Hornsby Junction Remodelling and Commuter Car Park Projects
Review of Environmental Factors

January 2016
## Document History

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# Abbreviations

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<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>AHIMS</td>
<td>Aboriginal Heritage Information Management System</td>
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<tr>
<td>ARI</td>
<td>Average recurrence interval</td>
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<tr>
<td>ASRIS</td>
<td>Australian Soil Resource Information System</td>
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<tr>
<td>CBD</td>
<td>Central Business District</td>
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<tr>
<td>CCTV</td>
<td>Closed-circuit television</td>
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<tr>
<td>CEMP</td>
<td>Construction Environmental Management Plan</td>
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<tr>
<td>CLP</td>
<td>Community liaison plan</td>
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<td>CO</td>
<td>Carbon monoxide</td>
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<td>CPTED</td>
<td>Crime Prevention Through Environmental Design</td>
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<tr>
<td>CTMP</td>
<td>Construction Traffic Management Plan</td>
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<tr>
<td>DBH</td>
<td>Diameter at Breast Height</td>
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<td>DECC</td>
<td>Former NSW Department of Environment and Climate Change (now the NSW Office of Environment and Heritage)</td>
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<tr>
<td>DECCW</td>
<td>Former NSW Department of Environment, Climate Change and Water (now the NSW Office of Environment and Heritage)</td>
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<td>DPI</td>
<td>NSW Department of Primary Industries</td>
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<td>ECM</td>
<td>Environmental Control Map</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<tr>
<td>EMS</td>
<td>Environmental Management System</td>
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<tr>
<td>EPA</td>
<td>NSW Environment Protection Authority</td>
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<tr>
<td>EP&amp;A Act</td>
<td>NSW <em>Environment Planning and Assessment Act 1979</em></td>
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<tr>
<td>EP&amp;A Regulation</td>
<td>NSW <em>Environment Planning and Assessment Regulation 2000</em></td>
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<tr>
<td>EPBC Act</td>
<td>Commonwealth <em>Environment Protection and Biodiversity Conservation Act 1999</em></td>
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<tr>
<td>EPL</td>
<td>Environmental Protection Licence</td>
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<tr>
<td>ESD</td>
<td>Ecologically sustainable development</td>
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<tr>
<td>FM Act</td>
<td>NSW <em>Fisheries Management Act 1994</em></td>
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<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
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<td>GST</td>
<td>Galvanised Steel Trough</td>
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LALC | Local Aboriginal Land Council
LCZ | Landscape character zone
LEP | Local Environmental Plan
LGA | Local Government Area
MNES | Matter of National Environmental Significance
NOx | Nitrogen oxides
NPW Act | National Parks and Wildlife Act 1974
NSW | New South Wales
OEH | NSW Office of Environment and Heritage
PAH | Polycyclic aromatic hydrocarbons
PCG | Project Control Group
PCYC | Police-Citizens Youth Club
REF | Review of Environmental Factors
Roads Act | NSW Roads Act 1993
RMS | NSW Roads and Maritime Services
SEPP | State Environmental Planning Policy
SO2 | Sulphur dioxide
SREP 20 | Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No. 2 – 1997)
TAP | Transport Access Program
TCP | Traffic Control Plan
TSC Act | NSW Threatened Species Conservation Act 1995
VIS | Vegetation Information System
Definitions

Crossover  A crossover is a connection between two tracks that allows a train travelling on one track to cross over to the other.

Danger zone  The danger zone refers to the area located within three metres of the nearest operating track.

Diamond  A diamond generally refers to a track configuration consisting of two overlapping crossovers that allow four different train movements.

Ecologically sustainable development  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 (refer to Section 4.6).

Light spill  Light spill occurs where light falls outside the area intended to be lit, for instance, by shining over a fence into a neighbouring property.

Points  Points are movable sections of track that are designed to allow a train to either cross over to another track or continue travelling on the same track by physically guiding the train wheels towards either the straight or the diverging track.

The Proposal  The construction and operation of the Hornsby Junction Remodelling and Commuter Car Park works.

Rail loop  A rail loop is a section of track that allows a slow moving train to be overtaken by a faster moving train by enabling the train to move off the main line.

Rail possession  A ‘possession’ is where a section of railway corridor is restricted from everyday rail operations for a specified period of time. By closing the corridor to normal rail activity, it enables essential track maintenance to be conducted in a fast, efficient and safe environment.

Siding  A siding is a section of track that allows a train to either be parked or moved out of the way of another train.

Slips  A slip is a level-crossing between two tracks that allows a train to either switch tracks (i.e. cross over onto the other rail line) or continue travelling on the same rail line (i.e. cross directly over the other rail line without switching tracks). Single and double slips refer to the number of train movements that could be performed using a particular slip configuration.

Sydney Trains  From 1 July 2013, Sydney Trains replaced RailCorp as a new rail operator created to service the different needs of Sydney and intercity customers.

Turnback facility  A turnback facility consists of track work that allows trains to pass from one track on a diverging path.

Vegetation Offset Guide  The Transport for NSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed ‘significant’ for the purposes of section 111 of the *Environmental Planning and Assessment Act 1979*. 
Executive summary

Transport for NSW is the proponent for the Hornsby Junction Remodelling and Commuter Car Park (the Proposal), to be delivered by the Infrastructure and Services Division.

The Proposal comprises two components; track work remodelling and the construction of a commuter car park. The track work is being delivered to increase the capacity of the T1 North Shore Line including supporting the integration of the Sydney Metro Northwest into the existing rail network. The commuter car park is being delivered as part of the Transport Access Program – an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

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

Hornsby Junction Remodelling

Hornsby Junction Remodelling comprises the reconfiguration of track, signalling and overhead wiring within the existing rail corridor between Waitara and Asquith. The key features of the Hornsby Junction Remodelling would include:

- installation, removal and reconditioning of track work between Hornsby Station and approximately 400 metres north of Bridge Road, Hornsby
- relocation of overhead wires and support structures
- installation, removal and modifications of signalling infrastructure to enable the operation of up to 16 city-bound trains per hour on the T1 North Shore Line. This work would generally be limited to:
  - installing new signals and/or modifying existing signals
  - installing new field equipment including train stops, points and track circuits. Pending signal sighting outcomes, there is also potential for existing warning lights and guard indicators to be relocated or newly installed
  - running new cables within existing galvanised steel trough (GST) to connect the additional signals
- modification of track drainage, combined services routes and other rail infrastructure (such as local cable routes)
- provision of a new train driver’s walkway and a train turnback facility located approximately 30 metres south of Bridge Road.

The indicative extent of this work is shown in Figure E-1.
Hornsby commuter car park

The Proposal also comprises the construction and operation of a multi-storey car park at the site of the existing at-grade Hornsby Station commuter car park.

The key features of the proposed Hornsby Station commuter car park would include:

- partial demolition of the existing at-grade commuter car park, including the decommissioning and replacement of an existing on-site stormwater detention storage tank
- construction of a multi-storey car park structure
- provision for approximately 230 additional commuter parking spaces
- provision of vehicular entry and exit from the George Street/Burdett Street intersection (via reconfigured traffic signals); the existing vehicle entry and exit off George Street (south of Burdett Street) would also be retained
- provision of a new retaining wall along the eastern boundary of the commuter car park
- provision of a new retaining wall and planter along the western side of George Street (to replace the existing retaining wall structure that would be demolished to facilitate construction)
- ancillary works including stairs, a lift, perimeter fencing, power and lighting, communications, CCTV camera surveillance, drainage, utilities, line-marking and signage, urban design works and landscaping
- maintaining access to the Sydney Trains maintenance facility via the car park.

A number of other associated works would also be required as part of the proposed commuter car park, comprising:

- relocation of high voltage overhead power lines from the site of the existing commuter car park
- provision of approximately six accessible parking spaces adjacent to the eastern station entrance in accordance with the relevant requirements (to be created from existing unrestricted commuter parking at this location)
- extension of the footpath on the western side of George Street from the George Street/Burdett Street intersection, where it currently terminates, to the northern boundary of the proposed commuter car park, to provide pedestrian access between Hornsby Station and the proposed lifts in the commuter car park
- modification of the George Street/Burdett Street intersection to accommodate the proposed new commuter car park entry
- utility protection works
- vegetation removal from the existing car park site.

It should be noted that the car park is at an early stage of design and is subject to further modifications.
Legend
- Proposed Signalling Work
- Proposed Trackwork
- Proposed commuter car park
- Rail line

Figure E-1 | Location of the Proposal

Data sources
Jacobs 2015
Ausimage 2014
LPI 2014
Need for the Proposal

The NSW Long Term Transport Master Plan sets the direction for transport planning for the next 20 years, providing a framework for transport policy and investment decisions.

An integral component of the NSW Long Term Transport Master Plan is Sydney’s Rail Future, which provides a plan to modernise Sydney’s rail network by investing in new services and upgrading existing infrastructure.

The Hornsby Junction is heavily used by passenger and freight rail services and is the junction where the Main North Line and North Shore Line meet. The current complex track configuration through the Hornsby Junction limits the ability to increase the number of rail services operating on the T1 North Shore Line due to speed restrictions and track crossovers. Reconfiguring the existing track would increase train capacity and provide faster turnaround times for T1 North Shore Line services at Hornsby.

Hornsby Station is an attractive interchange for park-and-ride commuters travelling to Sydney from the Central Coast, due to the station’s location approximately two kilometres from the southern end of the M1 Pacific Motorway. The Station generates a large demand for unrestricted parking, with the existing commuter car park currently having insufficient capacity to meet this demand (Arup 2015). Increased competition for car parking at Hornsby Station is likely to impact on customer journey times, with park-and-ride commuters forced to either seek alternative parking further away from the station or travel to an alternative station (which may not have the capacity to absorb the increased parking demand). Given that timeliness is a key driver of customer satisfaction, poor customer outcomes are expected to cause a shift away from rail.

Increased demand for unrestricted parking at Hornsby Station also has the potential to adversely affect the accessibility of those businesses, community services and other land uses located around the station as competition for parking between rail and non-rail customers increases.

The proposed Hornsby Station commuter car park forms part of the Transport Access Program. This program is designed to improve customer experience, deliver seamless travel to and between transport modes, encourage greater public transport use and better integrate station interchanges with the role and function of town centres within the metropolitan area and developing urban centres in regional areas of NSW.

By delivering additional commuter car parking at Hornsby Station, the Proposal would contribute to achieving the objectives of the following NSW Government planning strategies:

- NSW Long Term Transport Master Plan (Transport for NSW 2012)
- Sydney’s Rail Future (Transport for NSW 2012)
- State and Premier priorities
- A Plan for Growing Sydney (NSW Government 2014)
- Disability Action Plan (Transport for NSW 2012)

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

Hornsby Station is currently the 18th busiest station on the rail network (based on 2014 data), with over 23,000 customer trips being made to and from this station on a typical weekday (Bureau of Transport Statistics 2015).
Transport for NSW estimates that an additional 143 unrestricted parking spaces will be required to accommodate the forecast 2036 parking demand (Arup 2015). Without further investment in commuter car parking at Hornsby Station, the accessibility of rail services for park-and-ride customers will continue to decrease as competition for limited available unrestricted parking increases.

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

*State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) is the primary environmental planning instrument relevant to the Proposal. Clause 79 of the Infrastructure SEPP allows for the development of ‘rail infrastructure facilities’ by or on behalf of a public authority without consent on any land.

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

This REF has been prepared to assess the construction and operational environmental impacts of the Proposal. The REF has been prepared in accordance with clause 228 of the Environment Planning and Assessment Regulation 2000 (the EP&A Regulation) and the Department of Urban Affairs and Planning guidelines *Is an EIS Required?* (DUAP 1999).

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

**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, or where local heritage items are affected. Although not mandated under Part 5 of the EP&A Act or the Infrastructure SEPP, Transport for NSW will be undertaking consultation with the surrounding community stakeholders, which will include:

- direct notification to community stakeholders by way of newsletter
- public display of this REF.

Community consultation activities for the Proposal would be undertaken during public exhibition of this REF. The REF would be displayed for a period of two weeks.

During this display period, the REF would be available for viewing at the Hornsby Shire Council office and library and online on the Transport for NSW website and NSW Government ‘Have your Say’ website. Furthermore, an information line (1800 684 490) would be available for the public to make enquiries about the Proposal.

Transport for NSW would review and assess all feedback received during the public display period prior to determining whether or not to proceed with the Proposal. Should the Proposal proceed to construction, the community would be kept informed throughout the duration of the construction period. See Figure E-2 for the consultation process to be followed for the Proposal.
Transport for NSW determines planning approvals process by preliminary assessment of impact of the project on the environment


Transport for NSW prepares a Review of Environmental Factors (REF) for public display over two weeks and invites submissions from the public

Transport for NSW assesses and responds to feedback and prepares a submissions report/determination report with proposed conditions to minimise environmental impacts

Transport for NSW determines the proposal

If approved, conditions are made available to the public on TfNSW website

Contractor construction commences subject to compliance with conditions

Figure E-2 Planning approval and consultation process for the Proposal
Environmental impact assessment

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

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

- disruptions to vehicle movements and commuter parking
- tree removal
- noise and vibration
- visual impacts.

Crime Prevention through Environmental Design principles have been incorporated into the design in order to minimise risk to personal safety and asset security, and would be further incorporated at the detailed design phase.

Upon completion of the construction of the Proposal, there would be improved track capacity of the T1 North Shore Line, and increased parking capacity for commuters of Hornsby Station. The provision of additional commuter car parking would improve amenity for Hornsby Station commuters and the general community within the town centre. Improved access would service a growing population in the Hornsby LGA and encourage public transport use to the metropolitan areas of Sydney.

Conclusion

This REF has been prepared having regard to sections 111 and 112 of the EP&A Act, clause 228 of the EP&A Regulation and the Department of Urban Affairs and Planning guidelines Is an EIS Required? (DUAP 1999), to ensure that Transport for NSW takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The Proposal has also been designed in accordance with the Transport for NSW’s Sustainable Design Guidelines and has taken into account the principles of ecologically sustainable development (ESD).

Key sustainability initiatives include the selection of sustainable materials where possible and incorporation of energy efficient lighting. Sustainability initiatives would be considered further during the detailed design, construction and operational phases of the Proposal.

Should the Proposal proceed, the likely impacts would be appropriately managed in accordance with the mitigation measures outlined in this REF. Transport for NSW has determined that an environmental impact statement is not required for the Proposal, nor is the approval of the Minister for Planning.
1. **Introduction**

Transport for NSW is the lead agency for integrated delivery of public transport services across all modes of transport in New South Wales (NSW). The Proposal comprises two components; track work remodelling and the construction of a commuter car park. The track work is being delivered to increase the capacity of the T1 North Shore Line including supporting the integration of the Sydney Metro Northwest into the existing rail network. The commuter car park is being delivered as part of the Transport Access Program – an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

Transport for NSW is the proponent for the Hornsby Junction Remodelling and Commuter Car Park (the Proposal), to be delivered by the Infrastructure and Services Division.

1.1. **Overview of the Proposal**

1.1.1. **Need for additional rail network capacity**

The Hornsby Junction is a complex network of interconnected tracks located between the Pacific Highway and Bridge Road in Hornsby’s business centre (refer to Figure 1-1). The junction is heavily used by passenger and freight rail services and is the junction where the Main North Line and North Shore Line meet. The current complex track configuration through the Hornsby Junction limits the ability to increase the number of rail services operating on the T1 North Shore Line due to speed restrictions and track crossovers.

Hornsby Junction does not currently have the capacity to enable the operation of additional city-bound T1 North Shore Line train services. To create this capacity, the Hornsby Junction would need to be reconfigured to allow the operation of additional T1 North Shore Line services. This would increase the junction’s capacity up to 16 trains per hour.

Further discussion on the need for the Proposal is provided in Section 2.1.1 of this Review of Environmental Factors (REF).

1.1.2. **Need for additional commuter car parking**

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

Hornsby Station is currently the 18th busiest station on the rail network (based on 2014 data), with over 23,000 customer trips being made to and from this station on a typical weekday (Bureau of Transport Statistics 2015). Hornsby Station generates a large demand for unrestricted parking, with the existing commuter car park currently having insufficient capacity to meet this demand (Arup 2015).

Transport for NSW estimates that an additional 143 unrestricted parking spaces will be required to accommodate the forecast 2036 parking demand (Arup 2015). Without further investment in commuter car parking at Hornsby Station, the accessibility of rail services for park-and-ride customers will continue to decrease as competition for limited available unrestricted parking increases.
Increased demand for unrestricted parking at Hornsby Station also has the potential to adversely affect the accessibility of those businesses, community services and other land uses located around the station as competition for parking between rail and non-rail customers increases.

Further discussion on the need for the Proposal is provided in Section 2.1.2 of this REF.

1.1.3. Key features of the Proposal

The key features of the proposed Hornsby Junction Remodelling and Commuter Car Park are outlined in the following sections. A detailed description of the Proposal is provided in Chapter 3 of this Review of Environmental Factors (REF).

Hornsby Junction Remodelling

The key features of the Hornsby Junction Remodelling are shown in Figure 3-1 and would include the installation, removal and reconditioning of track work, overhead wiring and signalling infrastructure between Waitara and Asquith. The Proposal would also include a new train driver’s walkway and a train ‘turnback’ facility located approximately 30 metres south of Bridge Road, Hornsby.

The indicative extent of this work is shown in Figure 1-1 and Figure 1-2. A detailed description of the Proposal is provided in Section 3.1 of this REF.

Subject to planning approval, construction of the proposed Hornsby Junction Remodelling is expected to commence in mid-2016 and is anticipated to take up to 20 months, with completion expected in the first quarter of 2018.

Hornsby commuter car park

The key features of the proposed Hornsby Station commuter car park are shown in Figure 3-2 to Figure 3-4 and would include a new multi-storey commuter car park that provides approximately 230 additional commuter parking spaces. The Proposal would also include a new vehicular entry and exit from the George Street/Burdett Street intersection (via reconfigured traffic signals) and the relocation of the high voltage overhead power lines (owned by Sydney Trains) from the site of the existing commuter car park.

A detailed description of the Proposal is provided in Section 3.1 of this REF.

Subject to planning approval, construction of the Hornsby Station commuter car park is expected to commence in mid-2016 and is anticipated to take up to 18 months to complete. The car park is anticipated to reopen in the first quarter of 2018; however, options to progressively open the car park earlier would be assessed during detailed design and construction. To minimise the duration of commuter car parking impacts at Hornsby Station, Transport for NSW will review the timing and duration of construction works for both elements of the Proposal with the contractor.

1.2. Location of the Proposal

The Proposal is located in the Hornsby Local Government Area (LGA) approximately 21 kilometres northwest of the Sydney CBD. The location of the Proposal is shown in Figure 1-1 and Figure 1-2.

An overview of the existing environment of land directly affected by, and surrounding, the Proposal is provided in the following sections. The existing environment surrounding the Proposal is described in more detail in Chapter 6 of this REF.
Figure 1-1 | Location of the Proposal

Legend
- Proposed Signalling Work
- Proposed Trackwork
- Proposed commuter car park
- Rail line

Data sources
Jacobs 2015
Ausimage 2014
LPI 2014
Legend
- Proposed Signalling Work
- Proposed Trackwork
- Hornsby Station existing commuter car parks
- Rail line

LEP Zone
- Residential
- Infrastructure
- Business Development (light industrial/commercial)
- Mixed Use
- Commercial Core

Data sources
Jacobs 2015
Ausimage 2014
LPI 2014
Hornsby LEP 2013
1.2.1. Hornsby Junction Remodelling site context

The proposed Hornsby Junction Remodelling would be situated within the existing rail corridor (for the T1 North Shore and T1 Northern lines) between Waitara and Asquith (as shown in Figure 1-1 and Figure 1-2).

This section of the rail corridor traverses through the Hornsby town centre and contains the following key rail related infrastructure:

- Hornsby Station – located within the Hornsby town centre and served by suburban and intercity rail services operating on the T1 North Shore and T1 Northern lines (as summarised in Section 1.1.1). The station has five platforms (comprising two island platforms and one single faced platform) that are connected via the station concourse (at its southern end) and a pedestrian footbridge (at its northern end)
- Hornsby Maintenance Centre – located approximately 240 metres south of Asquith Station on the eastern side of the rail corridor
- Hornsby Up Yard – train stabling facility located on the eastern side of the rail corridor between Hornsby Station and Bridge Road, Hornsby.

Vehicle access into the rail corridor is currently provided via Sydney Trains’ maintenance access gates located at:

- George Street, approximately 80 metres south of Bridge Road
- Jersey Street, approximately 100 metres south of Bridge Road
- Government Road, approximately 70 metres south of the Pacific Highway
- the northern end of the Hornsby Station at-grade commuter car park (accessed via Sydney Train’s maintenance access facility)
- Railway Parade, approximately 140 metres north of Bridge Road
- Edgeworth David Avenue, approximately 50 metres south of the Pacific Highway.

1.2.2. Commuter car park site context

The proposed Hornsby Station commuter car park would be situated on a parcel of land located immediately adjacent to the rail corridor. This parcel of land is owned by Sydney Trains and forms part of the existing at-grade Hornsby Station commuter car park.

The at-grade Hornsby Station commuter car park currently provides approximately 374 unrestricted parking spaces. Vehicle access to the car park is provided from the northbound traffic lane of George Street via a non-signalised intersection. No vehicle access is provided directly between the car park and the southbound traffic lane of George Street, with right-turns into and out of the car park restricted by a raised concrete median and fencing.

The at-grade commuter car park also provides vehicle access to a Sydney Trains maintenance facility located at the northern end of the site (refer to Figure 1-2). This maintenance facility contains a number of demountable offices and 11 staff parking spaces, which are segregated from the adjacent commuter car park via a locked access gate.

High voltage overhead power lines (owned by Sydney Trains) traverse through the centre of the Hornsby Station commuter car park. These power lines generally run parallel to the rail corridor and are suspended over the car park by seven power poles.
The site of the existing at-grade commuter car park is elevated above George Street, with a vegetated retaining wall providing partial screening of the site from the road and adjacent footpath. The site is overlooked by a number of tall residential apartment complexes, located on the eastern side of George Street.

1.2.3. Surrounding land uses and context

The area immediately surrounding the Proposal forms part of the Hornsby town centre and contains a mixture of commercial, retail, residential, recreational and educational land uses.

The locality is characterised by high volumes of vehicle, pedestrian and cyclist traffic associated with a number of key trip generating/attracting land uses. These include Hornsby Station; Westfield Hornsby Shopping Centre; TAFE NSW’s Hornsby College; Hornsby Park; Hornsby Aquatic and Leisure Centre; Hornsby Shire Council; and other commercial and retail premises located within Hornsby town centre.

Land uses and the local road network surrounding the Proposal is shown in Figure 1-2. Key roads providing access to/from and throughout the locality include the Pacific Highway, George Street, Jersey Street, Bridge Road, Edgeworth David Avenue, Burdett Street, Coronation Street and Station Street.

Key pedestrian facilities in the vicinity of the Proposal include:

- the George Street pedestrian overbridge (providing access between Westfield Hornsby Shopping Centre and Hornsby Station)
- footpaths along the George Street, the Pacific Highway, Station Street, Coronation Street and Jersey Street
- signalised pedestrian crossings at the intersections of the Pacific Highway/George Street; George Street/Burdett Street; George Street; Burdett Street; and the Pacific Highway/Coronation Street; and the signalised pedestrian crossing of the Pacific Highway at the southern end of Station Street
- non-signalised pedestrian crossings at the southern ends of Station Street and Jersey Street.

East-west pedestrian access across the rail corridor is provided at the following three locations:

- via the George Street pedestrian overbridge and Hornsby Station concourse
- via the Pacific Highway overbridge
- via the Bridge Road overbridge.

There are a number of street plantings and patches of remnant vegetation located in the vicinity of the Proposal, with the largest concentrations of these occurring at the following locations:

- street plantings located adjacent to the eastern boundary of the Hornsby Station at-grade commuter car park
- street plantings along Jersey Street (between Coronation Street and the northern end of the TAFE NSW’s Hornsby College car park)
- remnant vegetation located adjacent to the rail corridor south of the Pacific Highway overbridge. Some of this vegetation has been previously mapped as Blue Gum High Forest, which is listed as critically endangered on the NSW Threatened Species Conservation Act 1995 (TSC Act) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- remnant vegetation located adjacent to the rail corridor north of Bridge Road.
The nearest sensitive receivers to the Proposal are shown in Figure 1-2 and include:

- residential, retail and commercial properties fronting George Street, Railway Parade, Jersey Street, Station Street, the Pacific Highway, High Street, Forbes Street, Government Road, Pound Road, Leonard Street and Hornsby Street
- Police Citizens Youth Clubs (PCYC) Hornsby Ku-ring-gai
- TAFE NSW's Hornsby College
- Hornsby Shire Council Library
- Hornsby Court House
- Hornsby Police Station
- Hornsby Girls High School
- public recreation areas (e.g. Hornsby Park).

1.3. **Purpose of this Review of Environmental Factors**

This REF has been prepared by Jacobs Group (Australia) Pty Ltd on behalf of Transport for NSW. For the purpose of these works, Transport for NSW 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 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 EP&A Regulation and the Department of Urban Affairs and Planning guidelines *Is an EIS Required? (DUAP 1999).*

This assessment has also considered the relevant provisions and approval requirements of other relevant environmental legislation, including the *Threatened Species Conservation Act 1995 (TSC Act)*, *Fisheries Management Act 1994 (FM Act)* and the *Roads Act 1993*.

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 significantly impact a matter 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.
2. Need for the Proposal

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

2.1. Strategic justification

The following sections provide an outline of the strategic justification for the Proposal, specifically:

- the need to increase capacity on the T1 North Shore Line
- the need to increase commuter car parking supply at Hornsby Station to accommodate the forecast 2036 parking demand.

2.1.1. Increasing Sydney's rail network capacity

The NSW Long Term Transport Master Plan identifies a planned and coordinated set of actions to address transport challenges. It guides the NSW Government’s transport funding priorities over the next 20 years. The NSW Long Term Transport Master Plan would meet a number of challenges to building an integrated transport system for Sydney and NSW, including:

- customer-focused integrated transport planning
- integrated modes to meet customer needs
- getting Sydney moving again
- sustaining Growth in Greater Sydney.

An integral component of the NSW Long Term Transport Master Plan is Sydney’s Rail Future (Transport for NSW 2012a). Sydney’s Rail Future details how the NSW Government will deliver the core elements needed to give Sydney a world-class rail network that can support the city’s growth. It aims to improve the customer’s experience, improve reliability and increase services across the rail network.

Sydney’s Rail Future describes the plan to transform and modernise Sydney’s rail network based on a three-tiered system, comprising:

- Tier 1 – Metro: based on ‘turn-up-and-go’ services and single-deck metro trains
- Tier 2 – Suburban: timetabled services with double-deck trains
- Tier 3 – Intercity: timetabled services with double-deck trains and on-board amenities for long distance commutes.

Delivering network efficiencies on the existing Sydney Trains network (through amongst other things, track infrastructure enhancements) are identified as key actions in both the NSW Long Term Transport Master Plan and Sydney’s Rail Future.

The Hornsby Junction is heavily used by passenger and freight rail services and is the junction where the Main North Line and North Shore Line meet. The current complex track configuration through the Hornsby Junction limits the ability to increase the number of rail services operating on the T1 North Shore Line due to speed restrictions and track crossovers. Reconfiguring the existing track would increase train capacity and provide faster turnaround times for T1 North Shore Line services at Hornsby. In so doing, the Proposal would address the key action of the NSW Long Term Transport Master Plan and Sydney’s Rail Future to deliver network efficiencies on the existing Sydney Trains network.
Objectives of the Hornsby Junction Remodelling Proposal

The specific objectives of the proposed Hornsby Junction Remodelling are to:

- increase the capacity of the T1 North Shore Line at Hornsby Junction (this would involve increasing the junction’s capacity up to 16 trains per hour on the city-bound track of the T1 North Shore Line.)
- provide a ‘turnback’ facility for North Shore Line trains to allow terminating Platform 2 trains to move off the main lines while the driver changes ends of the train to turn-back and approach Platform 1 for city bound services
- achieve greater operational independence between the T1 North Shore Line, the T1 Northern Line and the Main North Line
- improve train entry/exit times to/from Hornsby Station Platforms 1 and 2
- reduce asset and configuration issues that impact on reliability, accessibility and maintainability of the rail network (for example, reduce the number of single and double slips in the Hornsby Junction).

2.1.2. Increasing the accessibility of public transport

Improving transport customer experience is the focus of the NSW Government’s transport initiatives. Transport for NSW carried out a series of studies to identify suitable locations for improvements to existing interchanges and commuter car parks. The need for additional unrestricted commuter car parking at Hornsby Station was identified.

Hornsby Station is currently the 18th busiest station on the rail network (based on 2014 data), with over 23,000 customer trips being made to and from this station on a typical weekday (Bureau of Transport Statistics 2015). The station is served by both suburban and intercity rail services operating on Sydney Trains’ T1 North Shore and T1 Northern lines and NSW TrainLink’s Central Coast and Newcastle Line.

Hornsby Station is an attractive interchange for park-and-ride commuters travelling to Sydney from the Central Coast, due to the station’s location at the southern end of the M1 Pacific Motorway. The Station generates a large demand for unrestricted parking, with the existing commuter car park currently having insufficient capacity to meet this demand (Arup 2015).

It is expected that without further investment in commuter car parking at Hornsby Station, the accessibility of rail services for park-and-ride customers will continue to decrease as competition for limited available unrestricted parking increases.

Increased competition for car parking at Hornsby Station is likely to impact on customer journey times, with park-and-ride commuters forced to either seek alternative parking further away from the station or travel to an alternative station (which may not have the capacity to absorb the increased parking demand). Given that timeliness is a key driver of customer satisfaction, poor customer outcomes are expected to cause a shift away from rail.

Increased demand for unrestricted parking at Hornsby Station also has the potential to adversely affect the accessibility of those businesses, community services and other land uses located around the station as competition for parking between rail and non-rail customers increases.

The proposed Hornsby Station commuter car park forms part of the Transport Access Program. This program is designed to improve customer experience, deliver seamless travel to and between transport modes, encourage greater public transport use and better integrate station interchanges with the role and function of town centres within the metropolitan area and developing urban centres in regional areas of NSW.
By delivering additional commuter car parking at Hornsby Station, the Proposal would contribute to achieving the objectives of the following NSW Government planning strategies:

- *NSW Long Term Transport Master Plan* (Transport for NSW 2012)
- *Sydney’s Rail Future* (Transport for NSW 2012)
- *State and Premier priorities*
- *Disability Action Plan* (Transport for NSW 2012)

Further details of how the Proposal addresses the objectives of the above NSW Government policies and strategies are discussed in Section 4.4 of this REF.

Discussion on the specific objectives of the Transport Access Program and the proposed Hornsby Station commuter car park is provided in the following sections.

