandestinum*) and Buffalo Grass (*Stenotaphrum secundatum*), along with the native species Common Couch (*Cynodon dactylon*). Landscaped garden beds present within the Proposal site contain a mix of planted natives including; Spiny-head Mat-rush (*Lomandra longifolia*), Native Rosemary (*Westringia fruticose*) and Blue Flax-lily (*Dianella caerulea*).

A total of 386 trees and shrubs (358 native and 28 exotic trees) were recorded in the Proposal site during the field survey. The location of each tree/shrub in the Proposal site is identified in Figure 32.

Threatened flora

No threatened flora species were identified within the Proposal site. Although Magenta Lilly Pilly and Netted Bottle have previously been recorded multiple times within the locality (within five kilometres of the Proposal site), both species are considered unlikely to occur in the Proposal site due to the historic disturbance, urban modification and level of weed encroachment.

Noxious weeds

African Olive (*Olea europaea subsp. Cuspidate*) and Camphor Laurel (*Cinnamomum camphora*) which are declared as Class 4 noxious weed species in the Northern Beaches - Pittwater LGA (DPI, 2016) were identified within the Proposal site.

Fauna habitat

No threatened fauna species were identified within the Proposal site. Furthermore, due to the lack of preferred habitat features such as caves, aquatic habitat and rocky outcrops; none of the threatened fauna identified from the desktop assessment were found to have a moderate or high likelihood of occurrence within the Proposal site.

Two hollow-bearing trees (Grey Gum (*Eucalyptus punctate*) and Broad-leaved Scribbly Gum (*Eucalyptus haemastoma*)) were recorded in the study area (referred to as Trees 125 and 128 respectively). These trees are unlikely to provide roosting and/or nesting habitat for the Eastern Pygmy-possum, Eastern Bentwing-bat, Little Bentwing-bat, Barking Owl or Powerful Owl.

Vegetation within the site may also provide marginal foraging resources suitable for highly mobile bird and bat species. Due to the highly urbanised context of the site, impacts are considered negligible and hence no further assessment is required.

6.7.2. Potential impacts

a) Construction phase

Construction of the Proposal would require the removal of approximately 33 trees and shrubs for the construction of the northbound bus indent in Village Park, southbound B-Line bus shelter and kerb and footpaths works on Golf Avenue.

Vegetation proposed to be removed is listed in Table 27 and primarily consists of Swamp Oak (*Casuarina glauca*). Direct biodiversity impacts are predicted to be minor due to the highly urbanised nature of the Proposal site.

An assessment of each tree within the vicinity of the Proposal site including suggested Tree Protection Zones (TPZs), according to the *AS 4970-2009 for the Protection of Trees on Development Sites* is provided in Appendix D.

Table 27 Summary of species requiring removal

Common name	Scientific name	Number of trees / shrubs proposed to be removed	Type
Swamp Oak	*Casuarina glauca*	21	Native
Angophora	*Angophora sp.*	1	Native
Crimson Bottlebrush	*Callistemon citrinus*	1	Native
Swamp Mahogany	*Eucalyptus robusta*	2	Native
Grey Gum	*Eucalyptus punctata*	1	Native
Sydney Blue Gum	*Eucalyptus saligna*	2	Native
Broad-leaved Paperbark	*Melaleuca quinquenervia*	1	Native
Brush Cherry	*Syzygium australe*	2	Native
Grevillea cultivar.	*Grevillea sp*	1	Native
Black She-Oak	*Allocasuarina littoralis*	1	Native

The final extent of vegetation removal would be confirmed during detailed design and construction planning and would be minimised as far as practicable. Any trees that are found to require removal would be subject to offsetting in accordance with TfNSW's *Vegetation Offset Guide* (TfNSW, 2013d).

The Proposal would result in the removal of one hollow bearing tree (Grey Gum (*Eucalyptus punctata*), referred to as Tree 125 in Appendix D) which is unlikely to provide potential roosting and/or nesting habitat for threatened fauna species due to the small dimensions of the hollow (less than 15 centimetre) and the highly urbanised nature of the environment.

A map of flora within the Proposal site is provided in Figure 32.

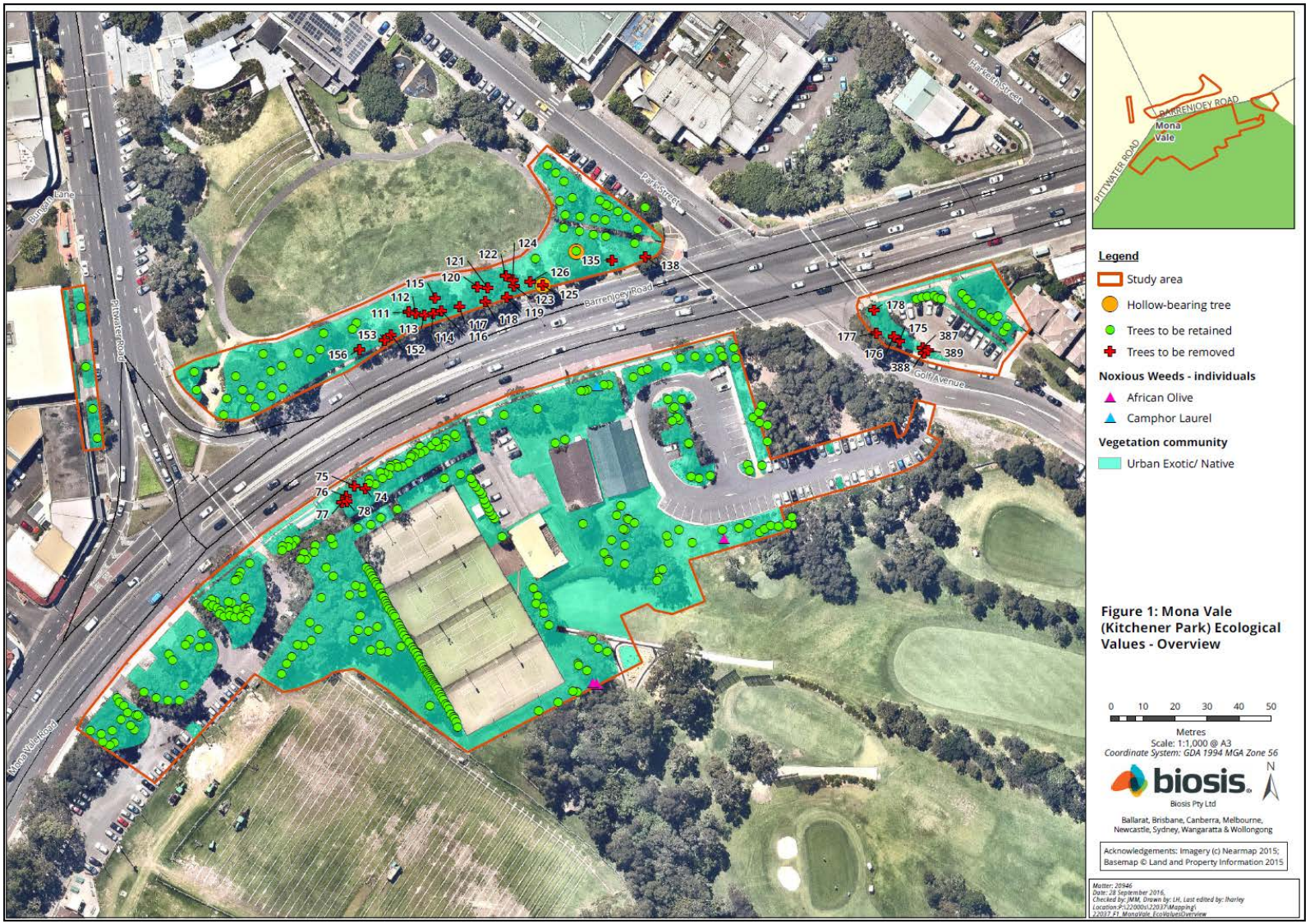

Figure 32 Map of flora within the Proposal site

b) Operational phase

No operational impacts are expected.

6.7.3. Mitigation measures

The following mitigation measures are proposed to manage impacts to biodiversity:

- a minimum of 140 trees should be planted to meet offset requirements for the removal of 33 trees / shrubs through the planting of LGA suitable native species. The TfNSW *Vegetation Offset Guide* (2013d) also states that replanting should occur on or near the impacted site, or, where this is not practicable, alternative locations should be identified and agreed with Northern Beaches Council
- a period of 24 hours is to lapse following the clearing of ground cover and other vegetation immediately surrounding Tree 125 - Grey Gum (*Eucalyptus punctata*) before the felling of this tree, to provide resident fauna an opportunity to evacuate the tree. An ecologist and experienced fauna handler is to supervise the felling of the hollow-bearing / habitat tree to manage any fauna that may still be occupying the trees
- minimise to the fullest extent practicable disturbance to native vegetation within and/or adjacent to the Proposal site
- minimise soil transportation within, into or out of the Proposal site to reduce the spread of weeds. In addition, it is recommended that machinery is free of weed material before entering and exiting the Proposal
- where possible, stockpiling or storage of construction materials should occur in areas already cleared, such as the existing car park or footpath
- TPZ areas are to be established for all trees to be retained prior to start of construction
- detailed design should minimise impacts on the trees to be retained by impacting less than 10 per cent of the TPZ area as outlined in Australian Standard 4970-2009
- the trees to be removed and retained would be clearly demarcated on site prior to construction to avoid inadvertent vegetation removal. In the event of any tree to be retained becoming damaged during construction, an arborist would be informed immediately to inspect and provide advice on remedial action where practicable
- weed control measures would be developed and implemented in the CEMP to manage the dispersal and establishment of weeds during the construction phase. This would include the management and disposal of weeds in accordance with the *Noxious Weeds Act 1993*
- all workers would be provided with an environmental induction prior to commencing work on-site. This induction would include information on the protection measures to be implemented to protect vegetation, including TPZs and weed identification and control
- should onsite works determine the removal or trimming of any additional trees not identified in this REF, the TfNSW Tree Removal Application Form would need to be completed and submitted to TfNSW for approval prior to any removal or trimming being undertaken.

