NSW GOVERNMENT

Transport Access Program

Hazelbrook Station Upgrade

Review of Environmental Factors

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

November 2018

Hazelbrook Station Upgrade Review of Environmental Factors

Transport Access Program
Ref – 6159542

Contents

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Figures

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Abbreviations

Term	Meaning
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
APS	Access to Premises (Disability Standards)
ARI	Average Recurrence Interval
ASA	Asset Standards Authority (refer to Definitions)
ASS	Acid Sulfate Soils
BCA	Building Code of Australia
BC Act	*Biodiversity Conservation Act 2016* (NSW)
Biosecurity Act	*Biosecurity Act 2015*(NSW)
CBD	Central Business District
CCTV	Closed Circuit TV
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CNVMP	Construction Noise and Vibration Management Plan
CNVS	Construction Noise and Vibration Strategy
CPTED	Crime Prevention Through Environmental Design
CTMP	Construction Traffic Management Plan
DBH	Diameter Breast Height
DBYD	Dial Before You Dig
D&C	Design & Construct
DDA	*Disability Discrimination Act 1992* (Cwlth)
DoE	Commonwealth Department of the Environment
DP&E	NSW Department of Planning and Environment
DSAPT	*Disability Standards for Accessible Public Transport (2002)*
DSI	Detailed Site Investigation (Phase II Contamination Investigation)
ECM	Environmental Controls Map

Term	Meaning
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
ETS	Electronic Ticketing System
FAT	Family Accessible Toilet
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
HV	High Voltage
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2000).
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
LCT	Landscape Character Type
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
LV	Low Voltage
NES	National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
OHWS	Overhead Wire Structure
OOHW	Out of hours works
PA system	Public Address system

Term	Meaning
PDP	Public Domain Plan
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
RailCorp	(former) Rail Corporation of NSW
RAP	Remediation Action Plan
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	*Roads Act 1993* (NSW)
Roads and Maritime	NSW Roads and Maritime Services (formerly Roads and Traffic Authority)
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
SSER	Station Services Equipment Room
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TGSI	Tactile Ground Surface Indicators (“tactiles”)
TPZ	Tree Protection Zone
TT&AI	Traffic, Transport and Access Impact Assessment
TVM	Ticket Vending Machine
UDP	Urban Design Plan
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)

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 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 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 *Disability Standards for Accessible Public Transport 2002* ("Transport Standards") (as amended) are a set of legally enforceable standards, authorised under the Commonwealth *Disability Discrimination Act 1992* (DDA) for the purpose of removing discrimination 'as far as possible' against people with disabilities. The Transport Standards cover premises, infrastructure and conveyances, and apply to public transport operators and premises providers.
Ecologically Sustainable Development	As defined by clause 7(4) Schedule 2 of the EP&A Regulation. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Feasible	A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.
Interchange	Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.
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).

Term	Meaning
NSW TrainLink	From 1 July 2013, NSW Trains (NSW TrainLink) became the new rail provider of services for regional rail customers.
Opal card	The integrated ticketing smartcard being introduced by TfNSW.
Out of hours works	Defined as works *outside* standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).
Proponent	A person or body proposing to carry out an activity under Division 5.1 of the EP&A Act - in this instance, TfNSW.
Rail possession	Possession 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 Hazelbrook Station Upgrade.
Vegetation Offset Guide	The TfNSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed 'significant' for the purposes of section 5.5 of the EP&A Act. The Guide provides for planting of a minimum of eight trees for each large tree with a diameter at breast height (DBH) of more than 60 cm, four trees where the DBH is 15-60 cm, or two trees where DBH is less than 15 cm.

Executive summary

Overview

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

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

The Proposal would aim to provide:

- a lift to the station platform
- a new accessible path, ramp and stairs between the station and commuter carpark on Railway Parade
- improved amenities such as a new ambulant toilet and family accessible toilet.

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

This Review of Environmental Factors (REF) has been prepared to assess the environmental impacts associated with the construction and operation of the Proposal under the provisions of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Subject to approval, construction is expected to commence in early 2019 and take around 18 months to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF. An overview of the Proposal is shown in **Figure 1** below.

