

Transport Access Program **Glenbrook Station Upgrade** Review of Environmental Factors



Artist's impression of Glenbrook Station Upgrade, indicative only, subject to detailed design



Glenbrook Station Upgrade Review of Environmental Factors

**Transport Access Program
Ref-6128776**

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Abbreviations

Term	Meaning
AS	Australia Standard
AHIMS	Aboriginal Heritage Information Management System
ARI	Average Recurrence Interval
ASA	Asset Standards Authority (refer to Definitions)
ASS	Acid Sulfate Soils
BCA	Building Code of Australia
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BMCC	Blue Mountains City Council
BS	British Standard
CBD	Central Business District
CCTV	Closed Circuit TV
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CLM Act	<i>Contaminated Land Management Act 1997 (NSW)</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 (Cwlth)</i>
DoEE	Commonwealth Department of the Environment and Energy
DP&E	NSW Department of Planning and Environment
DSAPT	<i>Disability Standards for Accessible Public Transport (2002)</i>
ECM	Environmental Controls Map
EEC	Endangered Ecological Community
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>

Term	Meaning
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000 (NSW)</i>
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EPI	Environmental planning instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
ICNG	<i>Interim Construction Noise Guideline</i> (Department of Environment and Climate Change, 2000).
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007 (NSW)</i>
KTP	Key threatening process
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
MCA	Multi-criteria analysis
NCA	Noise catchment area
NES	National Environmental Significance
NHL	National Heritage List
NML	Noise management level
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
PA system	Public Address system
PAMP	Pedestrian Access and Mobility Plan
PCT	Plant Community Type
PDP	Public Domain Plan
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>

Term	Meaning
PTNL	Project Trigger Noise Level
RailCorp	(former) Rail Corporation of NSW
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	<i>Roads Act 1993 (NSW)</i>
Roads and Maritime	NSW Roads and Maritime Services (formerly Roads and Traffic Authority)
SEPP	State Environmental Planning Policy
SHI	State Heritage Inventory
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
TECs	Threatened ecological communities
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TGSI	Tactile Ground Surface Indicators (“tactiles”)
TMP	Traffic Management Plan
TPZ	Tree Protection Zone
UDP	Urban Design Plan
VDV	Vibration Dosage Value
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001 (NSW)</i>
WHL	World Heritage List

Definitions

Term	Meaning
Average Recurrence Interval	The likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood will occur on average once every 100-years.
Asset Standards Authority	The ASA is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets. Design Authority functions formerly performed by RailCorp are now exercised by ASA.
Concept design	The concept design is the preliminary design presented in this REF, which would be refined by the Construction Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance).
Design and Construct Contract	A method to deliver a project in which the design and construction services are contracted by a single entity known as the Construction Contractor. The Construction Contractor completes the project by refining the concept design presented in the REF and completing the detailed design so that it is suitable for construction (subject to TfNSW acceptance). The Construction Contractor is therefore responsible for all work on the project, both design and construction.
Detailed design	Detailed design broadly refers to the process that the Construction Contractor undertakes (should the Proposal proceed) to refine the concept design to a design suitable for construction (subject to TfNSW acceptance).
Disability Standards for Accessible Public Transport	The Commonwealth <i>Disability Standards for Accessible Public Transport 2002</i> ("Transport Standards") (as amended) are a set of legally enforceable standards, authorised under the Commonwealth <i>Disability Discrimination Act 1992</i> (DDA) for the purpose of removing discrimination 'as far as possible' against people with disabilities. The Transport Standards cover premises, infrastructure and conveyances, and apply to public transport operators and premises providers.
Ecologically Sustainable Development	As defined by clause 7(4) Schedule 2 of the EP&A Regulation. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Feasible	A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.
Interchange	Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.
Noise sensitive receiver	In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios and places of worship/religious facilities (e.g. churches).
Nosing	Refers to the top edge of a step that protrudes slightly out.

Term	Meaning
NSW TrainLink	From 1 July 2013, NSW TrainLink became the new rail provider of services for regional rail customers.
Opal card	The integrated ticketing smartcard introduced by TfNSW.
Out of hours works	Defined as works <i>outside</i> standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).
Proponent	A person or body proposing to carry out an activity under Part 5, Division 5.1 of the EP&A Act - in this instance, TfNSW.
Rail shutdown	Shutdown is the term used by railway building/maintenance personnel to indicate that they have taken possession of the track (usually a section 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 Glenbrook Station Upgrade.
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 5.5 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 Glenbrook 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, 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, Division 5.1 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:

- installation of a new lift on the platform to provide access to the existing footbridge (footbridge and stairs to be retained)
- provision of a new station entrance which would include removal of the existing (non-compliant) ramp from the footbridge to Burfitt Parade to be replaced with new stairs and a new accessible path from the existing footbridge extending east to the raised pedestrian crossing
- landscaping around the station entrance
- internal reconfiguration of the station building to allow for a new Family Accessible Toilet, a new ambulant toilet, communications room and staff facilities
- installation of an external glass canopy at the entrance to the Family Accessible Toilet to provide weather protection
- new formalised kiss and ride on Burfitt Parade
- installation of a pad mount electrical transformer adjacent to the new stairs
- ancillary works including lighting, fencing, new bin storage, minor drainage works, seating adjustments, improvement to station communication systems (including CCTV cameras), hearing loops, installation of wayfinding signage and other signage to identify existing and new accessible features including installation of new tactile ground surface indicators (TGSIs).

Subject to approval, construction is expected to commence in early 2019 and take around 12 months to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF.

Need for the Proposal

Upgrades under the Transport Access Program are designed to ensure that stations are fully accessible to a wider range of customers, 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 ensure that Glenbrook Station would meet legislative requirements under the Commonwealth *Disability Discrimination Act 1992* (DDA) and the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

In summary, the Proposal fulfils the Transport Access Program objectives as it would provide:

- a station that is accessible to people with a disability, limited mobility and parents with prams
- buildings and facilities that meet the needs of a growing population
- interchanges that support an integrated network and allow seamless transfers between transport modes for all customers.

The Proposal is also consistent with NSW planning strategies including *NSW: Making It Happen* (NSW Government, 2015) and *Future Transport 2056* (TfNSW, 2018a).

Design options considered

Options for improving access at Glenbrook Station were developed following a series of workshops with TfNSW, relevant stakeholders (including Sydney Trains) and the Proposal design team. Two options were developed which both focused on meeting DDA requirements, their key elements are outlined below:

- Option 1: installation of a lift, retention of the existing (non-compliant ramp) with installation of a new compliant access path
- Option 2: installation of a lift, removal of the existing (non-compliant ramp) to be replaced with new stairs and a new compliant access path.

Option 2 is the preferred option, the Proposal, and the subject of this REF.

Statutory considerations

The EP&A Act provides for the environmental impact assessment of development in NSW. Part 5, Division 5.1 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.

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, Division 5.1 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 development consent. Consequently, the environmental impacts of the Proposal have been assessed by TfNSW under Part 5, Division 5.1 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 5.5 of the EP&A Act, TfNSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Chapter 6 of this REF presents the environmental impact assessment for the Glenbrook 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, NSW TrainLink and Blue Mountains City Council (BMCC) during the development of design options and the preferred option. Consultation with stakeholders would continue through the detailed design and construction of the Proposal.

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

- direct notification to station customers and the broader community
- pop up information stalls (locations to be advised in the community notifications)
- public display of the REF.

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

The REF would be placed on public display on the [TfNSW website¹](#), [Your Say website²](#) and hard copies provided at the following locations:

- [Blue Mountains City Council³](#) (Lower Mountains Office), 104 Macquarie Road Springwood (02) 4723 5000
- [Blaxland Library⁴](#) (Blue Mountains City Council), 33 Hope St Blaxland NSW 2774, (02) 4739 2484
- TfNSW Office at Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood.

Further information on the Proposal may be requested by contacting the Project Infoline (1800 684 490) or by [email⁵](#).

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 <https://www.transport.nsw.gov.au/projects/current-projects/glenbrook-station-upgrade>

² yoursay.transport.nsw.gov.au/Glenbrook

³ <https://www.bmcc.nsw.gov.au/contact-us>

⁴ https://library.bmcc.nsw.gov.au/client/en_AU/

⁵ projects@transport.nsw.gov.au



Figure 1 Planning approval and consultation process for the Proposal

Environmental impact assessment

The Proposal would provide the following benefits:

- improved and equitable access to Glenbrook Station for customers resulting from the installation of a lift, accessible pathway and a formalised kiss and ride
- improved station amenity and safety for customers at the station resulting from the installation of the Family Accessible Toilet, ambulant toilet, new lighting and CCTV.

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

- temporary changes to vehicle and pedestrian movements to, from and around the station during construction – these impacts were assessed to be minor and would be managed via the implementation of a Construction Traffic Management Plan
- temporary reduction of around 10 commuter parking spaces in the western car park to allow for a construction compound – this impact is not considered to be significant as the car parking spaces would be reinstated at the end of construction. It is anticipated that the 10 cars can be temporarily accommodated in on-street parking in the surrounding area
- impacts to the visual character of Glenbrook Station due to the removal of vegetation and installation of the lift, stairs, accessible path and transformer – visual impacts were assessed as ranging from negligible to moderate for most of the selected viewpoints with the exception of Viewpoint 3 (No.5B Burfitt Parade). This location has been assessed as having a moderate-high impact due in part to the close proximity of a residential receiver to the new station entry stairs and transformer, and tree removal required for the Proposal
- temporary noise and vibration impacts during construction – these impacts were assessed as being variable dependent on the construction stage. Higher levels of noise are anticipated during vegetation clearing and during rail shut downs outside of standard hours. Impacts would be mitigated through the implementation of a range of mitigation measures in the *Construction Noise and Vibration Strategy* (TfNSW 2018b)
- impacts to heritage fabric of the station building and the platform due to the internal reconfigurations of the station building and localised platform regrading – these impacts were assessed as ranging from minor in relation to the platform fabric impacts to moderate in relation to the station building
- impacts to the heritage setting due to installation of a new lift to connect to the existing footbridge to the platform – this impact was assessed as moderate
- removal of around 406 square metres of vegetation, including 31 trees, due to installation of the new stairs, accessible path and transformer. The vegetation has been identified as a NSW listed endangered ecological community and Commonwealth listed critical endangered ecological community, however, the vegetation removal was assessed as unlikely to result in a significant impact to these ecological communities. In addition, offsetting planting and bush regeneration would be undertaken in the adjoining vegetation patch.

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

Conclusion

This REF has been prepared having regard to sections 5.5 to 5.7 of the EP&A Act, and clause 228 of the EP&A Regulation, to ensure that TfNSW takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The detailed design of the Proposal would also be undertaken in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017b) 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 Glenbrook Station Upgrade (the Proposal).

1.1 Overview of the Proposal

1.1.1 Need for the Proposal

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

Glenbrook Station access does not currently meet key compliance requirements of the *Disability Standards for Accessible Public Transport* (DSAPT) or the Commonwealth *Disability Discrimination Act* 1992 (DDA).

A non-compliant ramp (due to the steep grade) and stairs to the platform currently provide the only means of access to the footbridge and the station platform. These do not provide an accessible path of travel for people with reduced mobility, parents/carers with prams or customers with luggage. In addition, there are currently no accessible toilet facilities for customers using the station.

The Proposal would provide safe and equitable access to the station platform, car park and pedestrian network surrounding the station. Customer facilities and amenity would also be improved. These improvements would assist in supporting future growth in public transport use and provide an improved customer experience for existing and future users of the station.

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- installation of a new lift on the platform to provide access to the existing footbridge (footbridge and stairs to be retained)
- provision of a new station entrance which would include removal of the existing (non-compliant) ramp from the footbridge to Burfitt Parade to be replaced with new stairs and a new accessible path from the existing footbridge extending east to the raised pedestrian crossing
- landscaping around the station entrance
- internal reconfiguration of the station building to allow for a new Family Accessible Toilet, a new ambulant toilet, communications room and staff facilities
- installation of an external glass canopy at the entrance to the Family Accessible Toilet to provide weather protection
- new formalised kiss and ride on Burfitt Parade
- installation of a pad mount electrical transformer adjacent to the new stairs
- ancillary works including lighting, fencing, new bin storage, minor drainage works, seating adjustments, improvement to station communication systems (including CCTV cameras), hearing loops, installation of wayfinding signage and other signage to identify existing and new accessible features including installation of new tactile ground surface indicators (TGSIs).

Subject to planning approval, construction is expected to commence in early 2019 and take around 12 months to complete.

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

1.2 Location of the Proposal

The Proposal would involve upgrade works to Glenbrook Station, which is located around 67 kilometres west of Central Station. The location of the Proposal and the regional context is shown in Figure 2.

Glenbrook Station is located within the Blue Mountains Local Government Area (LGA). The area surrounding the station consists of low density residential areas, commercial and conservation zones.

The station is located off Burfitt Parade between Mann Street and Euroka Road (Figure 3). The Proposal would involve works to the station and adjacent car parks. The station and the car park to the west is owned by RailCorp and operated and maintained by Sydney Trains (and referred to in this document as the 'western car park'). The car park to the north-east of the station is owned and maintained by Blue Mountains City Council (and referred to in this document as the 'eastern car park').

Glenbrook Station consists of a single island platform and is served by the BMT – Blue Mountains Line. The station has a number of existing facilities for customers including ticket machines, Opal card readers and female and male toilets that are non-DDA compliant.

1.3 Existing infrastructure and land uses

Under the *Blue Mountains Local Environmental Plan 2015* (BM LEP 2015) Glenbrook Station is zoned SP2 Infrastructure. The area immediately to the north of the station is zoned Deferred Matter (DM) and Environmental Living (E4) (shown in Figure 10). Immediately south of the station the area is also zoned E4. The Glenbrook Village shopping area is around 100 metres north of the station entrance in an area zoned B1 Neighbourhood Centre.

The residential area that is shown as a Deferred Matter under the BM LEP 2015 is zoned Living Conservation under the Blue Mountains LEP 2005 (refer to Figure 3).

Figure 3 shows the location of the Proposal and Figure 10 shows the corresponding land use zoning, while Figure 4, Figure 5 and Figure 6 provide photos of the existing station and surrounds.

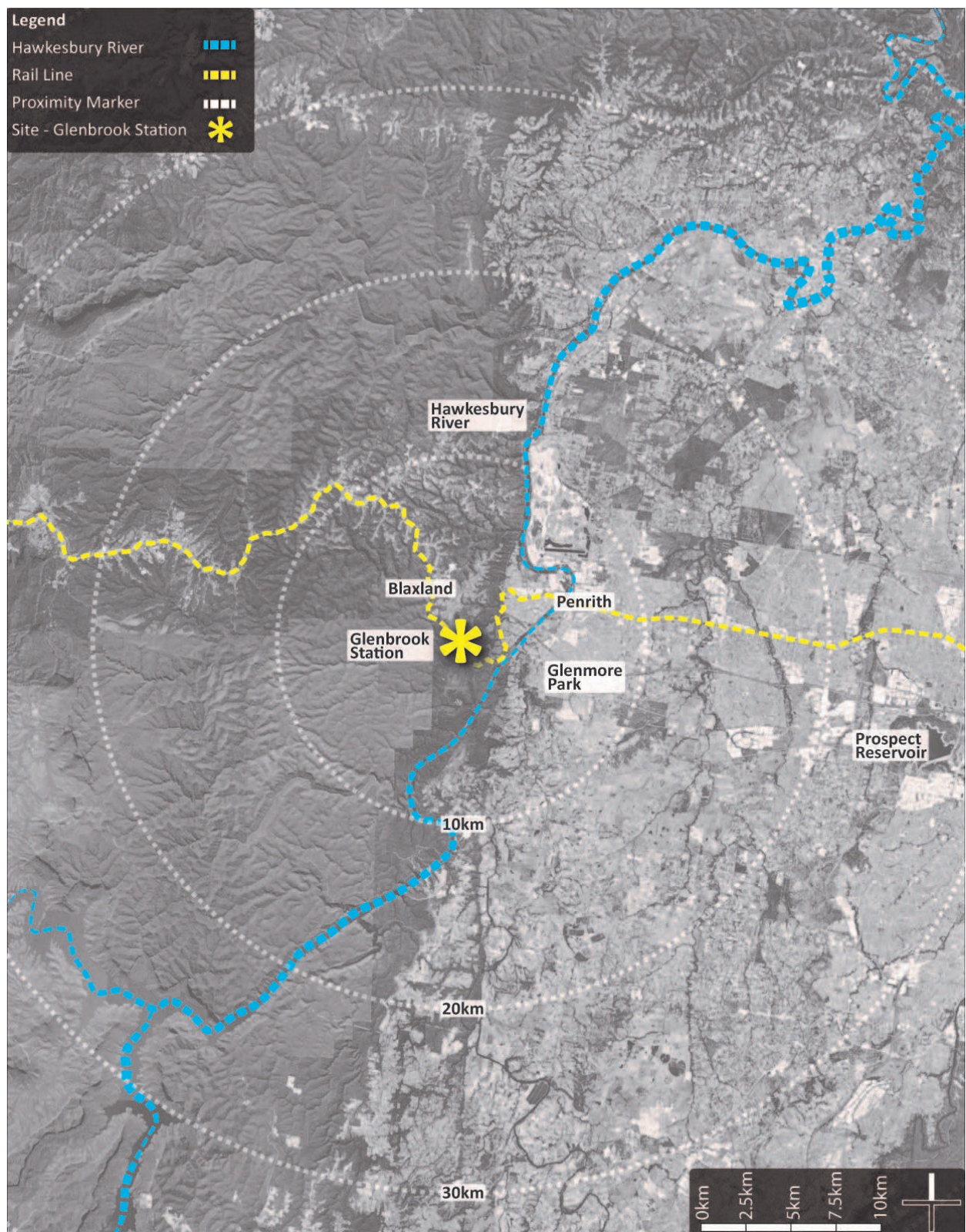


Figure 2 Regional context

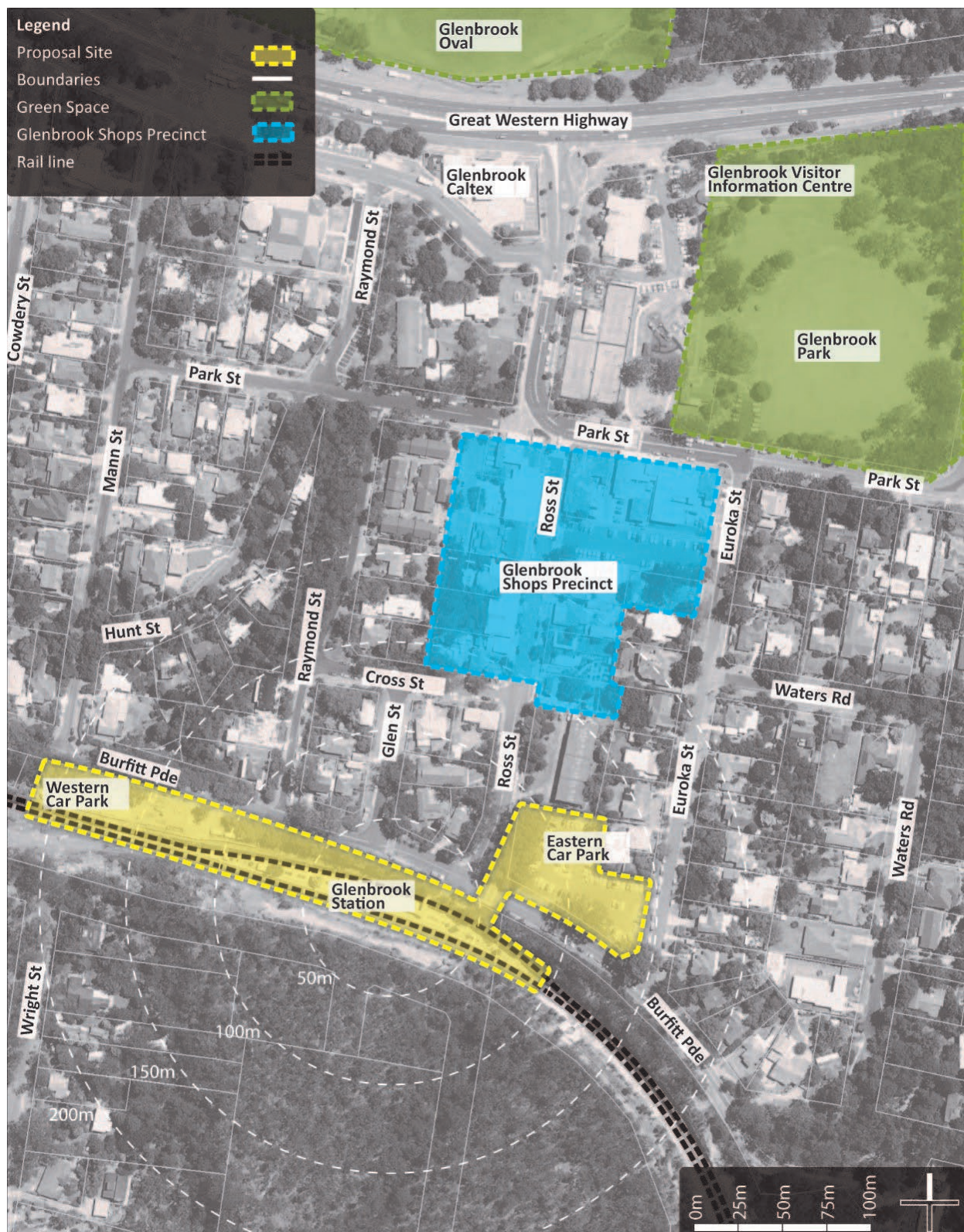


Figure 3 Site locality map



Figure 4 Photo of Glenbrook Station looking west from the existing footbridge

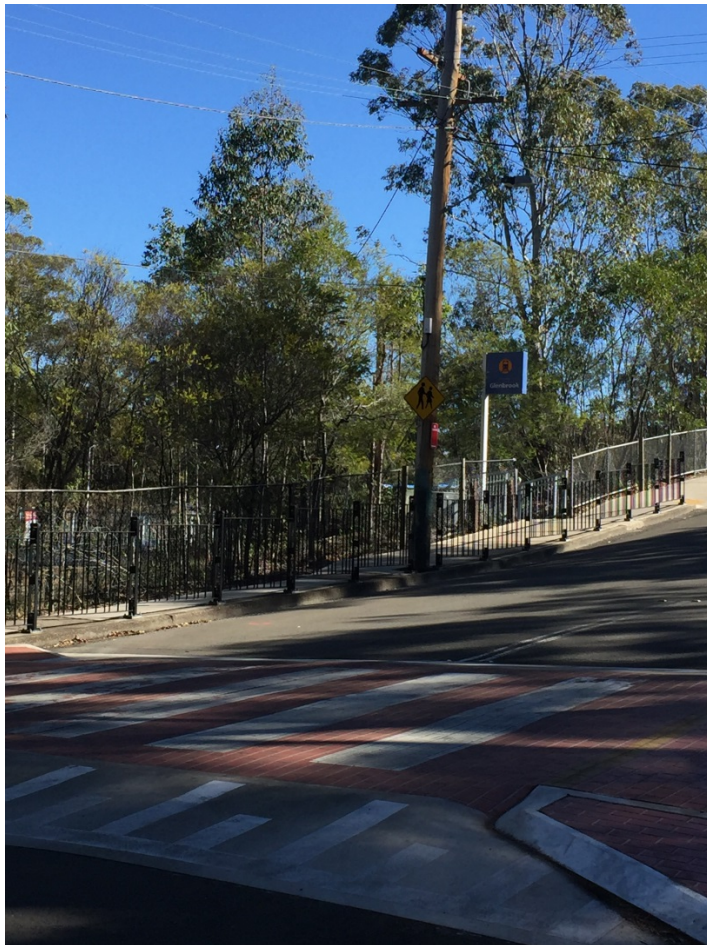


Figure 5 Photo of Glenbrook Station entrance and raised pedestrian crossing on Burfitt Parade



Figure 6 Photo of Glenbrook Station existing access stairs and footbridge

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of the Glenbrook Station Upgrade. For the purpose of these works, TfNSW is the proponent and the determining authority under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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

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

Having regard to the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this REF considers the potential for the Proposal to have a significant impact on matters of National Environmental Significance (NES) or Commonwealth land, and the need to make a referral to the Commonwealth Department of 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

The Glenbrook Station Upgrade, the subject of this REF, forms part of the Transport Access Program which is an initiative to provide a better experience for public transport customers by delivering accessible, secure and integrated transport infrastructure.

The Proposal would improve accessibility of the station in line with the requirements of the *Disability Discrimination Act 1992* (DDA) (Commonwealth) and the *Disability Standards for Accessible Public Transport 2002* (DSAPT). Alignment with other key strategies is discussed below.