6.8. Contamination, landform, geology and soils

A geotechnical and contamination investigation (Cardno, 2015) was undertaken and a summary of the results of the investigation is provided below.

6.8.1. Existing environment

Soils and landscape

The *Sydney 1:100,000 Geological Series Sheet 9130* shows the site to be underlain by "Silty to peat quartz sand, silt and clay, ferruginous and humic cementation in places, common shell layers" over "Medium to coarse-grained quartz sandstone, very minor shale and laminate lenses from the Wianamatta Group".

The topography of the site is relatively level at seven metres AHD with levels rising to 13 metres between Park Street and Harkeith Street before again dropping down further east. The highest point of the site is located at the entry to the existing at-grade car park on Golf Avenue. The site falls moderately from Golf Avenue south towards the Tennis Clubhouse and remains relatively level between the tennis courts and the skate park to the south. The existing Beeby Reserve car park is sealed with asphalt road and concrete footpaths, with surrounding grass areas.

Landscaped earth berms are situated immediately north of Barrenjoey Road in Village Park. The former Pittwater Council advised that the berms are made of fill material.

Sampling and assessment

Preliminary soil sampling for the targeted assessment for soil contamination was undertaken. Six boreholes were collected from the site. Soil samples were collected and submitted for analytical testing in a laboratory.

Laboratory results revealed the following:

- Site soil encountered fill materials to a depth of approximately two metres below ground level. Fill materials generally consisted of sands, with road base materials.
- Bedrock was encountered between 15 and 20 metres below ground level in boreholes undertaken to the north of Barrenjoey Road in Village Park. The bedrock generally comprised siltstone overlying sandstone. Boreholes on the southern side of Barrenjoey Road within Beeby Reserve revealed sandy clay varying between 0.15 metres and 2.80 metres which extended to bedrock at depths of between 6.6 metres and 8.81 metres below ground level. The bedrock comprised siltstone overlying sandstone.
- Groundwater was encountered between 4.1 and 6.5 metres below ground level.
- There is low potential for acid sulphate soils to occur within the eastern extent of the site. No acid sulphate soil indicators were observed in any of the samples collected.
- Soil analytical results indicated that concentrations of heavy metals were less than the adopted assessment criteria for a commercial / industrial land use setting.
- Asbestos was not detected within any analysed soil sample.
- Polycyclic Aromatic Hydrocarbons (PAHs) - Benzo(a)pyrene was detected within samples obtained from the northern and southern portions of the site, with one sample obtained from 0.5 metres below ground level beneath bitumen within the southern portion of the site, exceeding the adopted ecological assessment criteria.
- Polychlorinated Biphenyls (PCBs) were not reported within any analysed soil sample.

- Organochlorine and Organophosphate Pesticides were not detected within any analysed soil samples.
- Total Recoverable Hydrocarbons (TRHs) within analysed samples were detected in concentrations below the adopted assessment criteria.
- Preliminary testing indicated that soils meet the *Restricted Solid Waste* classification under the NSW EPA *Waste Classification Guidelines* (2014).

6.8.2. Potential impacts

a) Construction phase

The Proposal would require excavation activities for the following:

- construction of new northbound bus indent at Village Park
- road adjustments and widening
- utilities adjustments.

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 generated from excavation and vehicle movements over exposed soil
- an increase in sediment loads entering the stormwater system and/or runoff.

These impacts are considered to be low due to the site terrain and soil type. It is expected that erosion risks could be adequately managed through the implementation of standard measures as outlined in the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004).

Excavation also has the potential to expose localised contamination, which if not appropriately managed, can present a risk to construction workers the community and environment. There is also potential for activities to result in the contamination of soil through accidental fuel or chemical spills from construction plant and equipment.

Further testing would be required to classify waste soil prior to reuse or disposal.

b) Operational phase

Given the reported absence and low levels of contaminants there is no appreciable risk to site users and/or intrusive maintenance workers following completion of construction.

6.8.3. Mitigation measures

The following mitigation measures are proposed to manage impacts as a result of soils and contamination:

- all waste would be managed in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) and excavated soil would be classified prior to reuse or disposal
- during excavation, site workers would be provided with appropriate training as part of the project induction regarding the identification and response actions for the management of potential acid sulfate soils and/or contamination, such as presence of waste and/or other imported materials, odours, soil colouring etc

- prior to construction soil sampling to confirm the presence of any contaminated materials and the waste classification in accordance with the *Waste Classification Guidelines* (EPA, 2014) within the landscaped berm shall be undertaken.

  Should the site investigation identify the presence of contaminated materials and / or hazardous materials, a Contamination Management Plan and / or Hazardous Materials Management Plan would be prepared and implemented for the Proposal.
- where previously unidentified contamination is encountered, or suspected, the works in the vicinity of the affected area would cease immediately, and access to the site prevented (e.g. demarcation fencing or equivalent). The discovery would be investigated, and where necessary remediated and validated as being suitable for its intended land use by an appropriately qualified and experienced contamination advisor. Works would only resume after approval
- an Unexpected Finds Protocol, incorporating asbestos and other potential contaminants, would be included in the Construction Environment Management Plan
- the investigation, management, handling and disposal of any asbestos containing materials would be undertaken by a suitably qualified and experienced occupational hygienist. The disturbance of, handling and disposal of any asbestos containing materials would be undertaken by an appropriately licenced asbestos removal contractor in accordance with applicable WorkCover and EPA requirements and guidelines
- all fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards and EPA Guidelines.

6.9. Hydrology and water quality

6.9.1. Existing environment

The Proposal site is located in a catchment that encompasses Mona Vale civic centre, surrounding residential areas and Mona Vale Golf Course. Surface runoff within the vicinity of the Proposal is collected by a series of at-grade stormwater pits and flows towards a low point near the intersection of Barrenjoey Road and Pittwater Road, to Kitchener Park and then through Mona Vale Golf Course before discharging into the ocean at Mona Vale Beach

The quality of surface water runoff in the vicinity of the Proposal site would be impacted by the existing land uses, including the operation of roads, car park uses and parkland.

Flood information for the site obtained from the Northern Beaches Council – Pittwater mapping indicates that the site is affected by flooding (major overland flows). Lower-lying areas to the south and west of the Proposal have historically been susceptible to overland flooding of the sporting fields and tennis courts.

6.9.2. Potential impacts

a) Construction phase

Without appropriate safeguards, pollutants (fuel, chemicals or wastewater from accidental spills, and sediment from excavations and stockpiles) could potentially reach nearby stormwater drains. Soil disturbance during construction, has the potential to impact upon local water quality as a result of erosion and run off sedimentation. There is also the potential to contaminate local water quality as a result of incidental spills, especially during periods of rainfall.

In an extreme rainfall event, flooding may impact on construction activities. Moderate to heavy wet weather events may cause localised flooding which could increase the potential for soil erosion and sedimentation impacts.

Impacts on groundwater are unlikely. The geotechnical and contamination testing identified groundwater at approximately 6.5 metres depth within Beeby Reserve. Excavations for bus shelter foundations and service trenches would be required but would not involve excavation to any significant depth within the soil profile.

b) Operational phase

The Proposal is unlikely to impact upon the hydrology of the Proposal site or the surrounding area. The existing car park would be retained and no drainage works are proposed in this area.

The detailed design would take stormwater management into consideration. Drainage modifications would be limited to the northbound bus indent area and Pittwater / Barrenjoey intersection works. Such works would be designed and undertaken in accordance with the relevant standards and requirements.

Water pollution reduction measures (water sensitive urban design) would be considered during detailed design. Further hydrological assessment would be undertaken during detailed design to ensure that the Proposal would not impact on or be impacted by flooding.

6.9.3. Mitigation measures

The following measures are proposed to manage the impacts on hydrology and water quality:

- stormwater and drainage systems would be designed in accordance with the relevant Sydney Water and Council standards and requirements where practicable
- prior to commencement of works, an Erosion and Sediment Control Plan would be prepared and implemented in accordance with the 'Blue Book' Managing Urban Stormwater: Soils and Construction Guidelines (Landcom, 2004). The plan would be updated in response to changes in site conditions and management controls maintained throughout the construction phase. Erosion and sediment control measures would be regularly inspected (particularly following rainfall events) to ensure their ongoing functionality
- weather forecasts would be monitored and measures put in place during predicted rainfall events to manage water flows
- 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, 2015c) during the construction phase. All staff would be made aware of the location of the spill kit and be trained in its use
- vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel / oil leaks
- the existing Sydney Water and Council drainage systems would remain operational and be protected throughout the construction of the Proposal
- temporary scour protection and energy dissipation measures would be designed and implemented to protect receiving environments from erosion

- should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and *Water Discharge and Reuse Guidelines* (TfNSW, 2015b).

6.10. Air quality

6.10.1. Existing environment

Air quality in the vicinity of the Proposal is representative of an urban area which is mainly dominated by heavy vehicle usage (cars, buses and trucks) along Barrenjoey Road and Pittwater Road.

The Proposal is mainly surrounded by public recreational areas, local centre and medium density residential development.

A search of the National Pollutant Inventory undertaken on 14 June 2016 for the 2014 to 2015 reporting period identified 12 air polluting substances from one source (Warriewood Sewage Treatment Plant) in the former Pittwater LGA.