**Objectives of the Transport Access Program**

The Transport Access Program is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. The program aims to provide:

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

The proposed commuter car park is being delivered as part of the Transport Access Program. Consistent with the above objectives of the Transport Access Program, the proposed commuter car park would improve the customer experience by:

- increasing the number of commuter car parking spaces around Hornsby Station thereby improving the accessibility of rail services for park-and-ride customers
- providing safe car parking through lighting and CCTV
- reducing the number of cars parked on the streets, potentially improving traffic and safety and reducing competition for long-stay parking between rail and non-rail customers
- providing pedestrian access from the proposed car park to existing pedestrian infrastructure
- installing clear and direct way-finding signage between the car park and the station.
Objectives of the Proposal

The specific objectives of the proposed commuter car park are to:

- provide additional commuter car parking spaces within close walking distance of Hornsby Station to accommodate the predicted year 2036 parking demand
- provide safe, accessible and sustainable facilities for commuters and other users from the proposed car park to the station, including lighting
- promote increased use of public transport by increasing convenience and accessibility to and from Hornsby Station
- deliver a commuter car park that is sympathetic with surrounding land uses, including heritage listed items, residential properties and sensitive land uses
- deliver a commuter car park that does not preclude Hornsby Shire Council’s plans to rejuvenate Hornby’s ‘west side’ or Council’s plan to replace the existing Hornsby footbridge over George Street (described further in Section 6.11 of this REF)
- deliver a commuter car park that provides a safe connection to the surrounding road network and minimises potential traffic impacts.

2.2. Design development

2.2.1. Hornsby Junction Remodelling

Issues and opportunities with the existing track configuration through the Hornsby Junction have been identified by Transport for NSW. This included:

- constraints imposed by the current track configuration
- locations of existing rail infrastructure and third-party utilities
- locations of environmental constraints.

These issues informed the development of the design criteria and options considered for the Hornsby Junction Remodelling, as discussed in Sections 2.3 and 2.4 of this REF, respectively. Consultation regarding the development of the design has been undertaken with key stakeholders including Sydney Trains during design development.

2.2.2. Commuter car park

In 2013, Hornsby Shire Council commissioned a traffic and parking study (the Hornsby West Side Traffic Study; Bitzios Consulting 2013) as part of its review of planning controls for the ‘West Side Precinct’. (The West Side Precinct was defined as the commercial area located adjacent to the Pacific Highway in the immediate vicinity of Hornsby Station).

Specific parking issues identified by the Hornsby West Side Traffic Study (Bitzios Consulting 2013) included:

- insufficient supply of unrestricted parking in the Hornsby Town Centre for park-and-ride rail commuters
- rail commuters using unrestricted parking areas in the Hornsby Town Centre due to Hornsby Station commuter car park operating at capacity; creating shortages in unrestricted parking for other local workers
- insufficient short stay (up to three hours) parking in the Hornsby Town Centre.
The TAP Commuter Car Parking Concept Planning – Tranche 1 Concept Design Report – Hornsby Station (Transport for NSW 2015) identified the issues and opportunities in the immediate area surrounding Hornsby Station. This included:

- availability of vacant land within easy walking distance to the station
- forecast 2036 patronage and parking demand
- existing traffic and transport conditions
- environmental and social constraints.

These issues and opportunities informed the development of the design criteria and options considered for the commuter car park, as discussed in Sections 2.3 and 2.4 of this REF, respectively. Detailed design would be undertaken in consultation with Council, RMS, Sydney Trains and the NSW Government design and sustainability review panel.

2.3. Design criteria

2.3.1. Hornsby Junction Remodelling

The criteria for identifying a revised track configuration through the Hornsby Junction focused on delivering the required increase in rail network capacity (as outlined in Section 2.1.1) minimising impacts to existing rail infrastructure and third-party assets, and minimising impact to the community and environment.

2.3.2. Commuter car park

The criteria for identifying a site for additional commuter car parking at Hornsby Station focussed on delivering the maximum number of spaces, meeting the legislated accessibility requirements and minimising impact to the community and environment.

2.4. Options assessment

2.4.1. Hornsby Junction Remodelling

Options assessment criteria

The performance of each option was assessed against the following criteria:

- ability to increase capacity on the city-bound T1 North Shore track
- addresses the rail network constraint imposed by the points located at the northern end of Hornsby Station Platforms 1 and 2
- provides an alternative turnback location for the purpose of turning T1 North Shore Line trains around
- minimises impacts to other rail infrastructure and third-party assets
- track work to be contained within the existing rail corridor boundary
- potential environmental constraints and amenity considerations
- ability to construct the Proposal without significantly impacting on rail network operations
- feasibility of delivery in terms of timing and construction requirements.
Options assessment

The ‘do-nothing’ option

The ‘do-nothing’ option would involve not providing any additional rail network capacity through the Hornsby Junction. The city-bound track of the T1 North Shore Line would continue to operate at its current capacity.

Ultimately the ‘do nothing’ option would preclude the improved services to city-bound customers through the increased capacity of the T1 North Shore Line services. For this reason, this option was not considered a feasible alternative to the Proposal and was discounted.

Alternative option – Hornsby Junction Remodelling

This option involves removing the ‘points’ at the northern end of Hornsby Station Platforms 1 and 2 and relocating the existing T1 North Shore Line turnback. The revised turnback facility would enable train turnarounds to be completed at an alternative location that does not result in conflicting train movements with the T1 Northern and Main North lines.

The alternative option (i.e. the Hornsby Junction Remodelling) would increase the capacity of the T1 North Shore Line to allow the operation of up to 16 T1 North Shore Line services per hour. This option would also involve the least amount of track work, with the current positions of the T1 North Shore and Main North tracks being retained. For this reason, the Hornsby Junction Remodelling was identified as the preferred option for the Proposal.

2.4.2. Commuter car park

Options assessment criteria

The performance of each option was assessed against the following criteria:

- proximity to station
- hierarchy of road network
- ownership and availability of land to build the car park
- potential environmental constraints and amenity considerations
- pedestrian accessibility and pedestrian and commuter safety
- ability to construct the car park whilst also minimising impacts to the net parking supply within easy walking distance of Hornsby Station
- feasibility of delivery in terms of timing and construction requirements.
- vehicular access arrangement to the car park to provide a satisfactory level of traffic safety
- impact of the proposed car park on the surrounding road network
- minimising the number of entry and exit points to the car park.
Options assessment

The ‘do-nothing’ option

The ‘do-nothing’ option involves not providing any additional commuter car parking at Hornsby Station. Park-and-ride customers would continue to compete for a limited number of unrestricted parking spaces located within easy walking distance of the station.

Increased competition for a limited number of unrestricted parking spaces would continue to impact on customer journey times, with park-and-ride commuters forced to either seek alternative parking further away from the station or travel to an alternative station (which may not have the capacity to absorb the increased parking demand).

Given that timeliness is a key driver of customer satisfaction, poor customer outcomes would likely cause a shift away from rail.

Increased competition for unrestricted commuter car parking could eventually impact on the accessibility of rail services, particularly for those customers who are unable to walk the additional distances required to access alternative unrestricted parking (which is also in short supply). The lack of unrestricted parking could also prevent some customers from making their journey’s at their preferred times. This would require these customers to either travel at an alternative time to increase their chances of finding parking; or to choose an alternative mode of transport.

Increased demand for unrestricted parking at Hornsby Station would also continue to adversely affect the accessibility of those businesses, community services and other land uses located around the station as competition for parking between rail and non-rail customers increases.

Overall, the ‘do-nothing’ option would not provide the additional commuter car parking supply required to accommodate the forecast 2036 patronage growth and would not help encourage the use of public transport. For this reason, the ‘do-nothing’ option was not considered a feasible alternative to the Proposal and was discounted.

Alternative sites for the proposed car park

Two sites were considered for the location of the commuter car park:

- Option 1 – eastern side of the rail corridor on the site of the existing Hornsby Station commuter car park
- Option 2 – western side of the rail corridor on the site of TAFE NSW’s Hornsby College staff/student car park.

The locations of these sites are shown in Figure 2-1. Further discussion on the key constraints and benefits of the two options considered are outlined in Table 2-1.
Figure 2-1 | Options considered for the location of the commuter car park

Legend
- Car park option 1
- Car park option 2
- Hornsby Station existing commuter carparks
- Rail line

Data sources
Jacobs 2015
Ausimage 2014
LPI 2014
### Table 2-1: Key benefits and constraints of the car park options considered

<table>
<thead>
<tr>
<th>Option</th>
<th>Key benefits of the option</th>
<th>Key constraints for the option</th>
</tr>
</thead>
</table>
| 1 (eastern side – existing commuter car park) | • Located approximately 150 metres from Hornsby Station  
• Located entirely on land owned by RailCorp; therefore, no property acquisition would be required  
• A commuter car park at this location could be configured to provide approximately 230 additional parking spaces  
• Car park entry could be tied into the existing signalised intersection at George Street/Burdett Street  
• Car park would not impact on sites on the western side of the rail corridor that could be redeveloped as part of Council’s planned town centre growth  
• Car park would provide station parking at one location, delivering traffic efficiencies  
• Car park could beneficially serve parking demand for surrounding businesses, community facilities and land uses, particularly after hours (e.g. at night) when the car park is vacated by rail customers | • Requires the temporary closure of the existing Hornsby Station commuter car park affecting approximately 374 spaces  
• Construction activities being undertaken parallel to George Street and in close proximity to Hornsby Westfield Shopping Centre and Hornsby Shire Library – an area characterised by high pedestrian, cycling and traffic volumes  
• Site is located in close proximity to residential properties which would overlook the site  
• Requires the relocation of high voltage power lines and poles from the site  
• Prolonged construction amenity impacts to residential properties fronting George Street, which would also be affected by the proposed Hornsby Junction Remodelling |
| 2 (western side – TAFE car park) | • Avoids the need to temporarily close the existing Hornsby Station commuter car park  
• Avoids the need to relocate the high voltage power lines and poles from the existing Hornsby Station commuter car park site  
• Avoids prolonged construction amenity impacts to residential properties fronting George Street, which would also be affected by the proposed Hornsby Junction Remodelling | • Located further away from Hornsby Station than Option 1 (approximately 350 metres)  
• Car park would be smaller than Option 1 and, this, would provide fewer parking spaces (approximately 120 spaces)  
• Would require a leasing arrangement to be established with TAFE NSW to enable a car park to be constructed on top of its staff/student car park  
• Would result in parking being distributed between two locations (i.e. on eastern and western side of the rail corridor), resulting in additional traffic movements as drivers search for parking between locations.  
• Would potentially conflict with Council’s broader plans to redevelop land on the western side of the rail corridor |
Preferred option for the location of the commuter car park

Based on a review of the benefits and constraints of each option in relation to the option assessment criteria, Option 1 was identified as preferable for the following reasons:

- it would be located entirely on RailCorp land and, thus, would avoid the acquisition of land that could be beneficially used for other redevelopment
- traffic efficiency associated with locating all commuter car parking at the one location
- it would be in close proximity to Hornsby Station
- the car park entry could be tied into the existing signalised intersection at George Street/Burdett Street, which would provide a safe and efficient connection to the surrounding road network
- a car park at this location would maximise the number of spaces that could be provided.

2.5. Preferred option

As outlined in Sections 2.3.1 and 2.3.2, the preferred option for the Proposal comprises:

- the installation, removal and reconditioning of track work, overhead wiring and signalling infrastructure between Waitara and Asquith (known as the Hornsby Junction Remodelling)
- a new commuter car park on the eastern side of the rail corridor, on the site of the existing Hornsby Station commuter car park.

These options were identified to best meet the specific objectives of the Proposal (as outlined in Sections 2.1.1 and 2.1.2) and the Transport Access program and would not result in significant impacts to surrounding land uses. The key features of the preferred option for the Proposal are described further in Chapter 3 of this REF.
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 design details available at the time of preparing this REF and is subject to refinement during detailed design.

3.1. The Proposal

As described in Section 1.1 of this REF, the Proposal involves the construction and operation of track work and a new commuter car park at Hornsby Station. This work is being delivered as part of the Transport Access Program.

The Proposal comprises two parts:

- Hornsby Junction Remodelling, comprising the reconfiguration of track, signalling and overhead wiring within the existing rail corridor between Waitara and Asquith
- Hornsby Station commuter car park, comprising the construction and operation of a multi-storey car park at the site of the existing at-grade Hornsby Station commuter car park.

An overview of the Proposal is provided in Sections 3.1.1 and 3.1.2.

3.1.1. Overview of Hornsby Junction Remodelling

The key features of the Hornsby Junction Remodelling are shown in Figure 3-1 and would include:

- installation, removal and reconditioning of track work between Hornsby Station and approximately 400 metres north of Bridge Road, Hornsby
- relocation of overhead wires and support structures
- installation, removal and modifications of signalling infrastructure to enable the operation of up to 16 city-bound trains per hour on the T1 North Shore Line. This work would generally be limited to:
  - installing new signals and/or modifying existing signals
  - installing new field equipment including train stops, points and track circuits. Pending signal sighting outcomes, there is also potential for existing warning lights and guard indicators to be relocated or newly installed
  - running new cables within existing galvanised steel trough (GST) to connect the additional signals
- modification of track drainage, combined services routes and other rail infrastructure (such as local cable routes)
- provision of a new train driver’s walkway and a train turnback facility located approximately 30 metres south of Bridge Road, Hornsby.

The indicative extent of this work is shown in Figure 1-1 and Figure 1-2.
3.1.2. Overview of Hornsby commuter car park

The key features of the proposed Hornsby Station commuter car park are shown in Figure 3-2 to Figure 3-4 and would include:

- partial demolition of the existing at-grade commuter car park, including the decommissioning and replacement of an existing on-site stormwater detention storage tank
- construction of a multi-storey commuter car park structure
- provision for approximately 230 additional commuter parking spaces
- provision of vehicular entry and exit from the George Street/Burdett Street intersection (via reconfigured traffic signals); the existing vehicle entry and exit off George Street (south of Burdett Street) would also be retained
- provision of a new retaining wall along the eastern boundary of the commuter car park
- provision of a new retaining wall and planter along the western side of George Street (to replace the existing retaining wall structure that would be demolished to facilitate construction)
- ancillary works including stairs, a lift, perimeter fencing, power and lighting, communications, CCTV camera surveillance, drainage, utilities, line-marking and signage, urban design works and landscaping
- maintaining access to the Sydney Trains maintenance facility via the car park.

A number of other associated works would also be required as part of the proposed commuter car park, comprising:

- relocation of high voltage overhead power lines from the site of the existing commuter car park
- provision of approximately six accessible parking spaces adjacent to the eastern station entrance in accordance with the relevant requirements (to be created from existing unrestricted commuter parking at this location)
- extension of the footpath on the western side of George Street from the George Street/Burdett Street intersection, where it currently terminates, to the northern boundary of the proposed commuter car park to provide pedestrian access between Hornsby Station and the proposed lifts in the commuter car park
- modification of the George Street/Burdett Street intersection to accommodate the proposed new commuter car park entry
- utility protection works
- vegetation removal from the existing car park site.
3.1.3. Design Features – Hornsby Junction Remodelling

Track work

The proposed scope of track works within the Hornsby Junction would comprise:

- removal of single and double ‘slips’
- removal and installation of ‘crossovers’
- installation of a standard ‘diamond’
- reconditioning of an existing rail ‘siding’ located approximately 50 metres south of Bridge Road on the eastern side of the rail corridor.

An indicative plan view of the proposed track work is shown in Figure 3-1.

The finished track structure would consist of parallel, continuously welded steel rails tied together by reinforced concrete sleepers, supported and retained by a bed of stone ballast (as per the existing track structure).

Overhead wiring works

The Proposal would require the relocation or replacement of existing overhead wiring to suit the reconfigured track alignment. Existing overhead wiring structures would be retrofitted where possible. Alternatively, new or relocated overhead wiring structures would be installed adjacent to the existing structures.

The Proposal would also involve the removal of an obsolete overhead wiring structure (A-frame structure) located approximately 190 metres north of Hornsby Station (as shown in Figure 6-6). This structure is currently in poor condition (showing extensive signs of rust damage) and has been decommissioned (i.e. the structure is no longer supporting overhead wires).

Signalling works

The Proposal would require the relocation of, and modifications to, existing signalling and communications infrastructure. Signalling work would generally be limited to:

- installing new signals and/or modifying existing signals
- installing new field equipment including train stops, points and track circuits. Pending signal sighting outcomes, there is also potential for existing warning lights and guard indicators to be relocated or newly installed
- running new cables within existing galvanised steel trough (GST) to connect the additional signals.

It is highly unlikely that the signalling work would require vegetation clearing or ground disturbance (e.g. for the purposes of installing new cabling or conduits). The signalling works would be carried out within a short timeframe and would not incorporate high noise emitting activities. Planned access would be provided through established Sydney Train access points.
Figure 3-1: Indicative plan view of proposed track work within the Hornsby Junction
Train driver’s walkway

The proposed train driver’s walkway would consist of a concrete footpath that would allow the train driver to walk from one end of the train to the other along the turnback facility. The walkway would be situated between the proposed reconditioned rail siding and a southbound rail ‘loop’ for the T1 Northern Line (as shown in Figure 3-1).

The train driver’s walkway would be approximately 1.2 metres wide, with fencing to be provided to separate walkway from the ‘danger zone’ of the adjacent operating track. The walkway would be designed in accordance with RailCorp standards. Key design features of the walkway would include fencing to clearly delineate the edge of the walkway and lighting.

The final design of the Train driver’s walkway would be determined during detailed design in consultation with Sydney Trains.

3.1.4. Design Features – Commuter car park

Building footprint and configuration

The proposed car park structure would incorporate a two level layout, with the upper and lower level connected by internal ramps. The structure would be situated on top of the existing Hornsby Station commuter car park (as shown in Figure 3-2) and would be approximately 200 metres in length and up to eight metres high (including stair and lift canopies). The upper level of the structure would be open (i.e. there would not be a roof covering this level).

An indicative layout, 3D visualisation and artist’s impression of the Proposal is provided in Figure 3-2, Figure 3-3 and Figure 3-4, respectively. It should be noted that the car park is at an early stage of design and is subject to further modifications.

Vehicle circulation through the car park would generally be in a clockwise one-way direction (as shown in Figure 3-2), with the exception of ramps, where vehicles would circulate in an anti-clockwise one-way direction when travelling between car park levels (as shown in Figure 3-2).
Figure 3-2: Indicative plan view of the commuter car park
Figure 3-3: Indicative 3D visualisation of the commuter car park
Building façade

The proposed façade treatment would be in line with the existing environment and sustainable design features (as outlined in Section 3.1.3). The final façade would be determined during detailed design and would be subject to urban design requirements.

The building façade would incorporate crash barriers and façade screens. The crash barrier refers to those structural elements of the car park that have been specifically designed to withstand a vehicle collision and, thus, prevent an errant vehicle from crashing through the car park structure. Conversely, the façade screen refers to a non-structural element of the car park that has been designed to improve the overall appearance of the structure and is not designed to withstand a vehicle collision.

The crash barrier would contribute significantly to the entire façade. A visual indicator would be provided to guide cars reversing into the parking bay.

Façade screens would be located where residents could potentially be impacted by light spill from vehicle headlights and/or lighting. Façade screenings would reduce the impact on residents by either completely blocking or by diffusing the impact to soften any light spill.

The following types of vertical screening have been considered for the proposed car park; however, final finishes would be determined during detail design:

- folded aluminium sheets presented in an irregular spacing and shape across the façade for the purposes of creating a contained edge along the façade while also maintaining airflow requirements. This design would also allow passive solar design, air transfer and guards against spill light from car headlights
- seamless mesh designed to provide fall protection, façade cladding, security screening, shading and wind protection and sculptural effects. This mesh offers fresh air circulation, passive surveillance and pedestrian security.
Both types of screening have been used effectively in Transport for NSW commuter car parks with similar constraints:

- solid screening – around 1.3 metres high, provides screening primarily for vehicles turning into the parking bays facing residential sites
- solid or diffusing screening – ceiling-to-floor full height, screens moving vehicles travelling up and down ramps and aisles.

There are some restrictions over how solid the selected screening is in order to maintain the passive ventilation of the Proposal as an open car park.

There is the opportunity to minimise potential impacts as a result of light spill, noise and air quality through the incorporation of prescribed finishes within the façade of the car park. The car park has been designed as an open-deck structure which allows for cross-ventilation by permanent unobstructed openings. Along each façade of the car park, a solid crash barrier would exist from the floor to 1.4 metres high.

The openings above this barrier would allow for cross-ventilation and as such there are some restrictions on the screening which can be placed here. The relevant standards require any additional screening, above this barrier to be no less than 20 per cent perforated to maintain the status of an open-deck car park and therefore reduce the need for mechanical ventilation.

Screenings may be required to mitigate light and noise impacts as a result of operation of the car park.

Crime Prevention Through Environmental Design (CPTED) principles would be incorporated into the design of the commuter car park to reduce the potential for graffiti. Measures that would be adopted to assist with deterring graffiti include CCTV and appropriate lighting levels to increase passive surveillance of the commuter car park. The commuter car park would also include anti-graffiti treatment.

**Vehicle access**

Vehicle access would consist of:

- a combined entry and exit from the George Street/Burdett Street intersection (which would be modified to accommodate the Proposal)
- a direct entry to the upper level of the car park from the adjacent existing commuter car park (exit from the car park would not be permitted at this location, with vehicles needing to exit via the George Street/Burdett Street intersection).

To accommodate the proposed new entry/exit for the car park, the George Street/Burdett Street intersection would be reconfigured to provide turning bays and traffic signal control from George Street and Burdett Street. The final access arrangements and revised intersection configuration would be determined during detailed design in consultation with Roads and Maritime Services (as the relevant Roads Authority). An indicative arrangement is shown in Figure 3-5.
Pedestrian access

The main pedestrian access for the new lower floor of the car park would be provided via George Street using an existing footpath that runs along the western kerb.

There is currently no pedestrian footpath on George Street at the northern end of the proposed car park. The existing footpath would be extended to connect to the proposed stair access points to the car park (as shown in Figure 3-2).

The stairs connect between the footpath on George Street, the ground level where this is higher than the footpath and to the upper deck.

The main pedestrian desire line is approximately 175 metres from the southern pedestrian entry to the station. The new car park would extend the pedestrian route to approximately 300 metres from the northern pedestrian exit of the facility to the station entry. The majority of commuters could be expected to walk through the car park utilising the car park aisles.
Wayfinding

In consideration of design information for wayfinding the Proposal considers:

- simple movement patterns for minimal change in direction
- design elements should promote and facilitate way finding
- segregation of vehicle entry/exit spaces and pedestrian access paths
- transport information and timetables located at convenient and accessible locations
- the main pedestrian desire line should provide a clear view of the railway station entry (T) sign.

The final wayfinding strategy adopted for the Proposal would be determined during detailed design.

Safety and security

The design, with architectural, landscaping and urban design features, aims to increase passive security. Crime Prevention Through Environmental Design (CPTED) principles would be incorporated into the design. Features include CCTV, clear sight lines, signage and lighting. Design has considered maximising safety and security for pedestrians and drivers alike.

Lighting

Key features of the lighting design include:

- using available natural light in the daytime to assist in the achievement of adequate lighting levels
- keeping energy consumption through lighting as low as possible while maximising safety throughout the car park and conforming to relevant Standards
- using timers to control lighting on the lower floor of the car park
- using photo-electric cells to control lighting on the upper floor of the car park
- using LED lighting on the upper floor of the car park to achieve suitable illumination levels at night without unduly disturbing adjacent residents
- continually lighting stair wells where appropriate lighting levels cannot be achieved through natural lighting.

Given the car park’s location in close proximity to residential dwellings, the design has also considered strategies to minimise the impact of lighting on adjacent properties. This could include:

- the use of non-directional lighting with reduced light spillage
- the provision of amenity screening/light spill containment measures to those car park façades facing visually sensitive receivers to reduce the impact of vehicle headlights (refer to Figure 3-6 for an indicative visualisation of a light spill containment measure that could be provided).

Lighting would be further developed during the detailed design phase.

Landscaping

Landscaping design for the commuter car park would be developed during the detailed design phase.
Relocation of high voltage power lines

The relocation of Sydney Train’s high voltage power lines would be required. The revised power line route would be determined during the detailed design phase, and would comply with Sydney Trains standards to provide clearance from the proposed commuter car park.

Minor modifications to the George Street high voltage power lines may be required and would be undertaken in consultation with AusGrid.

Accessible parking

Accessible parking is currently provided in the existing commuter car park located on the eastern side of the rail corridor, south of the Hornsby Station. These parking spaces would not be affected by the Proposal.

The Proposal would provide approximately six additional accessible parking spaces adjacent to the eastern station entrance in accordance with the relevant requirements (to be created from existing unrestricted commuter parking at this location).

3.1.5. Design standards

The Proposal has been designed having regard to the following:

- RailCorp Business Requirements
- RailCorp Design Standards
- Transport for NSW Sustainable Design Guidelines
- Australian Standard AS1428.1/2: Disability Standards for Accessible Public Transport
- Australian Standard AS4282-1997: Control of the obtrusive effects of outdoor lighting
- Crime Prevention through Environmental Design (CPTED) principles
- Building Code of Australia
- Transport for NSW Guidelines for development of transport interchange facilities
- RailCorp Design Guidelines for the upgrade and construction of new and existing stabling yards and turnback sidings (June 2006).
3.1.6. **Sustainability in design**

The design of the Proposal has been undertaken in accordance with the project targets identified in Transport for NSW’s Environmental Management System (EMS) and the Sustainable Design Guidelines (Version 3.0) 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 adopted on the project to achieve a silver rating.

A selection of the sustainable design initiatives proposed in the concept design include:

- undertake a carbon footprint to inform decision making in design and construction
- design out extreme, high and medium risks as identified in a climate change impact assessment
- ensure at least 95 per cent of construction and demolition waste (by weight) is diverted from landfill
- reduce the absolute quantity of Portland cement by at least 30 per cent
- design car park layout with an efficient circulation pattern with a repetitive pattern and where possible avoid traffic jams
- incorporate energy efficient LED lighting
- design car park to minimise noise during operation (e.g. low noise speed bumps and road surface
- use prefabricated components to reduce construction waste material usage, pollution risks and travel.
3.2. Construction activities

3.2.1. Work methodology

The Proposal is likely to be constructed in the following four stages, with construction anticipated to be completed by March 2018:

- **Stage 1:** Construction of the Hornsby Junction Remodelling works and high voltage overhead wiring relocation including some car park enabling works.
- **Stage 2:** Construction of the majority of the new commuter car park including some minor works associated with the Hornsby Junction Remodelling.
- **Stage 3:** Construction of the majority of the track work for the Hornsby Junction Remodelling.
- **Stage 4:** Demobilisation and car park opening in March 2018.

An overview of the indicative construction activities anticipated to occur during each of the above four stages of work is provided in Table 3-1. This staging is based on the current preliminary design and may change once the detailed design methodology is finalised. It is anticipated that there would be some overlap between the stages in order to meet the March 2018 construction completion date.

The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with Transport for NSW.

Table 3-1: Indicative construction methodology and staging

<table>
<thead>
<tr>
<th>Stage</th>
<th>Main activities</th>
<th>Approx. duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction start</td>
<td>Mid-2016</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Hornsby Junction Remodelling, HV relocation, car park enabling works</td>
<td>9 months</td>
</tr>
<tr>
<td></td>
<td>• Establish offset car parking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Establish site compound, including the closure of approximately 90 car parking spaces</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undertake preliminary Hornsby Junction remodelling works during possession weekends</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Relocate existing HV located within the car park in accordance with detailed design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undertake minor alterations on Ausgrid power lines on George Street if required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undertake car park enabling works</td>
<td></td>
</tr>
<tr>
<td>Stage</td>
<td>Main activities</td>
<td>Approx. duration</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2</td>
<td><strong>Commuter car park construction, minor Hornsby Junction Remodelling works</strong>&lt;br&gt;- Full car park closure - establish further temporary commuter car park&lt;br&gt;- Establish site compound/hoarding and construction access&lt;br&gt;- Ground works and site clearance, including removal of existing pavements, selected trees, lighting and services&lt;br&gt;- Drive contiguous piled retaining structure&lt;br&gt;- Excavate commuter car park footprint&lt;br&gt;- Substructure preparation (e.g. preparation for services, drainage and foundations) and construction of car park structure&lt;br&gt;- Car park fit out, including installation of building services (e.g. electrical, communications, CCTV, hydraulics)&lt;br&gt;- Construct internal footpaths, ramps, kerbs, islands and fences&lt;br&gt;- Install street lighting, fencing, signage and line marking&lt;br&gt;- Reconfigure George Street/Burdett Street intersection, including new pavement, kerbs, turning lanes and reconfigured traffic signals&lt;br&gt;- Extend footpath on western side of George Street&lt;br&gt;- Landscaping&lt;br&gt;- Establish new accessible parking spaces adjacent eastern entrance of Hornsby Station</td>
<td>9 months</td>
</tr>
<tr>
<td>3</td>
<td><strong>Main Hornsby Junction Remodelling works</strong>&lt;br&gt;- Continued full car park closure&lt;br&gt;- Establish site compound/hoarding and construction access&lt;br&gt;- Relocate, divert and/or protect rail and public utilities&lt;br&gt;- Construct signalling infrastructure bases&lt;br&gt;- Track work, including installation, removal and reconditioning of track&lt;br&gt;- Install signalling and overhead wiring systems&lt;br&gt;- Testing and commissioning of railway systems and signals</td>
<td>4 months</td>
</tr>
<tr>
<td>4</td>
<td><strong>Finalisation works, demobilisation, car park opening</strong>&lt;br&gt;- Post construction demobilising, including removal of temporary construction facilities</td>
<td>2 months</td>
</tr>
<tr>
<td></td>
<td><strong>Construction finish</strong></td>
<td>March 2018</td>
</tr>
</tbody>
</table>
### 3.2.2. Plant and equipment

An indicative list of plant and equipment that would likely be used to construct the Proposal is provided in Table 3-2. This list is indicative only. The actual plant and equipment used on site and the numbers required would be further refined during the detailed design and construction phases of the project.

