

Penrith Station Upgrade

Review of Environmental Factors





**Transport
for NSW**

Penrith Station Upgrade Review of Environmental Factors

**Transport Access Program
REF-4517531**

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Abbreviations

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

Term	Meaning
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
NES	National Environmental Significance
Noxious Weeds Act	<i>Noxious Weeds Act 1993</i>
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
PA system	Public Address system
PMP	Pedestrian Management Plan
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PSNC	Proposal Specific Noise Criteria
PV	Photovoltaic
RailCorp	(former) Rail Corporation of NSW
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	<i>Roads Act 1993</i>
Roads and Maritime	NSW Roads and Maritime Services (formerly Roads and Traffic Authority)
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TPZ	Tree Protection Zone
TSC Act	<i>Threatened Species Conservation Act 1995</i>
UDLP	Urban Design and Landscaping Plan
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001</i>

Definitions

Term	Meaning
Asset Standards Authority	<p>The ASA is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets.</p> <p>Design Authority functions formerly performed by RailCorp are now exercised by ASA.</p>
Average Recurrence Interval	<p>The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. It is implicit in this definition that the periods between exceedances are generally random.</p>
Concept Design	<p>The Concept Design is the preliminary design presented in the REF, which would be refined by the Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance).</p> <p>TfNSW contracts a single entity (the Contractor) to further develop the design to a level suitable for construction. The Contractor therefore becomes responsible for all work on the project.</p>
Design and Construct Contract	<p>A method to deliver a project in which the design and construction services are contracted by a single entity known as the Contractor. The Contractor completes the project by refining the Concept Design presented in the REF (subject to TfNSW acceptance) to be suitable for construction. The Contractor is therefore responsible for all work on the project, both design and construction.</p>
Disability Standards for Accessible Public Transport	<p>The Commonwealth <i>Disability Standards for Accessible Public Transport 2002</i> ("Transport Standards") (as amended) are a set of legally enforceable standards, authorised under the Commonwealth <i>Disability Discrimination Act 1992</i> (DDA) for the purpose of removing discrimination 'as far as possible' against people with disabilities. The Transport Standards cover premises, infrastructure and conveyances, and apply to public transport operators and premises providers.</p>
Ecologically Sustainable Development	<p>As defined by clause 7(4) Schedule 2 of the EP&A Regulation.</p> <p>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.</p>
Feasible	<p>A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.</p>
Interchange	<p>Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.</p>
Noise sensitive receiver	<p>In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios and places of worship/religious facilities (e.g. churches).</p>
NSW Trains	<p>From 1 July 2013, NSW Trains became the new rail provider of services for regional rail customers.</p>

Term	Meaning
Opal card	The integrated ticketing smartcard being introduced by TfNSW.
Paid	Paid access is a term to refer to an area of the station that is accessible by rail customers (i.e. who have paid to access the transport facilities).
Proponent	A person or body proposing to carry out an activity under Part 5 of the EP&A Act – in this instance, TfNSW.
Rail possession	Possession is the term used by railway building/maintenance contractors to indicate that they have taken possession of the track (usually a block of track) for a specified period, so that no trains operate for a specified time. This is necessary to ensure the safety of workers and rail users.
Reasonable	Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.
Sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.
Sydney Trains	From 1 July 2013, Sydney Trains replaced CityRail as the provider of metropolitan train services for Sydney.
Tactiles	Tactile tiles or Tactile Ground Surface Indicators (TGSIs) are textured ground surface indicators to assist pedestrians who are blind or visually impaired. They are found on many footpaths, stairs and train station platforms.
The Proposal	The construction and operation of the Penrith Station Upgrade.
Unpaid	Unpaid access is a term to refer to an area of the station (or in the case of Penrith - the pedestrian footbridge) that is accessible by the general public.
UrbanGrowth	UrbanGrowth NSW is the NSW Government's urban transformation delivery organisation. It is a State-Owned Corporation which was established in 2013, integrating and refocusing the roles of the former Landcom.
Vegetation Offset Guide	<p>The TfNSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed 'significant' for the purposes of section 111 of the EP&A Act.</p> <p>The Guide provides for planting of a minimum of eight trees for each large tree with a diameter at breast height (DBH) of more than 60 cm, four trees where the DBH is 15-60 cm, or two trees where DBH is less than 15 cm.</p>

Executive summary

Overview

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

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

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

Description of the Proposal

The key features of the Proposal are summarised as follows:

- existing pedestrian footbridge retained for unpaid access across the railway and extended further south
- new stairs on both the northern and southern entrances of the pedestrian footbridge
- new paid concourse accessible from the pedestrian footbridge with relocated ticket gates, new Customer Information Window, Family Accessible Toilet, store room and stairs to platforms
- three replacement lifts to provide access to the platforms/interchange
- new canopies for the existing footbridge and new stairs, lift landings, paid concourse, in addition to replacing platform canopies affected by works
- reconfiguration of the southern transport interchange which would involve:
 - upgraded bus interchange with reversed traffic flow to include set down, pick up and layover spaces for buses, and shelters for weather protection for customers
 - relocated kiss and ride and taxi rank (with shelters) on Belmore Street
 - landscaping, paving and lighting for the interchange and forecourt area
- extension of the south-western car park with approximately 25 spaces (to offset some of the commuter parking removed for the long-term bus layover)
- establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the existing Platform 3 heritage building
- ancillary works including services diversion and/or relocation, alterations to traffic signals, station power supply upgrade, minor drainage works, adjustments to fencing, lighting and seating, improvements to station communication systems with new infrastructure (including lighting, CCTV cameras, Passenger Information Display boards and Opal card readers) and wayfinding signage.

Subject to approval, construction is expected to commence in 2016 and take approximately two years to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF.

Need for the Proposal

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

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

The Proposal fulfils the program objectives and would:

- improve customer safety and enhance pedestrian and bus network links through the reconfiguration of the bus, taxi, kiss and ride and bicycle zones within the interchange
- provide a station with improved accessibility for all, including those with a disability, the ageing and parents/carers with prams by minimising conflict points and crowding points, and by improving modal separation to provide a safer interchange
- improve cross-corridor connections by creating a new paid concourse, allowing for increased capacity for unpaid access across the existing pedestrian footbridge and new stairs
- improve customer experience and amenity through improved facilities including canopies for weather protection, a new Customer Information Window and Family Accessible Toilet, Passenger Information Display boards and new wayfinding in and around the station
- improve the integration of the station and interchange with its current and future urban context, and create a positive addition to the public domain
- potentially increase the use of public transport to and from Penrith Station.

The Proposal is also consistent with planning strategies in NSW, including *NSW 2021 – Making NSW Number One* (Department of Premier and Cabinet, 2011) and the *NSW Long Term Transport Master Plan* (TfNSW, 2012a). The Proposal would also ensure that Penrith Station would meet legislative requirements under the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

Design options considered

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

The *Penrith Station Precinct – Station Capacity and Interchange Upgrade Concept Plan Project* report considered three station options and three transport interchange options. The three interchange options comprised:

- **Option 1:** a new south-western transport interchange located approximately 160 metres from the existing station access (southern side), with vehicle access via a central intersection
- **Option 2:** a new central southern transport interchange with a reversed traffic flow so that buses would enter via a driveway from Belmore Street and exit via the Riley Street intersection

- **Option 3:** a new south-eastern transport interchange located approximately 100 metres from the existing station access (southern side) with vehicle access via a central intersection.

The station pedestrian footbridge options included the following:

- **Option A:** partial retention of the existing pedestrian footbridge as a paid concourse, with a new pedestrian footbridge
- **Option B:** complete demolition of the existing pedestrian footbridge, with a new pedestrian footbridge and paid concourse
- **Option C:** retention of the existing footbridge which would be extended into the interchange, along with a new paid concourse to the west

Each interchange option was paired with a station option to create a total of nine concept design options. Four options – Option 1A, 2A, 2B and 3C were progressed through to the next phase of analysis and workshops.

Option 2A (partial retention of the pedestrian footbridge as a paid concourse along with a new pedestrian bridge, and a central southern transport interchange option) was selected as the preferred option as it provided the greatest benefits for customer experience and precinct/modal integration benefits.

The south-eastern and south-western transport interchange options (Options 1 and 3) did not support accessibility and customer experience objectives due to the distance from the station entrance, when compared with the central interchange (Option 2). Option A for the station was considered to provide better precinct integration and customer experience when compared with the other station options (Options B and C).

However there were a number of design refinements from the preferred Option 2A that resulted from a review process that considered customer experience, heritage and urban design principles, cost and constructability in more detail. These key refinements included:

- full retention of the existing pedestrian bridge (and extension into the interchange) with a new paid concourse on the eastern side – the retention of the pedestrian footbridge had cost and constructability benefits, but unlike earlier concepts that proposed retention with a new paid concourse on the western side, locating the new paid concourse to the eastern side would have a more positive heritage outcome by removing the need to construct a new bridge structure close to existing station heritage buildings
- relocation of a Bus Driver's Amenities Room and Customer Service Manager's Office into the Platform 3 heritage building – this removed the need to install a new amenities building inside the heritage curtilage and promotes adaptive reuse.

A description of the Proposal (Option 2A including subsequent design refinements) is presented in Chapter 3.

Statutory considerations

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

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

Clause 79 of the Infrastructure SEPP allows for the development of 'rail infrastructure facilities' by or on behalf of a public authority without consent on any land. Clause 78 defines 'rail infrastructure facilities' as including elements such as 'railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms', 'public amenities for commuters' and 'associated public transport facilities for railway stations'.

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

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

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

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

Community and stakeholder consultation

Under the Infrastructure SEPP, consultation is required with local councils or public authorities in certain circumstances, including where council-managed infrastructure is affected. Consultation has been undertaken with Sydney Trains, UrbanGrowth, the Heritage Division (Office of Environment and Heritage (OEH)), Penrith City Council, relevant bus companies and the NSW Taxi Council during the development of design options and the concept design for the preferred option. Consultation with these stakeholders would continue through the detailed design and construction phases of the Proposal.

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

- direct notification to community stakeholders
- public display of the REF.

Community consultation activities for the Proposal would be undertaken during the public display period of this REF. The REF would be displayed for a period of approximately three weeks. Further information about these specific activities is included in Section 4.5 of this REF.

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

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

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

¹ <http://www.transport.nsw.gov.au/projects>

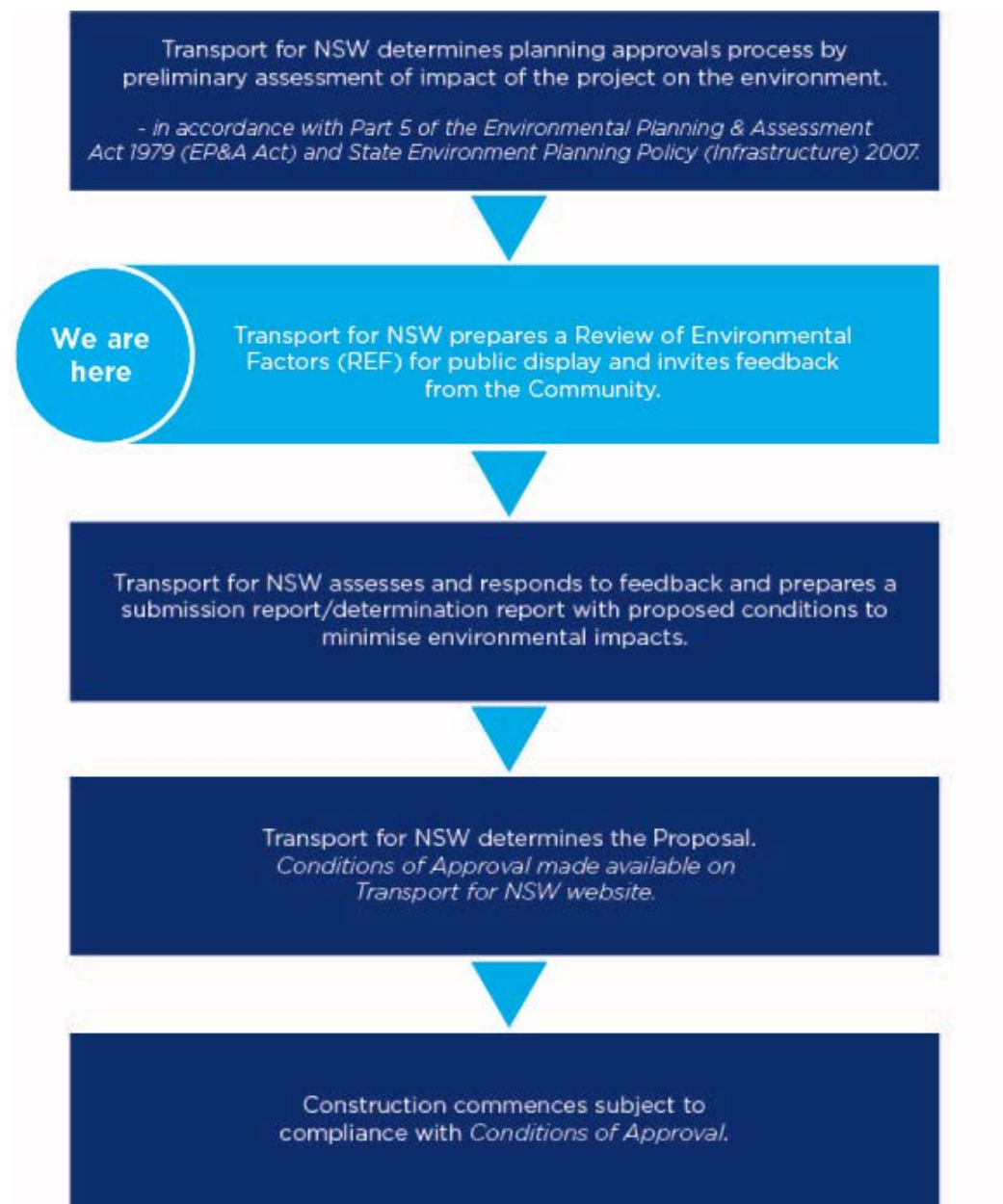


Figure 1: Planning approval and consultation process for the Proposal

Environmental impact assessment

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

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

- changes to access/egress station entry points, platforms and nearby footpaths during construction and operation
- changes to bus/taxi/kiss and ride operations during construction and reduction of kiss and ride and taxi rank capacity during operation
- temporary loss of parking around the station during construction and the permanent removal of the timed car park on the south-eastern side of the station (approximately 25 spaces and seven motorbike spaces) and some loss of parking from the south-western car park (net loss of approximately 20 spaces and 11 motorbike spaces)
- temporary construction noise, dust and visual impacts
- introduction of new elements into the heritage precinct and modifications to the Platform 3 heritage building
- removal of trees/vegetation that would require planting offsets
- introduction of new elements into the visual environment such as the new paid concourse, canopies, lifts and stairs.

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

Conclusion

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

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

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

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

1 Introduction

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

1.1 Overview of the Proposal

1.1.1 The need for the Proposal

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

A station upgrade is proposed at Penrith Station to cater for future growth and to address the poor existing modal separation, safety issues, and accessibility requirements. Penrith is recognised as a regional city centre and the station connects the new Thornton development in the north to the commercial centre of Penrith to the south. Currently there is a pedestrian footbridge across the railway but only the eastern half of the bridge can be accessed by the general public.

As part of the Proposal, the pedestrian footbridge would be converted to unpaid access to increase capacity and extended over the interchange to reduce the pedestrian/vehicle conflict. A new paid concourse with a Family Accessible Toilet and Customer Information Window would also be constructed for customers. The improvements would in turn assist in supporting the growth in public transport use and would provide an improved customer experience for existing and future users of the station.

The expected increase in customers and pedestrian traffic has been taken into consideration during the design development. The 2014 barrier counts indicated a daily patronage of 15,040 trips which is expected to increase by approximately 79 per cent to 26,880 in 2036. The Proposal has been designed to cater for a daily patronage of 30,915 (which is the 2036 daily patronage + 15 per cent)

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- existing pedestrian footbridge retained for unpaid access across the railway and extended further south
- new stairs on both the northern and southern entrances of the pedestrian footbridge
- new paid concourse accessible from the pedestrian footbridge with relocated ticket gates, new Customer Information Window, Family Accessible Toilet, store room and stairs to platforms
- three replacement lifts to provide access to the platforms/interchange
- new canopies for the existing footbridge and new stairs, lift landings, paid concourse, in addition to replacing platform canopies affected by works

- reconfiguration of the southern transport interchange which would involve:
 - upgraded bus interchange with reversed traffic flow to include set down, pick up and layover spaces for buses, and shelters for weather protection for customers
 - relocated kiss and ride and taxi rank (with shelters) on Belmore Street
 - landscaping, paving and lighting for the interchange and forecourt area
- extension of the south-western car park with approximately 25 spaces (to offset some of the commuter parking removed for the long-term bus layover)
- establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the existing Platform 3 heritage building
- ancillary works including services diversion and/or relocation, alterations to traffic signals, station power supply upgrade, minor drainage works, adjustments to fencing, lighting and seating, improvements to station communication systems with new infrastructure (including lighting, CCTV cameras, Passenger Information Display boards and Opal card readers) and wayfinding signage.

Subject to planning approval, construction is expected to commence in 2016 and is anticipated to take approximately two years to complete.

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

1.2 Location of the Proposal

The Proposal would involve upgrade works to Penrith Station which is located approximately 55 kilometres west of Sydney's Central Station in the suburb of Penrith in the Local Government Area (LGA) of Penrith (refer Figure 2).

Penrith Station is serviced by the T1 North Shore, Northern and Western Line which are operated by Sydney Trains, and the Blue Mountains Line serviced by NSW Trains. Penrith Station is the 33rd busiest station on the Sydney Trains network with an average patronage of 15,040 trips per weekday (NSW Bureau of Transport Statistics barrier counts, 2014).

The Proposal would involve works to Penrith Station (and transport interchange) which is located on land owned by RailCorp and operated and maintained by Sydney Trains. Some works would also be undertaken on land owned by UrbanGrowth in the north to allow for the new northern stairs, along with works on land owned by Penrith City Council south-east of the station for car park and interchange works. Refer to Figure 6 for a map of the proposed work areas.

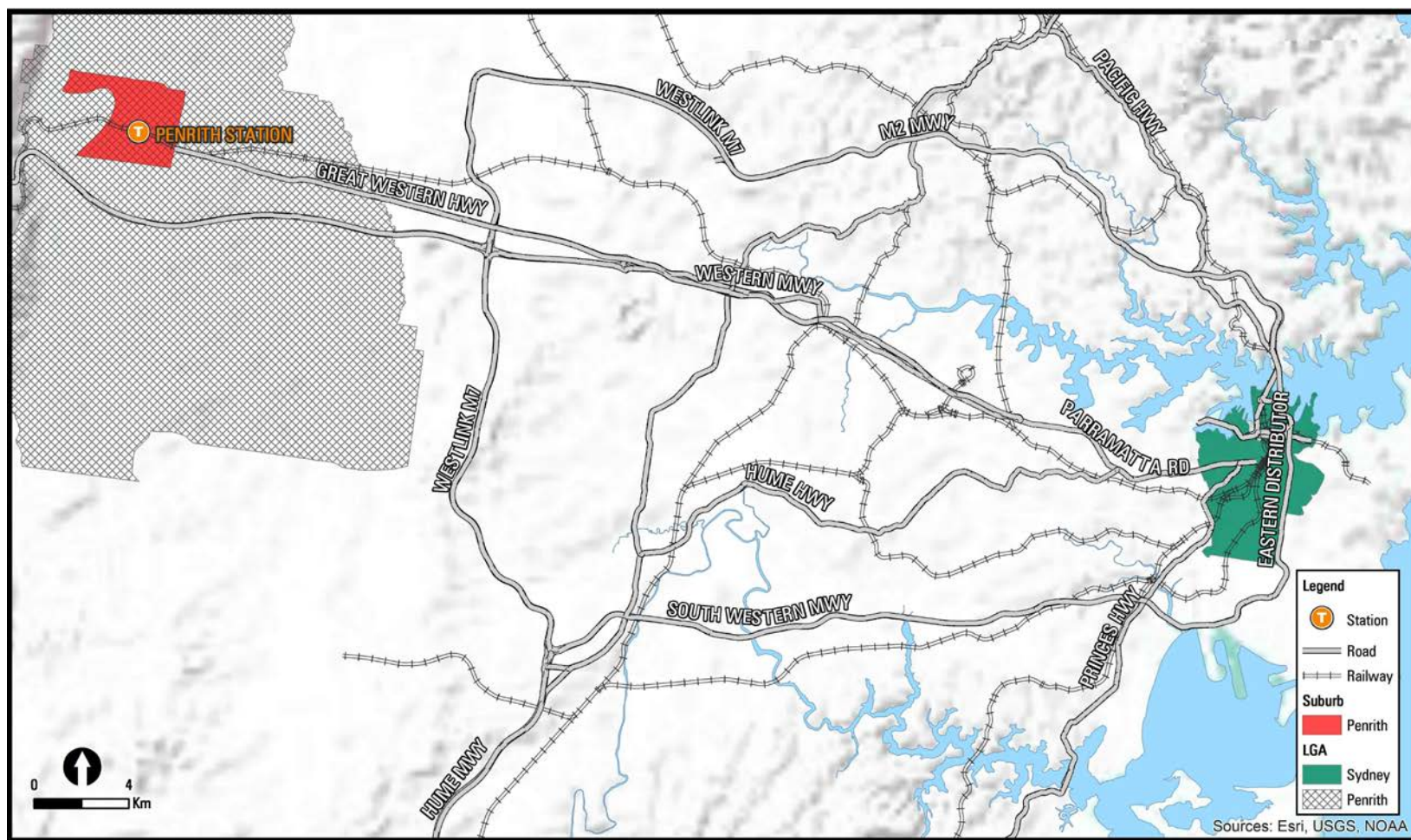


Figure 2: Regional context

1.3 Existing infrastructure and land uses

Penrith Station is located within the commercial centre of Penrith. To the south of the station are a number of government and commercial buildings including the Westfield Shopping Centre and Nepean TAFE College – Penrith Campus (refer Figure 3). To the north of the station, land use ranges from industrial land and the Thornton residential development, being developed by UrbanGrowth which, once complete will provide approximately 1,000 dwellings.

From the south, the station and interchange can be accessed from Jane Street and Belmore Street (part of the Great Western Highway) that run in an east-west alignment parallel to the railway, and also the intersections of these roads with Station Street and Riley Street. Within the interchange, there are bus pick up, set down and layover areas that service 23 bus routes (local and Blue Mountains routes) and Nightride services, a taxi rank, kiss and ride and bicycle facilities (including lockers and bicycle racks). A timed car park is located to the east along with commuter car parks to the east and west.

From the north, access to the station is from Lord Sheffield Circuit that provides access to a multi-storey commuter car park and at-grade car park. There are also kiss and ride facilities and bicycle lockers within a short walk to the station entrance.

A pedestrian footbridge (with stairs and lifts) provides access to the platforms, as well as being a north-south connection over the railway line. The eastern side of the footbridge is unpaid and the western side, which can be accessed via ticket barriers, is part of the paid concourse that connects to the platforms.

From the southern side of the station, Platform 3 can be accessed directly from street level via ticket barriers, while Platforms 1/2 (situated on an island platform) are accessible via the pedestrian footbridge and stairs.

The majority of station facilities are located on the southern side of the station (Platform 3) and include two retail spaces, customer luggage room, male/female toilet, Family Accessible Toilet, ticketing information and sales, wayfinding, locality maps, vending machines and public pay phones. Ticketing machines and real time train information are provided on the pedestrian overpass as well as the southern station entrance.

Penrith Station is serviced by the T1 North Shore, Northern and Western and the Blue Mountains lines with services running approximately every 5-15 minutes during peak periods, and up to every 25 minutes during off peak periods. The T1 Line provides suburban service connections between Emu Plains or Richmond and Berowra via Central, and the Blue Mountains Line provides intercity services between Bathurst and Central. In addition, four NSW TrainLink services stop at Penrith Station (two inbound and two outbound daily).

Photographs of the existing station and interchange are provided in Images 1 to 5.

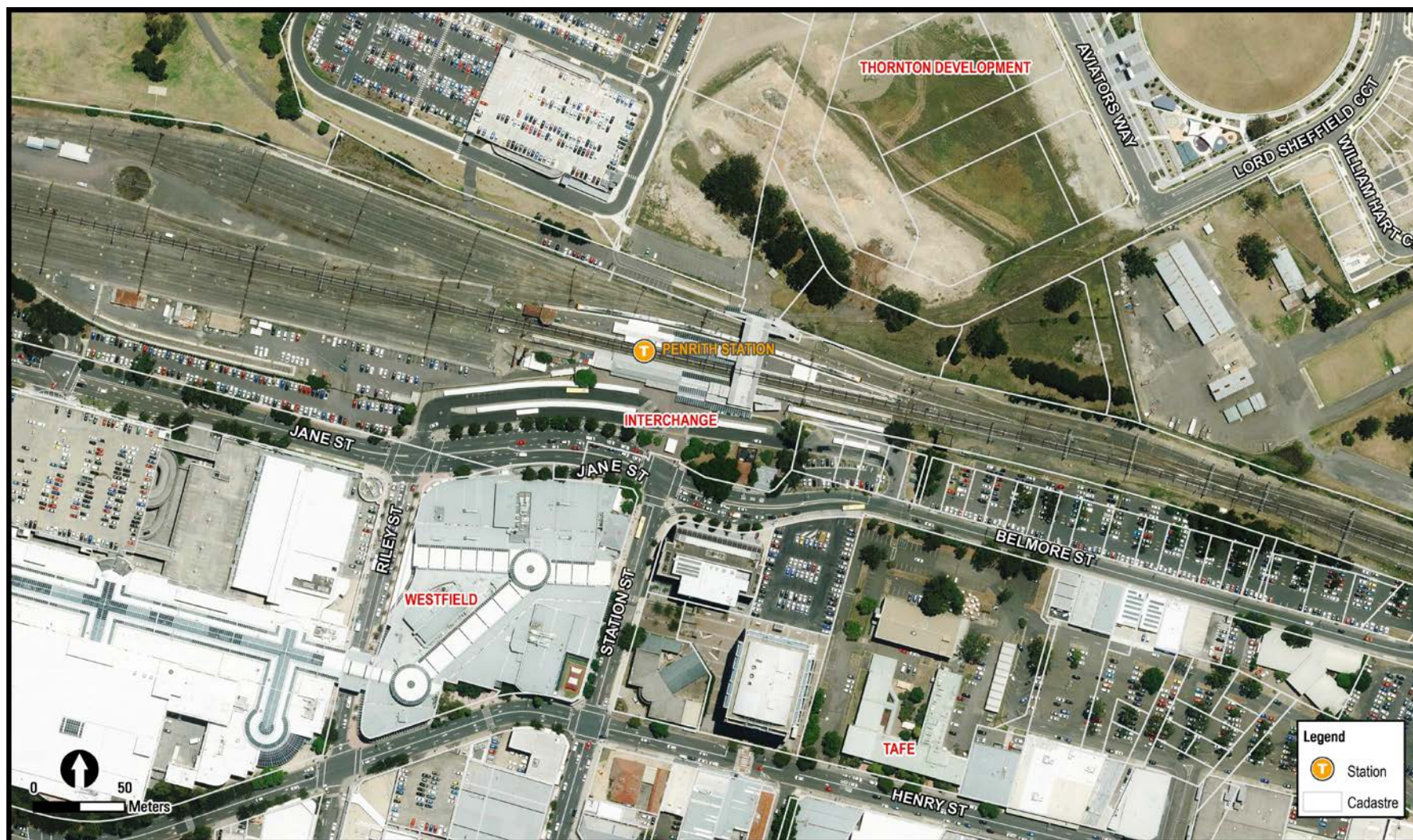


Figure 3: Site locality map



Image 1 View of Penrith Station southern entrance and interchange from Belmore Street



Image 2 View from northern stairs looking south across the eastern side of platform where the new paid concourse would be constructed adjacent to the pedestrian footbridge



Image 3 View from Penrith Station pedestrian footbridge looking south (and which would be converted to unpaid access with a new roof)



Image 4 View of existing stairs/entrance from northern side of the station (to be replaced) and the new northern plaza being developed by UrbanGrowth



Image 5 Platform 3 heritage building where a new Bus Driver's Amenities Room and Customer Service Manager's Office would be established

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of the Penrith Station Upgrade. For the purposes of these works, TfNSW is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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

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

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

2 Need for the Proposal

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

2.1 Strategic justification

2.1.1 Overview

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

The Penrith Station Upgrade, the subject of this REF, forms part of the Transport Access Program. This program is designed to drive a stronger customer experience outcome to deliver seamless travel to and between modes, encourage greater public transport use and better integrate station interchanges with the role and function of town centres within the metropolitan area and developing urban centres in regional areas of NSW.

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

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

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

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

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

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

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

2.1.2 Objectives of the Transport Access Program

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

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

2.1.3 Objectives of the Proposal

The specific objectives of the Penrith Station Upgrade are to:

- improve customer safety and enhance pedestrian and bus network links through the reconfiguration of the bus, taxi, kiss and ride and bicycle zones within the interchange
- provide a station with improved accessibility for all, including those with a disability, the ageing and parents/carers with prams by minimising conflict points and crowding points, and by improving modal separation to provide a safer interchange
- improve cross-corridor connections by creating a new paid concourse allowing for increased capacity for unpaid access across the existing pedestrian footbridge and new stairs
- improve customer experience and amenity through improved facilities including canopies for weather protection, a new Customer Information Window and Family Accessible Toilet, Passenger Information Display boards and new wayfinding in and around the station
- improve the integration of the station and interchange with its current and future urban context, and create a positive addition to the public domain.

2.2 Design development

AECOM was engaged by TfNSW to develop a concept design for a station upgrade at Penrith that would improve modal separation, safety and accessibility in and around the station and interchange. The design also aimed to better integrate the station with the Penrith City Centre as well as meet key architectural, engineering and urban design objectives. The design development also accommodated the forecast Sydney Trains patronage growth (which is the estimated 2036 daily customer patronage + 15 per cent) and changing travel patterns.

An assessment of Penrith Station and surrounds was undertaken to identify key deficiencies and opportunities with regards to accessibility and customer experience. The findings of the assessment were presented in AECOM's *Penrith Station Precinct – Station Capacity and Interchange Upgrade Concept Plan Project* (AECOM, 2013). Identified needs included:

- modal separation between pedestrians, taxis and buses
- accessible ticket facilities
- improved facilities for future growth
- pedestrian footbridge and concourse width to cater for future growth
- additional signage to improve wayfinding
- improved lighting and passive surveillance
- additional seating and shelter for interchange facilities.

2.3 Alternative options considered

Options for improving access, safety and amenity and Penrith Station were developed following a succession of workshops between various groups within TfNSW, Sydney Trains and the project design team. Consultation with other key stakeholders (including Penrith City Council, UrbanGrowth, BusWays, Blue Mountains Bus Company and Heritage Division, OEH) was also undertaken as part of the development of the concept design.

The *Penrith Station Precinct – Station Capacity and Interchange Upgrade Concept Plan Project* report considered three station options and three transport interchange options. The three interchange options comprised:

- **Option 1:** a new south-western transport interchange located approximately 160 metres from the existing station access (southern side), with vehicle access via a central intersection
- **Option 2:** a new central southern transport interchange with a reversed traffic flow so that buses would enter via a driveway from Belmore Street and exit via the Riley Street intersection
- **Option 3:** a new south-eastern transport interchange located approximately 100 metres from the existing station access (southern side) with vehicle access via a central intersection.