In September 2015, the NSW Government announced a series of State Priorities as part of *NSW: Making It Happen* (NSW Government, 2015). The State Priorities are intended to guide the ongoing actions of the NSW Government across the State, and guide resource allocation and investment in conjunction with the NSW Budget. *NSW: Making it Happen* focuses on 12 key 'priorities' to achieve the NSW Government's commitments. These priorities range across a number of issues including infrastructure, the environment, education, health, wellbeing and safety in addition to Government services.

One of the 12 priorities identified as part of *NSW: Making It Happen* relates to investment in building infrastructure. The ongoing development and investment in transport infrastructure is identified as part of the wider building infrastructure priority. The Proposal assists in meeting the priority by improving accessibility to public transport and encouraging greater use of public transport.

The NSW Government has developed a transport strategy *Future Transport 2056* (TfNSW 2018a). *Future Transport 2056* is an overarching strategy, supported by a suite of plans to achieve a 40-year vision for transport in NSW. The strategy outlines six state-wide transport outcomes:

- customer focused
- successful places
- a strong economy
- safety and performance
- accessible services
- sustainable.

The Transport Access Program contributes to the accessible services, safety and performance and customer focused outcomes.

In addition, TfNSW forecasts a continued increase in train patronage at Glenbrook Station up to 2036. It is anticipated that improved accessibility to the station will encourage increased use of public transport in the area.

Lastly, the *Disability Action Plan 2018-2022* (TfNSW, 2017e) 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. This 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 where it is needed most. The program aims to provide:

- a station that is accessible to people with a disability, limited mobility and parents with prams
- buildings and facilities for that meet the needs of a growing population
- interchanges that support an integrated network and allow seamless transfers between transport modes for all customers.

2.1.3 Objectives of the Proposal

The specific objectives of the Glenbrook Station Upgrade are to:

- provide a station that is accessible to people with a disability, limited mobility and parents with prams
- improve customer experience and amenity (better interchange facilities such as a formal kiss and ride area and upgraded toilet facilities)
- improve integration with the surrounding precinct by providing a linked accessible path of travel from the eastern car park on Burfitt Parade to the station
- improve customer accessibility and safety (CCTV, lighting, stair and handrail upgrades)
- improve wayfinding in and around the station
- minimise impacts to the heritage features of the station
- minimise impact to existing vegetation.

2.2 Design development

TfNSW has developed a concept design for the Glenbrook Station Upgrade that would improve accessibility in and around the station and meet key architectural, engineering and urban design objectives. The design integrates the heritage aspects of the station with current and future customer needs.

The development of the concept design involved several key tasks, including a performance assessment of existing station and surrounding precinct elements and identification of key deficiencies and opportunities for improving accessibility and amenity. The assessment identified the following deficiencies with the existing station and the surrounding precinct:

- lack of an accessible path between the station entrance and the platforms
- lack of tactile ground surface indicators on existing ramp, stairs and footbridge
- lack of a Family Accessible Toilet and ambulant toilet
- poor wayfinding signage and CCTV coverage
- lack of a formal kiss and ride area.

The needs and opportunities at Glenbrook Station were then considered in the development of options for the concept design with the preferred option to be further refined during detailed design.

2.3 Options considered

Options for improving access to Glenbrook Station were developed following workshops with a stakeholder working group attended by representatives from Sydney Trains and TfNSW.

Two options, in addition to the do-nothing option, were developed to address accessibility needs and other design principles. Improvements common to all options included the installation of the lift, installation of a Family Accessible Toilet and ancillary facilities such as CCTV, lighting and improvements to wayfinding signage.

The key differences in each option considered are summarised as follows:

- Option 1: retention of the existing (non-compliant) ramp with installation of a new compliant access path
- Option 2: removal of the existing (non-compliant) ramp to be replaced with new stairs and a new compliant access path.

2.3.1 The 'do-nothing' option

Under a 'do-nothing' option, existing access to the platforms, station (including toilets and ticketing facilities), footbridge and car parks would remain the same and there would be no changes to the way the station and surrounding area currently operates.

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

The 'do-nothing' option was not considered a feasible alternative as it would not meet the requirements of the DDA and DSAPT. A 'do nothing' option would not assist in encouraging the use of public transport or meet the current and future needs of the Glenbrook community.

2.3.2 Assessment of identified options

The design options were assessed in a multi-criteria analysis (MCA) that included consideration of factors such as customer experience, accessibility, engineering constraints, environmental constraints, heritage listing, modal integration and cost to select a preferred option.

2.4 Justification for the preferred option

Assessment of the two options was based on a MCA undertaken with key internal stakeholders. The assessment of options was informed by a workshop and with reference to relevant standards and guidelines.

Option 1 was not progressed because an area where the proposed ramp would connect to the existing ramp and footbridge would not meet DDA requirements. This option would also increase the construction footprint as it would require the new ramp to be larger (when compared to then new ramp with stairs for Option 2).

Option 2 was selected as the preferred option based on the outcomes of the MCA. This option optimises accessibility, achieves better integration with the existing footbridge and optimises amenity improvements while acknowledging the existing heritage and ecological values and constraints. This option would help to achieve better Glenbrook precinct outcomes with reduced ecological and visual amenity impacts, when compared with Option 1, as the new access path and stairs would minimise tree removal, helping to maintain the overall natural character of the area.

Where possible the preferred option has sought to reduce impacts to heritage fabric and the heritage setting. For example, works have been consolidated into the main station building, avoiding the need to undertake works in other heritage buildings, and tree removal has been minimised. Materials and finishes for the lift shaft have also been selected with consideration for the heritage setting and landscape character (e.g. a brick facade of similar colour to the brick of the existing heritage station building, with glass for the upper lift shaft to reduce visual impact). The proposed canopy adjacent to the Family Accessible Toilet to provide weather protection is to be constructed from glass, so not to visually detract from the heritage station building.

3 Description of the Proposal

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

3.1 The Proposal

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

The Proposal would include the following key elements:

- installation of a new lift on the platform to provide access to the existing footbridge (footbridge and stairs to be retained)
- provision of a new station entrance which would include removal of the existing (non-compliant) ramp from the footbridge to Burfitt Parade to be replaced with new stairs and a new accessible path from the existing footbridge extending east to the raised pedestrian crossing
- landscaping around the station entrance
- internal reconfiguration of the station building to allow for a new Family Accessible Toilet, a new ambulant toilet, communications room and staff facilities
- installation of an external glass canopy at the entrance to the Family Accessible Toilet to provide weather protection
- new formalised kiss and ride on Burfitt Parade
- installation of a pad mount electrical transformer adjacent to the new stairs
- ancillary works including lighting, fencing, new bin storage, minor drainage works, seating adjustments, improvement to station communication systems (including CCTV cameras), hearing loops, installation of wayfinding signage and other signage to identify existing and new accessible features including installation of new tactile ground surface indicators (TGSIs).

Figure 7 shows the general layout of key elements of the Proposal. Figure 8 shows the proposed changes to the station building.

FIGURE 7
Key elements of the Proposal

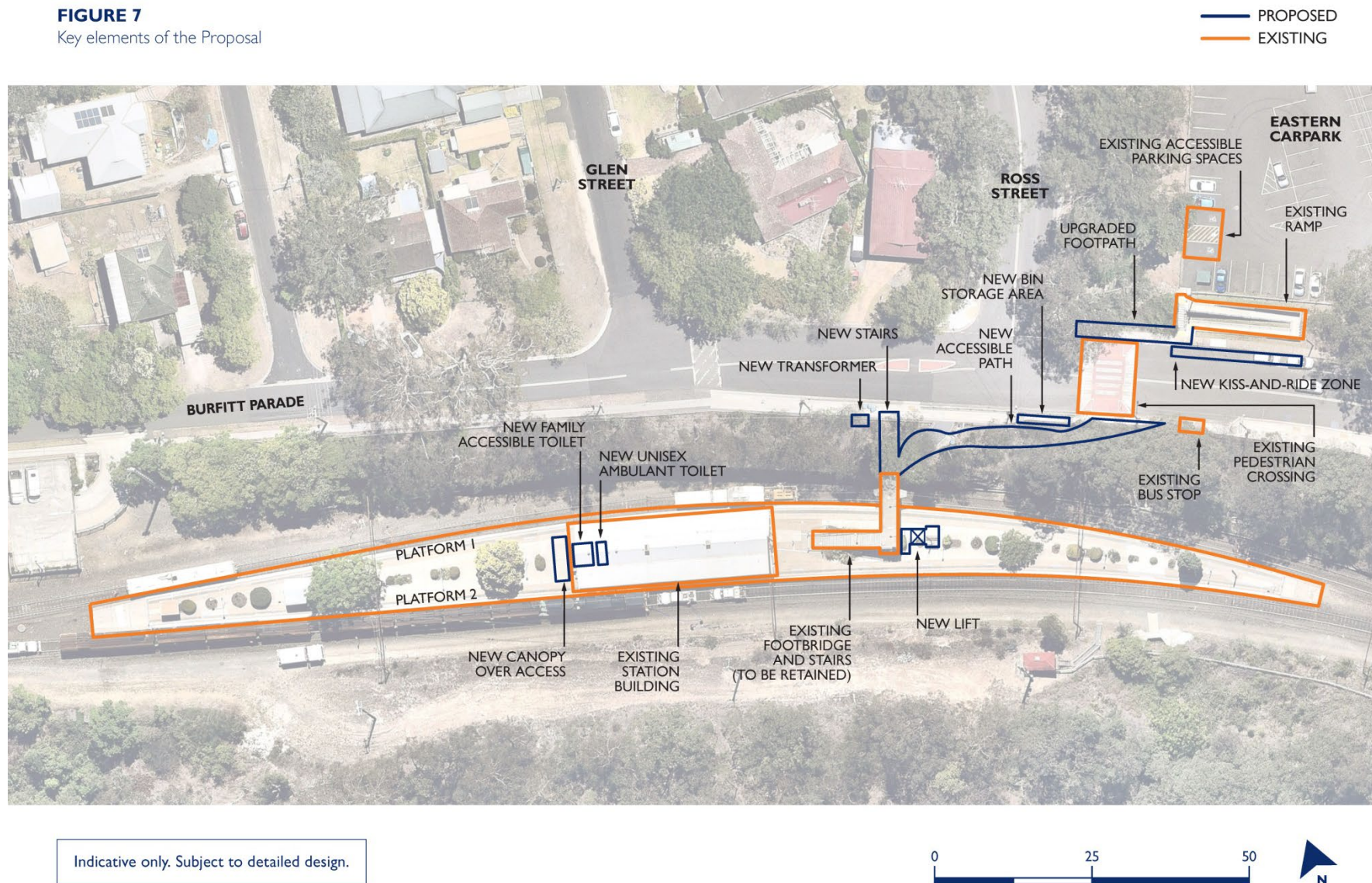


Figure 7 Key elements of the Proposal

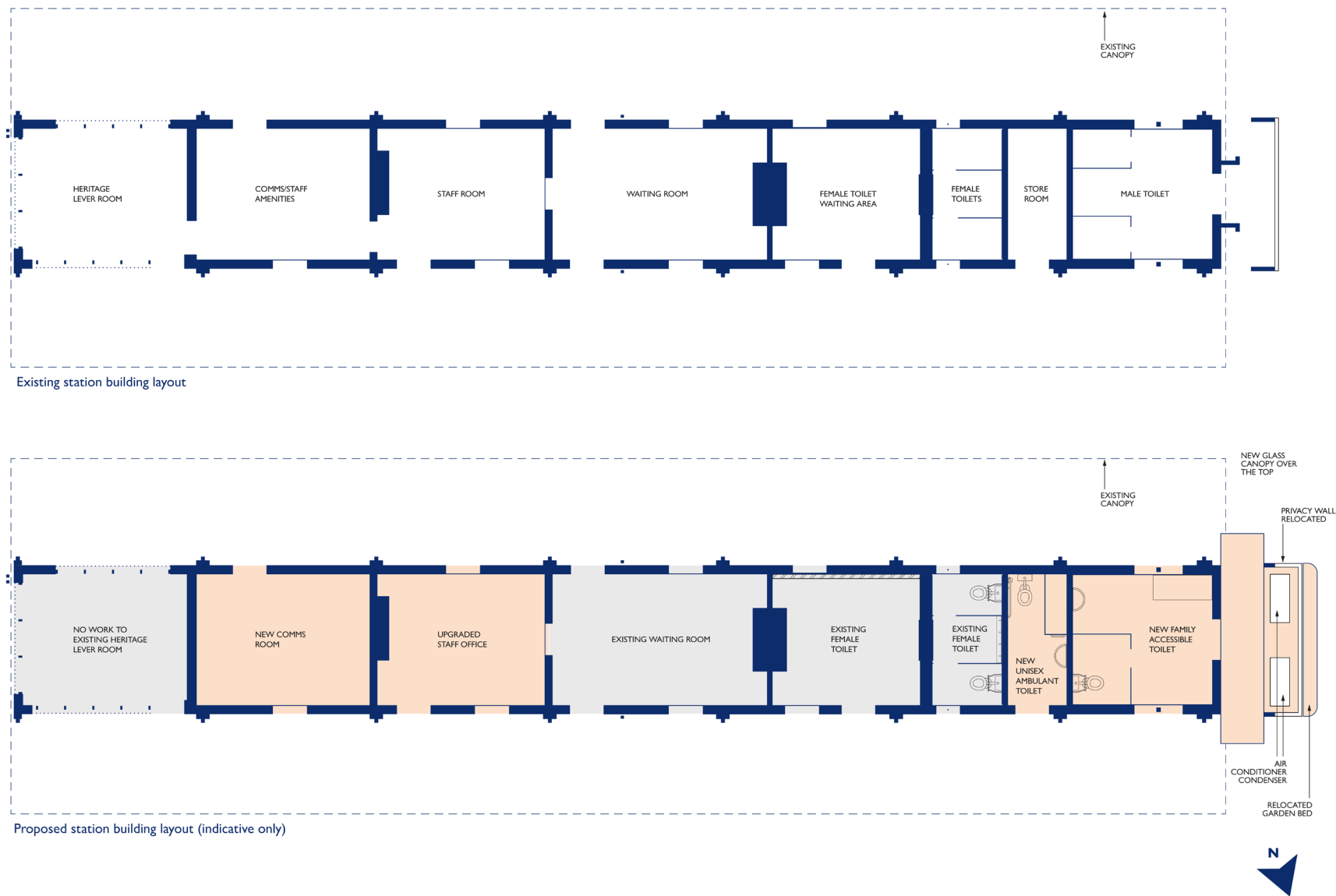


Figure 8 Existing and proposed station building layout

3.1.1 Scope of works

Station upgrade

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

- construction and installation of a lift on the island platform that would connect to a small extension to the existing footbridge (with covered waiting bay).
- existing footbridge and stairs to the platform to be retained but with new handrails, nosings and TSGIs installed to achieve DDA compliance
- removal of the existing (non-compliant) ramp from the footbridge to Burfitt Parade to be replaced with new stairs and construction of a new accessible path extending further east to connect to the raised pedestrian crossing and car park
- landscaping at the station entrance
- internal reconfiguration of the station building, including closure of some doors to public access (refer to Figure 8):
 - installation of a Family Accessible Toilet in the area currently occupied by the male toilets which includes lowering the existing concrete floor to ensure accessible entry, installing floor / wall tiling, and ceiling for fire safety standard compliance and installing a false wall to enclose the toilet cistern
 - installation of a new unisex ambulant toilet in the area currently occupied by the store room which includes lowering the floor to ensure accessible entry, installing a ceiling for fire safety standard compliance and installing a false wall to enclose the toilet cistern and hot water tank
 - modifications to establish a separate communications room (i.e. installation of new switchboards and equipment, permanent closure of two doors and installing a ceiling for fire safety standard compliance) and upgrades to the existing staff office (i.e. new furniture)
- external modifications to the station building:
 - removal of the existing entry partition/ nib walls of the existing men's toilet, and relocation of the privacy wall on the western end of the station building further west to house relocated condensers
 - installation of a glass canopy over the entrance to the Family Accessible Toilet for weather protection (between the station building and privacy wall)
 - widening of the existing door opening for the proposed Family Accessible Toilet
 - relocation of existing access ramp
 - minor intrusions to building facade to allow for communication cables, CCTV etc.
- removal / relocation of some existing seats and installation of new seating on the platform
- removal of some platform landscaping to allow for the installation of the lift
- relocation of a garden bed from the northern side of the Station Building to next to the privacy wall to allow access to the Family Accessible Toilet
- localised platform regrading and trenching for services and to ensure accessible entry to the Family Accessible Toilet

- installation of CCTV and lighting improvements where required, including under the stairs and at the lift landing
- provision of hearing loops to improve customer experience and safety
- installation of wayfinding signage and other signage to identify existing and new accessible features
- installation of TSGIs on the platform surface
- installation of a pad mount electrical transformer adjacent to the new stairs.

Interchange facilities

Details of the proposed works to take place at the interchange are provided below:

- new line marking and signage to establish three kiss and ride spaces on the northern side of Burfitt Parade, adjacent to the eastern car park
- upgrade of the existing footpath between the eastern car park and raised pedestrian crossing to achieve compliant grades
- relocation of bin storage area
- fencing adjustments and installation of new bollards.

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.

Subject to detailed design, the Proposal would include the following:

- station building canopy – glass
- lower lift shaft – brick facade (of similar colour to the brick of the existing heritage station building)
- upper lift shaft – steel, glass with steel and aluminium louvres
- lift waiting bay – steel frame, glass roof cladding
- access path – concrete base, brick and steel balustrade with steel hand rails
- access stairs – concrete base, brick and steel balustrade with steel handrails and non-slip tread.

The design would be submitted to TfNSW's Urban Design and Sustainability Review Panel at various stages for comment before being accepted by TfNSW. An Urban Design Plan (UDP) and/or Public Domain Plan (PDP) would also be prepared by the Construction Contractor, prior to finalisation of detailed design for endorsement by TfNSW.

3.1.2 Engineering constraints

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

Existing structures: the accessibility, placement and integrity of existing structures has been considered during the development of the design – these structures included the existing platform, footbridge, footpaths, access ramp and stairs, car park ramp and stairs, station building, overhead wiring and associated support structures, seating, light poles, the western and eastern car parks, raised pedestrian crossing and the pedestrian refuge.

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

Other considerations:

- **Heritage:** Glenbrook Station is listed on the RailCorp (Sydney Trains) Section 170 Heritage and Conservation Register and is also listed as a local heritage item – G011 in Schedule 5 of the *Blue Mountains Local Environment Plan 2015*. Of specific note within the Section 170 heritage listing is the station building and the landscaping on the station platform which has been recorded as an award winning and characteristic feature of the station in the past.
- **Topography:** The topography of the area surrounding Glenbrook Station is an influencing factor when considering access to the station, as it is characterised by steep slopes and the station itself is located within a deep cutting. The topography currently poses challenges to customers and would pose challenges to the constructability of the Proposal and would require specific mitigation measures to be implemented during its construction phase.
- **Vegetation/landscape:** Vegetation is known to be an important issue to residents of the Blue Mountains both because of its proximity to a National Park and wilderness areas and because of bushfire risks. The path from Burfitt Parade to the footbridge has been designed to minimise vegetation removal. The platform gardens, as recorded in the Section 170 heritage listing are a unique characteristic of Glenbrook Station. Minimising the impacts to the platform gardens has also been taken into consideration.
- **Construction access:** there is limited area available for a construction compound and use of a large crane would be required to lift construction materials and equipment to the station from Burfitt Parade.
- **Public access:** Maintaining pedestrian access to the station during construction.

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*)
- National Construction Code
- relevant Australian Standards
- Asset Standards Authority standards
- *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017b)
- *TfNSW Urban Design Guidelines*
- *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008).
- Crime Prevention Through Environmental Design (CPTED) principles
- other TfNSW policies and guidelines
- relevant council standards.

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 4.0* (TfNSW, 2017b). The Guidelines 'seek to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of transport infrastructure projects', grouping sustainability into seven key themes:

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

The applicable requirements have been reviewed and approved by TfNSW and subsequently incorporated into the concept design as documented in Appendix C.

3.2 Construction activities

3.2.1 Work methodology

Subject to approval, construction is expected to commence in early 2019 and take around 12 months to complete. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Construction Contractor in consultation with TfNSW.

The proposed construction activities for the Proposal are identified in Table 1. This staging is indicative and is based on the current concept design and may change once the detailed design methodology is finalised.

Table 1 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works - Stage 1	<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 vegetation to allow for construction of new accessible path and stairs • removal of minor landscaping, where required, on the platform to enable lift installation • service/utility relocation/upgrade where required • installation of safety barriers and hoarding around the nominated work zones on the platform
Access ramp, lift and stairs construction - Stages 2 and 3	<ul style="list-style-type: none"> • removal of existing structures such as the ramp and stairs • construction of lift well and installation of lift • construction/installation of accessible path and stairs including upgrade of hand rails, treads and fencing • installation of fixtures, lighting and CCTV cameras in the areas of the upgrade such as the lift
Platform and station building works - Stage 4	<ul style="list-style-type: none"> • platform resurfacing and raising/regrading • installation of TGSIs • construction of Family Accessible Toilet and associated canopy (mechanical/electrical fit out and drainage works) • removal of minor landscaping, where required, on the platform adjacent to the station building • removal, relocation and installation of seating adjacent to the lift area • installation of lighting, hearing loop and CCTV
Interchange works - Stage 4	<ul style="list-style-type: none"> • creation of the formal kiss and ride • bin storage area relocation • replanting/landscaping, fencing adjustments and bollards at the station entrance and where appropriate on the platform
Electrical upgrades - Stage 4	<ul style="list-style-type: none"> • electrical and power supply upgrade works – such as the installation of the transformer on a concrete base (approximately two metres west of the new stairs)
Signage - Stage 4	<ul style="list-style-type: none"> • installation of wayfinding signage
Testing and commissioning - Stage 5	<ul style="list-style-type: none"> • testing of all new systems and the lift • removal of all construction hoarding • removal of the site compound • defect resolution

3.2.2 Plant and equipment

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

- trucks (various types and sizes e.g. skip trucks and suction trucks)
- jack hammer
- chainsaw
- mulcher
- piling rig
- franna/ mobile cranes
- bobcat
- excavator
- demolition saw
- hydraulic saw/rock saw
- concrete grinder
- concrete pump
- concrete truck
- lighting tower
- coring machine
- water cart
- hi rail plant (e.g. rail mounted elevated work platform/flatbed/ hi ab and crane etc)
- road based elevated work platform
- forklift
- vibrating roller /compaction plate
- hand tools
- power tools (e.g. drill, hammer drill, saws, torque, impact wrenches and grinders)

3.2.3 Working hours

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

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

Certain works may need to occur outside standard hours and would include night works and works during routine rail shutdowns, which are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed for maintenance 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 approximately three rail shutdowns would be utilised to facilitate the following:

- electrical upgrades (such as the installation of transformer)
- excavation and installation of the lift
- works to the footbridge (extension, waiting bay, hand rails etc)
- platform works (such as regrading, trenching for power/communications systems).

Out of hours works may also be scheduled outside rail shutdown periods. Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in the *TfNSW Construction Noise and Vibration Strategy* (TfNSW, 2018b) (refer to Section 6.3 for further details).

3.2.4 Earthworks

Excavations and earthworks would generally be required for the following:

- installation of the lift on the platform
- installation of footings/supports for the access path and stairs
- relocation of any underground services or utilities.

Excavated material would be reused onsite where possible or disposed of in accordance with relevant legislative requirements. It is estimated that around 70 cubic metres of excavated material would be generated by piling and lift excavation activities.

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 4.0* (TfNSW, 2017b). 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:

- increased construction vehicle traffic including light and heavy vehicles within the station precinct and along local streets, most likely in particular Ross Street and Euroka Street
- temporary loss of 10 existing commuter car parking spaces in the western car park
- temporary increased demand for all-day parking for construction staff
- potential confusion and loss of amenity to customers accessing the station during construction
- minor travel delays on account of likely traffic control plan implementation requiring some users to stop for construction traffic
- temporary reduced access to Cowdery Street overbridge due to construction traffic.

A detailed construction methodology and associated management plans (such as a Construction Environmental Management Plan (CEMP)) would be developed during the next design phase of the Proposal to manage potential traffic and access impacts.

3.2.7 Ancillary facilities

A temporary construction compound would be required to accommodate a site office, amenities, laydown and storage area for materials. An area for a construction compound has been proposed within the western car park on Burfitt Parade (refer Figure 9). The area nominated for the compound is on land owned by RailCorp.

The proposed use of the car park as a site compound means that there would be a temporary reduction in the number of parking bays that would be available to commuters during the upgrade project. Around 10 car spaces are anticipated to be used as compound space.

3.2.8 Public utility adjustments

It is anticipated that some services may require relocation or upgrade, and further assessment would be undertaken. The appropriate utility providers, such as Endeavour Energy in relation to the pad mount transformer, would be consulted during the detailed design phase.