#### Table 3-2: Indicative construction plant and equipment

<table>
<thead>
<tr>
<th>Plant/equipment</th>
<th>Sound power level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commuter car park</strong></td>
<td></td>
</tr>
<tr>
<td>Excavator (20 tonne)</td>
<td>99</td>
</tr>
<tr>
<td>Truck (10 tonne)</td>
<td>98</td>
</tr>
<tr>
<td>Wacker Rammer</td>
<td>108</td>
</tr>
<tr>
<td>Hand tools</td>
<td>94</td>
</tr>
<tr>
<td>Bobcat</td>
<td>104</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>108</td>
</tr>
<tr>
<td>Dozer</td>
<td>110</td>
</tr>
<tr>
<td>Excavator (Breaker)</td>
<td>121</td>
</tr>
<tr>
<td>Grader</td>
<td>108</td>
</tr>
<tr>
<td>Truck (10 tonne)</td>
<td>98</td>
</tr>
<tr>
<td>Concrete Saw</td>
<td>115</td>
</tr>
<tr>
<td>Excavator (20 tonne)</td>
<td>99</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>108</td>
</tr>
<tr>
<td>Generator</td>
<td>101</td>
</tr>
<tr>
<td>CFA Rig</td>
<td>98</td>
</tr>
<tr>
<td>Truck (HIAB)</td>
<td>98</td>
</tr>
<tr>
<td>Concrete Pump</td>
<td>106</td>
</tr>
<tr>
<td>Concrete Truck/Agitator</td>
<td>106</td>
</tr>
<tr>
<td>Hand Tools</td>
<td>94</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>108</td>
</tr>
<tr>
<td>Truck (10 tonne)</td>
<td>98</td>
</tr>
<tr>
<td>Hand Tools</td>
<td>94</td>
</tr>
<tr>
<td>Concrete Pump</td>
<td>106</td>
</tr>
<tr>
<td>Concrete Truck/Agitator</td>
<td>106</td>
</tr>
<tr>
<td>Paving Machine</td>
<td>104</td>
</tr>
<tr>
<td>Grader</td>
<td>108</td>
</tr>
<tr>
<td>Mobile Crane (100 tonne)</td>
<td>101</td>
</tr>
<tr>
<td>Grinder 4</td>
<td>101</td>
</tr>
<tr>
<td>Hand Tools</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>94</td>
</tr>
<tr>
<td>Plant/equipment</td>
<td>Sound power level (dBA)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>Hornsby Junction Remodelling</strong></td>
<td></td>
</tr>
<tr>
<td>Excavator (20 tonne)</td>
<td>99</td>
</tr>
<tr>
<td>Truck and dog</td>
<td>98</td>
</tr>
<tr>
<td>Franna / Truck mounted crane</td>
<td>101</td>
</tr>
<tr>
<td>Backhoe</td>
<td>97</td>
</tr>
<tr>
<td>Hand tools</td>
<td>94</td>
</tr>
<tr>
<td>Crane</td>
<td>106</td>
</tr>
<tr>
<td>Front end loader</td>
<td>108</td>
</tr>
<tr>
<td>Trucks</td>
<td>98</td>
</tr>
<tr>
<td>14 tonne hi-rail dumpers</td>
<td>95</td>
</tr>
<tr>
<td>Lighting tower</td>
<td>105</td>
</tr>
<tr>
<td>Work trains</td>
<td>89</td>
</tr>
<tr>
<td>Water truck</td>
<td>108</td>
</tr>
<tr>
<td>Rail saw</td>
<td>107</td>
</tr>
<tr>
<td>Thermit welding equipment</td>
<td>110</td>
</tr>
<tr>
<td>Tamper regulator</td>
<td>106</td>
</tr>
<tr>
<td>Rail grinder</td>
<td>103</td>
</tr>
<tr>
<td>Elevated work platform</td>
<td>92</td>
</tr>
<tr>
<td>Test locomotive</td>
<td>89</td>
</tr>
<tr>
<td>Truck (10 tonne)</td>
<td>98</td>
</tr>
<tr>
<td>Wacker Rammer</td>
<td>108</td>
</tr>
</tbody>
</table>
3.2.3. Working hours

Commuter car park

Subject to planning approval, construction of the commuter car park is expected to commence in mid-2016, with works anticipated to take up to 18 months to complete. The majority of works would be undertaken during the standard (NSW) Environment Protection Authority (EPA) construction hours of:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm on Saturdays
- no work on Sundays or public holidays.

Exemptions and approval for works outside of the above standard construction hours may be required during the following circumstances to minimise disruptions to traffic, rail customers, pedestrians and nearby residents and businesses (e.g. due to disruptions to utilities):

- relocation of the high voltage overhead power lines from the Hornsby Station commuter car park. The majority of this work would be undertaken outside of standard construction hours to coincide with scheduled weekend track possessions
- works required by utility service providers or where impacts to services cannot be reasonably managed
- oversized deliveries/unloading of machinery that can only travel between hours specified by the police or the NSW Roads and Maritime Services
- emergency works (e.g. due to a damaged utility)
- where works can be undertaken so as to be inaudible at the nearest residential receivers.

The affected community would be advised of any noise intensive works scheduled to occur outside of standard construction hours and mitigation measures would be used in accordance with Transport for NSW's (2012) Construction Noise Strategy.

Hornsby Junction Remodelling

Subject to planning approval, construction of the proposed track work is expected to commence in mid-2016 and would be completed in the first quarter of 2018.

The majority of works would be undertaken outside of standard construction hours to coincide with scheduled weekend track possessions (that is, planned periods when Sydney Trains suspend rail services on a segment of the network to enable track maintenance).

Scheduled track possessions normally occur during weekends or holiday periods when patronage demand is traditionally lower and, therefore, expected to result in the least disruption to rail customers.

Construction hours during a scheduled weekend track possession typically extend over a consecutive 48-hour period from 2.00 am Saturday to 2.00 am the following Monday. The proposed track work would be staged to occur over approximately 18 scheduled track possessions.

In addition to the scheduled track possessions, construction of the Proposal would also require a two week shutdown of the Hornsby Junction (that is, a closure of the rail corridor that is specifically required to construct the Proposal). This shutdown is scheduled to coincide with the December 2017-January 2018 holiday period to minimise disruptions to rail customers.
During the commissioning shutdown period, 24 hour construction works would be undertaken, with noisy work activities scheduled to occur during standard construction hours (where practicable) and mitigation measures implemented outside of standard construction hours to minimise impacts to nearby sensitive receivers.

The affected community would be advised of any noise intensive works scheduled to occur outside of standard construction hours and mitigation measures would be used in accordance with Transport for NSW’s (2012) Construction Noise Strategy.

### 3.2.4. Earthworks

Approximately 33,000 cubic metres of material is anticipated to require excavation during construction of the Proposal, as summarised in Table 3-3. Fill material would also be required for backfilling. The estimated fill requirements for the Proposal is also summarised in Table 3-3.

As indicated in Table 3-3, the bulk of the excavated material would be generated during construction of the commuter car park. This would be due to the need to remove a large volume of fill to enable an at-grade car park entry from the George Street/Burdett Street intersection, as well as reduce the overall height of the car park (i.e. compared to constructing the structure directly on top of the existing car park).

<table>
<thead>
<tr>
<th>Construction activity</th>
<th>Estimated volume of material to be excavated</th>
<th>Estimated volume of material required for fill</th>
<th>Earthworks balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuter car park</td>
<td>27,000 m$^3$</td>
<td>0 m$^3$</td>
<td>27,000 m$^3$</td>
</tr>
<tr>
<td>Track work</td>
<td>6,000 m$^3$</td>
<td>6,000 m$^3$</td>
<td>0 m$^3$</td>
</tr>
<tr>
<td>Total</td>
<td>33,000 m$^3$</td>
<td>6,000 m$^3$</td>
<td>27,000 m$^3$</td>
</tr>
</tbody>
</table>

Where feasible, the excavated material would be reworked (if necessary) and used to meet fill material needs. However, this may be impractical if the excavated material is contaminated or unsuitable for the purposes of structural fill. In this case, fill material would need to be imported, and excavated material exported for reuse on other sites or for treatment or disposal.

All waste requiring off-site disposal would be classified in accordance with the Waste Classification Guidelines (EPA 2014) prior to disposal at an appropriate waste facility licenced to accept waste of the relevant classification. Refer to section 6.12.4 for further details.

### 3.2.5. Source and quantity of materials

The source and quantity of materials would be determined during the detailed design phase of the Proposal, and would consider the requirements of Transport for NSW’s Sustainable Design Guidelines. Materials would be sourced, where practicable, from local suppliers.
3.2.6. Construction vehicle movements

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

An indicative construction methodology has been developed for the Proposal as outlined in Section 3.2.1. A detailed construction methodology and associated management plan would be developed as part of the detailed design stage of works.

It is estimated that the maximum construction vehicle numbers would be:

- 32 truck movements a day (distributed evenly across an eight hour work day)
- 20 light vehicle movements a day (with a worst case scenario of 10 movements in the am peak hour)

This equates to a maximum of 14 vehicle movements in the AM peak hour (seven vehicles arriving and seven vehicles departing the construction site).

During the peak of construction there would be up to 80-100 construction staff on site. Staff would be encouraged to travel by public transport; however, if they drive they would be required to park outside a 600 metre radius of the construction site. Therefore, construction staff would not impact the operation of the road network in the immediate vicinity of the construction site or commuter car parking.

3.2.7. Site access

Construction access would primarily be via the existing commuter car park access off George Street. The existing traffic island at the car park access would be removed and four existing car parking spaces would be removed directly north of the access to allow heavy vehicles to access and exit the car park. The access location and assumed haulage route is shown in Figure 3-7.

In addition to the main site access point, vehicles would use the following existing Sydney Trains maintenance access gates to enter the rail corridor for track remodelling and signalling works:

- George Street, about 80 metres south of Bridge Road
- Jersey Street, about 100 metres south of Bridge Road
- Government Road, about 70 metres south of the M1 Pacific Highway
- the northern end of the Hornsby Station at-grade commuter car park (accessed via Sydney Train’s maintenance access facility)
- Railway Parade, about 140 metres north of Bridge Road.

These accesses would be used less frequently and with a much lower volume of vehicles than the main access at the existing commuter car park. The locations of the above access gates are shown in Figure 4.2 of Technical Paper 1 (Traffic and Transport).

The construction methodology and associated traffic and access routes would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with Transport for NSW, Roads and Maritime Services and Hornsby Shire Council.

A detailed Construction Traffic Management Plan (CTMP) would be prepared for the Proposal to manage these impacts in consultation with Roads and Maritime Services and Hornsby Shire Council prior to the commencement of construction.
Site-specific traffic management issues would be addressed through the implementation of appropriate Traffic Control Plans (TCPs) developed in consultation with the relevant Roads Authority. The TCPs would outline key details such as advanced warning signage, traffic flow management and pedestrian management measures.

3.2.8. Upgrade of the George Street/Burdett Street intersection

The upgrade of the George Street/Burdett Street intersection is anticipated to occur over a three week period. The works would include the addition of the car park access arm to the intersection, the existing northbound kerbside lane on George Street would become straight ahead and left turn into the car park, kerb upgrades on the western frontage of George Street, upgraded line markings on George Street and Burdett Street and upgraded signalling. It is anticipated that all construction works to upgrade the intersection would be undertaken overnight, therefore minimising disruption to road users.

3.2.9. Ancillary facilities

Construction compound

A construction compound would be established in the existing Hornsby Station commuter car park, as shown in Figure 3-7. The construction compound would include perimeter fencing and security lighting to clearly delineate the site from the adjacent station entry and footpaths and to minimise risks associated with unauthorised site access.

Vehicle access would initially be provided into the construction compound via George Street using the existing commuter car park access located south of Burdett Street (refer to Figure 3-7). Construction access to the compound would be switched to the proposed new car park access off the George Street/Burdett Street intersection once this access has been established.

The following associated works would need to be undertaken to enable the establishment of the construction compound:

- temporary relocation of Sydney Trains maintenance staff and operations from the existing facility at the northern end of the car park if required. Consultation with Sydney Trains would be undertaken during the detailed design stage to confirm the location of these temporary facilities if needed

- temporary closure of the Hornsby Station commuter car park on George Street and relocation of approximately 370 parking spaces during the construction of the Hornsby Junction Remodelling and commuter car park. This commuter car park is anticipated to be fully closed for approximately 10 months, from January 2017 to October 2017

- temporary relocation of approximately 90 commuter car parking spaces from the existing Hornsby Station car park during the proposed enabling works for the Proposal (refer to Table 3-1). These relocated commuter car parking spaces are anticipated to be required from mid-2016 for approximately nine months

- removal of a traffic island at the commuter car park entry to allow heavy vehicle access.

The construction compound is anticipated to be required for approximately 20 months. The compound would be operated 24 hours a day, with loud works scheduled during standard Environment Protection Authority (EPA) construction hours.
In addition to the operation of this compound, approximately 18 scheduled weekend track possessions (2.00 am Saturday to 2.00 am the following Monday) would be required, and a two week shutdown of the Hornsby Junction coinciding with the December 2017-January 2018 holiday period (as per the working hours specified in Section 3.2.3).

No impacts to the commuter car park on George Street or High Street are anticipated as a result of the construction activities. Following completion of construction works, the compound would be demobilised and reinstated to its former use. Sydney Trains maintenance staff and operations would also be returned to the existing facility if required.

**Temporary commuter car parking provisions**

Construction of the Proposal would require the following changes at the existing at-grade Hornsby Station commuter car park:

- temporary closure of the Hornsby Station commuter car park on George Street and relocation of approximately 370 parking spaces during the construction of the Hornsby Junction Remodelling and commuter car park.

- temporary relocation of approximately 90 commuter car parking spaces from the existing Hornsby Station car park during the proposed enabling works for the Proposal (refer to Table 3-1). These relocated commuter car parking spaces are anticipated to be required from mid-2016 for approximately nine months.

To minimise the parking impact associated with these closures, temporary alternative commuter car parking would be provided. Transport for NSW is currently investigating options to increase the number of unrestricted parking spaces available to park-and-ride rail commuters within the locality. These options would require further assessment and consultation with land owners, however could include a combination of the following:

- Leasing privately owned off-street car parks in the vicinity of Hornsby Station. These could include the Northern Sydney Institute (Hornsby TAFE)’s staff and student car parks, Westfield Hornsby customer car park and/or the Hornsby RSL patron car park.

- Reconfiguring existing on-street parking to increase parking supply. Streets that have been identified as being potentially suitable for such work include: Florence Street (between Sherbrook Road and Muriel Street); May Street (between Muriel Street and the dead end of the road); Frederick Street (between Nursery Street and Webb Avenue); and Jersey Street (between the southern TAFE car park driveway and 45 Jersey Street).

- Establishing additional off-street parking on vacant parcels of land. Potential options that have been identified include: a parcel of land at the corner of Peats Ferry Road and Dural Street; a parcel of land at the corner of Forbes Street and Ashley Street.

- Increasing parking supply at Asquith and Waitara stations (with park-and-ride commuters catching trains from these stations as an alternative to using Hornsby Station).

The parking strategy for the Proposal would be finalised during detailed design in consultation with Hornsby Shire Council, the NSW Roads and Maritime Services and any relevant land owners.
Figure 3-7  | Construction compound
3.3. Public utility adjustments

Preliminary investigations have identified eight third-party utilities that have the potential to be affected by the Proposal. Details of these utilities, including their associated asset owners and anticipated utility works are provided in Table 3-4.

Potential impacts to existing services and utilities would be confirmed during the detailed design phase of the Proposal, with any proposed relocation and/or protection works determined in consultation with the relevant asset owners.

Table 3-4: Utilities potentially affected by the Proposal

<table>
<thead>
<tr>
<th>Asset owner</th>
<th>Type of utility</th>
<th>Location</th>
<th>Anticipated works required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney Trains</td>
<td>High voltage overhead power lines and poles</td>
<td>Running through the centre of the Hornsby Station commuter car park</td>
<td>Relocation of the power lines and poles, as described in Section 3.1.1</td>
</tr>
<tr>
<td>Ausgrid</td>
<td>High voltage overhead power lines and poles</td>
<td>Within western footpath of George Street</td>
<td>Minor modification of four electrical poles at the George Street/Burdett Street intersection</td>
</tr>
<tr>
<td>Telstra</td>
<td>Two banks of cable ducts containing telecommunications cables</td>
<td>Along Burdett Street, running west across George Street and the Hornsby Station commuter car park before crossing under rail corridor</td>
<td>Potential impacts would be confirmed during the detailed design stage. Any relocation would be undertaken in consultation with Telstra.</td>
</tr>
<tr>
<td>Optus</td>
<td>Fibre optic cables</td>
<td>Running in the shared Telstra cable ducts noted above and the eastern footpath of George Street south of Burdett Street</td>
<td>Potential impacts would be confirmed during the detailed design stage. Any relocation would be undertaken in consultation with Optus.</td>
</tr>
<tr>
<td>Sydney Water Corporation</td>
<td>DN150 vitrified clay sewer main, sewer vent line and vent shaft</td>
<td>Running through the Hornsby Station commuter car park</td>
<td>DN150 vitrified clay sewer main to be protected; sewer vent line and vent shaft to be relocated. The extent of relocation works would be confirmed during detailed design and in consultation with Sydney Water Corporation.</td>
</tr>
<tr>
<td>Sewer vent</td>
<td></td>
<td>25 metres south of Burdett Street on the western boundary of George Street</td>
<td>Vent shaft height may need to be adjusted in accordance with Sydney Water Corporation guidelines</td>
</tr>
<tr>
<td>Sydney Trains</td>
<td>On site stormwater detention tank and associated main stormwater line</td>
<td>Running through the Hornsby Station commuter car park</td>
<td>On site detention tank to be decommissioned and replaced; main stormwater line to be amended to suit the Proposal</td>
</tr>
<tr>
<td>Roads and Maritime Services</td>
<td>Traffic signals and associated infrastructure</td>
<td>George Street/Burdett Street intersection</td>
<td>Reconfiguration of the traffic signals to accommodate an additional intersection leg and turning bays, as described in Section 3.1.1</td>
</tr>
</tbody>
</table>

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3.4. Property acquisition

The Proposal is located on land owned by RailCorp. Therefore, Transport for NSW does not propose to permanently acquire any property as part of the Proposal. However, temporary leases of privately owned land may be required for the establishment of temporary offset parking during the construction of the Proposal. Options for offset car parking are currently being investigated and would depend on negotiations with relevant land owners as discussed in Section 3.2.9.

Where such an arrangement is required, a signed lease agreement would be obtained from the land owner prior to the establishment of the temporary offset parking provisions. The lease arrangement would stipulate any specific land owner requirements. After the completion of construction, the leased property would be restored to its pre-construction condition.

3.5. Operational management and maintenance

The management and maintenance of the proposed track work and commuter car park would continue to be the responsibility of Sydney Trains.
4. Statutory considerations

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

4.1. NSW legislation and regulations

4.1.1. Environmental Planning and Assessment Act 1979

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

In accordance with section 111 of the EP&A Act, Transport for NSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Proposal. Having regard to these provisions, Transport for NSW has determined that no significant environmental impact is likely and, therefore, an environmental impact statement is not required.

Clause 228 of the EP&A Regulation defines the factors which must be considered when assessing an activity under Part 5 of the EP&A Act. Chapter 6 of this REF provides an environmental impact assessment of the Proposal in accordance with clause 228 of the EP&A Regulation. Appendix 1 specifically responds to the factors for consideration under clause 228 of the EP&A Regulation.

4.1.2. Other NSW legislation and regulations

Table 4-1 provides an overview of other relevant NSW legislation that is applicable to the Proposal.

Table 4-1: Other relevant NSW legislation applicable to the Proposal

<table>
<thead>
<tr>
<th>NSW legislation</th>
<th>Requirements for the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminated Land Management Act 1997</td>
<td>Section 60 of the Act imposes a duty on landowners to notify the NSW Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. Land that would be affected by the Proposal has not been declared under the Act as being significantly contaminated. Contamination is assessed in Section 6.8 of this REF.</td>
</tr>
<tr>
<td>Heritage Act 1977</td>
<td>A section 57 exemption or a section 60 approval is required where items listed on the State Heritage Register are to be impacted. Sections 139 and 140 (permit) are required where archaeological relics are likely to be exposed. Non-Aboriginal heritage is assessed in Section 6.5 of this REF. The Proposal is not located in the vicinity of any items listed on the State Heritage Register. Land that would be disturbed by the Proposal has been assessed as having low to moderate potential to contain an archaeological resource. Excavation works within the former yard for the removal and installation of track work have low to moderate potential to encounter archaeological remains. Potential remains likely to be encountered are considered to be `works' under the Act and, as such, disturbance of these items would not require heritage approval or notification.</td>
</tr>
</tbody>
</table>
### NSW legislation

<table>
<thead>
<tr>
<th>Requirements for the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Parks and Wildlife Act 1974</strong></td>
</tr>
<tr>
<td>Sections 86, 87 and 90 of the Act require consent from the NSW Office of Environment and Heritage (OEH) for the destruction or damage of Aboriginal objects. An extensive search of the NSW Office of Environment and Heritage’s Aboriginal Heritage Information Management System (AHIMS) was undertaken for the Proposal on 13 October 2015 as part of the Hornsby Junction Remodelling Aboriginal Heritage Due Diligence Assessment. This assessment concluded that the Proposal is unlikely to disturb any Aboriginal objects. Aboriginal heritage is assessed in Section 6.4 of this REF.</td>
</tr>
<tr>
<td><strong>Noxious Weeds Act 1993</strong></td>
</tr>
<tr>
<td>The Act provides for the declaration of noxious weeds by the Minister for Primary Industries. Weeds may be considered noxious on a national, state, regional or local scale. All private landowners, occupiers, public authorities and councils are required to control noxious weeks on their land under Part 3 Division 1 of the NW Act. Any noxious weed identified on site would be managed in accordance with the regulations set out under the NW Act.</td>
</tr>
<tr>
<td><strong>Protection of the Environment Operations Act 1997</strong></td>
</tr>
<tr>
<td>Under Schedule 1(33) of the POEO Act, an environment protection licence is required for ‘railway systems activities’ (including the installation, onsite repair, onsite maintenance or onsite upgrading of track) where the track forms part of, or consists of, a network of more than 30 kilometres of track. Accordingly, an environment protection licence (EPL) would be required for the Proposal. Under Schedule 1(19) of the POEO Act, an environment protection licence is required for any land-based extraction activities that involve the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials. Depending on the volume of spoil excavated during the construction of the Proposal, the requirement for an environment protection licence may also be triggered under Schedule 1(19) of the POEO Act.</td>
</tr>
<tr>
<td><strong>Roads Act 1993</strong></td>
</tr>
<tr>
<td>In accordance with Section 138 of the Act, consent from the NSW Roads and Maritime Services (RMS) would be required for the carrying out of work in, on or over a public road. George Street is a classified road and, as such, Transport for NSW would need consent from RMS prior to carrying out work on this road.</td>
</tr>
<tr>
<td><strong>Threatened Species Conservation Act 1995</strong></td>
</tr>
<tr>
<td>A search of the NSW Atlas online database was undertaken on 28 October 2015. This search indicated that the site does not contain suitable habitat for any listed threatened species or community; therefore, the Proposal is unlikely to have a significant impact on any threatened species or community. Biodiversity is assessed in Section 6.7 of this REF.</td>
</tr>
<tr>
<td><strong>Waste Avoidance and Resource Recovery Act 2001</strong></td>
</tr>
<tr>
<td>This Act encourages the most efficient use of resources in order to reduce environmental harm. Transport for NSW would carry out the construction of the Proposal in accordance with the objects of this Act. Waste management measures would be prepared and implemented during construction through the Construction Environmental Management Plan.</td>
</tr>
<tr>
<td><strong>Water Management Act 2000</strong></td>
</tr>
<tr>
<td>The Act provides for the protection and management of water resources in NSW. The Act controls the extraction of water, how water can be used, the construction of works such as dams and weirs, and the carrying out of activities on or near water sources. Based on the geomorphological setting and site observations the groundwater level at the site is not expected to be close to ground surface. Potential impacts on groundwater would need to be considered further during the detailed design phase. An aquifer interference approval would be required in instances where an aquifer is intercepted during construction. In addition, any dewatering activities estimated to exceed three mega litres of abstracted water per year would require a water access license under Part 5 of the Act. Transport for NSW would consult with the NSW Office of Water should any approvals be required.</td>
</tr>
</tbody>
</table>
4.2. State Environmental Planning Policies

4.2.1. State Environmental Planning Policy (Infrastructure) 2007

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

Clause 79 of the Infrastructure SEPP allows for the development for the purposes of a ‘railway’ or ‘rail infrastructure facilities’ by or on behalf of a public authority without consent on any land (i.e. assessable under Part 5 of the EP&A Act). Clause 78 defines ‘rail infrastructure facilities’ as including:

- railway tracks, associated track structures, cuttings, drainage systems, fences, tunnels, ventilation shafts, emergency access ways, bridges, embankments, level crossings and roads, pedestrian and cycleway facilities
- signalling, train control, communication and security systems
- power supply (including overhead power supply) systems
- maintenance, repair and stabling facilities for rolling stock
- associated public transport facilities for railway stations' which, under clause 5, includes ‘car parks intended to be used by commuters.

Consequently, development consent for the Proposal is not required; however, the environmental impacts of the Proposal have been assessed under the provisions of Part 5 of the EP&A Act.

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils prior to the commencement of certain types of development. Under Clause 13 of the Infrastructure SEPP, Transport for NSW may be required to consult with Hornsby Shire Council in instances where the Proposal:

- would have a substantial impact on Council’s stormwater management services provided by a council
- is likely to generate traffic to an extent that would strain the capacity of the road system in the Hornsby LGA
- involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by Council
- involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council’s management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential
- involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the Roads Act 1993.

While the Proposal would not trigger the above statutory consultation requirements (due to the anticipated minor nature of the Proposal’s impact on the above matters), Transport for NSW would consult with Hornsby Shire Council during the detailed design and construction phases of the Proposal. Section 5.5 of this REF provides further discussion on the consultation that would be undertaken with project stakeholders during the subsequent phases of the Proposal.

It is noted that the Infrastructure SEPP prevails over all other environmental planning instruments except where State Environmental Planning Policy (Major Development) 2005, State Environmental Planning Policy No 14 – Coastal Wetlands or State Environmental Planning Policy No 26 – Littoral Rainforest applies. The Proposal does not trigger the need for these SEPPs to be considered.
4.2.2. Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River (No 2 – 1997)

Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No. 2 – 1997) (SREP 20) aims to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. SREP 20 applies to land within the Hornsby Local Government Area (LGA) (among other LGAs located within the Greater Metropolitan Region).

Clause 4 of SREP provides that the general planning considerations (set out in clause 5), as well as specific planning policies and related recommended strategies (set out in Clause 6) are applicable to proposed developments on land to which this plan applies, and must be taken into consideration:

- by a consent authority determining an application for consent to the carrying out of development on land to which this plan applies
- by a person, company, public authority or a company State owned corporation proposing to carry out development which does not require development consent.

The Proposal is located approximately 650 metres southwest of Jimmy Banks Creek, which forms part of the Hawkesbury-Nepean catchment area (Jimmy Banks Creek flows into Berowra Creek, which is a tributary to the Hawkesbury River).

The Proposal would not directly impact on primary watercourses or tributaries. Appropriate water quality measures would be adopted to manage any potential impacts to water quality (which would include the implementation of adequate erosion and sediment control measures). Water quality impacts are described further in Section 6.10 of this REF.

4.3. Commonwealth legislation

4.3.1. Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act requires the assessment of whether the Proposal is likely to significantly impact on matters of National Environmental Significance (matters of NES) or Commonwealth land. A search of the EPBC Protected Matters Search Tool was undertaken on 28 October 2015 and these matters are considered in full in Appendix 2.

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

4.3.2. Native Title Act 1993

The main objective of the Commonwealth Native Title Act 1993 is to recognise and protect native title. Section 8 states that the Native Title Act 1993 is not intended to affect the operation of any law of a State or a Territory that is capable of operating concurrently with the Act.

A search of the register maintained by the National Native Title Tribunal (undertaken on 2 December 2015) identified one native title claim registered with respect to land within the area of the project (Tribunal file no. NC2013/002 – Awabakal and Guringai People). However, as the Proposal is located within an existing operating rail corridor and commuter car park (which are owned by Sydney Trains), the Proposal site is unlikely to be affected by a native title holders or claim.
4.3.3. Disability Discrimination Act 1992

The Disability Discrimination Act 1992 aims to eliminate as far as possible discrimination against persons on the ground of disability in areas including access to premises and the provision of facilities, services and land. The components of the Proposal that are accessible to the public (i.e. the commuter car park) would be designed to be independently accessible and in compliance with the objectives and requirements of the Act.

4.4. NSW Government policies and strategies

In addition to statutory requirements, several NSW Government policies and strategies are relevant to the Proposal. Table 4-2 summarises the NSW Government policies and strategies applicable to the Proposal.

Table 4-2: Relevant NSW Government policies/strategies

<table>
<thead>
<tr>
<th>Document</th>
<th>Commitment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>State and Premier priorities</td>
<td>In September 2015 the NSW Premier released 30 ‘State priorities’, including 12 ‘Premier priorities’ to grow the economy, deliver infrastructure, and improve health, education and other services across NSW. Key priorities relevant to the Proposal include ‘building infrastructure’ and ‘creating jobs’.</td>
<td>The Proposal would deliver the following key benefits:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• increase capacity on the T1 North Shore Line to support customer demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• increase commuter car parking supply at Hornsby Station to accommodate the forecast 2036 parking demand.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In so doing, the Proposal would contribute to economic growth by providing direct benefits to customers in terms of accessibility to public transport, as well as increasing capacity on the T1 North Shore Line.</td>
</tr>
<tr>
<td>NSW Long Term Transport Master Plan</td>
<td>The NSW Long Term Transport Master Plan identifies a planned and coordinated set of actions to address transport challenges and guides the NSW Government’s funding priorities over the next 20 years. The Plan would address a number of challenges to building an integrated transport system for Sydney and NSW, including:</td>
<td>Key actions of the NSW Long Term Transport Master Plan that would be addressed by the Proposal comprise:</td>
</tr>
<tr>
<td></td>
<td>• customer-focused integrated transport planning</td>
<td>• implement efficiencies across the rail network through track infrastructure enhancement</td>
</tr>
<tr>
<td></td>
<td>• integrated modes to meet customer needs</td>
<td>• increase park and ride at interchanges</td>
</tr>
<tr>
<td></td>
<td>• getting Sydney moving again</td>
<td>The Proposal would implement efficiencies across the rail network by increasing capacity on the T1 North Shore Line.</td>
</tr>
<tr>
<td></td>
<td>• sustaining Growth in Greater Sydney.</td>
<td>Therefore, the Proposal would contribute to achieving the above key action of the NSW Long Term Transport Master Plan.</td>
</tr>
<tr>
<td></td>
<td>The NSW Long Term Transport Master Plan links to Sydney’s Rail Future, A Plan for Growing Sydney, Rebuilding NSW: State Infrastructure Strategy 2014, regional and sub-regional strategies, and national plans.</td>
<td>The Proposal would also increase park and ride at an important transport interchange by delivering additional commuter car parking.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In so doing, the Proposal would also contribute to achieving the following key themes of the NSW Long Term Transport Master Plan:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• improving customers’ journey experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• providing accessible transport to help address social exclusion.</td>
</tr>
<tr>
<td>Document</td>
<td>Commitment</td>
<td>Comment</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| Sydney’s Rail Future: Modernising Sydney’s Trains | Sydney’s Rail Future details how the NSW Government will deliver the core elements needed to give Sydney a world-class rail network that can support the city’s growth. It describes the plan to transform and modernise Sydney’s rail network based on a three-tiered system, comprising:  
  - Tier 1 – Metro: based on ‘turn-up-and-go’ services and single-deck metro trains  
  - Tier 2 – Suburban: timetabled services with double-deck trains  
  - Tier 3 – Intercity: timetabled services with double-deck trains and on-board amenities for long distance commutes. | Stage 2 of Sydney’s Rail Future includes the delivery of network efficiencies on the existing Sydney Trains network through (amongst other things) track infrastructure enhancements. The Proposal would enhance existing track infrastructure by increasing capacity on the T1 North Shore Line. Therefore, the Proposal would contribute to achieving Stage 2 of Sydney’s Rail Future. |
| A Plan for Growing Sydney | A Plan for Growing Sydney sets out the NSW Government’s strategy for accommodating Sydney’s population growth over the next 20 years. The plan consists of goals, directions and actions that provide a framework for strengthening the global competitiveness of Sydney and delivering strong investment and jobs growth in Western Sydney. | Through increasing the capacity of the the T1 North Shore Line at Hornsby, the Proposal would contribute to achieving the following goals of A Plan for Growing Sydney:  
  - Goal 1: A competitive economy with world-class services and transport  
  - Goal 2: Sydney’s housing choices. |
| Rebuilding NSW: State Infrastructure Strategy 2014 | Rebuilding NSW outlines the NSW Government’s plan to invest $20 billion in new productive infrastructure to sustain productivity growth in NSW’s major centres and regional communities, as well as to support a forecast population of almost six million people in Sydney and more than nine million in NSW. Rebuilding NSW identifies that $1 billion has been reserved for Sydney’s Rail Future Stage 2, which includes the Western Sydney Rail Upgrade program, which will:  
  - target capacity constraints on the T1 Western and Northern Lines to deliver more services  
  - upgrade power supplies, to allow improved train operations on the T1 Line  
  - introduce advanced train control systems to improve service frequencies and capacity. | The Proposal would address a capacity constraint on the T1 North Shore Line at Hornsby. Through addressing a significant capacity constraint on the T1 North Shore Line, the Proposal would contribute to achieving the objectives of Rebuilding NSW. |
The Disability Action Plan 2012-17 (Transport for NSW 2012b) was developed by Transport for NSW in consultation with the Accessible Transport Advisory Committee, which is made up of representatives from peak disability and ageing organisations within NSW. The Disability Action Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job, and provides a solid and practical foundation for future progress over the next five years.