The station pedestrian footbridge options included the following:

- **Option A:** partial retention of the existing pedestrian footbridge as a paid concourse, with a new pedestrian footbridge
- **Option B:** complete demolition of the existing pedestrian footbridge, with a new pedestrian footbridge and paid concourse
- **Option C:** retention of the existing footbridge which would be extended into the interchange, along with a new paid concourse to the west

Each interchange option was paired with a station option to create a total of nine concept design options. Four options – Option 1A, 2A, 2B and 3C were progressed through to the next phase of analysis and workshops.

2.3.1 The ‘do-nothing’ option

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

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

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

2.3.2 Assessment of identified options

The four options were presented to an internal stakeholder workshop and assessed in a multi-criteria analysis that included consideration of factors such as customer experience, accessibility, engineering constraints, modal integration and cost to select a preferred option to be taken forward for refinement and further assessment.

2.4 Justification for the preferred option

Option 2A (partial retention of the pedestrian footbridge as a paid concourse along with a new pedestrian bridge, and a central southern transport interchange option) was selected as the preferred option as it provided the greatest benefits for customer experience and precinct/modal integration benefits.

The south-eastern and south-western transport interchange options (Options 1 and 3) did not support accessibility and customer experience objectives due to the distance from the station entrance, when compared with the central interchange (Option 2). Option A for the station was considered to provide better precinct integration and customer experience when compared with the other station options (Options B and C).

However there were a number of design refinements from the preferred Option 2A that resulted from a review process that considered customer experience, heritage and urban design principles, cost and constructability in more detail. These key refinements included:

- full retention of the existing pedestrian bridge (and extension into the interchange) with a new paid concourse on the eastern side – the retention of the pedestrian footbridge had cost and constructability benefits, but unlike earlier concepts that proposed retention with a new paid concourse on the western side, locating the new paid concourse to the eastern side would have a more positive heritage outcome by removing the need to construct a new bridge structure close to existing station heritage buildings
- relocation of a Bus Driver's Amenities Room and Customer Service Manager's Office into the Platform 3 heritage building – this removed the need to install a new amenities building inside the heritage curtilage and promotes adaptive reuse.

A description of the Proposal (Option 2A including subsequent design refinements) is presented in Chapter 3.

3 Description of the Proposal

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

3.1 The Proposal

As described in Section 1.1, the Proposal involves an upgrade of Penrith Station (and interchange) as part of the Transport Access Program, and is designed to improve accessibility and amenities for customers.

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

- existing pedestrian footbridge retained for unpaid access across the railway and extended further south
- new stairs on both the northern and southern entrances of the pedestrian footbridge
- new paid concourse accessible from the pedestrian footbridge with relocated ticket gates, new Customer Information Window, Family Accessible Toilet, store room and stairs to platforms
- three replacement lifts to provide access to the platforms/interchange
- new canopies for the existing footbridge and new stairs, lift landings, paid concourse, in addition to replacing platform canopies affected by works
- reconfiguration of the southern transport interchange which would involve:
 - upgraded bus interchange with reversed traffic flow to include set down, pick up and layover spaces for buses, and shelters for weather protection for customers
 - relocated kiss and ride and taxi rank (with shelters) on Belmore Street
 - landscaping, paving and lighting for the interchange and forecourt area
- extension of the south-western car park with approximately 25 spaces (to offset some of the commuter parking removed for the long-term bus layover)
- establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the existing Platform 3 heritage building
- ancillary works including services diversion and/or relocation, alterations to traffic signals, station power supply upgrade, minor drainage works, adjustments to fencing, lighting and seating, improvements to station communication systems with new infrastructure (including lighting, CCTV cameras, Passenger Information Display boards and Opal card readers) and wayfinding signage.

Figure 4 shows the general layout of key elements for the Proposal, and Figure 5 provides an artist's impression of the Proposal.

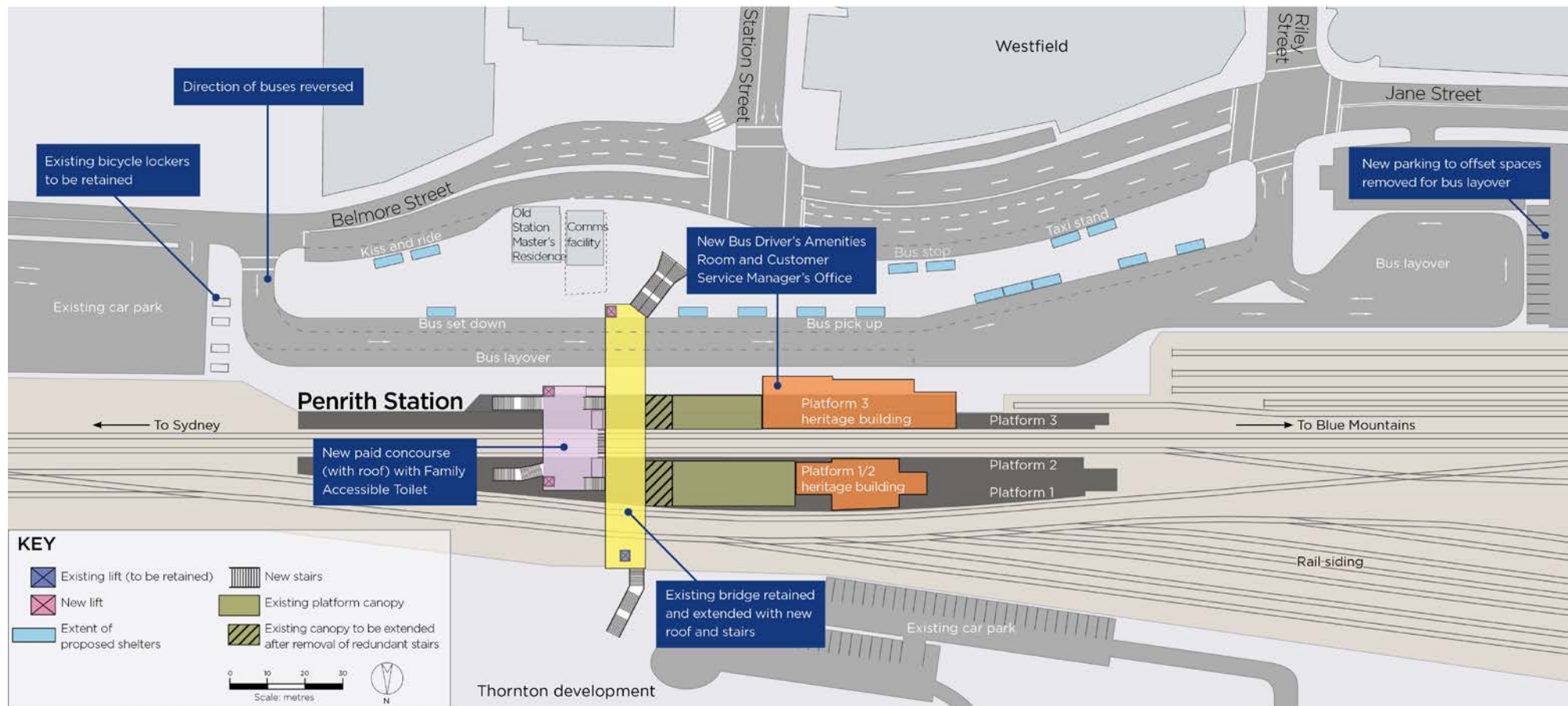


Figure 4: Plan view of the key elements of the Proposal

(Indicative only, subject to detailed design)



Figure 5: Artist impression of the Proposal – view from Station Street/Belmore Street intersection looking north

(Indicative only, subject to detailed design – also shown are future buildings as part of the Thornton development)

3.1.1 Design features

Station structures, building works and services provision

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

- temporary works (as required) during construction in order to maintain a similar 'level of service' for station users, such as temporary customer information and ticketing facilities, shelters, alternative bus/taxi and kiss and ride arrangements (including signage)
- demolition of structures including:
 - existing pedestrian footbridge elements such as the roof, façade and two lifts (the two existing lifts to be removed would be reused within the Sydney Trains network, if feasible)
 - note: the suspended concrete deck (floor) would be retained for use as an unpaid cross-corridor access
 - existing stairs from the pedestrian footbridge to platforms and associated canopies (some to be replaced) and the existing shelter on the eastern end of Platform 1/2
 - existing two retail shops on Platform 3 (to be replaced by two new retail kiosks on pedestrian footbridge, subject to separate planning approval)
 - existing male and female toilets on Platform 3
 - Family Accessible Toilet on Platform 3 (to be replaced in new building on Platform 3)
 - customer luggage room on Platform 3 (to be replaced in new building on Platform 3)
 - existing Gate Access Control office (to be replaced with new Customer Information Window on paid concourse)
- extension of the pedestrian footbridge to the south across the bus lanes of the interchange, and installation of new entrance stairs to the north and south along with a glass façade to the west to allow for views of the Blue Mountains and station heritage buildings
- construction of a new paid concourse (with glass façade) to the east of the pedestrian footbridge that would comprise relocated ticket barriers (from southern entrance) and ticketing machines, Customer Information Window, Family Accessible Toilet, store room and four new stairs down to the platforms
- construction of three replacement lifts (one lift to provide access from the southern plaza to the pedestrian footbridge, two lifts at the paid concourse to provide access to the station platforms, while the existing northern lift would be retained to provide access from the pedestrian bridge to the northern plaza)
- new canopies for weather protection installed above the existing pedestrian footbridge, new paid concourse and both station entrance stairs (it is envisaged that the canopies would comprise steel columns and roofs, would not be fully enclosed and would be designed so as to be sympathetic to the station surrounds with unobtrusive, modern, light materials)

- additional infill canopy for the uncovered area adjacent to the Platform 1 heritage building (to match the existing)
- new anti-throw/protective screens installed on the pedestrian footbridge/stairs
- new solar photovoltaic (PV) cells installed on the new roof of the pedestrian footbridge (subject to feasibility)
- closure of the existing street level entrance (to Platform 3) which would include the removal of the canopy covering the existing ticket barriers on Platform 3 and would result in access to all platforms via the new paid concourse and stairs
- establishment of an emergency egress from Platform 3 (with small platform extension on eastern end of Platform 3, new emergency door/stairs etc.)
- construction of the small building on Platform 3 (underneath the existing footbridge) to accommodate the relocated Family Accessible Toilet and customer luggage room
- establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the existing Platform 3 heritage building – this would include some internal modifications such as the creation of internal walls and external modifications such as infilling either end of the building to create a closed space, and creation of new door/s and window treatments
- other internal modifications to the Platform 3 heritage building including the conversion of an existing office to a store room and a ticket office to a staff training room
- platform modifications including removing pinch points and crowding points, new/upgraded tactiles and relocation/replacement of seats etc to ensure a compliant accessible path of travel and to enhance sight-lines to the heritage platform buildings (i.e. relocation of vending machines, seats, ATMs)
- platform resurfacing and raising/regrading to achieve compliant crossfalls (i.e. transverse slope) of maximum 1 in 40 (where required)
- services adjustments including for drainage, lighting and communications systems (e.g. Passenger Information Display boards and CCTV)
- station power supply as required to facilitate upgrades/modifications to station services systems
- new wayfinding signage and provision of other signage including statutory/regulatory signage.

Interchange facilities

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

- modified bus interchange on the southern side of the station entrance within the footprint of the existing interchange and involving the following:
 - the direction of traffic would be reversed and the entry/exit points would switch with buses to take priority at the Station Street/Belmore Street interchange
 - new interchange would comprise three lanes (a bus stand lane for set down/pick-ups, a through movement lane and a layover lane)

- the existing northbound right turn lane at Station Street would be converted to a bus only lane to increase bus priority at the intersection
 - reprogramming and alterations of the traffic signals on Belmore Street
- kiss and ride (with approximately seven spaces) relocated to the eastern end of Belmore Street
- taxi zone (with approximately eight spaces) relocated to the western side of Belmore Street along with an additional bus stand
- provision of a long-term bus layover west of the station and establishment of additional parking spaces in the south-western car park to offset some of the parking to be impacted by the works
- new shelters for weather protection for bus, taxi and kiss and ride areas along with lighting and CCTV coverage (and removal/salvage of the existing shelters)
- removal of existing bicycle racks in the southern plaza (to be salvaged and provided to Penrith City Council – in addition a bike shed with capacity for 30 bicycles is proposed, subject to a separate planning approval, as part of the Bike and Ride Initiative)
- landscaping, paving, street furniture and lighting in the southern plaza to complement Penrith City Council areas
- adjustment to boundary fencing and landscaping works for areas affected by the works.
- new wayfinding signage and provision of other signage including statutory/regulatory signage.

Materials and finishes

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

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

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

- the existing pedestrian footbridge would be extended to bridge the bus interchange using a concrete deck, steel frame structure, Colorbond roof, natural timber-like soffit and glazed facades
- the new paid concourse is being constructed adjacent to the existing pedestrian footbridge and would be constructed in materials to match, for an integrated and cohesive aesthetic
- the new entrance stairs to the pedestrian footbridge, and those from the paid concourse to the platforms, would be concrete with steel frame construction, Colorbond roofing and steel balustrades and handrails
- lift shafts would be constructed from concrete at platform level with steel framed and glazing to the upper area and integrated into the surrounding structures for aesthetic consistency.

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

3.1.2 Engineering constraints

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

Existing structures: the placement and integrity of existing structures needs to be considered during the development of the design – these structures include the pedestrian footbridge, platforms and station buildings.

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

Interchange requirements: consultation within TfNSW and with the affected bus companies and the NSW Taxi Council over the following provisions that would be provided:

- two set-down ranks (with capacity for four buses)
- four pick-up ranks (with capacity for eight buses)
- short-term layover spaces for four buses
- one set-down/pick-up rank (with capacity for one bus – to be used by the Blue Mountains buses)
- long-term layover for four buses
- taxi rank with capacity for eight vehicles.

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

- electrical services (aboveground and underground)
- telecommunication services (underground)
- gas
- stormwater
- water and sewer
- cables and conduits for RMS traffic signals at nearby intersections
- rail utilities, including signalling cabling and overhead wiring.

Heritage: Penrith Station is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the *Penrith Local Environmental Plan 2010*. The heritage values of the station have been considered during the development of the design and with particular consideration for the heritage buildings on Platform 1/2 and Platform 3 which form part of the listing and the potential to be most affected. Other items of significance, such as the water column and filler spout and water tank (eastern end of platforms), signal box (western end of platforms) and old Station Master's Residence (within the interchange) would not be directly impacted by the Proposal. Section 6.5 provides a summary of the heritage assessment prepared for the Proposal.

Other considerations:

- modal separation to improve safety is a key driver for the Proposal as there are several deficiencies that have been identified in the current layout including pedestrian/vehicle conflicts, unclear wayfinding and surveillance issues.
- provision for an extended pedestrian footbridge so not to preclude future development of the railway/station
- the setting of the station within the Penrith City Centre and the importance of the station entrances to mark Penrith as a regional destination and to promote cross-corridor connections
- the need to integrate the design of the northern stairs into the northern plaza of the Thornton development
- an opportunity to open up views of the Blue Mountains from the pedestrian footbridge
- consideration of a bike shed (with capacity for 30 bicycles) proposed as part of the NSW Government's Bike and Ride Initiative.

3.1.3 Design standards

The Proposal would be designed having regard to the following:

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

3.1.4 Sustainability in design

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

- energy and greenhouse gases
- climate resilience
- materials and waste
- biodiversity and heritage
- water

- pollution control
- community benefit.

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

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

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

TfNSW is considering installation of solar PV cells across Transport Access Program projects, and has undertaken preliminary investigations into the feasibility of utilising solar PV cells for the Penrith Station Upgrade. These investigations considered a number of design, environmental, cost-benefit and maintenance issues and found that the proposed roof structure for the pedestrian footbridge would make a suitable location for solar PV cells and would help supply electricity to the station. Further investigations will be undertaken to confirm the feasibility during the next stages of design.

3.2 Construction activities

3.2.1 Work methodology

Subject to approval, construction is expected to commence in 2016 and take approximately two years to complete. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with TfNSW.

The general approach for staging the construction activities would ensure that construction work would not affect the level of service for interchange operations, and must ensure that access for station staff and interchange customers is available throughout station operation hours. E.g. the new paid concourse would be constructed and commissioned prior to the closure of the street level access from Platform 3.

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

Table 1 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works	<ul style="list-style-type: none"> establishment of site compound (erect fencing, tree protection zones, site offices, amenities and plant/material storage areas etc) removal of awnings from the Belmore Street side of the station relocation of services/seats/bins on platforms
Bridge, lift and stairs construction	<ul style="list-style-type: none"> erection of hoarding on the pedestrian footbridge demolition of existing structures (existing pedestrian bridge roof, canopies, shelters and stairs etc.) construction of footings for columns for the pedestrian footbridge and extension and stairs, foundations for paid concourse and lift shafts (on platforms) installation of precast headstocks and decks for extended pedestrian footbridge construction of footings for columns for the pedestrian footbridge and extension and stairs, foundations for paid concourse and lift shafts (outside platforms areas) fit out of stairs, canopies and anti-throw screens installation of lifts installation of fixtures, lighting and CCTV cameras for areas affected by construction works
Platform/building and concourse works	<ul style="list-style-type: none"> construction of Family Accessible Toilet, Customer Information Window and store room (including mechanical/electrical/building fit out) construction of small building on Platform 3 (underneath the existing footbridge) to accommodate relocated Family Accessible Toilet and customer luggage room establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the existing Platform 3 heritage building other internal modifications to the Platform 3 heritage building including the conversion of an existing office to a store room and a ticket office to a staff training room platform resurfacing and raising/regrading
Interchange works	<ul style="list-style-type: none"> upgrade of existing roads and footpaths reconfiguration of bus, taxi and kiss and ride areas
Finalisation	<ul style="list-style-type: none"> installation of new bus canopies, seats, bins, wayfinding to interchange
Testing and commissioning	<ul style="list-style-type: none"> various activities to test and commission power supplies, lifts, lighting, new/modifications to station services, ticketing systems and communication and security systems

3.2.2 Plant and equipment

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

- trucks
- generators
- bobcats
- excavators
- crane
- hand tools
- rattle guns
- nail guns
- demolition saw
- jack hammers
- grinders
- piling rig
- concrete trucks
- concrete pump
- wacker packer
- compressors
- elevated work platforms
- scissor lifts
- vibratory roller
- hi rail vehicles
- lighting towers.

3.2.3 Working hours

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

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

Certain works may need to occur outside standard hours and would include night works and works during routine track possessions which are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed and trains are not operating.

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

- demolition of existing structures including existing stairs, lifts, pedestrian footbridge roof and platform canopies
- construction of the footings for the columns for the pedestrian footbridge extension and stairs, and foundations for paid concourse and lift shafts (on platforms)
- installation of precast headstocks and decks for extended pedestrian footbridge along with installation of lift shafts and stairs
- installation of lifts along with fixtures, lifting and CCTV cameras for areas affected by construction works
- platform resurfacing and raising/regrading.

Out of hours works may also be scheduled outside track possession periods. Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in TfNSW's *Construction Noise Strategy* (TfNSW, 2012c) (refer to Section 6.3 for further details).

3.2.4 Earthworks

Excavations and earthworks would generally be required for the following:

- excavation to allow for the footings for the columns of the pedestrian footbridge extension and stairs
- excavation for the foundations for paid concourse and lift shafts
- works for the reconfiguration of the interchange and new entry plaza areas
- other minor civil works including footings and foundations for structures, drainage/stormwater works (including retaining walls), and trenching activities for service adjustments and relocations.

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

3.2.5 Source and quantity of materials

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

3.2.6 Traffic access and vehicle movements

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

- impacts to pedestrians and rail customers, including :
 - potential for increased congestion during peak periods resulting from constrictions on the existing overhead pedestrian footbridge and along walkways in the station forecourt
 - the likelihood of longer walking distances resulting from diversions in the interchange area associated with construction works
 - potential higher levels of platform congestion as a result of areas being temporarily cordoned off
 - potential for higher road safety risk levels associated with construction vehicle/alternate interchange arrangements and pedestrian interaction
- changes to bus/taxi and kiss and ride operations which could create potential vehicle congestion due to reduced operational areas (or longer queuing) and potential access/egress difficulties
- construction vehicle movements and access arrangements which may impact local streets
- partial loss in the northern at-grade commuter car park during construction

- parking to be removed during construction (as part of operational changes) including a net loss of parking in the south-western car park (approximately 20 spaces and 11 motorbike spaces) and removal of the timed car park south-east of the station (25 spaces and seven motorbike spaces).

3.2.7 Ancillary facilities

Temporary construction compounds would be required to accommodate site offices, amenities, laydown and storage areas for materials. Construction compounds would likely be established immediately north of the station on land owned by RailCorp and UrbanGrowth (or land that is to be vested to Penrith City Council) (refer Figure 6).

Temporary works to facilitate access from Lord Sheffield Circuit to the station would be undertaken on land that is currently owned by UrbanGrowth but will also soon be vested to Penrith City Council (refer Figure 6). Impacts associated with utilising these areas have been considered in the environmental impact assessment including requirements for rehabilitation.

3.2.8 Services adjustments

The existing overhead electricity supplies, running parallel to the railway on the northern and southern sides of the station would be undergrounded as part of a separate project (and approval process). These works are expected to be completed prior to commencement of any works in that area that are related to the Proposal.

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

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

3.3 Property acquisition

Discussions with UrbanGrowth and Penrith City Council have been ongoing during the development of design options and the concept design and have addressed options to acquire a small section of land to the north of the station, currently owned by UrbanGrowth (and would be vested to Penrith City Council), to allow for the new stairs on the northern side of the pedestrian footbridge.

3.4 Operation management and maintenance

The future operation and maintenance of the upgraded station and surrounds is subject to further discussions with Sydney Trains and Penrith City Council. Structures constructed under this Proposal situated on RailCorp land would be maintained by Sydney Trains. However it is expected that the southern plaza, northern plaza and associated street furniture, lighting etc. would be maintained by Penrith City Council.

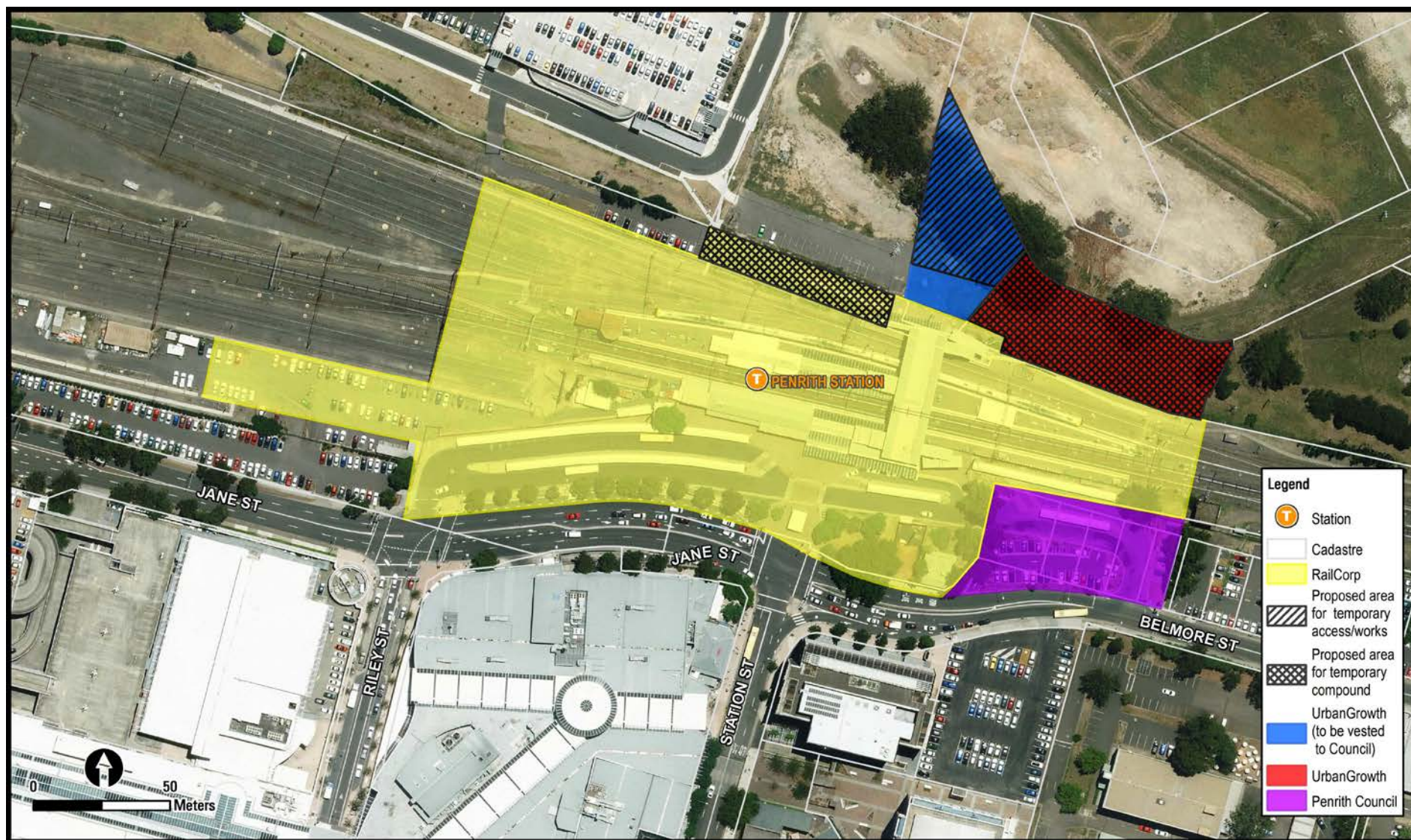


Figure 6: Proposed works areas

4 Statutory considerations

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

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

4.2 NSW legislation and regulations

4.2.1 Environmental Planning and Assessment Act 1979

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

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

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Part 5 of the EP&A Act has a significant impact on the environment. Chapter 6 of the REF provides an environmental impact assessment of the Proposal in accordance with clause 228 and Appendix B specifically responds to the factors for consideration under clause 228.

4.2.2 Other NSW legislation and regulations

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

Table 2 Other legislation applicable to the Proposal

Applicable legislation	Considerations
<i>Contaminated Land Management Act 1997</i> (CLM Act) (NSW)	<p>Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels.</p> <p>The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8).</p>
<i>Copyright Act 1968</i> (Cth)	<p>Section 195AT of the Copyright Act deems certain treatment of copyright works not to constitute an infringement of the author's (i.e. the architect's) right of integrity. With respect to the demolition of a building, an architect's right of integrity will not be infringed if, when wishing to demolish a building, the architect is provided with a written notice of such intentions and is provided access to make a record of the artistic work and consult in good faith.</p> <p>Notification would be provided to the architect of Penrith Station (for the upgrade works undertaken between 1998-2000) in accordance with these legislative requirements.</p>
<i>Crown Lands Act 1987</i> (NSW)	<p>The Proposal does not involve works on any crown land.</p>
<i>Disability Discrimination Act 1992</i> (DDA) (Commonwealth)	<p>The Proposal would be designed having regard to the requirements of this Act.</p>
<i>Heritage Act 1977</i> (Heritage Act) (NSW)	<ul style="list-style-type: none"> Sections 57 and 60 (approval) where items listed on the State Heritage Register are to be impacted. Sections 139 and 140 (permit) where relics are likely to be exposed. Section 170 where items listed on a government agency Heritage and Conservation Register are to be impacted. <p>Penrith Railway Station is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the Penrith LEP.</p> <p>The Proposal aims to ensure the Proposal objectives are achieved in a way that conserves important heritage values and minimises impacts on heritage significance. An approval by the Heritage Council under Section 60 of the Heritage Act would be required prior to any works proceeding.</p> <p>The heritage assessment has indicated that some works would be required in areas of archaeological sensitivity (refer Section 6.5). Should impacts to these areas still be anticipated following detailed design, a review of the approvals would be undertaken and a modification sought.</p>
<i>National Parks and Wildlife Act 1974</i> (NPW Act) (NSW)	<p>Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4).</p> <p>However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease and appropriate advice sought.</p>

Applicable legislation	Considerations
<i>Noxious Weeds Act 1993</i> (NSW)	Noxious weeds were not identified during site investigations, although, a number of environmental weeds are present. Appropriate management methods would be implemented during construction (refer Section 6.7).
<i>Protection of the Environment Operations Act 1997</i> (PoEO Act) (NSW)	The Proposal does not involve a 'scheduled activity' under Schedule 1 of the PoEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal. However, in accordance with Part 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Contractor.
<i>Roads Act 1993</i> (Roads Act) (NSW)	Section 138 of the Roads Act requires consent from the relevant road authority for the carrying out of work in, on or over a public road. However, clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require consent for works on unclassified roads. The Proposal would involve works on Belmore Street, Station Street and Jane Street. Belmore Street and Jane Street are classified roads and consent under the Roads Act would be required prior to such works commencing. Refer to Section 6.1 for more information. Operational changes (such as parking changes, signage and traffic signal changes etc.) to Belmore Street, Jane Street and Station Street would be undertaken with approval from the relevant road authority.
<i>Sydney Water Act 1994</i> (NSW)	The Proposal would not involve discharge of wastewater to the sewer.
<i>Threatened Species Conservation Act 1995</i> (TSC Act) (NSW)	The site does not contain suitable habitat for any listed threatened species or community and is unlikely to have a significant impact on any threatened species or community (refer Section 6.7).
<i>Waste Avoidance and Resource Recovery Act 2001</i> (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.
<i>Water Management Act 2000</i> (NSW)	The Proposal would not involve any water use, water management works, drainage or flood works, controlled activities or aquifer interference.

4.3 State Environmental Planning Policies

4.3.1 State Environmental Planning Policy (Infrastructure) 2007

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

Clause 79 of the Infrastructure SEPP allows for the development of 'rail infrastructure facilities' by or on behalf of a public authority without consent on any land (i.e. assessable under Part 5 of the EP&A Act). Clause 78 defines 'rail infrastructure facilities' as including elements such as 'railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms', public amenities for commuters' and 'associated public transport facilities for railway stations'.

Consequently, development consent is not required for the Proposal which is classified as a rail infrastructure facility, however, the environmental impacts of the Proposal have been assessed under the provisions of Part 5 of the EP&A Act.

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other agencies prior to the commencement of certain types of development. Section 5.2 of this REF discusses the consultation undertaken under the requirements of the Infrastructure SEPP.

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

4.3.2 State Environmental Planning Policy 55 – Remediation of Land

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

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

4.4 Local environmental planning instrument and development controls

The Proposal is located within the Penrith LGA. The provisions of the Infrastructure SEPP mean that Local Environmental Plans (LEPs) prepared by councils for an LGA, do not apply. However, during the preparation of this REF, the provisions of the *Penrith Local Environmental Plan 2010* (Penrith LEP) have been considered.

4.4.1 Penrith Local Environmental Plan 2010

The Penrith LEP is the governing plan for the Penrith LGA, including for Penrith Station and surrounds. Table 3 summarises the relevant aspects of the Penrith LEP applicable to the Proposal. Figure 7 shows the relevant section of the zoning map from the Penrith LEP, with the proposed work areas for the Proposal.