6.10.2. Potential impacts

a) Construction phase

During the construction phase, the Proposal may have impacts on air quality through emissions from construction plant and equipment and dust generation through on-site activities and the transportation of fill material. Changes to air quality in the vicinity of the site during construction are anticipated to be temporary in nature and would be further limited by implementation of the measures outlined in Table 28.

b) Operational phase

During the operational phase no additional impacts to air quality are expected. While the pattern of car park use may change with the conversion of spaces to commuter car parking, the number of parking spaces would remain the same. The Proposal would be expected to have a minor positive impact by increasing the availability of car parking spaces near the B-Line stop to encourage public transport use.

6.10.3. Mitigation measures

The following mitigation measures are proposed to manage impacts on air quality:

- methods for reduction of emissions during construction would be incorporated into project inductions, training and pre-start talks
- vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable
- water (or alternate measures) is to be applied to exposed surfaces to minimise the generation of dust
- rehabilitation of exposed surfaces would be carried out promptly, including revegetation or resurfacing as appropriate
- covering of loads on trucks transporting material to and from the construction site, and ensuring that truck tailgates are securely fixed prior to leaving site
- dust would be visually monitored and where necessary the following measures implemented:

- prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces
- plant and machinery would be regularly checked and maintained in a proper and efficient condition.

6.11. Cumulative impacts

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

A search of the Department of Planning and Environment's Major Projects Register, Sydney East Joint Regional Planning Panel Development and Planning Register, and Northern Beaches Development Application Register on 6 October 2016 identified 22 development applications within the suburb of Mona Vale. The nearest are commercial developments at 79 Barrenjoey Road and 3 Perak Street, alterations to an existing hotel at 2 Park Street and alterations to a dwelling at 24 Park Street.

Potential cumulative impacts may occur as a result of construction activities occurring simultaneously with the projects listed above. Potential impacts would include:

- increased traffic travelling through the study area and the surrounding road network and associated delays for road users
- construction noise and vibration
- reduced visual amenity.

Developments proposed within proximity to the Proposal site would also increase construction vehicles on local roads. All four of the above developments are in progress, however the construction period for local developments is unknown.

In addition, the delivery of the Northern Beaches B-Line Program would also involve construction of a number of projects along this corridor including the Warriewood commuter car park and B-Line stops. To manage the potential cumulative impacts of multiple projects being undertaken simultaneously, TfNSW and RMS would establish a coordination group within the project team.

Cumulative impacts would be minimised and managed through the application of environmental safeguards and management measures as summarised in Table 28.

Consultation with Council would be undertaken during construction planning, where required, to ensure that potential cumulative impacts are minimised. Any additional mitigation measures from consultation would be included in the construction TMP and CNVMP for the management of traffic and noise during construction.

The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed and implemented as appropriate.

6.12. Climate change and sustainability

6.12.1. Greenhouse gas emissions

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

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

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

Once operational, the Proposal would assist in facilitating an increase in the use of public transport. Any resultant shift in transport would encourage public transport use and potentially reduce the amount of fuel consumed by private motor vehicles, resulting in a relative reduction in associated greenhouse gas emissions in the local area.

6.12.2. Climate change

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

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

The site is affected by flooding. Details of flood mitigation and water pollutant reduction measures would be determined during detailed design in consultation with Council.

Climate change could lead to an increase in frequency and severity in bushfires. The Proposal is not situated on land mapped as bush fire prone.

6.12.3. Sustainability

The design of the Proposal would be based on the principles of sustainability, including the incorporation of the *Sustainable Design Guidelines – Version 3.0* (TfNSW, 2013a).

These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.4 for more information regarding the application of these guidelines.

The following key proposed key sustainability initiatives (theme and description) are being considered for the design and construction of the Proposal:

- **Energy and greenhouse**: undertake a compliant carbon foot printing exercise in accordance with *Transport for NSW's Greenhouse Gas Inventory Guide for Construction Projects* (TfNSW, 2013c).
- **Climate resilience**: perform a climate change impact assessment using current scientific predictions (i.e. Intergovernmental Panel on Climate Change (IPCC), Commonwealth Scientific and Industrial Research Organisation (CSIRO) etc) to determine the hazards/risks associated with future climatic conditions.
- **Materials and waste:** ensure at least 95 per cent of construction and demolition waste (by weight) is diverted from landfill, and either recycled or reused.
- **Materials and waste**: for all projects generating >300m^3 of spoil, ensure that 100 per cent of usable spoil (by weight) is beneficially reused, on-site or nearby off-site. Usable spoil is not to be sent to landfill.

- **Biodiversity and heritage:** for non-significant impacts offsetting is to be in accordance with the TfNSW *Vegetation Offset Guide* (TfNSW, 2013d) as applicable.
- **Biodiversity and heritage:** 100 per cent of significant heritage items are identified during project development and design and are protected or beneficially reused where practical.
- **Water:** retain hydrology features (i.e. streams, ponds etc) and incorporate with surface water treatment systems e.g. retention basins.
- **Community benefit:** incorporate CPTED principles during design. This may include natural observation and use of CCTV.

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.

Sub plans to the CEMP would include (but not limited to) the following:

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

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

7.2. Mitigation measures

Mitigation measures for the Proposal are listed in Table 28 . These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 28 Proposed mitigation measures

No.	Mitigation measure
	General
1.	An Environmental Controls Map (ECM) would be developed by the Contractor in accordance with TfNSW's *Guide to Environmental Controls Map* (TfNSW, 2015a) for approval by TfNSW, prior to the commencement of construction for implementation for the duration of construction.
2.	A project risk assessment including environmental aspects and impacts would be undertaken by the Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate regular intervals.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.

No.	Mitigation measure
5.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.
6.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.
	Traffic and site access
7.	Prior to the commencement of construction, a Construction Traffic Management Plan (CTMP) would be prepared in consultation with Council and RMS. Specifically the CTMP would address the following aspects: • traffic management, including access and egress • pedestrian and bicycle management arrangements to be implemented where affected by construction activities (including wayfinding signage and fencing) • construction traffic routes and turning movements of heavy vehicles • loading/delivery zones including queuing • parking arrangements for construction staff, and management of any changes to existing parking • an Emergency Response Plan • temporary bus stop arrangement (if required).
8.	Heavy vehicles would be restricted to specified routes, with the aim of minimising impacts on local roads, high pedestrian areas and school zones. Where feasible, route markers would be installed for heavy vehicles along designated routes.
9.	The queuing and idling of construction vehicles in residential streets would be minimised through the staging of deliveries which would be timed to avoid early mornings, peak hours, and peak usage of the adjacent community facilities where practicable.
10.	Ongoing consultation would be undertaken with transport service providers including buses and taxis to ensure any service disruptions are managed and minimised.
11.	Communication would be provided to the community and local residents to inform them of impacts to traffic, changes to bus services and anticipated effects on the local road network relating to site works.
12.	Should road or pedestrian access closures be required, signage would be erected to clearly delineate alternative access.
13.	Pedestrian access to and from the bus stops would be maintained at all times during construction, where practicable.
14.	Road occupancy licences for temporary road closures would be obtained, where required.

No.	Mitigation measure
	Urban design, landscape and visual amenity
15.	The site is to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries.
16.	Temporary hoardings, barriers, traffic management and signage to be removed when no longer required.
17.	Work/site compounds should be screened, with shade cloth or similar material (where necessary) to minimise visual impacts.
18.	Consolidate site equipment and facilities to maximise the area of useable public realm and maintain pedestrian permeability.
19.	Graffiti to be removed during construction in accordance with TfNSW's standard requirements.
20.	Lighting set up during construction would minimise light spill to nearby properties and the night sky.
21.	Restore any areas that are impacted by construction with appropriate landscape treatments.
22.	The detailed design of the Proposal is to consider the following measures to minimise impacts on visual amenity: • where landscaped berms and associated trees along Barrenjoey Road are removed, re-establish a continuous low-level visual barrier between the road and Village Park while maintaining access points • use alternative measures other than berms, such as low walls, to limit encroachments on Village Park if practicable • maintain eye-level visual accessibility between the Barrenjoey Road corridor and Village Park • integration of the northbound bus indent with the *Draft Imagine Mona Vale - Mona Vale Place Plan* (Pittwater Council, 2016) and the setting of the Great War Memorial • investigate opportunities to minimise tree removal where practicable.
23.	Utilise finishes and materials of a high standard that are complementary to the existing locality and landscape, and would minimise reflective surfaces with a preferred use of muted and not bright or reflective colours.
24.	Develop lighting that addresses Australian Standard *AS4284 Control of Obtrusive Effects of Outdoor Lighting* and consider the use of pole mounted LED luminaries ensuring that all light spill would be contained within the area of the bus stop and car park (if modified).
25.	An Urban Design Plan and Public Domain Plan would be prepared in consultation with relevant stakeholders, and any new plant species in the landscape design would be sympathetic to the existing character of the site and adjacent parks.
	Noise and vibration
26.	Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the *Construction Noise Strategy* (TfNSW, 2012b). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.

No.	Mitigation measure
27.	During detailed construction planning a work methodology for works within 50 metres of the Great War Memorial should be developed in order to achieve vibration limits for heritage structures. This may include: • consideration of using smaller capacity plant and/or using dampened rockbreaker • for construction activities within the safe working distance, vibration monitoring or attended vibration trials at the outset of works to ensure compliance with the relevant criterion • if a predicted vibration level exceeding 5 mm/s is identified at the Great War Memorial, an individual structural analysis of the item should be undertaken by a suitably qualified structural engineer in order to identify if the recommended and predicted maximum vibration of 5 mm/s is appropriate for the item and any potential mitigation measures that may be required in terms of its structural stability.
28.	Construction noise and vibration impacts on the Girl Guide Hall and Scout Hall are to be managed through consultation with the community groups to inform the works schedule. Works within 50 metres using noise and vibration intensive equipment use shall be planned to minimise the noise and vibration impacts during sensitive periods of operation of the hall as far as practicable.
29.	Works would be carried out during normal work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays) where practicable. If any out of hours works are required, further approvals would need to be obtained from TfNSW.
30.	High impact noise generating equipment (e.g. rock breaking or hammering, jack hammering, vibratory rolling, cutting of pavement, concrete or steel and any other activities) which result in impulsive or tonal noise generation would not be undertaken for more than three hours, without a minimum one hour respite period.
31.	Notification would be provided to the community, local residents and businesses informing them of the nature of works, expected noise levels, duration of works and provision of a point of contact to discuss any potential issues.
32.	To reduce the construction noise impact from human activities, the following reasonable and feasible noise mitigation options would be implemented, including: • using only the equipment necessary for the upgrade works at any one time where practicable • 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 should be switched off whilst being loaded/unloaded • no idling of delivery trucks • keeping delivering truck drivers informed of designated vehicle routes, parking locations and permitted delivery hours for the site • minimising talking loudly; no swearing, unnecessary shouting, or loud stereos/radios on site. No dropping of materials from height where practicable, throwing of metal items and slamming of doors.