3.3 Property acquisition

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


3.4 Operation management and maintenance

The future operation and maintenance of Glenbrook Station is subject to further discussions with Sydney Trains, NSW TrainLink, TfNSW and Blue Mountains City Council (BMCC). However, the Proposal is not anticipated to significantly alter the current operating arrangements.

Structures and landscaping within the rail corridor would be maintained by Sydney Trains while the eastern car park would continue to be managed by BMCC.



Figure 9: Proposed construction compound
(indicative only)

 Proposed construction
compound site location

0 20 40 Meters




Figure 9 Location of the proposed temporary compound (indicative only)

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 *Environment Protection and Biodiversity Conservation Act 1999* (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 require removal of around 31 trees and ground cover (an area of approximately 406 square metres) comprising Sydney Turpentine-Ironbark Forest (listed as a critically endangered ecological community (CEEC) under the EPBC Act). A test of significance has been undertaken as part of the Flora and Fauna Impact Assessment (RPS 2018b). This assessment concluded that the Proposal is not likely to have a significant impact on the Commonwealth listing of this CEEC.

The Blue Mountains National Park is located approximately 250 metres from the Proposal site. Given this distance and the nature and scale of the proposed works, there is expected to be negligible impacts to the Blue Mountains National Park.

As the Proposal would not impact on any matters of NES or on Commonwealth land, 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, Division 5.1 of the EP&A Act. Division 5.1 specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which do not require development consent under Part 4 of the Act.

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

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Part 5, Division 5.1 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>Biodiversity Conservation Act 2016</i> (BC Act) (NSW)	The Proposal would require the removal of 31 trees and groundcover (about an area of approximately 406 square metres) of a State listed endangered ecological community (EEC) – Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion. Assessment of the direct and indirect impacts of the Proposal – being a Test of Significance under the BC Act concluded that the Proposal is not likely to have a significant impact on the State listed EEC. Mitigation measures to minimise direct and indirect impacts have been developed refer Section 7.2.
<i>Biosecurity Act 2015</i> (NSW)	Clause 22 requires any person who deals with a biosecurity matter has a duty to ensure that in so far as is reasonably practicable, the potential biosecurity risk is prevented, eliminated or minimised. Appropriate management methods would be implemented during construction if declared noxious weeds in the Blue Mountains LGA are identified (refer to Section 6.7).
<i>Contaminated Land Management Act 1997</i> (CLM Act) (NSW)	Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8).
<i>Crown Lands Act 1987</i> (NSW)	The Proposal does not involve works on any Crown land.
<i>Disability Discrimination Act 1992</i> (DDA) (Cwlth)	The Proposal has been designed having regard to the requirements of this Act.
<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>Glenbrook Station is listed on the RailCorp (Sydney Trains) Section 170 heritage and conservation register and is of local heritage significance.</p> <p>The Proposal would have some impacts to heritage fabric within the station curtilage. A heritage assessment and archaeological review has been undertaken for the Proposal and is summarised in Section 6.5. The archaeological assessment concluded that there is a low risk of exposing historical archaeological relics during construction and that no archaeological approvals would be required. However, if unexpected archaeological items are discovered during construction of the Proposal, all works would cease, and appropriate advice sought as per TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW 2016a). Formal notification is to be provided by the asset owner to the Heritage Council regarding the demolition of structures associated with the Glenbrook Station Group at least 14 days prior to the demolition of these structures in accordance with section 170A (1) (c) of the Heritage Act.</p>

Applicable legislation	Considerations
<i>National Parks and Wildlife Act 1974</i> (NPW Act) (NSW)	Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4). However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease, and appropriate advice sought as per the TfNSW <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2016a).
<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 Construction 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 Burfitt Parade which is a local road under the control of BMCC. Consent under the Roads Act is not required; however, Road Occupancy Licence/s would be obtained from BMCC for road works and any temporary road closures where required. Refer to Section 6.1.
<i>Sydney Water Act 1994</i> (NSW)	The Proposal would not involve discharge of wastewater to the sewer.
<i>Waste Avoidance and Resource Recovery Act 2001</i> (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.
<i>Water Management Act 2000</i> (NSW)	The Proposal would not involve any water use (from a natural source e.g. aquifer, river – only from the network), water management works, drainage or flood works, controlled activities or aquifer interference.

4.3 State Environmental Planning Policies

4.3.1 State Environmental Planning Policy (Infrastructure) 2007

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

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

Consequently, development consent is not required for the Proposal which is classified as a rail infrastructure facility, however the environmental impacts of the Proposal have been assessed under the provisions of Part 5, Division 5.1 of the EP&A Act.

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

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 (Coastal Management) 2018* applies. The Proposal does not require consideration under these SEPPs and therefore these instruments have not been further considered 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 Blue Mountains 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 following LEPs were considered:

- *Blue Mountains Local Environmental Plan 2015*
- *Blue Mountains Local Environment Plan 2005*.

4.4.1 Blue Mountains Local Environmental Plan 2015

The *Blue Mountains Local Environmental Plan 2015* (BM LEP 2015) is the governing plan for the Blue Mountains LGA, including Glenbrook. Table 3 summarises the relevant aspects of the Blue Mountains LEP applicable to the Proposal. Figure 10 shows the relevant section of the zoning map from the Blue Mountains LEP 2015, with the indicative location of the Proposal.

4.4.2 Blue Mountains Local Environmental Plan 2005

The Proposal is mostly within areas zoned as SP2 Infrastructure (Rail) under the Blue Mountains LEP 2015 and works within Burfitt Parade and north of the station are zoned as 'Deferred Matter'. Deferred Matter indicates that the zoning objectives for this area relate to the zones shown in the Blue Mountains LEP 2005 (BM LEP 2005). The zone from the BM LEP 2005 within the Proposal locality to the north of the station is mostly road Deferred Matter and – Living – Conservation (refer to Table 3).

Table 3 Relevant provisions of the Blue Mountains LEPs

Provision description	Relevance to the Proposal
<p>Clauses – Zone objectives and Land Use Tables</p> <p>BM LEP 2015 Clause 2.3</p> <p>BM LEP 2005</p>	<p><u>Under the BM LEP 2015:</u></p> <ul style="list-style-type: none"> the station and the associated rail corridor is zoned SP2 – Infrastructure - Rail surrounding and adjacent residential areas south and north-west of the Proposal are zoned E4 Environmental Living these zones buffer areas zoned E2 Environmental Conservation and residential areas and car parking to the north of the Proposal are zoned DM – deferred matter the Glenbrook Precinct- Neighbourhood Centre is zoned B1. <p><u>Under the BM LEP 2005:</u></p> <ul style="list-style-type: none"> the adjacent residential area to the north of the Proposal is zoned as Living -Conservation the adjacent Council car park is also categorised as Deferred Matter Special Use – Parking. <p>The Proposal is consistent with the objectives of these zones.</p>
<p>Clause 5.10 – Heritage Conservation (BM LEP 2015)</p>	<p>Clause 5.10 of the BM LEP aims to:</p> <ul style="list-style-type: none"> conserve the environmental heritage of the Blue Mountains, conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views, conserve archaeological sites, to conserve Aboriginal objects and Aboriginal places of heritage significance. <p>Glenbrook Station is listed as a local heritage item – G011. A discussion of potential impacts to local heritage is discussed in Section 6.5.</p>
<p>Clause 6.14 Earthworks (BM LEP 2015)</p>	<p>Clause 6.14 of the BM LEP 2015 aims to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.</p> <p>By virtue of clause 5(3) and 79 of the Infrastructure SEPP, the Proposal is permissible without development consent.</p> <p>Consideration of the potential impacts and mitigation measures for earthworks for the Proposal is outlined in Section 6.8.</p>

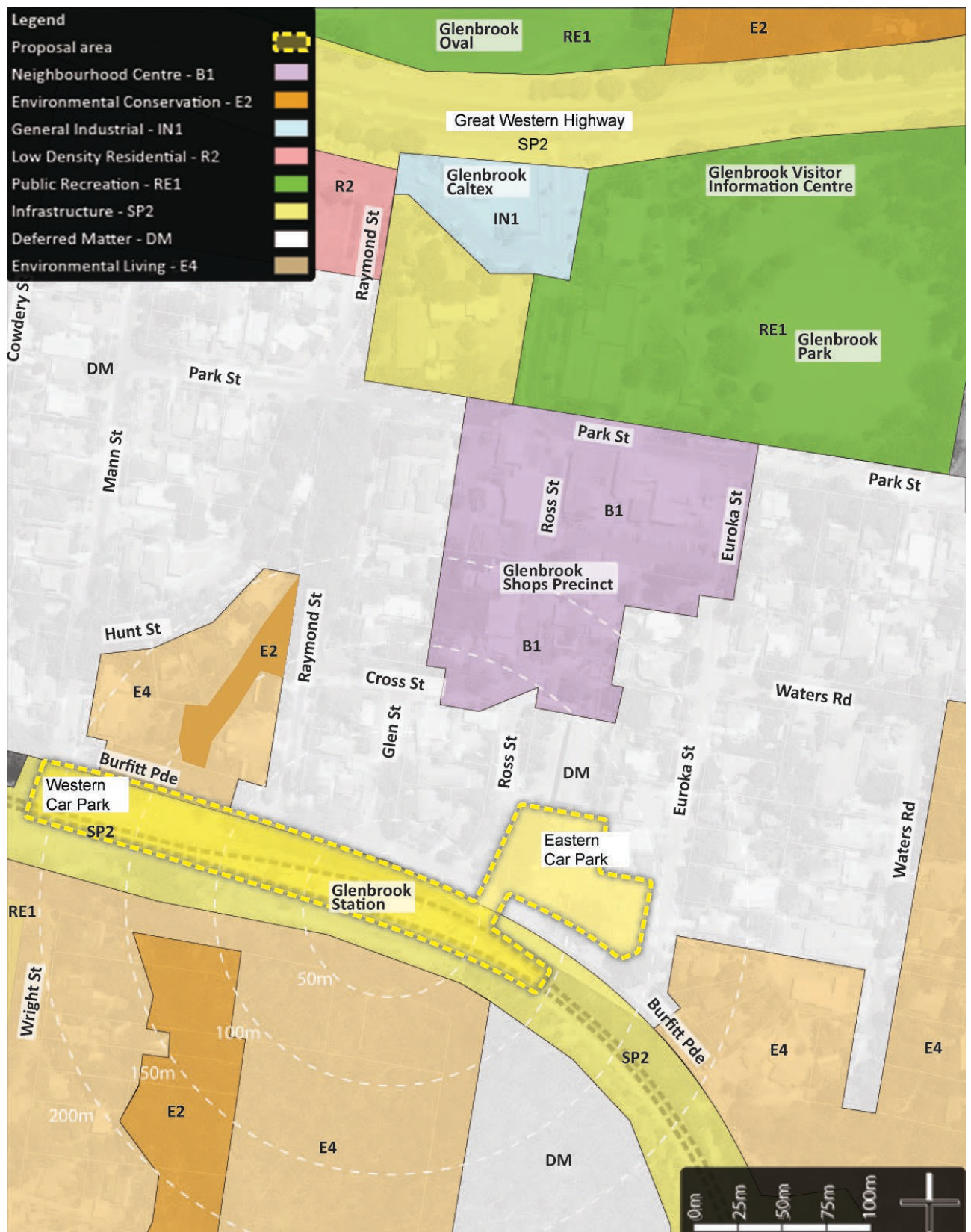


Figure 10 Glenbrook BM LEP 2015 zoning

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 applicable to the Proposal

Policy/Strategy	Commitment	Comment
<i>NSW: Making It Happen</i> (NSW Government, 2015)	<p>In September 2015, the NSW Government announced a series of State Priorities as part of <i>NSW: Making It Happen</i> (NSW Government, 2015). The State Priorities are intended to guide the ongoing actions of the NSW Government across the State, and guide resource allocation and investment in conjunction with the NSW Budget. <i>NSW: Making it Happen</i> focuses on 12 key 'priorities' to achieve the NSW Government's commitments. These priorities range across a number of issues including infrastructure, the environment, education, health, wellbeing and safety in addition to Government services.</p> <p>One of the 12 priorities identified as part of <i>NSW: Making It Happen</i> relates to investment in building infrastructure. The ongoing development and investment in transport infrastructure is identified as part of the wider building infrastructure priority.</p>	<p>The Proposal assists in meeting the priority by improving accessibility to public transport and encouraging greater use of public transport.</p>
<i>Future Transport Strategy 2056</i> (TfNSW 2018a)	<p><i>Future Transport 2056</i> is an update of NSW's <i>Long Term Transport Master Plan</i>. It is a suite of strategies and plans for transport to provide an integrated vision for the state.</p> <p>The strategy places the customer at the centre of works undertaken by TfNSW. It includes issue specific and place based supporting plans that seek to integrate transport modes.</p> <p>The strategy outlines 6 state-wide outcomes</p> <ul style="list-style-type: none"> • customer focused • successful places • a strong economy • safety and performance • accessible services • sustainable. 	<p>The Proposal would deliver on the customer focus and accessible services outcomes.</p> <p>The Transport Access Program is specifically referenced in the strategy as an example of accessibility initiatives that are underway.</p>

Policy/Strategy	Commitment	Comment
Disability Inclusion Action Plan 2018-2022 (TfNSW, 2017e)	<p>The <i>Disability Inclusion Action Plan 2018-2022</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 outlines practical measures to be taken across the various Transport agencies (e.g. TfNSW, Sydney Trains etc) to meet the objectives and principles of the <i>Disability Inclusion Act 2014</i>. These measures will also assist TfNSW to meet its obligations under the Transport Standards.</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>
Building Momentum State Infrastructure Strategy 2018-2038 (Infrastructure NSW 2018)	<p><i>The State Infrastructure Strategy 2018-2038</i> is a strategy to plan and fund the infrastructure that the NSW Government delivers over the next 20 years.</p> <p>Public transport is viewed as critical to productivity, expanding employment opportunities by connecting people to jobs, and reducing congestion.</p>	<p>The Proposal invests in public transport so that it provides a service that is accessible to a wider range of customers.</p>
Blue Mountains Pedestrian Access and Mobility Plan (PAMP) 2025 (BMCC, 2016)	<p>The PAMP 2025 responds to the overarching Community Strategic Plan which identifies the Blue Mountains community's main priorities. The PAMP addresses strategies that include:</p> <ul style="list-style-type: none"> • support development of an integrated, accessible and linked transport network that meets the needs of pedestrians, cyclists, vehicles, freight and public transport. • promote transport solutions for those unable to access transport; • ensure new and retrofitted development is accessible to people with a disability, including accessible pathways of travel leading to accessible facilities; 	<p>The Proposal assists in addressing the strategies by improving accessibility to public transport and encouraging greater use of public transport. The PAMP specifically references BMCC working with TfNSW regarding the Transport Access Program.</p>
Blue Mountains Citywide Parking Strategic Plan 2018 (BMCC, 2018)	<p>Providing and managing vehicle parking is an important issue for BMCC, Blue Mountains businesses and the wider community. The location of many Blue Mountains towns and villages along the railway line and Great Western Highway, and high levels of car usage, have resulted in competing demands for parking space between commuters, employees, shoppers and visitors.</p> <p>The Parking Plan aims to achieve a sustainable balance between the needs of drivers, the character of the Blue Mountains and environmental, economic and social objectives.</p>	<p>The Proposal is consistent with the Parking Plan as it would an accessible path from the accessible car spaces to the station platform.</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 Glenbrook Station Upgrade. Section 3.1.4 summarises how ESD would be incorporated in the design development of the Proposal. Section 6.13 includes an assessment of the Proposal on climate change and sustainability, and Section 7.2 lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.

5 Community and stakeholder consultation

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

5.1 Stakeholder consultation during concept design

As part of the design development for the Proposal meetings and workshops were held to ensure that key stakeholders were involved in the collaborative design process. Key stakeholders are:

- TfNSW
- Sydney Trains
- NSW TrainLink
- BMCC.

Meetings with Sydney Trains were also held to discuss the requirements for rail shutdowns to undertake the proposed work.

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 13-16 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">• temporarily disrupt pedestrian and vehicle movements• impact on road pavements under Council's care and control• impact on Council-operated footpaths. <p>Consultation with BMCC has been undertaken and would continue throughout the detailed design and construction phases.</p>

Clause	Clause particulars	Relevance to the Proposal
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>The Proposal includes works that would impact on the station which is a local heritage item as per Schedule 5 of the BM LEP 2015.</p> <p>Consultation with BMCC has been undertaken and would continue throughout the detailed design and construction phases.</p>
Clause 15 Consultation with Councils – development with impacts on flood liable land	<p>Where railway station works:</p> <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>. 	<p>The Proposal is located on land that is identified in the BM LEP 2015 as having potential for flooding. Two unnamed water courses are in proximity to the Proposal area. The flood planning level extends across the rail corridor near the corner of Ross Street and Burfitt Parade.</p> <p>Accordingly, consultation with BMCC is required in regard to this aspect. Refer to Section 6.9.</p>
Clause 15A Consultation with Councils – development with impacts on certain land within the coastal zone	<p>Where railway station works:</p> <p>impact on land within a coastal vulnerability area and is inconsistent with certified coastal management program that applies to that land</p>	<p>The Proposal is not within a coastal vulnerability area. No council consultation would be required in relation to this clause.</p>
Clause 15AA Consultation with State Emergency Service – development with impacts on flood liable land	<p>Where railway station works:</p> <p>impact on flood liable land -written notice must be given (together with a scope of works) to the State Emergency Services and taken into consideration any response to the notice received from the State Emergency Service within 21 days after the notice is given.</p>	<p>The Proposal area has been identified in the BM LEP 2015 as having potential for flooding.</p> <p>Accordingly, notice would be provided to the State Emergency Service and any response would be taken into consideration if received within the required period.</p>
Clause 16 Consultation with public authorities other than Councils	<p>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.</p> <p>Although not a specific Infrastructure SEPP requirement, other agencies TfNSW may consult with could include:</p> <ul style="list-style-type: none"> Roads and Maritime Sydney Trains NSW TrainLink OEH. 	<p>The Proposal is not located immediately 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.</p>

5.3 Consultation strategy

The consultation strategy for the Proposal was developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the project team. 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 is aware of the REF and consulted where appropriate
- provide opportunities for stakeholders and the community to express their view about the Proposal
- understand and access valuable local knowledge from the community and stakeholders
- record the details and input from community engagement activities
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach.

5.3.1 Public display

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

- public display of the REF at various locations
- pop up information stalls (locations to be advised in the community notifications)
- distribution of a project newsletter to rail customers at the station and to the local community, outlining the Proposal and inviting feedback on the REF
- advertisement of the REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
- consultation with BMCC, Sydney Trains, NSW TrainLink and other non-community stakeholders.

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

The REF would be placed on public display on the [TfNSW website⁶](#), [Your Say website⁷](#) and hard copies at the following locations:

- [Blue Mountains City Council⁸](#) (Lower Mountains Office), 104 Macquarie Road Springwood (02) 4723 5000
- [Blaxland Library⁹](#) (Blue Mountains City Council), 33 Hope St Blaxland NSW 2774, (02) 4739 2484
- TfNSW Office at Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood.

Further information on the Proposal may be requested by contacting the Project Infoline (1800 684 490) or by [email¹⁰](#).

During the display period feedback from the community is invited and can be submitted in the following ways:

- Mail: Transport Access Program – Glenbrook
Associate Director, Environmental Impact Assessment
Transport for NSW
Locked Bag 6501
St Leonards NSW 2065
- Email: projects@transport.nsw.gov.au
- Bang The Table webpage: yoursay.transport.nsw.gov.au/Glenbrook

Following the 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.

5.4 Aboriginal community involvement

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the area covered by the Proposal (the area around Glenbrook Station) plus a 200 metre radius, on 10 July 2018. No Aboriginal sites were identified in the initial search. An additional search with an increased radius was subsequently undertaken which identified an Aboriginal site approximately 850 metres from the Proposal. This site would not be impacted by the Proposal.

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

⁶ <https://www.transport.nsw.gov.au/projects/current-projects/glenbrook-station-upgrade>

⁷ yoursay.transport.nsw.gov.au/Glenbrook

⁸ <https://www.bmcc.nsw.gov.au/contact-us>

⁹ https://library.bmcc.nsw.gov.au/client/en_AU/

¹⁰ projects@transport.nsw.gov.au

5.5 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).

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 for the Proposal (SLR 2018a). The assessment involved a desktop study which considered previous traffic analysis and site observations from March 2018 (Cardno, 2018). Detailed traffic counts and modelling were not considered necessary as the Proposal is focused on the station and is unlikely to have a major impact on the surrounding road network. The findings of the assessment are summarised in this section.

6.1.1 Existing environment

Glenbrook Station and access

Glenbrook Station is on the BMT – Blue Mountains Line providing Glenbrook and adjacent suburbs with a link to the Sydney Trains and the NSW TrainLink services into the city via Penrith and west to Lithgow and Bathurst. It also provides people the opportunity to access and transfer between transport modes and services including cycling, bus and taxi. The number of rail services stopping at Glenbrook Station during the week and on weekends is shown in Table 6.

The station is an island platform station immediately south of Burfitt Parade within a cutting in the rail corridor. The station is connected to Burfitt Parade by an existing non-compliant ramp (due to the steep grade), connecting to a footbridge and stairs. There is currently no accessible path of travel to the island platform. There is no public access to the station from the south.

However, there are existing accessible parking spaces and a recently installed DDA-compliant ramp providing access from the eastern car park to the pedestrian crossing and pedestrian refuge and across to the station entrance.

Table 6 Glenbrook Station – number and frequency of train services

Service to/from	Operating days	Numbers of services per day	Service frequency
Bathurst and Lithgow to Central	Monday to Friday	32	every 60 min (approx.) in off peak every 15 min (approx.) in peak
	Weekends and holidays	26	every 60 min (approx.) in off peak every 15 min (approx.) in peak
Central to Lithgow and Bathurst	Monday to Friday	32	every 60 min (approx.) in off peak every 30 min (approx.) in peak
	Weekends and holidays	26	every 60 min (approx.) every 30 min (approx.) in peak

Source: <https://transportnsw.info/documents/timetables/93-BMT-Blue-Mountains-Line-20180125.pdf> (accessed 2 August 2018)

Road network and traffic

The station is located around 67 kilometres from Central Station and is bound by Burfitt Parade to the north and an unnamed road to the south. The road network is summarised in Table 7. The network primarily includes local roads managed by BMCC. Cowdery Street, Mann Street and Ross Street link the Proposal area to the Great Western Highway further north which is classified as a State road (refer also to Figure 11).

Table 7 Glenbrook Station surrounding road network

Road name	Classification	Posted speed limit	School zone	Configuration
Burfitt Parade	District Road	50km/hr	No	Two lane, two-way undivided
Cowdery Street	Access Road	50km/hr	Yes	Two lane, two-way undivided
Mann Street	Access Road	50km/hr	No	Two lane, two-way undivided
Ross Street	Collector Road	50km/hr	Yes	Two lane, two-way undivided
Great Western Highway	State Road	80km/hr	No	Four lanes, two-way median separated
Station Street	Access Street	50km/hr	No	Two lane, two-way undivided
Unnamed Road	N/A – unsealed/unformed		No	Unsealed / unformed

Parking

Two commuter car parking areas are provided adjacent to the station. The eastern car park, accessed via Euroka Road, is owned and managed by BMCC and has 69 parking spaces including two accessible spaces.

The western car park, accessed via Burfitt Parade, is owned and managed by Sydney Trains and has 56 car spaces.

On street, unrestricted, parallel car parking is available in two sections of Burfitt Parade for around 19-20 cars. Parking on the verge close to the station also occurs along Euroka Road, Ross Street and Raymond Street. There are varied parking restrictions on these roads linking to Burfitt Parade.

Taxi and kiss and ride facilities

No formal taxi zone is provided at the station. An informal taxi zone is located on the southern side of Burfitt Parade east of Ross Street. The bus shelter on Burfitt Parade is used by taxi customers to wait for taxis.

No formal kiss and ride facilities are provided at Glenbrook Station, however informal kiss and ride activity was observed to be occurring close to the station entrance along Burfitt Parade in the no stopping and bus zones.

Bus services

The existing bus shelter on Burfitt Parade is used by the 691 service operated by Blue Mountains Buses. The 691 and 690 routes stop at another bus stop on Park Street located closer to the Glenbrook Village shopping precinct, which has a more regular service.

Bicycle network and facilities

Cardno (2018) noted that cycle routes are indicated on local cycleway maps, however no dedicated bicycle paths are provided in this location and cyclists are instead encouraged to use the roads and if accessing the station would then need to use the existing ramp and footbridge to access the platform.

In addition, the station is also used by the community to gain access nearby mountain bike tracks (e.g. The Oaks Fire Trail – Woodford to Glenbrook Track).

Bicycle lockers, with capacity for four bicycles, are located in the eastern car park.