The Proposal has been developed in consideration of the objectives outlined in this Plan.

### 4.5. Local environmental planning instruments

#### 4.5.1. Hornsby Local Environmental Plan 2013

The Proposal is located within the Hornsby Local Government Area (LGA). Development within the Hornsby LGA is regulated by the *Hornsby Local Environmental Plan 2013* (Hornsby LEP). However, as outlined in Section 4.2.1, Clause 79 of the Infrastructure SEPP allows development of rail infrastructure facilities to be undertaken by or on behalf of a public authority without consent on any land. The Proposal can therefore be undertaken without consent. Notwithstanding, the Proposal would be designed, constructed and operated in a manner that is sympathetic to existing surrounding land uses.

### 4.6. Ecologically sustainable development

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

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

The principles of ESD have been adopted by Transport for NSW throughout the development and assessment of the Hornsby Junction Remodelling and Commuter Car Park (the Proposal). Section 3.1.3 summarises how ESD has been incorporated in the design development of the Proposal. Section 6.14 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 and operation of the Proposal.
Chapter 5 discusses the consultation undertaken to date for the Proposal and the consultation proposed for the future. This chapter discusses the consultation strategy adopted for the Proposal and the results of consultation with the community, relevant government agencies and stakeholders.

### 5.1. Consultation requirement

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils prior to the commencement of certain types of development. Table 5-1 provides details of consultation requirements under the Infrastructure SEPP of relevance to the Proposal.

#### Table 5-1: Infrastructure SEPP consultation requirements

<table>
<thead>
<tr>
<th>Consultation with Councils – development with impacts on council related infrastructure and services</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the Proposal would:</td>
<td></td>
</tr>
<tr>
<td>• substantially impact on storm water management services</td>
<td>The Proposal would not involve these types of work. Accordingly, consultation with Council is not required in regard to this aspect.</td>
</tr>
<tr>
<td>• place a local road system under strain</td>
<td></td>
</tr>
<tr>
<td>• involve connection to or impact on a council owned sewerage system</td>
<td></td>
</tr>
<tr>
<td>• involve connection to and substantial use of council owned water supply</td>
<td></td>
</tr>
<tr>
<td>• significantly disrupt pedestrian or vehicle movement</td>
<td></td>
</tr>
<tr>
<td>• involve significant excavation to a road surface or footpath for which Council has responsibility.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultation with Councils – development with impacts on local heritage</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the Proposal would:</td>
<td></td>
</tr>
<tr>
<td>• substantially impact on a local heritage item (if not also a State heritage item)</td>
<td>The Proposal would not substantially impact on a local heritage item or heritage conservation area (refer to Section 6.5). Accordingly, consultation with Council is not required in regard to this aspect.</td>
</tr>
<tr>
<td>• substantially impact on a heritage conservation area.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultation with Councils – development with impacts on flood liable land</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the Proposal would:</td>
<td></td>
</tr>
<tr>
<td>• impact on land that is susceptible to flooding – reference should be made to 'Floodplain Development Manual: the management of flood liable land'.</td>
<td>The proposed site is not susceptible to flooding. Accordingly, consultation with Council is not required in regard to this aspect.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultation with public authorities other than Councils</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where the Proposal would involve:</td>
<td></td>
</tr>
<tr>
<td>• development adjacent to land reserved under the National Parks and Wildlife Act 1994</td>
<td>The Proposal would not involve these forms of development. Accordingly, consultation with the relevant public authorities is not required in regard to this aspect.</td>
</tr>
<tr>
<td>• development adjacent to an aquatic reserve declared under the Marine Parks Act 1997</td>
<td></td>
</tr>
<tr>
<td>• development adjacent to an aquatic reserve declared under the Fisheries Management Act 1994</td>
<td></td>
</tr>
</tbody>
</table>
5.2. 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 valuable local knowledge from the community and stakeholders
- record the details and input from community engagement activities
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach.

5.3. Consultation tools and activities

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

- public display of the REF
- distribution of letterbox drops up to a radius of approximately 500 metres to Hornsby Station to local community and rail commuters, where appropriate, outlining the Proposal and inviting feedback on the REF
- advertisement of REF public display in local newspapers with a link to the Transport for NSW website that includes a summary of the Proposal and information on how to provide feedback
- two community information sessions during the public display period. These sessions aim to provide interested stakeholders with an opportunity to ask questions and discuss the Proposal further
- consultation with Council, Sydney Trains and other non-community stakeholders.
5.4. Public display of the REF

Community consultation activities for the Proposal would be undertaken during the public display of this REF. The display period of the REF would be advertised in the week that the public display commences. The REF would be placed on public display for a period of two weeks at the following locations:

- **Hornsby Shire Council**
  296 Peats Ferry Road
  Hornsby NSW
  Monday to Friday, 8.30 am to 5 pm

- **Hornsby Central Library**
  28-44 George Street
  Hornsby NSW
  Monday to Friday, 10 am to 9 pm
  Saturday, 9.30 am to 5 pm
  Sunday 2pm to 5pm


Feedback on the REF is invited during the public display period. Following consideration of feedback received during the public display period, Transport for NSW would determine whether to proceed with the Proposal.

5.5. Stakeholder consultation

Sydney Trains has been consulted at various stages throughout the development of the Proposal. Key activities that Sydney Trains have been involved with include:

- options assessment and development of the initial concept to achieve the service requirements
- review and approval of the business requirements specification for the Proposal
- development of the concept design for the Proposal (as documented in Chapter 3 of this REF)
- Project Control Group meetings.

Transport for NSW conducted a briefing on the Proposal with the NSW Roads and Maritime Services and Hornsby Shire Council in December 2014. A summary of the issues raised by these stakeholders at this meeting is provided in Table 5-2. Transport for NSW will continue to engage with these stakeholders during the development of the Proposal to resolve the issues raised during the meeting.
Table 5-2: Issues raised by Roads and Maritime and Hornsby Shire Council during initial consultation

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Issue raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads and Maritime Services</td>
<td>Concern raised about establishing a second vehicle access from George Street into the commuter car park; preference for the existing vehicle entry/exit to be used to access the proposed car park</td>
</tr>
<tr>
<td>Roads and Maritime Services</td>
<td>Concern raised about the proposed footpath extension along the western side of George Street; preference for existing pedestrian facilities to be used (i.e. using existing footpaths on eastern side of George Street and the signalised pedestrian crossing at Burdett Street)</td>
</tr>
<tr>
<td>Hornsby Shire Council</td>
<td>Transport for NSW should consider providing motorbike and bicycle parking as part of the Proposal</td>
</tr>
<tr>
<td>Hornsby Shire Council</td>
<td>Concern raised about the maintenance of landscaping or assets not located on Council owned land; this should remain the responsibility of Sydney Trains</td>
</tr>
<tr>
<td>Roads and Maritime Services</td>
<td>Proposed landscaping must not interfere with the proposed lines of sight to/from the proposed vehicle entry into the commuter car park. Roads and Maritime would not be responsible for maintaining any vegetation outside the road carriageway</td>
</tr>
</tbody>
</table>

Additional meetings and workshops would be held with key stakeholders during the detailed design process. These would include but not be limited to:

- Hornsby Shire Council
- Roads and Maritime Services
- Sydney Trains
- Rail freight operators.

## 5.6. Ongoing consultation

At the conclusion of the public display period for this REF, Transport for NSW will acknowledge receipt of feedback from each respective respondent. The issues raised by the respondents will be considered by Transport for NSW before determining whether to proceed with the Proposal.

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

Should Transport for NSW determine to proceed with the Proposal, the project team would keep the community, Council and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community throughout the construction phase would be undertaken in accordance with a community liaison plan (CLP) to be developed prior to the commencement of construction. See Figure 5-1 for the consultation process to be followed for the Proposal.
Transport for NSW determines planning approvals process by preliminary assessment of impact of the project on the environment

Transport for NSW prepares a Review of Environmental Factors (REF) for public display over two weeks and invites submissions from the public

Transport for NSW assesses and responds to feedback and prepares a submissions report/determination report with proposed conditions to minimise environmental impacts

Transport for NSW determines the proposal
*If approved, conditions are made available to the public on TfNSW website

Contractor construction commences subject to compliance with conditions

Figure 5-1: Ongoing consultation process
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 and the Department of Urban Affairs and Planning guidelines *Is an EIS Required?* (DUAP 1999). A checklist of clause 228 factors and how they have been specifically addressed in this REF is included at Appendix 1.

6.1. Traffic and transport

A Traffic and Transport assessment was undertaken for the Proposal by Jacobs in December 2015. The full assessment is provided in Technical Paper 1 (Traffic and Transport). The results of the assessment are summarised below.

6.1.1. Existing environment

Road network

The local road network surrounding the Proposal is shown in Figure 6-1 and summarised in Table 6-1.

Table 6-1: Key features of the local road network

<table>
<thead>
<tr>
<th>Road</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Street</td>
<td>An arterial road running north-south between the Pacific Highway and Bridge Road. George Street generally has two lanes in each direction with a sign posted speed limit of 60 kilometres per hour. Signalised intersections on George Street occur at the Pacific Highway, Edgeworth David Avenue, Burdett Street and Bridge Street/Railway Parade.</td>
</tr>
<tr>
<td>Burdett Street</td>
<td>A local road running east-west with a speed limit of 50 kilometres per hour. Between George Street and Hunter Street, Burdett Street has two westbound lanes and one eastbound lane that widens to two lanes at the intersection of Burdett Street and Hunter Street. 'No Stopping' zones are implemented throughout this section of Burdett Street. Burdett Street provides entry and exit points to the Westfield shopping centre.</td>
</tr>
<tr>
<td>Pacific Highway</td>
<td>A major north-south arterial route with a sign posted speed limit of 60 kilometres per hour in the vicinity of Hornsby Station. The Pacific Highway generally provides two lanes in each direction, narrowing to one traffic lane and one parking lane in each direction north of Station Street.</td>
</tr>
<tr>
<td>Edgeworth David Avenue</td>
<td>A collector route running east-west between the Pacific Highway and Junction Road in Waitara. It provides access to the Westfield car park and the road is primarily residential with local amenities such as Hornsby Girls High School at its western end near the Pacific Highway. The road has two lanes in each direction and a speed limit of 50 kilometres per hour, with a 40 kilometre per hour school zone in place between the Pacific Highway and Romsey Street.</td>
</tr>
</tbody>
</table>
Figure 6-1 | Key features of the existing traffic and transport environment
Car parking and other kerbside uses

Commuter car parking

There are currently four commuter car parks located within easy walking distance of Hornsby Station. The locations of these commuter car parks are shown in Figure 6-1 and summarised as follows:

- Main commuter car park off George Street – located on the eastern side of the rail corridor north of the Hornsby Station concourse. The car park provides 374 commuter parking spaces, as well as 11 Sydney Trains staff parking spaces which are segregated from the adjacent commuter car park via a locked access gate.
- Smaller commuter car park off George Street – located on the eastern side of the rail corridor south of the Hornsby Station concourse. The car park provides 53 parking spaces (including six accessible parking spaces).
- Smaller commuter car park off Jersey Street – located on the western side of the rail corridor north of the Coronation Street/Station Street roundabout. The car park provides 22 parking spaces (including one accessible parking space).
- Smaller commuter car park off High Street – located on the western side of the rail corridor, south of the Pacific Highway overbridge. The car park provides 21 parking spaces.

Vehicle access to the commuter car parks on the eastern side of the rail corridor is provided from the northbound traffic lane of George Street via an unsignalised intersection. No vehicle access is provided directly between the car parks and the southbound traffic lane of George Street, with right-turns into and out of the car parks restricted by a raised concrete median and fencing.

Vehicle access to the smaller commuter car park on the western side of the rail corridor is possible from both the northbound and southbound traffic lanes of Jersey Road.

The commuter car parks do not currently have sufficient capacity to meet parking demand (Arup 2015). Observations made during a 2014 parking survey (Arup 2015) identified the main Hornsby Station commuter car park to be fully occupied by 7.00 am, with customers arriving after this time forced to seek limited available unrestricted on-street parking within walking distance of the station.

Unrestricted on-street parking

A 2015 parking occupancy survey (PeopleTrans 2015) identified a total of 1,374 unrestricted on-street parking spaces within 800 metres of Hornsby Station.

The results of the 2015 parking occupancy survey are summarised in Table 6-2. These results indicate that the number of parking spaces available within 800 metres of Hornsby Station varies throughout the day with between 573 spaces (at 7.00 pm) and 236 spaces (at 11.00 am).
Table 6-2: Unrestricted on-street parking survey results

<table>
<thead>
<tr>
<th>Survey time</th>
<th>Total number of unrestricted on-street parking spaces</th>
<th>Number (%) of unrestricted parking spaces occupied at time of survey</th>
<th>Number (%) of available spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00 am</td>
<td>1,374</td>
<td>883 (64%)</td>
<td>491 (36%)</td>
</tr>
<tr>
<td>9.00 am</td>
<td></td>
<td>1,095 (80%)</td>
<td>279 (20%)</td>
</tr>
<tr>
<td>11.00 am</td>
<td></td>
<td>1,138 (83%)</td>
<td>236 (17%)</td>
</tr>
<tr>
<td>1.00 pm</td>
<td></td>
<td>1,134 (83%)</td>
<td>240 (17%)</td>
</tr>
<tr>
<td>3.00 pm</td>
<td></td>
<td>1,038 (76%)</td>
<td>336 (24%)</td>
</tr>
<tr>
<td>5.00 pm</td>
<td></td>
<td>965 (70%)</td>
<td>409 (30%)</td>
</tr>
<tr>
<td>7.00 pm</td>
<td></td>
<td>801 (58%)</td>
<td>573 (42%)</td>
</tr>
</tbody>
</table>

Source: Adapted from PeopleTrans (2015)

**Kiss-and-ride**

Kiss-and-ride facilities are currently provided on the eastern and western sides of the rail corridor, as shown in Figure 6-1. The kiss-and-ride facilities on the eastern side of the rail corridor are located in a layby zone on the western side of George Street adjacent to a taxi rank. The kiss-and-ride facilities on the western side of the rail corridor are located on Station Street outside shops and the Railway Hotel.

**Taxi zones**

A taxi rank is located on Station Street on the western side of the station approximately 50 metres north of the station entrance (refer to Figure 6-1). The rank operates as a secure taxi rank between the hours of 11.00 pm and 5.00 am on Friday and Saturday. During these times, security guards are stationed at the rank.

An additional taxi zone is provided within a layby on the western side of George Street outside the station entrance, with taxis permitted between the hours of 9.00 am and 12.00 am the following day (i.e. the taxi zone is not in operation between the hours of 12.00 am and 9.00 am each day).

**Rail services**

Hornsby Station consists of five platforms that are accessible and interconnected via a pedestrian concourse at the southern end of the station and a pedestrian overbridge at the northern end, which provides access between platforms. The station is a major transport interchange servicing three train lines:

- T1 North Shore Line (express and all stations services to City via Gordon)
- T1 Northern Line (all stations service to City via Macquarie Park)
- Central Coast and Newcastle Line (express services to City via Strathfield)

The average stopping frequency on each line during weekday and Saturday peak periods is summarised in Table 6-3.
### Table 6-3: Hornsby Station rail service frequencies

<table>
<thead>
<tr>
<th>Direction</th>
<th>Line</th>
<th>Service frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weekday AM peak (7-9 am)</td>
</tr>
<tr>
<td>Southbound</td>
<td>T1 Northern</td>
<td>15 minutes</td>
</tr>
<tr>
<td></td>
<td>T1 North Shore</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Central Coast and Newcastle</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Northbound</td>
<td>T1 Northern</td>
<td>15 minutes</td>
</tr>
<tr>
<td></td>
<td>T1 North Shore</td>
<td>7 minutes</td>
</tr>
<tr>
<td></td>
<td>Central Coast and Newcastle</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

Hornsby Station is the 18th busiest station on the Sydney Trains network (Bureau of Transport Statistics 2015). 2013 station barrier counts for the weekday morning peak period (6.00 am – 9.30 am) and afternoon peak period (3.00 pm – 6.30 pm) are presented in Table 6-4.

### Table 6-4: Hornsby Station barrier counts for 2013

<table>
<thead>
<tr>
<th>Time</th>
<th>Station entries (number of customers)</th>
<th>Station exits (number of customers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00 – 9.30 am</td>
<td>5,230</td>
<td>2,200</td>
</tr>
<tr>
<td>3.00 – 6.30 pm</td>
<td>3,120</td>
<td>4,680</td>
</tr>
</tbody>
</table>

Source: Bureau of Transport Statistics (2014)

### Bus services

The Hornsby bus interchange is located on the western side of the station (refer to Figure 6-1). This facility accommodates six bus stands (located on Station Street) as well as additional space for terminating or waiting services. Key bus routes operating in the area include:

- The high-frequency M60 services operating between Hornsby and Parramatta via Castle Hill. M60 services operate from Hornsby approximately every 10 minutes during the morning peak (7.00 am to 9.00 am). Similar service frequencies operate to Hornsby during the afternoon peak (5.00 to 7.00 pm).
- Route 575 services operating between Hornsby and Macquarie University. These services operate from Hornsby approximately every 20 minutes during the morning peak (7.00 am to 9.00 am). Services operate to Hornsby approximately every 30 minutes during the afternoon peak (5.00 pm to 7.00 pm).

A full list of bus routes servicing the Hornsby bus interchange is provided in Tables 2-3 and 2-4 of Technical Paper 1 (Traffic and Transport).
Pedestrian facilities
Hornsby Station is located in a highly developed retail and commercial area, with a large number of pedestrian facilities and crossing opportunities on either side of the station.

On the eastern side of the station, there is stair access from the main concourse to the western side of George Street and the two commuter car parks. A pedestrian bridge is also located across George Street providing direct connections between the station concourse and Florence Street and the retail area. Furthermore, there are signalised pedestrian crossing facilities on George Street at the Pacific Highway (south of the station) and Burdett Street (north of the station). A fence is located along the central reservation to prevent pedestrians crossing George Street between the intersections.

On the western side of the station, the main concourse is easily accessed at ground level via Station Street. In the immediate vicinity there is a two-stage zebra crossing facility at Station Street and a signalised pedestrian crossing is located at the Pacific Highway/Station Street intersection.

East-west pedestrian access across the rail corridor is provided at the following three locations:
- via the George Street pedestrian overbridge and Hornsby Station concourse
- via the Pacific Highway overbridge
- via the Bridge Road overbridge.

Cyclist facilities
There are several bicycle parking facilities in the vicinity of Hornsby Station. These include two secure cycle storage facilities, each containing 12 individual bicycle lockers. These facilities are operated by Transport for NSW and may be hired for three, six, nine or 12 month periods.

The closest bicycle racks are located on Station Street to the west of the station, with combined capacity for 18 bicycles. There are also cycle racks to the east of the station at Burdett Street and in the precinct surrounding Westfield Hornsby. The locations of designated bicycle storage in the vicinity of Hornsby Station are shown in Figure 2-6 of Technical Paper 1 (Traffic and Transport).

6.1.2. Potential impacts

Construction phase

Site access
The construction compound would be accessed via the existing entry and exit point for the Hornsby Station at-grade commuter car park (off George Street). This vehicle entry would continue to operate as a left-in / left-out access point and, as such, there is unlikely to be any visibility concerns associated with construction vehicles entering or exiting the construction compound. The existing traffic island and four car parking spaces to the north of the access would be removed to ensure construction vehicles can access and exit the site safely.

During the network morning peak hour, it is anticipated that up to fourteen construction vehicles would access and exit the site (refer to Table 6-5).
In addition to the main site access point, vehicles would use existing Sydney Trains' maintenance access gates to enter the rail corridor for track remodelling and signalling works. They would be used less frequently and with a much lower volume of vehicles than the main access at the existing commuter car park. The impact of construction vehicles using the additional access gates on the local road network is considered to be negligible given the small number of construction vehicles that are anticipated to infrequently use a given access gate.

**Traffic impacts**

Existing traffic volumes during the morning peak hour (7.00 am to 8.00 am) at key intersections along the assumed haulage routes and the anticipated construction vehicles are shown in Table 6-5.

### Table 6-5: Construction vehicle impacts – morning peak hour

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing traffic conditions</th>
<th>Maximum estimated construction traffic volumes</th>
<th>Increase in traffic relative to existing traffic volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Highway/ George Street</td>
<td>2,652</td>
<td>LoS B</td>
<td>0.53%</td>
</tr>
<tr>
<td>George Street/ Burdett Street</td>
<td>2,034</td>
<td>LoS A</td>
<td>0.69%</td>
</tr>
<tr>
<td>George Street/ Bridge Road/ Railway Parade</td>
<td>1,924</td>
<td>LoS D</td>
<td>0.73%</td>
</tr>
<tr>
<td>Bridge Road/ Pacific Highway</td>
<td>2,094</td>
<td>LoS B</td>
<td>0.67%</td>
</tr>
</tbody>
</table>

As indicated in Table 6-5, the hourly construction vehicles would represent less than one per cent of the total existing traffic at each of the assessed intersections. It can therefore be concluded that the impact of the anticipated construction traffic of the Proposal is unlikely to have a material impact on the local road network.

It should be noted, however, that the George Street / Bridge Road / Railway Parade intersection currently operates at Level of Service (LoS) D, meaning it is approaching an unstable flow of traffic. Therefore, construction traffic associated with this Proposal would be more likely to have a material impact at this intersection than the other assessed intersections on the local road network.

As discussed in Section 3.2.3, rail operations at Hornsby Station would be required to close for an eight day period around Christmas 2017. During this time replacement bus services would be provided by Sydney Trains. As the replacement bus services would be provided over an eight day period around Christmas, the morning peak hour traffic on the local road network in the vicinity of the station would be expected to be lower than normal. Therefore, the replacement buses would not be expected to cause a material impact on the operation of the above intersections.
Parking impacts

Construction of the Proposal would temporarily impact on the main Hornsby Station commuter car park. These impacts would occur as follows:

- temporary relocation of approximately 90 commuter car parking spaces from the existing Hornsby Station car park during the proposed enabling works for the Proposal (refer to Table 3-1). These relocated commuter car parking spaces are anticipated to be required from mid-2016 for approximately nine months.

- temporary closure of the Hornsby Station commuter car park on George Street and relocation of approximately 370 parking spaces during the construction of the Hornsby Junction Remodelling and commuter car park. This commuter car park is anticipated to be fully closed for approximately 10 months, from January 2017 to October 2017.

The three smaller commuter car parks (with a combined capacity of 96 car spaces) would not be affected by the works.

To manage potential parking impacts during construction of the Proposal, Transport for NSW is currently preparing a car parking offset strategy to identify temporary parking options during the closure of the commuter car park. Various options are currently being considered to address the loss of approximately 370 parking spaces from the commuter car park, including:

- changes to angle of car parking in Florence Street, May Street, Frederick Street and Jersey Street to gain additional on-street parking
- provide additional off-site parking on private property.

The car parking offset strategy would be further developed during detailed design; and further assessment of impacts would be undertaken as required.

As discussed in Section 3.2.6, up to 80-100 construction staff are anticipated to access the construction compound during the peak construction works. Staff would be encouraged to travel by public transport; however, if they drive they would be required to park outside a 600 metre radius of the construction site. Therefore, construction staff would not impact the operation of the road network in the immediate vicinity of the construction site or commuter car parking.

Impacts to rail services

As discussed in Section 3.2.3, rail operations at Hornsby Station would be required to close for an eight day period around Christmas 2017. During this period, the anticipated train passenger journey numbers are expected to be approximately 50 per cent or less of the standard peak weekday passenger numbers. This is due to the Christmas period where the number of customers travelling to and from work decreases.

During this time replacement bus services would be provided by Sydney Trains. Buses would be provided to meet the anticipated demand during the shutdown period and would align with the current train timetable times.
Pedestrian and cycling impacts

Impacts on pedestrians, including along the pedestrian desire line to the east of the station, are anticipated to be minimal. Pedestrians would continue to use the footbridge over George Street or the crossing facilities on Station Street on the western side of the station. Therefore pedestrians are not anticipated to be directly impacted from the construction vehicles and their anticipated haulage routes.

Cyclists would continue to use the cycle parking facilities on the western side of the station and therefore the construction traffic, using the eastern side of the station, would cause minimal impacts to cyclists accessing the station.

Cumulative impacts

Hornsby Shire Council is partially filling Hornsby Quarry with clean excavated material from the NorthConnex tunnel. It has been identified that this would occur over a two year period from late 2015 for approximately 28 months and would result in 380 truck movements per day along George Street. It has been assumed these would occur 24 hours a day and therefore result in 16 trucks per hour that would use the same haulage route as the junction remodelling works to access the quarry via Bridge Road.

The cumulative number of vehicle movements associated with the Proposal and the filling of Hornby Quarry has the potential to affect the performance of the local road network, particularly George Street, which would be used as a haulage route for both of these developments.

An assessment of the cumulative traffic impact that would occur during the construction of the Proposal is provided in Table 6-6.

Table 6-6: Cumulative construction vehicle impacts – morning peak hour

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing traffic conditions</th>
<th>Maximum estimated construction traffic volumes</th>
<th>Increase in traffic relative to existing traffic volumes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing traffic volumes</td>
<td>Level of Service (LoS)</td>
<td>The Proposal</td>
</tr>
<tr>
<td>Pacific Highway/George Street</td>
<td>2,652</td>
<td>LoS B</td>
<td>14</td>
</tr>
<tr>
<td>George Street/Burlett Street</td>
<td>2,034</td>
<td>LoS A</td>
<td>14</td>
</tr>
<tr>
<td>George Street/Bridge Road/Railway Parade</td>
<td>1,924</td>
<td>LoS D</td>
<td>14</td>
</tr>
<tr>
<td>Bridge Road/Pacific Highway</td>
<td>2,094</td>
<td>LoS B</td>
<td>14</td>
</tr>
</tbody>
</table>
As indicated in Table 6-6, the cumulative impact of construction vehicles on the assessed intersections would be less than 2 per cent of the existing traffic volumes. This is unlikely to result in a material impact on the operation of these intersections. Notwithstanding, potential cumulative traffic impacts would be managed by the Construction Contractor through the development and implementation of a detailed Construction Traffic Management Plan, which would include measures to address cumulative traffic impacts. Transport for NSW would coordinate activities with the proponents of these other major project to minimise potential cumulative impacts.

The increase in heavy vehicle movements on the local road network could also increase the rate of road pavement deterioration. To manage this impact, a road condition survey would be undertaken prior to the commencement of construction to document the existing condition of the road surface on local streets. Should damage occur to the road surface as a direct result of the construction of the Proposal, the construction contractor would be required to 'make good' any damage sustained.

Hornsby Shire Council plan to upgrade the pedestrian footbridge between the station and Florence Street. Construction is anticipated to occur this year and the new bridge would be open early to mid-2016. It is therefore anticipated that the bulk of the footbridge construction would be completed prior to the junction remodelling construction and therefore would result in minimal cumulative impacts.

**Operational phase**

*Hornsby Junction Remodelling*

The operation of the proposed Hornsby Junction Remodelling is not expected to generate additional traffic to the Sydney Trains maintenance facilities, located at the northern end of the car park. Therefore, the operational implications on the local road network for Sydney Trains operations would be negligible.

It is assumed that the additional train patronage associated with the Hornsby junction remodelling would be aligned generally to the predicted patronage increase (32 per cent increase in year 2036 + 15 per cent) at Hornsby Station. Additional car journeys would therefore be included in the additional car parking numbers provided below.

*Commuter car park*

The commuter car park is anticipated to generate an additional 44 two-way trips in the morning and afternoon peak hours (Arup 2015). During the morning peak hour (the worst case scenario), the following proportion of trips are anticipated:

- 30 per cent from the north
- 20 per cent from the east
- 20 per cent from the south
- 30 per cent from the west.

In order to accommodate the commuter car park, the George Street/Burdett Street intersection would be upgraded to become a four-armed signalised intersection. Entry to the commuter car park from George Street (north) would not be permitted.

The traffic generated by the proposed car park during the morning peak hour is anticipated to have a negligible impact on the George Street/Burdett Street intersection relative to the existing operation.
Road network

The Traffic and Transport Assessment (Arup 2015) refers to the Hornsby Westside Traffic and Parking Study (Bitzios 2013) to identify critical intersections during peak traffic periods. The Pacific Highway/George Street and Bridge Road/George Street intersections were identified as critical intersections during the peak traffic periods. The traffic volumes at these intersections were compared with the development traffic during the morning peak hour to assess the impact of the additional trips generated by the proposed car park on these key intersections.

The assessment concludes that as the development traffic is less than one per cent of the existing traffic volume at both intersections, the impact on the operation of each intersection is negligible.

The proposed upgraded intersection of George Street/Burdett Street was modelled using SIDRA to analyse the performance during the operation of the car park. With the upgraded intersection design, the traffic generated by the proposed car park during the morning peak hour would have a negligible impact relative to the existing operation. The afternoon peak hour would experience slightly worse conditions during the future scenario. However, the assessment concludes the additional trips would have a minimal impact on the intersection performance.

6.1.3 Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on traffic and transport (refer to Table 7-1):

- a detailed Construction Traffic Management Plan (CTMP) would be prepared for the Proposal to manage and minimise construction impacts. The CTMP would be produced in consultation with Transport for NSW, Roads and Maritime Services and Hornsby Shire Council prior to commencement. The CTMP would include but not be limited to the following:
  - timing of proposed works
  - hours of construction activities
  - number of construction vehicles to be used
  - designation of construction routes
  - mitigation and management measures including use of traffic control signals, construction vehicle access and traffic circulation arrangements
  - designation of temporary parking during construction works (for both the commuters and project personnel)
  - contact details for key onsite construction personnel

- site-specific traffic management issues would also be addressed through the implementation of appropriate Traffic Control Plans (TCPs) developed in consultation with the relevant Roads Authority. The TCPs would outline key details such as advanced warning signage, traffic flow management and pedestrian management measures

- maintain pedestrian access to and from Hornsby Station at all times
where practicable, minimise the use of local and town centre roads for construction vehicle access to and from the site, with major regional roads being used for construction haulage where practicable

where practicable, avoid the delivery of construction materials during peak commuter travel periods and school drop off/pick up times

minimise the total number of deliveries required during construction by providing enough storage within the construction compound for stockpiling materials

scheduling oversized deliveries and other significant traffic disrupting activities to occur at night using vehicles fitted with non-tonal reversing alarms

avoid a net loss in accessible parking spaces at the eastern Hornsby Station entrance by relocating existing commuter parking spaces

road occupancy licences for temporary closure of roads would be obtained, where required

traffic management plans would be prepared and provided to the relevant roads authority as required

heavy vehicles would be restricted to specified routes, with the aim of avoiding local streets, high pedestrian areas and school zones. Where feasible, route markers would be installed for heavy vehicles along designated routes

limit off-site construction vehicle parking to designated areas. Areas of temporary on-street parking during peak construction events would be identified in the traffic management plans to minimise the impact on surrounding properties and businesses. Construction worker parking would not be permitted within 600 metres of the construction site

the queuing and idling of construction vehicles in residential streets would be minimised

an emergency response plan would be developed for construction traffic incidents

where required, public communications would be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to site works in accordance with the CEMP

access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners

during project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents

Should damage occur to the road surface as a direct result of the construction of the Proposal, the construction contractor would be required to ‘make good’ any damage sustained.
6.2. Urban design, landscape and visual amenity

A Visual Impact Assessment was undertaken for the proposed Hornsby Station commuter car park by Spackman Mossop and Michaels in November 2015. (The proposed Hornsby Junction Remodelling would result in a negligible visual change in respect of the existing rail corridor and, as such, was not included in the Visual Impact Assessment.) The assessment was prepared in accordance with the *Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime 2013). The full assessment is provided in Technical Paper 2 (Landscape and Visual Amenity). The results of the assessment are summarised below.