No.	Mitigation measure
33.	To reduce the construction noise and vibration impacts from mechanical activities the following reasonable and feasible noise mitigation options would be implemented, including: • regular training of workers and contractors (such as at toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise • maximising the offset distance between noisy plant and adjacent sensitive receivers • directing noise-emitting plant away from sensitive receivers • installing non tonal reverse alarms, for all construction vehicles and plant regularly used on site (i.e. greater than one day) and for any out of hours work • regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc • use of quieter and less vibration emitting construction methods where feasible and reasonable • 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 • monitoring of noise and vibration would be undertaken during construction to measure compliance against relevant goals/criteria • deliveries and noisy activities would be undertaken during standard hours where practicable.
	Indigenous heritage
34.	All construction staff would receive training in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to both the Indigenous and non-Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
35.	If previously unidentified Indigenous heritage/archaeological objects are uncovered during construction works, all work in the vicinity of the find shall cease and appropriate advice shall be sought from a suitably qualified heritage consultant (and in consultation with the OEH Heritage Branch where appropriate). Works in the vicinity of the find shall not re-commence until clearance has been received from the heritage consultant.
	Non-Indigenous heritage
36.	The detailed design should consider any works which may affect the structural integrity of the Great War Memorial sandstone monument.
37.	A site specific Environmental Control Map (ECM) would identify measures to ensure that the Great War Memorial is protected from damage and would not be adversely impacted by the Proposal.
38.	All construction personnel would be briefed on the presence and significance of the nearby heritage items, their obligations under the *Heritage Act 1977* and the measures required to ensure the protection of any items of heritage significance for the duration of the works.
39.	An unexpected finds procedure would be developed for the works, including if a previously unidentified non-Indigenous historical relic is discovered, all work in the vicinity which could affect the relic would cease and TfNSW would be notified. Advice would be sought from a suitably qualified archaeologist to identify suitable measures to manage the discovery.

No.	Mitigation measure
	Socio-economic
40.	Safe access to the Scout Hall, Girl Guide Hall and Tennis Clubhouse is to be provided throughout construction.
41.	The proposed sustainability criteria for the project would encourage the construction contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
42.	Signage would be installed to notify the public about the works.
43.	Appropriate fencing around the proposed works area would help maintain public safety during construction.
44.	The Community Liaison Plan would identify all potential stakeholders and consultation activities 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.
45.	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.
46.	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
47.	A minimum of 140 trees should be planted to meet offset requirements for the removal of 33 trees/shrubs through the planting of LGA suitable native species. The TfNSW *Vegetation Offset Guide* (2013d) also states that replanting should occur on or near the impacted site, or, where this is not practicable, alternative locations should be identified and agreed with Northern Beaches Council
48.	A period of 24 hours is to lapse following the clearing of ground cover and other vegetation immediately surrounding Tree 125 - Grey Gum (*Eucalyptus punctata*) before the felling of this tree, to provide resident fauna an opportunity to evacuate the tree. An ecologist and experienced fauna handler is to supervise the felling of the hollow-bearing / habitat tree to manage any fauna that may still be occupying the trees.
49.	Minimise to the fullest extent practicable disturbance to native vegetation within and/or adjacent to the Proposal site.
50.	Minimise soil transportation within, into or out of the Proposal site to reduce the spread of weeds. In addition, it is recommended that machinery is free of weed material before entering and exiting the Proposal.
51.	Where possible, stockpiling or storage of construction materials should occur in areas already cleared, such as the existing car park or footpath.
52.	TPZ areas are to be established for all trees to be retained prior to start of construction.
53.	Detailed design should minimise impacts on the trees to be retained by impacting less than 10 per cent of the TPZ area as outlined in Australian Standard 4970-2009.

No.	Mitigation measure
54.	The trees to be removed and retained would be clearly demarcated on site prior to construction to avoid inadvertent vegetation removal. In the event of any tree to be retained becoming damaged during construction, an arborist would be informed immediately to inspect and provide advice on remedial action where practicable.
55.	Weed control measures would be developed and implemented by the CEMP to manage the dispersal and establishment of weeds during the construction phase. This would include the management and disposal in accordance with the *Noxious Weeds Act 1993.*
56.	All workers would be provided with an environmental induction prior to commencing work on-site. This induction would include information on the protection measures to be implemented to protect vegetation, including TPZs and weed identification and control.
57.	Should onsite works determine the removal or trimming of any additional trees not identified in this REF, the TfNSW Tree Removal Application Form would need to be completed and submitted to TfNSW for approval prior to any removal or trimming being undertaken.
	Contamination, landform, geology and soils
58.	All waste would be managed in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) and excavated soil would be classified prior to reuse or disposal.
59.	During excavation, site workers would be provided with appropriate training as part of the project induction regarding the identification and response actions for the management of potential acid sulfate soils and/or contamination, such as presence of waste and/or other imported materials, odours, soil colouring etc.
60.	Prior to construction soil sampling to confirm the presence of any contaminated materials and the waste classification in accordance with the *Waste Classification Guidelines* (EPA, 2014) within the landscaped berm shall be undertaken. Should the site investigation identify the presence of contaminated materials and / or hazardous materials, a Contamination Management Plan and / or Hazardous Materials Management Plan would be prepared and implemented for the Proposal.
61.	Where previously unidentified contamination is encountered, or suspected, the works in the vicinity of the affected area would cease immediately, and access to the site prevented (e.g. demarcation fencing or equivalent). The discovery would be investigated, and where necessary remediated and validated as being suitable for its intended land use by an appropriately qualified and experienced contamination advisor. Works would only resume after approval.
62.	An Unexpected Finds Protocol, incorporating asbestos and other potential contaminants, would be included in the Construction Environment Management Plan.
63.	The investigation, management, handling and disposal of any asbestos containing materials would be undertaken by a suitably qualified and experienced occupational hygienist. The disturbance of, handling and disposal of any asbestos containing materials would be undertaken by an appropriately licenced asbestos removal contractor in accordance with applicable WorkCover and EPA requirements and guidelines.
64.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards and EPA Guidelines.

No.	Mitigation measure
	Hydrology and water quality
65.	Stormwater and drainage systems would be designed in accordance with the relevant Sydney Water and Council standards and requirements where practicable.
66.	Prior to commencement of works, an Erosion and Sediment Control Plan would be prepared and implemented in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004). The plan would be updated in response to changes in site conditions and management controls maintained throughout the construction phase. Erosion and sediment control measures would be regularly inspected (particularly following rainfall events) to ensure their ongoing functionality.
67.	Weather forecasts would be monitored and measures put in place during predicted rainfall events to manage water flows
68.	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* during the construction phase. All staff would be made aware of the location of the spill kits and be trained in its use.
69.	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.
70.	The existing Sydney Water and Council drainage systems would remain operational and be protected throughout the construction of the project.
71.	Temporary scour protection and energy dissipation measures would be designed and implemented to protect receiving environments from erosion.
72.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2015b).

No.	Mitigation measure
	Air quality
73.	Methods for reduction of emissions during construction would be incorporated into project inductions, training and pre-start talks.
74.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
75.	Water (or alternate measures) is to be applied to exposed surfaces to minimise the generation of dust.
76.	Rehabilitation of exposed surfaces would be carried out promptly, including revegetation or resurfacing as appropriate
77.	Covering of loads on trucks transporting material to and from the construction site, and ensuring that truck tailgates are securely fixed prior to leaving site.
78.	Stockpiles would be covered when not in use.
79.	Dust would be visually monitored and where necessary the following measures implemented: • prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces • plant and machinery would be regularly checked and maintained in a proper and efficient condition.

8. Conclusion

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

The Proposal would support the delivery of a new B-Line service and provide the following benefits by:

- providing a high-quality bus stop precinct for customers
- increasing the number of commuter car parking spaces near bus stops
- improving connection between the bus stop and commuter car park, particularly for people with disabilities, the less mobile and parents/carers with prams
- ensuring bus stops have improved walkway/cycleway design and quality of cycling facilities.

During construction, the following key impacts have the potential to occur should the Proposal proceed:

- temporary noise and vibration impacts
- temporary traffic and pedestrian impacts
- vegetation removal
- minor impacts to a locally listed heritage item
- visual impacts.

These impacts are anticipated to be primarily temporary in nature and can be managed through appropriate mitigation measures detailed in this REF.

The following key operational impacts have the potential to occur as a result of the Proposal:

- visual impacts
- increase in commuter car parking
- removal of eight on street parking spaces.

The Proposal has been designed to reduce visual impacts and is considered to have a low to moderate impact during operation. The visual impacts would reduce over time as offset planting matures.