6.1.2 Potential impacts

a) Construction phase

Customer and public access impacts

The following impacts to pedestrians/rail customers are anticipated from construction activities:

- longer walking distances during the removal of the existing access ramp and construction of new stairs and access path
- potential higher levels of platform congestion arising from localised restrictions/narrowing of portions of the platform temporarily fenced off during construction of the lift and station building reconfigurations
- higher road safety risk levels due to elevated frequency of pedestrian and truck interactions on Burfitt Parade and local road network

- potential confusion / loss of amenity / short delays to customers during the temporary relocation of station entrances; and potential footpath closures and/or diversions where necessary.

Road network and traffic

Typically, construction trucks travelling on the road network would consist of medium and large rigid vehicles and articulated vehicles. Specific oversize vehicles may be required for specialist construction activities.

Construction traffic would be able to access the site via a number of routes off the Great Western Highway. Three routes have been nominated for heavy vehicle access as shown in Figure 11 and summarised in Table 8 (i.e. two primary routes and one route for crane haulage).

Table 8 Summary of vehicle haulage routes

Route type	Route
A – Access and egress route	via Ross Street to Burfitt Parade
B – Access and egress route	via Ross Street, Park Street and Euroka Road to Burfitt Parade
Crane haulage route	Via Mann Street, Wascoe Street and Cowdery Street to Station Street

The traffic generated during construction is likely to vary and would be confirmed in the detailed design and construction planning phase, however construction traffic would increase during scheduled weekend rail shutdown periods. It is noted that based on the relatively minor nature of the construction activities and lower order nature of vehicle and person movements in the immediate vicinity of the site, that traffic impacts arising from the Proposal during construction would be minor and manageable subject to the preparation and activation of Construction Traffic Management Plans (CTMPs) that would be prepared as part of a broader Construction Environmental Management Plan (CEMP).

No impact to haulage routes is anticipated. Only cranes of an appropriate size and weight would be used along the Cowdery Street overbridge due to the structural constraints of the bridge. Should a larger crane be required, it would be used along Burfitt Parade on the northern side of the station. Crane sizes would be confirmed with the Construction Contractor prior to construction.

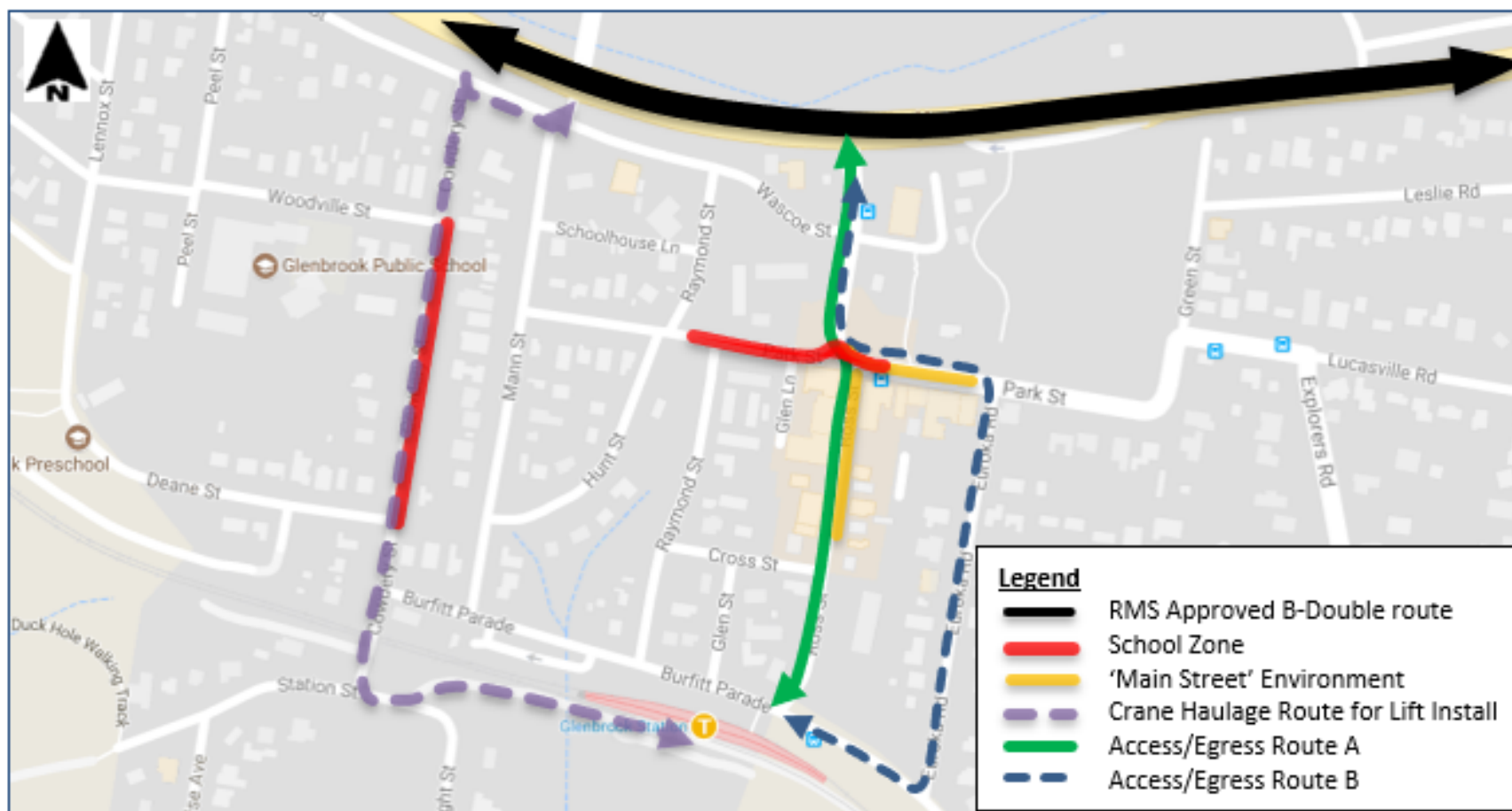


Figure 11 Potential construction vehicle routes – indicative only, subject to detailed design

Parking

An area for a construction compound has been proposed within the western car park on Burfitt Parade (refer Figure 9).

The nominated area would temporarily reduce the number of spaces available to commuters for parking by around 10 spaces. The reduction in parking spaces would be temporary and it is anticipated that this parking can be accommodated in the surrounding street network. It is anticipated that access to the western car park would remain unaltered during the construction period.

It is acknowledged that construction workers may contribute to a minor increase in demand for local parking and would be required to park away from the station (and commuter parking areas) and encouraged to car pool where possible.

Interchange facilities

There may be potential temporary changes as result of construction traffic accessing the site, or works being undertaken at the station entrances which may affect informal taxi zone activity or result in temporary relocation / changes to the operation of the bus stop.

The bicycle lockers would remain operational, and impact to cyclists is expected to be negligible.

Property access

Property access would be maintained during construction to minimise the impact to local residents. However, during activities such as unloading of oversized materials, short term diversions to properties may be necessary. In such incidences, affected residents would be notified in advance of the scheduled works.

b) Operational phase

The Proposal would result in positive impacts in terms of contributing towards making railway transport more accessible to the community. A summary of the operational traffic, transport and access impacts is provided below.

Customer and public access

The Proposal has been designed to cater for a daily patronage of 1,724 people (which is the estimated 2036 daily patronage plus 15 per cent). A pedestrian assessment was undertaken to determine if the Proposal would adequately cater for the projected increase in customers in terms of pedestrian flows (SLR, 2018a).

To assess the pedestrian Level of Service (LoS), Fruin's Pedestrian Flow Rate criteria was adopted (RailCorp, 2010), 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 which are expressed in terms of Levels of Service (LoS) and range from 'A' (best level) to 'F' (worst level). The target rating for Transport Access Program projects is a Level of Service 'C'.

It is assessed that the station would achieve LoS 'A' for all the new accessible pathway and existing footbridge (for 2036 plus 15 per cent under normal peak hour conditions), which means there would be no congestion or delays during the ongoing use of the new access path.

Overall the proposed improvements including the new lift, new station entrance stairs and new accessible path to Burfitt Parade would offer pedestrian benefits in terms of improved customer experience and amenity.

The new lift to the platform and the accessible path would ensure that the station is accessible from Burfitt Parade by mobility and vision impaired persons where this is not currently possible. The Proposal would also provide improved access for the elderly, people with a disability, and parents and carers with prams. Cyclists are also likely to benefit from utilising the lift instead of carrying their bikes up the stairs.

The new accessible entrance pedestrian path would improve the station access grade to/from Burfitt Parade. The new path would also align with the existing raised pedestrian crossing on Burfitt Parade which would improve legibility, wayfinding, and convenience. The improved route would better align with existing pedestrian desire lines across Burfitt Parade which appear to have been a prior issue based on the installation of kerbside fencing to physically control pedestrians crossing at locations other than the desired crossing/s.

The additional pedestrian access and egress route to Burfitt Parade created through the combination of the new accessible path and new stairs would also provide some capacity benefit.

Road network

The Proposal would increase accessibility to Glenbrook Station and improve the customer experience and amenity, potentially leading to a minor increase in utilisation and patronage. This may be due to customers either travelling by train where they did not before, or by changing from another nearby station.

Therefore, there may be an increase in traffic generation; however, it is projected to be minor and would have a negligible impact on the surrounding road network and the amenity of local residents. Importantly, the Proposal would not bring about a change in motorist behaviour or introduce or require changes in current travel behaviours and patterns.

Parking

There would be a minor direct operational change, i.e., a loss of around three to four existing on-street parking spaces due to the creation of a formalised kiss and ride on Burfitt Parade as shown in Figure 7. This loss is considered reasonable when viewed in the context of customers served:

- existing situation: three long-term car parking spaces – likely only three customers served per day
- proposed situation: three kiss and ride spaces – projected at around 50-100 persons per day based on observations.

A minor indirect change to parking, i.e. an increase in parking demand, may also result from increased station patronage.

Interchange facilities

No operational impacts to the existing bicycle, taxi and bus facilities are anticipated as a result of the Proposal.

Property access

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

6.1.3 Mitigation measures

A Construction Traffic Management Plan (CTMP) would be prepared by the Construction Contractor in consultation with TfNSW and provided to BMCC. The CTMP would be the primary tool to manage potential traffic and pedestrian impacts associated with each phase of construction. The CTMP, at a minimum, would include:

- procedures for preparing and implementing Traffic Control Plans (TCPs) which would provide details for signage and timing of any detours (if required) or traffic controls to manage temporary road disruptions
- identification of final construction traffic access routes, site compound, contractor parking and loading zones
- nomination of access routes to and from the local road network and contractor parking
- scheduling of works/deliveries to avoid peak times and limiting of works in the road carriageway as much as practicable to limit parking losses and maintain customer access to the station
- measures to:
 - limit temporary parking losses
 - maintain customer access to and from the station
 - maintain private property access unless otherwise agreed
 - identify changed traffic/pedestrian conditions including details of construction signage including signposts and variable message signs, traffic controllers and other community notifications.

The following mitigation measures would also be implemented:

- limit Cowdery Street overbridge access usage to off-peak hours periods including non-school zone periods
- allocate construction parking within the rail corridor access road south of the station to avoid impact on local resident's street parking availability.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.2 Urban design, landscape and visual amenity

A Visual Impact Assessment was undertaken by RPS for the Proposal (RPS, 2018c). The findings of the assessment are summarised in this section. The assessment included desktop analysis, site inspection and creation of photomontages (also referred to as artist's impressions). The photomontages provide an indication of what the Proposal may look like from key representative viewpoints once complete, in particular to demonstrate the bulk and scale, noting that materials and finishes are indicative and would be further investigated during detailed design.

The Visual Impact Assessment was prepared in accordance with the *Roads and Maritime Environmental Impact Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime, 2013). In accordance with this guideline, an impact grading matrix was used to assess both landscape and visual impacts. The sensitivity and magnitude of the impact was assessed to produce a combined impact rating of negligible, low, moderate and high (refer to Figure 12). The findings of the assessment are summarised in this section.

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Figure 12 Roads and Maritime impact grading matrix

6.2.1 Existing environment

Landscape character

Three landscape character zones (LCZs) have been identified for the Proposal (refer to Figure 13):

- **LCZ 1 Residential:** This zone is defined by a generally homogenous style of residential urban development on either side of the road. Dwellings are typically one to two storeys in height with a generous eight metre setback from the road, which provides a wide and spacious streetscape. The streets are lined with native and exotic street trees, and the high level of vegetation within the dwelling yard has resulted in a highly vegetated neighbourhood aesthetic
- **LCZ 2 Glenbrook Shops Precinct:** This zone is concerned with the various commercial activities of the Glenbrook CBD, centred around hospitality and retail trade. It encompasses federation heritage buildings (brickwork, corrugated iron and federation style decoration) which has been retained and highlighted to provide the commercial zone with a greater sense of historic value
- **LCZ 3 Railway Infrastructure:** This zone comprises the station and Burfitt Parade which generally runs at 90 degrees to the slope on which its positioned, following the natural contours of the localised topography. The road has a perched southern aspect with broken views down into the rail corridor due to the natural topography and vegetation.

Visual receivers / viewpoints

Visual receivers are individuals and/or groups of people whose views may be affected by the Proposal. These include users of residential dwellings, commercial properties and open space/ and generally comprise residents, rail customers, motorists and pedestrians.

Six locations have been identified to represent key viewpoints to and from the Proposal. As part of the Visual Impact Assessment, an assessment was undertaken to understand the potential impacts on views as a result of the Proposal at these locations. These locations are shown in Figure 14.

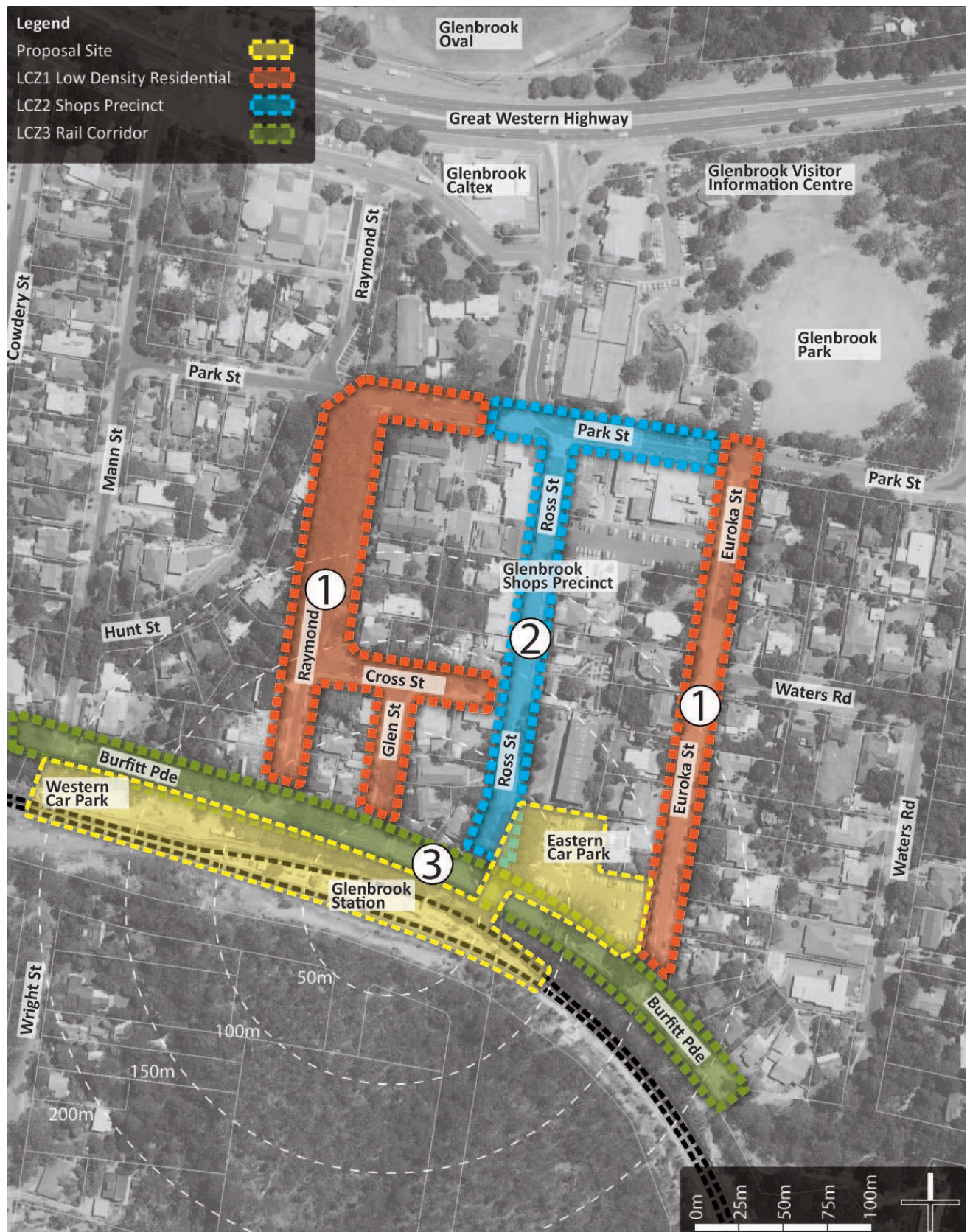


Figure 13 Landscape Character Zones

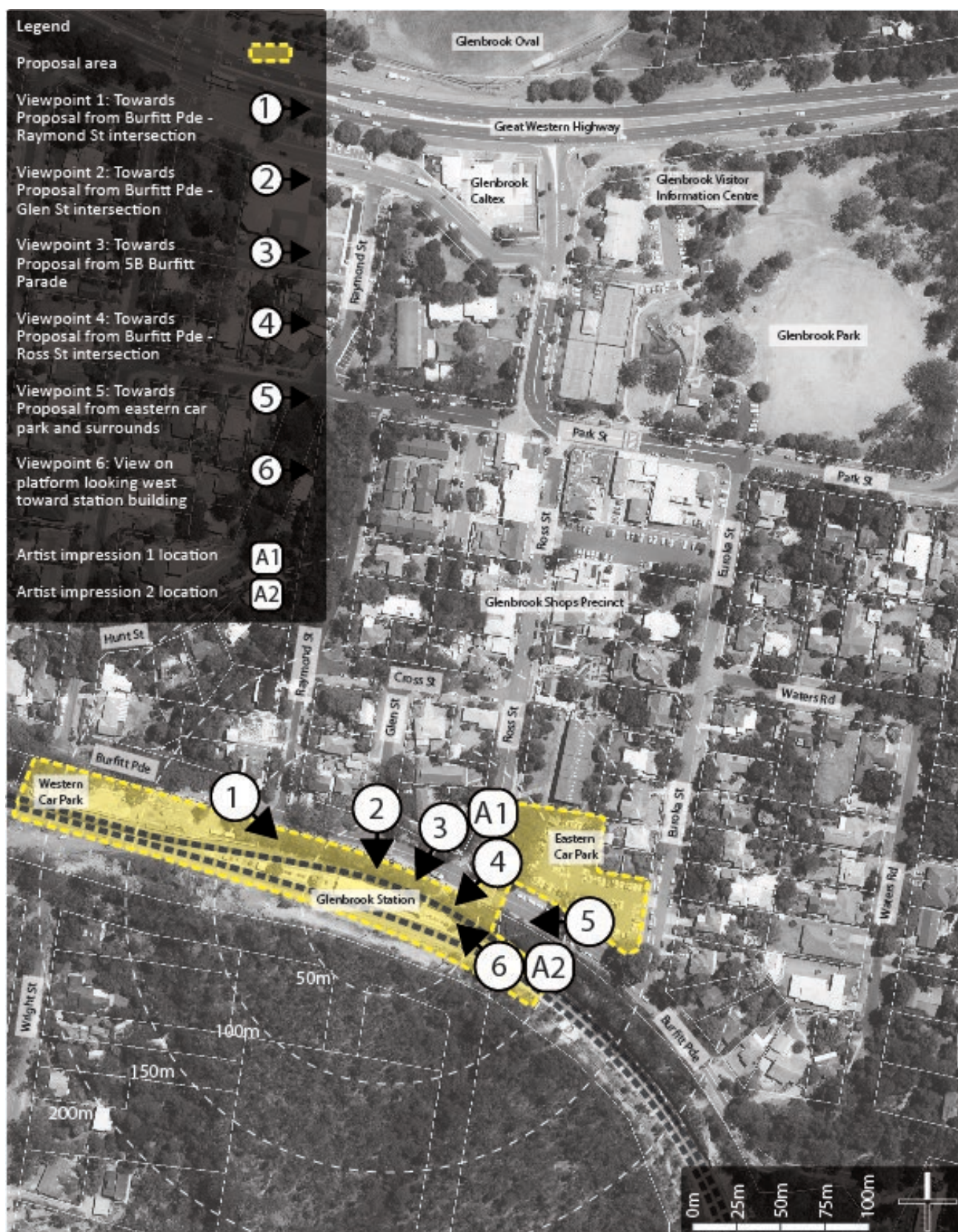


Figure 14 Viewpoint locations

6.2.2 Potential impacts

a) Construction phase

Construction activities would generally be more visible than the operational stage of the Proposal. The construction activities would be transient in nature. Temporary elements likely to be introduced into the visual environment include:

- fencing and hoarding
- road barriers and signage
- crane and other construction equipment
- site office and amenities.

Where night works are required for the Proposal this would involve the use of temporary lighting 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

Photomontages have been prepared from Viewpoint 4 (from the Burfitt Parade / Ross Street intersection) and Viewpoint 6 (from the platform looking west) to provide an indication of what the Proposal may look like during operation and are included at Figure 15, Figure 16, Figure 17 and Figure 18.

An assessment of the visual sensitivity and magnitude of each viewpoint during the operational phase of the Proposal is provided in Table 9, utilising the impact grading system matrix previously discussed (refer Figure 12).

Lighting would be designed in accordance with the requirements of standards relevant to *AS 1158 Road Lighting* and *AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting*, and as such operational lighting impacts (such as light spill) are expected to be negligible.



Figure 15 Viewpoint 4 – existing view from Ross Street and Burfitt Parade intersection



Figure 16 Viewpoint 4 –photomontage / artist impression of proposed view from Ross Street and Burfitt Parade intersection



Figure 17 Viewpoint 6 – existing view from platform looking west towards station building



Figure 18 Viewpoint 6 – photomontage / artist impression of proposed view from platform looking west towards station building

Table 9 Summary of visual impact assessment

Viewpoint	Summary	Overall impact (sensitivity x magnitude)
Viewpoint 1: Views from Burfitt Parade – Raymond Street intersection	<p>Situated within close-proximity to the western car park, clear views to residential properties, rail infrastructure and dense bushland-style vegetation.</p> <p>As the locality consists of residential and other sensitive visual receivers the Sensitivity is considered High.</p> <p>As the Proposal works are far away and visually buffered from view the Magnitude is Negligible.</p>	Negligible
Viewpoint 2: Views from Burfitt Parade – Glen Street intersection	<p>Positioned from the road, directly opposite the main station building, this viewpoint consists of elements including residential properties, rail infrastructure and mature bushland-style vegetation. As the locality consists of residential and other sensitive visual receivers the Sensitivity is considered High.</p> <p>As the Proposal works are far away and visually buffered from view the Magnitude is Negligible.</p>	Negligible
Viewpoint 3: Views from No.5B Burfitt Parade	<p>No.5B Burfitt Parade is located adjacent to the station entry. Views here are characterised by Glenbrook Station infrastructure; station platform, signage, fencing and other urban elements. The eastern car park adjoins the intersection. Localised mature vegetation provides a high level of visual amenity.</p> <p>As the localised area consists of sensitive visual receivers the Sensitivity is High.</p> <p>Mature native vegetation within Proposal area visually mitigates views to Proposal but the removal of 31 trees may expose receivers to new and existing station infrastructure. Magnitude is considered to be Moderate due to level of tree removal. A sympathetic mitigation strategy would be investigated.</p>	High-moderate
Viewpoint 4: Views from Burfitt Parade – Ross Street Intersection	<p>Positioned at the Burfitt Parade - Ross Street intersection, this viewpoint considers views experienced by pedestrians and motorists. Views within this locality include Glenbrook Station infrastructure; the station platform, signage, fencing and other urban elements. Adjoining the intersection is the eastern car park. Localised mature vegetation provides a high level of visual amenity.</p> <p>Sensitivity is Moderate as the primary receivers are motorists and pedestrians.</p> <p>Mature native vegetation within Proposal area visually mitigates views to Proposal, but the removal of 31 trees may expose receivers to new and existing station infrastructure. Magnitude is considered Moderate.</p>	Moderate

Viewpoint	Summary	Overall impact (sensitivity x magnitude)
Viewpoint 5: Views from eastern car park and surrounds	<p>This viewpoint considers receivers within and around the eastern car park and bus stop, including pedestrians and motorists moving through the public transport infrastructure, and several residential dwellings with minor viewing potential to the Proposal area.</p> <p>Views here consist of Burfitt Parade streetscape items (including the bus stop which has a painted mural and the associated mosaics which are installed in the pavement), along with light poles, street signage and the Burfitt Parade pedestrian crossing. Mature vegetation within this locality provides visual amenity. Removal of six trees within Proposal area would impact this viewpoint.</p> <p>As the localised area consists of sensitive visual receivers the Sensitivity is High.</p> <p>However, the Magnitude is considered Negligible, due to the moderate distance between the Proposal and residential dwellings who have restricted views, and the high level of vegetation screening.</p>	Negligible
Viewpoint 6: Views from the west-bound platform approach	<p>This viewpoint is positioned along the Glenbrook Station platform looking west towards the existing footbridge and considers two types of visual receivers; train passengers in motion and those disembarking and moving along the platform.</p> <p>This viewpoint is characterised by rail corridor infrastructure, the primary features being the Glenbrook Station Building, and the other heritage items including such as the footbridge, brick platform, and platform gardens. Located to the north of the platform is a tall vertical sandstone escarpment, and atop the rock shelf and to the south of the rail line are tall mature native trees.</p> <p>This viewpoint considers passengers and pedestrians with direct views to the heritage listed station; thus, the Sensitivity is High.</p> <p>The location of the proposed lift to the east of the footbridge would provide a physical separation between the new lift and the heritage listed Station Building. Visual impacts would be further reduced through the selection of appropriate materials including brick facade for the lower lift shaft which is similar to the brick of the existing Station Building. As the Proposal represents a minimal departure from the existing design qualities the Magnitude is considered Low.</p>	Moderate

6.2.3 Mitigation measures

Overall, the Proposal would have a negligible to moderate visual impact on the majority of people living, working in or travelling through the landscape surrounding Glenbrook Station during operation, with the exception of Viewpoint 3 (No.5B Burfitt Parade). This location has been assessed as having a moderate-high impact due in part to the close proximity of a residential receiver to the new station entry stairs and transformer, and tree removal required for the Proposal.