Table 3 Relevant provisions of the Penrith LEP

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Table	<p>Under the Penrith LEP:</p> <ul style="list-style-type: none"> the rail corridor (including the interchange) and commuter car park to the north are zoned SP2 Infrastructure – Railway the area to the north of the station (Thornton development) is B2 Local Centre to the south of the station, shops and businesses along Jane Street and Belmore Street are zoned B3 Commercial Core. <p>The Proposal is consistent with the objectives of the SP2 Infrastructure, B2 Local Centre and B3 Local Centre which includes maximising public transport patronage and encouraging walking and cycling.</p>
Clause 5.9 – Preservation of trees or vegetation	<p>Clause 5.9 is aimed at the preservation of trees and development consent is required for tree removal in most instances. However by virtue of clause 5(3) and 79 of the Infrastructure SEPP, the clearing of vegetation for the Proposal is permissible without development consent and would be approved under Part 5 of the EP&A Act. Some tree removal on the southern side of the station would be required. More detailed information on trees and vegetation is included in Section 6.7.</p>
Clause 5.10 – Heritage conservation	<p>The Penrith LEP aims to conserve heritage significance of heritage items within the LGA. The Penrith Railway Station is listed under Schedule 5 – Environmental Heritage of the Penrith LEP. Other heritage items/conservation areas in the vicinity of the Proposal area include the TAFE building and Red Cow Hotel. A discussion of potential impacts to local heritage is outlined in Section 6.5.</p>

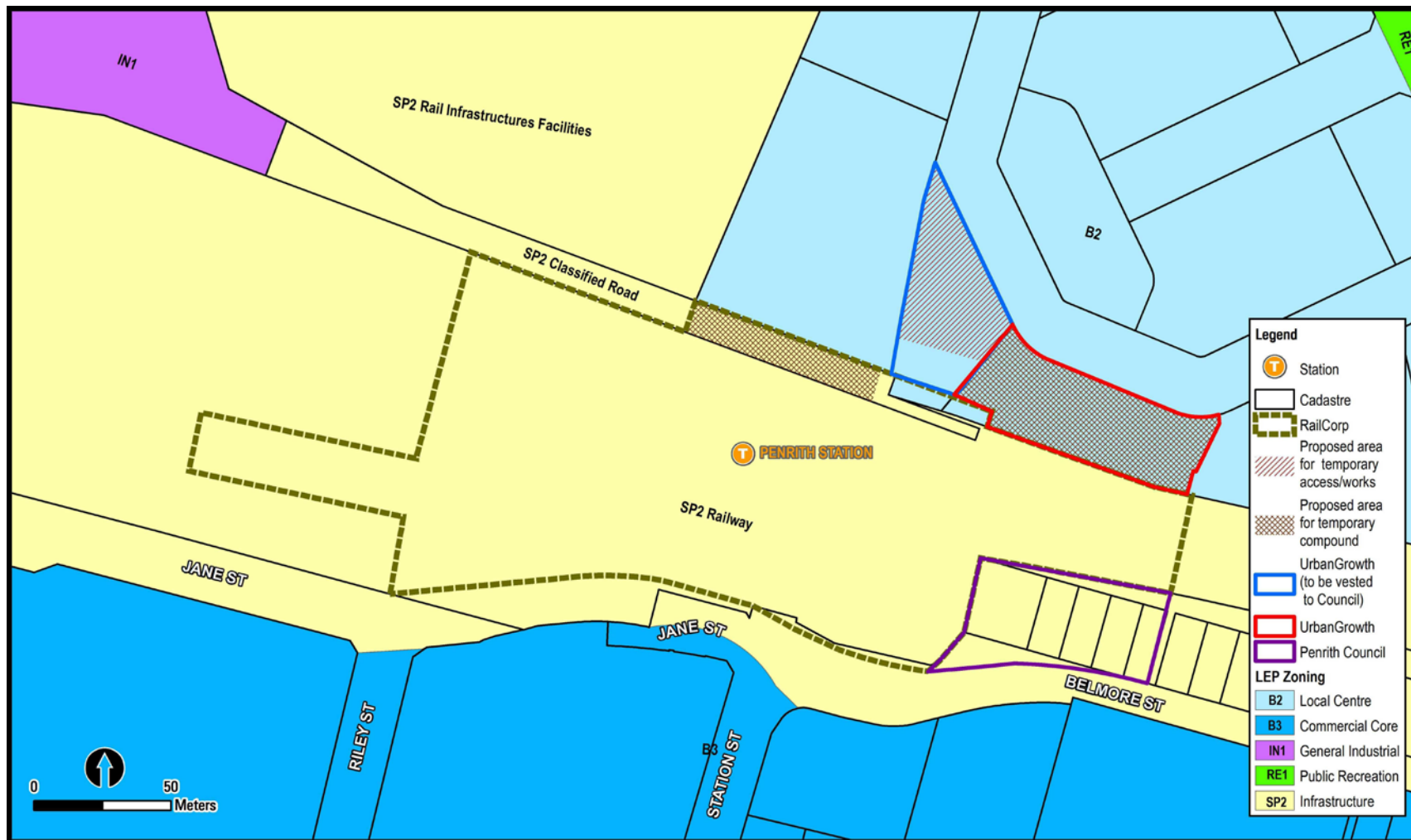


Figure 7: Penrith LEP zoning map

4.5 NSW Government policies and strategies

Table 4 provides an overview of other NSW Government policies and strategies relevant to the Proposal.

Table 4 NSW Government policies and strategies

Policy/Strategy	Commitment	Comment
NSW 2021 – A Plan to Make NSW Number One (Department of Premier and Cabinet, 2011)	<p>NSW 2021 – A Plan to Make NSW Number One is a ten-year plan developed in 2011 and outlines the high level strategic priorities and associated goals for government and its respective agencies.</p> <p>A key aspect in the transport strategy includes:</p> <ul style="list-style-type: none"> the return of quality transport and community services building infrastructure that improves people's lives and strengthening our local environments. <p>NSW 2021 includes the following goals, targets and priority actions relevant to the Proposal:</p> <ul style="list-style-type: none"> reduce travel times minimise public transport waiting times for customers improve co-ordination and integration between transport modes grow patronage on public transport improve public transport reliability improve customer experience with transport services. 	<p>The Proposal is consistent with the NSW Government's commitment to:</p> <ul style="list-style-type: none"> grow patronage on public transport, and improve customer experience with transport services. <p>In particular, it is consistent with <i>Goal 14 – Increase opportunities for people with a disability, by improving transport access</i>.</p> <p>The Proposal also contributes to <i>Goal 7 – Reduce travel times</i>, and <i>Goal 20 – Build liveable centres</i>.</p>

Policy/Strategy	Commitment	Comment
NSW Long Term Transport Master Plan (TfNSW, 2012a)	<p>The <i>NSW Long Term Transport Master Plan</i> identifies a planned and co-ordinated set of actions to address transport challenges and will guide the NSW Government's transport funding priorities over the next 20 years.</p> <p>A number of actions relate to Penrith which is in part driven by its status as a regional city centre in the growing Western Sydney area. In 2031, the number of people working in Penrith is expected to increase to 37,000 from 16,000 in 2011. Around 27,000 of these workers will be travelling to Penrith during the morning peak.</p> <p>As such there are a number of actions contained within the Master Plan that specifically relate to Penrith:</p> <ul style="list-style-type: none"> • improve public transport services in Penrith • increase train capacity on the Western Line • co-ordinate planning approaches with Penrith City Council • provide faster and more frequent services to major employment centres in Penrith • upgrade Penrith Interchange. 	<p>The Proposal is consistent with the overarching objectives of the Master Plan addressing key themes of improving customer's journey experience and providing accessible transport.</p> <p>It also helps to address many of the actions for the Penrith area as well as directly addressing the action to upgrade the Penrith Interchange and to ensure alignment with the Thornton development.</p>
Disability Action Plan 2012-2017 (TfNSW, 2012b)	<p>The <i>Disability Action Plan 2012-2017</i> was developed by TfNSW in consultation with the Accessible Transport Advisory Committee, which is made up of up of representatives from peak disability and ageing organisations within NSW.</p> <p>The Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job, and provides a solid and practical foundation for future progress over the next five years.</p>	<p>The Proposal has been developed with consideration of the objectives outlined in this Plan and seeks to improve and provide equitable access to public transport facilities.</p>
Sydney's Walking Future - Connecting people and places (TfNSW, 2013b)	<p><i>Sydney's Walking Future</i> outlines the NSW government's efforts to:</p> <ul style="list-style-type: none"> • promote walking for transport • connect people to places through safe walking networks around activity centres and public transport interchanges. 	<p>The Proposal would facilitate walking by providing an upgraded cross-corridor connection through using the existing pedestrian footbridge solely for unpaid access (increasing capacity from the existing), and connected by two new entrance stairs. In addition, the Proposal would improve safety for pedestrians by removing the pedestrian/vehicle conflict that exists at the present interchange by extending the pedestrian footbridge across the bus lanes.</p>

Policy/Strategy	Commitment	Comment
Sydney's Cycling Future - for everyday transport (TfNSW, 2013c)	<i>Sydney's Cycling Future</i> outlines the NSW Government's commitment to a safe and connected network of bicycle paths as an important part of Sydney's integrated transport system. The government wants to make bike riding a convenient and enjoyable option by improving access to towns and centres, and investing in bicycle facilities at transport hubs.	<p>The Proposal would require the removal of the bicycle racks (with capacity for 13 bicycles) however the existing bicycle facilities, in the interim, would provide the minimum required bicycle facilities for the station and interchange.</p> <p>The NSW Government is also implementing the Bike and Ride Initiative, which is a separate program to the Transport Access Program and Penrith Station has been identified as a future site for improved bicycle facilities. A bike shed with capacity for 30 bicycles would be provided at Penrith Station, which would likely be situated at the western end of Belmore Street (subject to a separate planning approval). This Proposal would not preclude the development of such a facility in the future.</p>
Rebuilding NSW – State Infrastructure Strategy 2014 (NSW Government, 2014)	<p><i>Rebuilding NSW</i> is a plan to deliver \$20 billion in new productive infrastructure to sustain productivity growth in our major centres and regional communities.</p> <p><i>Rebuilding NSW</i> will support overall population growth in Sydney and NSW. Public transport is viewed as critical to urban productivity, expanding employment opportunities by connecting people to jobs, reducing congestion, and supporting delivery of urban renewal.</p>	The Proposal supports investment in rail infrastructure, and aligns with the reservation of \$8.9 billion for urban public transport to support Sydney's population, that is expected to reach almost six million by 2031.
A Plan for Growing Sydney (Department of Planning and Environment, 2014)	<p><i>A Plan For Growing Sydney</i> superseded the draft <i>Metropolitan Strategy for Sydney 2036</i>. The Plan provides information on the strategies to accommodate an additional 664,000 homes and 689,000 jobs by 2031, which in part will be helped by a more integrated transport network.</p> <p>The Proposal is located in the West subregion and the priorities relevant to the Penrith (which is identified as a regional city centre) include retaining a commercial core in Penrith for long-term employment growth; and improving walking and cycling connections between Penrith and the Nepean River.</p>	<p>The Proposal would be consistent with the aims of <i>Goal 1 – A competitive economy with world-class services and transport</i> and <i>Goal 3 – A great place to live with communities that are strong, healthy and well connected</i>.</p> <p>And in particular, <i>Direction 3.3 - creating healthy built environments</i> that aim to encourage walking and cycling to public transport and local centres. The Proposal would assist in meeting this direction by using the existing pedestrian footbridge only for unpaid access (increasing capacity from the existing), and connected by two new entrance stairs. In addition, the Proposal would improve safety for pedestrians by removing the pedestrian/vehicle conflict that exists at the present interchange by extending the pedestrian footbridge across the bus lanes.</p>

Policy/Strategy	Commitment	Comment
Penrith City Centre Parking Strategy (Penrith City Council, 2011)	<p>The <i>Penrith City Centre Parking Strategy</i> establishes principles and strategies to effectively and efficiently manage the access and car parking provisions of the Penrith City Centre, both now and into the future.</p> <p>It includes a number of principles which include providing effective public transport, road, pedestrian and cycle networks.</p>	<p>The Proposal supports the principle of creating a successful regional city, with effective public transport to reduce car parking demand, and improved road, pedestrian and cycle networks.</p>
Penrith City Centre Transport Management Strategy (Penrith City Council, 2013)	<p>The <i>Penrith City Centre Transport Management Strategy</i>'s key objectives included:</p> <ul style="list-style-type: none"> • supporting growth by managing the need to travel and better integrating land use and transport • focusing on better managing existing assets, optimising and prioritising transport network improvements and improving network reliability. 	<p>The Proposal supports increasing the public transport mode share; and rail and bus service capacity improvements.</p>
Penrith Interchange Precinct Study (Penrith City Council & Arup, 2014)	<p>This study explores Penrith Interchange and considers the future interchange design in the context of the transport needs and the connectivity to the surrounding precinct. It also provided a review of early concept options for the Proposal.</p>	<p>The development of the concept design for the Proposal has been undertaken with reference to this study (and design principles) and in consultation with Penrith City Council.</p> <p>In particular, the Proposal would address many of the opportunities identified in the study such as providing an improved cross-corridor connection, opening up views of the Blue Mountains, catering for any future railway/station expansion, recognising the heritage values of the station/precinct, improved wayfinding, and upgraded bus driver's facilities (also refer to Section 5.1 which summarises key issues raised by Penrith City Council that are also echoed in this study). There are also opportunities to create a sense of place through the landscaping and pavement treatment of the southern plaza.</p>

4.6 Ecologically sustainable development

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

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

The principles of ESD have been adopted by TfNSW throughout the development and assessment of the Penrith Station Upgrade. Section 3.1.4 summarises how ESD would be incorporated in the design development of the Proposal. Section 6.13 includes an assessment of the Proposal in terms of climate change and sustainability, and Section 7.2 lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.

5 Community and stakeholder consultation

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

5.1 Stakeholder consultation during concept design

As part of the development of concept design options and the preferred option, TfNSW has consulted with Sydney Trains, Heritage Division (OEH), UrbanGrowth, Penrith City Council, BusWays, Blue Mountains Bus Company and the NSW Taxi Council.

Internal divisions of TfNSW and Sydney Trains were involved in a number of workshops in late 2013 to identify key issues and decide on a preferred option. Briefings have also been provided to Heritage Division, while workshops have been held with UrbanGrowth and Penrith City Council to understand the future context and land constraints.

As the preferred option has been refined, additional consultation in 2014 and 2015 has been undertaken with the following stakeholders:

- **Penrith City Council** – some of the key issues raised during this process include:
 - the importance of the station entrances to mark Penrith as a regional destination and promote cross-corridor connections
 - the Proposal needs to provide safe and convenient access and reduce the need for pedestrians to cross traffic
 - views of the Blue Mountains from the pedestrian footbridge are desirable
 - adaptive reuse of station heritage buildings
 - opportunities to provide open space for markets, meetings, public art, landscaping etc in the southern plaza
 - traffic management during construction and operation (i.e. impacts resulting from the proposed reversal of traffic flow at the interchange)
 - a bicycle route along Jane Street is to be established by Penrith City Council
 - future context of the station and other planned developments (including reference to the *Penrith Interchange Precinct Study* (Penrith City Council & Arup, 2014)).
- **UrbanGrowth** – to integrate the design of the northern station entrance into the northern plaza
- **BusWays, Blue Mountains Bus Company and the NSW Taxi Council** – to understand operational requirements for the interchange.

Issues raised by stakeholders during various meetings have been considered during the development of the concept design. For example, the new glass façade on the pedestrian bridge would allow for views of the Blue Mountains, while it is proposed to locate the Bus Driver's Amenities Room and Customer Service Manager's Office inside the Platform 3 heritage building.

The proposed arrangement of the interchange would also meet the operational requirements of the various bus companies. A Traffic, Transport and Access Impact Assessment has been prepared to assess construction and operational traffic impacts (refer Section 6.1). The future context of the site has also been considered, for example, the new northern stairs are being designed to integrate with the Thornton development. Consultation with these stakeholders would be ongoing during the detailed design process.

5.2 Consultation requirements under the Infrastructure SEPP

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

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

Table 5 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 13 Consultation with Councils – development with impacts on council related infrastructure and services	<p>Consultation is required where the Proposal would result in:</p> <ul style="list-style-type: none"> substantial impact on stormwater management services generating traffic that would place a local road system under strain involve connection to or impact on a council owned sewerage system involve connection to and substantial use of council owned water supply significantly disrupt pedestrian or vehicle movement involve significant excavation to a road surface or footpath for which Council has responsibility. 	<p>The Proposal includes works that would:</p> <ul style="list-style-type: none"> disrupt pedestrian and vehicle movements impact on road pavements under Council's care and control impact on Council-operated footpaths <p>Consultation with Penrith City Council has been undertaken, and would continue throughout the detailed design and construction phases.</p>
Clause 14 Consultation with Councils – development with impacts on local heritage	<p>Where railway station works:</p> <ul style="list-style-type: none"> substantially impact on local heritage item (if not also a State heritage item) substantially impact on a heritage conservation area. 	<p>Penrith Railway Station is listed on the heritage schedule of the Penrith LEP. The Proposal is also being undertaken close to other local heritage items and conservation areas.</p> <p>Consultation with Penrith City Council has been undertaken, and would continue throughout the detailed design and construction phases.</p>

Clause	Clause particulars	Relevance to the Proposal
Clause 15 Consultation with Councils – development with impacts on flood liable land	Where railway station works: <ul style="list-style-type: none"> • impact on land that is susceptible to flooding – reference would be made to <i>Floodplain Development Manual: the management of flood liable land</i>. 	The Proposal is not located on land that has been identified as being flood liable. Consultation with Penrith City Council is not required under this clause.
Clause 16 Consultation with public authorities other than Councils	For <i>specified development</i> which includes consultation with the OEH for development that is undertaken adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> , and other agencies specified by the Infrastructure SEPP where relevant. Although not a specific Infrastructure SEPP requirement, other agencies TfNSW may consult with could include: <ul style="list-style-type: none"> • Roads and Maritime • Sydney Trains • OEH. 	The Proposal is not located adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> . Accordingly, consultation with the OEH on this matter is not required.

5.3 Consultation strategy

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

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

The objectives of the consultation strategy are to:

- provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- raise awareness of the various components of the Proposal and the specialist environmental investigations
- ensure that the directly impacted community are aware of the REF and consulted where appropriate
- provide opportunities for stakeholders and the community to express their view about the Proposal
- understand and access valuable local knowledge from the community and stakeholders
- record the details and input from community engagement activities
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach.

5.4 Public display

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

- public display of the REF at various locations
- distribution of a project update at the station, and to local community and rail customers outlining the Proposal and inviting feedback on the REF
- advertisement of REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
- consultation with Penrith City Council, Sydney Trains, UrbanGrowth, relevant bus companies and other non-community stakeholders.

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

1. Penrith City Council, 601 High Street, Penrith
2. Penrith City Library, 207 Queen Street, St Marys
3. TfNSW Community Information Centre, Ground Floor, 388 George Street, Sydney.

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

5.5 Aboriginal community involvement

The Penrith area forms part of a landscape that was used by the Darug people for many thousands of years prior to European contact. A basic search of the Aboriginal Heritage Information System (AHIMS) database was undertaken on 24 September 2015 and an area within a 200 metre buffer around the station was searched in order to gain information on the archaeological context of the area, and to ascertain whether there are any previously recorded Indigenous sites.

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

The Proposal is located in an area that has been highly modified for a range of uses associated with the railway, and it is considered therefore unlikely that any Indigenous heritage items would be located in or in the vicinity of the Proposal area, due to this past history of disturbance. Therefore, it was not considered necessary to undertake specific Aboriginal consultation.

² <http://www.transport.nsw.gov.au/projects>

³ projects@transport.nsw.gov.au

5.6 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal (refer Figure 1, page 14).

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

Should TfNSW determine to proceed with the Proposal, the project team would keep the community, councils and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community would be undertaken in accordance with a Community Liaison Plan to be developed prior to the commencement of construction.

6 Environmental impact assessment

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

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

6.1 Traffic and transport

A Traffic, Transport and Access Impact Assessment was prepared by GTA Consultants for the Proposal (GTA, 2015). The assessment included a desktop analysis, site inspection (including pedestrian, traffic and parking observation surveys during the weekday AM and PM peak periods with the aim of capturing traffic, commuter and rail customer behaviour), and intersection modelling (using SIDRA Intersection modelling software) to consider potential traffic impacts as a result of the proposed traffic reversal and egress arrangements on the Belmore Street/Station Street and Jane Street/Riley Street intersections. The findings of the assessment are summarised in this section.

6.1.1 Existing environment

Penrith Station

Penrith Station is located between Kingswood Station and Emu Plains Station on the T1 North Shore, Northern and Western Line operated by Sydney Trains and the Blue Mountains Line which is serviced by NSW Trains. It is the 33rd busiest station within the Sydney Trains network, with approximately 15,040 trips per weekday (NSW Bureau of Transport Statistics Barrier Counts, 2014).

The T1 Line provides suburban service connections between Emu Plains or Richmond and Berowra via Central, and the Blue Mountains Line provides intercity services between Bathurst and Central. Services run approximately every 5-15 minutes during peak periods, and up to every 25 minutes during off peak periods. In addition, four NSW TrainLink services stop at Penrith Station (two inbound and two outbound daily).

Penrith Station is busiest during the morning (6:00-9:30am) and afternoon (3:00-6:30pm) commuter peak periods, which reflects its primary use as both a commuter station to/from Sydney/Parramatta and key employment zones. There is also a high level of activity associated with school student movements.

The majority of station facilities are located on the southern side of the station (Platform 3) and include two retail spaces, customer luggage room, male/female toilet, Family Accessible Toilet, ticketing information and sales, wayfinding, locality maps, vending machines and public pay phones. Ticketing machines and real time train information are provided on the pedestrian overpass as well as the southern station entrance. There are also canopies/building awnings across most of the platforms for weather protection.

The key transport facilities around the station are explained in more detail in this section and illustrated in Figure 8.



Figure 8: Existing transport interchange facilities (GTA, 2015)

Customer and public access

Access to station platforms is provided by a combination of street level access (to Platform 3) and overhead pedestrian footbridge and stairs (to Platforms 1 and 2). The pedestrian footbridge is separated into ticketed and public access sections, separated by a barrier. The pedestrian footbridge also has publicly accessible lift access to the local streets with separate lifts to provide access to the platforms from within the paid area of the station.

Access from the north is via Lord Sheffield Circuit and the northern plaza of the Thornton development.

Access from the southern side of the station is through Belmore Street adjacent to Station Street and there are signalised pedestrian crossings provided on all approaches at the intersection of Belmore and Riley Streets. Although the interchange experiences lower traffic volumes and speeds compared with the adjacent Belmore Street, specific pedestrian crossing points across bus travel paths in the interchange are not clearly marked. Site observations noted that there were a number of instances where pedestrians walking between the station entry and Belmore Street were not fully aware of the risks associated with bus movement and activity.

The key desire line for school students walking from/to Penrith Station was between the eastern areas on Belmore Street (towards the south-eastern car parks), while for the general community, pedestrian desire lines link the station entry with commuter car parks to the north, east and west, the bus interchange, the taxi rank, kiss and ride and the local catchment of retail, commercial and school uses (refer Figure 9 which illustrates the potential conflicts with bus movements through the interchange).

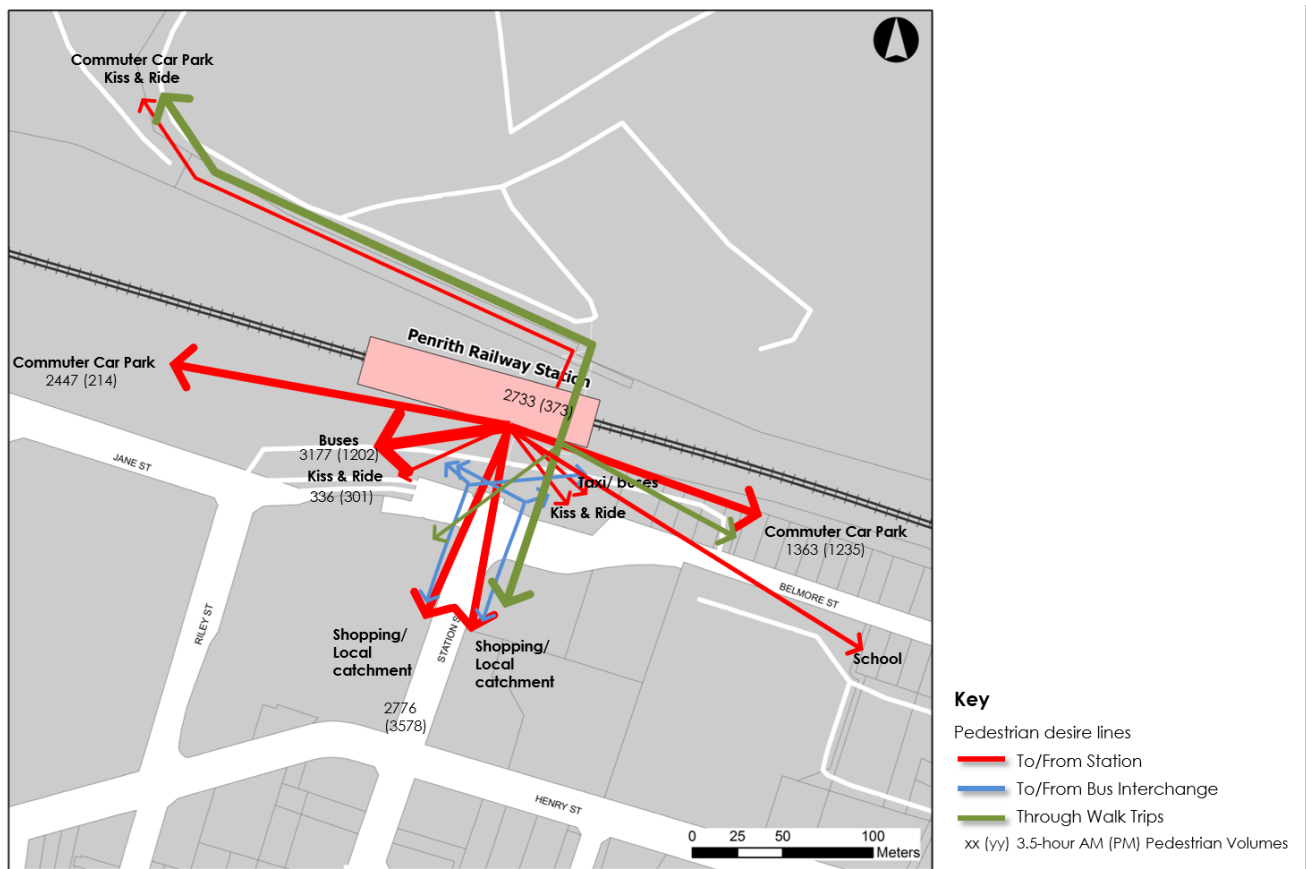


Figure 9: Pedestrian desire lines (GTA, 2015)

Road network and traffic

The access roads to Penrith Station include Jane Street/Belmore Street, Riley Street and Station Street to the south and Lord Sheffield Circuit/Coreen Avenue to the north. These roads are discussed in more detail below.

Jane Street – Belmore Street

Jane Street and Belmore Street run in an east-west alignment parallel to the railway to form a two-way State-classified arterial road configured with two traffic lanes in each direction with localised widening for turn bays, with a sign posted speed of 50 km/hr. The roads form part of the Great Western Highway (Route A44), linking (via North Street) with The Northern Road (Route A9) to the east, and to Mulgoa Road/Castlereagh Road to the west.

In the vicinity of the station, Jane Street/Belmore Street form signalised intersections with Riley Street and Station Street, and a roundabout with the North Street/Lawson Street intersection to the east. The signalised Riley Street intersection provides bus and taxi access into the interchange. Taxis and buses then exit via a driveway east of the station back onto Belmore Street.

To better understand existing traffic flows and movement patterns, GTA conducted sample vehicle turning movement counts during the morning and afternoon peak periods at the Belmore Street/Station Street and the Jane Street/Riley Street intersections, to the south of the interchange. The counts indicate that two-way flows along Belmore Street–Jane Street is about 800 vehicles in the AM peak hour and about 1,200 vehicles in the PM peak hour. The turning movement volumes were used to assess operational traffic impacts of the proposed upgrade; in particular the proposed reversal of bus access and egress arrangements.

Riley Street

Riley Street is a one lane, one way road extending south to north with two additional lanes for parking, buses and taxis. It is used by a number of buses serving suburbs to the west, including the Lower Blue Mountains to access the interchange. Riley Street has a sign posted speed limit of 40 km/hr and is a designated High Pedestrian Activity Area which is as a result of the road bisecting the Westfield Shopping Centre and associated parking, bus and taxi activity. At the intersection with Jane Street, egress ramps from the Westfield Shopping Centre's basement car parking straddle both sides of the single-lane road.

Station Street

Station Street is a local two-way road with two lanes in each direction, linking Penrith Station with Jamison Road and has a sign posted speed of 40 km/hr being within the designated High Pedestrian Activity Area. There is no vehicle access from Station Street into the interchange however this is a key intersection for pedestrians accessing the station and interchange.

Lord Sheffield Circuit and Coreen Avenue

Lord Sheffield Circuit is a local road within the Thornton development that comprises a one way loop (one travel and one parking lane) around the northern commuter car park and is a designated 10 km/hr Shared Zone in this area. Access to Lord Sheffield Circuit is from Combewood Avenue and Coreen Avenue to the north.

Coreen Avenue runs in an east-west orientation about 600 metres north of the rail corridor with a posted speed limit of 60 km/hr in this section. It is a regional road with generally one travel lane and a kerbside parking lane in each direction and provides access to the north side of Penrith Station and associated commuter car parking facilities.

Bus operations

The interchange at Penrith Station is a key bus facility serving the Penrith region and beyond. Bus vehicle entry is via the signalised intersection of Jane Street/Belmore Street and Riley Street and the exit via a driveway onto Belmore Street to the east of Station Street. Currently, no bus services are provided to the north of the interchange.

Bus services are provided by two bus companies

- **BusWays** operate the majority of services with 19 routes that connect Penrith Station to suburbs in the north, east and south, as well as to interchange locations at St Marys and Mt Druitt
- **Blue Mountains Bus Company** operates four routes between Penrith and Springwood and Emu Heights.

Night Ride services, to replace trains, also run each night between Penrith and Town Hall.

The interchange includes eighteen bus stands, as well layover space which is located to the west of the station. The majority of bus services operated by BusWays use stands 1-12 to the west of the station entrance to pick up customers, however bus stands 16, 17 and 18 to the east of the station entrance are also utilised by BusWays.

The Blue Mountains Bus Company utilises bus stands 13, 14 and 15 in front of the station entrance. The bus interchange is also used by buses for layover.

Bus shelters, lighting and security surveillance is provided at the interchange, although current seating is considered inadequate (capacity and design). A key issue with the layout of the current bus interchange is that the dispersion of bus stands could potentially confuse customers not familiar with the allocation of bus routes in the interchange. Wayfinding for unfamiliar customers looking for a particular bus route or bus stand is not readily visible, and there is the likelihood that some customers would need to travel back to their bus stand after confirming information from the other stands.

Bus activity tended to be congested at the interchange between 7:30-8:00am, and between 8:30-9:00am as it related to the school peak activities. However, no overflow of buses into Belmore Street/Jane Street was observed at any time during the site inspection.

The right turn bay from Belmore Street westbound into the bus interchange at the Riley Street intersection was found to reach its capacity (three buses) in one instance between 8:30-9:00am, causing a bus to block westbound traffic. Other than this, the signalised bus access to the interchange appeared to be operating within acceptable limits.

Other site observations by GTA noted that as the interchange is also used by taxis to access the taxi ranks, during busy periods an overflow of the highly utilised taxis creates a blockage within the interchange and such blockages were observed during both the morning and afternoon peak periods at 7:30am and 4:50pm.



Figure 10: Penrith bus interchange layout (Source: BusWays website)

Taxis

Taxi access and egress is shared with buses, i.e. entry on Jane Street opposite Riley Street, and exit via Belmore Street east of Station Street.