The study area was divided into four landscape character zones, classified based on land use and urban character. Eight key representative viewpoints from where the Proposal could potentially be visible were used to determine the Proposal’s visual impact. The Proposal’s landscape character and visual impacts were assessed using the impact assessment grading matrix (refer to Figure 6-2).

![Impact assessment grading matrix](Adapted from the *Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime 2013))

**Figure 6-2 Impact assessment grading matrix**

6.2.1. Existing environment

Visual catchment

The Proposal is located in the Hornsby town centre within a highly urbanised context. The study area contains a mixture of commercial, retail, residential, recreational and educational land uses. The study area is influenced by topography, vegetation, and infrastructure. Views to the Proposal are generally constrained by the infrastructure surrounding the existing commuter car park. The visual receivers of the Proposal include residents, shoppers, workers, pedestrians, cyclists and motorists. The visual envelope map is shown in Figure 6-3.
Figure 6-3 Visual envelope map and key representative viewpoints
Landscape character zones

A description of each of the landscape character zones adopted for the purpose of informing the visual impact assessment is provided in Table 6-7. The locations of the landscape character zones are shown in Figure 6-4.

Table 6-7: Landscape character zones

<table>
<thead>
<tr>
<th>Landscape character zone (LCZ)</th>
<th>Description</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCZ 1 – Commercial/residential (high density) zone</td>
<td>LCZ 1 is located on the eastern side of the railway line. The zone is the most visually prominent LCZ within the Hornsby area. The LCZ is a busy commercial centre, dominated by the Westfield Hornsby Shopping Centre. A pedestrian mall leads into the shopping centre and links the Hornsby Library. A series of light industrial stores, workshops and garages are located between Bridge Road and Burdett Street. There are three residential apartment blocks within this zone, which are up to thirteen stories high. Multi-level office buildings are also located within this zone. The area is fed directly via a pedestrian foot bridge descending from Hornsby Station, which accentuates the sense of movement of workers, shoppers and vehicles throughout the area. The zone contains minimal vegetation, with scattered planter beds and some small street trees located throughout the zone. Views to the proposed car park would be possible for some of the higher stories of the commercial and residential properties within the zone.</td>
<td>LCZ 1 was assessed to have a low sensitivity due to the highly commercial and homogenous urban character of the zone.</td>
</tr>
<tr>
<td>LCZ 2 – Residential (low to medium density) zone</td>
<td>LCZ 2 is located on the eastern side of the railway line. The zone includes varying types of residential built forms, comprising medium sized apartment blocks, units and detached housing, and single lane streets. Grassed verges and layers of shrubbery on property boundaries and beneath mature street trees create a suburban character. LCZ 2 is adjacent to LCZ 1 and most views to the proposed car park are screened by the buildings in LCZ1.</td>
<td>LCZ 2 was assessed to have a moderate sensitivity due to the residential nature of the zone.</td>
</tr>
<tr>
<td>Landscape character zone (LCZ)</td>
<td>Description</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>LCZ 3 – Hornsby town centre zone</td>
<td>LCZ 3 is located on the western side of the railway line. The zone consists of a traditional shopping village. Antique lamp posts are preserved along a small section of the highway and alfresco dining is located near established, mature trees. On-street parking slows traffic through the space and allows ease of pedestrian access to the variety of stores. The police station, court house and Hornsby Shire Council Chambers reflect architecture dating to 1915, and add to the historic sense of place of the area. Hornsby Park, Hornsby Aquatic Centre and Hornsby TAFE also contribute to the character of the zone. A small park and war memorial is located immediately outside the police station entrance and which also serves as a meeting place or drop off/pick up area.</td>
<td>LCZ 3 was assessed to have a moderate sensitivity due to heritage aspects and the quieter nature of the zone.</td>
</tr>
<tr>
<td>LCZ 4 – Infrastructure road and rail zone</td>
<td>LCZ 4 is located on the western side of the railway line. The zone includes the transport network and bisects LCZ 1, LCZ 2, and LCZ 3. The zone includes Hornsby Railway Station, the rail lines, the existing commuter car park, the bus stops, the taxi rank, and the road network. LCZ 4 is predominantly functional, consisting of hardwearing materials such as asphalt, concrete and steel. Overhead wires occupy the airspace immediately above the existing commuter car park and railway and feed into the stabling yard and large railway workshop at the northern end. Pedestrian movement around the zone is regimented and desire lines are restricted by fences and signalised intersections. A large area of mixed vegetation exists on the eastern car park batter slope which meets ground level on George Street, adjacent to the northbound travel lane. Tall trees and dense shrub occur amidst a variety of groundcovers.</td>
<td>LCZ 4 was assessed to have a low sensitivity.</td>
</tr>
</tbody>
</table>
Figure 6-4 Landscape character zones
6.2.2. Potential impacts

Construction phase

The construction of the Proposal may cause temporary adverse visual amenity impacts for surrounding sensitive receivers (listed in Section 1.2.3 of this REF) due to:

- the establishment of the construction compound, stockpile sites and worksites
- erection of fencing, barricades, gates and lighting for the provision of safe and secure worksites
- construction vehicle movements within construction sites and along haulage routes
- traffic disruption associated with construction traffic
- visual impacts associated with the removal of existing street plantings, earthworks and the parking/use of construction plant and vehicles.

The impact of the Proposal on individual sensitive receivers would be dependent on the stage of the construction, their location and severity of the impact. Visual amenity impacts would be greatest at locations where sensitive receivers have an unscreened view of the construction site. Over time, impacts would be reduced through the gradual reinstatement of the site. In general, it is anticipated that the majority of sensitive receivers located within close proximity to the construction works, construction compound, stockpile sites and construction access routes would experience a temporary reduction in visual amenity.

Construction of the proposed commuter car park is anticipated to be highly visible due to the height of the proposed structure and the topography of the surrounding landscape. Light spill from construction sites would also affect the visual amenity of adjacent land uses. During construction, security lighting would be required at the construction compound to prevent and discourage the unauthorised access by members of the public. Lighting would also be required during scheduled night-works.

Safeguards and management measures that would be implemented to manage visual amenity impacts on surrounding heritage items are outlined in Section 6.2.3.

Operational phase

Landscape character assessment

The Proposal would have a moderate to low impact on the surrounding landscape, with improvements to the urban character of the area through the formalisation of additional parking and a better integrated design along George Street that fits with the urban character of the area and should provide an improved aesthetic view. During operation, the following structures would contribute to the visual impact of the Proposal:

- proposed commuter car park
- permanent façade and fencing
- landscaping and removal of vegetation
- traffic lights at the George Street intersection.

Generally the visual impact from the Proposal would be moderate to low. Potential impacts of the Proposal on each of the landscape character zones are summarised in Table 6-8.

Visual impact assessment

The potential impact of the Proposal on visual amenity was assessed for eight key representative viewpoints. These impacts are summarised in Table 6-9 and include:

- a low visual impact at three viewpoints
- a moderate to low visual impacts to four viewpoints
- a moderate visual impact at one viewpoint.
### Table 6-8: Potential impacts on landscape character zones

<table>
<thead>
<tr>
<th>Landscape character zone</th>
<th>Sensitivity of zone</th>
<th>Magnitude of change</th>
<th>Description of operation impacts</th>
<th>Landscape character impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape character zone 1</td>
<td>Low</td>
<td>Moderate</td>
<td>The Proposal would have a visual impact within this zone. However, the new commuter car park would reflect the predominantly built character of the zone. The zone’s eastern edge currently has views onto the existing car park and would look directly onto the proposed commuter car park. This edge of the zone would be exposed to the change in formation, particularly the shops and light industry to the northern end. Although no viewpoints were taken from the apartment blocks located on George Street, Burdett Street and Hunter Lane, it is evident through the height of the three buildings, that views onto the car park would be affected in every storey above ground floor. The formalisation of the car park would provide a better integrated design along George Street that fits with the urban character of the area and should provide an improved aesthetic view from the apartments, particularly through the removal of the overhead wiring above the existing car park. The finish to the wall of the car park may however have the potential to reflect glare and heat from the morning sun into the resident’s apartments. The green edge which screens the existing car park, provides a softening function to the edge of landscape character zone 1 and landscape character zone 4, and may be appreciated by the residents of the apartment blocks. The removal of the existing vegetation would alter the view from this zone; however, the provision of new landscaping and the urban design would reduce the visual impact of the Proposal.</td>
<td></td>
</tr>
</tbody>
</table>

| Landscape character zone 2 | Moderate            | Low                 | The majority of the zone would experience negligible impact as a result of the car park development. The residential zone would be unaffected by the Proposal due to the screening effect of the buildings in landscape character zone 1, which are located between this zone and the proposed commuter car park. There is potential increased traffic on Burdett Street due to the proposed phasing of the traffic lights at the George Street intersection, which may affect traffic up to the start of landscape character zone 2 at Hunter Street. |
|-------------------------|---------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|

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<table>
<thead>
<tr>
<th>Landscape character zone</th>
<th>Sensitivity of zone</th>
<th>Magnitude of change</th>
<th>Description of operation impacts</th>
<th>Landscape character impact</th>
</tr>
</thead>
</table>
| Landscape character zone 3 | Moderate             | Low                | The Proposal has negligible impact in this zone. The top floor car park level sits marginally above the existing car park level. The vehicle barrier, top of stairwell and elevator housing sit 2.5 metres above the first floor, and although they may potentially be visible from landscape character zone 3, the series of cables, fencing and rail components spread across the rail infrastructure would make it difficult to view.  
The removal of the existing vegetation on the site would have a minor visual impact from landscape character zone 3. The canopy of some of the larger trees can be seen from the bus terminal and Railway Hotel on Station Street. | Moderate to low             |
| Landscape character zone 4 | Low                 | Moderate           | The existing commuter car park is in high demand, with cars using space not formally designated for parking. The new design would formalise the layout and provide an ease of entry and exit on to George Street. Phasing the traffic lights at Burdett Street with vehicle entry and exit from the car park would allow a more efficient and safe transition onto the road.  
The proposed design would give the car park a definitive edge, where it would meet street level and frame the extent of RailCorp land. Opportunities exist to return the existing vegetation to George Street and soften the impervious, functional zone. | Moderate to low             |
### Table 6-9: Visual impact assessment

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewpoint 1 – 108 George Street (visible to pedestrians, cyclists and motorists)</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate to low</td>
</tr>
<tr>
<td>Viewpoint 2 – Burdett Street and Hunter Street intersection (visible to workers, residents, motorists, and pedestrians)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Viewpoint 1 – 108 George Street**

- **View to:** 108 George Street (visible to pedestrians, cyclists and motorists)
- **Sensitivity:** Low
- **Magnitude:** Moderate
- **Impact:** Moderate to low
- **Description:**
  - The Proposal would be prominent from this view, yet would sit within the current context of the zone. The Proposal is an upgrade of the existing car park.
  - Replacement planting along the verge next to the Proposal would mitigate the magnitude of the impact of the works, as the vegetation matures.
  - It is unlikely that the visual impact of the site establishment or construction machinery would be of high magnitude.

**Viewpoint 2 – Burdett Street and Hunter Street intersection**

- **View to:** Burdett Street and Hunter Street intersection (visible to workers, residents, motorists, and pedestrians)
- **Sensitivity:** Low
- **Magnitude:** Low
- **Impact:** Low
- **Description:**
  - As the site would remain as a commuter car park, the magnitude of change on the current form would be low. No clearing of vegetation would take place from this view.
<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewpoint 3 – Corner of George Street and Burdett Street (visible to</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate to low</td>
</tr>
<tr>
<td>motorists, pedestrians, and cyclists)</td>
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<tr>
<td>A notable change to the current form would take place if vegetation is</td>
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<tr>
<td>not replaced. Replacement planting would mitigate the magnitude of the</td>
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<tr>
<td>works, as they mature.</td>
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<tr>
<td>During construction, the temporary concrete safety barriers and fencing</td>
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<td>to create a safe work zone would be visible.</td>
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<tr>
<td>Viewpoint 4 – Pedestrian footbridge (visible to pedestrians)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Elements of the Proposal would be visible from this view as the</td>
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<tr>
<td>vegetation along George Street would be removed.</td>
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<tr>
<td>However, replacement planting would mitigate the impact as they mature.</td>
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<tr>
<td>Temporary fencing and storage facilities, stockpile areas, site buildings</td>
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<tr>
<td>and other facilities may be visible.</td>
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<tr>
<td>Viewpoint</td>
<td>Sensitivity</td>
<td>Magnitude</td>
<td>Impact</td>
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<td>--------------------------------------------------------------------------</td>
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<tr>
<td>Viewpoint 5 – Hornsby town centre, west side of the railway (visible to</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Low</td>
</tr>
<tr>
<td>pedestrians, park users, motorists, and bus and taxi patrons)</td>
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<td>The Proposal would have a</td>
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<td>negligible effect on the</td>
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<td>magnitude of change from</td>
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<td>this viewpoint. The elevator</td>
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<td>shafts and stairwells</td>
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<td>would potentially be</td>
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<td></td>
<td>visible.</td>
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<tr>
<td>Viewpoint 6 – Station Street outside Railway Hotel (visible to pedestrians,</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate to</td>
</tr>
<tr>
<td>workers, Railway Hotel, and café patrons)</td>
<td></td>
<td>The current view from The</td>
<td>low</td>
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<td></td>
<td></td>
<td>Railway Hotel and cafe is</td>
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<td></td>
<td></td>
<td>of the railway and commuter</td>
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<td>car park. The Proposal is</td>
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<td>synonymous with the</td>
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<td></td>
<td></td>
<td>existing land use and would</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>only slightly differ in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>height, causing a low</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>magnitude rating.</td>
<td></td>
</tr>
<tr>
<td>Viewpoint</td>
<td>Sensitivity</td>
<td>Magnitude</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>Viewpoint 7 – Hornsby Railway Station, eastern side of the railway, Platform 1 stairway landing (visible to rail customers)</td>
<td>Low</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The change in car park form would be evident from this view; however the appearance of the car park would be very similar to the existing view, particularly during construction. The new formalised arrangement of vehicles and removal of overhead wiring would have a positive impact.</td>
<td></td>
</tr>
</tbody>
</table>

| Viewpoint 8 – Jersey Street, western side of the railway (visible to pedestrians) | Low | Negligible |
| | | The magnitude of change to the current view would be negligible. Construction of the Proposal would result in the removal of vegetation only sighted from the viewpoint through gaps in fencing and buildings. |
6.2.3. Mitigation measures

The following design principles are proposed to protect and enhance the existing visual character of Hornsby Junction and its surrounds, where possible (refer to Table 7-1):

- anti-graffiti coating would be provided to elements of the buildings and wall finishes which are accessible to the public
- layered planting, including the provision of medium height trees, would be provided along the eastern edge of the Proposal to:
  - provide visual amenity for the road user, pedestrian and residents
  - provide shade to pedestrians and parked cars
  - mitigate the hard surface character and magnitude of works, as the vegetation matures
- about 80 square metres of redundant footpath at the northern part of George Street, from the stair shaft to the extent of works boundary can be redesigned to allow for replacement of vegetation in this area and the mitigation of the visual impact of the structure
- the following building facades are proposed; however, would be determined during detailed design:
  - the long facade of the building which borders George Street would be finished with vertical, irregular spaced aluminium sheets, to assist breaking up the monotonous form of the Proposal and help soften its edge by allowing air and light through the structure
  - the finish of the ground level wall would be of a textured pattern, or tactile appearance of either an exposed aggregate or tile cladding
  - the upper parapet can be concrete finish, concrete with an added oxide, or painted concrete to provide a look of formalised capping to the Proposal
  - the parapet would be finished with a double rail which spans the length of the building. This galvanized rail would have the effect of reducing the apparent height of the structure as well as prevent the public from walking along the top of the wall.

The following mitigation measures are proposed to manage the potential construction landscape character and visual impacts of the Proposal (refer to Table 7-1):

- detail design and documentation drawings would define the extent of all construction activity including temporary works in order to protect the area of vegetation immediately adjacent during construction
- construction facilities would be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use
- prior to construction, provide suitable barriers, such as shade cloth or a similar material, to screen views from adjacent areas during construction
- existing trees to be retained within construction facilities areas would be identified, protected and maintained
- minimise light spill from the rail corridor into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution
- heritage items should be protected
- once construction is complete, or progressively throughout the works where possible, return compound sites to at least their pre-construction state.
6.3. Noise and vibration

A Noise and Vibration Impact Assessment was undertaken for the Proposal by Jacobs in November 2015. The full assessment is provided in Technical Paper 3 (Noise and Vibration). The results of the assessment are summarised below.

6.3.1. Existing environment

Background noise

The Proposal is located within and immediately adjacent to an existing operating rail corridor (used for both passenger and freight train operations). Rail and road traffic noise and noise from station operations are likely to be key factors influencing background noise levels in the vicinity of the Proposal.

Background noise levels were monitored at the following sensitive receiver locations between the 13 and 26 November 2015:

- Monitoring Location 1: residential property on level 2 of the Avanti units (88-90 George Street, Hornsby).
- Monitoring Location 2: residential property on level 12 of the Avanti units (88-90 George Street, Hornsby).
- Monitoring Location 3: residential property at Jersey Street, Hornsby.

The locations of these monitoring sites are shown in Figure 6-5. These monitoring locations were used to provide representative noise levels for the following three basic noise environments:

- George Street – street level (based on Monitoring Location 1)
- George Street – high level units (based on Monitoring Location 2)
- other residential areas (based on Monitoring Location 3)

The results of the background noise monitoring are presented in Appendix B of Technical Paper 3 (Noise and Vibration) and summarised in Table 6-10.

The three primary noise metrics used to describe construction noise emissions include:

- \( L_{A1} \) – the ‘typical maximum noise level’ for an event, used in the assessment of potential sleep disturbance during night-time periods. Alternatively, assessment may be conducted using the \( L_{Amax} \) or maximum noise level.

- \( L_{Aeq} \) – the ‘energy average noise level’ evaluated over a specified time period (for example 15 minutes). The \( L_{Aeq(15\ minute)} \) parameter is used to assess the potential construction noise impacts.

- Rating Background Level (RBL) – the ‘background noise level’ in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively (also referred to as \( L_{A90} \)). The \( L_{Aeq(15\ minute)} \) construction Noise Management Levels (NMLs) are based on the \( L_{A90} \) background noise levels.

The subscript ‘A’ indicates that the noise levels are filtered to match normal human hearing characteristics (i.e. A-weighted).
Table 6-10: Summary of background noise monitoring results

<table>
<thead>
<tr>
<th>Monitoring location</th>
<th>Time period</th>
<th>$L_{Aeq}$ dB(A)</th>
<th>$L_{A1}$ dB(A)</th>
<th>RBL dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring Location 1: Avanti units - Level 2</td>
<td>Day (7 am to 6 pm)</td>
<td>68.7</td>
<td>75.5</td>
<td>58.8</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>65.8</td>
<td>72.7</td>
<td>49.2</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>62.7</td>
<td>71.5</td>
<td>40.0</td>
</tr>
<tr>
<td>Monitoring Location 2: Avanti units - Level 12</td>
<td>Day (7 am to 6 pm)</td>
<td>62.8</td>
<td>71.3</td>
<td>43.1</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>63.6</td>
<td>71.5</td>
<td>55.8</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>62.2</td>
<td>70.4</td>
<td>44.6</td>
</tr>
<tr>
<td>Monitoring Location 3: Jersey Street</td>
<td>Day (7 am to 6 pm)</td>
<td>61.8</td>
<td>70.1</td>
<td>46.6</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>61.1</td>
<td>69.0</td>
<td>43.9</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>58.0</td>
<td>67.5</td>
<td>35.6</td>
</tr>
</tbody>
</table>

The results in Table 6-10 indicate that the existing noise environment is influenced by rail and road traffic noise. For example, while ‘background noise levels’ (represented in Table 6-10 as RBL) decrease considerably during the night-time period, the corresponding ‘energy average noise levels’ ($L_{Aeq}$) remain considerably high. This data is indicative of a night-time noise environment that is dominated by short term relatively loud noises, such as a passing train and/or noisy road vehicle. During daytime hours, noise levels are influenced by a variety of long and short term noise sources.

The results in Table 6-10 also show that the $L_{Aeq}$ dB(A) noise levels at higher levels of the George Street units remain largely unchanged throughout the 24 hour daytime period. These properties are exposed to a wider field of background noise and, as such, night time background noise levels ($L_{A90}$) do not show the extent of decrease that is apparent at street level.

**Sensitive receivers**

*Noise sensitive receivers*

There are a number of noise sensitive land uses within the vicinity of the Proposal, including residential dwellings, commercial premises (e.g. cafes, restaurants and retail/commercial buildings), educational facilities (e.g. TAFE NSW’s Hornsby Collage) and public recreation areas (e.g. Hornsby Park and Hornsby Aquatic and Leisure Centre).

The nearest sensitive receivers comprise residential properties located along the northern end of Jersey Street and large residential units located on George and Hunter streets (refer to Figure 6-5). Land uses in the vicinity of the Proposal are shown in Figure 6-5.
Figure 6-5 | Surrounding land uses and background noise monitoring locations
Vibration sensitive receivers

As outlined in Section 6.5, there are a number of heritage items of local significance located within the study area. Heritage structures can be particularly susceptible to damage from ground vibration. The nearest vibration sensitive heritage items are listed in Table 6-11. The locations of these items are shown in Figure 6-5.

Table 6-11: Vibration sensitive receivers

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Approximate distance from nearest works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hornsby Railway Station</td>
<td>Within work zone</td>
</tr>
<tr>
<td>SRA electricity plant and signal box</td>
<td>5 – 10 metres</td>
</tr>
<tr>
<td>Peats Ferry Road precinct</td>
<td>100 metres</td>
</tr>
<tr>
<td>WWI War memorial</td>
<td>180 metres</td>
</tr>
<tr>
<td>Jersey Street shops</td>
<td>50 metres</td>
</tr>
<tr>
<td>The Browsery cottage</td>
<td>50 metres</td>
</tr>
<tr>
<td>TAFE buildings K&amp;M</td>
<td>100 metres</td>
</tr>
</tbody>
</table>

6.3.2. Noise and vibration assessment criteria

Construction noise

Residential receivers

The Interim Construction Noise Guideline (ICNG) sets out ways to deal with the impacts of construction noise on residences and other sensitive land uses. It does this by presenting assessment approaches that are tailored to the scale of construction projects.

For construction work during standard daytime hours, a $\text{L}_{\text{Aeq}(15\text{ minute})}$ noise management level (NML) of the rating background level (RBL) + 10 dBA applies for residential receivers. This is aimed to represent the level above which there may be some community reaction to construction noise.

Refer to Table 6-12 for the NMLs at the nearest residential receivers.

Table 6-12: Summary of existing background noise monitoring results and NMLs

<table>
<thead>
<tr>
<th>Location</th>
<th>Parameter</th>
<th>Construction NMLs – $\text{L}_{\text{Aeq}(15\text{ minute})}$ dB(A)</th>
<th>Sleep disturbance $\text{L}_{\text{A1}(1\text{ minute})}$ dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Street – street level</td>
<td>RBL</td>
<td>59</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Allowance</td>
<td>+10</td>
<td>+5</td>
</tr>
<tr>
<td></td>
<td>NML</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td>George Street – high units</td>
<td>RBL</td>
<td>43</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Allowance</td>
<td>+10</td>
<td>+5</td>
</tr>
<tr>
<td></td>
<td>NML</td>
<td>53</td>
<td>57</td>
</tr>
<tr>
<td>Other residential areas</td>
<td>RBL</td>
<td>47</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Allowance</td>
<td>+10</td>
<td>+5</td>
</tr>
<tr>
<td></td>
<td>NML</td>
<td>57</td>
<td>45</td>
</tr>
</tbody>
</table>
Where the predicted levels exceed the NML, all feasible and reasonable work practices would be applied to minimise the potential noise impacts. Where \( L_{A_{eq}(15\text{minute})} \) construction noise levels are predicted to exceed 75 dBA, a receiver may be considered ‘highly noise affected’ and additional measures, such as the implementation of respite periods, may be implemented.

The ICNG and *Road Noise Policy* (DECCW 2011) also set out ways to deal with the impacts of construction noise on sleep disturbance. Residents are usually most annoyed by work at night-time as it has the potential to disturb sleep. Factors that may be important in assessing the extent of impact on sleep include how often high noise events occur at night, the predicted maximum noise levels at night, whether there are times when there is a clear change in the noise environment (such as early morning shoulder periods), and the degree of maximum noise levels above the background levels at night.

Refer to Table 6-12 for the sleep disturbance NMLs at the nearest residential receivers.

**Commercial Receivers**

The ICNG explains that due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories:

- industrial premises: external \( L_{A_{eq}(15\text{minute})} \) 75 dBA
- offices, retail outlets: external \( L_{A_{eq}(15\text{minute})} \) 70 dBA
- other businesses that may be very sensitive to noise, where the noise level is project specific as discussed below.

The above noise management levels apply only when the property is in use.

**Other Sensitive Land Uses**

Noise management levels applicable to other sensitive land uses are summarised as follows:

- classrooms and other educational institutions: \( L_{A_{eq}(15\text{minute})} \) 55 dB(A) (internal)
- passive recreation areas (quiet recreation): \( L_{A_{eq}(15\text{minute})} \) 60 dB(A)

The above noise management levels apply only when the receiver is in use.

**Construction vibration**

The effects of vibration in buildings can be divided into three main categories: those in which the occupants or users of the building are inconvenienced or possibly disturbed, those where the building contents may be affected and those in which the integrity of the building or the structure itself may be prejudiced.

Guidance on appropriate plant and equipment and associated recommendations for safe working distances is provided in a number of publications, as detailed below.

The recommended safe working distances for building structural damage and human comfort are identified in the EPA’s *Assessing Vibration: a technical guideline* (DEC, 2006).

The *Construction Noise Strategy* (TfNSW, 2012a) recommends the minimum safe working distances for large hydraulic hammers to be 22 metres for cosmetic damage and 73 metres for human response.
The EPA’s *Assessing Vibration: a technical guideline* (DEC, 2006) provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV) rather than a continuous vibration level. The VDV is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

Guidance is also provided in the German Standard (DIN4150:3) for the effects of long term vibration. The relevant vibration criteria are provided in Tables 6-13 and 6-14.

**Table 6-13: DIN4150:3 guideline vibration velocity values for evaluating effects of long term vibration**

<table>
<thead>
<tr>
<th>Type of structure</th>
<th>Vibration at horizontal plane of highest floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellings and buildings of similar design and/or occupancy</td>
<td>5mm/s</td>
</tr>
<tr>
<td>Buildings used for commercial purposes, industrial buildings, and buildings of similar design</td>
<td>10mm/s</td>
</tr>
<tr>
<td>Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)</td>
<td>2.5mm/s</td>
</tr>
</tbody>
</table>

Notes: Guideline values presented at Peak Particle Velocity (PPV)  
Vibration at horizontal plane of highest floor applies to all frequencies.

**Table 6-14: Recommended safe working distances for vibration intensive plant**

<table>
<thead>
<tr>
<th>Plant item</th>
<th>Rating/description</th>
<th>Cosmetic damage (BS7385)</th>
<th>Human response (DEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small hydraulic hammer</td>
<td>300 kg (5 to 12T) excavator</td>
<td>2 metres</td>
<td>7 metres</td>
</tr>
<tr>
<td>Medium hydraulic hammer</td>
<td>900 kg (12 to 18T excavator)</td>
<td>7 metres</td>
<td>23 metres</td>
</tr>
<tr>
<td>Large hydraulic hammer</td>
<td>1600 kg (18 to 34T excavator)</td>
<td>22 metres</td>
<td>73 metres</td>
</tr>
<tr>
<td>Vibratory pile driver</td>
<td>Sheet piles</td>
<td>2 to 20 metres</td>
<td>20 metres</td>
</tr>
<tr>
<td>Pile boring</td>
<td>≤ 800 mm</td>
<td>2 metres (nominal)</td>
<td>n/a</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>Handheld</td>
<td>1 metre (nominal)</td>
<td>Avoid contact with structure</td>
</tr>
</tbody>
</table>

Notes: Table data reproduced from TfNSW’s Construction Noise Strategy  
BS 7385 – British Standard 7385 Evaluation and measurement for vibration in buildings  
DEC = Department of Environment and Conservation NSW (now EPA)

**Operational rail noise**

For airborne noise created by the operation of surface track, the NSW Rail Infrastructure Noise Guidelines (RING) provides noise trigger levels for rail infrastructure projects, including for the ‘redevelopment of an existing railway line’.

The noise trigger levels for residential and non-residential noise sensitive receiver locations are provided in Tables 6-15 and 6-16, respectively.
Table 6-15: RING noise trigger levels for residential receivers

<table>
<thead>
<tr>
<th>Type of development</th>
<th>Noise trigger levels (external) dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day (7am to 10pm)</td>
</tr>
<tr>
<td>Redevelopment of existing train line</td>
<td>Development increases existing $L_{Aeq(period)}$ rail noise levels by 2dB or more (or existing $L_{Amax}$ rail noise levels by 3dB or more) AND predicted rail noise levels exceed:</td>
</tr>
<tr>
<td></td>
<td>65 $L_{Aeq(15\text{ hour})}$</td>
</tr>
<tr>
<td></td>
<td>85 $L_{Amax(Fast)}$</td>
</tr>
</tbody>
</table>

Table 6-16: RING noise trigger levels for non-residential land uses

<table>
<thead>
<tr>
<th>Land use (when in use)</th>
<th>Noise trigger levels, redevelopment of existing rail line – dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Development increases rail noise by 2dB(A) or more in any hour and rail noise exceeds:</td>
</tr>
<tr>
<td>Schools, educational facilities and child care centres (internal)</td>
<td>45 $L_{Aeq(1\text{ hour})}$</td>
</tr>
<tr>
<td>Places of worship (internal)</td>
<td>45 $L_{Aeq(1\text{ hour})}$</td>
</tr>
<tr>
<td>Hospitals wards</td>
<td>40 $L_{Aeq(1\text{ hour})}$</td>
</tr>
<tr>
<td>Hospitals – other uses</td>
<td>65 $L_{Aeq(1\text{ hour})}$</td>
</tr>
<tr>
<td>Open space – passive use</td>
<td>65 $L_{Aeq(15\text{ hour})}$</td>
</tr>
<tr>
<td>Open space – active use</td>
<td>65 $L_{Aeq(24\text{ hour})}$</td>
</tr>
</tbody>
</table>

Operational traffic noise

*Noise from commuter car park site*

The noise limits for the operational noise emissions from the proposed commuter car park are derived from the NSW EPAs *Industrial Noise Policy* (INP).