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

The Proposal would also take into account the principles of ESD (refer to Section 3.1 and Section 6.12). 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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SLR, 2016, *Mona Vale Commuter Car Park and B-Line Stops Noise and Vibration Impact Assessment*, October 2016, Sydney

TfNSW, 2012, *NSW Long Term Transport Master Plan*, Sydney

TfNSW, 2013a, *NSW Sustainable Design Guidelines - Version 3.0*, Sydney

TfNSW, 2013b, *Sydney's Bus Future - Simpler, faster, better bus services*, Sydney

TfNSW, 2013c, *Greenhouse Gas Inventory Guide for Construction Projects*, Sydney

TfNSW, 2013d, *Vegetation Offset Guide*, Sydney

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

TfNSW, 2015b, *Water Discharge and Reuse Guideline*, Sydney

TfNSW, 2015c, *Chemical Storage and Spill Response Guidelines*, Sydney

Umwelt, 2016, *Mona Vale NBBRT Commuter Car Park – Desktop Heritage Assessment*, October 2016, Sydney

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? The Proposal would not have any impact on a World Heritage property.	Nil
Any impact on a National Heritage place? The Proposal would not have any impact on a National Heritage place.	Nil
Any impact on a wetland of international importance? The Proposal would not have any impact on a wetland of international importance.	Nil
Any impact on a listed threatened species or communities? The Proposal would not have an impact on a listed threatened species, population or communities.	Nil
Any impacts on listed migratory species? The Proposal would not have any impacts on listed migratory species.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? The Proposal would not have 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? The Proposal is for a transport facility and is not related to coal seam gas or mining.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The Proposal would not have a direct or indirect impact 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.

Factor	Impacts
(a) Any environmental impact on a community? The Proposal would have a positive benefit on the community by providing additional commuter parking spaces. The increased capacity located adjacent a bus service would improve connection between the bus stop and commuter car park.	Minor
(b) Any transformation of a locality? The conversion of an existing car park would not cause the transformation of the locality.	Nil
(c) Any environmental impact on the ecosystem of the locality? The Proposal would require removal of 33 trees but given the Proposal's location within an urbanised environment and the low habitat value of the trees to be removed, impacts to biodiversity and ecosystems are expected to be negligible.	Minor
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be some temporary impacts during construction particularly in relation to noise, traffic and access and visual amenity. During operation the Proposal would have positive impacts to the community through providing additional commuter car parking facilities.	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 Proposal would have a positive effect on public transport access and would be sympathetic to the existing surroundings.	Nil
(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 have any impact on the habitat of protected fauna.	Nil
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The Proposal is unlikely to have any impact on endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.	Nil
(h) Any long-term effects on the environment? The Proposal is unlikely to have any long term effects on the environment.	Nil

Factor	Impacts
(i) Any degradation of the quality of the environment? During construction there is potential for noise, visual and traffic and access impacts. During operation, some increase in traffic volume generated by the site is anticipated. However the increase is considered to be low and would not affect the surrounding road network adversely.	Minor
(j) Any risk to the safety of the environment? The Proposal is unlikely to cause any pollution or safety risks to the environment provided the recommended mitigation measures are implemented.	Nil
(k) Any reduction in the range of beneficial uses of the environment? The Proposal is unlikely to have any reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The Proposal is unlikely to cause any pollution or to the environment provided the recommended mitigation measures are implemented.	Nil
(m) Any environmental problems associated with the disposal of waste? The Proposal is unlikely to cause any environmental problems associated with the disposal of waste. All waste would be managed and disposed of with a site-specific Waste Management Plan. Mitigation measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Nil
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is unlikely increase demands on resources that are or are likely to become in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative effects of the Proposal are described in Chapter 6. Where feasible, environmental management measures would be coordinated to reduce cumulative construction impacts. The Proposal is unlikely to have any significant long term impacts.	Nil
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal would not affect or be affected by any coastal processes or hazards.	Nil

Appendix C Predicted construction noise levels

Table 1 Predicted Construction Noise Levels for Receiver R1

Phase	Activity	NML (D)	NML (D OOHW)	NML (E)	NML (N)	Activity, $L_{Aeq(15min)}$, dBA	Exceedance (D)	Exceedance (D OOHW)	Exceedance (E)	Exceedance (N)
1.1	Establish site compound. Install hoardings. Utility location works.	67	62	58	46	79	12	n/a	n/a	n/a
1.2	Material delivery - compound.	67	62	58	46	71	4	n/a	n/a	n/a
1.3	Tree removal - Golf Avenue.	67	62	58	46	79	12	n/a	n/a	n/a
2.1	Road works: utility protection and relocation; intersection works; northbound bus indent; median works; turning lanes; pedestrian fencing.	67	62	58	46	82	15	20	24	36
2.2	Pavement works. Line marking.	67	62	58	46	78	11	16	20	32
3.1	B-Line stop footing / civil works.	67	62	58	46	63	0	0	5	17
3.2	Pavement works. Line marking.	67	62	58	46	78	11	16	20	32
3.3	Construct / fit out B-Line stops. Landscaping. Commissioning systems. Relocate bus stop and remove redundant bus stop infrastructure.	67	62	58	46	51	0	0	0	5
3.4	Landscaping. Remove site compound and hoardings.	67	62	58	46	74	7	n/a	n/a	n/a

Notes: NML is the Noise Management Level, D is daytime (i.e. 7am to 6pm during standard construction hours), E is evening (i.e. 7pm-10pm), N is night time (i.e. 10pm to 7am)

Table 2 Predicted Construction Noise Levels for Receiver R2

Phase	Activity	NML (D)	NML (D OOHW)	NML (E)	NML (N)	Activity, $L_{Aeq(15min)}$, dBA	Exceedance (D)	Exceedance (D OOHW)	Exceedance (E)	Exceedance (N)
1.1	Establish site compound. Install hoardings. Utility location works.	57	52	52	43	69	12	n/a	n/a	n/a
1.2	Material delivery - compound.	57	52	52	43	61	4	n/a	n/a	n/a
1.3	Tree removal - Golf Avenue.	57	52	52	43	72	15	n/a	n/a	n/a
2.1	Road works: utility protection and relocation; intersection works; northbound bus indent; median works; turning lanes; pedestrian fencing.	57	52	52	43	73	16	21	21	30
2.2	Pavement works. Line marking.	57	52	52	43	69	12	17	17	26
3.1	B-Line stop footing / civil works.	57	52	52	43	61	4	9	9	18
3.2	Pavement works. Line marking.	57	52	52	43	69	12	17	17	26
3.3	Construct / fit out B-Line stops. Landscaping. Commissioning systems. Relocate bus stop and remove redundant bus stop infrastructure.	57	52	52	43	49	0	0	0	6
3.4	Landscaping. Remove site compound and hoardings.	57	52	52	43	64	7	n/a	n/a	n/a

Table 3 Predicted Construction Noise Levels for Receiver R3

Phase	Activity	NML (D)	NML (D OOHW)	NML (E)	NML (N)*	Activity, $L_{Aeq(15min)}$, dBA	Exceedance (D)	Exceedance (D OOHW)	Exceedance (E)	Exceedance (N)*
1.1	Establish site compound. Install hoardings. Utility location works.	70	70	70	60	65	0	n/a	n/a	n/a
1.2	Material delivery - compound.	70	70	70	60	57	0	n/a	n/a	n/a
1.3	Tree removal - Golf Avenue.	70	70	70	60	73	3	n/a	n/a	n/a
2.1	Road works: utility protection and relocation; intersection works; northbound bus indent; median works; turning lanes; pedestrian fencing.	70	70	70	60	74	4	4	4	14
2.2	Pavement works. Line marking.	70	70	70	60	74	4	4	4	14
3.1	B-Line stop footing / civil works.	70	70	70	60	67	0	0	0	7
3.2	Pavement works. Line marking.	70	70	70	60	74	4	4	4	14
3.3	Construct / fit out B-Line stops. Landscaping. Commissioning systems. Relocate bus stop and remove redundant bus stop infrastructure.	70	70	70	60	55	0	0	0	0
3.4	Landscaping. Remove site compound and hoardings.	70	70	70	60	60	0	n/a	n/a	n/a

*Applies only if there is overnight accommodation at R3.

Table 4 Predicted Construction Noise Levels for Receiver R4

Phase	Activity	NML (D)	NML (D OOHW)	NML (E)	NML (N)	Activity, $L_{Aeq(15min)}$, dBA	Exceedance (D)	Exceedance (D OOHW)	Exceedance (E)	Exceedance (N)
1.1	Establish site compound. Install hoardings. Utility location works.	65	65	65	n/a	62	0	n/a	n/a	n/a
1.2	Material delivery - compound.	65	65	65	n/a	50	0	n/a	n/a	n/a
1.3	Tree removal - Golf Avenue.	65	65	65	n/a	65	0	n/a	n/a	n/a
2.1	Road works: utility protection and relocation; intersection works; northbound bus indent; median works; turning lanes; pedestrian fencing.	65	65	65	n/a	65	0	0	0	n/a
2.2	Pavement works. Line marking.	65	65	65	n/a	61	0	0	0	n/a
3.1	B-Line stop footing / civil works.	65	65	65	n/a	64	0	0	0	n/a
3.2	Pavement works. Line marking.	65	65	65	n/a	61	0	0	0	n/a
3.3	Construct / fit out B-Line stops. Landscaping. Commissioning systems. Relocate bus stop and remove redundant bus stop infrastructure.	65	65	65	n/a	52	0	0	0	n/a
3.4	Landscaping. Remove site compound and hoardings.	65	65	65	n/a	57	0	n/a	n/a	n/a