There are three designated taxi zones on the southern side of the station with a combined capacity for approximately 13 taxis (refer Figure 8). However, the demand for taxi spaces in the ranks within the interchange was observed to exceed capacity during a number of instances between 8:00-9:00am, as well as in the evening, during which up to 14 taxis queuing for customers were observed in the interchange. The taxi zones were also observed to accommodate truck loading activities.

Kiss and ride and timed parking facilities

Kiss and ride and timed car park areas are currently provided around the station, including:

- approximately 15 kiss and ride spaces (signposted with a 15 minute parking restriction) are provided along the western end of Belmore Street in a dedicated lane
- timed parking for 25 vehicles immediately south-east of the station (15 minute parking restricted during peak times)
- approximately 13 kiss and ride spaces provided outside the multi-storey car park north of the station in two zones.

Informal kiss and ride activity has also been observed within the south-eastern commuter car park, and on the north side, along the curve between each existing kiss and ride zone.

Site observations indicated that the kiss and ride zone on Belmore Street was well utilised during both the weekday AM and PM peak periods. However, while it was able to accommodate most kiss and ride demand, there were a few instances when vehicle demand exceeded available capacity, notably around 7:00am, 7:40am and 8:00am and 3:30pm and 3:45pm. There was moderate usage of the timed car park east of the station observed during the site inspection. Also the eastern commuter car park was also used informally for kiss and ride.

Kiss and ride activity in the north was also observed in the 'No Stopping' zone in the bend of the road between the formal kiss and ride zones, which is likely because it is the closest point to access the station. UrbanGrowth are planning to establish additional kiss and ride facilities to cater for the growing area north of the station.

Bicycle facilities

Penrith Station requires a minimum of 30 bicycle parking spaces, and currently there is capacity for 63 bicycles, with facilities provided on both sides of the station including:

- 13 bicycle racks on the southern side of the station in the forecourt area
- 32 bicycle lockers adjacent to the south-eastern commuter car park also on the southern side of the station
- ten bicycle racks located within the multi-storey commuter car park on the north side of the station
- eight bicycle lockers located within the multi-storey car park.

There are no designated cycle routes in the immediate vicinity surrounding Penrith Station and the nearest designated cycle route is the on road/shared lane facility along Henry Street, one block to the south of the station. However, *Sydney's Cycling Future* (TfNSW, 2013c) identifies the need to complete the cycle network within Penrith City Centre, to link with regional cycle routes that would serve the wider Penrith region, including the Nepean River Green Bridge and the Penrith to St Marys corridor along the Great Western Highway (partially completed). Penrith City Council has also proposed to provide an off-road shared path along Jane Street between Castlereagh Road and Penrith Station.

The NSW Government is also implementing the Bike and Ride Initiative (a separate program to the Transport Access Program), and Penrith Station has been identified as a future site for improved bicycle facilities.

Commuter parking and motorbike parking

A summary of car parking around the station is provided below (refer Figure 11):

- **Car Park 1:** accessed via Belmore Street with capacity for approximately 347 vehicles
- **Car Park 2:** the Soper Place car park, accessed via Lawson Street, with capacity for approximately 125 vehicles
- **Car Park 3:** a combination of at-grade car parking and a multi-level car park (three levels) at the northern end of the station, with a total of about 1,000 untimed parking spaces
- **Car Park 4:** parking with 25 spaces restricted to 15 minutes between 6:30-9:30am and 3:30-7:30pm Mondays to Saturdays with untimed parking outside of these times (also discussed in timed parking facilities above)
- **Car Park 5:** untimed at-grade car park accessed via Jane Street, with capacity for approximately 445 vehicles (includes some staff parking)
- **Car Park 6:** untimed at-grade car park with capacity for approximately 47 vehicles.

There is also accessible parking for eight vehicles within Car Parks 1 and 5, and for 30 vehicles within Car Park 3.

Motorbike parking spaces are also provided with seven spaces located within the timed car park south-east of the station (Car Park 4), 11 spaces within the western car park (Car Park 5)

and nine spaces located on the ground floor of the multi-storey car park north of the station (Car Park 3). During the site inspection it was observed that these were not at capacity.



Figure 11: Car parks around Penrith Station (GTA, 2015)

6.1.2 Potential impacts

a) Construction phase

Construction routes

The surrounding road network is well established and would provide direct access to/from the site. Figure 12 illustrates the likely access routes to be used by construction vehicles to access the Proposal construction site, making use of the existing interchange facilities. These routes are approved B-double routes (Roads and Maritime), and link to the wider regional Roads and Maritime approved road network. These routes include:

- Great Western Highway (Jane Street/Belmore Street)
- M4 Western Motorway
- Mulgoa Road
- Castlereagh Road
- The Northern Road.

Locally, the main construction access route to/from the northern end of the site is proposed via Combewood Avenue, linking with Coreen Avenue and Castlereagh Road. The main construction vehicle access to/from the southern end of the station is proposed via Belmore Street and Jane Street to link with Mulgoa Road in the west and The Northern Road in the east, as shown in Figure 13.

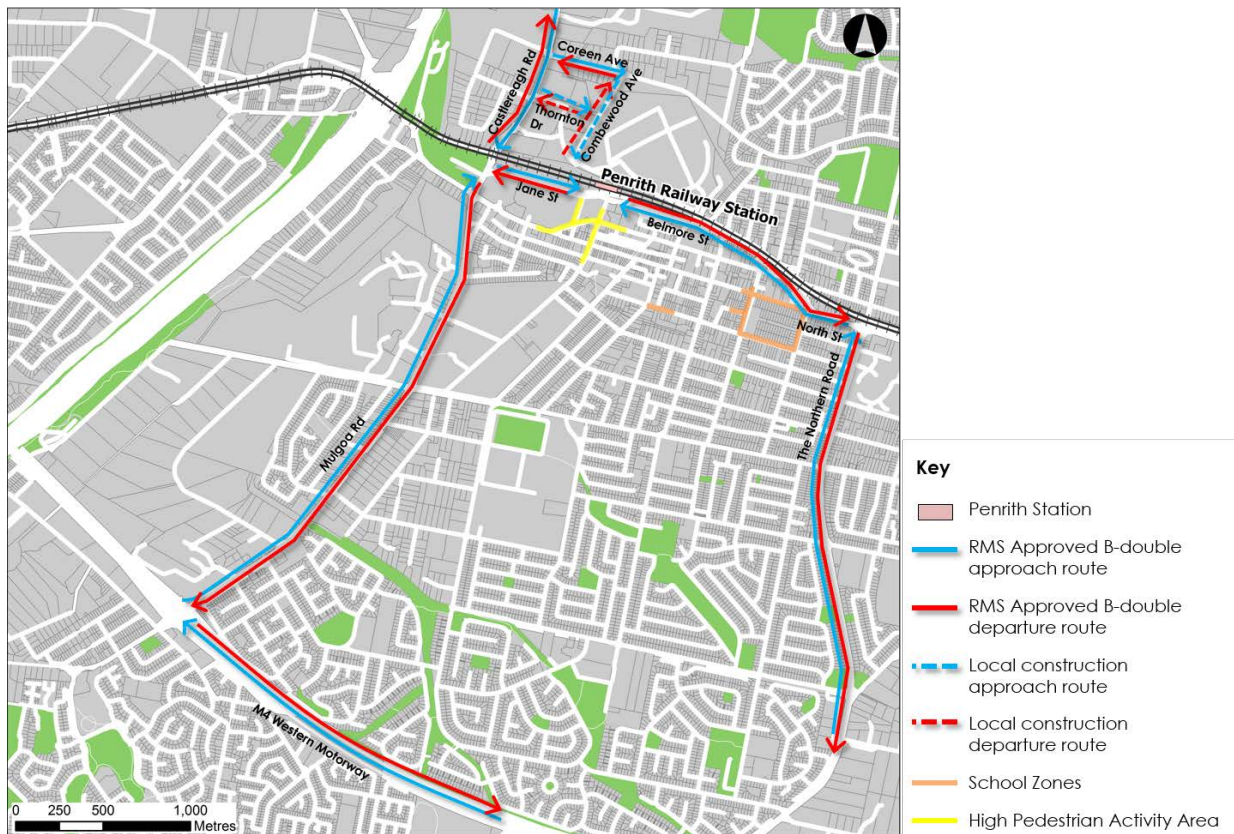


Figure 12: Potential construction vehicle routes (GTA, 2015)

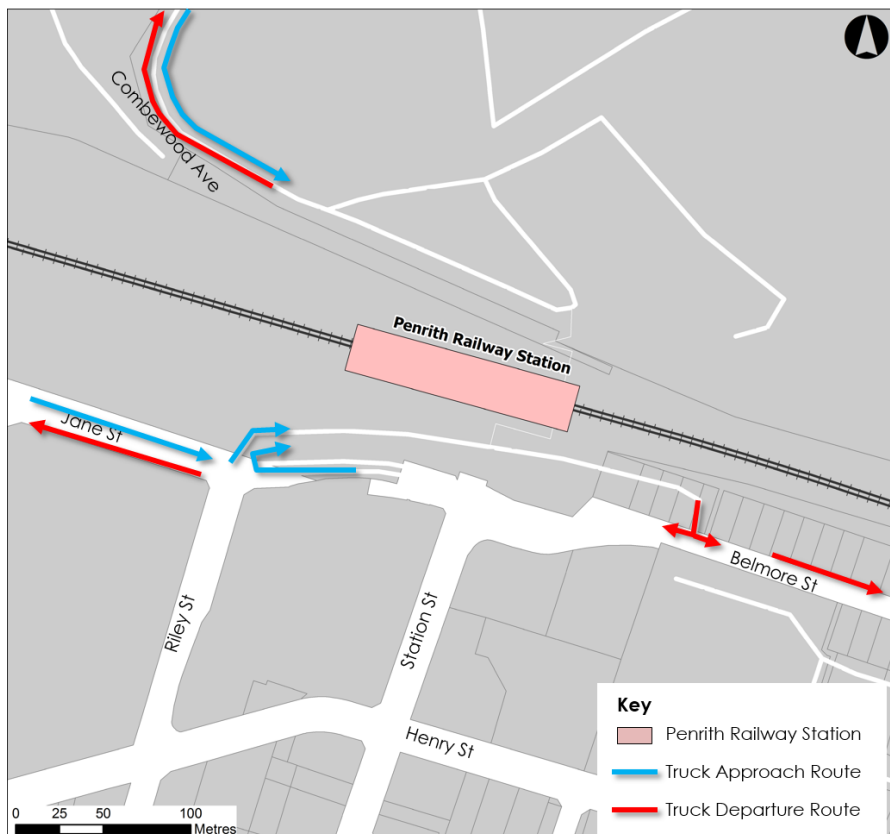


Figure 13: Proposed local construction vehicle access/egress

Customer and public access impacts

The following impacts to pedestrians and customers are anticipated to arise from construction activities:

- potential for increased congestion during peak periods resulting from constrictions on the existing overhead pedestrian footbridge and along walkways in the station forecourt
- the likelihood of longer walking distances resulting from diversions in the interchange area associated with construction works
- potential higher levels of platform congestion as a result of areas being temporarily cordoned off
- potential for higher road safety risk levels associated with construction vehicle/alternate interchange arrangements and pedestrian interaction.

These impacts are considered to be manageable, with a CEMP (and Pedestrian Management Plan) to be prepared by the Contractor outlining how the safety and congestion issues would be addressed.

Traffic impacts

Traffic generated by construction activities includes construction worker light vehicles (including utility vans), as well as heavy vehicles for periodic delivery and removal of materials. Vehicle types and sizes would vary depending on the required use, but typically include medium and large rigid vehicles and articulated vehicles for import of bulk materials or spoil removal, as well as concrete trucks. The amount of fill material or spoil would be minor as the site is (for the most part) level and paved. Specific oversize vehicles may be required for precast elements such as pedestrian footbridge spans and pre-fabricated sections/structures.

The traffic generated by construction activities would typically involve 4-6 movements per day to access the northern side of the station (for plant and equipment) and 6-8 movements to access the southern side, and approximately 18-22 movements per day for works in the interchange. There would also be some light vehicles movements for staff/contractors (10-12 movements per day). During weekend track possessions this is likely to increase to approximately 80-92 movements.

These levels of traffic impacts during construction are expected to be manageable and would have minimal impacts on existing traffic conditions. Construction site access via the north to the construction compound area/s would require access via Combewood Avenue from Coreen Avenue or Castlereagh Road – Thornton Drive to Lord Sheffield Circuit. Access via Sydney Smith Drive through residential land uses in Thornton should be avoided. Interfaces with local traffic movements would also need to be managed in this regard.

Access to private properties surrounding the station would be maintained during construction.

Bus operations

Details of the proposed construction staging for the Proposal, in particular the construction of the reconfigured bus and taxi interchange area are still currently being developed however, key impacts of construction on bus operations may include:

- potential congestion at the bus interchange due to reduced operational and circulation areas for bus access and for passenger set-down and pick-up, as well as the requirement for temporary bus shelters and other customer facilities
- potential access and egress difficulties (turning manoeuvres) for buses, depending on configuration of temporary bus interchange arrangements
- potential for confusion among bus customers as a result of bus interchange operational areas and access arrangements shifting from one construction stage to the next
- difficulties in the transition period when the upgraded bus interchange is used with current bus flow arrangements, prior to construction completion.

Depending on construction staging, it is possible that temporary stairs may need to be provided to link the new overhead concourse with temporary bus bays adjacent to the station side of the interchange.

Taxi operations

The construction of the interchange area would require the relocation of the taxi ranks to the existing Belmore Street-Jane Street kiss and ride area in order to remain operational (i.e. establishment of the new taxi stand which would have capacity for approximately eight vehicles). The key impacts during this construction period would likely include:

- potential traffic impacts of taxi queues that are longer than the allowed capacity (which could result in queuing to the Riley Street/Jane Street intersection and potentially impacting intersection operations)
- taxi access to the rank from Station Street would be constrained. Taxis coming from the south and heading to the rank would need to access via Riley Street.

The impacts of construction activities on taxi operations are considered manageable, subject to appropriate taxi queue managements systems being implemented.

Kiss and ride and timed parking facilities

The construction activities and staging would temporarily displace existing kiss and ride activity from the current location while it is relocated to its new position at the eastern end of Belmore Street.

The works would also require the removal of the timed car park immediately south-east of the station (i.e. Car Park 4 with capacity for 25 vehicles) to allow for the upgraded interchange and which would also reduce timed parking facilities used for kiss and ride during construction (and operation).

Alternative temporary kiss and ride areas for peak periods during construction (e.g. within the south-eastern commuter – Car Park 1) would be investigated as part of the CEMP.

Bicycle facilities

The Proposal would require the removal of the 13 bicycle racks from the southern plaza to allow for the upgrade works, however there is sufficient alternate bicycle parking provided around the station during construction (a review of the available bicycle lockers in October 2015 indicated there were 14 lockers available).

Commuter parking and motorbike parking

The following parking impacts are likely to occur during construction:

- partial loss of parking at the at-grade car park north of the station (Car Park 6) to allow for a construction compound
- net loss of approximately 20 parking spaces in the south-western car park (Car Park 5) – approximately 45 parking spaces would be removed to allow for the long-term bus layover however 25 replacement parking spaces would be constructed prior to bus layover works so that parking impacts are minimised during construction
- permanent removal of seven motorbike parking spaces within the timed car park south-east of the station (Car Park 4) and 11 motorbike parking spaces within the western car park (Car Park 5).

The anticipated parking impacts associated with construction would be a combination of minor overspill of commuter parking and staff parking demand to other areas and construction vehicle parking in long-term parking areas. This would impact existing spaces within the town centre and within residential streets in the Thornton development.

Moreover, if similar levels of service for bus and taxi operations are to be maintained then this may require the temporary conversion of other commuter car parking areas for bus and/or taxi operations, which would further decrease available commuter parking.

b) Operational phase

The Proposal includes upgrades and improvements to the existing Penrith Station and interchange pedestrian access, in particular reducing the potential conflicts between pedestrian desire lines and bus and taxi movements through the interchange, resulting in lower road safety risk levels for pedestrians. A summary of the operational traffic, transport and access impact is summarised below.

Customer and public access

The proposed pedestrian facilities, including the extended pedestrian footbridge, new paid concourse, new lifts, new stairs and new canopies would present pedestrian benefits, (particularly in improving accessibility), as well as improving customer experience and amenity by providing new and upgraded facilities, not only for transport customers, but for the general public.

Figure 9 outlines the existing pedestrian desire lines between the main transport interchange trip generators. The extension of the pedestrian footbridge and new paid concourse would eliminate several potential conflicts between these pedestrian desire lines and bus/taxi movements through the interchange, resulting in lower road safety risk levels for pedestrians.

The relocation of the paid concourse to a new area east of the pedestrian footbridge, would allow for greater capacity on the pedestrian footbridge (as unpaid access) to accommodate future pedestrian flows; and would also positively contribute to pedestrian circulation and amenity.

It is noted that customers who are currently using Platform 3 would need to traverse two flights of stairs and a corresponding longer walking distance to access the southern station forecourt. However, this negative impact is offset by the improved road safety and reduced potential conflicts with bus and taxi movements through the interchange.

The Proposal has been designed to cater for a daily patronage of 30,915 (which is the 2036 daily patronage forecast + 15 per cent) and which equates to an approximate doubling of 2014 patronage levels. Therefore, a focus of the Traffic, Transport and Access Impact Assessment

was to consider if the proposed pedestrian bridge would adequately cater for the projected increase in customers in terms of pedestrian flows.

To assess the pedestrian Level of Service (LoS), GTA Consultants adopted Fruin's Pedestrian Flow Rate criteria, which is the number of pedestrians that pass a point during a specific period of time for a given level of service, which is a qualitative measure of pedestrian comfort and crowding tolerance level. Fruin defined six levels of crowding for queuing areas, walkways and stairways, and these are expressed in terms of Levels of Service (LoS) which range from 'A' (best level) to 'F' (worst level).

The LoS for the pedestrian footbridge (all as unpaid access) with a minimum clear width of four metres has been assessed as 'A' and would improve pedestrian flows and interaction in and around the station. Further assessment of potential 'pinch points' indicated that pedestrian passageways (stairs, ticket barriers and walkways) would operate at LoS 'C' or better for a 2036 + 15 per cent demand levels.

Traffic generation and road safety

South side

Given that the Proposal provides a higher level of station accessibility and usability at Penrith, the improved commuter experience and upgraded facilities are likely to attract greater commuter use. As a result, it is likely that traffic activity would marginally increase, but is unlikely to have any significant impact on the surrounding road network.

One key impact the Proposal would have on traffic flows is the revised bus access arrangements. Currently, the access/egress arrangements of all buses servicing interchange can be categorised into four main types:

- access via northbound Riley Street and egress via southbound Station Street
- access via northbound Riley Street and egress via westbound Jane Street
- access via eastbound Jane Street and egress via westbound Jane Street
- access and egress via Station Street.

The revised bus interchange circulation will alter access arrangements and have potential implications on the Belmore Street/Jane Street – Riley Street intersection and the Belmore Street/Station Street intersection, as shown in Figure 14, which also presents a summary of the potential impacts of the bus interchange access/egress changes on the Riley Street and Station Street intersections.

There are several external factors that could further impact traffic flows at these two key intersections. These include potential implications for taxi/kiss and ride activity, other Council proposals in relation to Penrith City Centre, as well as potential regional traffic flow changes resulting from the upgrade of the Jane Street/Mulgoa Road intersection to the west of the interchange.

However, for the purpose of providing a comparative analysis of the potential bus route change impacts, a high-level assessment was undertaken for the Belmore Street/Station Street and the Jane Street/Riley Street intersections.

The assessment considered current turning movement volumes through the two intersections, as determined from sample traffic counts undertaken during the AM and PM peak hours in August 2015, as well as estimated peak hour movements for each bus route servicing the interchange, from a review of bus timetables. Figure 14 illustrates the changes resulting from the reversal of bus movements through the interchange and summarises the potential traffic impacts that could arise for each group of bus routes.

The overall LoS for the intersections would generally remain within existing levels, except for the Jane Street/Riley Street intersection in the PM peak, which would operate from LoS B to LoS C as a result of reversal in bus direction (buses now approaching intersection and incurring a delay). However, all other intersection approaches remain consistent with existing levels of service.

Based on the assessment, the reversal of bus interchange movements associated with the Proposal would have minor impacts on traffic flows during the peak periods assessed. Notwithstanding this, it is envisaged that further detailed analysis of intersection operation would be conducted as design development for the Proposal progresses. The analysis would address potential reconfiguration options for the Belmore Street/Station Street and Jane Street/Riley Street intersections, including changes to the existing Jane Street/Riley Street right turn bay into the interchange (which would no longer be required), as well as potential signal phasing changes to incorporate bus priority.

North side

Traffic impacts of the Proposal on the north side of the interchange would primarily be focused on Lord Sheffield Circuit, Combewood Avenue, Sydney Smith Drive and its intersection with Coreen Avenue.

It is not known at this stage how much additional traffic the Proposal would generate on the north side of Penrith Station as a result of the upgrade. However, due to the residential nature of the area to the north, only minor additional traffic volumes accessing the station are anticipated as a result of improvements to the station plaza. Increased activity on the northern side of Penrith Station would largely be a function of an increasing residential population, with associated park and ride and/or kiss and ride commuter demands.

Existing Access/ Egress	Diagram of Existing vs Proposed Access/ Egress	Potential Traffic Impacts
<ul style="list-style-type: none"> ○ Access via northbound Riley Street ○ Egress via southbound Station Street 		<ul style="list-style-type: none"> ○ Negligible impacts on Riley Street, as signal phasing would likely be comparable. ○ Potential impacts on Station Street, with increased right turn demand from the interchange.
<ul style="list-style-type: none"> ○ Access via northbound Riley Street ○ Egress via westbound Jane Street 		<ul style="list-style-type: none"> ○ Potential impacts on Riley Street, with additional right turn egress phase required. ○ Negligible impacts on Station Street, phasing not impacted.
<ul style="list-style-type: none"> ○ Access via eastbound Jane Street ○ Egress via westbound Jane Street 		<ul style="list-style-type: none"> ○ Potential minor impacts on Riley Street, with additional right turn egress phase required. ○ Negligible impacts on Station Street, phasing not impacted.
<ul style="list-style-type: none"> ○ Access and egress via Station Street 		<ul style="list-style-type: none"> ○ Potential improvements for Riley Street, with right turn phase from Jane Street potentially removed. The right turn bay could also potentially be removed. ○ Potential impacts on Station Street, with additional right turn demand for both inbound and outbound directions.

Figure 14: Bus access and egress arrangements – existing vs proposed (GTA, 2015)

Bus facilities

The Concept Design Report (AECOM, 2013) assessed the future requirements for bus interchange capacity at Penrith Station, based on an analysis of existing timetables, and incorporated the school bus requirements from consultation with bus operators. The assessment indicated that the maximum number of buses per hour at the bus interchange is approximately 45. The proposed configuration under the Proposal would adequately address the forecasted bus interchange requirements.

The removal of bus and taxi conflicts with pedestrian flows also positively contributes in providing better opportunities for more efficient bus operations at the interchange.

The change in bus access arrangements and the bus directional flow through the interchange could potentially have minor impacts on bus travel times as a result of delays at access intersections, arising from the revised turning manoeuvres required. There are also potential difficulties with tighter turning manoeuvres required for bus access and egress. These potential impacts are expected to balance out, with opportunities for overall travel time savings with the Proposal to provide bus priority at the signalised access intersections.

It is acknowledged that there is the potential for two bus stops to the north of the station to be established as part of the Thornton development and this would need to be reviewed in line with future bus plans for the region, and integrated with planning for the Thornton development. However, the Proposal does not preclude these bus facilities, should a review indicate that they would be required.

Taxi facilities

The Proposal requires the relocation of the taxi rank (comprising three taxi areas in the interchange) to one rank on the western side of Belmore Street, which is currently used as a kiss and ride zone. The new area would have capacity for approximately eight vehicles (as the other section of the kerbside zone has been nominated for use by the Blue Mountains Bus Company buses).

A positive impact of this relocation is that the taxi rank would be consolidated into a single rank, compared with the three existing zones that would allow for more efficient taxi operations.

However the following potential issues have been identified:

- reduction of capacity from 13 (existing) to eight (proposed) with no provision for taxi layover or additional space for taxi overflow during peak periods
- potential minor to moderate traffic impacts if taxi queues are longer than the proposed capacity (which could result in queuing to the Riley Street/Jane Street intersection and potentially impact intersection operations)
- constrained access to the taxi rank from the east (e.g. Belmore Street and Station Street) and taxis coming from this direction would need to loop via the Henry Street/Riley Street intersection to access the rank.

Further consultation with the NSW Taxi Council and Penrith City Council would be undertaken during the next phases of design in order to ascertain the adequacy of the proposed taxi rank capacity and identify any management measures that could be considered to accommodate potential taxi overflow. Investigation into other measures to mitigate the potential overflow issues (e.g. location/s for an alternate/overflow rank and/or options to increase capacity of the proposed rank) would also be undertaken during the next stage of design.

Kiss and ride and timed parking facilities

The Proposal would involve the relocation of the existing kiss and ride facility from the western end of Belmore Street/Jane Street (which would be converted to a bus stand to service the Blue Mountains Bus Company and taxi rank) to a location east of the old Station Master's Residence on Belmore Street. This would reduce the kiss and ride rank capacity from the existing 15 spaces to approximately seven spaces.

Further, the removal of the existing peak-period timed car park immediately south-east of the station (Car Park 4 – which is currently also used as a kiss and ride area), would reduce the informal kiss and ride capacity at the interchange.

Site observations indicate that current levels of kiss and ride demand at the existing rank on Belmore Street/Jane Street can reach as high as 20 or more at any given time, particularly around the time of train arrivals in the PM peak. The Proposal would reduce the kiss and ride zone capacity which would result in negative impacts, particularly during the PM peak, when typically cars stay at the rank longer to pick up passengers.

To mitigate the reduction in kiss and ride capacity, opportunities to formalise timed parking in the south-eastern commuter car park (Car Park 1) would be investigated during detailed design (i.e. 15 minutes during peak periods – in a similar manner to the existing timed car park which is used as a kiss and ride area).

No changes are proposed to kiss and ride facilities to the north on Lord Sheffield Circuit, however it is acknowledged that UrbanGrowth are planning to establish additional kiss and ride facilities to cater for the growing area north of the station.

Bicycle facilities

Bicycle access to the interchange is not expected to be impacted by the Proposal.

The Proposal would require the removal of the bicycle racks (with capacity for 13 bicycles) from the southern plaza that would be salvaged and returned to Penrith City Council. However the existing bicycle lockers (with capacity for 32 bicycles) on the southern side of the station would not be impacted, nor would any of the bicycle facilities to the north of the station which would, in the interim, provide the minimum required bicycle facilities for the station and interchange.

The NSW Government is also implementing the Bike and Ride Initiative, which is a separate program to the Transport Access Program and Penrith Station has been identified as a future site for improved bicycle facilities. A bike shed with capacity for 30 bicycles would be provided at Penrith Station, which would likely be situated at the western end of Belmore Street (subject to a separate planning approval). This Proposal would not preclude the development of such a facility in the future.

Commuter parking and motorbike parking facilities

The Proposal is not expected to significantly increase commuter car parking demand.

Approximately 45 commuter parking spaces in the south-western car park (Car Park 5) would need to be removed to allow for the new long-term bus layover however 25 replacement parking spaces would be constructed prior to bus layover works so that parking impacts are minimised and would result in a net loss of approximately 20 parking spaces during operation. The reduction of commuter car parking supply at the interchange in favour of other increasing capacity and accessibility for other higher priority modes is considered to be an appropriate outcome.

Motorbike parking (for seven motorbikes) in the south-eastern timed car park would be removed as part of the Proposal along with parking for 11 motorbikes in the western car park, however motorbike parking available to the north of the station would not be affected. While

not observed during the site inspection to be at capacity, options to relocate some of the motorbike parking on the southern side of the station would be investigated during detailed design.

Property access

The Proposal is not expected to have any impact on existing access to properties in the vicinity of Penrith Station.

6.1.3 Mitigation measures

Further consideration would be given during detailed design to interactions between pedestrians/cyclists (to avoid potential congestion/crowding) along with more detailed analysis of intersection operations. Further, and to address the impacts discussed in this section, opportunities to formalise timed parking in the south-eastern commuter car park for kiss and ride would be investigated during detailed design along with investigating options to address potential taxi overflow issues, and relocate some motorbike parking.

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

- procedures for preparing and implementing Traffic Control Plans (TCPs) and in particular for detours and traffic control to manage temporary disruptions on local roads
- procedures for preparing and implementing Pedestrian Management Plans (PMPs) in particular for arrangements/detours to maintain access to and from the station at all times, and safely manage pedestrian and cyclist route changes/diversions
- measures, including but not limited to:
 - safely manage potential impacts to the operation of buses , taxis and kiss and ride (including details of alternate locations/facilities, signage etc.)
 - limit temporary parking losses and provide alternative area/s for kiss and ride
 - maintain private property access unless otherwise agreed
- final construction traffic approach and departure routes
- location of access to and from the local road network and contractor parking
- scheduling of works/deliveries to avoid peak times (e.g. school pick up/drop off times, where practicable)
- details of traffic controllers, construction signage and other community notification.

Refer to Table 15 for a list of proposed mitigation measures.

6.2 Urban design, landscape and visual amenity

A Visual Impact Assessment was undertaken by Envisage Consulting for the Proposal (Envisage Consulting, 2015). The findings of this assessment are summarised in this section. The assessment included desktop analysis, site inspection and creation of photomontages to provide an indication of what the Proposal may look like once complete.

6.2.1 Existing environment

Visual character

The dominant character of the surrounding area is highly urban on the southern side, consisting of the main commercial area of Penrith City Centre that is dominated by the large Westfield Shopping Centre across Belmore Street/Jane Street to the south of the station. This shopping centre has one of its main entrances along Station Street, creating strong pedestrian movement from this location to the station.

The side of the Westfield Shopping Centre that faces toward the station and bus interchange, along Jane Street, is dominated by blank walls and car park driveways to the centre, with some softening provided by existing trees. The interchange on the opposite side is separated by a visually strong row of native Tallowood trees which have a natural character that serves to greatly increase the potential amenity of this facility.

The station itself displays a mix of heritage buildings and the more contemporary structure which houses the concourses and station access. This structure is rectangular and mostly grey in colour, and comprised of materials such as steel, concrete and glass.

Overall the character of the southern side of the station is diminished by the rather haphazard format of the area immediately around the station entrance. This area suffers from a dominance of road and transport infrastructure which dissects the zone between the station and Belmore/Jane Streets, with pedestrian movement and public space secondary. The area around the old Station Master's Residence is physically separated from the station by roadways and is quite hidden by the existing vegetation which has an important role in the building's setting and is likely linked to its heritage. The Platform 3 heritage building along the southern station side is partially obscured by the existing bus interchange.

The developing area of Thornton on the northern side has a character which is currently constantly changing as the new housing, parklands and commercial areas are completed. The northern plaza comprises a generous paved area and landscape planting.

Visibility

Penrith Station has a relatively confined area of visibility due to the flat landform and surrounding tall buildings and trees which serve to obstruct many potential views.

The potential area of visibility includes the main shopping area along Station Street near Westfield Shopping Centre, Belmore Street and areas to the east, the existing interchange, Jane Street and areas further west, the northern plaza (under construction) and Thornton development and the station itself.

From the existing pedestrian footbridge, there are opportunities for views to the west toward the Blue Mountains. These views are particularly noteworthy as the mountains represent a local natural landmark that both orientates viewers and is valued for its aesthetics.