Mitigation measures would be reviewed and revised where appropriate during detailed design development and construction planning to minimise the level of visual impact of the construction and operation phases of the Proposal.

The detailed design of the Proposal is to be undertaken with reference to the recommendations included in the Visual Impact Assessment (RPS, 2018c) which are included in the list of proposed mitigation measures in Section 7.2, and include:

- a landscape plan highlighting planting and streetscape design would be prepared in alignment with the civil design, with the intent to provide some integration between the new Proposal elements and the existing / planned landscape character. This might include landscape design for visual mitigation for the lift shaft and footbridge
- a landscape plan that supports and strengthens the existing heritage values of Glenbrook Station would be prepared which would assist in reducing the visual influence/impact of the Proposal
- further exploration of the potential design outcomes of the Proposal to ensure it is sympathetic to the heritage values of Glenbrook Station. Consult the relevant policies, including the *Blue Mountains City Council Heritage Strategy 2014 – 2017*, TfNSW and Sydney Trains guidelines and to drive design direction
- new ancillary items including signage and balustrades would reflect the overall heritage aesthetic of the existing station to ensure the heritage qualities of the station are retained. Make reference the Sydney Trains *Station Components Guide* where possible
- retain the community focused character of the Glenbrook Station locality through the protection and enhancement of the existing mosaics adjacent to the bus stop. Ensure they are adequately protected during construction, or should an impact need to occur, develop a community consultation strategy to relocate or replace the mosaics.

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 and screening of compounds.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.3 Noise and vibration

This section provides a summary of the Noise and Vibration Impact Assessment undertaken by SLR (2018b). The assessment included:

- establishing the existing background noise levels in the vicinity of Glenbrook Station
- establishing the construction noise management levels and vibration limits that would apply to the upgrade works
- predicting environmental noise and vibration levels at nearby residential and other sensitive receivers due to the upgrade works
- considering potential noise from the operation of the upgraded Glenbrook Station.
- identifying mitigation measures to reduce and manage noise and vibration impacts from the upgrade works to comply with established construction noise management levels and vibration limits.

As operational noise levels are expected to remain mostly unchanged and the specific mechanical systems to be installed for the Proposal are not yet finalised, no quantitative modelling of operational noise impacts was undertaken.

6.3.1 Existing environment

Noise sensitive receivers

The area surrounding the station was divided into four noise catchment areas (NCA01-NCA04) as shown in Figure 19.

The locality is primarily characterised by low density residential receivers, bushland and a neighbourhood shopping precinct. There is one educational receiver located around 320 metres north west of the Proposal site.

Background noise levels

Existing noise levels (prior to construction of the Proposal) are measured to understand existing ambient noise levels and their sources, which inform the assessment of potential noise impacts from the Proposal.

Rating Background Noise Levels (RBLs) are determined from measurement of L_{A90} noise levels (representing the noise level exceeded for 90 per cent of the monitoring period) in the absence of noise from the Proposal.

To determine the RBLs, unattended noise monitoring using a noise logger was undertaken from 23 July 2018 to 31 July 2018 at two residential locations – 2 Wright St Glenbrook (L01) and 11 Burfitt Parade (L02) which are shown in Figure 19. Rating background levels (RBLs) are reported as L_{A90} as shown in Table 10.

Table 10 Unattended noise monitoring results

Location	Address	Period ¹	Rating Background Level (L_{A90}) in dB	Ambient noise level (L_{Aeq}) in dB
L01 in NCA01	2 Wright Street	Daytime	33	50
		Evening	32	52
		Night time	26	51
L02 in NCA03	11 Burfitt Parade	Daytime	35	52
		Evening	34	52
		Night time	26	50

Note 1: Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays & Public Holidays.

The results of continuous unattended noise monitoring at these locations show levels typical of an outer-city suburban noise environment with low night-time noise levels. Daytime noise levels are likely to be dominated by the natural environment, road traffic on adjacent roads, and rail traffic.

Operator attended monitoring was also undertaken at both monitoring locations on 23 July 2018. Daytime ambient noise levels were observed to be largely controlled by traffic movements along adjacent roads.

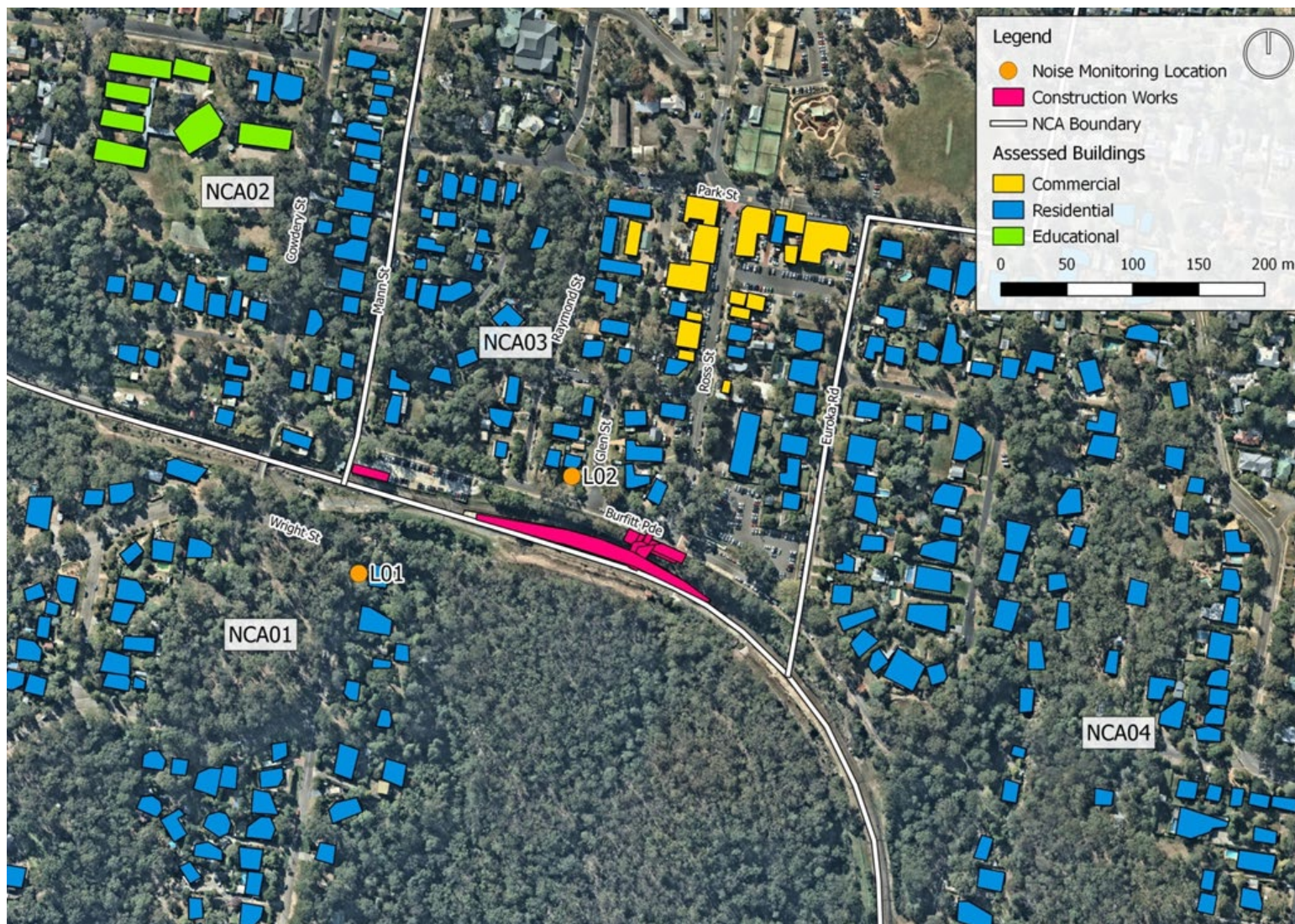


Figure 19 Proposal location and noise catchments

Construction noise criteria

The EPA's *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) is the principal guideline for the assessment and management of construction noise in NSW. The ICNG recommends standard hours of construction as:

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

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

Where works exceed the noise management levels, all reasonable and feasible measures (such as equipment selection and location, construction scheduling and respite periods) should be implemented to reduce noise levels as far as practicable.

The construction NMLs calculated for residential receivers are listed in Table 11. The NML for the Glenbrook Public School is prescribed by the ICNG, and is an internal noise management level, therefore the corresponding external noise level (which the assessments are based on) has been determined on the assumption that a 10 dB noise reduction from outside to inside is applicable. This is considered to be a typical assumption for a 'windows open' scenario.

Sleep disturbance noise goals have also been established for residential receivers which are based on the *NSW Roads Noise Policy* (Department of Environment, Climate Change and Water, 2011). Based on the Policy, the sleep disturbance criteria for both NCA are a screening level of 50-55 dB(A) $L_{A1(1 \text{ minute})}$ and an awakening reaction at 60 to 65 dB(A) $L_{A1(1 \text{ minute})}$.

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

Table 11 NMLs for construction

NCA	Standard hours (RBL + 10dB)	Out of hours – daytime ¹ (RBL + 5dB)	Out of hours – evening ¹ (RBL + 5dB)	Out of hours – night time ¹ (RBL + 5dB)	Sleep disturbance (RBL + 15dB)
NCA01 - Residential	43	38	37	35 ²	45
NCA02 - Residential	45	40	39	35 ²	45
NCA02 - Educational	55 ³	55 ³	N/A	N/A	N/A
NCA03 - Residential	45	40	39	35 ²	45
NCA03 - Commercial	70	70	N/A	N/A	N/A
NCA04 - Residential	45	40	39	35 ²	45

Note 1: Out of Hours construction hours – Evening hours are 6pm to 10pm. Night-time hours are 10pm to 7am Sunday to Saturday and 10pm Saturday to 8am Sunday

Note 2: Based on the 30 dBA minimum night-time RBL in accordance with the Noise Policy for Industry.

Note 3: ICNG internal goal + 10 dB as openable windows are assumed. An outside-to-inside attenuation of 10 dB is assumed.

Construction vibration criteria

The effects of vibration in buildings can be divided into three main categories:

- those in which the occupants or users of the building are inconvenienced or possibly disturbed
- those where the building contents may be affected
- those in which the integrity of the building or the structure itself may be prejudiced.

Human comfort

The EPA's *Assessing Vibration: a technical guideline* (Department of Environment and Conservation, 2006) provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV) rather than a continuous vibration level. The VDV is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The maximum criteria level is 0.4 m/s^{1.75} for residences during the daytime and 0.26 m/s^{1.75} during the night time. For educational facilities (when in use) the maximum criteria is 0.8 m/s^{1.75}.

Effects on building contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment. For most receivers, the controlling vibration criterion will be the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on most building contents.

Where appropriate, objectives for the satisfactory operation of critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

Structural damage vibration

Structural damage vibration limits are based on Australian Standard *AS 2187: Part 2-2006 Explosives - Storage and Use - Part 2: Use of Explosives* and British Standard *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2*. These standards provide frequency-dependent vibration limits related to cosmetic damage, noting that cosmetic damage is very minor in nature, is readily repairable and does not affect the structural integrity of the building.

The recommended vibration limits from BS 7385 for transient vibration for minimal risk of cosmetic damage to residential and industrial buildings is shown in Table 12.

Table 12 Transient vibration guide values for minimal risk of cosmetic damage (BS 7385)

Type of building	Peak particle velocity: 4 – 15 Hz	Peak particle velocity: 15 Hz and above
Reinforced or framed structures industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Un-reinforced or framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Safe working distances

Safe working distances for items of vibration intensive equipment are provided in Table 13.

Table 13 Safe working distances from vibrating plant

Plant item	Rating/description	Safe working distance (Cosmetic damage)	Safe working distance (Human response)
Vibratory roller	< 50 kN (Typically 1-2t)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4t)	6 m	20 m
	< 200 kN (Typically 4-6t)	12 m	40 m
	< 300 kN (Typically 7-13t)	15 m	100 m
	> 300 kN (Typically 13-18t)	20 m	100 m
	> 300 kN (Typically > 18t)	25 m	100 m
Small hydraulic hammer	300 kg - 5 to 12t excavator	2 m	7 m
Medium hydraulic hammer	900 kg - 12 to 18t excavator	7 m	23 m
Large hydraulic hammer	1600 kg - 18 to 34t excavator	22 m	73 m
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure
Bored piling	< 800 mm	2 m	n/a

Operational noise criteria

The *Noise Policy for Industry* (EPA, 2017) has two broad objectives:

- controlling intrusive noise levels in the short term
- maintaining noise amenity levels for particular land uses over the medium to long-term.

The *Noise Policy for Industry* sets out procedures for establishing the project intrusiveness $L_{Aeq(15\text{minute})}$ and project amenity $L_{Aeq(\text{period})}$ noise levels, where the lower (i.e. more stringent) is then adopted as the Project Trigger Noise Level (PTNL).

Applicable PTNLs for all noise sensitive receiver areas surrounding the Proposal have been calculated and are shown in Table 14.

Table 14 Project Trigger Noise Levels – residential

NCA	Time of day	Intrusive¹ (dBA)	Amenity² (dBA)	Overall PTNL³ (dBA)
NCA01	Day	40	50	40
	Evening	37	40	37
	Night	35	35	35
NCA02 – NCA04	Day	40	50	40
	Evening	39	40	39
	Night	35	35	35

Note 1: Project intrusive noise level is RBL + 5dB

Note 2: Project amenity (period) noise level is the prescribed amenity criteria minus 5 dB

Note 3: Resulting PTNL is the lower of the project intrusive and project amenity noise levels

6.3.2 Potential impacts

a) Construction phase

Noise

To assess the potential impacts from the proposed works, the construction phases described in Chapter 3 were used to develop indicative construction scenarios comprising typical plant and equipment. The scenarios developed were:

- Site establishment
- Main works - Burfitt Parade
- Main works – platform level (rail shutdown dependent)
- Main works – platform level (non-rail shutdown).

A 3D computer noise model was then used to predict the LAeq(15minute) and LA1(1minute) noise levels for each of the NCAs resulting from the above scenarios.

Predictions include the source noise levels of the anticipated equipment, the location of the nearest sensitive receivers, the number of plant items likely to be operating at any given time, the distance between the equipment and the receivers, and any shielding or reflections that the topography or buildings may provide.

Worst-case noise level predictions have been made based on worst case impacts for each work scenario when the works are located at the nearest position within the works area to each receiver. The predictions are provided in Noise and Vibration Impact Assessment for the Proposal (SLR, 2018b). The impacts are summarised in Table 15.

In practice, the noise levels would vary because plant would move around the worksites and would not all be operating concurrently. This means that noise levels are likely to be lower than the worst-case noise levels presented for notable periods of time during the works.

Overall, three residential receivers in NCA03 have been predicted to be highly impacted by noise during vegetation clearing and piling. The modelled highly noise affected receivers are shown in Figure 20.

Table 15 Summary of predicted noise impacts

Works scenario	Summary of predictions	Timing and duration of works
Site establishment	<ul style="list-style-type: none"> Minor exceedances of NMLs are predicted for the nearest residential receivers (NCA01, NCA02 and NCA04) for most of the proposed activities associated with site establishment During site establishment vegetation clearing works are predicted to generate high exceedances of the NMLs in NCA01, NCA02 and NCA04 of up to 20 dB, 16 dB and 24 dB respectively due to chainsaw and chipper use In NCA03 some residential receivers with a direct line of sight to the proposed works could experience daytime exceedances of up to 39 dB during site establishment activities 	<p>Standard day time construction hours only.</p> <p>It is anticipated that the high noise level generating activities would occur for a few days only.</p>
Main works - Burfitt Parade	<ul style="list-style-type: none"> Daytime NMLs of up to 15 dB are predicted for residential receivers in NCA01, NCA02 and NCA04 Receivers in NCA03 directly adjacent to the proposed works may experience NML exceedances of up to 30 dB 	<p>Standard day time construction hours only.</p>
Main works – platform level (rail shutdown dependent)	<ul style="list-style-type: none"> Day time exceedances of NMLs 10 dB or less may be experienced by residential receivers in NCA01, NCA02 and NCA04 Evening and night time exceedances of NMLs up to 20 dB may be experienced by residential receivers in NCA01, NCA02 and NCA04 Day time NML exceedances of up to 27 dB may be experienced by residential receivers in NCA03 NML exceedances of up to 37 dB are predicted for residential receivers directly adjacent to the works in NCA03 	<p>Standard day time hours and out of hours work – night and weekends.</p> <p>Three rail shutdowns.</p>
Main works – platform level (non-rail shutdown)	<ul style="list-style-type: none"> No substantial NML exceedances are predicted for residential receivers in NCA01 and NCA02 during these works NCA04 closest receivers may experience minor NML exceedances of up to 5 dB. Receivers directly adjacent to the works in NCA03 may experience NML exceedances of up to 13 dB Receivers further from the works in NCA03 would have substantially lower NML exceedances 	<p>Standard day time construction hours only.</p>



Figure 20 Highly noise affected receivers

Cumulative noise impacts

Cumulative noise impacts warrant assessment where more than one works scenario operates at the same time and in the same location such that the same receiver is impacted by noise from more than one works scenario. Generally, the proposed works are scheduled in consecutive phases and therefore cumulative noise impacts are not anticipated as the assessment is controlled by noise impacts from the individual phases (as assessed). Section 6.12 also notes no major development applications are listed in Glenbrook for approval at this time.

Construction traffic noise

The proposed construction activities would not generate a significant amount of construction traffic. The relatively small number of construction vehicles accessing the site is predicted to have an insignificant effect on existing road traffic noise levels and further consideration of noise impacts due to construction traffic is not required.

Vibration

Vibration intensive equipment is proposed during the service relocation works scenarios which include the use of jackhammers and bored piling.

Piling works are associated with several works activities. It is assumed that piling works would be performed using non-vibration intensive bored piling. If the Construction Contractor elects to use an alternative piling method, the vibration levels generated by this plant may be higher than those assessed.

Human comfort

In relation to human comfort (response), the safe working distances in Table 13 relate to continuous vibration and apply to residential receivers. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are permitted, as discussed in *Assessing Vibration - a technical guideline* (Department of Environment and Conservation, 2006).

Cosmetic damage assessment

Indicative vibration levels at nearby receivers are shown in Table 16.

Table 16 Indicative vibration levels at receivers

Receiver	Approximate distance to works	Indicative vibration level (mm/s) ¹
NCA01	> 100 m	< 0.1 mm/s
NCA02	> 100 m	< 0.1 mm/s
NCA03	25 m	0.1 mm/s
NCA04	> 100 m	< 0.1 mm/s

Note 1: Estimated from the safe working distances specified in TfNSW Construction Noise and Vibration Strategy and assumed dense rock.

Heritage building impacts

Heritage structures identified within 100 metres of the Proposal site are:

- Glenbrook Railway Station Group (including platform buildings and the footbridge)
- 3 Ross Street, Glenbrook
- 15 Euroka Road, Glenbrook.

Heritage buildings are to be considered on a case by case basis. Where a historic building is deemed to be sensitive to damage from vibration (following inspection), it is recommended to reduce the vibration criteria accordingly in line with the *Construction Noise and Vibration Strategy* (TfNSW, 2018b).

The more conservative DIN 4150 (German Institute for Standardisation, DIN 4150-3:1999-02 *Structural vibration – Effects of vibration on structures*) superficial cosmetic damage criteria of 2.5 mm/s should be considered for vibration sensitive structures. Where heritage buildings of a typical residential-type construction are not found to be structurally unsound, DIN 4150 superficial cosmetic damage criteria of 5 mm/s may be more suitable as a screening criterion.

The anticipated vibration impacts of the Proposal are summarised in Table 17.

Table 17 Summary of vibration impacts

Vibration assessment criteria	Impact and comment	Duration and nature
Human comfort	<ul style="list-style-type: none">• Based on safe working distances and the distance to the Proposal the works are anticipated to comply with the human comfort vibration criteria at all residential receivers.	Intermittent during piling and jackhammer use scenarios.
Cosmetic damage assessment	<ul style="list-style-type: none">• Based on the distance from the proposed works, structural or cosmetic damage from vibration intensive work is considered unlikely for adjacent receivers.	Intermittent during piling and jackhammer use scenarios.
Heritage building impacts	<ul style="list-style-type: none">• The separation and distance between the proposed equipment and the non-station heritage items on Ross Street and Euroka Road would be sufficient to mitigate vibration levels from the use of identified equipment.• Where vibration intensive works are required to be undertaken within the safe working distances in Table 13 or in close proximity to vibration sensitive heritage structures such as the station building and the existing footbridge vibration monitoring should be undertaken to ensure acceptable levels of vibration are satisfied.	Intermittent during piling and jackhammer scenarios.

b) Operational phase

The key identified fixed noise sources associated with the station upgrade are the proposed new station lift and the transformer. The lift would be installed at the eastern end of the platform to provide access to the footbridge, and the transformer would be installed west of the new stairs at the entrance to the station (refer to Figure 7).

At this stage of the design, specific lift and transformer systems have not been selected, which means it is too early to assess compliance with the applicable noise criteria. However, given that these noise sources generally have relatively low noise emissions, it is anticipated that noise of the lift and transformer systems design could be relatively easily mitigated if required during the detailed design phase of the Proposal through the selection of appropriate equipment. The applicable criteria for operational noise (i.e. PTNLs) for the new station lift and any other operational equipment are included in Table 14.

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 and Vibration Strategy* (TfNSW, 2018b) and the Noise and Vibration Impact Assessment (SLR, 2018b) and in consultation with impacted receivers.

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

For any highly affected noise receivers (over 75 dB), TfNSW would communicate with the impacted residents regarding the duration and noise level of the works, and by describing any respite periods that would be provided.

Operational plant and equipment would be designed with regard to the PTNLs.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.4 Indigenous heritage

6.4.1 Existing environment

A due diligence assessment was undertaken for the Proposal in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010). An Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the area covered by the Proposal (the area around Glenbrook Station) plus a 200 metre radius, on 10 July 2018. No Aboriginal sites were identified in the initial search. An additional search with an increased radius was subsequently undertaken which identified an Aboriginal site approximately 850 metres from the Proposal. This site would not be impacted by the Proposal.

Certain landscape features, such as nearby waterways, sand dune systems, ridge tops, ridge lines, headlands, cliff faces and rock caves/shelters, can indicate the likely presence of Indigenous objects. None of these features are present immediately surrounding the station and therefore the Proposal is not considered to be located within a high risk landscape for Indigenous heritage potential. The extensive landscape modification and high level of disturbance that has occurred across the Proposal area suggests that the presence of culturally sensitive buried items is unlikely within the boundaries of the Proposal.

6.4.2 Potential impacts

a) Construction phase

Construction of the Proposal would involve some minor excavation and other ground disturbing activities for the following activities:

- the foundations and pit for the new lift shaft would require excavation up to a depth of around three metres
- the footings/supports and construction of the new stairs and accessible path at the station entrance
- the foundations for the new transformer.