Table 5 Predicted Construction Noise Levels for Receiver R5

Phase	Activity	NML (D)	NML (D OOHW)	NML (E)	NML (N)	Activity, $L_{Aeq(15min)}$, dBA	Exceedance (D)	Exceedance (D OOHW)	Exceedance (E)	Exceedance (N)
1.1	Establish site compound. Install hoardings. Utility location works.	70	70	n/a	n/a	58	0	n/a	n/a	n/a
1.2	Material delivery - compound.	70	70	n/a	n/a	44	0	n/a	n/a	n/a
1.3	Tree removal - Golf Avenue.	70	70	n/a	n/a	59	0	n/a	n/a	n/a
2.1	Road works: utility protection and relocation; intersection works; northbound bus indent; median works; turning lanes; pedestrian fencing.	70	70	n/a	n/a	86	16	16	n/a	n/a
2.2	Pavement works. Line marking.	70	70	n/a	n/a	80	10	10	n/a	n/a
3.1	B-Line stop footing / civil works.	70	70	n/a	n/a	68	0	0	n/a	n/a
3.2	Pavement works. Line marking.	70	70	n/a	n/a	80	10	10	n/a	n/a
3.3	Construct / fit out B-Line stops. Landscaping. Commissioning systems. Relocate bus stop and remove redundant bus stop infrastructure.	70	70	n/a	n/a	56	0	0	n/a	n/a
3.4	Landscaping. Remove site compound and hoardings.	70	70	n/a	n/a	52	0	n/a	n/a	n/a

Appendix D Tree assessment

Table 1 Tree assessment and required offsets

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
Trees to be removed							
74	Yes	Angophora.	*Angophora sp*	13	2	Poor	2
75	Yes	Swamp Oak	*Casuarina glauca*	37	4.44	Good	4
76	Yes	Swamp Oak	*Casuarina glauca*	34	4.08	Good	4
77	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4
78	Yes	Swamp Oak	*Casuarina glauca*	20	2.4	Good	4
111	Yes	Swamp Oak	*Casuarina glauca*	48	5.76	Good	4
112	Yes	Swamp Oak	*Casuarina glauca*	40	4.8	Good	4
113	Yes	Swamp Oak	*Casuarina glauca*	32	3.84	Good	4
114	Yes	Swamp Oak	*Casuarina glauca*	50	6	Good	4
115	Yes	Swamp Oak	*Casuarina glauca*	61	7.32	Good	8
116	Yes	Swamp Oak	*Casuarina glauca*	35	4.2	Good	4
117	Yes	Swamp Oak	*Casuarina glauca*	20	2.4	Good	4
118	Yes	Swamp Oak	*Casuarina glauca*	48	5.76	Good	4
119	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
120	Yes	Swamp Oak	*Casuarina glauca*	52	6.24	Good	4
121	Yes	Swamp Oak	*Casuarina glauca*	80	9.6	Good	8

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
122	Yes	Black She-Oak	*Allocasuarina littoralis*	28	3.36	Good	4
123	Yes	Swamp Oak	*Casuarina glauca*	32	3.84	Good	4
124	Yes	Swamp Oak	*Casuarina glauca*	46	5.52	Good	4
125	Yes	Grey Gum	*Eucalyptus punctata*	37	4.44	Good Hollow bearing tree	4
126	Yes	Sydney Blue Gum	*Eucalyptus saligna*	32	3.84	Good	4
135	Yes	Crimson Bottlebrush	*Callistemon citrinus*	38	4.56	Good	4
138	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	90	10.8	Good	8
152	Yes	Swamp Oak	*Casuarina glauca*	40	4.8	Good	4
153	Yes	Swamp Oak	*Casuarina glauca*	30	3.6	Good	4
156	Yes	Swamp Oak	*Casuarina glauca*	61	7.32	Good	8
175	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
176	Yes	Brush Cherry	*Syzygium australe*	15	2	Good	2
177	Yes	Sydney Blue Gum	*Eucalyptus saligna*	117	14.04	Good	8
178	Yes	Grevillea cultivar	*Grevillea sp.*	8	2	Moderate	2
387	Yes	Swamp Mahogany	*Eucalyptus robusta*	12	2	Good	2
388	Yes	Swamp Mahogany	*Eucalyptus robusta*	16	2	Good	4
389	Yes	Swamp Oak	*Casuarina glauca*	5	2	Good	2

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
Trees to be retained							***offset provided if removal is required**
1	No	African Olive	*Olea europaea subsp. Cuspidate*	24	2.88	Good Noxious weed	4
2	Yes	Swamp Oak	*Casuarina glauca*	8	2	Good	2
3	Yes	Swamp Oak	*Casuarina glauca*	32	3.84	Poor	4
4	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
5	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4
6	Yes	Swamp Oak	*Casuarina glauca*	58	6.96	Good	4
7	Yes	Swamp Oak	*Casuarina glauca*	23	2.76	Good	4
8	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4
9	Yes	Swamp Oak	*Casuarina glauca*	44	5.28	Good	4
10	Yes	Flame Tree	*Brachychiton acertifolius*	24	2.88	Good	4
11	Yes	Flame Tree	*Brachychiton acertifolius*	38	4.56	Good	4
12	Yes	Angophora	*Angophora sp.*	8	2	Good	2
13	Yes	Angophora	*Angophora sp.*	7	2	Moderate	2
14	Yes	Eucalyptus	*Eucalyptus sp.*	6	2	Good	2
15	Yes	Rough-barked Apple	*Angophora floribunda*	12	2	Good	2
16	Yes	Swamp Oak	*Casuarina glauca*	72	8.64	Good	8

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
17	Yes	Swamp Oak	*Casuarina glauca*	53	6.36	Good	4
18	Yes	Swamp Oak	*Casuarina glauca*	56	6.72	Good	4
19	Yes	Swamp Oak	*Casuarina glauca*	67	8.04	Good	8
20	Yes	Swamp Oak	*Casuarina glauca*	26	3.12	Good	4
21	Yes	Swamp Oak	*Casuarina glauca*	46	5.52	Good	4
22	Yes	Swamp Oak	*Casuarina glauca*	44	5.28	Good	4
23	Yes	Swamp Oak	*Casuarina glauca*	62	7.44	Good	8
24	Yes	Swamp Oak	*Casuarina glauca*	24	2.88	Good	4
25	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
26	Yes	Swamp Oak	*Casuarina glauca*	87	10.44	Good	8
27	Yes	Swamp Oak	*Casuarina glauca*	96	11.52	Good	8
28	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4
29	Yes	Swamp Oak	*Casuarina glauca*	82	9.84	Good	8
30	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
31	Yes	Swamp Oak	*Casuarina glauca*	26	3.12	Good	4
32	Yes	Swamp Oak	*Casuarina glauca*	29	3.48	Good	4
33	Yes	Swamp Oak	*Casuarina glauca*	72	8.64	Good	8
34	Yes	Eucalyptus	*Eucalyptus sp.*	7	2	Poor	2