6.2.2 Potential impacts

a) Construction phase

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

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

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

b) Operational phase

Visual impact assessments generally focus on two main types of visual effects or impacts:

- **effect on visual character** – which considers the visual changes to the character of the general area and takes into account the magnitude of the change and aspects such as the difference in the scale of new structures, compatibility with existing visual character, contrast in colour, heritage considerations, vegetation loss and change to any views to landmarks or vistas
- **effect on key viewpoints** – the general relationship of the two factors of visual sensitivity and the magnitude of visual change together determine the likely effect, or ‘level of impact’ on existing key viewpoints (and can range from insignificant, low, moderate, high to very high).

Effect on visual character

The upgraded pedestrian footbridge would comprise a new roof which would be several metres lower than the existing and designed as a contemporary, visually lightweight element that complements the surrounding Penrith City Centre.

At the southern end there would be a new wide staircase that would connect to the southern plaza and lead pedestrians to and from the main shopping centre and commuter car parks. This entry has been designed as a key focal point that would integrate the upgraded bridge structure into the surrounding public space and urban environment. It would link the two sides of the rail corridor and draw together the urban uses on each side.

As is intended, the upgraded bridge structure, and its entrance stairs would be part of a modern station facility visually delineated from nearby heritage elements such as the old Station Master’s Residence and heritage platform buildings. The attractiveness of the setting of the old Station Master’s Residence would improve with planned high quality landscape improvements around the building and removal of the existing security fencing. The planned retention of the existing large Pepper Tree (tree 10) near the building (a likely remnant of the former garden) would also retain this important visual backdrop which gives both context and amenity to the building.

The upgraded interchange has been designed to reduce unnecessary structures and infrastructure and open up views of the Platform 3 heritage building which greatly contributes to the visual character on the southern side of the station (i.e. reducing the number of shelters and locating in locations that are considerate of the existing heritage buildings). The reconfiguring of the existing bus interchange would allow for a more generous and consolidated public space to be created between the interchange and Jane/Belmore Street. This space would greatly improve the attractiveness of the area around the station, transforming it to a far more pedestrian environment with pleasant pathways, planting, shade and seating.

On the northern side the new stairs would descend into the northern plaza as part of the Thornton development. From this side the stairs and upgraded bridge structure would be less visually obvious as these built elements would sit within the setting of the planned tall commercial buildings on this side.

As viewers become more familiar with the changes, it is suggested that the new features of the station and bus interchange would become an integrated and compatible part of the overall character and one appreciated as a modern public facility. The new public space on the southern side would be particularly transformational, changing the station into a pedestrian gathering space and new focus for this part of Penrith, and having a positive effect on the visual character.

Effect on key view points

Envisage Consulting has undertaken an assessment from seven different receiver locations around the station to determine the overall visual impact from each location (ranging from insignificant, low, moderate, high or very high). The location of the receivers included in the assessment is shown in Figure 15 and the results of the assessment are summarised in Table 6.

To inform the visual assessment, digital photographs were taken during the course of the fieldwork from two different locations to illustrate existing views in the vicinity and then a model of the Proposal was rendered to show indicative elements of the Proposal, where relevant to provide an indication of the potential visual changes. Refer to Figure 16 – Figure 21 for existing and proposed views.

The majority of receiver locations, including residential dwellings, road corridors and public spaces around the station precinct have been determined to have an overall low-moderate visual impact with regard to the Proposal and its associated infrastructure.

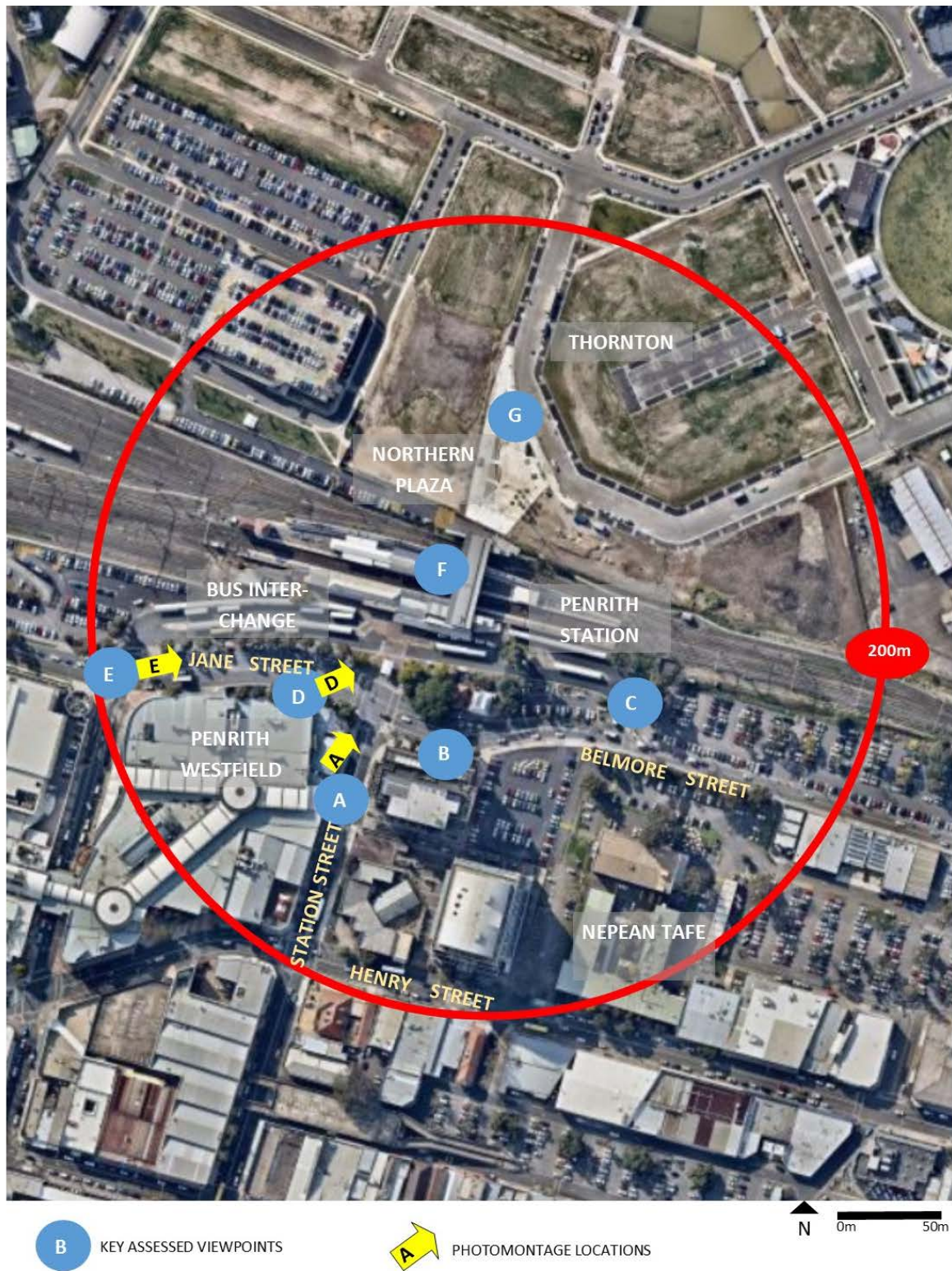


Figure 15 Key view points and photomontage locations (Envisage Consulting, 2015)



Figure 16 Existing view from Station Street looking north (Envisage Consulting, 2015)



Figure 17 View of Proposal from Station Street looking north (Envisage Consulting, 2015)

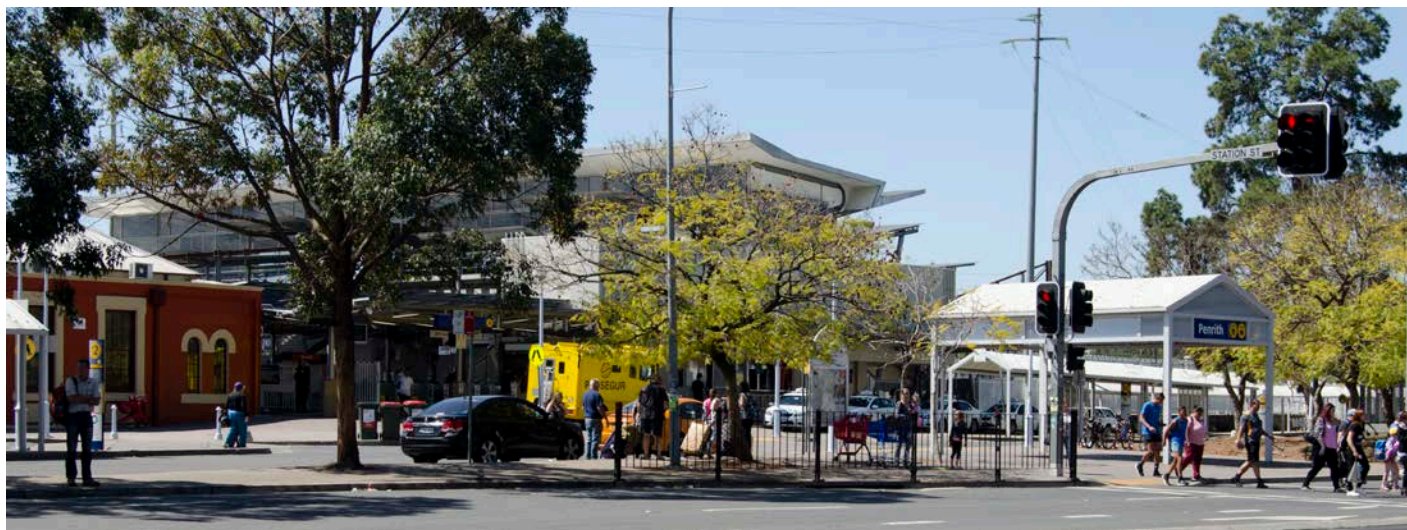


Figure 18 Existing view from Jane Street looking north-east (Envisage Consulting, 2015)



Figure 19 View of Proposal from Jane Street looking north-east (Envisage Consulting, 2015)



Figure 20 Existing view from western end of Jane Street looking east (Envisage Consulting, 2015)



Figure 21 View of Proposal from western end of Jane Street looking east (Envisage Consulting, 2015)

Table 6 Summary of visual impacts

Public viewpoint	Visual sensitivity	Magnitude of visual change	Overall visual impact
A – Station Street	high	moderate	moderate
B – Belmore Street (opposite station)	high	moderate	moderate
C – Belmore Street (eastern end)	moderate	low	low
D – Jane Street (opposite station)	moderate	moderate	moderate
E – Jane Street (western end)	moderate	low	low
F - Station	high	moderate	moderate
G – Northern plaza	high	moderate	moderate

Other impacts

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

6.2.3 Mitigation measures

Measures to mitigate visual impacts during construction would be included in a CEMP for the Proposal and would include measures such as minimising light spill during night works, screening of compounds and minimising tree removal. Refer to Table 15 for a list of proposed mitigation measures.

The overall visual significance of the Proposal has been determined as low to moderate for the majority of surrounding receiver locations, and mitigation measures should be considered to minimise the level of residual visual impacts. The detailed design of the Proposal would be undertaken with reference to the recommendations included in the Visual Impact Assessment (Envisage Consulting, 2015) which is included in the list of proposed mitigation measures in Table 15. Opportunities for mitigation include:

- design any seating to be both aesthetically-pleasing and functional. Both formal and informal seating (such as grassed areas, steps and low walls) could be used to activate this public space
- adequate shelter/weather protection and trees should be placed such that they allow for views of the existing heritage buildings and the station entrance stairs
- minimise visual clutter by coordinating and streamlining station-related signage and advertising material.

6.3 Noise and vibration

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

6.3.1 Existing environment

Sources of noise in the vicinity of the Proposal are typical of a suburban centre affected by road and rail traffic and the area to the north is also currently affected by construction noise associated with the Thornton development. Existing sources of vibration in the immediate area would most likely be attributable to trains passing through the station. Sensitive receivers within close proximity to the Proposal include:

- residences located on The Crescent and Lemon Grove Road over 500 metres to the east of the station
- one residence located on Lawson Street over 500 metres to the south-east
- residences located along Union Road over 500 metres to the south of the station
- residential premises in the Thornton development immediately north of the station
- Thornton Playground approximately 290 metres to the north-east
- Nepean TAFE College – Penrith Campus approximately 150 metres south-east of the station
- commercial receivers on Belmore Street, Jane Street, Riley Street and Station Street with commercial and industrial receivers situated further south of the station.

Additionally, transient receivers (such as customers and pedestrians) generally travelling along adjacent streets would have the potential to be impacted for short periods by construction noise.

For the assessment GHD has referred to the attended noise monitoring undertaken at Lemon Grove Road in October and November 2013 as part of the noise assessment for the Penrith Substation Upgrade (Aurecon, 2014) and also conducted attended noise monitoring on 12 November 2014 at The Crescent (refer Figure 22 for specific locations).

The noise measurements taken as part of the earlier assessment were considered to best represent the background noise level for neighbouring residential receivers (i.e. less impacted by the construction noise as part of the Thornton development) and these levels have been used to inform the construction noise assessment.

As per the procedures outlined in the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009), background noise monitoring results were used to establish a Rating Background Level (RBL) for the day, evening and night time periods, which was then used for noise assessment purposes (refer Table 7). The existing average noise level (L_{Aeq}) represents the average noise level over the monitoring period. The background noise level (L_{A90}) represents the noise level exceeded for 90 per cent of the monitoring period and is also referred to as the RBL.



Figure 22 Noise monitoring location and sensitive receivers (GHD, 2015)

Table 7 Background and ambient noise levels (Aurecon, 2014)

Location	Period	Rating Background Level (L_{A90})	Ambient noise level (L_{Aeq})
Lemon Grove Road	Daytime	43 dBA	48 dBA
	Evening	-	-
	Night time	38 dBA	41 dBA

Note: Daytime 7am to 6pm (or 8am to 6pm Sundays and public holidays), Evening 6pm to 10pm and Night 10pm to 7am (or 10pm to 8am Sundays and public holidays). No evening monitoring was undertaken.

6.3.2 Potential impacts

a) Construction phase

Noise

Proposal specific noise criteria

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

Sleep disturbance noise goals have also been established for residential receivers which are based on the *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011). Based on the Policy, the sleep disturbance criterion for residential receivers is a screening level of 53 dBA L_{Amax} (external) which is calculated from the background night time noise level + 15 dBA.

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

Table 8 Proposal specific noise criteria – residential receivers

Period	Standard hours PSNC ($L_{Aeq, 15 \text{ min}}$)	Out of hours PSNC ($L_{Aeq, 15 \text{ min}}$)
Daytime	53dBA	48 dBA
Evening	N/A	43 dBA*
Night time	N/A	43 dBA

*Based on night time background noise levels

Table 9 Proposal specific noise criteria – non-residential receivers

Receiver type	PSNC – when in use ($L_{Aeq, 15 \text{ min}}$)
Classrooms at the Nepean TAFE College	55 dBA*
Thornton Playground	65 dBA
Commercial premises (including offices, retail outlets)	70 dBA
Industrial receivers	75 dBA

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

Noise modelling

Construction of the Proposal would be undertaken over a period of approximately two years in various stages (refer Chapter 3 for more detail). Modelling of noise sources (trucks, excavators, grinders etc) for 13 overarching stages was undertaken by GHD to allow for a 'worse-case' scenario assessment.

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

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

Summary of noise impacts during standard hours

From the assessment it is likely that there would be exceedances of the daytime PSNC at three receiver locations during some construction stages. However the modelling indicated that there would be no exceedances of the highly affected noise level (75 dBA) at any receiver locations. In summary:

- the Nepean TAFE College (R1) is likely to be most impacted by services/seats/bin relocation works on the station platforms, demolition works, construction of facilities on the paid concourse (i.e. Family Accessible Toilet), upgrade of existing roads and footpaths and car park works, and installation of facilities at the interchange (e.g. bus shelters) with noise levels up to around 70 dbA
- residences around Lemon Grove Road (R2) would likely experience noise levels above the PSNC during the upgrade of existing roads and footpaths and car park works with a noise level of up to around 55 dbA
- residences to the north of the station within the Thornton development (R4) are likely to experience noise levels above the PSNC during demolition works, upgrade of existing roads and footpaths and car park works, and installation of facilities at the interchange (e.g. bus shelters) with noise levels up to around 56 dbA
- the modelling indicated that there would be no exceedances of the PSNC for Thornton Playground (R3), Lawson Street (R5) and Station Street (R6) during standard hours

- noise levels are also predicted to exceed the noise affected PSNC of 70 dBA at commercial receivers (when in use) directly adjacent the works along Belmore Street and Jane Street during services/seats/bin relocation works on the station platforms, demolition works, construction of facilities on the paid concourse (i.e. Family Accessible Toilet), upgrade of existing roads and footpaths and car park works, and installation of facilities at the interchange (e.g. bus shelters).

It is noted that construction activities as part of the Thornton development are likely to be the dominant noise contributors at these residences.

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

Summary of noise impacts during out of hours

Out of hours works would be required during track possessions that typically extend 24-hours a day over a weekend. Around seven track possessions would occur during the construction period and the following activities are likely to be required during track possessions or out of hours periods:

- demolition of existing structures including existing stairs, lifts, pedestrian footbridge roof and platform canopies
- construction of the footings for the columns for the pedestrian footbridge extension and stairs, and foundations for paid concourse and lift shafts (on platforms)
- installation of precast headstocks and decks for extended pedestrian footbridge along with installation of lift shafts and stairs
- installation of lifts along with fixtures, lifting and CCTV cameras for affected areas
- platform resurfacing and raising/regrading.

The modelling has indicated that there would be exceedances of the out of hours PSNC for demolition and platform resurfacing and raising/regrading works at representative receiver locations (R2, R4-R6) with noise levels of up to 56 dbA at the closest receivers (i.e. Thornton development). Exceedances of the sleep disturbance criteria are also likely at R2 and R4. The TAFE (R1) would not be operational during out of hours periods and therefore would not be impacted by construction noise at these times.

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

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

Vibration

When assessing vibration there are two categories of vibration criteria, one related to the impact of vibration on building structures, and one relating to human comfort. The *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) provides vibration criteria for human comfort. For intermittent vibration (like that which could result from construction machinery) the criteria is based on a concept of a vibration 'dose'. The maximum criteria level is $0.4 \text{ m/s}^{1.75}$ for residences during the daytime and $0.26 \text{ m/s}^{1.75}$ during the night time. For educational facilities (when in use) the maximum criteria is $0.8 \text{ m/s}^{1.75}$.

The German Standard *DIN 4150 1999-02 Standard Structural Vibration – Effects of vibration on structures* provides guidelines for vibration levels for building structures. For dwellings the Standard recommends a maximum allowable vibration velocity of 5 mm/s, and for commercial buildings a maximum allowable vibration velocity of 20 mm/s.

The Noise and Vibration Impact Assessment provided safe working distances for vibratory rollers, wacker packers, hydraulic hammers, jack hammers and a bored piling rig which would be used for demolition and construction works – and these distances are displayed in Table 10.

The assessment concluded the expected magnitude of ground vibrations from construction equipment would not be sufficient to cause damage to buildings within 15 metres of the works and that no standard dwellings were identified within 15 metres of the station (GHD, 2015)

With respect to heritage buildings within the station, it is recommended that smaller equipment (such as vibratory rollers less than four tonnes) be used for works around heritage structures (with safe working distances for larger plant) to prevent structural damage.

Human comfort impacts would be limited to commercial properties located along Jane Street, should a 7-13 vibratory roller be required. Short-term human comfort impacts from other equipment would be limited to transient customers and pedestrians in and around the station.

Table 10 Vibration safe working buffer distances

Plant	Human comfort	Structural damage (standard dwelling)	Structural damage (heritage building/structure)
Vibratory roller (7-13 t)	100 m	30 m	15m
Vibratory roller (4-6 t)	40 m	24 m	12 m
Vibratory roller (2-4 t)	20 m	12 m	6 m
Vibratory roller (1-2 t)	15 m	10 m	5 m
Wacker packer	15 m	10 m	5 m
Small hydraulic hammer	7 m	4 m	2 m
Jack hammer	Avoid contact	2 m (nominal)	1 m (nominal)
Piling (bored)	-	4 m (nominal)	2 m (nominal)

b) Operational phase

The interchange would be reconfigured and the direction of the traffic reversed however the number of bus movements is not expected to change significantly as a result of the Proposal, which aims to improve safety by separating vehicles and pedestrians. As such, operational noise impacts as a result of the interchange works are expected to be minimal.

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

6.3.3 Mitigation measures

Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the *Construction Noise Strategy* (TfNSW, 2012c) and the Noise and Vibration Impact Assessment (GHD, 2015).

The CNVMP would be the key management document that would prescribe specific mitigation measures to help reduce the impacts of construction noise and vibration. The measures would focus on Contractor inductions, and the efficient operation of plant and equipment, along with prescribing safe working distances for vibration intensive equipment and detailing procedures for noise and vibration monitoring, and for obtaining TfNSW approval for out of hours works.

The CNVMP would also be supported by the Community Liaison Plan to be prepared for the Proposal, which would detail community notification requirements which can range from letter box drops, phone calls to offers of alternative accommodation.

Refer to Table 15 for a list of proposed mitigation measures.

6.4 Indigenous heritage

6.4.1 Existing environment

The Penrith area forms part of a landscape that was used by the Darug people for many thousands of years prior to European contact. A basic search of the Aboriginal Heritage Information System (AHIMS) database was undertaken on 24 September 2015 and an area within a 200 metre buffer around the station was searched in order to gain information on the archaeological context of the area, and to ascertain whether there are any previously recorded Indigenous sites.

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

The Proposal is located in an area that has been highly modified for a range of uses associated with the railway, and it is therefore considered unlikely that any Indigenous heritage items would be located in or in the vicinity of the Proposal area, due to this past history of disturbance.

6.4.2 Potential impacts

a) Construction phase

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

b) Operational phase

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

6.4.3 Mitigation measures

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

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

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

Refer to Table 15 for a list of proposed mitigation measures.

6.5 Non-Indigenous heritage

A Statement of Heritage Impact (SoHI) has been prepared by AECOM for the Proposal which included a desktop assessment and site inspection of the Proposal area, which was undertaken on 2 September 2015. The findings of the SoHI are summarised in this section.

6.5.1 Existing environment

Historical context

As part of early settlement, the land on which the Penrith Station was to be constructed was initially granted to Captain Daniel Woodriffe. Meanwhile, the Main Western Line opened on 26 September 1855 and sought to connect Sydney with the rural railways under construction across the Blue Mountains to Bathurst and across the Southern Highlands to Goulburn. The original intention of the line was not to serve the suburban population and, as a consequence, there were few stations along the route.

With the approach of the railway line towards Penrith, tenders were let for the construction of the station building and warehouse, however, the time allowed for completion of the structures was insufficient and the buildings were incomplete when the track opened on 19 January 1863. On opening, the station consisted of a side platform (now Platform 3), platform building (part of the Platform 3 heritage building), goods shed (now demolished) with a rail siding, a single track and a rail loop.

The platform building initially consisted of a centrally located booking office, with a refreshment room, small ticket office, Station Master's room, male and female toilets and a ladies' waiting room arranged on either side. The building was constructed of brick and sandstone, with a slate roof. A verandah was provided on the timber platform to provide protection for waiting passengers. Since then, the station has undergone additional modifications and expansions including:

- duplication of the rail line in 1886
- establishment of the Platform 1/2 heritage building in 1890
- alterations to both platform heritage buildings and construction of a new footbridge
- electrification of the line in 1955 and the replacement of the original footbridge
- the 1955 footbridge was removed and replaced with the current configuration of lifts, stairs and concourse in time for the 2000 Olympics, also the Platform 3 heritage building was also opened up at the western and eastern ends to create a

covered ticketing area with ticketing windows through into the main part of the building.

Statutory context

A search of historic heritage registers including the World Heritage List, National Heritage List, the Commonwealth Heritage List, the Register of the National Estate (non-statutory archive), the NSW State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedules of the Penrith LEP was undertaken for the Proposal area and surrounds. In addition, a desktop review of existing parish maps, historical plans, aerial photography and other historical records was undertaken by AECOM to inform the assessment.

Penrith Railway Station Group (refer Figure 23) is listed on the State Heritage Register (#01222), Section 170 Heritage and Conservation Register (#4801032) and the heritage schedule of the Penrith LEP (188).

The statement of significance from the State heritage listing is reproduced below (NSW Heritage Office, 1999):

Penrith Railway Station is of state significance as an early railway site with buildings dating from the 1860s and as a former terminus for a number of years during the extension of the railway line over the Blue Mountains. The 1860s and 1890s station buildings are relatively intact examples of Victorian second-class and third-class station buildings and remain as important landmarks in the townscape of Penrith. The station was instrumental in the development of the main western railway line across the mountains and an important terminus for changing locomotives to cross the Blue Mountains as well as pushing trains towards Sydney.

The Penrith station master's residence is of state significance for its long association with Penrith station since 1878 and as only one of four known two storey residences constructed in the metropolitan region demonstrating its importance as a major terminus station on the NSW network. The residence is of aesthetic significance as a landmark within the Penrith station precinct and the town centre of Penrith providing a tangible link with the establishment of Penrith as an important railway location. Its simple Victorian Georgian detailing and lack of embellishment demonstrate the design and construction techniques of late 19th Century railway residences where aesthetic qualities and embellishments were restricted due to a balance between status and financial restraint.

The Penrith signal box is significant as evidence of Penrith station's role in assisting the railway traffic management between Sydney and the Blue Mountains since 1956. It is an unusual example of post World War II period Functionalist style railway signal boxes due to its polygonal signal tower presenting a design more like an airport control tower than a signal box. The signal box is a dominant feature within the station's setting when approached from the Down side.

The turntable at Penrith is significant as a railway relic from the early days of the operation of the locomotive depot that once existed immediately west of the Penrith station until 1956 and as the last physical reminder of what was a large locomotive depot and later coaling facility. While dating from 1896, the turntable represents an important function that was in existence at the station opening in 1863 when it was an important terminus.

The water tank, filler spout and water column are important surviving items of infrastructure supporting steam locomotive operation, denoting the close affiliation Penrith station has with steam train operations over the Blue Mountains.

The existing significance assessment, prepared in October 2010, captures the heritage significance of the station and it was therefore considered unnecessary to undertake a reassessment. However, it is noted that the assessment under Criterion G (representativeness) refers to a footbridge and overhead booking office. The footbridge in question, constructed in the 1950s, was demolished to make way for the modern footbridge (1999). Reference to this element is therefore no longer relevant. The reference to the overhead booking office appears to be in error – there is no indication that Penrith was ever provided with an overhead booking office. The booking office has always been located within the platform buildings. It is considered that these two elements are not of relevance to the station and are not addressed in the following assessment of impacts.

Heritage items/areas located adjacent to the Proposal site that front the station are listed in Table 11. Other nearby items, such as the Museum of Fire and former Penrith Council Chambers, have no direct view lines of the station and therefore would not be impacted by the Proposal.

Table 11 Heritage items/areas in the vicinity of the Proposal that front the station

Heritage list	Item/area
Penrith LEP	Red Cow Hotel (690)
Penrith LEP	TAFE building (689)

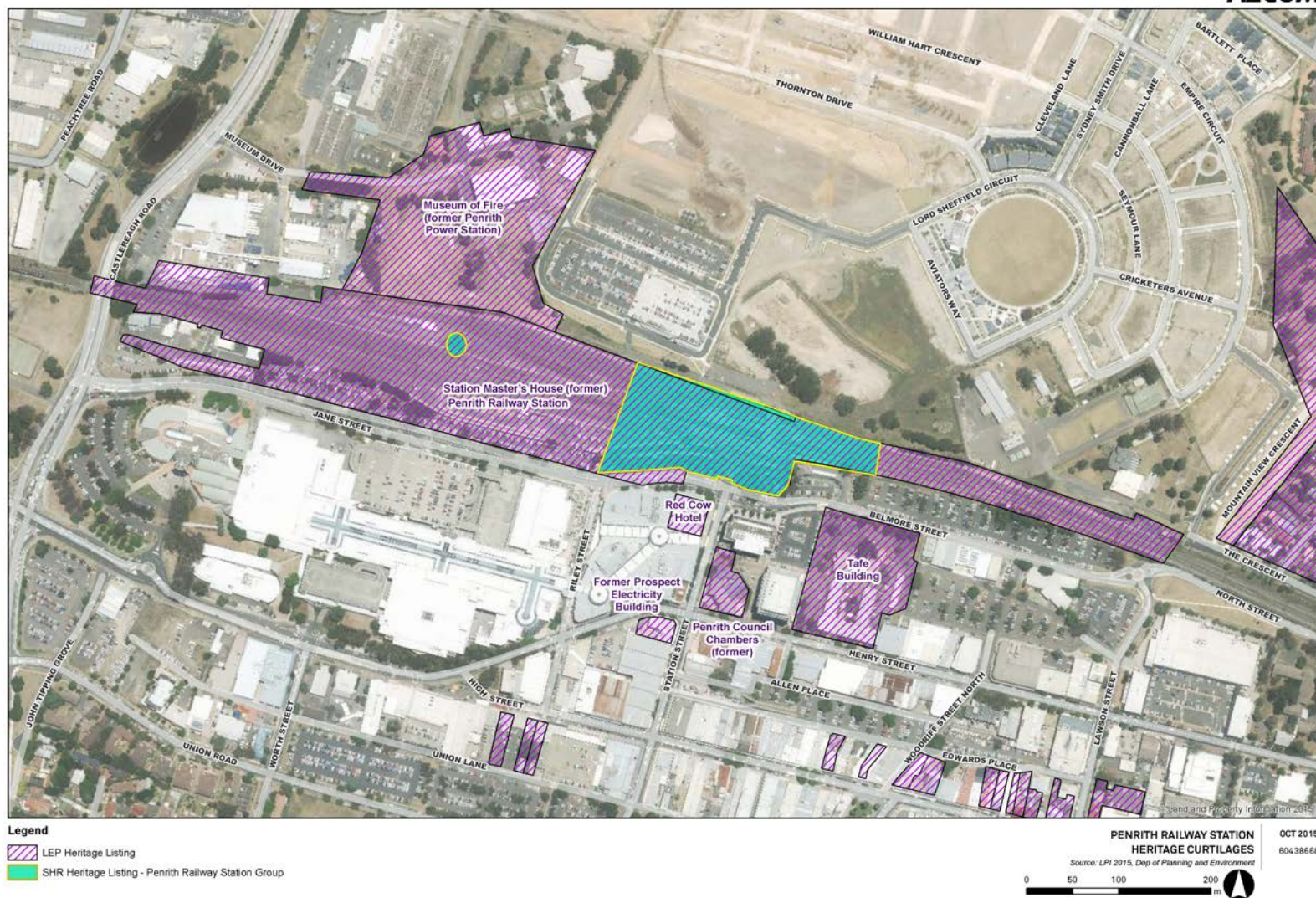


Figure 23 State heritage curtilage of Penrith Station and nearby heritage items/areas (AECOM, 2015)

Physical description

Detailed information on the physical description of each of the heritage elements of the station is provided in the SoHI, and a summary of the description of the existing footbridge, platform buildings, Station Master's Residence and moveable heritage is provided below. Other items not affected by the Proposal (including the water column/filler spout, water tank, turntable and signal box) are discussed in the SoHI.

Platform 3 heritage building

The building on Platform 3 incorporates the original 1863 station building and is constructed of brick with a corrugated iron roof. The building has been painted in reddish-brown, with cream detailing. The building is approached from the interchange and the only portion accessible to the public is the 1895 extension on the south-eastern corner, which is open at the western and eastern ends to allow access to the ticketing windows (also referred to as the Platform 3 heritage building foyer).