The INP provides criteria for the assessment of noise impacts associated with industrial activities. It aims to balance the need for industrial activity with the desire for quiet within the community. The INP sets two separate noise criteria: one to account for intrusive noise and the other to protect the amenity of particular land uses. These criteria are to be met at the most-affected boundary of the receiver property.

To provide for protection against intrusive noise, the INP states that the $L_{Aeq}$ noise level of the source, measured over a period of 15 minutes, should not be more than 5 dB above the ambient (background) $L_{A90}$ noise level (or RBL), measured during the daytime, evening and night-time periods at the nearest sensitive receivers.

To provide protection against impacts on amenity, the INP specifies suitable maximum noise levels for particular land uses and activities during the daytime, evening and night-time periods. For this assessment, the existing residences in the vicinity of the commuter car park have been defined as ‘urban residential’.

A summary of the specific noise limits for the proposed commuter car park are presented in Table 6-17.
Table 6-17: INP noise criteria for the proposed commuter car park

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Time of day</th>
<th>Intrusive noise criteria</th>
<th>Amenity noise criteria</th>
<th>Applicable INP noise criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avanti units - Level 2</td>
<td>Day (7 am to 6 pm)</td>
<td>64</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>64</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Avanti units - Level 12</td>
<td>Day (7 am to 6 pm)</td>
<td>48</td>
<td>60</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>61</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>50</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Jersey Street</td>
<td>Day (7 am to 6 pm)</td>
<td>52</td>
<td>60</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Evening (6 pm to 10 pm)</td>
<td>49</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Night (10 pm to 7 am)</td>
<td>41</td>
<td>45</td>
<td>41</td>
</tr>
</tbody>
</table>

Operational traffic noise along road network

The NSW Road Noise Policy (RNP) provides the following guidance for the consideration of additional road traffic noise generated by a development: ‘For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.

6.3.3. Potential impacts

Construction phase

To provide detailed assessment of potential noise impacts from construction works, a noise propagation model was established using the CONCAWE algorithm with SoundPLAN (version 7.3) software.

The predictions represent worst-case scenarios, as the predicted noise levels include the cumulative impact from all works occurring at the same time. It is also noted that the works would not be likely to be continuous for extended periods of time, noise levels would be expected to be lower than the calculated levels.

Daytime construction noise impacts

A summary of the predicted daytime construction noise impacts at the three assessed representative receiver locations (shown in Figure 6-5) is provided in Table 6-18. A comparison with the relevant NMLs is also presented.

A worst case exceedance of the daytime (standard construction hours) $L_{Aeq\,(15\text{minute})}$ background noise level of up to 21 dBA is predicted at the most affected sensitive receiver during piling works for the car park. It is noted that these works are restricted to the daytime periods only.
Several receivers surrounding the construction works are expected to potentially be ‘highly noise affected’ during the following activities:

- high voltage power line relocation
- ground works and site clearance for the proposed commuter car park
- driven sheet piling for the proposed commuter car park
- earthworks for the proposed commuter car park.

In order to minimise the potential noise and vibration impacts upon nearby sensitive receivers, most construction works associated with the commuter car park would be undertaken during standard daytime construction periods (7.00 am to 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm on Saturdays).

**Out-of-hours construction noise impacts**

A summary of the predicted night-time construction noise impacts at the three assessed representative receiver locations (shown in Figure 6-5) is provided in Table 6-18. A comparison with the relevant NMLs is also presented.

Some works would be undertaken outside of standard construction hours. It is anticipated that approximately 18 track possessions would be required to undertake the project, and these would be likely to require works to be undertaken out of standard daytime construction hours.

During proposed night time works, exceedences of up to 25dB(A) may be experienced at locations along Jersey Street during removal of the existing railway track. Similar exceedences are predicted along Jersey Street during installation of new track, and to a lesser extent during track conditioning works.

During the relocation of the high voltage power line, receivers on George Street may be ‘highly noise affected’ during night time activities.

It is likely that some deliveries may also take place outside standard daytime construction hours. Due to the low existing background noise levels, and the proximity of the site offices to the George Street units, deliveries outside standard construction hours may potentially exceed the out of hours NMLs. Implementation of all reasonable and feasible measures identified in the *Construction Noise Strategy* (TfNSW 2012) would see impacts as a result of noise and vibration minimised where possible.
Table 6-18: Predicted construction noise impacts

<table>
<thead>
<tr>
<th>Construction activity</th>
<th>Receiver location</th>
<th>Predicted noise – dB(A)</th>
<th>Predicted daytime impact – dB(A)</th>
<th>Predicted night-time impact – dB(A)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NML</td>
<td>Exceedance</td>
<td>NML</td>
<td>Exceedance</td>
</tr>
<tr>
<td>Commuter car park</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ancillary Compound</td>
<td>Avanti units - Level 2</td>
<td>50</td>
<td>69</td>
<td>50</td>
<td>Noise levels are expected to comply with NMLs at all locations during daytime hours. Where full operation is underway during night time hours, some impacts may occur at west facing receivers along George Street, particularly at the lower levels of the units.</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>46</td>
<td>53</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>37</td>
<td>57</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>High voltage overhead wire relocation</td>
<td>Avanti units - Level 2</td>
<td>&gt;75</td>
<td>69</td>
<td>50</td>
<td>Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts would be limited to residential properties on George and Hunter Streets. Receivers at the lower levels of the west facing George Street units may be ‘highly noise affected’. During night time hours, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>72</td>
<td>53</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>50</td>
<td>57</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Ground works and site clearance</td>
<td>Avanti units - Level 2</td>
<td>&gt;75</td>
<td>69</td>
<td>50</td>
<td>Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts will be limited to residential properties on George and Hunter Streets. Receivers at the lower levels of the west facing George Street units may be ‘highly noise affected’. If this work is required during night time, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>73</td>
<td>53</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>50</td>
<td>57</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Construction activity</td>
<td>Receiver location</td>
<td>Predicted noise – dB(A)</td>
<td>Predicted daytime impact – dB(A)</td>
<td>Predicted night-time impact – dB(A)</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NML</td>
<td>Exceedance</td>
<td>NML</td>
<td>Exceedance</td>
</tr>
<tr>
<td>Driven sheet piling</td>
<td>Avanti units - Level 2</td>
<td>&gt;75</td>
<td>69</td>
<td>Highly noise affected</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>74</td>
<td>53</td>
<td>21</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>50</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts would be limited to residential properties on George and Hunter Streets. Receivers at the lower levels of the west facing George Street units may be ‘highly noise affected’. If this work is required during night time, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.</td>
</tr>
<tr>
<td>Earthworks</td>
<td>Avanti units - Level 2</td>
<td>&gt;75</td>
<td>69</td>
<td>Highly noise affected</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>73</td>
<td>53</td>
<td>20</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>50</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts will be limited to residential properties on George and Hunter Streets. Receivers at the lower levels of the west facing George Street units may be ‘highly noise affected’. If this work is required during night time, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.</td>
</tr>
<tr>
<td>Construct base car park structure</td>
<td>Avanti units - Level 2</td>
<td>75</td>
<td>69</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>71</td>
<td>53</td>
<td>18</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>42</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts would be limited to residential properties on George and Hunter Streets. If this work is required during night time, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.</td>
</tr>
</tbody>
</table>
### Construction activity

<table>
<thead>
<tr>
<th>Receiver location</th>
<th>Predicted noise – dB(A)</th>
<th>Predicted daytime impact – dB(A)</th>
<th>Predicted night-time impact – dB(A)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NML</td>
<td>Exceedance</td>
<td>NML</td>
<td>Exceedance</td>
</tr>
<tr>
<td>Car park and street infrastructure and fit out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avanti units - Level 2</td>
<td>75</td>
<td>69</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Avanti units - Level 12</td>
<td>71</td>
<td>53</td>
<td>18</td>
<td>57</td>
</tr>
<tr>
<td>Jersey Street</td>
<td>42</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td>Roadwork at George Street / Burdett Street intersection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avanti units - Level 2</td>
<td>68</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td>Avanti units - Level 12</td>
<td>64</td>
<td>53</td>
<td>11</td>
<td>57</td>
</tr>
<tr>
<td>Jersey Street</td>
<td>40</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td>Fit out of reconfigured George Street / Burdett Street intersection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avanti units - Level 2</td>
<td>45</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td>Avanti units - Level 12</td>
<td>41</td>
<td>53</td>
<td>–</td>
<td>57</td>
</tr>
<tr>
<td>Jersey Street</td>
<td>Inaudible</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
</tbody>
</table>

Some noise impacts may extend to receivers on Jersey Street; however, most noise impacts would be limited to residential properties on George and Hunter Streets. If this work is required during night time, these impacts are likely to extend further to the east, into properties along Albert Street and possibly receivers further beyond this location.

Noise levels arising from roadwork activities in the vicinity of the George / Burdett Street intersection are expected to comply with NMLs at all ground level locations during daytime hours. Minor exceedences may occur at higher floors of the George Street units. Where full operation is underway during night time hours, some impacts may extend to residential receivers along George and Burdett Street.

Noise levels are expected to comply with NMLs at all locations during day and night time hours.
### Hornsby Junction Remodelling

<table>
<thead>
<tr>
<th>Construction activity</th>
<th>Receiver location</th>
<th>Predicted noise – dB(A)</th>
<th>Predicted daytime impact – dB(A)</th>
<th>Predicted night-time impact – dB(A)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NML</td>
<td>Exceedance</td>
<td>NML</td>
<td>Exceedance</td>
</tr>
<tr>
<td>Hornsby Junction Remodelling</td>
<td>Avanti units - Level 2</td>
<td>50</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>46</td>
<td>53</td>
<td>–</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>37</td>
<td>57</td>
<td>–</td>
<td>45</td>
</tr>
<tr>
<td>Relocation of public utilities</td>
<td>Avanti units - Level 2</td>
<td>57</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>53</td>
<td>53</td>
<td>–</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>60</td>
<td>57</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>Removal of track</td>
<td>Avanti units - Level 2</td>
<td>67</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>63</td>
<td>53</td>
<td>10</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>70</td>
<td>57</td>
<td>13</td>
<td>45</td>
</tr>
</tbody>
</table>
### Construction activity

<table>
<thead>
<tr>
<th>Construction activity</th>
<th>Receiver location</th>
<th>Predicted noise – dB(A)</th>
<th>Predicted daytime impact – dB(A)</th>
<th>Predicted night-time impact – dB(A)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NML</td>
<td>Exceedance</td>
<td>NML</td>
<td>Exceedance</td>
</tr>
<tr>
<td>Installation of new track</td>
<td>Avanti units - Level 2</td>
<td>65</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>60</td>
<td>53</td>
<td>7</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>69</td>
<td>57</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>Track conditioning</td>
<td>Avanti units - Level 2</td>
<td>64</td>
<td>69</td>
<td>–</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Avanti units - Level 12</td>
<td>60</td>
<td>53</td>
<td>7</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Jersey Street</td>
<td>66</td>
<td>57</td>
<td>9</td>
<td>45</td>
</tr>
</tbody>
</table>
**Construction vibration impacts**

Predicted vibration levels based on the types of vibration intensive equipment proposed to be used during construction are shown in Table 6-19 (building damage) and Table 6-20 (human comfort). Predicted exceedences of the applicable vibration criteria are illustrated in red text. These predicted vibration levels are based on typical ground conditions and provide an indication of the expected vibration impacts during construction works.

**Table 6-19: Estimated construction vibration levels – building damage**

<table>
<thead>
<tr>
<th>Plant description</th>
<th>Vibration level (mm/s)¹</th>
<th>5 metres</th>
<th>10 metres</th>
<th>25 metres</th>
<th>50 metres</th>
<th>100 metres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Building damage criteria: 5 mm/s (typical) and 3 mm/s (heritage)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (3-8 tonne)²</td>
<td>7</td>
<td>3</td>
<td>0.7</td>
<td>0.3</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (8-13 tonne)²</td>
<td>19</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (13-18 tonne)²</td>
<td>22</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (&gt;18 tonne)²</td>
<td>28</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Hydraulic hammer</td>
<td>6</td>
<td>2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Impact Pile driver³</td>
<td>76</td>
<td>30</td>
<td>9</td>
<td>3.8</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Pile boring</td>
<td>6</td>
<td>2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Jackhammer (hand held)</td>
<td>2</td>
<td>0.8</td>
<td>0.2</td>
<td>&lt;0.1</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Notes:  
1: Calculated in accordance with BS5228 – Code of practice for noise and vibration control on construction and open sites (95% confidence) / FTA Guidance Manual for Transit Noise and Vibration Impact Assessment  
2: Mid amplitude setting  
3: Assumes soft ground, 380kJ per stroke (30T Ram, 1.3m stroke)

**Table 6-20: Estimated construction vibration levels – Human comfort**

<table>
<thead>
<tr>
<th>Plant description</th>
<th>Vibration level eVDV (mm/s¹,75)¹</th>
<th>5 metres</th>
<th>10 metres</th>
<th>25 metres</th>
<th>50 metres</th>
<th>100 metres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human comfort criteria: 0.2 mm/s¹,75 daytime and 0.13 mm/s¹,75 night-time</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (3-8 tonne)²</td>
<td>5.9</td>
<td>2.3</td>
<td>0.6</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (8-13 tonne)²</td>
<td>16.2</td>
<td>7.3</td>
<td>2.2</td>
<td>0.8</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (13-18 tonne)²</td>
<td>18.2</td>
<td>8.2</td>
<td>2.5</td>
<td>0.9</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Vibratory roller (&gt;18 tonne)²</td>
<td>23.7</td>
<td>10.7</td>
<td>3.2</td>
<td>1.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Hydraulic hammer</td>
<td>5</td>
<td>1.8</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Impact Pile driver³</td>
<td>65</td>
<td>26</td>
<td>8</td>
<td>3.2</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Pile boring</td>
<td>5</td>
<td>1.8</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Jackhammer (hand held)</td>
<td>1.9</td>
<td>0.7</td>
<td>0.2</td>
<td>&lt;0.1</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Notes:  
1: Calculated in accordance with Appendix B2 ‘Assessing vibration a technical guideline’ and assumes 6 hrs per day of intermittent vibration  
2: Mid amplitude setting  
3: Assumes soft ground, 380kJ per stroke (30T Ram, 1.3m stroke)
As shown in Table 6-19 (building damage), potential exceedances of the heritage criteria have been identified for heritage items located within 5 metres of rockbreaking and within 10 metres of a medium vibratory roller. Use of this equipment would be avoided in the vicinity of the SRA electricity plant / signal box and Hornsby Station platforms.

Where structures that do not have a heritage rating are considered, structural damage limits may be increased to 5 mm/s, and shows a risk to building structures located within 30 metres of piling works and 15 metres of most other vibration intensive activities. This is a conservative estimate and may be increased further, depending upon the frequency spectrum of the equipment in use. This spectrum and site specific operating distances may be determined through vibration monitoring.

The nearest residential receivers are located approximately 30 metres from the nearest work area of both the track reconfiguration works and the multi-storey car park. Where impact piling or medium to large vibratory rollers are used within 100 metres of these receivers, potential exceedances of Human Comfort Criteria may occur at ground level locations. Hydraulic hammers may exceed the criteria where used within 25 metres of these properties. Vibration levels above ground floors are highly complex and relate to building structure and design. Potential human comfort impacts at these locations would be considered as they arise.

These predicted vibration levels indicate that structural damage may occur at residential buildings where vibratory rollers are used within 10m of a structure or where impact piling is carried out within 25 metres of the building.

For the Proposal, a building condition survey and vibration monitoring would be undertaken where residences are within approximately 50 metres of the works.

Potential human comfort impacts would be quantified with a vibration monitoring survey during the initial phase of the works to account for actual site conditions and distances to the works at the closest locations.

**Operational phase**

**Operational rail noise**

The proposed reconfiguration of track work within Hornsby Junction is not anticipated to result in substantial changes in the location of train movements within the rail corridor (i.e. tracks would not move substantially closer to residential properties). Therefore, this track work is unlikely to affect the overall noise level generated by each train passby at the nearest sensitive receivers.

As outlined in Section 2.1, one of the objectives of the Proposal is to increase the capacity of Hornsby Junction up to 16 trains per hour. This increase in rail traffic has the potential to increase airborne noise emissions along the T1 North Shore Line.

The predicted change in airborne noise associated with the proposed increase in rail traffic on the T1 North Shore Line is provided in Table 6-21. The applicable noise trigger levels for residential and non-residential noise sensitive receiver locations are provided in Tables 6-15 and 6-16, respectively.

**Table 6-21: Potential change in airborne rail noise**

<table>
<thead>
<tr>
<th>Train sound power level</th>
<th>$L_{A_{eq}(9 \text{ hour})}$ dB(A) 12 trains per hour</th>
<th>$L_{A_{eq}(9 \text{ hour})}$ dB(A) 16 trains per hour</th>
<th>Increase dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 dB(A)$^1$</td>
<td>60.2</td>
<td>61.4</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Note 1: Sourced from Transport for NSW’s train noise database (average of all Tangara trains)
The calculations provided in Table 6-21 show that the proposed increase in train numbers is likely to result in a potential increase in train noise of approximately 1.2 dB(A). This increase would apply at all locations and is independent of existing base noise levels. Although this calculation is represented as an hourly figure, as it is an $L_{Aeq}$, this increase would also be representative of the increase during day (15 hour) and night time (9 hour) time periods.

An increase of 1.2 dB(A) is well below the allowable 2 dB(A) increase, and as such the Proposal is not expected to exceed the RING guidelines and further assessment of total rail noise levels is not required.

It is also noted that the proposed track work would allow a small increase in passenger train travel speeds as they approach Hornsby Station. Current typical approach speeds are in the order of 12 km/hr; which may increase to 25 km/hr following the proposed track work. In terms of train noise emissions, this increase in speed is not likely to affect overall train noise levels, and is not expected to be noticeable at surrounding receiver locations.

**Operational traffic noise from the commuter car park site**

The movement of vehicles around the car park has the potential to contribute to noise impacts at surrounding sensitive receivers. The extent of potential operational traffic noise impacts has been modelled using the CONCAWE algorithm within SoundPLAN (version 7.3) software.

The predicted operational noise impact of the proposed commuter car park on surrounding sensitive receivers is identified in Table 6-22.

**Table 6-22: Predicted operational noise impacts from the commuter car park**

<table>
<thead>
<tr>
<th>Receiver location and height</th>
<th>Maximum $L_{Aeq(1hr)}$</th>
<th>INP noise criteria – $L_{Aeq(Day)}$</th>
<th>Complies with criteria?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>88 – 90 George Street (Avanti apartments)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 m elevation</td>
<td>50.0</td>
<td>48</td>
<td>No</td>
</tr>
<tr>
<td>20 m elevation</td>
<td>51.5</td>
<td>60</td>
<td>Yes</td>
</tr>
<tr>
<td>10 m elevation</td>
<td>51.0</td>
<td>60</td>
<td>Yes</td>
</tr>
<tr>
<td>1.5 m elevation</td>
<td>49.5</td>
<td>60</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>1c Burdett Street (Avanti apartments)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 m elevation</td>
<td>46.5</td>
<td>48</td>
<td>Y</td>
</tr>
<tr>
<td>20 m elevation</td>
<td>47.6</td>
<td>60</td>
<td>Y</td>
</tr>
<tr>
<td>10 m elevation</td>
<td>47.4</td>
<td>60</td>
<td>Y</td>
</tr>
<tr>
<td>1.5 m elevation</td>
<td>43.8</td>
<td>60</td>
<td>Y</td>
</tr>
<tr>
<td><strong>25 – 29 Hunter Street (The Madison apartments)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20m elevation</td>
<td>39.9</td>
<td>60</td>
<td>Y</td>
</tr>
<tr>
<td>10m elevation</td>
<td>40.6</td>
<td>60</td>
<td>Y</td>
</tr>
<tr>
<td>1.5m elevation</td>
<td>38.3</td>
<td>60</td>
<td>Y</td>
</tr>
</tbody>
</table>
As shown in Table 6-22, noise levels from the commuter car park are expected to comply with the operational INP noise criteria at most nearby locations during peak usage of the car park (representing the worst case scenario). It is possible that under these conditions, noise levels at the upper floors of the George Street units may marginally exceed INP criteria. Although this assessment considers a worst case noise level, which may last for only peak hour periods of the day, it is important that transmission paths between internal areas of the car park and the higher levels of the Avanti units are considered during detailed design.

Note that this noise modelling does not consider polished concrete, which is used in some car park facilities. This floor type generates substantial tyre noise and is the source of most car park noise complaints. It is recommended that polished concrete is not used in this facility.

During normal operations, it is expected that the loudest noise event during cars entering and exiting the multi-story car park would be from doors opening and closing. For a typical light vehicle, this event has an $L_{A_{\text{max}}}$ of approximately 61 dB(A).

A noise event of this level is of a similar level to typical pass by noise as vehicles move along George Street, and well below the sleep disturbance criteria outlined in Section 6.1.2. As such, it is not expected that the car park would generate any sleep disturbance impacts during normal operations.

Occasional events such as horns or aggressive driving around the site may generate higher noise levels than those outlined above, however these are expected to be very infrequent and as such not result in significant sleep disturbance impacts.

**Operational traffic noise along road network**

The proposed commuter car park has the potential to increase traffic noise on the local road network due to the increased number of vehicles travelling to and from the site.

The predicted change in road traffic noise along primary roads leading to the proposed car park site is outlined in Table 6-23. This change in road traffic noise was calculated based on the UK’s Department of Environment, Calculation of Road Traffic Noise (CORTN) algorithms.

**Table 6-23: Predicted change in road traffic noise**

<table>
<thead>
<tr>
<th>Location</th>
<th>Predicted increase in road traffic noise – dB(A)</th>
<th>Complies with RNP criteria?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Morning peak</td>
<td>Evening peak</td>
</tr>
<tr>
<td>George Street</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Bridge Road</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Pacific Highway</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Burdett Street</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Linda Street</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Edgeworth David Avenue</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Allowable RNP increase: +2 dB(A)
As shown in Table 6-23, the predicted increase in road traffic noise on the local road network is likely to remain below 1 dB(A) at all locations and, therefore, would comply with the allowable noise level increase of 2 dB(A). For this reason, the proposed commuter car park is considered unlikely to have a substantial traffic noise impact on sensitive receivers surrounding these roads.

### 6.3.4. Mitigation measures

The following mitigation measures are proposed to manage the potential noise and vibration impacts of the Proposal (refer to Table 7-1):

- a Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the Construction Environmental Management Plan. Measures documented in the CNVMP would be consistent with the mitigation measures outlined in the Transport for NSW Construction Noise Strategy and the Interim Construction Noise Guideline where practicable. These measures may include (but would not be limited to):
  - letter box drops, individual briefings, respite periods, or where highly intrusive noise levels are anticipated, alternative accommodation for specific construction activities
  - use of localised acoustic hoarding around significant noise generating items of plant
  - briefing of the work team in order to create awareness of the locality of sensitive noise receivers and the importance of minimising noise emissions
  - planning the higher-noise activities and work near residential noise receivers to be undertaken predominantly during less sensitive periods
  - ensuring spoil is placed and not dropped into awaiting trucks
  - use of less noise-intensive equipment
  - noise monitoring

- all construction plant and vehicles would be fitted with non-tonal reversing alarms

- operational traffic noise impacts associated with the proposed commuter car park would be considered further during detailed design, with the aim of minimising impacts to residential properties within the Avanti units on George Street. Measures that could be considered include avoiding the use of polished concrete in the car park and minimising gaps in traffic barriers along the George Street façade.
6.4. Aboriginal heritage

An Aboriginal Heritage Due Diligence Assessment was undertaken for the Proposal by Artefact Heritage in October 2015. The assessment was prepared in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010). The assessment included a search of the Aboriginal Heritage Information Management System (AHIMS) (undertaken on 13 October 2015), a review of previous archaeological studies, and a site inspection (undertaken on 13 October 2015). The results of the assessment are summarised below.

6.4.1. Existing environment

**Historical background**

Evidence of Aboriginal occupation in NSW dates back to around 50,000 to 60,000 years at Lake Mungo (in NSW’s south-western region, approximately 110 kilometres northeast of Mildura) and up to 30,000 years at Parramatta. The traditional owners of the Hornsby LGA were the Aboriginal people of the Darug and Guringai language group (Hornsby Shire Council 2014).

**Previously registered Aboriginal heritage sites**

No previously recorded Aboriginal heritage sites were identified in the vicinity of the Proposal during the extensive AHIMS search. The closest previously recorded Aboriginal heritage site identified during the extensive AHIMS search is located approximately 1.2 kilometres north-west of the Proposal.

**Aboriginal heritage sites identified during the site inspection**

No Aboriginal objects or areas of archaeological potential were identified within the study area during the site inspection.

**Archaeological potential**

The study area has been significantly disturbed by the construction and maintenance of the railway over an extended period. The potential for intact archaeological deposits across the study area is considered low. Following the NSW Office of Environment and Heritage due diligence guidelines the landscape features within the study area do not indicate that Aboriginal objects are likely to occur in subsurface deposits. Significant levels within the study area indicate that the natural landform has been completely modified.

6.4.2. Potential impacts

**Construction phase**

Construction of the Proposal would not impact on any previously recorded Aboriginal heritage sites. As outlined in Section 6.4.1, the closest previously recorded Aboriginal heritage site is located approximately 1.2 kilometres north-west of the Proposal.

The potential for previously unrecorded Aboriginal heritage items to be impacted by the Proposal is considered to be low (due to the low archaeological potential of the study area) and would be manageable through the application of the measures documented in Section 6.4.3 of this REF.

**Operational phase**

Aboriginal heritage would not be impacted during the operation of the Proposal as widespread ground disturbance/excavation would be restricted to the construction phase.
6.4.3. Mitigation measures

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

- all construction staff would receive basic training in the recognition of Aboriginal cultural heritage material. This training would include information such as the importance of Aboriginal cultural heritage material and places to both the Aboriginal and non-Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal cultural heritage material and sites
- if Aboriginal objects are located during works, all works would stop in the vicinity of the find, and the OEH, Local Aboriginal Land Council (LALC) and an archaeologist would be notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained before works recommence
- if the project design is changed, and areas not surveyed are to be impacted, further archaeological assessment would be undertaken. Should any Aboriginal heritage items be found, they would be identified on the construction contractor’s environmental control maps.

6.5. Non-Aboriginal heritage

A Non-Aboriginal Heritage Impact Assessment was carried out for the Proposal by Artefact Heritage in October 2015. The assessment was prepared using the Statement of Heritage Impact (NSW Heritage Office 2002) as a guideline and included a search of non-Aboriginal heritage registers, a review of background information, and a site inspection. The results of the assessment are summarised below.

6.5.1. Existing environment

History of the study area

The Hawkesbury River provided the major transport route for early settlers. During the 1800s, the region was largely rural with land holdings primarily utilised for agriculture. The fruit growing industry commenced in the 1830s and was the main industry within the region. During the 1890s, Dural and the Hills district was the chief supplier of citrus fruit for most of Australia. As well as growing fruit for sale in the Sydney market, local growers also entered the market as suppliers of seeds and seedlings of ornamental and fruit bearing plants.

Rail transport became important to the development of the colony during the 1800s. This made the area accessible to settlers and squatters who established industries, such as sheep farming. In 1849, the Sydney Railway Company was formed, and was purchased by the State government in 1854. The first Sydney station was constructed by the Sydney Railway Company in 1855.
The first railway junction was built in 1893, linking the main northern railway line to Newcastle with the North Shore Line at Hornsby. The construction of the railway altered the course of the development of Hornsby, providing access to markets for the local farmers and transport options for the increasing population.

With the development of additional transport routes, the district changed from a predominantly agricultural district to one characterised by commuters and orchardists. Most of the development within Hornsby followed the railway lines. Hornsby became the centre of the district due to its association with the railway junction, providing work for railway employees, shopkeepers and publicans. Hornsby also became a popular residential area for families.

**Listed heritage items**

Nine listed heritage items of local significance are located within the study area. These items are listed in Table 6-24. The locations of these items are shown in Figure 6-6.

No items listed on the State Heritage Register, Commonwealth Heritage List, or National Heritage List are located within the study area.

**Table 6-24: Listed heritage items in the vicinity of the Proposal**

<table>
<thead>
<tr>
<th>Heritage item</th>
<th>Register(s) listed</th>
<th>Heritage significance</th>
<th>Distance from the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hornsby Railway Station Group and Barracks</td>
<td>RailCorp (now Sydney Trains) s170 register Hornsby LEP</td>
<td>Local</td>
<td>Within the extent of construction works</td>
</tr>
<tr>
<td>SRA electricity plant and signal box</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>Within the extent of construction works</td>
</tr>
<tr>
<td>Railway cloak room buildings</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>Within the extent of construction works</td>
</tr>
<tr>
<td>Peats Ferry Road Precinct, Hornsby West Side Heritage Conservation Area</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>Partially within the study area</td>
</tr>
<tr>
<td>Street trees</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>55 metres west of the study area, along Jersey Street</td>
</tr>
<tr>
<td>War Memorial and Palms</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>60 metres south west of the study area</td>
</tr>
<tr>
<td>Shops</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>70 metres west of the study area</td>
</tr>
<tr>
<td>“The Browsery Cottage”</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>70 metres west of the study area</td>
</tr>
<tr>
<td>TAFE college – Buildings “K” and “M” and grounds (excluding other buildings)</td>
<td>Hornsby LEP</td>
<td>Local</td>
<td>70 metres west of the study area at its closest</td>
</tr>
</tbody>
</table>
Figure 6.6 Listed heritage items located near the Proposal
Archaeological potential

The Proposal area was assessed to have a nil to low potential of containing archaeological remains pre-dating the construction of the North Shore Railway Line and Hornsby Railway Station.

The portion of the study area located within the Hornsby Railway yard has potential to encounter evidence of earlier rail infrastructure, including the former goods platform and sheds, the former locomotive depot, water tanks, water columns and turntable. It is also possible that evidence of earlier track work and rail configurations are buried within the yard (such as tracks and ballast). Overall, there is low to moderate potential that archaeological remains associated with earlier phases of the Hornsby Railway yard would be encountered within the Proposal area.

6.5.2. Potential impacts

Construction phase

The proposed works would not impact on fabric associated with the Hornsby Railway Station, or with the signal box. An early steel A-frame within the eastern portion of the railway yard, located within the heritage curtilage, would require removal (refer to Figure 6-6). The A-frame has not been specifically included in the description of the heritage item; however, as a rare survivor of earlier rail infrastructure within the curtilage of a listed heritage item, it is considered to be an element of moderate heritage significance within the overall heritage rail context. Removal would result in a minor impact to heritage fabric.

Construction of the Proposal also has the potential to indirectly impact on the following four heritage items during vibration intensive construction works:

- Hornsby Railway Station Group and Barracks
- SRA electricity plant and signal box
- Railway cloak room buildings.

Safeguards and management measures that would be implemented to manage construction vibration impacts on surrounding heritage items are outlined in Section 6.3.3.

Operational phase

The establishment of the proposed new commuter car park would have a moderate visual impact on the following two items of local heritage significance:

- The Hornsby Railway Station group and Barracks, listed on the RailCorp (now Sydney Trains) section 170 register: The proposed commuter car park is likely to result in a moderate visual impact to the heritage railway station through the introduction of a structure currently occupied by ground-level car parking. As the view corridor between the former barracks building and the proposed car park is limited, the new car park would result in a minor visual impact to the former barracks building.