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
35	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
36	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
37	Yes	Forest Red Gum	*Eucalyptus tereticornis*	54	6.48	Good	4
38	Yes	Crimson Bottlebrush	*Callistemon citrinus*	6	2	Good	2
39	No	Camphor laurel	*Cinnamomum camphora*	12	2	Good Noxious weed	2
40	Yes	Swamp Mahogany	*Eucalyptus robusta*	64	7.68	Good	8
41	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	26	3.12	Good	4
42	Yes	Swamp Oak	*Casuarina glauca*	11	2	Moderate	2
43	Yes	Swamp Mahogany	*Eucalyptus robusta*	78	9.36	Good	8
44	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
45	Yes	Swamp Mahogany	*Eucalyptus robusta*	70	8.4	Good	8
46	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
47	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
48	Yes	Swamp Mahogany	*Eucalyptus robusta*	36	4.32	Moderate	4
49	Yes	Swamp Oak	*Casuarina glauca*	26	3.12	Good	4
50	Yes	Swamp Mahogany	*Eucalyptus robusta*	8	2	Moderate	2
51	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
52	Yes	Swamp Oak	*Casuarina glauca*	13	2	Good	2
53	Yes	Swamp Oak	*Casuarina glauca*	26	3.12	Good	4
54	Yes	Swamp Oak	*Casuarina glauca*	31	3.72	Good	4
55	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
56	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
57	Yes	Swamp Oak	*Casuarina glauca*	17	2.04	Good	4
58	Yes	Swamp Oak	*Casuarina glauca*	33	3.96	Good	4
59	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
60	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4
61	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
62	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
63	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
64	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
65	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
66	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
67	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4
68	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4
69	Yes	Swamp Oak	*Casuarina glauca*	17	2.04	Moderate	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
70	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
71	Yes	Swamp Oak	*Casuarina glauca*	9	2	Good	2
72	Yes	Swamp Oak	*Casuarina glauca*	30	3.6	Good	4
73	Yes	Swamp Oak	*Casuarina glauca*	16	2	Good	4
79	Yes	Coast Banksia	*Banksia integrifolia*	16	2	Good	4
80	Yes		*Callistemon rigidus*	10	2	Good	2
81	Yes	Coast Banksia	*Banksia integrifolia*	15	2	Good	2
82	Yes	Coast Banksia	*Banksia integrifolia*	30	3.6	Good	4
83	No	Cotton Palm	*Washingtonia robusta*	33	3.96	Good	4
84	Yes	Cheese Tree	*Glochidion ferdinandi*	28	3.36	Good	4
85	Yes	Crimson Bottlebrush	*Callistemon citrinus*	13	2	Good	2
86	Yes	Crimson Bottlebrush	*Callistemon citrinus*	29	3.48	Good	4
87	Yes	Swamp Mahogany	*Eucalyptus robusta*	15	2	Moderate	2
88	Yes	Swamp Mahogany	*Eucalyptus robusta*	15	2	Good	2
89	Yes	Swamp Mahogany	*Eucalyptus robusta*	8	2	Good	2
90	Yes	Swamp Oak	*Casuarina glauca*	25	3	Good	4
91	Yes	Swamp Oak	*Casuarina glauca*	35	4.2	Good	4
92	Yes	Swamp Oak	*Casuarina glauca*	32	3.84	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
93	Yes	Swamp Oak	*Casuarina glauca*	37	4.44	Good	4
94	Yes	Smooth-barked Apple	*Angophora costata*	38	4.56	Good	4
95	Yes	Swamp Oak	*Casuarina glauca*	25	3	Good	4
96	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
97	Yes	Swamp Mahogany	*Eucalyptus robusta*	16	2	Good	4
98	Yes	Swamp Mahogany	*Eucalyptus robusta*	13	2	Good	2
99	Yes	Swamp Mahogany	*Eucalyptus robusta*	11	2	Good	2
100	Yes	Swamp Mahogany	*Eucalyptus robusta*	27	3.24	Good	4
101	Yes	Swamp Oak	*Casuarina glauca*	34	4.08	Good	4
102	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
103	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4
104	Yes	Swamp Mahogany	*Eucalyptus robusta*	9	2	Good	2
105	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
106	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4
107	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
108	Yes	Swamp Oak	*Casuarina glauca*	8	2	Good	2
109	Yes	Swamp Oak	*Casuarina glauca*	8	2	Good	2
110	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
127	No	Avocado	*Persea americana*	18	2.16	Good	4
128	Yes	Broad-leaved Scribbly Gum	*Eucalyptus haemastoma*	95	11.4	Good Hollow bearing tree	8
129	No	Chinese Pistachio	*Pistacia chinensis*	12	2	Good	2
130	No	Chinese Pistachio	*Pistacia chinensis*	16	2	Good	4
131	No	Chinese Pistachio	*Pistacia chinensis*	18	2.16	Good	4
132	No	Chinese Pistachio	*Pistacia chinensis*	12	2	Good	2
133	No	Chinese Pistachio	*Pistacia chinensis*	8	2	Good	2
134	No	Chinese Pistachio	*Pistacia chinensis*	23	2.76	Good	4
136	No	Chinese Pistachio	*Pistacia chinensis*	18	2.16	Good	4
137	No	Chinese Pistachio	*Pistacia chinensis*	19	2.28	Good	4
139	No	Chinese Pistachio	*Pistacia chinensis*	12	2	Good	2
140	No	Chinese Pistachio	*Pistacia chinensis*	23	2.76	Good	4
141	Yes	Tuckeroo	*Cupaniopsis anacardioides*	43	5.16	Good	4
142	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	42	5.04	Good	4
143	Yes	Swamp Mahogany	*Eucalyptus robusta*	56	6.72	Good	4
144	Yes	Swamp Mahogany	*Eucalyptus robusta*	18	2.16	Good	4
145	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	23	2.76	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
146	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	28	3.36	Good	4
147	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	30	3.6	Good	4
148	Yes	Lemon Scented Gum	*Corymbia citriodora*	45	5.4	Good	4
149	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	31	3.72	Good	4
150	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	16	2	Good	4
151	Yes	Broad-leaved	*Paperbark Melaleuca quinquenervia*	16	2	Good	4
154	Yes	Swamp Oak	*Casuarina glauca*	30	3.6	Good	4
155	Yes	Swamp Oak	*Casuarina glauca*	16	2	Good	4
157	Yes	Swamp Oak	*Casuarina glauca*	55	6.6	Good	4
158	Yes	Swamp Oak	*Casuarina glauca*	16	2	Good	4
159	Yes	Swamp Oak	*Casuarina glauca*	45	5.4	Good	4
160	Yes	Swamp Oak	*Casuarina glauca*	16	2	Good	4
161	Yes	Swamp Mahogany	*Eucalyptus robusta*	40	4.8	Good	4
162	Yes	Swamp Mahogany	*Eucalyptus robusta*	17	2.04	Good	4
163	Yes	Swamp Mahogany	*Eucalyptus Eucalyptus saligna robusta*	10	2	Good	2
164	Yes	Sydney Blue Gum		65	7.8	Good	8