The floor of the foyer area is tiled, with extant decorative column and stub wall section preserved. The presentation of the building (from the platform) has been cluttered by the inappropriate placement of platform furniture in front of openings. The awning on the (northern) side of the building is supported on steel posts. This replacement awning was installed during the electrification of the line in 1956.

The remainder of the Platform 3 heritage building is used for rail operations purposes and contains Customer Service Manager's Office, Communications Room, Ticketing/Booking Office, male toilet/lockers, Control Room, Sign-on Room Meals Rooms, female toilet/lockers and store room. The majority of these spaces have undergone significant modification to the fabric – with the ceilings being lowered and doors opened between connecting rooms.

Platform 1/2 heritage building

The Platform 1/2 heritage building is a third-class type 4 building. The original section of the building is centrally located, with later additions added to each end. It is constructed of brick and has a hipped corrugated iron roof with a historical awning on the southern (Platform 2) side covering the original central section of the building. A modern awning has been added to fill the gap between the historical awning and the modern glass canopy structure. The northern (Platform 1) side also has a centrally located awning, although it dates to a later period, based on the materials. The area around the building is further cluttered by services, CCTV and wayfinding signage. The interior of the building has undergone numerous modifications to meet the evolving needs of the station.

Station Master's Residence

The former Station Master's Residence (south of the station) has been separated from the station by the construction of the interchange. The Residence is a rendered brick building of two-storeys and is currently vacant.

Footbridge

The existing pedestrian footbridge was constructed in the late 1990s and is of concrete and steel and completely replaced the earlier 1950s footbridge, which was in the same location

Moveable heritage

The State Heritage Register listing does not list any moveable items, however during the inspection a set of scales was identified in the customer luggage room in the other Platform 3 building, most likely from the 1980s at the earliest. Indicator boards from Penrith Station are now located in the State Movable Collection managed by Transport Heritage NSW.

Archaeological potential

An examination of historic plans (1912, 1921 and 1943) and an aerial photograph from 1943 was undertaken by AECOM for the archaeological assessment. As the ground disturbance associated with the Proposal would mainly be in areas already disturbed by previous/recent works (i.e. the construction of the existing pedestrian footbridge and in the interchange area), the assessment focused on the interchange.

The historic plans show the Station Master's Residence along with the former District Inspector's Office/Regional Railways Manager's Residence (with lavatory) and adjacent weatherboard store room – situated west of the Station Master's Residence. As the Regional Railways Manager's Residence is shown as being of weather board construction, it is considered likely that it was constructed on timber posts and the archaeological relics are likely to be reasonably ephemeral. It is unclear whether the lavatory was connected to the sewer, Penrith Station being connected in 1941, but if it pre-dated the sewer connection, a long-drop style lavatory could prove a rich source of archaeological deposits.

Also shown in the 1912 plan are a range of structures associated with the operation of the weighbridge. These are shown in the 1921 plan, but have been thinned from six to three buildings by the 1943 plan and aerial. Based on this comparison of plans, the archaeological sensitivity of the current bus interchange is shown on a current aerial in Figure 24.

In addition, a Pine tree and a Pepper tree (see Figure 24) are likely to date from the establishment of the old Station Master's Residence. The 1943 aerial does indicate trees in similar locations and it is considered likely that the pine and pepper tree in question date to at least 1943 and are therefore associated with the old Station Master's Residence.

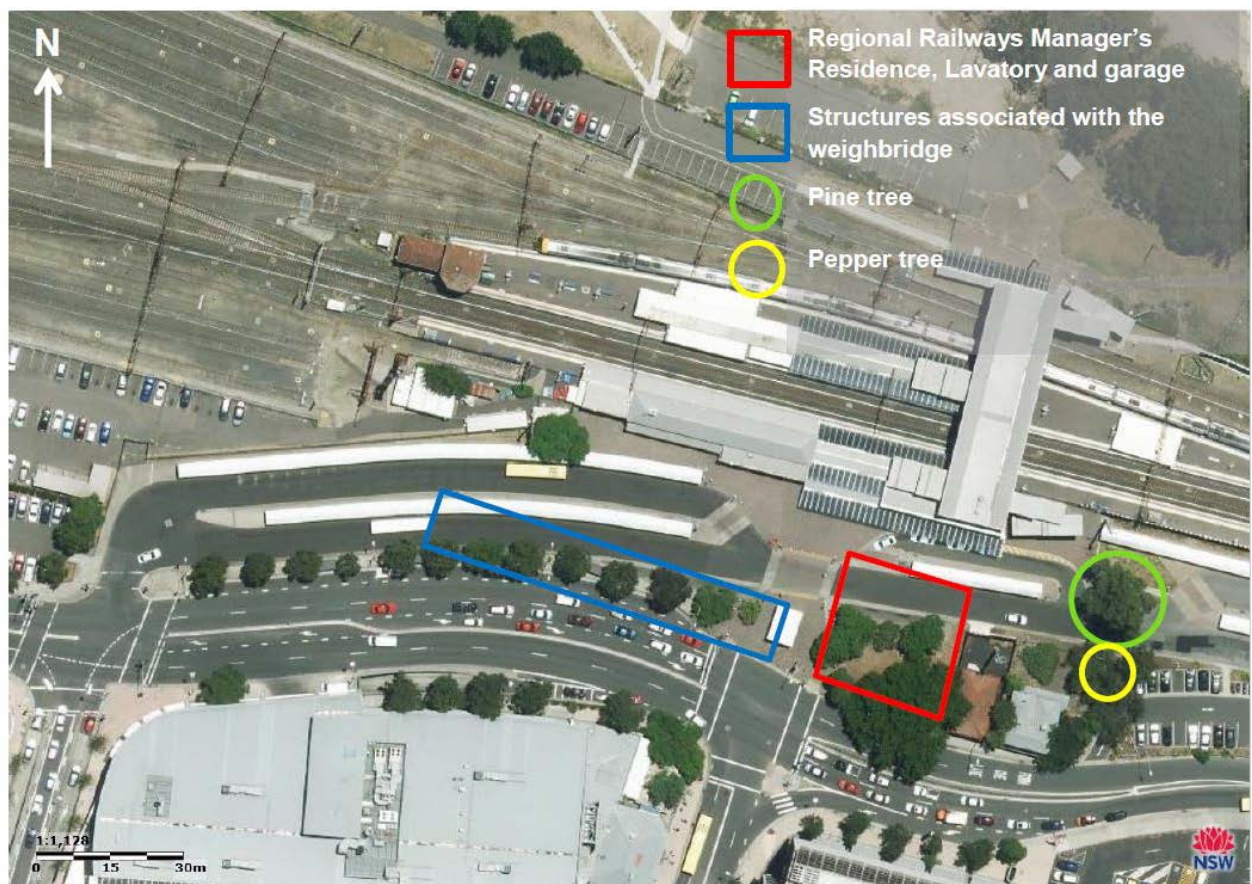


Figure 24 Areas of archaeological sensitivity (AECOM, 2015)

6.5.2 Potential impacts

a) Construction phase

Impacts to heritage significance

The construction of the Proposal would involve demolition of existing structures such as the existing roof and stairs of the pedestrian footbridge and the establishment of a new Bus Driver's Amenities Room and Customer Service Manager's Office in the Platform 3 heritage building. A more detailed scope is provided in Section 3.1.1.

Demolition

The demolition works would not impact on fabric of heritage significance. The ticket windows and glass screen in the Platform 3 heritage building foyer are modern and were probably inserted when the existing pedestrian footbridge was constructed in 1999. The removal of these items is not considered to constitute an adverse heritage impact.

The six Jacaranda trees proposed for removal are located in what is shown as the rear yard of the Regional Railways Manager's Residence in the 1943 aerial photograph. They are not evident in this photograph and appear to post-date the demolition of the residence and are probably associated with the construction of the interchange. The trees have no historical significance and their removal does not constitute a heritage impact.

The Pine tree and Pepper tree seem to be present on the 1943 aerial and are considered to date from the establishment of the old Station Master's Residence garden. The removal of these two trees is considered to be an adverse heritage impact however the removal of the Pine tree is required as it located within the new lanes of the bus interchange and an alternate route is not possible due to the design constraints and requirements for the safe operation of buses. The Pepper tree is located close to the bus lane and it may be possible to retain this tree and this has been included as a recommendation to be investigated during detailed design.

Construction

The construction of the southern entrance stairs to the pedestrian footbridge and interchange canopies would impose minor additional visual barriers between the old Station Master's Residence and the station heritage buildings. This visual link has already been attenuated by the construction of the interchange, communications facility immediately west of the old Station Master's Residence) and the growth of a vegetation screen. The negative impact would be somewhat moderated by the additional views of the Station Master's Residence that would be available from the new paid concourse. The footprint of the stairs would also be established within an area of archaeological sensitivity, as shown in Figure 24, as being the former location of a weatherboard structure first used as a District Inspectors Office and then the Regional Railways Manager's Residence.

The impacts to heritage significance associated with the proposed construction is discussed in more detail in Table 12 however in general, the Proposal would have limited impacts to the heritage significance of the station and also has positive heritage outcomes.

The construction works within the Platform 3 heritage building foyer to create a new Bus Driver's Amenities Room and Customer Service Manager's Office is unlikely to impact on fabric of heritage significance. The space has been significantly altered since its construction in 1880 as an extension of the original 1863 station building. The alterations to the space can be seen through comparison of a plan from 1895 showing the open plan arrangement in use while it was a refreshment room and changes approved in 1954, compared with the existing layout. The two retained heritage elements, being the decorative cast iron column and the stub wall, would be retained within the refurbishment of this space.

Temporary works

Temporary enabling works would consist of two crane pad locations located to the north-east and south-east of the existing pedestrian footbridge on either side of the railway line. Immediately east of the northern crane pad would be a temporary construction compound containing site offices, amenities, laydown and storage areas for materials. None of these areas are considered to hold archaeological potential.

Services and landscaping

The Proposal would likely require three trenches for the provision of electrical supply for lighting associated with the alterations to the interchange and canopies on the platforms. The trenches on Platform 1/2 and 3 are considered unlikely to impact on archaeological deposits or relics. The proposed service trench through the interchange has the potential to pass through a small structure located within the forecourt area shown on a 1943 plan as being the weighbridge operator/guard's room. It may also impact on the archaeological relics of a structure shown on a 1921 plan as being the District Inspectors Office and by 1943 as the Regional Railways Manager's Residence.

It is proposed that the southern plaza would be paved in dry-pressed brick in a mix of historically appropriate colours. The selection of proposed landscaping trees is also considered to be sensitive to the heritage character of the station and includes the era appropriate Moreton Bay fig, Jacaranda and Illawarra flame tree species. It is considered that the proposed landscaping would not have a negative impact on the historic significance of the station.

Aesthetic significance

There would be impacts to the aesthetic significance of the station, some of which would be positive and some negative. On the positive side, the views towards the platform heritage buildings would be opened up from the upgraded footbridge (with glass façade) while views of the old Station Master's Residence would be possible from the new paid concourse. The proposed works would also help to de-clutter the platforms to increase visibility of the heritage platform buildings at ground level by relocating seats, vending machines etc.

Views between the old Station Master's Residence and the station would be further impacted by the proposed southern entrance stairs. Views towards the station from Belmore Street would be neutrally impacted – the existing shelters in the interchange would be removed, but would be replaced however the location of these shelters has been chosen in an attempt to limit the impact.

The proposed filling of a canopy section on Platform 1, while important for weather protection, would have a negative heritage impact by further enclosing the heritage building. The replacement of some sections of canopy (i.e. to allow for the demolition of existing platform stairs) would have a neutral effect.

Table 12 Assessment of impacts to heritage significance

Action	Impact to heritage significance
Historical significance State Heritage Register (SHR) criteria (a)	<p><i>Penrith Station Group is of historical significance as an early railway site with buildings dating from the 1860s and as a former locomotive depot for a number of years during the extension of the railway line over the Blue Mountains. The Signal Box is historically important as evidence of Penrith Station's role in providing assistance to the management of the increased railway traffic between Sydney and the Blue Mountains since 1956.</i></p> <p><i>The Station Master residence is of historical significance as it was built for the accommodation of the Penrith Station Master in 1878 when the Station was instrumental in the changing of the locomotives of the trains to cross the Blue Mountains as well as pushing trains towards Sydney. The residence had served successive Station Master's for many years and has been used for various community operations until the early 2000s. The historical visual link between the station and the residence is important, which remains relatively intact today with some interruption by the adjoining ancillary building to the west.</i></p> <p><i>The water tank, filler spout and water column are important surviving steam locomotive supporting infrastructure dating from 1921, which denote the close affiliation Penrith Station has with steam train operations over the Blue Mountains, an association that started in 1863. Apart from the station buildings, the turntable is now the oldest item of railway structure remaining at Penrith dating from 1896. It is also the last item remaining from the former Penrith locomotive depot.</i></p>
Demolition	<p>The demolition of the modern footbridge (including the existing toilets, customer luggage room etc.) and elements of the associated canopies would not impact on the elements that contribute to the historical significance of the station. The heritage platform buildings, old Station Master's Residence and the infrastructure associated with steam locomotives would remain in their current positions. The one exception to this is the removal of a glass partition in the current ticketing hall within the Platform 3 heritage building. However this is a modern wall and would not impact on heritage fabric.</p> <p>The Proposal would also remove clutter from the platforms and clear views towards the station buildings, which is considered a positive heritage outcome.</p>
Construction	<p>The construction would involve the replacement of the stairs and lifts on Platforms 1/2, 3 and the northern and southern side of the tracks. This would not negatively impact on the historical significance of the station. The footbridge provides an opportunity to design a replacement that is more sensitive to its historical location. This includes lowering the overall height of the roof line, opening up of views to the west and the east to maintain or re-create visual access to heritage elements within the station group and removal of clutter from the platforms to open views towards heritage buildings.</p> <p>The visual link between the old Station Master's Residence and the station would be impacted through the construction of the southern stairs, although this link has already been attenuated by the insertion of the interchange between the residence and the station and the plantings that currently screen views.</p>
Temporary enabling works	The location of the crane pads and site accommodation/material laydown areas would not impact on the historic significance of the Station.
Services and landscaping	<p>The proposed removal of a pine and pepper tree from the interchange area constitutes a negative heritage impact. Interrogation of an historical aerial photograph indicates these two trees are likely to date from the establishment of the garden associated with the Station Master's Residence. As such, they contribute to the physical demonstration of the historical significance of the Station. It is recommended that retention of the trees be investigated during detailed design.</p> <p>The selection of proposed landscaping trees is sensitive to the heritage character of the station and includes era appropriate species such as the Moreton Bay fig, Jacaranda and Illawarra flame tree. It is considered that the proposed landscaping would not have a negative impact on the historic significance of the station.</p>
Historical associative significance SHR criteria (b)	<i>Penrith Station was closely associated with Driver John Heron and The Heron train was a daily commuter train to and from Sydney that was named after him. This association is considered to be of secondary significance.</i>
Demolition	The associative significance of the affiliation of the station with Driver John Heron is intangible and would therefore not be impacted by the proposed works.

Action	Impact to heritage significance
Construction	
Temporary enabling works	
Services and landscaping	
Aesthetic significance SHR criteria (c)	<p><i>The station buildings are good examples of second class and third class station buildings despite the changes made over the years. They feature typical design characteristics of such roadside railway station buildings in the 1860s and 1890s, such as a large central brick building flanked by attached wing, simple hip roofs with multiple brick chimneys, a symmetrical layout and platform awning supported on cast iron columns with decorative bracketing.</i></p> <p><i>The signal box is of aesthetic significance as a dominant feature within the station's setting presenting a design more like an airport control tower than a signal box. It is an unusual example of post World War II period Functionalist style railway signal boxes due to its polygonal signal tower and flat roofed stepped down wing featuring multi-paned glazing to Up, Down and rail side elevations of the control room of the tower, and a polygonal hipped and tiled roof with wide eaves.</i></p> <p><i>Penrith SM's residence is of aesthetic significance as a landmark within the Penrith station precinct and the historic town of Penrith. It is a simply detailed symmetrical building demonstrating the construction techniques of the late 19th Century 'type 4' railway residences, where aesthetic qualities and embellishments were restricted due to a balance between status and financial restraint.</i></p> <p><i>The water tank, filler spout and water column are engineered structures of the steam industrial age that possess a robust functional aesthetic well suited to railway environs. The turntable is an excellent example of a 19th Century cast iron turntable demonstrating technology of such structures at the time.</i></p>
Demolition	<p>The modern footbridge, stairs and associated canopies do not contribute to the aesthetic significance of the station and their removal would make way for a more sensitive design. It is considered that the replacement elements would have a positive impact.</p> <p>The proposed removal of the pine and pepper tree thought to be associated with the old Station Master's Residence garden is considered to be a negative impact to the aesthetic heritage significance of the station. The trees provide an indication of the former extent and layout of the garden, which has been largely lost through the insertion of the bus interchange, which has cut the old Station Master's Residence off from the station. The retention of the pepper tree would be investigated during detailed design.</p>
Construction	The replacement design is more sensitive to the aesthetic significance of the station and would be lower in profile, would provide increased opportunities to view heritage elements than new glass facades, and the interface between the canopies and historic buildings would be better managed to have a positive impact. The enclosing of Platform 1/2 heritage building through the construction of a section of in-fill canopy would have a negative aesthetic impact.
Temporary enabling works	The temporary enabling works (i.e. crane pads) are proposed to be located on the north-eastern and south-eastern sides of the existing footbridge, and would remain in place during construction of the paid concourse and essentially block views between the heritage buildings and the enabling works areas. Therefore there would be no or limited views of the crane pads and site accommodation/material laydown areas from the heritage buildings. It is considered that the temporary works would not impact on the aesthetic significance of the station.
Services and landscaping	The selection of species for planting are appropriate to the station's era and it is considered that the landscaping would have a positive effect by providing a softer environment within the interchange area. The proposed selection of brick paving in this area is also considered appropriate.

Action	Impact to heritage significance
Social significance SHR criteria (d)	<i>The place has the potential to contribute to the local community's sense of place and can provide a connection to the local community's history.</i>
Demolition	The proposed works would not impact on the connection the local community has to the station and may improve it by increasing views to the historic elements.
Construction	
Temporary enabling works	
Services and landscaping	
Technical/Research significance SHR criteria (e)	<p><i>The signal box has a moderate degree of technical research potential as it retains its original communication and control desk, CTC panel and staff signalling equipment. These features, however, are found at many other signal boxes in the railway network.</i></p> <p><i>Penrith SM's residence has research potential in providing physical evidence on the construction techniques of a two-storey type 4 Station Master's residence built in the late 19th century.</i></p> <p><i>The water tank, filler spout and water column are of technical and research significance demonstrating the equipment used in providing large quantities of water very quickly to steam locomotives. The turntable is of technical and research potential demonstrating the equipment used in steam locomotive operations.</i></p>
Demolition	The proposed works include the excavation of trenches to provide electricity to the proposed bus shelters and associated with the construction of the southern entrance stairs. One of these trenches passes through an area formerly the location of the Regional Railway Manager's Residence. An Archaeological Research Design and Excavation or Monitoring Methodology would be prepared and submitted to the Heritage Council of NSW, or its delegate, for approval if works in this area are still required following detailed design.
Construction	
Temporary enabling works	
Services and landscaping	
Rarity SHR criteria (f)	<p><i>Penrith Station Group features a number of rare items including a filler spout and water column, which are one of a few such facilities remaining in operating condition on the system. The signal box is one of a series of five similar signal boxes built in the Functionalist style, the others being Granville, Clyde, Blacktown and Auburn. There are many good examples of Inter-War Functionalist style signal boxes in the railway network.</i></p> <p><i>Penrith SM's residence is only one of four known two-storey residences constructed in the metropolitan region demonstrating its importance as a major terminus station on the NSW network. However, better examples exist at Lithgow and other regional locations.</i></p> <p><i>Penrith turntable is one of a decreasing number of turntables on the system, and rare in the metropolitan network.</i></p>

Action	Impact to heritage significance
Demolition	The proposed works would not directly impact on the items identified as being rare. These would remain in situ, with some potential to increase recognition of these items through the opening of views and the provision of interpretation.
Construction	
Temporary enabling works	
Services and landscaping	
Representativeness SHR criteria (g)	<i>Penrith Station Group is a representative example of railway station arrangements combining a range of buildings and structures dating from the 1860s, 1890s and post-war period to the present day including Victorian second class and third class roadside station buildings, a signal box, water tower, water column and filler spout, footbridge and overhead booking office. The water tank is one of approximately 13 (2009) water tanks remaining in-situ in the Sydney metropolitan area, the others include Eveleigh and Cardiff although most are now unused. The signal box is representative of the style of signal box built on the Main Western Line after World War II. Penrith Station Master's residence is a representative example of a type 4 two-storey residences built in the late 19th Century demonstrating the balance between the status and financial restraint at the time. The turntable is a good example of similar types surviving in rural centres.</i>
Demolition	<p>The proposed works would not impact on items identified as contributing to the representative significance of the station, namely the station platform buildings, signal box, water tower, water column and filler spout.</p> <p>Also note that the footbridge in question was removed to construct the present modern footbridge and there is no indication Penrith had an overhead booking office. It is considered that these elements are not relevant to the representativeness of the station.</p>
Construction	
Temporary enabling works	
Services and landscaping	

Statement of Heritage Impact

A Statement of Heritage Impact (SoHI) has been prepared for the Proposal by AECOM to assess the heritage impact of the proposal in accordance with the *NSW Heritage Manual* (NSW Heritage Office & Department of Urban Affairs and Planning, 1996) and the NSW Heritage Office's *Statements of Heritage Impact* (NSW Heritage Office, 2002).

The guidelines pose a series of questions as prompts to aid in the consideration of impacts due to a project, based on the type of proposed works. The Proposal involves the demolition of a building or structure as well as major additions to the station, and the process questions for these activities are considered in Table 13 and Table 14.

Table 13 Demolition process questions

Process question	Comment
Have all options for retention and adaptive re-use been explored?	The existing pedestrian footbridge would be retained to the bridge level and would be extended east to create a paid concourse area and south over the bus lanes of the interchange to provide modal separation. However, the existing pedestrian footbridge is not considered to be of heritage significance and does not require retention to retain the significance of the station group.
Can all of the significant elements of the heritage item be kept and any new development be located elsewhere on the site?	The existing pedestrian footbridge is not considered to be of heritage significance. The partial demolition would not directly impact on any items that contribute to the heritage significance of the station.
Is demolition essential at this time or can it be postponed in case future circumstances make its retention and conservation more feasible?	The existing pedestrian footbridge is not of heritage significance and its complete retention and conservation is not desired. The proposed replacement structure is more sensitive to the heritage significance of the station and is considered an improvement.
Has the advice of a heritage consultant been sought? Have the consultant's recommendations been implemented? If not, why not?	TfNSW has sought advice from a number of sources (internal as well as independent heritage consultants) who have had input into the development of the design.

Table 14 Major additions process questions

Process question	Comment
<p>How is the impact of the addition on the heritage significance of the item to be minimised? Are the additions sympathetic to the heritage item? In what way (e.g. form, proportions, design?)</p>	<p>The impact of the upgraded footbridge, including the associated replacement of the lifts, Family Accessible Toilet and customer luggage room, has been minimised through placement, form and proportions. The upgraded footbridge would have a reduced form and the paid concourse has been placed on the eastern side, away from the heritage building, which would preserve the current space separation between the footbridge and heritage buildings.</p> <p>On Platform 1/2, the stairs between the concourse and the platform would be removed and placed away from heritage building, which would help to increase the space and visibility heritage buildings. This would be complimented through the rationalisation of services and clutter in front of the building to produce a better heritage outcome.</p> <p>The overall height of the roof structure is being reduced by between four and six metres. The projecting roof profile of the existing pedestrian footbridge would be replaced with a shallow pitched butterfly roof, which would sit within the heritage precinct, rather than being a visually dominant feature. The unpaid section is located on the western side and the proportions would be wide enough to allow pedestrians to pause and observe the views towards the heritage buildings and the Blue Mountains through the glass facade. The profile of the canopy on the southern entrance stairs has also been minimised to reduce visual impacts.</p> <p>The northern entrance stairs have been placed so that there would be no heritage impacts.</p>
<p>Can the additional area be located within an existing structure? If no, why not?</p>	<p>The initial concept included the construction of a Bus Driver Amenities building in the interchange area. Through consultation, it has been determined that a better heritage outcome can be reached if these facilities are integrated into the existing Platform 3 heritage building foyer, currently used as a ticketing hall. Following the upgrade, ticketing services would be provided on the paid concourse of the pedestrian footbridge and the foyer would no longer have a function. Therefore, the conversion of this space into a Bus Driver's Amenities Room and Customer Service Manager's Office would provide a function for this space, and would also result in it being unnecessary to add a further structure to the interchange, thereby retaining views to the Platform 3 heritage building.</p>
<p>Will the additions visually dominate the heritage item?</p>	<p>While the additions would be visible, there would be less impact than the current pedestrian footbridge. The integration of the Bus Driver's Amenities Room and Customer Service Manager's Office into the Platform 3 heritage building has the effect of reducing the visual impact of providing the necessary amenities on the station group. The location of sundry facilities, such as the bike shed has been carefully considered to ensure they do not create a visual barrier or dominate the plaza area.</p> <p>The existing bus shelters clutter the interchange and reduce the visibility of the station. The replacement shelters would likewise be a visual barrier, however the selection of materials and the placement has been considered to lessen the overall impact from the existing level.</p> <p>The glazed fence proposed for the southern side of the station would help to maintain views between the southern plaza and the station.</p>

Process question	Comment
Is the addition sited on any known, or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?	<p>The majority of the works would be undertaken within the disturbance footprint of the existing modern footbridge and is therefore considered unlikely to impact on archaeological deposits.</p> <p>The landing for the stairs in the southern plaza sits in proximity to the former location of a weather board structure shown on a 1921 plan as being the District Inspectors Office and by 1943 as the Regional Railways Manager's Residence. The extant plans indicate the structure was of weatherboard and it is therefore considered that the foundations were likely to have consisted of timber piles. The excavation of trenches to provide electricity to the proposed bus shelters and associated with the construction of the southern entrance stairs is also located within an area of archaeological sensitivity.</p> <p>The proposed location of the crane pads and temporary works compound are not considered to be of archaeological potential.</p>
What changes to the fabric are required as a result of the creation of the Bus Driver's Amenities Room and Customer Service Manager's Office?	<p>The creation of the Bus Driver's Amenities Room and Customer Service Manager's Office would involve the infilling of the existing ticketing windows in the Platform 3 heritage building foyer and the openings (no longer required in the western and eastern facades).</p> <p>The replacement doors would be selected to match the existing doors and would therefore minimise the visual impacts. This would be achieved with recessive, matching brickwork and would be painted to match the existing. The northern wall of the foyer is not original, being constructed as part of the 1999 upgrade of the station, and therefore these works would not have a heritage impact. The two elements considered to be of heritage significance within the space, being the decorative cast iron column and the stub wall would be retained and incorporated into the final design.</p> <p>It is possible that the windows on the southern façade of the Platform 3 heritage building would need to be treated for security purposes. The design of the security treatments would be developed during detailed design.</p> <p>No changes to heritage fabric would be required for the change in use of the other Platform 3 heritage building rooms to enable the repurposing of the Station Manager's Office as a store room and the Ticket/Booking Office for use as a training room.</p>

Impacts to nearby heritage

There are limited views between the Red Cow Hotel and Penrith Station, which is located approximately 70 metres to the north. The sight lines are obscured by the beer garden, the road, interchange and mature vegetation within the curtilage of the hotel and the interchange. Similarly, there are no view lines between Penrith Station and the TAFE due to the vegetation and parked cars. As such, it is considered that direct or indirect impacts to these items as result of the Proposal would be negligible.

b) Operational phase

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

6.5.3 Mitigation measures

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

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

It is recommended that an Archaeological Research Design and monitoring or excavation methodology be developed to further explore the potential impacts to archaeological relics associated with the District Inspectors Office/Regional Railways Manager's Residence and the Weighbridge/Guard hut. Should impacts be anticipated following detailed design, a review of the approvals would be undertaken and a modification sought, which should include an Archaeological Research Design and Methodology and nominate an Excavation Director with a demonstrated track record of working within a State Heritage Listed site.

As Penrith Station is listed on the heritage schedule of the Penrith LEP, Penrith City Council would be notified of the proposed works.

Archival recording of the station as a whole prior to the commencement of construction following NSW Heritage Division guidelines *Photographic recording of heritage items using film or digital capture* (NSW Heritage Office, 2006) and *How to prepare archival records* (NSW Heritage Office, 1998). Copies should be provided to the NSW Heritage Division, Penrith City Council and Sydney Trains for future reference. In particular the following elements should be concentrated on:

- existing pedestrian footbridge (including all spaces such as the retail spaces, offices etc.) and canopies and interface with the heritage structures
- Platform 3 heritage building foyer, and current Station Manager's Office and Ticket/Booking Office.

A CEMP would be prepared by the Contractor that would prescribe mitigation measures to be implemented during the construction period. This would include identifying the heritage curtilage and heritage items/area on the Environmental Controls Map. The CEMP would also specify requirements for heritage inductions to be undertaken by all staff, and procedures for unexpected archaeological finds in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2015a).

Refer to Table 15 for a list of proposed mitigation measures.

6.6 Socio-economic impacts

6.6.1 Existing environment

Penrith Station is located within the commercial centre of Penrith. To the south of the station are a number of government and commercial buildings including the Westfield Shopping Centre and Nepean TAFE College – Penrith Campus (refer Figure 3, page 20). To the north of the station land use ranges from industrial land to the Thornton residential development, being developed by UrbanGrowth which once complete will provide approximately 1,000 dwellings.

Penrith Station is serviced by the T1 North Shore, Northern and Western Line which are operated by Sydney Trains, and the Blue Mountains Line serviced by NSW Trains. Penrith Station is the 33rd busiest station on the Sydney Trains network with an average patronage of 15,040 trips per weekday (NSW Bureau of Transport Statistics barrier counts, 2014). There

are two existing retail shops located on the southern side of the station (with access to both the southern plaza and Platform 3) that sell food, beverages and other general items.

There are some existing CPTED considerations around the station including areas of poor lighting and passive surveillance particularly for the kiss and ride area located on the southern side of the station where trees obscure street lighting and there is no lighting provided with the shelters. Crime statistics obtained from the NSW Bureau of Crime Statistics and Research represent criminal incidents recorded by NSW Police and the area around Penrith Station was identified as a crime hot spot based on 2012-2013 data, in the Concept Design Report (AECOM, 2013).

6.6.2 Potential impacts

a) Construction phase

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

- changes to accessing station entry points, platforms and nearby footpaths
- changes to bus, taxi, and kiss and ride traffic arrangements
- partial loss in the northern at-grade commuter car park during construction
- parking to be removed during construction (as part of operational changes) including a net loss of parking in the south-western car park (approximately 20 spaces and 11 motorbike spaces) and removal of the timed car park south-east of the station (25 spaces and seven motorbike spaces).
- increase in truck movements delivering site materials, plant and equipment
- reduced amenity from the temporary removal of retail services
- construction noise, dust and visual impacts.