- The State Rail Authority (SRA) electricity plant and signal box, listed on the Hornsby Local Environmental Plan 2013 (Hornsby LEP): Construction of the proposed commuter car park would result in a moderate visual impact to the heritage item, as it would introduce a structure where currently car parking is at ground level only. The introduction of the proposed car park would alter the current landscape of the car park and railway station, and be directly visible from the SRA electricity plant and signal box.
An additional two heritage items of local significance would also be subject to negligible visual impacts primarily due to the commuter car park. These comprise:

- The Railway cloak room building, listed as item A52 on the Hornsby LEP
- The Peats Ferry Road Precinct, Hornsby West Side Heritage Conservation Area and street trees on the eastern side of Jersey Street, listed as item C5 on the Hornsby LEP.

6.5.3. Mitigation measures

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

- non-Aboriginal heritage items would be identified on the construction contractor’s environmental control maps
- if any unanticipated archaeological deposits are identified within the Proposal area during construction, work likely to impact on the deposit would cease immediately and the NSW Heritage Council and a heritage consultant would be contacted. Where required, further archaeological work and/or consents would be obtained for the unanticipated archaeological deposits prior to works recommencing at the location
- a heritage induction would be provided to workers before construction begins, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction
- design of the commuter car park is to consider the heritage context of the Hornsby Railway Station, and aim to minimise the potential for adverse impact on the setting of the surrounding heritage item. The design would aim to be low in form where possible, to avoiding competing with unmodified elements of Hornsby Station visible from street level, such as the current platform canopies. The façade fronting George Street would be finished in a suitable material and colour that is consistent with the existing visual context
- consultation would be carried out with Sydney Trains and Hornsby Shire Council in relation to potential impacts on locally listed heritage items listed on RailCorp’s s170 register and the Hornsby LEP, respectively
- a program of archival recording would be carried out prior to the removal of the existing A-frame in the Hornsby rail yard. The recording would include a photographic record of the A-frame to be replaced in the yards and on the platforms, and be carried out in accordance with the How to Prepare Archival Records of Heritage Items guidelines (OEH 1998). The recording would meet the minimum requirements for archival recording.
6.6. Socio-economic impacts

A desktop analysis of publicly available information, such as local and State government documents and statistics from the Australian Bureau of Statistics (ABS) 2011 Census, was carried out in October 2015 to assess the potential socio-economic impacts of the Proposal. The results of the assessment are presented below.

6.6.1. Existing environment

The Hornsby LGA is located approximately 21 kilometres north-west of the Sydney CBD. At the 2011 Census, the Hornsby LGA had a population of 156,847 people (ABS 2011). The proportion of people under 14 years of age and over 65 years of age was relatively consistent with that of NSW (refer to Table 6-25). The Hornsby LGA had a high proportion of people who used the train as the primary method of travel to work at 14.4 per cent, compared to 6.2 per cent of NSW (ABS 2011).

There were approximately 41,501 people working in the Hornsby LGA at the 2011 Census (ABS 2011). In 2011, approximately 6.9 per cent of people working in the Hornsby LGA travelled by train for all or part of their journey to work, compared to 9.4 per cent in NSW as a whole.

The Plan for Growing Sydney (NSW Government 2014) identified Hornsby as one of Sydney’s Strategic Centres, which is also located within the Global Economic Corridor. The Global Economic Corridor is a strategic location for intensive development to sustain and expand the economy and support more jobs closer to where people live. The Sydney Strategic Centres are identified as priority locations for employment, retail, housing, services and mixed-uses.

Table 6-25: Socio-economic characteristics of Hornsby LGA

<table>
<thead>
<tr>
<th>Socio-economic characteristics</th>
<th>Hornsby LGA</th>
<th>New South Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>156,847</td>
<td>6,917,658</td>
</tr>
<tr>
<td>Median age</td>
<td>39 years</td>
<td>38 years</td>
</tr>
<tr>
<td>Family households</td>
<td>80.1%</td>
<td>71.9%</td>
</tr>
<tr>
<td>Average people per household</td>
<td>2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Single (or lone) person households</td>
<td>17.7%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Households with no vehicles</td>
<td>7.2%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Households with two or more vehicles</td>
<td>54.9%</td>
<td>48.6%</td>
</tr>
<tr>
<td>Median weekly household income</td>
<td>$1,824</td>
<td>$1,237</td>
</tr>
<tr>
<td>Full-time employment</td>
<td>60.3%</td>
<td>60.2%</td>
</tr>
<tr>
<td>Travel to work, car as driver (employed aged 15 years and over)</td>
<td>51.4</td>
<td>57.6</td>
</tr>
<tr>
<td>Travel to work, train (employed aged 15 years and over)</td>
<td>14.4</td>
<td>6.2</td>
</tr>
<tr>
<td>Travel to work, car as passenger (employed aged 15 years and over)</td>
<td>3.0</td>
<td>3.7</td>
</tr>
<tr>
<td>Travel to work, bus (employed aged 15 years and over)</td>
<td>3.0</td>
<td>3.7</td>
</tr>
<tr>
<td>Travel to work, walked only (employed aged 15 years and over)</td>
<td>2.8</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Social infrastructure assists in catering for the needs of the local community by providing a range of community services and facilities, such as education facilities; health, medical and emergency services; sport, recreation and leisure facilities; and community and cultural facilities. The area immediately surrounding the Proposal forms part of the Hornsby town centre and contains a mixture of commercial, retail, residential, recreational and educational land uses (refer to Figure 1-2). Social infrastructure located near the Proposal is listed in Table 6-26.

**Table 6-26: Social infrastructure located near the Proposal**

<table>
<thead>
<tr>
<th>Facility</th>
<th>Location</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAFE NSW Hornsby College</td>
<td>Peats Ferry Road, Hornsby</td>
<td>Education</td>
</tr>
<tr>
<td>Benowie Walking Track (which forms part of the Great North Walk)</td>
<td>Access via Rosemead Road, Hornsby</td>
<td>Sport and recreation</td>
</tr>
<tr>
<td>Hornsby Mountain Bike Trail</td>
<td>Quarry Road, Hornsby</td>
<td>Sport and recreation</td>
</tr>
<tr>
<td>Hornsby Aquatic and Leisure Centre</td>
<td>Peats Ferry Road, Hornsby</td>
<td>Sport and recreation</td>
</tr>
<tr>
<td>Kim Warwick Tennis Academy</td>
<td>Edgeworth David Avenue, Hornsby</td>
<td>Sport and recreation</td>
</tr>
<tr>
<td>Hornsby Central Library</td>
<td>George Street, Hornsby</td>
<td>Community facility</td>
</tr>
<tr>
<td>Hornsby Function Centre</td>
<td>High Street, Hornsby</td>
<td>Community facility</td>
</tr>
<tr>
<td>PCYC</td>
<td>George Street, Hornsby</td>
<td>Community facility</td>
</tr>
<tr>
<td>Summers Avenue Medical Practice</td>
<td>Summers Avenue, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>Three Bears Kindergarten</td>
<td>Railway Parade, Hornsby</td>
<td>Childcare facility</td>
</tr>
<tr>
<td>Community Church Hornsby</td>
<td>Jersey Street, Hornsby</td>
<td>Place of worship</td>
</tr>
<tr>
<td>Hornsby Fire Station</td>
<td>Bridge Road, Hornsby</td>
<td>Emergency services</td>
</tr>
<tr>
<td>Hornsby Park</td>
<td>Peats Ferry Road, Hornsby</td>
<td>Park</td>
</tr>
<tr>
<td>Berowra Valley Regional Park</td>
<td>Rosemead Road, Hornsby</td>
<td>Park</td>
</tr>
<tr>
<td>Hornsby Police Station</td>
<td>Pacific Highway, Hornsby</td>
<td>Emergency services</td>
</tr>
<tr>
<td>Hornsby Girls High School</td>
<td>Edgeworth David Avenue, Hornsby</td>
<td>Education</td>
</tr>
<tr>
<td>Hornsby Station Medical Practice</td>
<td>Pacific Highway, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>The Madison Practice</td>
<td>Hunter Street, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>Hornsby Fountain Medical Centre</td>
<td>Hunter Street, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>Hornsby Mall Medical Centre</td>
<td>Florence Street, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>Hornsby Medical Practice</td>
<td>Florence Street, Hornsby</td>
<td>Health</td>
</tr>
<tr>
<td>Hornsby Ku-Ring-Gai Community College</td>
<td>Hunter Street, Hornsby</td>
<td>Education</td>
</tr>
<tr>
<td>St Peter's Anglican Church Hornsby</td>
<td>Pacific Highway, Hornsby</td>
<td>Place of worship</td>
</tr>
<tr>
<td>Hornsby Children's Centre</td>
<td>Peats Ferry Road, Hornsby</td>
<td>Childcare facility</td>
</tr>
<tr>
<td>Community Church Hornsby</td>
<td>Jersey Street, Hornsby</td>
<td>Place of worship</td>
</tr>
</tbody>
</table>
A number of community events within the Hornsby LGA are held at these facilities. Examples of past and current events located near the Proposal include:

- Let’s Light Westside, at the Hornsby Council Chambers in November 2015
- Christmas Spectacular, at Hornsby Park in December 2015
- The Glee Club Christmas Fun Show, at Hornsby Central Library in December 2015
- The West Side Vibe, in Dural Lane in April 2015.

In addition, the Westfield Hornsby Shopping Centre is located on the Pacific Highway, immediately adjacent to the Proposal. The Westfield Hornsby Shopping Centre contains approximately 335 store and services including retail stores, restaurants, and a cinema.

### 6.6.2. Potential impacts

#### Construction phase

**Temporary disruptions to rail services**

The Proposal would require various rail track possessions during construction of the Hornsby Junction Remodelling. This includes a two-week shutdown period of Hornsby Junction, which is scheduled to coincide with the December 2017 – January 2018 holiday period to minimise disruptions to rail customers.

During rail track possessions, rail services would be suspended and replacement buses would operate. These rail track possessions would have a short-term temporary negative impact on rail customers who would normally travel via Hornsby Junction during this time, including people travelling to work, or accessing social infrastructure within the study area, as no trains would service Hornsby Station during this period. This may also cause disruptions to rail customers accessing the Hornsby Westfield Shopping Centre during the Christmas period. To manage this impact, rail customers would be provided with adequate notification of the scheduled track possessions to allow them to plan their journey during this period.

**Temporary disruptions to commuter car parking**

Construction of the Proposal would require the following changes at the existing at-grade Hornsby Station commuter car park:

- temporary closure of the Hornsby Station commuter car park on George Street and relocation of approximately 370 parking spaces during the construction of the Hornsby Junction Remodelling and commuter car park. This commuter car park is anticipated to be fully closed for approximately 10 months, from January 2017 to October 2017
- temporary relocation of approximately 90 commuter car parking spaces from the existing Hornsby Station car park during the proposed enabling works for the Proposal (refer to Table 3-1). These relocated commuter car parking spaces are anticipated to be required from mid-2016 for approximately nine months.

The three smaller commuter car parks (with a combined capacity of 96 car spaces) would not be affected by the works.
As discussed in Section 6.1.2, Transport for NSW is currently preparing a car parking offset strategy to identify temporary parking options during the closure of the commuter car park. Various options are being considered to address the temporary loss of commuter car parking from the existing at-grade commuter car park including:

- changes to angle of car parking in Florence Street, May Street, Frederick Street and Jersey Street to gain additional on-street parking
- provide additional off-site parking on private property.

The car parking strategy is to be further developed during detailed design; and further assessment of impacts would be undertaken as required. Rail customers would be provided with adequate notification of alternative parking provisions during the temporary closure of the commuter car park to allow them to plan their journey during this period.

**Temporary local amenity impacts**

Construction of the Proposal has the potential to result in temporary adverse local amenity impacts due to construction noise, traffic, dust and visual changes associated with construction works (e.g. lighting, stockpiling etc.). Impacts of the Proposal on traffic and transport, noise and vibration, air quality and visual amenity are discussed in Section 6.1, Section 6.3, Section 6.10, and 6.2 respectively.

**Operational phase**

During operation, the Proposal is expected to have a number of positive impacts on access and connectivity for the local and regional community. The Proposal would provide increased capacity on the T1 North Shore Line, and provide increased commuter parking supply at Hornsby Station.

### 6.6.3. Mitigation measures

Measures to manage impacts associated with traffic and transport, noise and vibration, landscape character and visual amenity, and air quality are identified in Table 7-1. In addition, the following mitigation measures are proposed to manage the potential socio-economic impacts of the Proposal (refer to Table 7-1):

- a Community Liaison Plan would be prepared for the Proposal. The plan would identify all potential stakeholders and the best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the Proposal
- rail customers would be provided with adequate notification of the scheduled track possessions and any temporary closures of the existing commuter car park to allow them to plan their journey during these periods
- newsletters and other communication tools would be distributed to keep the community informed of construction progress, activities and impacts. This would especially outline the need to undertake out of hours works and the process for the community to register complaints in relation to the works
- contact details for a 24-hour construction response line, project infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase.
6.7. Biodiversity

A biodiversity assessment was undertaken for the proposed commuter car park by Biosis in June 2015. The assessment was undertaken as part of the concept design report prepared by Arup and informed the selection of the preferred option (Arup, 2015). The biodiversity assessment included a desktop search of the following databases:

- OEH Vegetation Information System (VIS) Mapping through the Spatial Information eXchange (SIX) Vegetation Map Viewer (OEH 2013)
- Department of Environment (DoE) Environment Protection and EPBC Act Protected Matters Search Tool (DoE 2015)
- NSW Department of Primary Industries (DPI) Noxious Weeds Act 1993 (NW Act) listed weeds for Hornsby LGA (DPI 2015).

A field investigation was also undertaken of the proposed commuter car park site on 30 October 2015.

These results of the biodiversity assessment are summarised below.

### 6.7.1. Existing environment

**Vegetation**

The field investigation determined that vegetation within the study area was predominantly planted native and exotic vegetation, including Sydney Red Gum, Camphor Laurel, Wattle, Sweet Pittosporum, Coast Banksia, Brush Box, Bottlebrush, and Willow-leaved crowea. The understorey consisted of a high proportion of exotic weeds. Natives such as Cassia, Castor Oil Plant, Morning Glory and Mat-rush were also present.

Three exotic species listed to be noxious within the Hornsby LGA (DPI 2015) were identified during the field investigation. These include Camphor Laurel, Castor Oil Plant, and Morning Glory.

**Threatened species**

Threatened fauna searches identified 134 recent records for the Powerful Owl (Vulnerable, TSC Act) with the closest record being within one kilometre from the study area. The study area also has the potential to provide some foraging habitat for Powerful Owl.

Threatened flora searches identified records for *Tetratheca glandulosa* (Vulnerable, TSC Act) within one kilometre from the study area. However, this small, spreading shrub is generally found on ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches (OEH 2013). Given a lack of suitable habitat existing within the study area, it is unlikely that *Tetratheca glandulosa* would be present.

### 6.7.2. Potential impacts

**Construction phase**

Construction of the Proposal would result in the removal of all vegetation from the site of the proposed commuter car park. As outlined in Section 6.7.1, vegetation to be removed from the site comprises planted native and exotic vegetation.
It is unlikely that the Proposal would disturb threatened ecological communities, threatened species and migratory species listed under the TSC Act and EPBC Act to any significant degree. Vegetation removal as part of the Proposal is unlikely to pose any significant impact on the Powerful Owl as there is better quality habitat within the broader area (OEH 2014).

**Operational phase**

The Proposal is not considered to have a significant effect on threatened species, populations or ecological communities during operation.

### 6.7.3. Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on biodiversity (refer to Table 7-1):

- all workers would be provided with an environmental induction prior to commencing work on-site
- disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. The clearing of mature, native trees would be minimised as far as practicable
- the principal mechanism to reduce impacts on biodiversity values within the study area would be to minimise removal of native vegetation and fauna habitat by restricting the encroachment of the works on adjacent native vegetation. This would be achieved through the following:
  - there would be no disturbance or damage to threatened species, endangered ecological communities, or critical habitat
  - any vegetation to be removed that has not been assessed in this REF would be subject to separate approval in accordance with Transport for NSW’s Application for Removal or Trimming Vegetation (Form PE-FO-078/5.0)
- weed control measures would be developed and included in the CEMP to manage the dispersal and establishment of weeds during the construction phase of the Proposal. This would include the management and disposal of weeds found to be noxious within the Hornsby LGA, as well as the following weeds that are known to occur within the rail corridor:
  - exotic perennial grasses, such as *Chloris gayana*, *Melinis repens* and *Pennisetum clandestinum*
  - exotic vines, such as *Asparagus aethiopicus*, *Asparagus asparagoides*, *Hedera helix*, *Ipomoea indica* and *Tradescantia fluminensis*
  - noxious weeds of *Ageratina adenophora*, *Ambrosia tenuifolia*, *Asparagus asparagoides*, *Lantana camara* and *Rubus fruticosus*, in accordance with the NW Act
- individual species or groups of trees within the Proposal area found to have a Diameter at Breast Height (DBH) greater than 15 centimetres which require removal, would require offset in accordance with the Transport for NSW Vegetation Offset Guide 9TP-ST-149. Quantities for offset to be determined during the detailed design stages of works.
6.8. **Landform, geology, soils and contamination**

A desktop analysis of publicly available information was carried out in October 2015 to assess potential impacts of the Proposal on landform, geology, soils and contamination. Outcomes of the concept design report for the proposed commuter car park (Transport for NSW 2015) were also considered. The results of the assessment are presented below.

6.8.1. **Existing environment**

The Proposal area has been highly modified due to the construction of the existing car park, the railway station, and other infrastructure. The landform of the Proposal area is generally flat.

**Geology**

The project is located within the Sydney Basin, a large depositional geological feature that spans from Batemans Bay to the south, Newcastle to the north and Lithgow to the west. The Sydney 1:100,000 Geological Series Sheet 9130 (Geological Survey of NSW Department of Mineral Resources 1983) indicates the study area is underlain by:

- Ashfield Shale of the Wianamatta Group – generally consisting of black to dark grey shale and laminate
- Hawkesbury Sandstone – generally consisting of medium to coarse-grained quartz sandstone, very minor shale and laminate lenses.

**Soils**

The Sydney 1:100,000 Soil Landscape Series Sheet 9130 (Chapman and Murphy, 1989) indicates that the Proposal is located within the following soil landscapes:

- Glenorie – these soils generally exhibit high soil erosion hazard
- Lucas Heights – these soils generally exhibit stony soil, low soil fertility and low available water capacity.

**Acid sulphate soils**

The desktop geotechnical investigation (ARUP 2015) prepared to inform the concept design for the proposed commuter car park (Transport for NSW 2015) considered the likelihood for acid sulphate soils to occur within the Proposal area. Based on acid sulphate soils risk maps, the investigation identified no known occurrence of acid sulphate soils to be present within the Proposal area. The closest location of known acid sulphate soils is at Cockle Creek and Cowan Creek, approximately 6.5 kilometres northeast of the Proposal area.

**Contamination risks**

A search of the OEH Contaminated Land Record of Notices, and list of NSW contaminated sites notified to EPA in October 2015 identified the following sites located near the Proposal:

- Shell Coles Express, 194/206 Pacific Highway on the western side of the rail corridor
- Midas Car Care Centre, 2A Linda Street, which is currently under assessment and is located approximately 70 metres east of the Proposal near to the junction of Linda Street and George Street.
A search of the Protection of the Environment Operations Act 1997 public register identified the following licenced operations to be located near the Proposal:

- Hornsby Aquatic Centre (Swimming Pool), located 170 metres west of the Proposal
- Readymix Hornsby Quarry (Hard-Rock Gravel Quarrying) located 360 metres west of the Proposal.

In addition, a preliminary site investigation (Environmental Earth Sciences 2015) was prepared to inform the concept design for the proposed commuter car park (Transport for NSW 2015). The preliminary site investigation was undertaken at Hornsby Railway Station (Part Lot 164, DP1043781). The site inspection identified some fill material present along the eastern boundary, along with old railway sleepers. Fill material may have been derived from onsite or imported in the past.

Potential for contamination at the site is associated with the unverified fill material, as well as any spills or leaks that may have occurred during historical site uses. The unverified fill material is considered to pose a moderate contamination risk.

6.8.2. Potential impacts

Construction phase

The Proposal would result in the exposure and disturbance of soils through the junction upgrade and utility adjustments within the railway corridor and the construction of the car park, which would involve excavations to a depth of approximately two to three metres below existing ground levels.

The Proposal would not involve excavation within the vicinity of known contaminated land; however, the Proposal could result in the exposure and disturbance of unknown contaminated materials, if present. Ground disturbance activities also have the potential to disturb acid sulphate soils. The soils likely to be encountered on site are identified as having a high erosion hazard. Therefore impacts associated with earthworks include the erosion of exposed soils and stockpile materials and increased sediment loads entering the adjacent stormwater system.

Operational phase

The Proposal would not result in any impacts to contaminated land, geology or soils. The landform would be altered by the inclusion of a new multistorey car park. However impacts associated with this would be minor.

6.8.3. Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on landform, geology, soils and contamination (refer to Table 7-1):

- if hazardous or contaminated materials are found during construction, work would stop immediately and the Project Manager would be contacted. Following this, a hygienist would identify if hazardous materials are present. If so, these would be removed by a licensed contractor
- any contaminated waste would be classified according to the Waste Classification Guidelines (EPA 2014) prior to removal offsite. Should any contaminated material be uncovered during redevelopment works that exceeds the relevant land use guidelines then further delineation works may be required
- assessment of any soil exposed during the construction of Phase 2 of the Proposal would be carried out to assist in quantifying any potential contamination risks
- procedures for handling asbestos contaminated materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements.
6.9. Hydrology and water quality

A desktop analysis of publicly available information, such as local government documents, was carried out in November 2015 to assess the potential impacts of the Proposal on hydrology and water quality. Outcomes of the concept design report for the proposed commuter car park (Transport for NSW 2015) were also considered. The results of the assessment are presented below.

6.9.1. Existing environment

Four major water catchments are located within the Hornsby LGA, including Berowra Creek, Cowan Creek, Hawkesbury River, and Lane Cove River (Hornsby Shire Council 2014). The Proposal is located within the Berowra Creek catchment area. Berowra Creek is located approximately 2.2 kilometres west of the Proposal and is approximately 22 kilometres in length. Berowra Creek drains in a northerly direction into the Hawkesbury River.

The main impacts to water quality within the Berowra Creek result from the discharge of tertiary treated sewage from the West Hornsby and Hornsby Heights Wastewater Treatment Plants into the tributaries of Waitara Creek and Calma Creek (Hornsby Shire Council 2015). Water quality within the Berowra Creek is also influenced by urban stormwater run-off (Hornsby Shire Council 2015).

Other waterbodies which are located near the Proposal include Waitara Creek, Old Mans Creek, and Jimmy Banks Creek. Waitara Creek is located approximately 1.6 kilometres west of the Proposal and extends for approximately three kilometres. Waitara Creek flows into Berowra Creek. The Water Quality Companion Technical Report, Water quality report card (Hornsby Shire Council 2014) identified water quality within the Waitara Creek to have an overall poor health grading. Old Mans Creek is located approximately 1.4 kilometres west of the Proposal. Old Mans Creek extends for approximately 840 metres and flows into Waitara Creek. Jimmy Banks Creek is the closest waterbody to the Proposal. Jimmy Banks Creek is located approximately 300 metres west of the Proposal and flows into Waitara Creek.

Groundwater

A search of the NSW Office of Water groundwater database was undertaken as part of the preliminary site investigation for the Proposal (Environmental Earth Sciences 2015). The search indicated that no registered monitoring bores are located within 500 metres of the Proposal.

6.9.2. Potential impacts

Construction phase

Construction has the potential to adversely affect water quality in nearby watercourses and receiving catchments through the pollution of stormwater runoff with sediments, fuel and other hazardous materials from construction sites. These impacts would be adequately managed with standard environmental management measures. These measures would be consistent with the principles and practices detailed in Managing Urban Stormwater: Soils and Construction (Landcom, 2004).

Operational phase

The operation of the Proposal would not result in a substantial impact on local hydrology or water quality. While the Proposal has the potential to result in a minor increase in the risk of stormwater contamination (due to an increased risk of fuel, oil and chemical leaks from vehicles), this risk would be adequately managed through the adoption of appropriate stormwater treatment measures into the design of the commuter car park (to be identified during the detailed design phase).
Additionally, the Proposal would reinstate the existing on site stormwater detention storage tank that would be affected (at the site of the existing at-grade commuter car park) during construction.

The detailed design would take into consideration appropriate drainage and stormwater management measures. The Proposal would be designed in accordance with the relevant Sydney Trains, Sydney Water and Council standards and requirements.

6.9.3. Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on hydrology and water quality (refer to Table 7-1):

- soil and water management measures would be identified, consistent with the principles and practices detailed in *Managing Urban Stormwater: Soils and Construction* (Landcom 2004)
- no stockpiles of materials or storage of fuels or chemicals would be located within high/medium flood risk areas or adjacent to existing culverts
- vehicles and machinery would be properly maintained to minimise the risk of fuel/oil leaks
- routine inspections of all construction vehicles and equipment would be undertaken for evidence of fuel/oil leaks
- all fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards and EPA Guidelines
- emergency spill kits would be kept on-site at all times. All staff would be made aware of the location of the spill kit and be trained in its use
- construction plant, vehicles and equipment would be refuelled off-site, or in a designated re-fuelling area
- site offices and staff facilities would be located above the 100-year ARI flood level, where practicable
- the existing RailCorp and Council drainage systems would remain operational throughout the construction of the Proposal
- groundwater encountered during the construction of the Proposal would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA 2014) and *Water Discharge and Reuse Guideline* (Transport for NSW 2015)
- clean water would be diverted around the work site in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004)
- erosion and sediment control measures would be regularly inspected (particularly following rainfall events) to ensure their ongoing functionality
- erosion and sediment control measures would be left in place until the works are complete and areas are stabilised
- works would be managed during rainfall (or whilst the ground remains sodden) to minimise plant and vehicle disturbance to the topsoil
- adequate water quality and hazardous material procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented during the construction of the Proposal
- disturbed surfaces would be reinstated as quickly as practicable after construction
- all stockpiled materials would be covered when not in use, and stored in bunded areas and kept away from waterways to avoid sediment entering the waterways
erosion and sediment control plans would be prepared in accordance with *Volume 2D of Managing Urban Stormwater: Soils and Construction* (DECC 2008). The erosion and sediment control plans would be established prior to the commencement of construction and be updated and managed throughout as relevant to the activities during the construction phase.

- sediment would be prevented from moving off-site and sediment laden water prevented from entering any watercourse, drainage line or drainage inlet.
- temporary scour protection and energy dissipation measures would be designed and implemented to protect receiving environments from erosion.

### 6.10. Air quality

A desktop analysis of publicly available information was carried out in October 2015 to assess potential impacts of the Proposal on air quality. The results of the assessment are presented below.

#### 6.10.1. Existing environment

The Proposal is located in a relatively disturbed environment, comprised of road and rail infrastructure, and a mix of commercial and residential land uses. Local emission sources that are likely to affect air quality within the locality include exhaust emissions from vehicles using the road network, exhaust emissions from diesel freight and passenger trains operating on the rail network and particulate emissions (dust) from wind erosion of exposed surfaces.

A search of the Commonwealth Department of the Environment’s National Pollutant Inventory database identified that three industries reported air emissions from within the Hornsby LGA during the 2013-2014 reporting period. The nearest facility is The Wrigley Company, which is located approximately two kilometres north-east of the Proposal, in Asquith.

#### 6.10.2. Potential impacts

**Construction phase**

During construction, local air quality may be temporarily affected by particulate (dust) and gaseous emissions (such as emissions from the combustion of fuels and storage of volatile organic compounds). These impacts are described in the following sections.

**Dust**

The main potential air quality impacts during construction of the Proposal would be associated with the generation of dust, which would include pollutants such as deposited dust, total suspended solids (TSP) and particulate matter with an aerodynamic diameter less than 10 microns (PM$_{10}$) and 2.5 microns (PM$_{2.5}$).

Construction activities with the greatest potential to generate dust would include:

- excavation, handling, stockpiling, loading/unloading and transport of spoil
- demolition of structures, and the handling, stockpiling and transport of demolition materials
- transport, loading/unloading, stockpiling and handling of imported construction materials such as imported fill
- creation of exposed surfaces through the stripping of topsoil and other overlying structures (such as road pavement at the existing commuter car park site), which would increase the potential for dust emissions to be generated by wind erosion
- movement of construction plant, vehicles and equipment along unsealed surfaces.
Without the implementation of adequate management measures, dust emissions from the above activities could result in reduced local air quality and dust deposition at the nearest potentially affected receivers.

The volume of dust generated during a typical work day would vary depending on the types of activities occurring at each work site and prevailing weather conditions (for example, dry windy conditions increase the potential for wind erosion). Dust emissions would also be expected to increase during unfavourable weather, such as dry windy conditions.

Overall, the volume of dust emissions would be comparable to volumes generated by other similar infrastructure projects and the impacts readily manageable through standard mitigation measures, such as wetting stockpiles and exposed surfaces and minimising dust-generating works during adverse weather conditions.

**Exhaust emissions**

Exhaust emissions would generally be restricted to minor localised emissions of carbon monoxide, oxides of nitrogen, sulfur dioxide and volatile organic compounds. These pollutants would be generated during the combustion of fuel in construction plant, machinery and equipment, as well as from the handling and/or onsite storage of fuel and other chemicals. Minor emissions of these pollutants would not significantly affect local air quality at the nearest sensitive receivers and would be adequately managed with standard mitigation measures.

**Operational phase**

Air quality impacts associated with the operation of the Proposal would be minimal. The main air quality impact during operation would be associated with exhaust emissions from private vehicles using the car parking. Exhaust emissions from these vehicles would be localised and, given the relatively low level of additional traffic likely to be generated by the Proposal, are unlikely to significantly affect sensitive receptors.

6.10.3. Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on air quality (refer to Table 7-1):

- methods for management of emissions would be incorporated into the CEMP, inductions, training and pre-start talks
- activities with the potential to cause substantial emissions, such as material delivery and load out and earthworks, would be identified in the CEMP. Work practices which minimise emissions during these activities would be investigated and applied where reasonable and feasible
- visually monitor dust and where necessary implement the following measures:
  - apply water (or alternate measures) to exposed surfaces that are causing dust generation. Surfaces may include unpaved roads, stockpiles, hardstand areas and other exposed surfaces (for example recently graded areas)
  - appropriately cover loads on trucks transporting material to and from the construction site. Securely fix tailgates of road transport trucks prior to loading and immediately after unloading
  - prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.
- ensure plant and machinery is regularly checked and maintained in a proper and efficient condition. This would reduce the likelihood of exceeding relevant emissions standards.
6.11. Cumulative impacts

A desktop analysis of publicly available information was carried out in November 2015 to assess potential cumulative impacts of the Proposal. The results of the assessment are presented below.

Cumulative impacts have the potential to occur when two or more projects are constructed within the same timeframe and locality. As a result of the construction of multiple projects within a locality, the potential for impacts, such as traffic, noise and air quality, would be greater than those identified for the Proposal in isolation.

A search of the Major Projects Register (NSW Department of Planning and Environment 2015) on 5 November 2015 identified the Road Construction Spoil Management Project proposed by Roads and Maritime Services to be potentially occurring within the same timeframe as the Proposal. The project is anticipated to commence late 2015 and be completed in the third quarter of 2018.

The project includes the partial infill of Hornsby Quarry, which is located approximately 650 metres west of the Proposal, with excavated rock and spoil from the construction of the NorthConnex project. As discussed in Section 6.1.2, the cumulative number of vehicle movements associated with the Proposal and the filling of Hornby Quarry has the potential to affect the performance of the local road network, particularly George Street, which would be used as a haulage route for both of these developments.