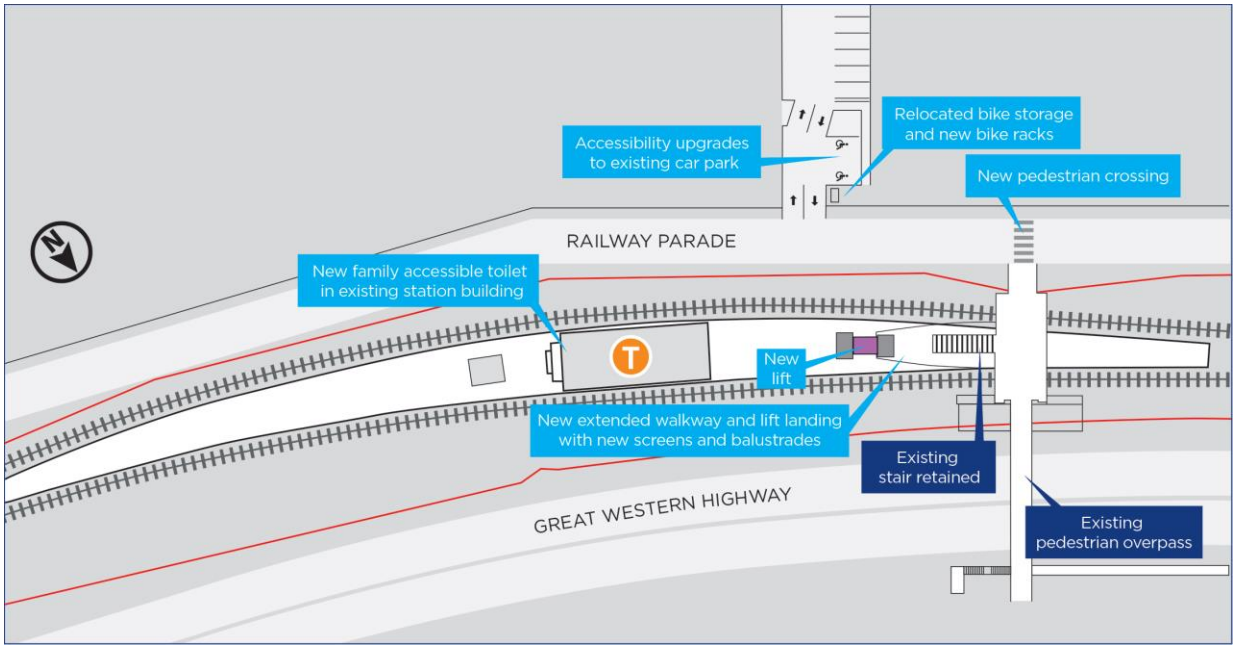


Figure 1 Proposed Hazelbrook Station Upgrade (subject to change during detailed design)

Need for the Proposal

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

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

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

Community and stakeholder consultation

Community consultation activities for the Proposal would be undertaken during the public display period of this REF and the public invited to submit feedback to help TfNSW understand what is important to customers and the community. The REF would be displayed for a period of two weeks. Further information about these specific activities is included in Section 4.5 of this REF.

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

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

Should the Proposal proceed to construction, the community would be kept informed throughout the duration of the construction period. Figure 2 shows the planning approval and consultation process for the Proposal.

Feedback can be sent to:

- **projects@transport.nsw.gov.au**
- **Transport Access Program – Hazelbrook**
  Transport for NSW
  Locked Bag 6501
  St Leonards NSW 2065

Or submitted:

- **In person at a project community information session**
- **Via yoursay.transport.nsw.gov.au/Hazelbrook**

Figure 2 Planning approval and consultation process for the Proposal

Environmental impact assessment

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

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

- temporary traffic impacts during construction
- temporary noise and vibration impacts
- visual impacts

- impacts to station heritage fabric and to the views and settings of the surrounding areas
- removal of vegetation and planting offsets.

The longer term benefits of the Proposal include improved accessibility to the station and improved station facilities.

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

Conclusion

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

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.

Figure 3 Photomontage of the Proposal (subject to detailed design)

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 Hazelbrook Station Upgrade (the Proposal), to be delivered by the Infrastructure and Place Division.

1.1 Overview of the Proposal

1.1.1 The need for the Proposal

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

Hazelbrook Station does not currently meet key requirements of the *Disability Standards for Accessible Public Transport* (DSAPT) or the Commonwealth *Disability Discrimination Act 1992* (DDA). There is currently no accessible path to the station platforms for people with reduced mobility or parents/carers with prams, no lift facilities, and some paths of travel from the surrounding footpath and roads are not compliant with requirements of the DDA. There are also issues with the connections between the station and other modes of transport, including a lack of kiss and ride and limited bicycle parking facilities.