Access for emergency services would be maintained at all times and it is not anticipated that access to private properties would be affected during construction of the Proposal.

b) Operational phase

Overall, the Proposal would provide positive socio-economic benefits to Penrith and would:

- improve customer safety and enhance pedestrian and bus network links through the reconfiguration of the bus, taxi, kiss and ride and bicycle zones within the interchange
- provide a station with improved accessibility for all, including those with a disability, the ageing and parents/carers with prams by minimising conflict points and crowding points, and by improving modal separation to provide a safer interchange
- improve cross-corridor connections by creating a new paid concourse allowing for increased capacity for unpaid access across the existing pedestrian footbridge and new stairs
- improve customer experience and amenity through improved facilities including canopies for weather protection, a new Customer Information Window and Family Accessible Toilet, Passenger Information Display boards and new wayfinding in and around the station
- improve the integration of the station and interchange with its current and future urban context, and create a positive addition to the public domain

- potentially increase the use of public transport to and from Penrith Station.

The pedestrian footbridge (with increased capacity) and new paid concourse and new entrance stairs would help to improve sightlines, legibility and opportunities for natural surveillance. The additional lighting and CCTV that would be installed would also provide positive CPTED outcomes for the area. The upgraded interchange would provide a well-defined, multi-functional space and this multi-use can increase activity and passive surveillance. CPTED would be further considered during the detailed design of the Proposal.

The Proposal would require the closure of two retail shops located on the southern side of the station (Platform 3) to allow for the extension of the pedestrian footbridge, but it is proposed to install two retail kiosks on the pedestrian footbridge, subject to detailed design and approval by Penrith City Council, as required. Existing ATM facilities would be relocated, to maintain the same level of service provided currently.

A male and female toilet, Family Accessible Toilet and customer luggage room would be demolished from Platform 3 but would be replaced with a Family Accessible Toilet on Platform 3 and on the paid concourse, and a replacement luggage room on Platform 3.

Discussions with UrbanGrowth have been ongoing during the development of design options and the concept design and have addressed options to acquire a small section of land to the north of the station, currently owned by UrbanGrowth (and to be vested to Penrith City Council), to allow for the new stairs on the northern side of the pedestrian footbridge. It is not anticipated that there would be any adverse impacts of the acquisition and the design of the northern stairs would be integrated with the design of the northern plaza.

6.6.3 Mitigation measures

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

Table 15 provides a number of environmental safeguards to minimise these potential impacts with a particular focus on keeping the community informed and includes the following:

- sustainability criteria for the Proposal would be established to encourage construction personnel to purchase goods and services locally helping to ensure the local community benefits from the construction of the Proposal
- the Community Liaison Plan (to be developed by the Contractor prior to construction) would identify all potential stakeholders and the best-practice methods for consultation with these groups during construction. The Plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where possible
- the community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan
- contact details for a 24-hour construction response line, Project Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase.

6.7 Biodiversity

An Ecological Impact Assessment has been prepared by Biosis for the Proposal which included a desktop assessment, literature review and site inspection of the study area (shown in Figure 25), which was undertaken by a qualified ecologist on 13 November 2014. The findings of the assessment are summarised in this section.

6.7.1 Existing environment

Threatened species and communities

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

- 19 threatened ecological communities listed under the TSC Act/EPBC Act
- 20 threatened flora species listed under the TSC Act/EPBC Act
- 30 threatened fauna species listed under the TSC Act, FM Act and/or EPBC Act
- 19 migratory species listed under the EPBC Act.

No threatened flora, fauna or migratory species were identified during the survey.

Of the 20 threatened flora species and 30 threatened fauna species listed under the TSC Act and previously recorded within the search area, six fauna species are considered to have some potential to occur within the study area.

A small amount of potential foraging habitat for the EPBC listed Grey-headed Flying-fox and Little Lorikeet (two large Spotted Gum trees and 19 planted Tallowwood trees) and for the Swift Parrot (two large Spotted Gums) was identified within the study area. However the two Tallowwood trees and two Spotted Gums have since been removed as part of the Thornton development.

The old Station Master's Residence and adjacent large Pepper tree provides potential roosting habitat for threatened micro-bat species listed under NSW legislation (i.e. the Greater Broad-nosed Bat, the Eastern Bentwing-bat and the Eastern/East Coast Freetail-bat).

Flora

Platforms

There are no trees, shrubs or other vegetation present on the station platforms.

South side of the rail corridor

On the southern side of the rail corridor most of the vegetation comprises planted trees and garden plants. The following is a summary of the vegetation identified during the survey (refer also to Figure 25):

- three Tallowwood trees (trees 1-3) and two large Pepper trees (trees 5-6) are located in the south-eastern side of the bus interchange, with two Hackberry trees (considered to be an environmental weed) located inside the corridor (trees 4 and 7)
- the south-eastern car park area has been landscaped with Crinum Lilies, Mat Rushes, Hairpin Banksia, Flax Lilly and Climbing Guinea Flower
- a large Black Cypress Pine (tree 8), a large Hackberry tree (tree 9) and two large Pepper trees (trees 10-11) are situated outside, and to the east, of the old Station Master's Residence. One of these Pepper trees is very old and has two large

widely separated leaning trunks which may be at risk of collapse, it also has hollows which could potentially be used for roosting by micro-bats

- there is a planted Hackberry tree (tree 12), a Cockspur Coral tree (tree 13) and a Jacaranda (tree 14) within the fenced boundary of the Station Master's Residence
- a large Pine tree (tree 15) is situated north of the old Station Master's Residence in the bus interchange
- west of the Station Master's Residence a large Rubber tree (tree 16) is present along with three Cypress trees (trees 17-19) and four Jacarandas (trees 20-23)
- along Jane Street there are three small Jacarandas (trees 24-26) and then a row of 11 evenly spaced Tallowwoods (trees 27-37), with an additional three Tallowwoods (trees 38-40) having been planted in the south-west corner of the study area
- a large Jacaranda (tree 41) is inside a fenced area adjacent to Platform 3 alongside a Red Tips plant (tree 42) and Hackberry tree (tree 43).

The vegetation habitat throughout the majority of the study area has been modified by a long history of disturbances which have resulted in clearance of native vegetation and replacement by exotic trees and by infestation of environmental weeds in the ground and shrub layers. No noxious weeds were identified and environmental weed infestation is relatively minor in all areas with the exception of the fenced area around the Station Master's Residence. Environmental weed species of note include Cobbler's Pegs, Moth Vine, Fat Hen, Paddy's Lucerne and perennial grasses.

North side of the rail corridor

There is little vegetation remaining on the northern side of the rail corridor which is in part due to clearing required to facilitate the Thornton development. A row of planted Tallowwood trees appear on aerial imagery of the northern side of the study area but have since been removed. At the time of the survey, there were four trees remaining on the north side – two Tallowwoods (trees 44 and 47) and two large Spotted Gums (trees 45-46), but has since been removed. Some new landscape planting has been established in the northern plaza.

Fauna

Few fauna species were observed during the site inspection and little fauna habitat is present within the study area. Due to the limited habitat available and lack of connectivity to other areas of habitat, overall fauna diversity is expected to be low.

However while no patches of native vegetation are present, some mature trees and shrubs with some fauna habitat value are present within the study area, in particular, the 17 Tallowwoods on the southern side of the study area, which may provide foraging resources for nectarivorous birds and flying foxes during flowering periods. The Jacarandas on the south side may also provide foraging resources for nectarivorous birds.

The old Station Master's Residence and station buildings may provide roosting/nesting habitat for micro-bats and introduced bird species such as the Feral Pigeon and Indian/Common Myna, which were observed within the study area during the site inspection. Other trees may provide foraging and nesting resources for Pee Wees/Magpie Larks and Noisy Miners observed within the study area during the site inspection.

The stairs and existing pedestrian footbridge do not appear to contain suitable cracks or holes that could be used by fauna species such as microbats or birds.



6.7.2 Potential impacts

a) Construction phase

Threatened species and communities

As noted in Section 6.7.1, no threatened flora species or ecological communities were identified during the survey, however six threatened fauna species are considered to have some potential to occur within the study area as a small amount of potential foraging habitat is present.

None of trees identified as potential foraging habitat would be removed so impacts to threatened species would be negligible. The Proposal does not involve changes to the old Station Master's Residence, so no impacts on potential roosting habitat for micro-bats are expected.

Direct impacts

The proposed works would not impact any of the remnant elements of native vegetation identified within the study area, and the works would not impact on any vegetation or trees on the north side of the rail corridor.

Impacts to trees would be confined to the southern side of the rail corridor. Of the 47 trees recorded within the study area, a total of eight trees (seven medium and one large tree) would be removed and would include:

- one Pine tree (tree 15) north of the old Station Master's Residence
- one Pepper tree (tree 11) east of the old Station Master's Residence
- six Jacaranda trees (trees 20-25) further west of the old Station Master's Residence
- the trimming of the large Rubber tree (tree 16) is also proposed and is at risk of indirect impacts associated with adjacent construction activities.

The trees proposed to be removed provide little or no fauna habitat, as such, the impacts on nectivorous fauna is expected to be minor.

Indirect impacts

Noise, dust, light and contaminant pollution is predicted to be minimal. The mitigation measures outlined in Table 15 would ensure that these indirect impacts would be minimised.

Without appropriate management strategies, construction activities have the potential to disperse weeds and to also import new weed species into the study area. Hackberry trees are considered to be an environmental weed and two such trees are proposed for removal, so the precautionary adoption of the weed management practices, including specific disposal, control and later, prevention measures, is recommended if these trees are fruiting at the time of removal.

b) Operational phase

No additional impacts are expected to occur during the operational phase of the proposal.

6.7.3 Mitigation measures

The Contractor is required to undertake the detailed design and construction of the Proposal with regard for the trees on Belmore/Jane Street and to avoid impacts to any trees/vegetation beyond that which is assessed in the Ecological Impact Assessment (Biosis, 2015). Further, tree 11 should be retained if possible and this would be investigated during detailed design.

Tree Protection Zones (TPZ) would be established as per the recommendations in the Ecological Impact Assessment (Biosis, 2015) to protect trees during construction. An arborist would inspect trees at the commencement of excavation works, and again at the completion of all works to ascertain the percentage loss of structural root zone of trees in close proximity to the works and advise on the health of trees and any remedial actions required.

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

As some trees have been identified for removal (seven medium and one large), the Ecological Impact Assessment has recommended that a minimum of 36 trees be planted to meet TfNSW's offset ratios. Any additional trees that are found to require removal during construction would also need to be approved by TfNSW for removal and offset. Such measures and procedures for tree assessment and removal would be included and implemented as part of the CEMP for the Proposal. This would also include checking trees for active nests or hollows, prior to their removal.

The CEMP would be developed in accordance with the recommendations of the Ecological Impact Assessment (Biosis, 2015) and would include a range of other weed control, tree protection, and erosion and sedimentation control measures.

6.8 Contamination, landform, geology and soils

AECOM was engaged by TfNSW to undertake a contamination assessment at Penrith Station (AECOM, 2014). The investigation included a desktop assessment, and establishment of three boreholes (to a maximum depth of 15 metres) in October 2014. Borehole 1 (BH1) was established immediately north of the station, BH2 was located close to the southern entrance while BH3 was established in the interchange adjacent to the existing trees west of the old Station Master's Residence. Samples were obtained from the boreholes for the purposes of laboratory testing for the contamination assessment. The findings of these investigations are summarised in this section.

6.8.1 Existing environment

Geology and soils

Penrith Station is located on an even slope. The Soil Landscape Sheet for Penrith indicates that the station lies in an area underlain by the Richmond Formation (Bannerman & Hazelton., 1990) and this soil landscape typically has a low erosion potential. The *1:250,000 Geological Map of Sydney* maps the regional geology for the Proposal site as Quaternary Alluvium with gravel, sand, silt and clay (Bryan, 1966).

The NSW Natural Resource Atlas website and CSIRO Australian Soil Resource Information System tool were used to identify the potential for Acid Sulfate Soils (ASS) at the site. Penrith is not identified as an area with known occurrence of ASS. As such, the site is considered to have a very low probability for the occurrence of ASS.

Borehole testing undertaken by AECOM provided the following information about the subsurface conditions at Penrith Station:

- fill materials were encountered in all three boreholes and ranged in thickness from 0.9 metres to 2.8 metres below ground surface.
- fill materials were underlain by silty clays grading to sand and gravel
- grey siltstone and sandstone bedrock was observed in BH2 from 13.5 metres extending to the maximum depth of 15 metres.

Contamination

Laboratory analysis of six selected soil samples (two per borehole) was undertaken to identify concentrations of heavy metals; polycyclic aromatic hydrocarbons (PAHs); total recoverable hydrocarbons (TRHs); benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN); organochlorine and organophosphate pesticides; polychlorinated biphenyls (PCBs); asbestos; and toxicity characteristic leaching procedure for lead on a selected sample.

There were no exceedances of the selected soil assessment criteria for human health in any of the samples analysed and it was concluded that no remediation is considered necessary (AECOM, 2014). An assessment of the soil and Toxicity Characteristic Leaching Procedure analytical results indicated that material at the Proposal site could be classified as general solid waste. Further, no asbestos materials or fibres were detected in any of the samples collected.

A review of the contaminated land registers and the PoEO public register indicated that Penrith Station is not listed as a contaminated site, nor has the site been subject to regulation under the *Contaminated Land Management Act 1997*.

6.8.2 Potential impacts

a) Construction phase

The Proposal would require some excavation work for the foundations and footings of the pedestrian footbridge extension, paid concourse, lift shaft pits, stairs and canopies. Other trenching or excavation would be required for footpath and road works, relocation of services, new services, drainage works, retaining walls and tree removal.

Excavation and other earthworks such as trenching can result in erosion and sedimentation if not undertaken with appropriate controls. Such impacts can also lead to an adverse effect on biodiversity such as through the introduction of sediments into waterways. Erosion and sedimentation risks for the Proposal are considered to be low, given the soil landscape type and the existing slope of the surrounding area. It is expected that erosion risks could be adequately managed through the implementation of standard measures as outlined in the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004).

In addition, excavation has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. Contaminants would also pose an environmental risk if they were to enter nearby waterways through the stormwater infrastructure. Testing has indicated there is a low risk of contamination, however given the past land use, chemical testing and visual characterisation may need to be undertaken to confirm the composition and nature of excavated material. If any spoil is classified as unsuitable for reuse, it would be transferred to an appropriately licensed offsite facility.

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

b) Operational phase

There would be no operational risks to geology and soils as a result of the Proposal.

6.8.3 Mitigation measures

As part of the CEMP, a site-specific erosion and sediment controls plan/s would be prepared and implemented in accordance with the 'Blue Book' – *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004). The Erosion and Sediment Control Plans would be established prior to the commencement of construction and be updated and managed throughout as relevant to the activities during the construction phase.

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

Refer to Table 15 for a list of proposed mitigation measures.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface water and ground water

The nearest drainage line is Peach Tree Creek which is located around one kilometre to the west which then joins the Nepean River approximately 800 metres to the north.

The existing pedestrian footbridge, platforms and stairs all drain to existing track stormwater drainage systems. Surface runoff within the vicinity of the Proposal is managed by Penrith City Council's stormwater drainage system that consists mainly of at-grade stormwater pits and also a culvert which is present on the northern side of the station, which connect to an underground pipe network that flows to the Nepean River.

AECOM was engaged by TfNSW to undertake geotechnical investigations at the station which involved establishing three boreholes to a depth of up to 15 metres. Groundwater was encountered at depths of 4.5 metres, 7.5 metres and 8 metres below ground (AECOM, 2014)

Flooding

The map of areas subject to flood related development controls for Penrith City Council indicates that the 100 year Average Recurrence Interval (ARI) storm event flood does not impact the station and should not pose any difficulty to the development in terms of surface flooding. It is noted that the 1 in 100 year ARI storm event flood does impact the railway corridor to the west of Castlereagh Road however this should not pose any problems to the upgrade of the station (AECOM, 2013).

6.9.2 Potential impacts

a) Construction phase

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

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

Areas of excavations may need to be dewatered as a result of groundwater seepage and/or rainfall runoff. Incorrect dewatering can pose risks to nearby waterway and may be in contravention with associated legislation.

b) Operational phase

The Proposal is unlikely to impact upon the hydrology of the Proposal site or the surrounding area. New eaves and gutters would be installed for new canopies and roofs to connect to existing track drainage. New water supplies and sewer connections would be required for any new amenity areas (such as the Family Accessible Toilet).

Stormwater and drainage works would be designed and undertaken in accordance with the relevant ASA/Sydney Trains, Sydney Water and Penrith City Council standards and requirements.

6.9.3 Mitigation measures

As noted in Section 6.8.3, an Erosion and Sediment Control Plan would be prepared and implemented for the Proposal to manage risks to water quality. Other mitigation measures that would be required for construction include regular vehicle and equipment maintenance along with spill kits and spill response procedures. Any dewatering would be undertaken in accordance with the TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2015b).

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

Refer to Table 15 for a list of proposed mitigation measures.

6.10 Air quality

6.10.1 Existing environment

Based on a review of the existing land uses surrounding the Proposal, the existing air quality is considered to be characteristic of an urban environment (e.g. localised vehicle emissions). There is also potential for odour/dust from industrial areas to the north-east and dust from the construction of the Thornton development. Sensitive receivers in the vicinity of the Proposal include staff and customers at Penrith Station, residential, commercial and educational properties around the station.

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

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

The Penrith LGA forms part of the Sydney North West monitoring region with air quality monitored from four fixed sites at Richmond, St Marys, Vineyard and Prospect. A search of the daily regional air quality index (AQI) for the Sydney North West region for the last year (September 2014 to August 2015) showed that the region experienced:

- very good air quality on 7.4 per cent of days
- good air quality on 69.6 per cent of days
- fair air quality on 17.8 per cent of days
- poor air quality on 3.3 per cent of days
- very poor air quality on 0.8 per cent of days
- hazardous air quality on 1.1 per cent of days.

6.10.2 Potential impacts

a) Construction phase

The main air quality impacts that have the potential to occur during construction would be temporary impacts associated with dust particles and emissions of CO, SO₂, PM₁₀, nitrous oxides, volatile organic compounds (VOC), and polycyclic aromatic hydrocarbons (PAH) compounds associated with the combustion of diesel fuel and petrol from construction plant and equipment

Anticipated sources of dust and dust-generating activities include

- demolition of existing infrastructure such as existing stairs, pedestrian footbridge roof and platform canopies, shelters in the interchange and portable bus driver's facility adjacent to Platform 3
- excavation for the footings for the pedestrian footbridge extension and new stairs, and foundations for paid concourse and lift shafts
- other trenching or excavation may be required for footpath and road works, relocation of services, drainage works and tree removal
- stockpiling activities
- dust generated from the loading and transfer of material from trucks
- other general construction works.

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

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

b) Operational phase

Overall impacts of air quality during the operation of the Proposal are considered minimal as the Proposal would not result in a significant change in land use. Also, as the Proposal would increase access to public transport, the use of public transport would be anticipated to increase and subsequently aim to reduce the amount of private vehicle related emissions in the long term.

6.10.3 Mitigation measures

Table 15 provides a list of mitigation measures that are proposed to manage air quality issues during construction. They are aimed around maintaining and operating plant and equipment efficiently and implementing measures for dust suppression including watering, covered loads and appropriate management of tracked dirt/mud on vehicles. Such measures would be included in the CEMP to be prepared for the Proposal.

6.11 Other impacts

6.11.1 Services/utilities

The Proposal has the potential to impact services such as through direct impact from excavation activities or operation of other equipment, if services are not appropriately identified and protected or relocated.

The existing overhead electricity supplies, running parallel to the railway on the northern and southern sides of the station would be undergrounded as part of a separate project (and approval process). These works are expected to be completed prior to commencement of any works in that area that are related to the Proposal.

The detailed design of the Proposal would be undertaken to avoid services where feasible. Relocation or other works that may affect services would be undertaken in consultation with the respective utility authorities.

6.11.2 Waste

The construction of the Proposal would generate the following waste:

- asphalt and concrete
- civil works spoil (steel, concrete and roof materials from the demolition of existing structures along with fill material, silty clays and potentially some bedrock from excavations)
- materials from the lifts to be removed (to be reused)
- various building material wastes (including metals, timbers, plastics, concrete, carpeting etc.)
- bus shelters and bicycle racks (to be salvaged and provided to Penrith City Council)
- general waste, including food and other wastes generated by construction workers.

Waste management would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). A Waste Management Plan would be prepared that would identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities along with other onsite management practices such as keeping areas free of rubbish.

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

6.12 Cumulative impacts

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

A search of the Department of Planning and Environment's Major Projects Register, the Sydney West Joint Regional Planning Panel Development and Planning Register and Penrith City Council's Development Application Registers on 2 October 2015 identified a number of developments in the local area that are likely to be under construction at a similar time to the Proposal, and these are summarised below.

Penrith Progression began as an initiative of Penrith City Council and the Penrith Business Alliance, to transform the City Centre and deliver jobs for the future. *The Penrith Progression – A Plan for Action* formally launched in February 2015, and has the potential to bring 10,000 jobs and 5,000 dwellings to the City Centre (Penrith City Council, 2015). As a result there have been, and are likely to be, a number of residential, aged care and mixed use developments proposed around the station. The Proposal would help to meet the growing demand for public transport, but there may also be potential issues associated with numerous developments under construction at a similar time.

In particular, the area to the north of Penrith Station is undergoing change with the establishment of the Thornton development which will comprise 1,000 dwellings, approximately 15,125 m² of retail and commercial space, approximately 7,000 m² of light industrial floor space and seven hectares of open space. Construction for the subdivision works commenced a few years ago with construction works ongoing as the development is established over the coming years. The potential future receivers in this area have been considered in the Noise and Vibration Assessment for the Proposal (refer Section 6.3).

In addition there has also been recent construction associated with the multi-storey car park also to the north of the station and future works to underground the electricity cables along the northern rail corridor which are planned for later in 2015.

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

Traffic associated with the construction work is not anticipated to have a significant impact on the surrounding road network. Operational traffic and transport impacts would have a minor impact on the performance of the surrounding road network and would generally have a positive impact in particular by reducing the potential conflicts between pedestrian desire lines and bus and taxi movements through the interchange, resulting in lower road safety risk levels for pedestrians (refer also to Section 6.1.2).

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

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

6.13 Climate change and sustainability

6.13.1 Greenhouse gas emissions

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

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

Due to the small scale of the Proposal and the short-term temporary nature of the individual construction works, it is considered that greenhouse gas emissions resulting from the construction of the Proposal would be minimal. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures detailed in Table 15.

It is anticipated that, once operational, the Proposal may result in an increase in use of public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Penrith. A modal shift in transport usage may reduce the amount of fuel consumed by private motor vehicles with a corresponding relative reduction in associated greenhouse gas emissions in the local area.

6.13.2 Climate change

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

Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall expected to occur in a 100-year average recurrence interval flood event would occur more frequently. Such changes in weather in the region are unlikely to significantly impact on the operation of the Proposal, as the Proposal would not greatly increase the hardstand area and is not located within a flood prone area (refer also to Section 6.9).

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

6.13.3 Sustainability

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

Further positive impacts in relation to climate change and sustainability associated with the Proposal include encouraging a reduction in private vehicle use and increase the accessibility of public transport services.

7 Environmental management

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

7.1 Environmental management plans

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

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed below in Table 15. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 15 Proposed mitigation measures

No.	Mitigation measure
General	
1.	An Environmental Controls Map (ECM) would be developed prior to commencement of construction in accordance with TfNSW's <i>Guide to Environmental Controls Map</i> (TfNSW, 2015c). The ECM would be implemented and updated for the duration of construction.
2.	A project risk assessment including environmental aspects and impacts would be undertaken prior to the commencement of construction.
3.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate regular intervals.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, mitigation measures and conditions of approval.
5.	Service relocation would be undertaken in consultation with the relevant authority.
6.	Notification would be provided to the architect of Penrith Station (for the upgrade works undertaken between 1998-2000) in accordance with the legislative requirements of the <i>Copyright Act 1968</i> (Cth) prior to demolition works.

No.	Mitigation measure
Traffic and site access	
7.	An assessment of the interactions between pedestrians/cyclists (to avoid potential congestion/crowding) along with more detailed analysis of intersection operations would be undertaken during detailed design.
8.	Opportunities to formalise timed parking in the south-eastern commuter car park for kiss and ride/short stay during peak periods would be investigated during detailed design.
9.	Opportunities to relocate some of the motorbike parking to a suitable location on the southern side of the station would be investigated during detailed design.
10.	Further consultation with the NSW Taxi Council and Penrith City Council would be undertaken during the next phases of design in order to ascertain the adequacy of the proposed taxi rank capacity and identify any management measures that could be considered to accommodate potential taxi overflow. Investigation into other measures to mitigate the potential overflow issues (e.g. location/s for an alternate/overflow rank and/or options to increase capacity of the proposed rank) would also be undertaken during the next stage of design.
11.	<p>Prior to the commencement of construction a Construction Traffic Management Plan (CTMP) would be prepared as part of the CEMP and would include as a minimum:</p> <ul style="list-style-type: none"> procedures for preparing and implementing Traffic Control Plans (TCPs) and in particular for detours and traffic control to manage temporary disruptions on local roads procedures for preparing and implementing Pedestrian Management Plans (PMPs) in particular for arrangements/detours to maintain access to and from the station at all times, and safely manage pedestrian and cyclist route changes/diversions measures, including but not limited to: <ul style="list-style-type: none"> safely manage potential impacts to the operation of buses , taxis and kiss and ride (including details of alternate locations/facilities, signage etc.) limit temporary parking losses and provide alternative area/s for kiss and ride maintain private property access unless otherwise agreed final construction traffic approach and departure routes location of access to and from the local road network and contractor parking scheduling of works/deliveries to avoid peak times (e.g. school pick up/drop off times, where practicable) details of traffic controllers, construction signage and other community notification. <p>Consultation with the relevant roads authorities would be undertaken during preparation of the CTMP.</p>
12.	Heavy vehicles would be restricted to specified routes, with the aim of minimising impacts on local roads, high pedestrian areas and school zones. Where feasible, route markers would be installed for heavy vehicles along designated routes.
13.	The impacts of construction traffic on the local road network and the impacts on intersection operation would be minimised by undertaking construction vehicle traffic movements outside of peak road traffic periods and outside of school peak periods, where practicable.
14.	The queuing and idling of construction vehicles in residential streets would be minimised through staging of deliveries where practicable.

No.	Mitigation measure
15.	Communication would be provided to the community and local residents to inform them of impacts to vehicle movements and anticipated effects on the local road network relating to site works.
16.	Access to all private properties and businesses adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners.
17.	Should road closures be required, signage would be erected to clearly delineate alternative access and that nearby businesses would operate as normal.
18.	Pedestrian access to and from the station would be maintained at all times during construction.
19.	The performance of all project traffic arrangements would be monitored during construction.
20.	Consent under Section 138 of the <i>Roads Act 1993</i> would be obtained from Roads and Maritime prior to works on classified roads (i.e. Belmore Street/Jane Street).
21.	Road Occupancy Licences for temporary closure of local/classified roads would be obtained, where required.
22.	Consent from the relevant roads authority would be obtained for any proposed operational changes such as parking changes, signage and traffic signal changes etc. to Belmore Street, Jane Street and Station Street.
Urban design, landscape and visual amenity	
23.	<p>The detailed design of the Proposal would be undertaken with reference to the recommendations in the Visual Impact Assessment (Envisage Consulting, 2015) including, but not limited to, the following opportunities to mitigate visual impacts:</p> <ul style="list-style-type: none"> design any seating to be both aesthetically-pleasing and functional. Both formal and informal seating (such as grassed areas, steps and low walls) could be used to activate this public space adequate shelter/weather protection and trees should be placed such that they allow for views of the existing heritage buildings and the station entrance stairs minimise visual clutter by coordinating and streamlining station-related signage and advertising material.
24.	An Urban Design and Landscaping Plan (UDLP) would be prepared by the Contractor and submitted to TfNSW prior to finalisation of the detailed design.
25.	Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.
26.	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
27.	Light spill from the rail corridor into adjacent visually sensitive properties would be minimised by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution.
28.	All lighting would be designed and installed in accordance with the requirements of standards relevant to <i>AS 4282:1997 Controlling the Obtrusive Effects of Outdoor Lighting</i> .

No.	Mitigation measure
29.	During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.
Noise and vibration	
30.	Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the <i>Construction Noise Strategy</i> (TfNSW, 2012c) and the Noise and Vibration Impact Assessment for the Proposal (GHD, 2015). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
31.	Works would generally be carried out during normal work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). While some out of hours works would be required (e.g. during track possessions) an Out of Hours Work approval would need to be obtained from TfNSW by the Contractor.
32.	<p>To reduce the construction noise impact from human activities, reasonable and feasible noise mitigation options should be considered, including:</p> <ul style="list-style-type: none"> regularly training workers and contractors (such as at toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise avoiding any unnecessary noise when carrying out manual operations and when operating plant ensuring spoil is placed and not dropped into awaiting trucks avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where possible switching off any equipment not in use for extended periods e.g. heavy vehicles engines should be switched off whilst being unloaded avoiding deliveries at night/evenings wherever possible no idling of delivery trucks keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite; no dropping of materials from height where practicable, throwing of metal items and slamming of doors.
33.	<p>To reduce the construction noise and vibration impacts from mechanical activities, reasonable and feasible noise mitigation options should be considered, including:</p> <ul style="list-style-type: none"> maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances using the most suitable equipment necessary for the construction works at any one time directing noise-emitting plant away from sensitive receivers regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc. using non-tonal reversing/movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), or for any out of hours works fitting mufflers/silencers to pneumatic tools (e.g. breakers) and use residential-grade mufflers on plant use of quieter and less vibration emitting construction methods where feasible and reasonable.

No.	Mitigation measure
34.	Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding should take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible.
35.	Where the $L_{Aeq (15minute)}$ construction noise levels are predicted to exceed 75 dBA at nearby affected sensitive receivers, respite periods would be observed, where practicable. This would include restricting the hours that very noisy activities can occur.
36.	To avoid structural impacts as a result of vibration or direct contact with structures, the proposed works would be undertaken in accordance with the safe work distances outlined in the Noise and Vibration Assessment (GHD, 2015) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
Indigenous heritage	
37.	All construction staff would receive training in the recognition of Indigenous cultural heritage material as part of the project induction. This training would include information such as the importance of Indigenous cultural heritage material and places to both the Indigenous and non-Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
38.	If unanticipated Indigenous objects are uncovered during construction, work should cease in the vicinity of the find and the TfNSW Project Manager and TfNSW Environment and Planning Manager are to be immediately notified to assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist, the OEH and the Local Aboriginal Land Council. If human remains are found, work should cease, the site should be secured and the NSW Police and the OEH should be notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained before works recommence.
Non-Indigenous heritage	
39.	A Section 60 approval under the <i>Heritage Act 1977</i> would be obtained from the NSW Heritage Council prior to works commencing and the conditions of such must be implemented.
40.	As Penrith Station is listed on the heritage schedule of the Penrith LEP, Penrith City Council would be notified of the proposed works.
41.	A suitably qualified and experienced heritage architect will be engaged to provide input to, and review of, the detailed design of the Proposal. Modifications to the scope of works should be undertaken in consultation with the engaged heritage consultant to ensure that works may proceed in accordance with heritage best practice and the Section 60 Approval.
42.	It is recommended that an Archaeological Research Design and monitoring or excavation methodology be developed to further explore the potential impacts to archaeological relics associated with the District Inspectors Office/Regional Railways Manager's Residence and the Weighbridge/Guard hut. Should impacts be anticipated following detailed design, a review of the approvals would be undertaken and a modification sought, which should include an Archaeological Research Design and Methodology and nominate an Excavation Director with a demonstrated track record of working within a State Heritage Listed site.
43.	Wayfinding signage design to be further assessed and designed and installed in cooperation with the engaged heritage architect.