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

As no known Indigenous heritage items are located in the vicinity of the Proposal area and no high-risk landscape features are located at or near the Proposal area, the potential for unknown items to be present is considered to be low. As such, 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

If previously unidentified Indigenous objects are uncovered during construction, in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a), 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, OEH and the Local Aboriginal Land Council/s. If human remains are found, work would cease, the site would be secured and the NSW Police and OEH would be notified.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.5 Non-Indigenous heritage

A Statement of Heritage Impact (SoHI) has been prepared by RPS (2018a) for the Proposal which included a desktop assessment and site inspection of the Proposal site undertaken on 17 July 2018. The assessment of the SoHI is summarised in this section.

6.5.1 Existing environment

Database results

A desktop search of historic registers including the World Heritage List, National Heritage List, Commonwealth Heritage List, the Register of the National Estate (non-statutory archive), NSW State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedules of the Blue Mountains LEP was undertaken for the Proposal site and surrounds.

Heritage listed items in and within the vicinity of the Proposal site are listed in Table 18. Glenbrook Railway Station Group is listed on RailCorp's Section 170 Heritage and Conservation Register. The station is also identified in Schedule 5 of the Blue Mountains LEP. The extent of the Section 170 heritage listing for the station is shown in Figure 21.

Table 18 Summary of heritage listings

Name / item	Listing	Location in relation to Glenbrook Station
Glenbrook Railway Station Group (SHI 4801053)	s.170	Within
Glenbrook Railway Station (G011)	LEP	Within
Glenbrook Garden Centre (G012)	LEP	135 metres north
Greater Blue Mountains Area – additional values (AHD #105127)	WHL/NHL	170 metres west

There would be no adverse impacts to the Glenbrook Garden Centre or Greater Blue Mountains Area due to the nature and scale of the proposed works, and distance to these heritage items. No further assessment of these items is required.



Figure 21 Heritage items

Historical background

The continuation of the rail line from Penrith (established in 1863) over the Blue Mountains presented an engineering challenge for the Sydney Railway Company, primarily due to steep gradients and dense natural vegetation. However, four years after the completion of the Main Western Line to Penrith the extension to Wentworth Falls, including Glenbrook was opened.

Glenbrook Station was initially established as a siding and later as a passenger station in a different location to present day and was known by various names until 1879 when it was confirmed as Glenbrook Station.

Glenbrook Railway Station Group

Glenbrook Station, in its current location, was opened in 1913 and is of local significance. The Statement of Significance from the State Heritage Inventory (SHI) listing is provided below:

Glenbrook Railway Station is of local significance as an excellent example of a standard Federation station building design set within a distinctive landscape setting with platform gardens that are a landmark as the gateway to the Blue Mountains line.

The gardens have been an iconic railway landscape due to being the recipient of many awards in the annual NSW Railway Station Garden Awards, six of which were first prize, since the early 1950s to the 1990s.

The existing station was the last station to be built along this section of the line and replaced the earlier 1860s Glenbrook Station for duplication and deviation of the line in 1913, and as such is significant for demonstrating the engineering achievements associated with the last major construction works of the Blue Mountains line.

Different elements of an item can provide different contributions to the item's heritage significance. It is sometimes beneficial to identify significant elements and how they contribute to the overall heritage significance. The NSW Heritage Division provide the grading criteria which have been reproduced in Table 19.

Table 19 Grading of significance criteria (NSW Heritage Office, 2001)

Grading	Justification	Status
Exceptional	Rare or outstanding element directly contributing to an item's local and State significance.	Fulfils criteria for local or State listing
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or State listing
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing

Table 20 provides a summary of the significance of each of the components of the Glenbrook Railway Station Group (with the exception of the Cowdery Street overbridge which is 155 metres west of the platform and would not be impacted by the Proposal). Refer to Chapter 3 of the SoHI for more information on the existing condition of the heritage elements.

Table 20 Summary of major heritage elements

Station components	Grading	Comments
Station Building <ul style="list-style-type: none"> • Moveable heritage components • Original layout of building • Original features such as multi-paned windows, ceiling roses and cornices • Signal Room 	Exceptional	The Station Building is an excellent example of a Federation type railway station building. Alterations such as the 2015 bathroom upgrades have not detracted from the overall significance of this element. The moveable heritage located within the Station Building contributes to a rich sense of history and illustrates changes within rail technology through time.
Out of Shed <ul style="list-style-type: none"> • Moveable heritage components 	High	The Out of Shed is a small building structure associated with the historic storage of goods and it is of the same Federation style as the Station Building creating tangible links between the structures and contributing to the overall aesthetic of this building. The moveable heritage components included in this element demonstrate the significance of the gardens in the past.
Lamp Room/Store	Moderate	Whilst not associated with the early use of the item the Lamp Room provides evidence for the changing uses of technology and the move away from kerosene manual lamps to electrical lighting methods.
Platforms	High	The platforms are a good example of platform construction in the early 20th Century with little alteration to the vertical brick walls. The attachment of multiple services to the platform walls are considered to detract from the element's aesthetic value. The pattern of concrete paving references the former gravel surfacing material.
Footbridge	Moderate	The footbridge is a standard steel beam bridge supported on steel trestle with bracing. With the exception of the original steel structure, all components of the footbridge have been replaced since the 1990s, however the form of the footbridge contributes to an otherwise relatively intact railway station precinct.
Gardens	High	The gardens have played an important role in the identity of the Glenbrook Railway Station Group in the past. The gardens contribute to the setting of the item and the overall significance of the item.

Potential archaeological features

There are no known potential archaeological elements on the station, however remnants of former station yard sidings and decommissioned electric wiring towers/poles indicate possible archaeological findings within the railway corridor outside the station platforms. The siding was removed in 2013 to make way for the western car park, following archaeological monitoring.

The construction of the railway cutting in which Glenbrook Station is located is likely to have removed any archaeological remains associated with early land uses in the area. An excerpt of a 1912 plan for the construction of the Glenbrook platforms obtained from the Sydney Trains Plan Room indicates that the bulk of the platforms were formed by hand packed rubble enclosed by brick facing. This rubble was likely sourced by spoil from the rail cutting. There is very low potential that items such as coins or other domestic demolition materials would be identified within this rubble.

Early photographs, plans and aerials available for the station and surrounds indicate that buildings were not constructed to the north or south of the railway cutting near the station. Therefore, there is no potential for archaeological remains to be located in these areas.

6.5.2 Potential impacts

a) Construction phase

This section considers the potential heritage impacts associated with construction of the Proposal. It focuses on impacts associated with the station upgrade works described in Section 3.1.1, as the interchange works would not result in any direct impacts to heritage fabric, and would not impact views and vistas to and from the Glenbrook Railway Station Group.

The assessment of heritage impact has been undertaken in accordance with the Heritage Division guidelines (NSW Heritage Office & Department of Urban Affairs and Planning, (1996, revised 2002). The assessment of the levels of impact used are outlined in Table 21.

Table 21 Heritage Impact Assessment Methodology (Heritage Office & DUAP 2002)

Level of impact	Description
Moderate	The proposed works would impact defining elements inherent to the item's heritage significance such as built fabric, archaeological remains, defining landscape characteristics and/or associated aesthetic elements. Although the integrity/intactness of the item would be impacted, some defining elements of the item would be retained. Therefore, there is potential for the heritage significance of the item to be retained.
Minor	The proposed works would impact defining elements inherent to the item's heritage significance such as built fabric, archaeological remains, defining landscape characteristics and/or associated aesthetic elements. However, these impacts are not considered to detract from the heritage significance of the item.
Nil	The proposed works would not impact defining elements inherent to the items heritage significance such as built fabric, archaeological remains, defining landscape characteristics and associated aesthetic elements. The works are not considered to detract from the heritage significance of the item.

Heritage impacts

Station Building

The Proposal would not impact the original internal layout of the Station Building. Rather the function of the former parcel office, male toilets and store room would be altered. Therefore, the Proposal is considered to have a moderate impact to the heritage significance of the Glenbrook Station Building (refer to Figure 8 for proposed changes).

- Internal modifications: the modifications required for the installation of a Family Accessible Toilet would include direct impacts to the fabric of the Station Building. This includes the widening of doorways and lowering of the floor in the current male toilets and conversion of the store room to accommodate an ambulant bathroom. The door to the current male toilets would be widened to 850 millimetres. The door widening would require the removal of heritage bricks and installation of new door. The installation of toilets and basins would require piping and plumbing to service the new facilities which may need to penetrate or be attached to heritage fabric. It is assumed that the family accessible toilet would be able to utilise some of the existing basins and toilets currently in the male toilets. The proposed works also include the installation of new services and a glass and steel canopy over the entry to the current male toilets.

Modifications to the former parcels office (currently used by staff and for communications equipment) would include installation of new switchboards and communications equipment. This is likely to require additional installation of wiring through heritage fabric to service the switchboards and equipment. These impacts would also involve minor impacts to the exterior façade of the Station Building. The modifications would also require the permanent closure of doors between the former parcels office and Station Master's office as well as the signal room. Fire proof linings would be installed to the ceiling and walls of the room as well as the permanently closed doors potentially obscuring heritage features such as ceiling cornices and requiring penetration into heritage fabric. This lining would have a moderate visual impact to the former parcel room. The installation of electrical wiring and fireproof lining are likely to have moderate cumulative impacts on the former parcel room.

Upgrades to the existing staff office (former Station Master's Office) would require the removal of moveable heritage items such as the original Station Master's desk, mirror and fire proof safe.

- Privacy wall: the demolition and relocation of the privacy wall and wall nibs/partitions on the western end of the Station Building would not involve direct impacts to heritage fabric as it is a modern addition to the item (circa mid to late 20th Century). Visual impacts are likely to be minor as the proposed privacy wall would be similar in form to the current privacy wall.
- Lift: the construction of the lift shaft would impact views towards the Station Building from Burfitt Parade and the eastern end of the platform. The location of the Station Building within the railway cutting obstructs views towards the building from Burfitt Parade. The footbridge and garden beds restrict views towards the Station Building from the eastern side of the platform. Views towards the Station Building from the footbridge would not be impacted. The location of the proposed lift structure to the east of the footbridge would provide a physical separation between the new element and the heritage Station Building. Overall the proposed lift shaft would have minor impacts to views and vistas to and from the Station Building.

The construction of the lift shaft would impact views towards the Station Building from Burfitt Parade and the eastern end of the platform. The location of the Station

Building within the railway cutting obstructs views towards the building from Burfitt Parade. The footbridge and garden beds restrict views towards the Station Building from the eastern side of the platform. Views towards the Station Building from the footbridge would not be impacted. The location of the proposed lift structure to the east of the footbridge would provide a physical separation between the new element and the heritage Station Building. Overall the proposed lift shaft would have minor impacts to views and vistas to and from the Station Building.

Out of Shed

There are no direct impacts to the heritage fabric of the Out of Shed. There are not considered to be any visual impacts to the Out of Shed as the bulk of the Station Building would block views towards the proposed lift shaft.

Lamp Room/Store

There are no direct impacts to the heritage fabric of the Lamp Room/Store. There are not considered to be any visual impacts to the Lamp Room/Store as the bulk of the Station Building would block views towards the proposed lift shaft.

Platforms 1 and 2

The proposed works would have minor impacts to the heritage significance of the Glenbrook platforms.

The proposed works include subsurface impacts to the platforms to install the proposed lift and associated services as well as localised grading of the platform surfaces to ensure that cross falls are compliant from the lift to the boarding point of the platform. These works would have minor impacts to the platforms.

The works would not impact the brick walls lining the sides of the platforms.

The current seating and lighting on the platforms are modern and do not contribute to the heritage significance of this component and so any proposed adjustments would have a negligible impact.

Footbridge

The Proposal would have a moderate impact to the heritage significance of the Glenbrook Station footbridge.

The installation of the lift and connection to the existing footbridge would have direct impacts to the 1916 steel component of the bridge. These impacts involve the addition of new materials to the 1916 component of the bridge. The *NSW Rail Footbridges Heritage Conservation Strategy* (NSW Government Architect's Office, 2016) recommends the retention of the Glenbrook Footbridge and so the retention of the original steel structure is therefore in keeping with the policies of this strategy.

The concrete deck, stairs and balustrades were added to footbridge in the 1990s, these elements do not contribute to the heritage significance of the footbridge. The demolition of the existing ramp, construction of a new accessible path and additional landscaping would not impact the heritage significance of the footbridge.

The proposed lift shaft would impact views towards the station from the end of the footbridge on Burfitt Parade. The use of minimal materials and canopies aids to reduce the visual impacts. However, these visual impacts would alter the current setting of the station and are considered to be moderate in nature.

Gardens

The Proposal would have a minor impact to the heritage significance of the Glenbrook Station gardens.

The installation and construction of the proposed lift would require the removal of garden beds in this area, however the majority of the garden beds and established plants and shrubs across the station platforms would be retained. This would have visual impacts to the gardens at Glenbrook Station as there would be minor impacts to the views of the garden beds from the eastern end of the platform looking towards the footbridge.

A garden bed currently located on the northern side of the Station Building is proposed to be relocated to next to the privacy wall (refer Figure 8) in order to accommodate the enlargement of the door for the proposed Family Accessible Toilet and localised platform grading. This would have minor visual impacts to the gardens at Glenbrook Station.

Views and vistas

The Glenbrook Railway Station Group is located within the railway cutting as such views towards the item from Burfitt Parade are generally limited. However, the proposed lift shaft would be visible from Burfitt Parade and the proposed works to the station entrance could potentially impact views towards the heritage item from Burfitt Parade.

The retention of screening vegetation and replacement of vegetation with similar vegetation would reduce these visual impacts. Utilising visually recessive materials (like glass for the upper lift shaft) or sympathetic materials (like matching brick for the lower lift shaft) as well as limiting the height and form of the lift canopy would assist in reducing visual impacts. Overall, the visual impacts of the Proposal with consideration to the heritage setting are considered to be minor in nature.

The removal of platform garden beds and construction of the lift shaft would have visual impacts to the gardens at Glenbrook Station. There would be minor impacts to the views of the garden beds from the eastern end of the platform looking towards to footbridge.

Archaeological potential

The archaeological potential assessment has identified nil to low potential for archaeological remains to be located within the platform structures. The floors within the Station Building female toilets were replaced in 2015 therefore there is no potential for archaeological sub-floor deposits to be identified during the proposed works in this area.

The Proposal would not impact any areas of archaeological potential.

Summary of impacts

The potential heritage impacts associated with the Proposal are summarised in Table 22.

Table 22 Summary of heritage impacts

Item	Type of impact	Heritage impact assessment	Visual impact assessment
Station Building (including moveable heritage)	Direct	Moderate	Minor
Out of Shed (including moveable heritage)	None	No Impact	None
Lamp Room/Store	None	No Impact	None
Platforms 1 and 2	Direct	Minor	None
Footbridge	Direct	Minor	Minor
Overbridge	None	No Impact	None
Gardens	Direct	Minor	Minor
Archaeological potential	None	No Impact	N/A

b) Operational phase

The operation of the Proposal would not impact upon non-Indigenous heritage.

6.5.3 Mitigation measures

A number of mitigation measures would be implemented during detailed design and construction of the Proposal to minimise/avoid heritage impacts. Following completion of works, the RailCorp Section 170 Heritage and Conservation Register listing description and historical context should be updated to reflect the new works.

Detailed design

The detailed design and construction of the Proposal would be undertaken with consideration to the heritage values of the station. In order to minimise impacts on the heritage fabric of the station, the following mitigation measures would be implemented during detailed design:

- a suitably qualified and experienced heritage conservation architect would be engaged to provide ongoing heritage and conservation advice throughout detailed design and any subsequent relevant design modifications. The nominated heritage conservation architect would provide specialist advice throughout the detailed design phase to ensure that the final design adheres to the *NSW Rail Footbridges Heritage Conservation Strategy* (NSW Government Architect's Office, 2016) and the design recommendations made in the SoHI (RPS, 2018a)
- a Heritage Interpretation Strategy for the station would be prepared, in accordance with the *Interpreting Heritage Places and Items* (NSW Heritage Office, 2015)

- archival recording of the station as a whole would be undertaken 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 would be provided to BMCC and Sydney Trains for future reference. In particular, the following elements the following elements would be concentrated on:
 - Station Building
 - Platforms
 - Footbridge
 - Gardens
- the removal or transfer of any moveable heritage items should be undertaken in accordance with the Sydney Trains *Moveable Heritage Disposal Policy* (2016) and the Sydney Trains *Movable Heritage Management Strategy 2015-2017*.

Construction

Potential impacts to non-Indigenous heritage during construction would be managed through the implementation of the CEMP. The CEMP would prescribe management measures to ensure impacts to the heritage fabric of the station are minimised and impacts to archaeological relics or deposits are avoided. The CEMP would include the following measures:

- property conditions surveys would be completed prior to piling, excavation of bulk fill or any vibratory works
- a heritage induction would be provided to all on-site staff and contractors involved in the project and would clearly layout the heritage constraints of the site
- inclusion of stop work procedures in the in the unlikely event that intact archaeological relics or deposits are encountered in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a)
- minimise intrusions to the external façade associated with installation of services/conduits.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.6 Socio-economic impacts

6.6.1 Existing environment

Glenbrook Station is located within a cutting between low density residential areas and bushland areas. The station has a number of existing facilities for customers including ticket machines, Opal card readers, female and male toilets (non-accessible). Other transport facilities are discussed in Section 6.1.1.

Land use surrounding Glenbrook Station comprises a mixture of low density residential and commercial zones. The closest residential properties are around 30 metres from the Proposal site on Burfitt Parade, Ross Street and Glen Street. Around 130 metres north of the Proposal area is the Glenbrook Neighbourhood Precinct that provides retail, business and community services. The area to the north west of the Proposal includes Glenbrook Public School which is around 350 metres from the Proposal area.

Glenbrook Station is also located around 250 metres from the boundary of the Blue Mountains National Park and as one of the first entry points is frequented by tourists visiting the area.

6.6.2 Potential impacts

a) Construction phase

The construction phase of the Proposal has the potential to impact station customers, pedestrians, adjacent residents and motorists due to:

- temporary changes to accessing the station
- temporary closure of toilets and waiting rooms
- temporary loss of some parking in the western car park due to the location of the construction compound
- minor increase in traffic including truck movements delivering site materials, plant and equipment
- construction noise, vibration, dust and visual impacts.

b) Operational phase

It is anticipated that the Proposal would provide positive socio-economic benefits to Glenbrook and the wider area including:

- improved accessibility for Glenbrook Station customers due to the provision of a new lift and new accessible path from the station entrance to the platform
- improved customer amenity and facilities at the station including a Family Accessible Toilet, ambulant toilet, CCTV, improved wayfinding and new lighting
- potential increased use of public transport to and from Glenbrook.

6.6.3 Mitigation measures

A number of environmental safeguards would be implemented to minimise potential impacts on the community including:

- mitigation measures in respect of potential impacts to amenity (e.g. noise, dust and visual) as assessed in the relevant sections of this report and listed in Section 7.2 of this report

- development of a Community Liaison Plan (to be developed by the Construction Contractor prior to construction) which would identify 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
- informing the community of construction progress, activities and impacts in accordance with the Community Liaison Plan
- providing contact details for a 24-hour construction response line, Project Infoline and email address provided for ongoing stakeholder contact throughout the construction phase.

6.7 Biodiversity

A Flora and Fauna Assessment Report was undertaken for the Proposal (RPS, 2018b). This included a site inspection by an ecologist on 17 July 2018 and a qualified arborist on 29 August 2018 along with review of relevant databases and other ecological resources.

6.7.1 Existing environment

The Proposal area is characterised by a combination of landscaped vegetation and native bushland, including landscaped garden beds on the platform. The results of database searches using OEH Atlas of NSW Wildlife (accessed July 2018) and EPBC Protected Matters Search (accessed July 2018) identified 21 threatened flora species, 35 threatened fauna species and 25 threatened ecological communities (TECs) as either previously recorded or potentially occurring within the locality.

The EPBC Act Protected Matters Search and regional vegetation mapping identified a further eight TECs (DoEE 2018; OEH 2018). This information was used to prepare a preliminary 'likelihood of occurrence' analysis prior to the field investigation that was subsequently updated following analysis of field data.

Flora and threatened ecological communities

Nine native flora species were identified as part of the ecological survey and landscaping with exotic species was also noted. No threatened flora was detected within the area to be impacted by the Proposal.

Some Weeds of National Significance, as listed in the NSW Department of Primary Industries (DPI) website, were also identified on site. These include Lantana (*Lantana camara*) and Climbing asparagus (*Asparagus africanus*).

Analysis of floristic (plant) data indicates the Proposal is situated in an ecotone (transition area) between the following two plant community types (PCTs):

- PCT 792: Deane's Gum – Mountain Grey Gum – Turpentine tall moist forest on shale, Sydney Basin Bioregion
- PCT 1281: Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion

The distribution of native PCTs observed at the Glenbrook Station is shown in Figure 22, and both these PCTs form part of the following State and Commonwealth listed TECs:

- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (listed as an endangered ecological community (EEC) under the BC Act)
- Sydney Turpentine-Ironbark Forest (listed as a critically endangered ecological community (CEEC) under the EPBC Act).

The extent of these TECs coincides with the mapped occurrences of PCT 792 and PCT 1281 as shown in Figure 22.

Fauna

A total of eight fauna species were identified during opportunistic surveys on-site. These included:

- Yellow-faced Honeyeater (*Lichenostomus chrysops*)
- White-throated Treecreeper (*Cormobates leucophaea*)
- Australian Magpie (*Cracticus tibicen*)
- Eastern Yellow Robin (*Eopsaltria australis*)
- Striated Pardalode (*Pardalotus striatus*)
- Noisy Miner (*Manorina melanocephala*)
- Rainbow Lorikeet (*Trichoglossus moluccanus*)
- Sulphur Crested Cockatoo (*Cacatua galerita*).

No important fauna habitat features such as hollow-bearing trees, fallen logs or termite mounds were observed in the area to be impacted by the Proposal. However, seasonal nectar resources produced by mature Grey Ironbark (*Eucalyptus paniculata*) could be used for foraging purposes by the Grey-headed Flying Fox (*Pteropus poliocephalus*). No koala feed trees as listed on Schedule 2 of SEPP 44 were identified within the area to be impacted by the Proposal.

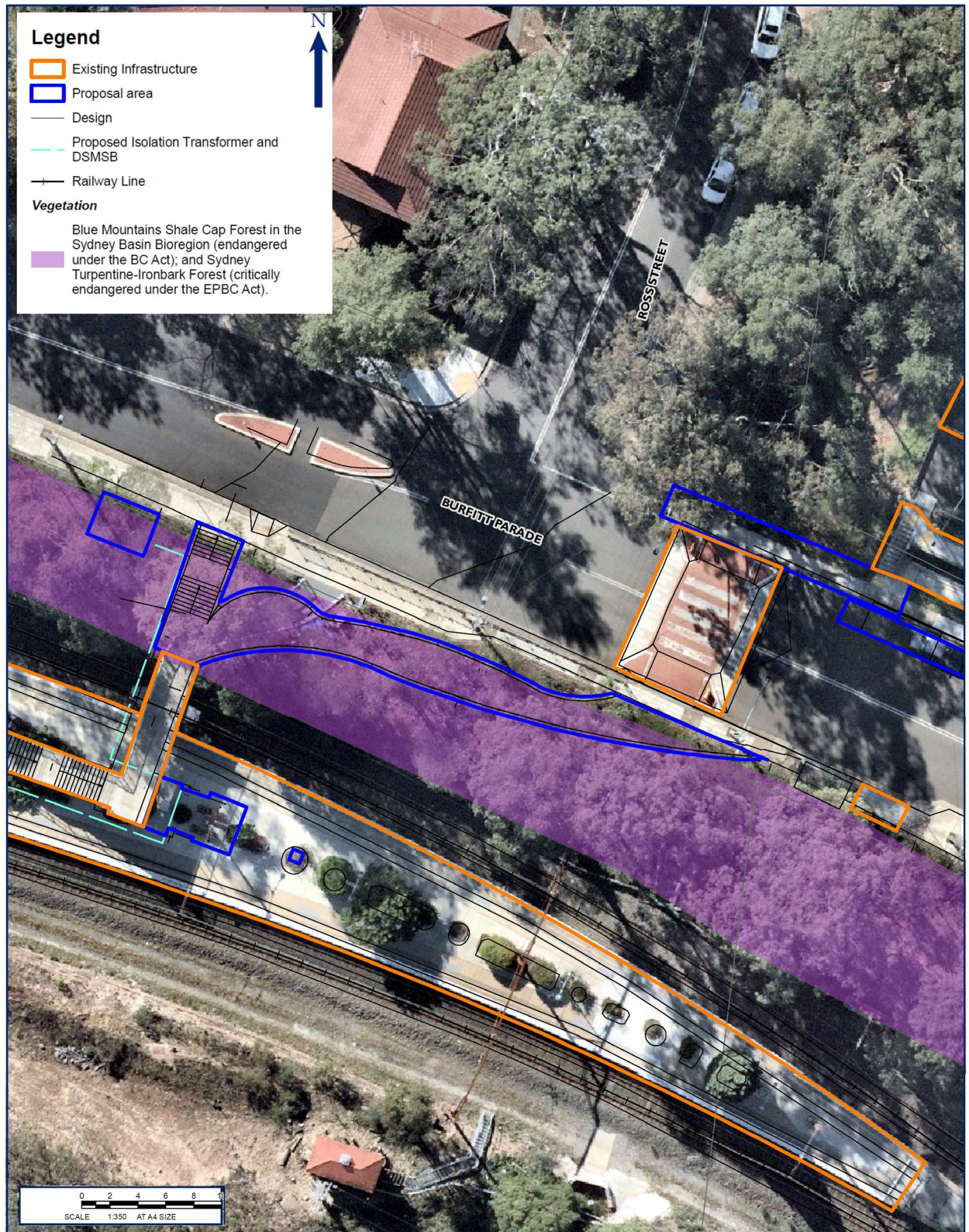


Figure 22 Plant community types mapped at Glenbrook Station

6.7.2 Potential impacts

a) Construction phase

Direct impacts

The Proposal has been designed in a manner to avoid the clearing of mature trees, where possible. In particular, the new access path from the footbridge to the pedestrian crossing where the current alignment has been further refined from earlier concept design options. However due to design parameters, it was not possible to avoid the clearing of some trees and groundcover vegetation and some tree clearing is necessary due to anticipated impacts to the root zones.