The Proposal is required to provide safe and equitable access to the station and to improve customer facilities. The improvements would also assist in supporting growth in public transport use and would provide an improved customer experience for existing and future users of the station.

The expected increase in patronage has been taken into consideration during the design development.

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- installation of a new lift, glazed awnings and a new lift landing from the existing footbridge to the platform
- modification to the existing levels within the commuter car park, Railway Parade pedestrian crossing (including new road humps) and footbridge to provide DDA compliant pedestrian routes to the proposed new lift
- regrading the existing platform surfaces to provide DDA compliant pedestrian routes between new lift, station building, toilets and the boarding zone on the platform
- upgrade of two DDA compliant parking spaces to the commuter car park
- relocation of the existing bike storage and construction of a retaining wall within the existing commuter car park
- new canopies around the lift and over the new family accessible toilet (FAT)
- installation of new rail corridor fencing
- removal of some plants and gardens within and surrounding the station to allow for works
- modification of existing station building layout to allow for new amenities and station SSER

- ancillary works including adjustments to lighting and additional opal card readers, new anti-throw screens, handrails, electrical upgrades, minor drainage works, landscaping, improvements to station communications systems including closed circuit TV (CCTV) cameras, hearing loops, wayfinding signage, emergency help points and installation of tactile ground surface indicators (TGSIs)
- a new padmount and upgrade of the low voltage system for the new lift.

Subject to planning approval, construction is expected to commence in early 2019 and take around 18 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 is located in Hazelbrook Village in the Blue Mountains Local Government Area (LGA) about 93 kilometres west of Sydney's Central Business District (CBD). The location of the Proposal in the regional context is shown in Figure 4.

Hazelbrook Station is located on the southern side of the Great Western Highway. Hazelbrook Public School is located about 400 metres east of the station on the northern side of the rail corridor. Access from the southern side of the rail corridor is available via Railway Parade (Oaklands Road).

Hazelbrook Station is serviced by the Train Link Blue Mountains Line with about 580 passenger trips (combined entry and exit) recorded at the station on an average weekday in 2016. Platform 1 provides services east to Sydney and Platform 2 provides train services west to Katoomba, Mount Victoria and Lithgow. The predicted 2036 patronage for this station is 2,100 passenger trips (Beca, August 2018).

The Proposal includes upgrades to Hazelbrook Station on land owned by RailCorp and managed by NSW Trains.