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
165	Yes	-	*Eucalyptus saligna x botriodes*	61	7.32	Good	8
166	Yes	Swamp Mahogany	*Eucalyptus robusta*	25	3	Good	4
167	Yes	Swamp Mahogany	*Eucalyptus robusta*	48	5.76	Good	4
168	Yes	Swamp Oak	*Casuarina glauca*	61	7.32	Good	8
169	Yes	Swamp Oak	*Casuarina glauca*	55	6.6	Good	4
170	Yes	Swamp Oak	*Casuarina glauca*	61	7.32	Good	8
171	No	Conifer	*Juniperus sp.*	40	4.8	Good	4
172	No	Golden Dewdrops	*Duranta erecta*	16	2	Good	4
173	No	Conifer	*Cupressus sp.*	50	6	Good	4
174	No	Conifer	*Cupressus sp.*	35	4.2	Good	4
179	Yes	Grevillea cultivar	*Grevillea sp.*	16	2	Moderate	4
180	Yes	Grevillea cultivar	*Grevillea sp.*	18	2.16	Good	4
181	Yes	Crimson Bottlebrush	*Callistemon citrinus*	22	2.64	Moderate	4
182	Yes	Grevillea cultivar	*Grevillea sp*	11	2	Good	2
183	Yes	Hairpin Banksia	*Banksia spinulosa*	21	2.52	Good	4
184	Yes	Crimson Bottlebrush	*Callistemon citrinus*	33	3.96	Good	4
185	Yes	Sydney Blue Gum	*Eucalyptus saligna*	28	3.36	Moderate	4
186	Yes	Scribbly Gum	*Eucalyptus haemastoma*	32	3.84	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
187	Yes	Hairpin Banksia	*Banksia spinulosa*	9	2	Good	2
188	Yes	Scribbly Gum	*Eucalyptus haemastoma*	62	7.44	Good	8
189	Yes	Grevillea cultivar	*Grevillea sp.*	14	2	Good	2
190	Yes	Grevillea cultivar	*Grevillea sp.*	12	2	Good	2
191	Yes	Grevillea cultivar	*Grevillea sp.*	15	2	Good	2
192	Yes	Willow Bottlebrush	*Callistemon salignus*	13	2	Good	2
193	Yes	Scribbly Gum	*Eucalyptus haemastoma*	32	3.84	Good	4
194	Yes	Coast Banksia	*Banksia integrifolia*	22	2.64	Good	4
195	No	Silky Oak	*Grevillea robusta*	38	4.56	Good	4
196	No	Golden Dewdrops	*Duranta erecta*	18	2.16	Good	4
197	No	Silky Oak	*Grevillea robusta*	29	3.48	Good	4
198	No	Golden Dewdrops	*Duranta erecta*	24	2.88	Good	4
199	No	Golden Dewdrops	*Duranta erecta*	26	3.12	Good	4
200	No	Silky Oak	*Grevillea robusta*	33	3.96	Good	4
201	Yes	Crimson Bottlebrush	*Callistemon citrinus*	42	5.04	Good	4
202	Yes	Crimson Bottlebrush	*Callistemon citrinus*	57	6.84	Good	4
203	Yes	Crimson Bottlebrush	*Callistemon citrinus*	22	2.64	Good	4
204	Yes	Swamp Oak	*Casuarina glauca*	42	5.04	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
205	Yes	Swamp Oak	*Casuarina glauca*	39	4.68	Good	4
206	Yes	Swamp Oak	*Casuarina glauca*	123	14.76	Good	8
207	No	African Olive	*Olea europaea subsp. cuspidata*	27	3.24	Good Noxious weed	4
208	No	African Olive	*Olea europaea subsp. cuspidata*	18	2.16	Good Noxious weed	4
209	Yes	Swamp Oak	*Casuarina glauca*	54	6.48	Good	4
210	No	Norfolk Island Hibiscus	*Lagunaria patersonia*	24	2.88	Good	4
211	Yes	Swamp Oak	*Casuarina glauca*	49	5.88	Good	4
212	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
213	Yes	Cheese Tree	*Glochidion ferdinandi*	45	5.4	Good	4
214	Yes	Swamp Mahogany	*Eucalyptus robusta*	26	3.12	Good	4
215	Yes	Swamp Oak	*Casuarina glauca*	31	3.72	Good	4
216	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
217	Yes	Swamp Oak	*Casuarina glauca*	35	4.2	Good	4
218	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
219	Yes	Swamp Oak	*Casuarina glauca*	19	2.28	Good	4
220	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
221	Yes	Swamp Oak	*Casuarina glauca*	27	3.24	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
222	Yes	Sydney Blue Gum	*Eucalyptus saligna*	43	5.16	Good	4
223	Yes	Sydney Blue Gum	*Eucalyptus saligna*	79	9.48	Good	8
224	Yes	Sydney Blue Gum	*Eucalyptus saligna*	27	3.24	Good	4
225	Yes	Swamp Mahogany	*Eucalyptus robusta*	15	2	Good	2
226	Yes	Sydney Blue Gum	*Eucalyptus saligna*	42	5.04	Good	4
227	Yes	Sydney Blue Gum	*Eucalyptus saligna*	18	2.16	Good	4
228	Yes	Sydney Blue Gum	*Eucalyptus saligna*	63	7.56	Good	8
229	Yes	Swamp Mahogany	*Eucalyptus robusta*	13	2	Good	2
230	Yes	Sydney Blue Gum	*Eucalyptus saligna*	74	8.88	Good	8
231	Yes	Sydney Blue Gum	*Eucalyptus saligna*	63	7.56	Good	8
232	Yes	Sydney Blue Gum	*Eucalyptus saligna*	82	9.84	Good	8
233	Yes	Swamp Mahogany	*Eucalyptus robusta*	13	2	Good	2
234	Yes	Swamp Mahogany	*Eucalyptus robusta*	12	2	Good	2
235	Yes	Sydney Blue Gum	*Eucalyptus saligna*	28	3.36	Good	4
236	Yes	Swamp Mahogany	*Eucalyptus robusta*	13	2	Moderate	2
237	Yes	Sydney Blue Gum	*Eucalyptus saligna*	54	6.48	Good	4
238	Yes	Sydney Blue Gum	*Eucalyptus saligna*	68	8.16	Good	8
239	Yes	Swamp Mahogany	*Eucalyptus robusta*	36	4.32	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
240	Yes	Swamp Oak	*Casuarina glauca*	48	5.76	Good	4
241	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
242	Yes	Swamp Oak	*Casuarina glauca*	24	2.88	Good	4
243	Yes	Swamp Oak	*Casuarina glauca*	58	6.96	Good	4
244	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
245	Yes	Swamp Oak	*Casuarina glauca*	51	6.12	Good	4
246	Yes	Swamp Oak	*Casuarina glauca*	49	5.88	Good	4
247	Yes	Forest Red Gum	*Eucalyptus tereticornis*	29	3.48	Moderate	4
248	Yes	Forest Red Gum	*Eucalyptus tereticornis*	53	6.36	Moderate	4
249	Yes	Forest Red Gum	*Eucalyptus tereticornis*	26	3.12	Moderate	4
250	Yes	Forest Red Gum	*Eucalyptus tereticornis*	11	2	Moderate	2
251	Yes	Forest Red Gum	*Eucalyptus tereticornis*	19	2.28	Moderate	4
252	Yes	Forest Red Gum	*Eucalyptus tereticornis*	14	2	Moderate	2
253	Yes	Swamp Mahogany	*Eucalyptus robusta*	62	7.44	Good	8
254	Yes	Sydney Blue Gum	*Eucalyptus saligna*	192	23.04	Good	8
255	Yes	Crimson Bottlebrush	*Callistemon citrinus*	28	3.36	Good	4
256	Yes	Crimson Bottlebrush	*Callistemon citrinus*	16	2	Good	4
257	Yes	Crimson Bottlebrush	*Callistemon citrinus*	24	2.88	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
258	Yes	Sydney Blue Gum	*Eucalyptus saligna*	66	7.92	Good	8
259	Yes	Crimson Bottlebrush	*Callistemon citrinus*	22	2.64	Good	4
260	Yes	Crimson Bottlebrush	*Callistemon citrinus*	29	3.48	Good	4
261	Yes	Crimson Bottlebrush	*Callistemon citrinus*	34	4.08	Poor	4
262	Yes	Crimson Bottlebrush	*Callistemon citrinus*	14	2	Moderate	2
263	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
264	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
265	Yes	Crimson Bottlebrush	*Callistemon citrinus*	17	2.04	Good	4
266	Yes	Swamp Oak	*Casuarina glauca*	18	2.16	Good	4
267	Yes	Crimson Bottlebrush	*Callistemon citrinus*	14	2	Good	2
268	Yes	Swamp Oak	*Casuarina glauca*	17	2.04	Good	4
269	Yes	Swamp Oak	*Casuarina glauca*	21	2.52	Good	4
270	Yes	Swamp Oak	*Casuarina glauca*	14	2	Good	2
271	Yes	Swamp Oak	*Casuarina glauca*	11	2	Good	2
272	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
273	Yes	Swamp Oak	*Casuarina glauca*	34	4.08	Good	4
274	Yes	Swamp Oak	*Casuarina glauca*	23	2.76	Good	4
275	Yes	Swamp Oak	*Casuarina glauca*	33	3.96	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
276	Yes	Swamp Oak	*Casuarina glauca*	17	2.04	Good	4
277	Yes	Swamp Oak	*Casuarina glauca*	41	4.92	Good	4
278	Yes	Swamp Oak	*Casuarina glauca*	46	5.52	Good	4
279	Yes	Crimson Bottlebrush	*Callistemon citrinus*	23	2.76	Good	4
280	No	Mirror Bush	*Coprosma repens*	29	3.48	Good	4
281	Yes	Crimson Bottlebrush	*Callistemon citrinus*	24	2.88	Good	4
282	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
283	Yes	Swamp Oak	*Casuarina glauca*	26	3.12	Good	4
284	Yes	Swamp Oak	*Casuarina glauca*	29	3.48	Good	4
285	Yes	Swamp Oak	*Casuarina glauca*	44	5.28	Good	4
286	Yes	Swamp Oak	*Casuarina glauca*	16	2	Good	4
287	Yes	Swamp Oak	*Casuarina glauca*	30	3.6	Good	4
288	Yes	Swamp Oak	*Casuarina glauca*	23	2.76	Good	4
289	Yes	Swamp Oak	*Casuarina glauca*	57	6.84	Good	4
290	Yes	Swamp Oak	*Casuarina glauca*	43	5.16	Good	4
291	Yes	Swamp Oak	*Casuarina glauca*	46	5.52	Good	4
292	Yes	Swamp Oak	*Casuarina glauca*	61	7.32	Good	8
293	Yes	Swamp Oak	*Casuarina glauca*	39	4.68	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
294	Yes	Swamp Oak	*Casuarina glauca*	9	2	Good	2
295	Yes	Swamp Oak	*Casuarina glauca*	37	4.44	Good	4
296	Yes	Swamp Oak	*Casuarina glauca*	36	4.32	Good	4
297	Yes	Swamp Oak	*Casuarina glauca*	58	6.96	Good	4
298	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
299	Yes	Brush Box	*Lophostemon confertus*	54	6.48	Good	4
300	Yes	Swamp Oak	*Casuarina glauca*	34	4.08	Good	4
301	Yes	Swamp Oak	*Casuarina glauca*	41	4.92	Good	4
302	Yes	Swamp Oak	*Casuarina glauca*	55	6.6	Good	4
303	Yes	Swamp Oak	*Casuarina glauca*	38	4.56	Good	4
304	Yes	Swamp Oak	*Casuarina glauca*	7	2	Good	2
305	Yes	Swamp Oak	*Casuarina glauca*	6	2	Good	2
306	Yes	Coast Banksia	*Banksia integrifolia*	13	2	Good	2
307	Yes	Coast Tea-tree	*Leptospermum lavigaetum*	38	4.56	Good	4
308	Yes	Swamp Oak	*Casuarina glauca*	10	2	Good	2
309	Yes	Swamp Oak	*Casuarina glauca*	7	2	Good	2
310	Yes	Crimson Bottlebrush	*Callistemon citrinus*	76	9.12	Good	8
311	Yes	Crimson Bottlebrush	*Callistemon citrinus*	32	3.84	Good	4

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
312	Yes	Crimson Bottlebrush	*Callistemon citrinus*	52	6.24	Good	4
313	Yes	Crimson Bottlebrush	*Callistemon citrinus*	38	4.56	Good	4
314	Yes	Callistemon	*Callistemon sp.*	29	3.48	Good	4
315	Yes	Brush Cherry	*Syzygium australe*	14	2	Good	2
316	Yes	Brush Cherry	*Syzygium australe*	14	2	Good	2
317	Yes	Brush Cherry	*Syzygium australe*	17	2.04	Good	4
318	Yes	Brush Cherry	*Syzygium australe*	13	2	Good	2
319	Yes	Brush Cherry	*Syzygium australe*	17	2.04	Good	4
320	Yes	Brush Cherry	*Syzygium australe*	17	2.04	Good	4
321	Yes	Brush Cherry	*Syzygium australe*	18	2.16	Good	4
322	Yes	Brush Cherry	*Syzygium australe*	14	2	Good	2
323	Yes	Brush Cherry	*Syzygium australe*	19	2.28	Good	4
324	Yes	Brush Cherry	*Syzygium australe*	18	2.16	Good	4
325	Yes	Brush Cherry	*Syzygium australe*	17	2.04	Good	4
343	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
344	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
345	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
346	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
347	Yes	Brush Cherry	*Syzygium australe*	13	2	Good	2
348	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
349	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
350	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
351	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
352	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
353	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
354	Yes	Brush Cherry	*Syzygium australe*	7	2	Good	2
355	Yes	Brush Cherry	*Syzygium australe*	8	2	Good	2
356	Yes	Brush Cherry	*Syzygium australe*	8	2	Good	2
357	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
358	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
359	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
360	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
361	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
362	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
363	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
364	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
365	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
366	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
367	Yes	Brush Cherry	*Syzygium australe*	10	2	Good	2
368	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
369	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
370	Yes	Brush Cherry	*Syzygium australe*	9	2	Good	2
371	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
372	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
373	Yes	Brush Cherry	*Syzygium australe*	10	2	Good	2
374	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
375	Yes	Brush Cherry	*Syzygium australe*	10	2	Good	2
376	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
377	Yes	Brush Cherry	*Syzygium australe*	11	2	Good	2
378	Yes	Brush Cherry	*Syzygium australe*	13	2	Good	2
379	Yes	Brush Cherry	*Syzygium australe*	14	2	Good	2

Reference number	Native tree yes/no	Common name	Scientific name	DBH (cm)	TPZ (m)	Condition	Offset required (TfNSW 2014)
380	Yes	Brush Cherry	*Syzygium australe*	14	2	Good	2
381	Yes	Brush Cherry	*Syzygium australe*	12	2	Good	2
382	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
383	Yes	Swamp Oak	*Casuarina glauca*	24	2.88	Good	4
384	Yes	Swamp Oak	*Casuarina glauca*	12	2	Good	2
385	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
386	Yes	Swamp Oak	*Casuarina glauca*	7	2	Good	2
382	Yes	Swamp Oak	*Casuarina glauca*	28	3.36	Good	4
383	Yes	Swamp Oak	*Casuarina glauca*	24	2.88	Good	4
384	Yes	Swamp Oak	*Casuarina glauca*	12	2	Good	2
385	Yes	Swamp Oak	*Casuarina glauca*	22	2.64	Good	4
386	Yes	Swamp Oak	*Casuarina glauca*	7	2	Good	2

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