There would be removal of some garden beds to allow for the construction of the new lift and the relocation of one garden bed to allow access to the Family Accessible Toilet. However, as the platform gardens to be removed are small and predominantly contain exotic plants they are not considered to contribute to the ecological makeup of the Proposal area and have not been considered further as part of the flora and fauna assessment.

In summary, vegetation loss would be limited to branch trimming, removal of 31 trees (*Eucalyptus spp.* and *Acacia spp.*) and groundcover vegetation. An area of approximately 406 square metres of native vegetation described as PCT 1281 would be removed, which is part of the following TECs:

- Sydney Turpentine-Ironbark Forest (CEEC under the EPBC Act)
- Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (EEC under the BC Act).

Edge effects are likely and cannot be avoided and are discussed further below.

The following impact assessments have been undertaken for the State and Commonwealth listed TECs impacted by the Proposal (RPS, 2018b):

- Test of Significance under the BC Act
- Assessment of Significance under the EPBC Act.

These assessments concluded that the Proposal is not likely to have a significant impact on the State and Commonwealth listed TECs. The Proposal is not likely to substantially reduce the extent or composition of the ecological community and no important habitat features would be adversely affected. The Proposal would not result in an impact on any declared area of outstanding biodiversity value. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Blue Mountains shale cap forest in the Sydney Basin Bioregion EEC.

The Proposal would not result in a substantial change in species composition or the quality and integrity of an ecological community, nor would the Proposal interfere with the recovery of the ecological community. On this basis, it is considered that the Proposal is not likely to have a significant impact on the patch of Sydney Turpentine Ironbark Forest CEEC.

Indirect impacts

The 'edge effect' describes a collection of factors and processes that influence the presence and abundance of species at a boundary such as natural boundaries (e.g. ecotones) or a disturbance of some kind (e.g. cleared lands). Edges can occur naturally within ecosystems and include situations such as the common boundary between two ecological communities or the boundary between burnt and unburnt vegetation.

Biodiversity often adapt to the effects of an edge, with some species being partially or wholly reliant on edge effects. The main factors and processes that operate at a disturbed edge of an ecological community are:

- microclimate (e.g. localised changes in temperature, wind, light, humidity)
- hydrology (i.e. localised changes in surface and subsurface water flows)
- altered fire frequency and intensity
- invasion by exotic plant and animal species
- alteration of soil conditions (e.g. increased sedimentation and nutrient availability)
- alteration of vegetation structure (e.g. tree death and increased shrub densities).

On average, edge effects have been estimated to occur up to 50 metres from the road shoulder. Edge effects are particularly pronounced in patches where a large edge to area ratio exists (i.e. small vegetation patches with a proportionally large perimeter). Such conditions often result in the simplification of biodiversity values in favour of generalists or edge specialist species. These impacts already exist in the smaller more isolated vegetation patches of the Proposal area.

The Proposal is unlikely to have any substantial incremental edge effects on these smaller isolated patches over and above existing conditions (refer Figure 23).

Potential edge effects promoted by the Proposal may include:

- establishment of weeds along boundaries between native vegetation and cleared lands and potential for weed incursions into adjacent native vegetation
- modification of habitat attributes, through increased light and noise levels, and changes to vegetation structure, soil nutrient levels and plant species diversity
- changes to fauna assemblages, including alteration of woodland and forest bird assemblages by edge specialists
- increased predation of vertebrate fauna by predator species that use forest edges for foraging
- increased nest predation of small insectivorous birds at forest edges.

Considering the above potential edge effects, it is anticipated that establishment of weeds and modification of habitat attributes (i.e. noise and water runoff also noted below) are the most likely indirect impacts that may arise from the Proposal.



Figure 23 Adjoining vegetation area proposed for offset planting and bush regeneration

Fauna habitat

The area impacted by the Proposal has limited habitat of value to native flora and fauna. Important habitat features such as hollow-bearing trees, fallen logs or termite mounds were not located in the impact area and would not be adversely impacted by the Proposal.

Foraging habitat for the Grey-headed Flying Fox (i.e. mature Grey Ironbark trees) occurs within the Proposal area. Five mature specimens of Grey Ironbark would be removed by the Proposal representing a potential impact to the Grey-headed Flying Fox. The BC Act test of significance was undertaken to determine if the Proposal is likely to have any significant impact on the Grey-headed Flying Fox. That assessment concluded that the Proposal is not likely to substantially reduce foraging habitat for that species. No significant impacts on nationally listed threatened migratory species listed under the EPBC Act are expected to occur as a result of the Proposal.

Vehicle, plant and construction equipment would temporarily increase noise pollution within the study area. This can cause disruption to normal fauna activity and lead to the departure of species from an area during construction.

The removal of vegetation, including both trees and grasses will increase the risk of sediment laden storm-water run-off.

Exotic flora

Due to equipment use and soil disturbance, there is the potential for the introduction of weeds. Also, without the use of appropriate weed management protocols, the Proposal has the potential to facilitate the spread of weeds into adjoining native vegetation.

Construction activities may also increase the risk of spills into the environment, specifically petroleum-based materials (e.g. fuel and hydraulic oils).

Key Threatening Processes

Key Threatening Processes (KTPs) are listed under Schedule 4 of the BC Act and EPBC Act. There are no relevant KTPs that have the potential to affect biodiversity values within the Proposal area. The proposed tree removal is not of a scale to cause significant impacts.

b) Operational phase

Post construction and operational phase impacts are likely to have a similar profile to existing conditions. No operational impacts to biodiversity are anticipated from the Proposal.

6.7.3 Mitigation measures

Key mitigation measures are:

- a Vegetation Management Plan would be implemented to enhance the adjoining existing (degraded) patch of native vegetation shown in Figure 23 which is in excess of the offsetting requirements stipulated by the *Vegetation Offset Guide* (TfNSW, 2016b). Bush regeneration and landscaping would use native species characteristic of PCT 1281
- implementation of tree protection measures prior to construction to protect retained trees
- a site-specific Erosion and Sediment Control Plan would be prepared and implemented for the Proposal during construction
- all fuels, chemicals and other hazardous materials would be stored in a roofed, fire-protected and impervious bunded area at least 50 metres from waterways, drainage lines, basins, flood-affected areas or slopes above 10 per cent

- implementation of sensitive landscaping and use of weed management techniques consistent with TfNSW's *Weed Management and Disposal Guideline* (TfNSW, 2015) during construction to maximise beneficial impact on residual vegetation cover at the station entrance and in the area of the accessible path and new stairs.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.8 Contamination, landform, geology and soils

6.8.1 Existing environment

Landform, geology and soils

As noted in the Glenbrook Station Design Report (Arcadis, 2018), Geological Series Sheet 9030 shows that the Proposal area is underlain by the Hawkesbury Sandstone formation. Hawkesbury Sandstone is described as medium to very coarse-grained quartz sandstone with minor shale lenses. The platform is situated within an existing sandstone cutting that extends to around eight metres high. The lower portion of the cutting (from six metres) is observed to be near vertical and therefore expected to be comprised of rock which is of medium strength or better.

The area of Glenbrook Station is mapped as the Faulconbridge (fb) soil landscape grouping on Sheet 9030 of the Penrith Soil Landscape Series. The fb soils are described as shallow, being generally less than 50 centimetres deep, earthy sands and yellow earths.

Acid Sulfate Soils

A review of the Australian Soil Resource Information System National Acid Sulfate Soils Database indicated that there is a low probability of occurrence for ASS within the vicinity of the Proposal.

Contamination

A review of the NSW EPA Contaminated Land Register and the POEO Act Public Registers indicate that the Proposal site is not listed as a contaminated site, nor has the site been subject to any regulation under the *Contaminated Land Management Act 1997*.

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

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

Given the age of the station building, there is also potential for asbestos materials and lead paint to be encountered.

6.8.2 Potential impacts

a) Construction phase

Soil disturbance

Excavation and other earthworks are described in more detail in Section 3.2.4, and if such activities are not adequately managed, could result in the following impacts:

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

These impacts are considered to be potentially problematic for this Proposal due to the steep sloping terrain in some areas and due to the presence of the railway cutting. However, it is expected that erosion risks would be adequately managed through the implementation of standard measures as outlined in the *'Blue Book' - Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

Contamination

Excavation also has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. The exposure of contaminants could also pose an environmental risk if they were to enter nearby waterways through the stormwater infrastructure.

The Proposal has the potential to disturb asbestos containing material and other hazardous substances (such as lead paint) from the refurbishment of the station building. There is also potential for construction activities to result in the contamination of soil through accidental fuel or chemical spills 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 Control Plan/s would be prepared and implemented in accordance with the *'Blue Book' - Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). The Erosion and Sediment Control Plan would be established prior to the commencement of construction and be updated and managed throughout according to the activities occurring during construction.

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

Appropriate mitigation measures would be implemented to manage hazardous substances during demolition works. This would include the removal of hazardous materials from the structure by appropriately licensed asbestos/hazardous waste removalists and in accordance with relevant legislation and guidelines.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface water

The Proposal area is close to two unnamed watercourses, which drain across the rail corridor. These watercourses flow to Glenbrook Creek, located approximately 700 metres to the south. These watercourses are within the Glenbrook-Erskine Creek catchment and ultimately drain into the Hawkesbury-Nepean River downstream of Warragamba Dam.

Built drainage in the immediate area is via the local road network and associated, gutters, stormwater drains and pipes and the stormwater and drainage system associated with the station itself.

Surface runoff is captured by the trunk drainage system managed by BMCC.

Flooding

BMCC flood planning mapping shows there are areas within the Proposal area that are below the flood planning level. The flood planning levels appear to follow the rail corridor in areas to the east and west of the station as shown in blue in Figure 24.

Due to the land being below flood planning levels, the BM LEP 2015 suggests flooding warrants consideration in this area. While the Proposal is permissible without development consent and is not bound by the specific requirements within the BM LEP 2015, flooding should be taken into consideration in the detailed design phase.



Figure 24 Proposal areas below flood planning level (BMCC interactive map, Glenbrook Station show in red)

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 Glenbrook Creek.

Activities which would disturb soil during construction work (such as tree removal, excavation for access pathway footings, and utility relocation) have the potential to impact upon local water quality due to erosion and sedimentation. There is also potential to contaminate local water quality as a result of incidental spills or inadequate fuel and chemical storage practices.

In an extreme rainfall event, flooding may impact on construction activities. Moderate to heavy wet weather events may cause water flows through the Proposal area which could increase the potential for soil erosion and sedimentation impacts in the cutting and the rail corridor.

Mitigation measures have been provided below to minimise the potential for these impacts.

b) Operational phase

The Proposal would have little to no impact upon the hydrology in the surrounding area, however, this would be confirmed during the detailed design phase. The detailed design would take stormwater management around new and existing structures into consideration.

The new design does not significantly increase impervious areas at the station however surface runoff from the new access pathway and stairs from Burfitt Parade across the top of the rail cutting could cause erosion and sedimentation into the rail corridor if appropriate drainage designs are not implemented.

6.9.3 Mitigation measures

During detailed design further hydrological assessment would be undertaken during to determine final drainage arrangements and flooding risks (an assessment has been completed for the concept design stage only).

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. Dewatering (if required) would be undertaken in accordance with the TfNSW *Water Discharge and Reuse Guideline* (TfNSW, 2017d).

Refer to Section 7.2 for a full 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 characteristic of an urban environment, with some transport emission influences. Given Glenbrook is situated in the Blue Mountains area it is also likely to experience effects from domestic wood heating and hazard reduction burns.

OEHS undertakes air quality monitoring across NSW. The site is located within the Sydney north-west monitoring region with air quality monitored at fixed sites. St Marys is the closest monitoring site to the Proposal. A search of the daily regional air quality index for the Sydney north-west region for the August 2018 showed that the region generally experienced 'Very Good' to 'Good' air quality values' some outlying values of 'Fair'.

A search of the National Pollutant Inventory database (NPI) 2016/17 data within the Glenbrook area (postcode 2773) indicates that there are no businesses in the vicinity of the Proposal that are monitored for air quality purposes. The database notes that there are air pollutants identified in the area from diffuse emitters. The source of the diffuse emissions is likely to be car/truck exhaust emissions and rail corridor emissions.

Potentially affected receivers within the vicinity of the site include the following:

- local residents
- users of the adjacent commercial and recreational areas
- pedestrians and commuters within the Glenbrook Station precinct.

6.10.2 Potential impacts

a) Construction phase

During construction, air quality impacts would be associated with the generation of dust and emissions from stationary and moving on-site machinery and associated vehicular traffic. Particulate emissions would be associated with a number of stationary and mobile sources as well as minor potential for wind erosion of areas of exposed soil.

Anticipated sources of dust and dust generating activities include:

- loading and transfer of material from trucks
- trenching and excavation activities associated with construction of the new lift, stairs and access path, relocation of services, drainage works etc
- demolition of the existing access ramp
- construction activities associated with Family Accessible Toilet and platform regrading.

The total amount of dust generated would depend on the properties of the demolition materials and soil material (silt and moisture content), the activities undertaken and the prevailing meteorological conditions.

The Proposal would have a minimal impact on air quality as it would not involve extensive excavation or other land disturbance with the potential to generate significant quantities of dust. Appropriate measures would be established to manage dust emissions from demolition works.

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. The likely airborne dust load generated during a typical construction day would be small and therefore would be unlikely to result in reduced local air quality at the nearest potentially affected receivers, given the relatively small construction footprint, and with the implementation of proposed control measures.

b) Operational phase

The Proposal is not anticipated to significantly increase customer traffic to and from the station. However, over the long term there is anticipated to be an increase in patronage at Glenbrook Station. Increase in patronage at the station is not anticipated to significantly impact air quality in the station area.

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.

6.10.3 Mitigation measures

Section 7.2 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 exposed soil surfaces, covered loads and appropriate management of tracked dirt or mud on vehicles. Such measures would be included in the CEMP to be prepared for the Proposal.

6.11 Other impacts

6.11.1 Waste

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

- asphalt and concrete
- surplus building materials
- excavated spoil
- building material wastes (including metals, timbers, plastics, packaging, fencing etc)
- electrical wiring and conduit waste (from electrical connections and utility relocation)
- green waste (including weeds)
- demolition waste from the existing ramp, electrical transformer and relocated services
- general waste, including food scraps generated by construction workers.

Appropriate planning of construction activities would ensure that the volume of surplus materials is minimised. Waste management would be undertaken in accordance with the WARR Act and a Waste Management Plan would be prepared that would identify all potential waste streams associated with the works and outline methods of disposal, reuse and recycling as well as other onsite waste management practices.

The handling, storage, transport and disposal of asbestos and hazardous waste (including lead waste) would be in accordance with the requirements of relevant EPA and Safe Work NSW guidelines.

Waste management targets in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017b) would be developed for the Proposal and would include reuse and recycling.

The Proposal would not result in major changes to operational waste management arrangements however, the Proposal does require the station bins to be moved from their current location and this would be communicated to the Council to ensure that the revised location is appropriate and safe for ongoing waste collection.

Refer to Section 7.2 for a full list of proposed mitigation measures.

6.11.2 Utilities

Investigations suggest there are numerous electrical, drainage, communication and signalling services on the platforms and to the north of the station.

Any services impacted by the Proposal would need to be relocated to enable Glenbrook Station to remain operational during the upgrade. All services would be accurately located prior to any detailed design development and mechanical excavation by using service locating (non-destructive digging).

Asset owners of the utilities to the north of the station would be consulted during detailed design and construction to determine specific requirements / mitigation measures for working adjacent to this asset.

The lift would be installed adjacent to the existing overhead wiring and the associated support structure. The installation would ensure that all required protection measures and safe working distances are implemented during construction.

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 at a similar time/similar location may also lead to construction fatigue, particularly around noise, traffic and air quality impacts, if not appropriately managed.

A search of the Department of Planning and Environment's Major Projects Register, Sydney Western City Planning Panel Development and Planning Register, and Blue Mountains City Council Development Application Register in August 2018 identified that no major development applications are listed in Glenbrook for approval at this time.

During construction, the works would be coordinated with any other construction activities in the area, where required. This would include other Sydney Trains works (for example works at Glenbrook as part of the New Intercity Fleet – Springwood to Lithgow Rail Corridor Modifications) or with BMCC and any other utilities/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 negligible impact on the performance of the surrounding road network.

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

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, 2013). 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 Section 7.2).

It is anticipated that, once operational, the Proposal may result in an increase in the use of public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Glenbrook. 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 major rainfall events or rare events such as a 100-year average recurrence interval flood event would occur more frequently. Such changes may contribute to any flooding issues however a detailed hydrological assessment would be undertaken to ensure that the proposed infrastructure would not increase the potential for flooding within the Proposal area. For more information on flooding, refer to Section 6.9.

Climate change could lead to an increase in frequency and severity in bushfires. The Blue Mountains is an inherently bush fire prone area, both as a result of the widespread bushland and historic patterns of development.

The Proposal is situated on land mapped as bush fire-prone, therefore it would be designed with appropriate fire protection measures. This includes installing a false ceiling for fire safety standard compliance in the station building and ensuring a clearance zone around the new transformer along with the continued implementation of the station's emergency management plan.

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 4.0* (TfNSW, 2017b) and the TfNSW *Environmental Management System* (EMS). 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 the TfNSW 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 but not be limited to the following key sub plans:

- Noise and Vibration Management Plan
- Traffic Management Plan
- Vegetation Management Plan
- Waste Management Plan.

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed in Table 23. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 23 Proposed mitigation measures

No.	Mitigation measure
General	
1.	A Construction Environmental Management Plan (CEMP) would be prepared by the Construction Contractor in accordance with the relevant requirements of <i>Guideline for Preparation of Environmental Management Plans</i> , Department of Infrastructure, Planning and Natural Resources, 2004) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
2.	A project risk assessment including environmental aspects and impacts would be undertaken by the Construction Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	An Environmental Controls Map (ECM) would be developed by the Construction Contractor in accordance with TfNSW's <i>Guide to Environmental Controls Map</i> (TfNSW, 2017c) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.

No.	Mitigation measure
5.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
6.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.
7.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.

Traffic and site access

8.	<p>Prior to the commencement of construction, a Traffic Management Plan (TMP) would be prepared as part of the CEMP and would include at a minimum:</p> <ul style="list-style-type: none"> ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised maximising safety and accessibility for pedestrians and cyclists ensuring adequate sight lines to allow for safe entry and exit from the site ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made) managing impacts and changes to on and off-street parking and requirements for any temporary replacement provision parking locations for construction workers away from stations and busy residential areas and details of how this will be monitored for compliance routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses details for rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus operators. Particular provisions would also be considered for the accessibility impaired measures to manage traffic flows around the area affected by the Proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the TMP. <p>Consultation with the relevant roads authorities would be undertaken during preparation of the CTMP. The performance of all project traffic arrangements must be monitored during construction.</p>
9.	Communication would be provided to the community and local residents to inform them of changes to parking, pedestrian access and/or traffic conditions including vehicle movements and anticipated effects on the local road network relating to site works.
10.	Road Occupancy Licences for temporary road closures would be obtained, where required.
11.	Limit Cowdery St overbridge access usage to off-peak hours periods including non-school zone periods.
12.	Allocate construction parking within the rail corridor access road south of the station to avoid impact on local residents street parking availability.

No.	Mitigation measure
Urban design, landscape and visual amenity	
13.	<p>An Urban Design Plan (UDP) would be prepared by the Construction Contractor, in consultation with the relevant council, and submitted to TfNSW for endorsement by the Precincts and Urban Design team, prior to finalisation of the detailed design. The UDP, at a minimum, would address the following:</p> <ul style="list-style-type: none"> the appropriateness of the proposed design with respect to the existing surrounding landscape, built form, behaviours and use-patterns (including consideration of Crime Prevention Through Environmental Design principles). This is to include but not be limited to: <ul style="list-style-type: none"> connectivity with surrounding local and regional movement networks including street networks, other transport modes and active transport networks. Existing and proposed paths of travel for pedestrians should be shown integration with surrounding local and regional open space and or landscape networks. Existing and proposed open space infrastructure/landscape elements should be shown integration with surrounding streetscape including street wall height, active frontages, awnings, street trees, entries, vehicle cross overs etc integration with surrounding built form (existing or desired future) including building height, scale, bulk, massing and land-use design detail that is sensitive to the amenity and character of heritage items located within or adjacent to the Proposal site.
14.	<p>A Public Domain Plan (PDP) would be prepared by the Construction Contractor, in consultation with the relevant council, and submitted to TfNSW for endorsement by the Precincts and Urban Design team, prior to finalisation of the detailed design. The PDP, at a minimum, would address the following:</p> <ul style="list-style-type: none"> materials, finishes, colour schemes and maintenance procedures including graffiti control for new walls, barriers and fences landscape treatments and street tree planting to integrate with surrounding streetscape opportunities for public art created by local artists to be incorporated, where considered appropriate, into the Proposal total water management principles to be integrated into the design where considered appropriate design measures included to meet TfNSW's <i>NSW Sustainable Design Guidelines - Version 4.0</i> (TfNSW, 2017b) identification of design and landscaping aspects that will be open for stakeholder input, as required.
15.	<p>All permanent lighting would be designed and installed in accordance with the requirements of standards relevant to <i>AS 1158 Road Lighting</i> and <i>AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting</i>.</p>
16.	<p>Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.</p>
17.	<p>Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.</p>
18.	<p>During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.</p>

No.	Mitigation measure
19.	A landscape plan highlighting planting and streetscape design would be prepared in alignment with the civil design, with the intent to provide some integration between the new Proposal elements and the existing / planned landscape character. This might include landscape design for visual mitigation for the lift shaft and footbridge.
20.	A landscape plan that supports and strengthens the existing heritage values of the Glenbrook Station would be prepared which would assist in reducing the visual influence/impact of the Proposal.
21.	Further explore the potential design outcomes of the Proposal to ensure it is sympathetic to the heritage values of Glenbrook Station. Consult the relevant policies, including the <i>Blue Mountains City Council Heritage Strategy 2014 – 2017</i> , TfNSW and Sydney Trains guidelines and to drive design direction.
22.	New ancillary items including signage and balustrades would reflect the overall heritage aesthetic of the existing station to ensure the heritage qualities of the station are retained. Reference the Sydney Trains Station Components Guide where possible.
23.	Retain the community focused character of the Glenbrook Station locality through the protection and enhancement of the existing mosaics adjacent to the bus stop. Ensure they are adequately protected during construction, or should an impact need to occur, develop a community consultation strategy to relocate or replace the mosaics.
Noise and vibration	
24.	Operational plant and equipment would be designed with regard to the PTNLs in the Noise and Vibration Impact Assessment (SLR, 2018a).
25.	Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the <i>Interim Construction Noise Guideline</i> (Department of Environment and Climate Change, 2009), <i>Construction Noise Strategy</i> (TfNSW, 2018b) and the Noise and Vibration Impact Assessment for the Proposal (SLR, 2018b). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.