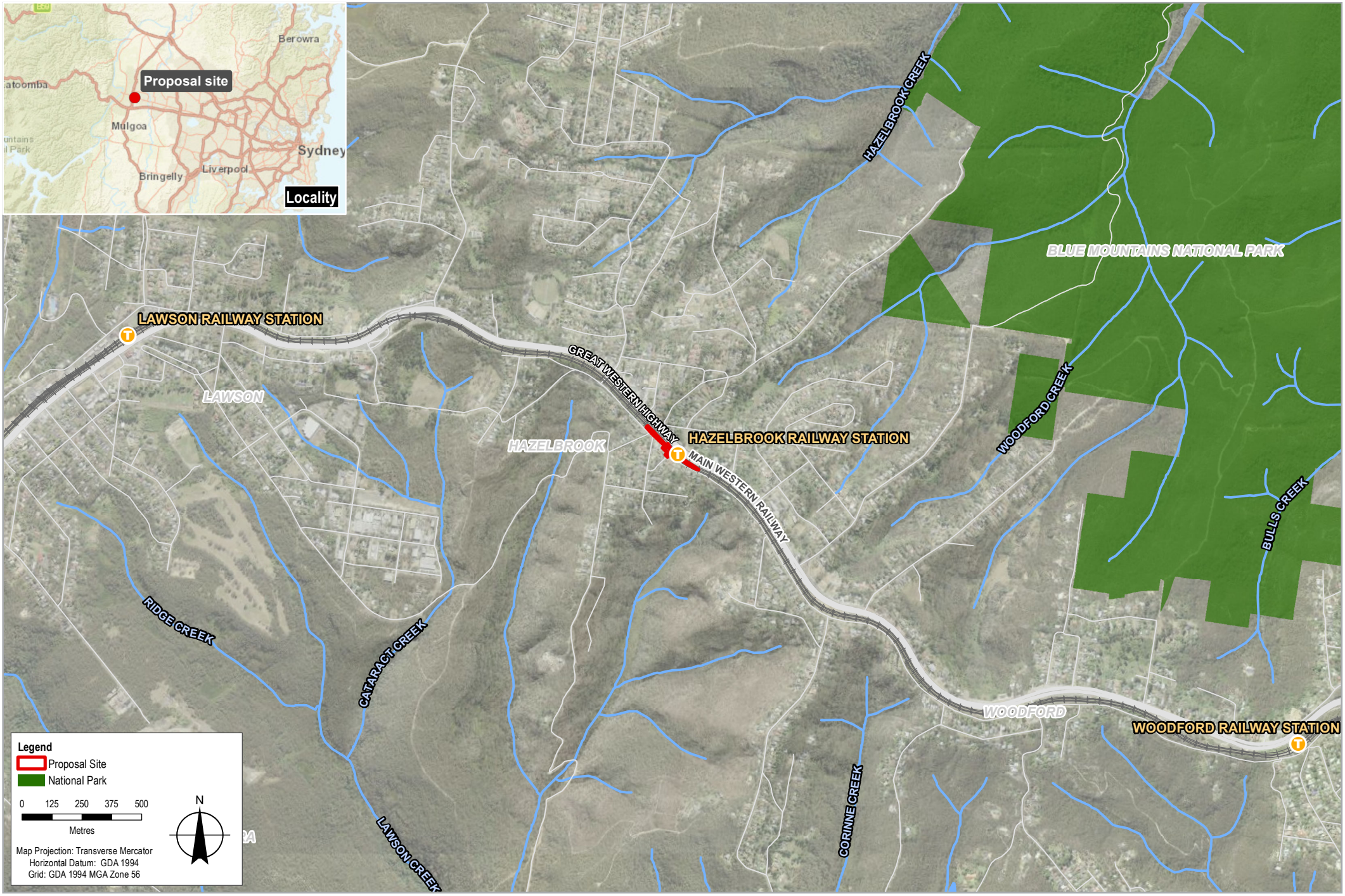


Figure 4: Regional Context - Hazelbrook

1.3 Existing infrastructure and land uses

Hazelbrook Station consists of an island platform (Platform 1 and Platform 2), servicing the Blue Mountains Line. Platform 1 is located on the northern side of the rail and services trains travelling towards Sydney. Platform 2 is located on the southern side of the rail corridor and services trains travelling towards the Blue Mountains.

Access to the station is via a pedestrian footbridge over the Great Western Highway (refer Figure 5) to the north of the station, and via Railway Parade on the south side of the station. Access to the platforms is via the footbridge and stairs (refer to Figure 6 and Figure 8). There is a station building located east of the footbridge which features ticketing, staff and public amenities.

The station entrance is located on the western side of the station close to the commuter car park located on the southern side of the station off Railway Parade (as described below).

Platform

The platform is currently accessed via stairs descending from a pedestrian overbridge onto the north-western end of the station platform as shown in Figure 8. No wheelchair access is currently available with access to the platform only via stairs. The existing platform contains the following:

- Opal card top up and single trip ticket machine
- payphone
- emergency help point
- male and female toilets
- heated waiting rooms
- staff facilities and storage.

The station building has wide metal corrugated awnings on each side, which provide some covered areas on the platform. This can be seen in Figure 8 and Figure 9.

Interchange facilities

The following interchange facilities are located at Hazelbrook Station:

- a bus stop located on Railway Parade approximately 100 metres south east of the Great Western Highway pedestrian overbridge on the southern side of the rail corridor. Another bus stop on the northern side of the rail corridor on the Great Western Highway approximately 250 metres north-west of the pedestrian overbridge.
- bike locker located within the commuter car park and two bike racks located off Railway Parade on the pedestrian overbridge.

Car parking

A commuter car park is located on the southern side of the rail corridor, between Railway Parade and Addington Road. This car park contains approximately 76 dedicated commuter spaces.

Figure 5 Great Western Highway and pedestrian footpath in the foreground with the pedestrian overbridge above the highway and train lines in the distance.

Figure 6 Looking southeast along Railway Parade towards the pedestrian overbridge and location of the Hazelbrook Station access stairs.

Figure 7 Current Hazelbrook access via stairs from the pedestrian overbridge.

Figure 8 Hazelbrook Station looking south from the top of the stairs descending to the platform.

Figure 9 Looking north from Railway Parade to the station building located on the platform.