No.	Mitigation measure
44.	A Heritage Management Plan (including detailed drawings, documentation and specifications) and Work Method Statement would be prepared as part of the Construction Environmental Management Plan (CEMP) to address heritage impacts and required management procedures to minimise risks.
45.	<p>Archival recording is to be undertaken of the station as a whole prior to the commencement of construction following NSW Heritage Division guidelines <i>Photographic recording of heritage items using film or digital capture</i> (NSW Heritage Office, 2006) and <i>How to prepare archival records</i> (NSW Heritage Office, 1998). Copies should be provided to the NSW Heritage Division, Penrith City Council and Sydney Trains for future reference. In particular the following elements should be concentrated on:</p> <ul style="list-style-type: none"> existing pedestrian footbridge (including all spaces such as the retail spaces, offices etc.) and canopies and interface with the heritage structures Platform 3 heritage building foyer, and current Station Manager's Office and Ticket/Booking Office.
46.	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.
47.	During construction, suitable measures should be put in place to ensure the retained heritage elements are protected from damage. Measures may include hoardings, use of spotters during the movement of equipment and other measures as necessary.
48.	To effectively mitigate potential impacts of vibration on the heritage platform buildings, activities that cause vibration would be managed in accordance with German Standard DIN 4150 – Part 3 (DIN 1999) heritage specifications. Real time vibration monitoring would be conducted at commencement of relevant works to confirm compliance with the German Standard DIN 4150. If vibration levels approach the determined trigger level, then construction activity would cease and the heritage structure would be assessed before construction recommences.
49.	Copies of the 'as built' construction plans, photographs illustrating the completed works and the Archival Record would be lodged with RailCorp's Office of Rail Heritage as a documentary record of changes to the station.
50.	On completion of works, an update should be prepared for the State Heritage Register, with required details.
51.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, works within the vicinity of the deposit would cease immediately and the TfNSW Project Manager and TfNSW Environment and Planning Manager would be immediately notified to assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist. Where it is required further, archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
Socio-economic	
52.	Sustainability criteria for the Proposal would be established to encourage the Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
53.	Feedback through the submissions process would be encouraged and would facilitate opportunities for the community and stakeholders to have input into the project, where possible.

No.	Mitigation measure
54.	A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where possible.
55.	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.
56.	The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan to be developed prior to construction.
Biodiversity	
57.	The construction of the Proposal must be undertaken in accordance with TfNSW's <i>Vegetation Management (Protection and Removal) Guideline</i> (TfNSW, 2015d).
58.	All workers would be provided with an environmental induction prior to commencing work onsite. This induction would include information on the protection measures to be implemented to protect vegetation, penalties for breaches and locations of areas of sensitivity.
59.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. The Contractor is required to undertake the detailed design and construction of the Proposal with regard for the planted Tallowwood trees in the interchange with the number of trees to be removed limited to those identified in this REF, as far as practicable.
60.	Tree 10 (large Pepper tree) should be retained for its visual and heritage value. However, given its potential for collapse as identified in the Ecological Impact Assessment (Biosis, 2015), a specialist arborist would carry out an assessment of Tree 10 to ensure its proposed retention is a safe and viable option. Prior to any lopping or removal of Tree 10 (if required), investigations would be undertaken by a suitably qualified ecologist to determine whether the tree provides roosting habitat for threatened micro-bat species.
61.	Tree 11 (smaller Pepper tree) is nominated for removal, but should be retained if possible and this would be investigated during detailed design.
62.	Investigations into Tree 16 (larger Rubber tree) would be undertaken during detailed design to ascertain the potential for future damage to buildings and paving from the typically invasive root system of this species.
63.	Tree Protection Zones (TPZs) should be established around trees to be retained, as nominated in the Ecological Impact Assessment (Biosis, 2015). Tree protection should be undertaken in line with <i>AS 4970-2009 Protection of Trees on Development Sites</i> and should include exclusion fencing of TPZs.
64.	Trees to be removed as nominated in the Ecological Impact Assessment (Biosis, 2015) would be clearly demarcated onsite prior to construction, to avoid unnecessary vegetation removal. Trees to be retained would be protected through temporary protection measures discussed above.
65.	In the event of any tree to be retained becoming damaged during construction, an arborist would be informed immediately to inspect and provide advice on remedial action where possible.

No.	Mitigation measure
66.	Should onsite works determine the removal or trimming of any additional trees, TfNSW's Tree Removal Application Form would need to be completed and submitted to TfNSW for approval.
67.	Weed control measures would be development and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal in accordance with the <i>Noxious Weeds Act 1993</i> .
68.	Vehicles and other equipment to be used onsite would be cleaned to minimise seeds and plant material entering the site to prevent the introduction of further exotic plant species.
69.	For new landscaping works, mulching and watering would be undertaken until plants are established.
70.	Offsets and/or landscaping would be undertaken in accordance with TfNSW's <i>Vegetation Offset Guide</i> (TfNSW, 2013d) and in consultation with Penrith City Council and Sydney Trains. The eight trees earmarked for removal should be offset with a minimum of 36 trees as advised in the Ecological Impact Assessment (Biosis, 2015). Any additional clearing would also require tree offset planting.
71.	Spotted Gums should be considered as species selected for tree offsets to provide foraging habitat.
Soils and water	
72.	<p>Prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' <i>Managing Urban Stormwater: Soils and Construction Guidelines</i> (Landcom, 2004). The Erosion and Sediment Control Plan would be implemented prior to and throughout construction and be updated and managed throughout as relevant to the activities during the construction phase. Measures would include:</p> <ul style="list-style-type: none"> • stabilised surfaces would be reinstated as quickly as practicable after construction • all stockpiled materials would be stored in bunded areas, covered appropriately and kept away from waterways to avoid sediment entering the waterways • sediment would be prevented from moving offsite and sediment laden water prevented from entering any watercourse, drainage line or drainage inlet • any material transported onto pavement surfaces would be swept and removed at the end of each working day. <p>Erosion and sediment control measures would be implemented and maintained to:</p> <ul style="list-style-type: none"> • prevent sediment moving offsite and sediment laden water entering any water course, drainage lines, or drain inlets • reduce water velocity and capture sediment onsite • minimise the amount of material transported from site to surrounding pavement surfaces • divert clean water around the site.
73.	Erosion and sediment control measures would be established prior to any clearing and grubbing and site establishment activities.
74.	Erosion and sediment control measures would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality.
75.	Erosion and sediment control measures would be left in place until the works are complete and areas are stabilised.

No.	Mitigation measure
76.	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.
77.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards and EPA Guidelines.
78.	Construction plant, vehicles and equipment would be refuelled offsite, or in a designated refuelling area.
79.	Adequate water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW <i>Chemical Storage and Spill Management Guidelines</i> (TfNSW, 2015f) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in its use.
80.	The existing Sydney Trains and Council drainage systems would remain operational throughout the construction of the project.
81.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the <i>Waste Classification Guidelines</i> (EPA, 2014) and <i>Water Discharge and Reuse Guideline</i> (TfNSW, 2015b).
82.	In the event of a pollution incident, works would cease in the immediate vicinity and the EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
Air quality	
83.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
84.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
85.	Visual monitoring of dust would be undertaken, where visible levels of dust are high, onsite activities would be reviewed, with additional control measures and/or varied site operations implemented if required.
86.	Stockpiles would be covered when not in use.
87.	Dust would be visually monitored and where necessary the following measures implemented: <ul style="list-style-type: none"> • 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.
88.	Prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces.
89.	Plant and machinery would be regularly checked and maintained in a proper and efficient condition.

No.	Mitigation measure
Waste and contamination	
90.	A Waste Management Plan would be prepared by the Contractor that would identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities along with other onsite management practices such as keeping areas free of rubbish.
91.	An appropriate Unexpected Finds Protocol, incorporating asbestos containing materials and other potential contaminants, would be included in the CEMP. This would include procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements.
92.	An environmental risk assessment is to be undertaken prior to construction and must include a section on contamination as per the TfNSW Standard Requirements.
93.	All spoil to be removed from site would be tested to confirm presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
94.	Waste material would not to be left on site once the works have been completed.
Climate change and sustainability	
95.	The detailed design process would undertake an AS14064-2 (Greenhouse Gases - project level) compliant carbon footprinting exercise in accordance with TfNSW <i>Greenhouse Gas Inventory Guide for Construction Projects</i> (TfNSW, 2013e). The carbon footprint would be used to inform decision making in design and construction.
96.	The detailed design process would undertake a climate change impact assessment with reference to the <i>Climate Change Impacts and Risk Management: A Guide for Business and Government</i> (Department of the Environment and Heritage, 2006) and the <i>ISCA Guidelines for Climate Change Adaptation</i> (AGIC, 2011) to determine the hazards/risks associated with future climatic conditions. Issues including protecting customers and electrical equipment from wind and rain during storm events, size of guttering, cross flow ventilation, reflective surfaces etc. would be considered in the design.
97.	Detailed design of the Proposal would be undertaken in accordance with the <i>NSW Sustainable Design Guidelines – Version 3.0</i> (TfNSW, 2013a) with a view to obtaining a Silver rating or better.
Cumulative impacts	
98.	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.

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:

- improve customer safety and enhance pedestrian and bus network links through the reconfiguration of the bus, taxi, kiss and ride and bicycle zones within the interchange
- provide a station with improved accessibility for all, including those with a disability, the ageing and parents/carers with prams by minimising conflict points and crowding points, and by improving modal separation to provide a safer interchange
- improve cross-corridor connections by creating a new paid concourse allowing for increased capacity for unpaid access across the existing pedestrian footbridge and new stairs
- improve customer experience and amenity through improved facilities including canopies for weather protection, a new Customer Information Window and Family Accessible Toilet, Passenger Information Display boards and new wayfinding in and around the station
- improve the integration of the station and interchange with its current and future urban context, and create a positive addition to the public domain
- potentially increase the use of public transport to and from Penrith Station.

The likely key impacts of the Proposal are as follows:

- changes to access/egress station entry points, platforms and nearby footpaths during construction and operation
- changes to bus/taxi/kiss and ride operations during construction and reduction of kiss and ride and taxi rank capacity during operation
- temporary loss of parking around the station during construction and the permanent removal of the timed car park on the south-eastern side of the station (approximately 25 spaces and seven motorbike spaces) and some loss of parking from the south-western car park (net loss of approximately 20 spaces and 11 motorbike spaces)
- temporary construction noise, dust and visual impacts
- introduction of new elements into the heritage precinct and modifications to the Platform 3 heritage building
- removal of trees/vegetation that would require planting offsets
- introduction of new elements into the visual environment such as the new paid concourse, canopies, lifts and stairs.

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

The Proposal would also take into account the principles of ESD (refer to Section 3.1.4 and Section 4.6). These would be considered during the detailed design, construction and operational phases of the Proposal. This would ensure the Proposal is delivered to maximum benefit to the community, is cost effective and minimises any adverse impacts on the environment.

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Appendix A Consideration of matters of National Environmental Significance

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

Matters of NES	Impacts
Any impact on a World Heritage property? There are no World Heritage properties in the vicinity of the Proposal.	Nil
Any impact on a National Heritage place? There are no National Heritage properties in the vicinity of the Proposal.	Nil
Any impact on a wetland of international importance? There are no wetlands of international significance in the vicinity of the Proposal.	Nil
Any impact on a listed threatened species or communities? It is unlikely that the development of the Proposal would significantly affect any listed species or communities.	Nil
Any impacts on listed migratory species? It is unlikely that the development of the Proposal would significantly affect any listed migratory species.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? There are no Commonwealth marine areas in the vicinity of the Proposal.	Nil
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The Proposal is for a transport facility and is not related to coal seam gas or mining.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The Proposal would not be undertaken on or near any Commonwealth land.	Nil

Appendix B Consideration of clause 228

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

Factor	Impacts
<p>(a) Any environmental impact on a community?</p> <p>There would be some temporary impacts to the community during construction, particularly in relation to noise, traffic and access and visual amenity. Mitigation measures outlined in Chapter 7 would be implemented to manage and minimise adverse impacts.</p>	Minor
<p>(b) Any transformation of a locality?</p> <p>The Proposal would have a positive impact on the locality by creating new station entrance points through the new stairs on each side of the pedestrian footbridge and allowing for a wider cross-corridor connection (with the existing pedestrian footbridge to be retained for unpaid access, and a new paid concourse immediately to the east).</p> <p>The new canopies/roofs would be lower than the existing and designed in consideration of the heritage values of the station.</p> <p>The Visual Impact Assessment considered the new structures within the existing visual environment and found that there would be an overall low-moderate impact to nearby receivers (based on the visual sensitivity of nearby receivers and magnitude of the impacts).</p>	Minor
<p>(c) Any environmental impact on the ecosystem of the locality?</p> <p>The Proposal would require removal of approximately eight trees (seven medium and one large) but given the Proposal's location within an urbanised environment and the low habitat value of the trees to be removed, impacts to biodiversity and ecosystems are expected to be negligible.</p>	Nil
<p>(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>There would be some temporary impacts during construction particularly in relation to noise, traffic and access and visual amenity.</p> <p>Approximately eight trees (seven medium and one large) would need to be removed from the southern side of the station. The number of trees to be removed would be minimised as far as possible given that the trees have a high aesthetic value contributing to the landscape character of the area. Landscaping around the station is proposed and would assist in the offset of vegetation to be removed.</p>	Minor

Factor	Impacts
<p>(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</p> <p>A desktop archaeological assessment has been undertaken which determined that the proposed works may be required in areas of archaeological sensitivity and that more research during detailed is required to determine potential impacts.</p> <p>The Proposal requires the addition of new infrastructure within the heritage precinct as well as modifications to the Platform 3 heritage building to allow for a new Bus Driver's Amenities Room and Customer Service Manager's Office. The impacts of these changes have been assessed in a Statement of Heritage Impact for the Proposal which found that the Proposal would not impact on the significance of the station and would not result in impacts to heritage fabric.</p> <p>The impacts to the heritage-listed station as a whole as a result of the Proposal have also been considered which includes designing new elements to be visually recessive with modern and light materials to maintain focus of the heritage-listed buildings. The removal of clutter and the rationalisation of services on the platforms would help to enhance the visual accessibility of the heritage buildings.</p> <p>On the positive side, the Proposal would have a positive contribution to the locality by creating a wider cross-corridor connection with new entrance stairs. The proposed glass façade on the western side of the pedestrian footbridge would allow for views of the heritage buildings and the Blue Mountains.</p>	Minor
<p>(f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)?</p> <p>The Proposal is unlikely to have any impact on the habitat of protected fauna.</p>	Nil
<p>(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The Proposal is unlikely to have any impact on endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.</p>	Nil
<p>(h) Any long term effects on the environment?</p> <p>The Proposal is unlikely to have any long term effects on the environment.</p>	Nil
<p>(i) Any degradation of the quality of the environment?</p> <p>The Proposal is unlikely to have any degradation on the quality of the environment.</p>	Nil
<p>(j) Any risk to the safety of the environment?</p> <p>The Proposal is unlikely to cause any pollution or safety risks to the environment provided the recommended mitigation measures are implemented.</p>	Nil
<p>(k) Any reduction in the range of beneficial uses of the environment?</p> <p>The Proposal is unlikely to have any reduction in the range of beneficial uses of the environment.</p>	Nil

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

Appendix C Sustainable Design Guidelines checklist

Compulsory initiatives

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
C.1 Carbon footprint	Energy and greenhouse	Undertake AS14064-2 (greenhouse gases – project level) compliant carbon footprinting exercise for all projects with a capital investment value over \$10 million in accordance with Transport for NSW's Greenhouse Gas Inventory Guide for Construction Projects. The carbon footprint is to be used to inform decision-making in design and construction. Use standard carbon coefficient values for construction material and fuel usage. Monitor and report the carbon footprint every six months during construction.	DC	Yes
C.3 Five star application	Energy and greenhouse	Purchase plug in equipment with at least five star Minimum Energy Performance Standards (MEPS) rating (fridges, air conditioners etc.) or an Energy Star accreditation (IT Equipment)	DC	Yes
C.4 Insulation	Energy and greenhouse	Insulate covered and indoor areas. Techniques include adequate thermal mass, and insulating walls and ceilings. Also ensure that all opening are sealed.	D	Yes
C.6 Climate change impact assessment	Climate resilience	Perform a climate change impact assessment for each project worth over \$10M using current scientific predictions (i.e. Intergovernmental Panel on Climate Change (IPCC), Commonwealth Scientific and Industrial Research Organisation (CSIRO) etc) to determine the hazards/risks associated with future climatic conditions. Refer to 'Climate Change Impacts and Risk Management: A Guide for Business and Government' and the 'AGIC Guidelines for Climate Change Adaptation' for guidance.	D	Yes
C.7 Design for climate change	Climate resilience	All projects with a capital investment value over \$10 million to design out extreme, high and medium risks as identified in the climate change impact assessment where practicable.	D	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
C.8 Whole of life costing	Materials and waste	Use whole of life costing methodologies (e.g. Life-Cycle Cost Analysis (LCCA) Method) in line with ISO 15686-5 to inform decision-making on significant issues pertaining to project scope options (e.g. route selection) and material/technology selection (e.g. steel versus concrete bridge). Significant issues can be determined using qualitative criteria such as likely scale of environmental impact.	DC	Yes
C.9 Reduce waste to landfill	Materials and waste	Ensure at least 95 per cent of construction and demolition waste (by weight) is diverted from landfill, and either recycled or reused, for all projects with a capital investment value over \$10 million.	DC	Yes
C.11 Reduce cement	Materials and waste	Reduce the absolute quantity of Portland cement by at least 30 per cent, as an average across all concrete mixes, by substituting it with supplementary cementitious materials (such as a fly ash, ground granulated blast furnace slag or alkali activated cements) subject to meeting strength and durability requirements.	DC	Yes
C.12 Biodiversity offsetting	Biodiversity and heritage	For non-significant impacts (inside or outside the rail corridor) offsetting is to be in accordance with the TPD Vegetation Offset Guide as applicable.	DC	Yes
C.13 Heritage conservation and enhancement	Biodiversity and heritage	100 per cent of significant heritage items are identified during project development and design and are protected or beneficially reused where practical. This will require consultation with all relevant Indigenous Heritage groups (where applicable).	DC	Yes
C.14 Heritage interpretation	Biodiversity and heritage	Achieve interpretation of all applicable heritage or historic items through development and implementation of a heritage interpretation strategy (e.g. incorporate interpretive signage at the station, which provides information on the heritage of the area).	DC	Yes
C.16 Water efficient fittings	Water	Ensure onsite amenities using potable water comply with the following criteria: Toilets to be WELS (max 4.5/3 L/min) dual flush toilets; Urinals to be waterless; All taps to be WELS (max 7.5 L/min); (see Green Star Office v3). Any other water fixtures should achieve at least a 5 Star WELS rating.	DC	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
C.17 Water efficient controls	Water	Specify sensors, timers or spring loaded devices for taps where possible to reduce water loss from taps that are left running.	D	Yes
C.18 Monitor and record construction water	Water	Projects that have capital value greater than \$10 million are to monitor and record water consumption at the site office, all outlets available to the construction site and other water uses such as from non -potable sources.	C	Yes
C.20 Noise management	Pollution control	Project to comply with Transport Projects Construction Noise Strategy and related conditions of approval.	DC	Yes
C.21 Community involvement in planning	Community benefit	Actively engage with stakeholders including the community during planning.	D	Yes
C.22 Planning framework		Plan and design projects to take into considerations existing planning strategies in consultation with relevant authorities.	D	Yes
C.23 Crime Prevention Through Environmental Design (CPTED)	Community benefit	Incorporate CPTED principles during design. This may include natural observation and use of CCTV. Natural observation is achieved through fence, landscape, streetscape and open space design in public or staff supervised areas. This is achieved by minimising narrow corridors, hidden corners and through the use of lighting.	D	Yes

Discretionary initiatives

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
1.2 Quantity surveyor	Energy and greenhouse	Quantity surveyor reports to include mass quantities of building materials. This will enable the carbon footprinting to be more accurate and more cost effective. Quantity surveyor reports will also include costing for capital and ongoing maintenance of sustainability initiatives that involve onsite energy generation.	DC	Yes
1.3 Power factor correction	Energy and greenhouse	Install power factor correction (PFC) units to keep the power factor of the system as close to one as possible.	D	Yes
1.15 Light coloured finishes	Energy and greenhouse	Use light coloured finishes on floors, walls and ceilings of offices, stations and platforms to help reflect ambient light. Within car parks, consider glare and safety issues that may arise.	D	Yes
1.17 Photo-electric switches	Energy and greenhouse	Install control systems for lighting that dim or switch-off lights according to the amount of daylight the zone is receiving. The lights can also switch on in order to maintain a minimum level of lighting. Lights should be off when areas are closed or unoccupied.	D	Yes
1.20 LED lights	Energy and greenhouse	Incorporate energy efficient LED lighting.	D	Yes
1.22 Lighting scheme	Energy and greenhouse	Prepare a lighting scheme by a suitably qualified lighting designer. Pay attention to zoning between lighting demands of different areas and strategic placement of lighting fixtures to maximise ground coverage.	D	Yes
1.23 CCTV lighting	Energy and greenhouse	Install low light CCTV monitoring equipment.	D	Yes
1.25 Natural ventilation	Energy and greenhouse	Naturally ventilate structures (refer to AS1668.2-2002 (type 3)). Consider prevailing winds.	D	Yes
1.40 Energy efficient HVAC	Energy and greenhouse	Select and design HVAC system with prioritisation of energy efficiency. See section 4.3.1.3 of the ASA Station Design Standard Requirements for further information on air conditioning and ventilation requirements at stations. Also refer to AS1668.2 -2002.	D	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
1.44 Vertical transport	Energy and greenhouse	Install energy efficient vertical transport systems (e.g. ramps; variable speed drive escalators that enable a slow-mode, so that they oscillate at lower speeds when not in use and increase in speed when users step into the foot panel at the entry to the escalator. Install and variable voltage variable frequency (VVVF) control gear for lifts.	D	Yes
1.45 Stair placement to encourage use	Energy and greenhouse	Locate stairs along desire lines to encourage use. Provide stairs instead of escalators unless there is a 6 metre rise or greater, or a platform clearance or congestion issue. Maintain ramps or lifts for disabled access.	D	Yes
1.50 Design for part-load operation	Energy and greenhouse	Design systems to run most efficiently under conditions that they are to be used most often, and where appropriate design to operate efficiently over a range of conditions.	D	Yes
2.3 Passenger comfort	Climate resilience	Review levels of passenger comfort to take account of climate change (e.g. provision of additional shelter from winds and driving rain and increased shading from sun in locations where customers wait for transport).	D	Yes
2.4 Design for flood/inundation risk	Climate resilience	Specify vent levels and portal drainage to address predicted increases in rainfall intensity, future flood conditions and sea levels.	D	Yes
2.6 Equipment resilience to temperature	Climate resilience	Select equipment that will be resilient to increased temperature and more frequent and severe heat waves. Temperature resilient equipment will also negate or reduce need for active temperature control, reducing operational energy consumption.	D	Yes
2.7 Back up power supply	Climate resilience	Incorporate backup or auxiliary power sources to supply essential services during power outages or extreme events.	D	Yes
2.8 Protection from extreme weather (sun, rain, wind)	Climate resilience	Consider design measures for protecting customers and electrical equipment from wind and rain during storm events.	D	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
2.9 Protect sensitive assets	Climate resilience	Protect sensitive assets (e.g. lifts, escalators) from the effects of extreme climate and weather.	D	Yes
3.3 Environmentally responsible suppliers	Materials and waste	Use materials certified under recognised environmental certification systems (such as EcoSpecifier, Good Environmental Choice, ECO-Buy, water efficiency labelling scheme (WELS), Energy Star, Forest Stewardship Council (FSC), Low Carbon Australia Carbon Neutral Certified).	DC	Yes
3.5 Optimise design	Materials and waste	Optimise design to minimise material consumption, mass/volume/space use and above ground land use.	D	Yes
3.6 Re-use of structures	Materials and waste	Retain or refurbish existing structures where possible.	DC	Yes
3.8 Low impact concrete	Materials and waste	<p>Make sure that the mix water for concrete contains at least 50 per cent non –potable water. Substitute aggregates to the following levels (but only if Portland cement content does not increase by more than 5 kg/m3):</p> <ul style="list-style-type: none"> At least 40 per cent of coarse aggregate is crushed concrete aggregate or alternative materials. At least 25 per cent of fine aggregates (sand) are manufactured sand or alternative materials. 	DC	Yes
3.9 Recycled aggregate	Materials and waste	Use recycled aggregate in non-structural steel (by weight) from a steel fabricator/contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute.	DC	Yes
3.14 Sustainable structural steel	Materials and waste	Source at least 60 per cent of structural steel (by weight) from a steel fabricator/contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute.	C	Yes
3.17 Low VOC paints and finishes	Materials and waste	Specify low volatile organic compound (VOC) paints and finishes. Refer to Green Star – Office Interiors v1.1 available online.	DC	Yes
3.18 Low VOC adhesives and sealants	Materials and waste	Specify all adhesives and sealants as low VOC. Refer to Green Star – Office Interiors v1.1 available online.	DC	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
3.29 Segregation of waste	Materials and waste	Enable waste segregation in the design process by including space for the collection and segregation of waste with appropriate marking (e.g. signage) and controls (e.g. lockable lids), located away from sensitive receptors (e.g. water courses). During construction, use facilities and procedures that maximise on-site separation of waste to maximise reuse/recycling.	DC	Yes
3.31 Mulching	Materials and waste	Mulch all appropriate waste vegetation (no weeds) where justified by volume or send it to an off-site compost facility.	C	Yes
3.34 Prevent electrolysis	Materials and waste	Prevent or minimise the effects of stray current electrolysis from electrified railway that increase the rate of corrosion. Such as selecting suitable building materials, avoiding using metal finishes in the vicinity of high voltage electricity, using masking agents or coatings to prevent exposure of metals, and preventing direct contact between metallic parts.	D	Yes
3.35 Modular construction	Materials and waste	Use modular and replaceable finishing elements (e.g. tunnel lining).	D	Yes
3.36 Prefabrication	Materials and waste	Use prefabricated building and civil components (for bridges, walls (retaining, deflection, noise), culverts, platforms, level crossings and tunnel lining etc) to reduce construction waste material usage, pollution risks and travel.	DC	Yes
3.37 Low finish interiors	Materials and waste	Specify low-finish interiors (e.g. exposed brick/rock walls, unpainted galvanised steel, polished concrete walls and floors) to avoid the need for large quantities of paint and/or cement render. Consider graffiti removal in specifying surface textures.	D	Yes
3.39 Member spacing	Materials and waste	Optimise the spacing of structural members in beam and post type designs.	D	Yes
3.41 Coordinate dimensions	Materials and waste	Design for standard material sizes and components to reduce waste and improve ease of assembly and disassembly.	D	Yes
3.42 Design for disassembly	Materials and waste	Design for disassembly of new structures to maximise opportunities for recycling materials. Develop a deconstruction plan supported by disassembly principles.	D	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
3.43 Durable finishes	Materials and waste	Specify building materials and finishes to demonstrate high quality and durability.	D	Yes
3.47 Correct site layout	Materials and waste	Layout of construction site (including plant and equipment) to be designed to reduce travel distance and double carrying.	C	Yes
3.49 Just in time inventory	Materials and waste	Using 'just in time' methods of equipment and supply delivery; reducing overall storage requirements and potential for waste materials/equipment.	C	Yes
4.2 Ecological value opportunities	Biodiversity and heritage	Maximise ecological values through landscape species choice, and planting density and configuration. Make sure that appropriate weed management strategies are undertaken to avoid migration or contamination on and offsite.	DC	Yes
5.10 Planting	Water	Select plant species that require minimal or no irrigation after establishment.	DC	Yes
5.15 Permeable and porous surfaces	Water	Design for permeable and porous surfaces to allow for stormwater infiltration (preferably with other treatments such as vegetated swales).	D	Yes
6.4 Avoid dangerous goods and hazardous materials	Pollution control	Use Safety Data Sheets (SDS) to avoid the use of dangerous goods and hazardous materials. See the materials section in Appendix B for details.	DC	Yes
6.5 Apply noise control hierarchy	Pollution control	Apply a hierarchy of control by addressing noise at source first (e.g. orient equipment away from residential receivers), then propagation path (e.g. a noise barrier) and finally at the receiver (e.g. double glazed windows) as a last option (see Rail Infrastructure Noise Guidelines for further information).	D	Yes
6.12 Optimise outdoor PA systems	Pollution control	Optimise design and installation of open and semi-enclosed stations' PA systems to reduce impact on community.	D	Yes
6.14 Location of air intakes	Pollution control	Make sure that air intakes are located away from loading bays, parking areas, exhaust stacks, garbage/waste storage areas and other contamination points that may transfer odours, particulates or moisture.	D	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
6.17 Avoid glare and light pollution	Pollution control	Minimise ambient light levels and glare towards neighbouring properties (e.g. avoid or obstruct up lighting). Refer to ASA standard 3.11.3.3 for guidance and make sure that design complies with AS4282 Control of the Obtrusive Effects of Outdoor Lighting. Do not exceed minimum requirements of AS1158 for illuminance levels for 95 per cent of outdoor spaces.	D	Yes
7.11 Avoid future possessions	Community benefit	Consider maintenance and construction solutions that eliminate or minimise need for future possessions (e.g. power isolation).	D	Yes
7.13 Enhance visual interest of asset	Community benefit	Use lighting, landscaping and/or public art to direct visual interest towards the structure and enhance the visual amenity of the structure.	DC	Yes
7.19 Kiss and ride	Community benefit	Provide for kiss and ride at the station.	D	Yes
7.20 Taxi stand and/or bus stop	Community benefit	Provide shelter for nearby taxi stands and bus stops.	D	Yes
7.22 Code of practice for construction	Community benefit	Prepare a code of practice for construction contractors. Refer to the Australian Procurement and Construction Council (APCC) National Code of Practice for the Construction Industry (1997) and supporting Towards Best Practice Guidelines (1999) and Implementation Guidelines (2009) for guidance.	D	Yes
7.33 Safe pedestrian movement	Community benefit	Make sure that safe movement is promoted for pedestrians and cyclists by minimising vehicle crossings of paths, providing clear signage, and providing freedom from obstacles such as poles, trees etc.	D	Yes
7.35 Asset protection zones	Community benefit	Provide an asset protection zone (APZ) fire buffer around buildings and infrastructure. Refer to the Standards for Asset Protection Zones (NSW Rural Fire Service).	D	Yes
7.36 Safe hot water	Community benefit	Use safe hot water fittings (instead of mixing valves) to control water temperature at the tap and prevent scalding.	DC	Yes

Initiative	Theme	Description	Design (D) or Construct (C) interface	Under consideration
7.38 Reduce vandalism	Community benefit	Minimise risks from vandalism during design, such as designing pedestrian bridges and walkways with a high degree of surveillance or railings, restrict window openings and limit to a maximum 80mm opening.	D	Yes
7.39 Reduce graffiti	Community benefit	Minimise graffiti risks such as through treatment of fencing and other surfaces with anti-graffiti paint or coatings, vegetation cover to deter graffiti or providing designated walls for graffiti.	D	Yes
7.40 Intelligible PA systems	Community benefit	Design public address (PA) system to maximise coverage and speech intelligibility for customers and staff. Considerations are to include distributed speaker systems, announcements booths to allow clear and audible announcements, acoustic absorption materials in appropriate waiting areas and text based announcements on public displays for the hearing impaired.	D	Yes
7.50 Shading	Community benefit	Provide shade through vegetation or structures over platform, concourse, car parks and pedestrian pathway areas and work/lunch areas.	D	Yes