No.	Mitigation measure
26.	<p>The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include:</p> <ul style="list-style-type: none"> regularly training workers and contractors (such as at the site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise avoiding any unnecessary noise when carrying out manual operations and when operating plant ensuring spoil is placed and not dropped into awaiting trucks avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where practicable switching off any equipment not in use for extended periods e.g. heavy vehicles engines would be switched off whilst being unloaded avoiding deliveries at night/evenings wherever practicable no idling of delivery trucks keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite; no dropping of materials from height where practicable, no throwing of metal items and slamming of doors.
27.	<p>The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which would be considered, include:</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), and for any out of hours works use of quieter and less vibration emitting construction methods where feasible and reasonable.
28.	<p>Works would generally be carried out during standard construction hours (i.e. 7.00 am to 6.00 pm Monday to Friday; 8.00 am to 1.00 pm Saturdays). Any works outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An Out of Hours Work application form would need to be prepared by the Construction Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.</p>
29.	<p>Where the $L_{Aeq}(15\text{minute})$ construction noise levels are predicted to exceed 75 dBA and/or 30 dBA above the Rating Background Level at nearby affected sensitive receivers, respite periods would be observed, where practicable, and in accordance with TfNSW's <i>Construction Noise and Vibration Strategy</i> (TfNSW, 2018b). This would include restricting the hours that very noisy activities can occur.</p>
30.	<p>Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding would take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible.</p>

No.	Mitigation measure
31.	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 (SLR, 2018b) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
32.	<p>Vibration resulting from construction and received at any structure outside of the project would be managed in accordance with:</p> <ul style="list-style-type: none"> for structural damage vibration - German Standard DIN 4150: Part 3 – 1999 <i>Structural Vibration in Buildings: Effects on Structures</i> and British Standard BS 7385-2:1993 <i>Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)</i> for human exposure to vibration the acceptable vibration - values set out in the <i>Environmental Noise Management Assessing Vibration: A Technical Guideline</i> (Department of Environment and Conservation, 2006) which includes British Standard BS 7385-2:1993 <i>Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)</i>.
33.	Property conditions surveys would be completed prior to piling, excavation of bulk fill or any vibratory works including jack hammering and compaction for all buildings/structures/roads with a plan distance of 20 metres from the works and all heritage listed buildings and other sensitive structures within 50 metres of the works (unless otherwise determined following additional assessment they are not likely to be adversely affected).
34.	Affected pre-schools, schools, universities and other identified sensitive receivers are to be consulted in relation to noise mitigation measures to identify any noise sensitive periods, e.g. exam periods. As much as reasonably possible noise intensive construction works in the vicinity of affected educational buildings are to be minimised.
Indigenous heritage	
35.	All construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to the Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
36.	If unforeseen Indigenous objects are uncovered during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council. If human remains are found, work would cease, the site secured and the NSW Police and the OEH notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.
Non-Indigenous heritage	
37.	A suitably qualified and experienced heritage conservation architect would be engaged to provide ongoing heritage and conservation advice throughout detailed design and any subsequent relevant design modifications. The nominated heritage conservation architect would provide specialist advice throughout the detailed design phase to ensure that the final design adheres to the <i>NSW Rail Footbridges Heritage Conservation Strategy</i> (NSW Government Architect's Office, 2016) and the design recommendations made in the SoHI (RPS, 2018a).

No.	Mitigation measure
38.	<p>A heritage interpretation strategy for the station would be prepared, in accordance with the NSW Heritage Office guideline <i>Interpreting Heritage Places and Items</i> (2005). Currently there is no heritage interpretation at the station and much of the moveable heritage is stored within the Out of Shed. Options to incorporate heritage interpretation at the station could include signage to communicate the significance of the gardens at the station with historical photos, or incorporation of the gardening awards within the Passenger Waiting Room.</p> <p>Physical components of the station precinct could be incorporated into the heritage interpretation strategy such as the reinstatement and enlivening of the gardens of the station and the cementing and regrading of the platforms to reference the original gravel surfaces. The heritage interpretation strategy should undertake additional historical research to inform these aspects of the station.</p> <p>Any heritage interpretation strategy compiled for the station should be precinct wide and present a cohesive narrative of the significance of the item. Consideration should be given to the Sydney Trains <i>Draft Heritage Interpretation Guideline</i> (July 2018) in consultation with Sydney Trains Heritage, during the preparation and implementation of a heritage interpretation strategy.</p> <p>Heritage interpretation at the station would communicate the history of Glenbrook Station to the general public and enable customers to engage with the heritage significance of the station. Heritage interpretation at the station could include themes such as the Glenbrook deviation and the NSW Railway Stations Gardens Competitions.</p>
39.	<p>Archival recording of the station as a whole would be undertaken 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 would be provided to BMCC, Sydney Trains and Glenbrook and District Historical Society for future reference. In particular, the following elements the following elements would be concentrated on:</p> <ul style="list-style-type: none"> • Station Building • Platforms • Footbridge • Gardens.
40.	<p>The proposed lift and canopy additions would aim to include:</p> <ul style="list-style-type: none"> • sympathetic, minimalist & recessive in design without replicating historicist features • finishing of the super structure in a neutral recessive colour and use of visually recessive materials such as glass and lightweight slim frames.
41.	<p>Any additions to the footbridge would be sympathetic to the current materials and finishes. This includes the use of similar colours in the proposed handrails and balustrades.</p>
42.	<p>The station entrance works would avoid the removal of mature vegetation where practicable. Any vegetation that is to be removed would be replaced with a similar/appropriate species (refer also to mitigation measure 74). Where possible the works to the station entrance on Burfitt Parade would include screening vegetation to reduce visual impacts caused by the new lift shaft.</p>
43.	<p>All new electrical and data services would be installed in accordance with the Sydney Trains <i>Heritage Technical Note: Installation of New Electrical and Data Services at Heritage Sites</i> (2017). Installation of services would be carefully planned and aim to reduce visual impacts to the Station Building. Where possible services would be installed within established conduits to reduce cumulative impacts to heritage fabric.</p>

No.	Mitigation measure
44.	The removal or transfer of any moveable heritage items would be undertaken in accordance with the Sydney Trains <i>Moveable Heritage Disposal Policy</i> (2016) and the Sydney Trains <i>Movable Heritage Management Strategy 2015-2017</i> .
45.	TfNSW would consult with Sydney Trains Heritage to identify all listed moveable heritage items and potential moveable heritage items located within the Glenbrook Station Building. Where discrepancies with the State Heritage Inventory (SHI) sheet have been identified in this report for an item, these would be further investigated to ensure no inadvertent impacts to moveable heritage occur.
46.	Moveable heritage is an important component of a heritage listed site and would be retained <i>in situ</i> , in the first instance where possible. Further options to retain the moveable heritage items within the Station Master's Office (within the Station Building) would be investigated. For example, the mirror could be retained within the Station Master's Office.
47.	Where moveable heritage items cannot be retained in their original locations, the items would be tagged, recorded, catalogued and stored in secure long-term storage until a decision is made. In this instance the Out of Shed is currently used to store moveable heritage items such as the Railway Stations Garden Awards. Options to relocate the moveable heritage items to this location would be investigated. The conditions within the Out of Shed for long term storage would also be investigated, and any necessary repairs implemented.
48.	Where all other options are exhausted, and the decision is made to dispose of the moveable heritage items, an inventory of movable heritage objects at Glenbrook Railway Station Group would be made and assessed for retention by Sydney Trains prior to sale or disposal. If a movable heritage object is no longer required for Sydney Trains' purposes, it may be disposed of in accordance with an agreed Sydney Trains' <i>Heritage Disposal Policy</i> .
49.	Options would be investigated for opportunities to display, promote and interpret the moveable heritage at Glenbrook Station. This could include the display of gardening awards within the waiting room or development of heritage interpretation strategy for the station.
50.	<p>The following would be undertaken to minimise impacts to the Station Building:</p> <ul style="list-style-type: none"> • new brickwork would incorporate similar coloured existing brickwork, this includes colour mortar and tying the new doorway into the existing decorative rendered trims and moulded string courses • exclusions zones would be established around heritage elements during floor lowering works for the Family Accessible Toilet and the use of machinery near these elements would be minimised • privacy wall details would be guided by advice from the heritage conservation architect and constructed of a similar coloured brick to the Station Building and base of the lift • the design of the proposed canopy at the western end of the Station Building would be developed further to better blend with the existing canopies in terms of height and form, whilst not replicating the historic features.
51.	Protective measures would be put in place to protect heritage structures on the platforms during the regrading works and during any required trenching. Following the completion of these works the platform surfaces would be reinstated similarly to their current condition. The current concrete surfaces of the platforms reference the former gravel surfaces and are considered to contribute to the significance of the platforms.
52.	Addition of tactile surfaces would to be limited to the minimum amount required to meet legislative requirements.

No.	Mitigation measure
53.	<p>The addition of new station components such as seating, lighting and signage would adhere to the Sydney Trains and NSW TrainLink <i>Station Component Guide</i> (2017) and aim to be sympathetic to current seating, lighting and signage currently located on the platform. Consideration could be given to the reinstatement of original heritage features to the platforms such as bubblers and seating. This would aim to further reduce the cumulative impacts associated with the Proposal and reference the heritage significance of the station.</p>
54.	<p>Garden beds removed to accommodate the new lift would be replaced with garden beds of a similar size and nature. All stone edging used in the garden beds to be removed from the station should be collected and stored appropriately to be reused at the station. Vegetation removed from the garden beds would be replaced with plants of a similar species and the plants should be of a similar size and maturity where practicable.</p> <p>This recommendation would also mitigate against cumulative impacts and the removal of some garden beds to facilitate the proposed works. Landscape works to the station should be heritage led and precinct wide and undertaken in consultation with Sydney Trains Heritage. Effort should be made to identify potential stakeholders in the community that may be able to provide input to the management of the gardens at the station.</p> <p>Further historical research and community consultation should be undertaken to determine the most appropriate plant species for the station complex. This could be built into the heritage interpretation strategy.</p>
55.	<p>Intrusions to the external façade associated with installation of services/conduits would be minimised where practicable.</p>
56.	<p>To effectively mitigate potential impacts of vibration on Glenbrook Station building, 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 the construction activity would cease and the heritage structure would be assessed and alternative construction methodologies developed, where practicable, before construction recommences.</p>
57.	<p>In accordance with Section 170a of the Heritage Act, Sydney Trains should provide notification of the works to Heritage Division 14 days prior to the commencement of the works.</p>
58.	<p>A heritage induction would be provided to workers prior to construction, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction.</p>
59.	<p>In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.</p>
60.	<p>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.</p>
61.	<p>On completion of works, an update would be prepared for the Section 170 Heritage and Conservation Register, with required details.</p>

No.	Mitigation measure
Socio-economic	
62.	Sustainability criteria for the Proposal would be established to encourage the Construction Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
63.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
64.	A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
65.	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.
66.	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	
67.	Construction of the Proposal must be undertaken in accordance with TfNSW's <i>Vegetation Management (Protection and Removal) Guideline</i> (TfNSW, 2018c) and TfNSW's <i>Fauna Management Guideline</i> (TfNSW, 2018e).
68.	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.
69.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees/vegetation nominated to be removed in the Flora and Fauna Impact Assessment Report (RPS, 2018b) 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 below.
70.	Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the Flora and Fauna Assessment Report (RPS 2018)). Tree protection would be undertaken in line with <i>AS 4970-2009 Protection of Trees on Development Sites</i> and would include exclusion fencing of TPZs.
71.	In the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible.
72.	Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, the Construction Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval.

No.	Mitigation measure
73.	Weed control measures, consistent with TfNSW's <i>Weed Management and Disposal Guideline</i> (TfNSW, 2015), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the <i>Biosecurity Act 2015</i> .
74.	A Vegetation Management Plan would be implemented to enhance the adjoining (degraded) patch of native vegetation shown in Figure 23 which is in excess of the offsetting requirements stipulated by the <i>Vegetation Offset Guide</i> (TfNSW, 2016b). Bush regeneration and landscaping would use native species characteristic of PCT 1281.
75.	For new landscaping works, mulching and watering would be undertaken until plants are established.
Soils and water	
76.	During detailed design further hydrological assessment would be undertaken during to determine final drainage arrangements and flooding risks (an assessment has been completed for the concept design stage only).
77.	Prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the ' <i>Blue Book</i> ' <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of works and maintained throughout construction.
78.	Erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until the works are complete and areas are stabilised.
79.	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area.
80.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2015g).
81.	Adequate water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2018g) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in how to use the kits in the case of a spill.
82.	In the event of a pollution incident, works would cease in the immediate vicinity and the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
83.	The existing drainage systems would remain operational throughout the construction phase.

No.	Mitigation measure
84.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the <i>Waste Classification Guidelines</i> (EPA, 2014) and TfNSW's <i>Water Discharge and Reuse Guideline</i> (TfNSW, 2017d).
	Air quality
85.	Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's <i>Air Quality Management Guideline</i> (TfNSW, 2018f).
86.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
87.	Plant and machinery would be regularly checked and maintained in a proper and efficient condition. Plant and machinery would be switched off when not in use, and not left idling.
88.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
89.	<p>To minimise the generation of dust from construction activities, the following measures would be implemented:</p> <ul style="list-style-type: none"> • apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces) • cover stockpiles when not in use • appropriately cover loads on trucks transporting material to and from the construction site and securely fix tailgates of road transport trucks prior to loading and immediately after unloading • prevent mud and dirt being tracked onto sealed road surfaces.
	Waste and contamination
90.	<p>The CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum:</p> <ul style="list-style-type: none"> • identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities • detail other onsite management practices such as keeping areas free of rubbish • specify controls and containment procedures for hazardous waste and asbestos waste • outline the reporting regime for collating construction waste data.
91.	An appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with WorkCover requirements.
92.	All spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
93.	All spoil and waste must be classified in accordance with the <i>Waste Classification Guidelines Part 1: Classifying waste</i> (EPA, 2014) prior to disposal.
94.	Any concrete washout would be established and maintained in accordance with TfNSW's <i>Concrete Washout Guideline</i> – (TfNSW, 2018d) with details included in the CEMP and location marked on the ECM.

No.	Mitigation measure
Cumulative impacts	
95.	The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed in the CEMP and implemented as appropriate.
96.	Consultation with relevant stakeholders is to be undertaken during construction planning, where required, to ensure that potential cumulative impacts are minimised. Additional mitigation measures from consultation are to be included in the CTMP and CNVMP for the management of traffic and noise during construction.
97.	During construction, the works are to be co-ordinated with other construction activities in the immediate vicinity as required. Consultation and liaison would occur with BMCC, Sydney Trains and utilities/developers to minimise cumulative construction impacts such as traffic and noise as far as practicable.
Climate change and sustainability	
98.	Detailed design and construction of the Proposal is to be undertaken in accordance with the <i>NSW Sustainable Design Guidelines – Version 4.0</i> (TfNSW, 2017b).
99.	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, 2013). The carbon footprint would be used to inform decision making in design and construction.
100.	Ensure appropriate fire protection measures are installed as the Proposal is situated on land mapped as bush fire-prone.

8 Conclusion

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

The Proposal would provide the following benefits:

- improved and equitable access to Glenbrook Station for customers resulting from the installation of a lift, accessible pathway and a formalised kiss and ride
- improved station amenity and safety for customers at the station resulting from the installation of the Family Accessible Toilet, ambulant toilet, new lighting and CCTV.

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

- temporary changes to vehicle and pedestrian movements to, from and around the station during construction – these impacts were assessed to be minor and would be managed via the implementation of a Construction Traffic Management Plan
- temporary reduction of around 10 commuter parking spaces in the western car park to allow for a construction compound – this impact is not considered to be significant as the car parking spaces would be reinstated at the end of construction. It is anticipated that the 10 cars can be temporarily accommodated in on-street parking in the surrounding area
- impacts to the visual character of Glenbrook Station due to the removal of vegetation and installation of the lift, stairs, accessible path and transformer – visual impacts were assessed as ranging from negligible to moderate for most of the selected viewpoints with the exception of Viewpoint 3 (No.5B Burfitt Parade). This location has been assessed as having a moderate-high impact due in part to the close proximity of a residential receiver to the new station entry stairs and transformer, and tree removal required for the Proposal
- temporary noise and vibration impacts during construction – these impacts were assessed as being variable dependent on the construction stage. Higher levels of noise are anticipated during vegetation clearing and during rail shut downs outside of standard hours. Impacts would be mitigated through the implementation of a range of mitigation measures in the *Construction Noise and Vibration Strategy* (TfNSW 2018b)
- impacts to heritage fabric of the station building and the platform due to the internal reconfigurations of the station building and localised platform regrading - these impacts were assessed as ranging from minor in relation to the platform fabric impacts to moderate in relation to the station building
- impacts to the heritage setting due to installation of a new lift to connect to the existing footbridge to the platform – this impact was assessed as moderate
- removal of around 406 square metres of vegetation, including 31 trees, due to installation of the new stairs, accessible path and transformer. The vegetation has been identified as a NSW listed endangered ecological community and Commonwealth listed critical endangered ecological community, however, the vegetation removal was assessed as unlikely to result in a significant impact to these ecological communities. In addition, offsetting planting and bush regeneration would be undertaken in the adjoining vegetation patch.

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 6.13). 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 and Energy.

Matters of NES	Impacts
<p>Any impact on a World Heritage property?</p> <p>The Blue Mountains National Park is located approximately 250 metres from the Proposal site, given this distance and the nature and scale of the proposed works, there is expected to be negligible impacts.</p>	Negligible
<p>Any impact on a National Heritage place?</p> <p>The Blue Mountains National Park is located approximately 250 metres from the Proposal site, given this distance and the nature and scale of the proposed works, there is expected to be negligible impacts.</p>	Negligible
<p>Any impact on a wetland of international importance?</p> <p>There are no wetlands of international importance in the vicinity of the Proposal.</p>	Nil
<p>Any impact on a listed threatened species or communities?</p> <p>An estimated 406 square metres of native vegetation described as PCT 1281 would be removed, which is part of the following TECs:</p> <ul style="list-style-type: none"> • Sydney Turpentine-Ironbark Forest (CEEC under the EPBC Act) • Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (EEC under the BC Act). <p>The following impact assessments were undertaken for the State and Commonwealth listed TECs impacted by the Proposal (RPS, 2018b):</p> <ul style="list-style-type: none"> • Test of Significance under the BC Act • Assessment of Significant under the EPBC Act <p>These assessments concluded that the Proposal is not likely to have a significant impact on the State and Commonwealth listed TECs.</p>	Minor
<p>Any impacts on listed migratory species?</p> <p>It is unlikely that the development of the Proposal would significantly affect any listed migratory species.</p>	Nil
<p>Does the Proposal involve a nuclear action (including uranium mining)?</p> <p>The Proposal does not involve a nuclear action.</p>	Nil
<p>Any impact on a Commonwealth marine area?</p> <p>There are no Commonwealth marine areas in the vicinity of the Proposal.</p>	Nil

Matters of NES	Impacts
<p>Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources?</p> <p>The Proposal is for a transport facility and does not relate to coal seam gas or mining.</p>	Nil
<p>Additionally, any impact (direct or indirect) on Commonwealth land?</p> <p>The Proposal would not be undertaken on or near any Commonwealth land.</p>	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, access and visual amenity. The potential temporary shutdown would result in an inconvenience to commuters. Mitigation measures outlined in Section 7.2 would be implemented to manage and minimise adverse impacts.</p>	Minor
<p>(b) Any transformation of a locality?</p> <p>The Proposal would include the introduction of new visible elements to the station (including the construction of a new lift, new accessible path and new stairs). The appearance of the new elements would be consistent with the existing station elements. The extent of vegetation removal and trimming would be minimised during detailed design and additional landscaping is proposed for the station entrance to mitigate visual impacts as far as practicable.</p>	Minor
<p>(c) Any environmental impact on the ecosystem of the locality?</p> <p>An estimated 406 square metres of native vegetation described as PCT 1281 would be removed, which is part of the following TECs:</p> <ul style="list-style-type: none"> • Sydney Turpentine-Ironbark Forest (CEEC under the EPBC Act) • Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (EEC under the BC Act). <p>The following impact assessments were undertaken for the State and Commonwealth listed TECs impacted by the Proposal (RPS, 2018b):</p> <ul style="list-style-type: none"> • Test of Significance under the BC Act • Assessment of Significant under the EPBC Act <p>These assessments concluded that the Proposal is not likely to have a significant impact on the State and Commonwealth listed TECs.</p>	Minor
<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. Minor vegetation removal would be required which would result in some visual impacts. Any additional trees that are found to require removal, not assessed in this REF, would be subject to further assessment.</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>The Proposal would be a positive contribution to the area as it provides equitable access to the station platforms and improves amenity of the station for all customers.</p> <p>The station is listed on RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the Blue Mountains LEP 2015. The Proposal would result in some minor impacts to some parts of the station that are heritage listed. Impacts to heritage would be minimised through the implementation of the mitigation measures provided in the REF.</p> <p>A desktop archaeological assessment has been undertaken which determined that there is a low risk of encountering archaeological items/deposits and that the Proposal is unlikely to expose historical archaeological relics.</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. Also see item (c).</p>	Minor
<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>	Negligible
<p>(i) Any degradation of the quality of the environment?</p> <p>The Proposal is unlikely to have any degradation of 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. Specific management measures would be implemented to manage asbestos and other hazardous materials that may be encountered during construction or demolition works.</p>	Minor
<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
<p>(l) Any pollution of the environment?</p> <p>The Proposal is unlikely to cause any pollution of the environment provided the recommended mitigation measures are implemented.</p>	Nil

Factor	Impacts
<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 prepared as part of the Construction Environmental Management Plan. Mitigation measures would be implemented to ensure waste is reduced, reused or recycled where practicable.</p>	Minor
<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 to 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

Initiative	Theme	Description	Under consideration
1	Energy and greenhouse gases	All projects with a CapEx > \$15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).	No
2	Energy and greenhouse gases	Buildings are required to be designed and built to reduce energy consumption: <ul style="list-style-type: none"> • Covered or uncovered areas shall meet pre-requisite requirements for services (Appendix F, Section 3). • Enclosed building spaces shall meet the performance targets of the energy modelling pathway (P2-P5). • Where enclosed building space cost < \$10 million the prescriptive pathway may be followed in lieu of energy modelling (P1). 	Yes
2A	Energy and greenhouse gases	All new electrical equipment (for the final asset) to be at least market average star rating. In categories where no star ratings are available, equipment purchased should be recognised as high efficiency either by being ENERGY STAR accredited, in a high efficiency band under Australian Standards or being above-average efficiency of Greenhouse and Energy Minimum Standards (GEMS) registered products.	Yes
3	Climate resilience	All projects with a CapEx >\$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to I&S Climate Risk Assessment Guide for further guidance.	No
4	Materials and waste	90% of construction waste and demolition waste (by weight) to be diverted from landfill for all projects with a CapEx > \$15 million.	No

Initiative	Theme	Description	Under consideration
5	Materials and waste	<p>The aim of this requirement is to reduce resource consumption and waste generation in the design and construction of projects. Projects should consider:</p> <ul style="list-style-type: none"> • Balancing site works to avoid excess or importation of spoil. • Reuse any excess usable spoil on site (e.g. – landform feature, visual screening, noise attenuation). • Reuse any excess usable spoil off site (e.g. – at a nearby development where the spoil meets use requirements). 	Yes
6	Water	All new effective impervious area with a continuous area >1000m ² to be treated through water sensitive urban design.	No
7	Water	All projects with a CapEx > \$15 million to monitor and report water consumption during project construction and reduce potable water consumption where practicable.	No
8	Water	All projects with a CapEx >\$15 million to undertake a water balance study and identify and implement appropriate and proportionate* operational water efficiency measures.	No
8A	Water	All new water-using appliances, shower heads, taps and toilets must be at least the average Water Efficiency Labelling Scheme (WELS) star rating by product type.	Yes
9	Pollution control	All surface coatings to comply with the Australian Paint Approval Scheme (APAS) Volatile Organic Compounds Limits where fit for purpose	Yes
10	Pollution control	<p>All mobile non-road diesel plant and equipment (with an engine greater than 19kW) to report engine conformity with relevant United States Environmental Protection Agency (US EPA), European Union (EU) or equivalent emissions standards and the fitting of any exhaust after-treatment devices. Reporting should be in accordance with the Air Emission Data Workbook – 9TP-FT-439.</p>	Yes
11	Biodiversity	All projects with non-significant biodiversity impacts to comply with the Infrastructure and Services Vegetation Offset Guide as applicable.	Yes

Initiative	Theme	Description	Under consideration
12	Community benefit	All projects must: i. meet steel and timber sustainable procurement requirements; and ii. undertake sustainable procurement training for high impact suppliers.	Yes
13	Community benefit	All projects to address the urban design principles in the TfNSW Interim Urban Design Best Practice Guidelines within their urban design and landscaping plan (UDLP).	Yes
14	Community benefit	The project is awarded at least 1 point for a single initiative against the ISCA Innovation Credit Inn-1 OR The project makes a contribution to industry and/or the local community in line with the project legacy categories specified (Note: the requirements are determined by CapEx).	Yes