An assessment of the cumulative traffic impact is provided in Section 6.1.2. In summary, the cumulative impact of construction vehicles on the assessed intersections would be less than 2 per cent of the existing traffic volumes. This is unlikely to result in a material impact on the operation of these intersections.

In addition, Council is proposing to replace the existing Hornsby footbridge over George Street. Construction of the bridge has commenced and is anticipated to be completed in mid-2016. It is therefore anticipated that the bulk of the footbridge construction would be completed prior to the junction remodelling construction and as such there would be minimal cumulative impacts.

During construction the works would be coordinated with any other construction activities in the area with Hornsby Council, Sydney Trains and any other developments identified to minimise cumulative construction impacts such as traffic and noise. Traffic associated with the construction works is not anticipated to have a significant impact on the surrounding road network. Operational traffic and transport impacts would have minimal impact on the performance of the surrounding road network.

Based on this assessment it is anticipated that the cumulative impacts would be minor provided that consultation with relevant stakeholders and mitigation measures in Chapter 7 of this REF are implemented. The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed and implemented as appropriate.

6.11.1. Mitigation measures

The following mitigation measures are proposed to manage the potential impacts of the Proposal on cumulative impacts (refer to Table 7-1):

- 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

6.12.1. Greenhouse gas emissions

In line with the *NSW Sustainable Design Guidelines – Version 3.0* (Transport for NSW 2012), a Carbon Footprint Assessment would be undertaken for the Proposal during the detailed design stage. It would be undertaken in accordance with Transport for NSW’s *Greenhouse Gas Inventory Guide for Construction Projects*.

This assessment would inform a number of greenhouse gas (GHG) mitigation strategies to be included as part of the detailed design phase. These strategies fall within the following broad categories:

- avoiding – GHG emissions associated with the Proposal that can be avoided
- reducing – behaviour or processes that can be modified to achieve GHG emission reductions
- switching – fuel and energy source switching that can be used to reduce GHG.

Construction of the Proposal would result in increased GHG emissions associated with the materials required to build the commuter car park and reconfigured track work, the transport of materials to the site, and the fuel consumption of construction plant and equipment. Due to the scale and temporary nature of the construction works, GHG emissions are not expected to be significant.

The operation of the Proposal would result in minor additional GHG emissions associated with lighting and other services required for the commuter car park, as well as the operation of new signalling infrastructure.

Notwithstanding, the increase in car parking capacity would encourage people to use public transport instead of driving to destinations, which may result in a reduction in GHG emissions.

6.12.2. Climate change

The dynamic nature of our climate system indicates a need to focus attention on how to adapt to changes in the climate and understand the limitations of adaptation. The effects of climate change on the Sydney region can be assessed in terms of weather changes, storm intensity, flooding and increased risk of fire. Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall expected to occur in a 100-year average recurrence interval flood event would occur more frequently.

The detailed design would take into account the outcomes of a climate change impact assessment that includes an assessment of the likely climate change impacts such as extreme weather events to the Proposal. This assessment would inform a number of relevant climate adaptation measures to minimise and avoid these impacts to be included as part of the detailed design phase.

6.12.3. Sustainability

The design of the Proposal has been based on the principles of sustainability, including the *NSW Sustainable Design Guidelines – Version 3.0* and Transport for NSW’s Environmental Management System.

Section 3.1.3 provides a summary of the sustainable design features which have been considered for incorporation into the Proposal.
6.12.4. Waste

A variety of solid and liquid wastes would be generated during construction of the Proposal. These would include:

- green waste from cleared vegetation
- spoil comprising imported fill and virgin excavated natural material
- concrete slurry, concrete waste, timber formwork
- asphalt
- oil, grease and other liquid wastes from the maintenance of construction plant and equipment
- sediment-laden and/or potentially contaminated wastewater, sewage and grey water
- packaging materials from items delivered to site, such as pallets, crates, cartons, plastics and wrapping materials
- waste from the construction compound and staff amenities, including putrescibles, paper, cardboard, plastics, glass and printer cartridges.

The quantity of waste generated by the Proposal would be comparable to similar infrastructure projects and would be adequately managed with standard waste management measures, to be developed as part of the Construction Environmental Management Plan. These measures would include:

- managing construction waste through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001*
- establishing targets for the beneficial reuse of spoil, wastewater and other construction wastes in accordance with the project's sustainability
- developing procedures for the assessment, handling, stockpiling and disposal of potentially contaminated materials and wastewater, in accordance with the NSW Office of Environment and Heritage’s *Waste Classification Guidelines* (DECCW 2009).

Overall, construction waste from the Proposal is not anticipated to result in significant adverse environmental impacts.

Operation of the Proposal would not increase the amount or change the type of waste generated within the Proposal area.
7. Environmental management

Chapter 7 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 identified in Chapter 6.

7.1. Environmental management plans

A construction environmental management plan (CEMP) for the construction phase of the Proposal would be prepared in accordance with the requirements of Transport for NSW’s Environmental Management System (EMS). The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the Proposal would be managed, and a framework of procedures and controls for managing environmental impacts during construction.

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

Mitigation measures for environmental impacts occurring during the operational phase of the Proposal would be addressed through the design of the Proposal (e.g. measures to address visual amenity impacts) and/or Sydney Train’s EMS.

7.2. Mitigation measures

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

Table 7-1: Proposed mitigation measures

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
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<tr>
<td>General</td>
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<tr>
<td>G.1</td>
<td>An appropriately qualified and experienced site based environment manager would be appointed prior to the commencement of construction.</td>
<td>All</td>
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<tr>
<td>G.2</td>
<td>A project risk assessment including environmental aspects and impacts would be undertaken prior to the commencement of construction. The risk assessment would be used to inform the development of the CEMP and ECM(s).</td>
<td>All</td>
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<tr>
<td>G.3</td>
<td>Inspections would be undertaken on a weekly basis and after heavy rainfall to monitor environmental compliance and performance during construction.</td>
<td>All</td>
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<tr>
<td>G.4</td>
<td>Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, mitigation measures and conditions of approval. The ECM(s) would form part of the induction.</td>
<td>All</td>
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<tr>
<td>ID no.</td>
<td>Mitigation measures</td>
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<td><strong>Community engagement</strong></td>
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<tr>
<td>C.1</td>
<td>Rail customers would be provided with adequate notification of the scheduled track possessions and any temporary closures of the existing commuter car park to allow them to plan their journey during these periods.</td>
<td>All</td>
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<tr>
<td>C.2</td>
<td>Newsletters and other communication tools would be distributed to keep the community informed of construction progress, activities and impacts.</td>
<td>All</td>
</tr>
<tr>
<td>C.3</td>
<td>Contact details for a 24-hour construction response line, project infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase.</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Traffic and transport</strong></td>
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</tbody>
</table>
| T.1   | A detailed Construction Traffic Management Plan (CTMP) would be prepared for the Proposal to manage and minimise construction impacts. The CTMP would include but not be limited to the following:  
    - timing of proposed works  
    - hours of construction activities  
    - number of construction vehicles to be used  
    - designation of construction routes  
    - mitigation and management measures including use of traffic control signals, construction vehicle access and traffic circulation arrangements  
    - designation of temporary parking during construction works (for both the commuters and project personnel)  
    - contact details for key onsite construction personnel.                                                                                       | All                           |
<p>| T.2   | Site-specific traffic management issues would also be addressed through the implementation of appropriate Traffic Control Plans (TCPs) developed in consultation with the relevant Roads Authority. The TCPs would outline key details such as advanced warning signage, traffic flow management and pedestrian management measures. | All                           |
| T.3   | Maintain pedestrian access to and from Hornsby Station at all times.                                                                                                                                             | All                           |
| T.4   | Where practicable, minimise the use of local and town centre roads for construction vehicle access to and from the site, with major regional roads being used for construction haulage where practicable.                  | All                           |
| T.5   | Where practicable, avoid the delivery of construction materials during peak commuter travel periods and school drop off/pick up times.                                                                             | All                           |
| T.6   | Minimise the total number of deliveries required during construction by providing enough storage within the construction compound for stockpiling materials.                                                      | All                           |
| T.7   | Scheduling oversized deliveries and other significant traffic disrupting activities to occur at night using vehicles fitted with non-tonal reversing alarms.                                                         | All                           |
| T.8   | Avoid a net loss in accessible parking spaces at the eastern Hornsby Station entrance by relocating existing commuter parking spaces.                                                                           | All                           |</p>
<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.9</td>
<td>Road occupancy licences for temporary closure of roads would be obtained, where required.</td>
<td>All</td>
</tr>
<tr>
<td>T.10</td>
<td>Limit off-site construction vehicle parking to designated areas. Areas of temporary on-street parking during peak construction events would be identified in the traffic management plans to minimise the impact on surrounding properties and businesses. Construction worker parking would not be permitted within 600 metres of the construction site.</td>
<td>All</td>
</tr>
<tr>
<td>T.11</td>
<td>The queuing and idling of construction vehicles in residential streets would be minimised.</td>
<td>All</td>
</tr>
<tr>
<td>T.12</td>
<td>An emergency response plan would be developed for construction traffic incidents.</td>
<td>All</td>
</tr>
<tr>
<td>T.13</td>
<td>Where required, public communications would be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to site works in accordance with the CEMP.</td>
<td>All</td>
</tr>
<tr>
<td>T.14</td>
<td>Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners.</td>
<td>All</td>
</tr>
<tr>
<td>T.15</td>
<td>During project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents.</td>
<td>All</td>
</tr>
<tr>
<td>T.16</td>
<td>Should damage occur to the road surface as a direct result of the construction of the Proposal, the construction contractor would be required to ‘make good’ any damage sustained.</td>
<td>All</td>
</tr>
</tbody>
</table>

**Urban design, landscape and visual amenity**

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.1</td>
<td>Anti-graffiti coating would be provided to elements of the buildings and wall finishes which are accessible to the public.</td>
<td>Commuter car park</td>
</tr>
<tr>
<td>U.2</td>
<td>Layered planting, including the provision of medium height trees, would be provided along the eastern edge of the Proposal to: • provide visual amenity for the road user, pedestrian and residents • provide shade to pedestrians and parked cars • mitigate the hard surface character and magnitude of works, as the vegetation matures.</td>
<td>Commuter car park</td>
</tr>
<tr>
<td>U.3</td>
<td>About 80 square metres of redundant footpath at the northern part of George Street, from the stair shaft to the extent of works boundary can be redesigned to allow for replacement of vegetation in this area and the mitigation of the visual impact of the structure.</td>
<td>Commuter car park</td>
</tr>
<tr>
<td>ID no.</td>
<td>Mitigation measures</td>
<td>Applicable Proposal component</td>
</tr>
<tr>
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</tr>
<tr>
<td>U.4</td>
<td>The following building facades are proposed; however, would be determined during detailed design:</td>
<td>Commuter car park</td>
</tr>
<tr>
<td></td>
<td>- the long facade of the building which borders George Street would be finished with vertical, irregular spaced aluminium sheets, to assist breaking up the monotonous form of the Proposal and help soften its edge by allowing air and light through the structure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- the finish of the ground level wall would be of a textured pattern, or tactile appearance of either an exposed aggregate or tile cladding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- the upper parapet can be concrete finish, concrete with an added oxide, or painted concrete to provide a look of formalised capping to the Proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- the parapet would be finished with a double rail which spans the length of the building. This galvanized rail would have the effect of reducing the apparent height of the structure as well as prevent the public from walking along the top of the wall.</td>
<td></td>
</tr>
<tr>
<td>U.5</td>
<td>Detail design and documentation drawings would define the extent of all construction activity including temporary works in order to protect the area of vegetation immediately adjacent during construction.</td>
<td>All</td>
</tr>
<tr>
<td>U.6</td>
<td>Construction facilities would be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use.</td>
<td>All</td>
</tr>
<tr>
<td>U.7</td>
<td>Prior to construction commencement provide suitable barriers, such as shade cloth or a similar material, to screen views from adjacent areas during construction.</td>
<td>All</td>
</tr>
<tr>
<td>U.8</td>
<td>Existing trees to be retained within construction facilities areas would be identified, protected and maintained.</td>
<td>All</td>
</tr>
<tr>
<td>U.9</td>
<td>Minimise light spill from the rail corridor into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution.</td>
<td>All</td>
</tr>
<tr>
<td>U.10</td>
<td>Once construction is complete, or progressively throughout the works where possible, return compound sites to at least their pre-construction state.</td>
<td>All</td>
</tr>
</tbody>
</table>
### Noise and vibration

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
</table>
| N.1    | A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the Construction Environmental Management Plan. Measures documented in the CNVMP would be consistent with the mitigation measures outlined in the Transport for NSW Construction Noise Strategy and the *Interim Construction Noise Guideline* where practicable. These measures may include (but would not be limited to):  
- letter box drops, individual briefings, respite periods, or where highly intrusive noise levels are anticipated, alternative accommodation for specific construction activities  
- use of localised acoustic hoarding around significant noise generating items of plant  
- briefing of the work team in order to create awareness of the locality of sensitive noise receivers and the importance of minimising noise emissions  
- planning the higher-noise activities and work near residential noise receivers to be undertaken predominantly during less sensitive periods  
- ensuring spoil is placed and not dropped into awaiting trucks  
- use of less noise-intensive equipment  
- noise monitoring. | All |
| N.2    | All construction plant and vehicles would be fitted with non-tonal reversing alarms. | All |
| N.3    | Operational traffic noise impacts associated with the proposed commuter car park would be considered further during detailed design, with the aim of minimising impacts to residential properties within the Avanti units on George Street. Measures that could be considered include avoiding the use of polished concrete and minimising gaps in traffic barriers along the George Street façade. | All |

### Aboriginal heritage

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>All construction staff would receive basic training in the recognition of Aboriginal cultural heritage material. This training would include information such as the importance of Aboriginal cultural heritage material and places to both the Aboriginal and non-Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal cultural heritage material and sites.</td>
<td>All</td>
</tr>
<tr>
<td>A.2</td>
<td>If Aboriginal objects are located during works, all works would stop in the vicinity of the find, and the OEH, Local Aboriginal Land Council and an archaeologist would be notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained before works recommence.</td>
<td>All</td>
</tr>
<tr>
<td>A.3</td>
<td>If the project design is changed, and areas not surveyed are to be impacted, further archaeological assessment would be undertaken. Should any Aboriginal heritage items be found, they would be identified on the construction contractor’s environmental control maps.</td>
<td>All</td>
</tr>
<tr>
<td>ID no.</td>
<td>Mitigation measures</td>
<td>Applicable component</td>
</tr>
<tr>
<td>-------</td>
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<td>----------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Non-Aboriginal heritage</strong></td>
<td></td>
</tr>
<tr>
<td>H.1</td>
<td>Non-Aboriginal heritage items would be identified on the construction contractor’s environmental control maps.</td>
<td>All</td>
</tr>
<tr>
<td>H.2</td>
<td>If any unanticipated archaeological deposits are identified within the Proposal area during construction, work likely to impact on the deposit would cease immediately and the NSW Heritage Council and a heritage consultant would be contacted. Where required, further archaeological work and/or consents would be obtained for the unanticipated archaeological deposits prior to works recommencing at the location.</td>
<td>All</td>
</tr>
<tr>
<td>H.3</td>
<td>A heritage induction would be provided to workers before construction begins, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction.</td>
<td>All</td>
</tr>
<tr>
<td>H.4</td>
<td>Design of the commuter car park is to consider the heritage context of the Hornsby Railway Station, and aim to minimise the potential for adverse impact on the setting of the surrounding heritage item. The design would aim to be low in form where possible, to avoiding competing with unmodified elements of Hornsby Station visible from street level, such as the current platform canopies. The façade fronting George Street would be finished in a suitable material and colour that is consistent with the existing visual context.</td>
<td>Commuter car park</td>
</tr>
<tr>
<td>H.5</td>
<td>A program of archival recording would be carried out prior to the removal of the existing A-frame in the Hornsby rail yard. The recording would include a photographic record of the A-frame to be replaced in the yards and on the platforms, and be carried out in accordance with the <em>How to Prepare Archival Records of Heritage Items</em> guidelines (OEH 1998). The recording would meet the minimum requirements for archival recording.</td>
<td>Hornsby Junction Remodelling</td>
</tr>
<tr>
<td></td>
<td><strong>Biodiversity</strong></td>
<td></td>
</tr>
<tr>
<td>B.1</td>
<td>All workers would be provided with an environmental induction prior to commencing work on-site.</td>
<td>All</td>
</tr>
<tr>
<td>B.2</td>
<td>Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. The clearing of mature, native trees would be minimised as far as practicable.</td>
<td>All</td>
</tr>
<tr>
<td>B.3</td>
<td>Any vegetation to be removed that has not been assessed in this REF would be subject to separate approval in accordance with Transport for NSW’s <em>Application for Removal or Trimming Vegetation</em> (Form PE-FO-078/5.0).</td>
<td>All</td>
</tr>
</tbody>
</table>
## Mitigation measures

<table>
<thead>
<tr>
<th>ID no.</th>
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<th>Applicable Proposal component</th>
</tr>
</thead>
</table>
| B.4    | Weed control measures would be developed and included in the CEMP to manage the dispersal and establishment of weeds during the construction phase of the Proposal. This would include the management and disposal of weeds found to be noxious within the Hornsby LGA, as well as the following weeds that are known to occur within the rail corridor:  
  - exotic perennial grasses, such as *Chloris gayana*, *Melinis repens* and *Pennisetum clandestinum*  
  - exotic vines, such as *Asparagus aethiopicus*, *Asparagus asparagoides*, *Hedera helix*, *Ipomoea indica* and *Tradescantia fluminensis*  
  - noxious weeds of *Ageratina adenophora*, *Ambrosia tenuifolia*, *Asparagus asparagoides*, *Lantana camara* and *Rubus fruticosus*, in accordance with the NW Act. | All                          |
| B.5    | Native vegetation that is removed as a result of the Proposal would be offset in accordance with the Transport for NSW Vegetation Offset Guide 9TP-ST-149. Quantities for offset to be determined during the detailed design stages of works. | All                          |

### Landform, geology, soils and contamination

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.1</td>
<td>If hazardous or contaminated materials are found during construction, work would stop immediately and the Project Manager would be contacted.</td>
<td>All</td>
</tr>
<tr>
<td>L.2</td>
<td>Any contaminated waste would be classified according to the <em>Waste Classification Guidelines</em> (EPA 2014) prior to removal offsite. Should any contaminated material be uncovered during redevelopment works that exceeds the relevant land use guidelines then further delineation works may be required.</td>
<td>All</td>
</tr>
<tr>
<td>L.3</td>
<td>Assessment of any soil exposed during the construction of Phase 2 of the Proposal would be carried out to assist in quantifying any potential contamination risks.</td>
<td>All</td>
</tr>
<tr>
<td>L.4</td>
<td>Procedures for handling asbestos contaminated materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements.</td>
<td>All</td>
</tr>
</tbody>
</table>

### Hydrology and water quality

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.1</td>
<td>Soil and water management measures would be identified, consistent with the principles and practices detailed in <em>Managing Urban Stormwater: Soils and Construction</em> (Landcom 2004).</td>
<td>All</td>
</tr>
<tr>
<td>W.2</td>
<td>No stockpiles of materials or storage of fuels or chemicals would be located within high/medium flood risk areas.</td>
<td>All</td>
</tr>
<tr>
<td>W.3</td>
<td>Vehicles and machinery would be properly maintained to minimise the risk of fuel/oil leaks.</td>
<td>All</td>
</tr>
<tr>
<td>W.4</td>
<td>Routine inspections of all construction vehicles and equipment would be undertaken for evidence of fuel/oil leaks.</td>
<td>All</td>
</tr>
<tr>
<td>W.5</td>
<td>All fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards and EPA Guidelines.</td>
<td>All</td>
</tr>
<tr>
<td>ID no.</td>
<td>Mitigation measures</td>
<td>Applicable Proposal component</td>
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</tr>
<tr>
<td>W.6</td>
<td>Emergency spill kits would be kept on-site at all times. All staff would be made aware of the location of the spill kit and be trained in its use.</td>
<td>All</td>
</tr>
<tr>
<td>W.7</td>
<td>Construction plant, vehicles and equipment would be refuelled off-site, or in a designated re-fuelling area.</td>
<td>All</td>
</tr>
<tr>
<td>W.8</td>
<td>Site offices and staff facilities would be located above the 100-year ARI flood level, where practicable.</td>
<td>All</td>
</tr>
<tr>
<td>W.9</td>
<td>The existing RailCorp and Council drainage systems would remain operational throughout the construction of the Proposal.</td>
<td>All</td>
</tr>
<tr>
<td>W.10</td>
<td>Groundwater encountered during the construction of the Proposal would be managed in accordance with the requirements of the <em>Waste Classification Guidelines</em> (EPA 2014) and <em>Water Discharge and Reuse Guideline</em> (Transport for NSW 2015).</td>
<td>All</td>
</tr>
<tr>
<td>W.11</td>
<td>Erosion and sediment control measures would be regularly inspected (particularly following rainfall events) to ensure their ongoing functionality.</td>
<td>All</td>
</tr>
<tr>
<td>W.12</td>
<td>Erosion and sediment control measures would be left in place until the works are complete and areas are stabilised.</td>
<td>All</td>
</tr>
<tr>
<td>W.13</td>
<td>Works would be managed during rainfall (or whilst the ground remains sodden) to minimise plant and vehicle disturbance to the topsoil.</td>
<td>All</td>
</tr>
<tr>
<td>W.14</td>
<td>Adequate water quality and hazardous material procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented during the construction of the Proposal.</td>
<td>All</td>
</tr>
<tr>
<td>W.15</td>
<td>Erosion and sediment control plans would be prepared in accordance with <em>Volume 2D of Managing Urban Stormwater: Soils and Construction</em> (DECC 2008). The erosion and sediment control plans would be established prior to the commencement of construction and be updated and managed throughout as relevant to the activities during the construction phase.</td>
<td>All</td>
</tr>
<tr>
<td>W.16</td>
<td>Disturbed surfaces would be reinstated as quickly as practicable after construction.</td>
<td>All</td>
</tr>
<tr>
<td>W.17</td>
<td>All stockpiled materials would be stored in bunded areas and kept away from waterways to avoid sediment entering the waterways.</td>
<td>All</td>
</tr>
<tr>
<td>W.18</td>
<td>Sediment would be prevented from moving off-site and sediment laden water prevented from entering any watercourse, drainage line or drainage inlet.</td>
<td>All</td>
</tr>
<tr>
<td>W.19</td>
<td>Temporary scour protection and energy dissipation measures would be designed and implemented to protect receiving environments from erosion.</td>
<td>All</td>
</tr>
</tbody>
</table>
### Air quality

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ.1</td>
<td>Methods for management of emissions would be incorporated into the CEMP, inductions, training and pre-start talks.</td>
<td>All</td>
</tr>
<tr>
<td>AQ.2</td>
<td>Activities with the potential to cause substantial emissions, such as material delivery and load out and earthworks, would be identified in the CEMP. Work practices which minimise emissions during these activities would be investigated and applied where reasonable and feasible.</td>
<td>All</td>
</tr>
</tbody>
</table>
| AQ.3  | Visually monitor dust and where necessary implement the following measures:  
- apply water (or alternate measures) to exposed surfaces that are causing dust generation. Surfaces may include unpaved roads, stockpiles, hardstand areas and other exposed surfaces (for example recently graded areas)  
- appropriately cover loads on trucks transporting material to and from the construction site. Securely fix tailgates of road transport trucks prior to loading and immediately after unloading  
- prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.                                                                                                                                                                                                                                                                                                           | All                            |
| AQ.4  | Ensure plant and machinery is regularly checked and maintained in a proper and efficient condition. This would reduce the likelihood of exceeding relevant emissions standards.                                                                                                                                                                                                                                                                                                             | All                            |

### Cumulative impacts

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Mitigation measures</th>
<th>Applicable Proposal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI.1</td>
<td>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.</td>
<td>All</td>
</tr>
</tbody>
</table>
8. Conclusion

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

The Proposal would provide the following benefits:

- increased capacity of Hornsby Junction to increase the capacity and reliability of the T1 North Shore Line
- provision of a turnback facility for North Shore Line trains to allow terminating Platform 2 trains to move off the main lines while the driver changes ends of the train to turn-back and approach Platform 1 for city bound services
- greater operational independence between the T1 North Shore Line, the T1 Northern Line and the Main North Line
- improvements to the train entry/exit times to/from Hornsby Station Platforms 1 and 2
- reduced assets and configuration issues that impact on reliability, accessibility and maintainability of the rail network.

The key likely impacts of the Proposal are as follows:

- increased construction traffic, disruptions to access, and track possessions
- increased noise from construction activities near sensitive receivers
- temporary loss of commuter parking in the George Street Commuter car park
- moderate visual impacts on the Hornsby Railway Station Group and a minor visual impact on the Barracks building due to the construction and operation of the commuter car park
- moderate visual impact on the SRA electricity plant and signal box due to the construction and operation of the commuter car park
- impacts during track possessions and car park closures to commuters using the T1 Northern and T1 North Shore Lines for work or recreational purposes.

This REF has considered and assessed these impacts in accordance with clause 228 of the EP&A Regulations, the Department of Urban Affairs and Planning guidelines *Is an EIS Required?* (DUAP 1999) and the requirements of the EPBC Act (refer to Chapter 7, and Appendices 1 and 2). Should the project proceed, these impacts would be effectively managed by the Hornsby Junction Remodelling and Commuter Car Park CEMP, mitigation measures (refer to Chapter 8) and the conditions of approval. As a result, these environmental impacts are not considered to be significant. Accordingly an EIS is not required, nor is the approval of the Minister for Planning.

The Proposal has also taken into account the principles of ESD (refer to Section 3.1.5). These would be considered further during the detailed design and construction phases of the Proposal. This would ensure the Proposal is delivered in a manner that provides maximum benefit to the community is cost effective and minimises any adverse impacts on the environment.
References


NSW Heritage Office. 1998. *How to prepare archival records of heritage items*. Sydney, NSW.


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


## Appendix 1 – Consideration of Clause 228 factors

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

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any environmental impact on a community?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: The Proposal has the potential to result in short-term negative impacts during the construction phase due to increased noise and dust from construction activities, construction traffic, changes to access (including track possessions), and visual impacts. Operation of the Proposal would result in long-term positive impacts due to improved transport customer experience, additional rail network capacity, and the provision of additional car parking spaces.</td>
<td></td>
</tr>
<tr>
<td>Any transformation of a locality?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>The Proposal would result in the establishment of a new commuter car park at Hornsby Station, as the site of an existing at-grade commuter car park. Overall, the Proposal is unlikely to have any significant transformation of the locality surrounding Hornsby Station.</td>
<td></td>
</tr>
<tr>
<td>Any environmental impact on the ecosystem of the locality?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: With the proposed mitigation conditions in place, the Proposal is unlikely to impact the local ecosystem as confirmed in Chapter 6. Some tree removal would be required but such impacts are not expected to adversely affect any local ecosystems.</td>
<td></td>
</tr>
<tr>
<td>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: During construction, the Proposal would result in short-term impacts to the aesthetic and recreational quality of the locality due to construction noise and traffic, and visual impacts.</td>
<td></td>
</tr>
<tr>
<td>Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>The Proposal would result in a minor impact to the heritage fabric of one listed item of local heritage significance. The Heritage Impact Assessment completed for the Proposal concluded that the Proposal would not have a significant impact on the heritage significance on this item or other heritage items in the vicinity of the works.</td>
<td></td>
</tr>
<tr>
<td>Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: The Proposal would result in the removal of planted native and exotic vegetation. The vegetation to be removed would not constitute habitat of protected fauna.</td>
<td></td>
</tr>
<tr>
<td>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</td>
<td>Nil</td>
</tr>
<tr>
<td>Comment: The Proposal is not anticipated to endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Impacts</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Any long-term effects on the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>Comment: The Proposal is not anticipated to have any long-term effects on the environment.</td>
<td></td>
</tr>
<tr>
<td>Any degradation of the quality of the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>Comment: The Proposal is not anticipated to result in the degradation of the quality of the environment.</td>
<td></td>
</tr>
<tr>
<td>Any risk to the safety of the environment?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: Construction of the Proposal would be managed in accordance with a CEMP to reduce any risks to the environment.</td>
<td>☑ negative</td>
</tr>
<tr>
<td>☑ short term</td>
<td></td>
</tr>
<tr>
<td>Any reduction in the range of beneficial uses of the environment?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: The Proposal is not anticipated to have any reduction in the range of beneficial uses of the environment.</td>
<td>☑ negative</td>
</tr>
<tr>
<td>☑ short term</td>
<td></td>
</tr>
<tr>
<td>Any pollution of the environment?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: During construction, the Proposal has the potential to result in short-term noise, air and water pollution. These impacts would be managed in accordance with the mitigation measures outlined in Table 7-1.</td>
<td>☑ negative</td>
</tr>
<tr>
<td>Operation of the Proposal is unlikely to result in pollution of the environment.</td>
<td>☑ short term</td>
</tr>
<tr>
<td>Any environmental problems associated with the disposal of waste?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: The Proposal is unlikely to result in any environmental problems associated with the disposal of waste.</td>
<td>☑ negative</td>
</tr>
<tr>
<td>All waste requiring off-site disposal would be classified in accordance with the Waste Classification Guidelines (EPA 2014) prior to disposal at an appropriate waste facility licenced to accept waste of the relevant classification.</td>
<td>☑ short term</td>
</tr>
<tr>
<td>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</td>
<td>Nil</td>
</tr>
<tr>
<td>Comment: The Proposal would not increase demands on resources (natural or otherwise) that are, or are likely to become, in short supply.</td>
<td></td>
</tr>
<tr>
<td>Any cumulative environmental effect with other existing or likely future activities?</td>
<td>☑ minor</td>
</tr>
<tr>
<td>Comment: The Proposal may have cumulative impacts due to the construction of other known developments within the locality. These impacts are expected to be minor and would be limited to the construction phase.</td>
<td>☑ negative</td>
</tr>
<tr>
<td>☑ short term</td>
<td></td>
</tr>
<tr>
<td>Any impact on coastal processes and coastal hazards including those under projected climate change conditions?</td>
<td>Nil</td>
</tr>
<tr>
<td>Comment: The Proposal is not located on the coastline and has not been identified as within an area that would be subjected to increased sea level rise.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2 – Consideration of matters of national environmental significance

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

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any impact on a World Heritage property?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: There are no World Heritage properties in the vicinity of the Proposal.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Any impact on a National Heritage place?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: There are no National Heritage places in the vicinity of the Proposal.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Any impact on a wetland of international importance?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: There are no wetlands of international significance in the vicinity of the Proposal.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Any impact on a listed threatened species or communities?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal is unlikely to significantly affect listed threatened species or communities.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Any impacts on listed migratory species?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal is unlikely to significantly affect listed migratory species.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Any impact on a Commonwealth marine area?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal is not in the vicinity of a Commonwealth marine area.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Does the Proposal involve a nuclear action (including uranium mining)?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal does not involve a nuclear action.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Water resource, in relation to coal seam gas development and large coal mining development?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal does not involve a coal seam gas development or a large coal mining development.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
<tr>
<td>Additionally, any impact (direct or indirect) on Commonwealth land?</td>
<td>☑ nil</td>
</tr>
<tr>
<td>Comments: The Proposal would not be undertaken on or in the vicinity of Commonwealth land.</td>
<td>☐ minor</td>
</tr>
<tr>
<td>☐ significant</td>
<td></td>
</tr>
</tbody>
</table>