1.3.1 Existing land uses

Directly to the north of the station is the Great Western Highway. Beyond the highway and further north there is residential housing, with Hazelbrook Public School about 400 metres southeast of the station. To the northwest, beyond the Great Western Highway, there is a mixture of commercial properties with a Shopping Centre (off Rosedale Avenue) and Service Station. Immediately west and south of the station consists of a mixture of commercial properties and residential housing. These land uses are shown in Figure 10.

Figure 10: Key features of the study area

1.4 Purpose of this Review of Environmental Factors

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

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

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

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

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.

TfNSW has also developed a Future Transport Strategy 2056 (TfNSW 2018b), an overarching strategy, supported by a suite of plans, for transport in NSW to the year 2056. Future Transport 2056 ensures that NSW is prepared for rapid changes in technology and innovation to create and maintain a world class, safe, efficient and reliable transport system over the next 40 years.

Data forecasts indicate there would be significant growth in population and employment from 2006 up to 2036 in the area within the station catchment. The Proposal accommodates the forecast Sydney Trains patronage growth (an increase of 15 per cent to 2036) and changing travel patterns.

The *Disability Inclusion Action Plan 2018-2022* (TfNSW, 2017) was developed by TfNSW in parallel with the development of Future Transport Strategy 2056. The plan builds on the objectives of Future Transport 2056 in relation to accessibility to transport. The Transport Access Program has been identified in this plan as a key action to ensure transport networks in Sydney are accessible for all potential customers.

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:

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

2.1.3 Objectives of the Proposal

The key objective of this project is to develop and design an option for an accessibility upgrade of Hazelbrook Railway Station that would address accessibility deficiencies of the station and interchange to allow TfNSW to meet its accessibility obligations while being easy to maintain.

The specific objectives of the Hazelbrook Station Upgrade are to:

- provide a station that is accessible to those with a disability, limited mobility, parents/carers with prams and customers with luggage
- improve customer experience with better interchange facilities
- minimise pedestrian conflict and crowding points
- improve integration with surrounding precinct
- improve customer safety
- improve wayfinding in and around the station
- respond to the heritage values of the site
- improve customer amenity.

2.2 Design development

The need for an upgrade was identified due to the following constraints and issues at the station:

- the existing station entrance off Railway Parade is via a non-compliant DDA path
- the existing footpath width along the Railway Parade path may constrain widening
- the existing stair between the footbridge and platforms constrains the lift configuration
- the existing stair limits options to bringing the lift closer to the entrance
- the existing site entrances are close to capacity during evening peaks

- the height of the platform and the train vestibule do not align in accordance with current standards (ie. there is no 'level access')
- narrow platform width at the western end (Platform 1 and 2) constraining the ability to accommodate a lift
- existing access to the platform (i.e. via a footbridge and stairs), is not DDA compliant
- access points into the station building are not DDA compliant
- tactile ground surface indicators ("tactiles") to the stairs, platforms and interchange facilities do not meet current standards
- existing toilet facilities are not accessible
- inadequate passenger display information
- existing accessible car spaces do not meet DDA requirements.

To address the above issues TfNSW commissioned an options assessment for the proposed station upgrade. A number of options for different areas within the scope were considered and presented for input to determine the final configuration to be developed. The options considered during this assessment are outlined in Section 2.3.2.

2.3 Alternative options considered

2.3.1 The 'do-nothing' option

Under a 'do-nothing' option, existing access to the platform would remain non-compliant with DDA and DSAPT and there would be no changes to the way the station currently operates.

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

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

2.3.2 Identified options

To develop a preferred option for the station upgrade that addressed the project objectives and identified issues, a multi criteria assessment process was undertaken. Four options were developed and considered by key stakeholders to address access issues and deficiencies as follows.

- Option 1: Construction of a lift central to the platform with a new bridge extension to both sides of the existing stairs. The elliptical shape of the landing would taper to meet the lift shaft for a DDA compliant lift landing
- Option 2: Removal of existing stairs and construction of new stairs and a new bridge extension (approximately 13.75 metres) at the location of the existing stairs. The new stairs and lift would be connected by an extension of the existing footbridge. The new bridge extension would wrap around a new lift and continue south for access to new stairs
- Option 3: Construction of a new (narrow) lift to the west of the existing pedestrian bridge
- Option 4: Construction of a new lift to the south of the existing stairs via an alternative elevated route separate from the existing footbridge.

In addition, a number of options were considered for the proposed location of the SSER, in order to determine the final location being progressed.

2.3.3 Assessment of identified options

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

Stakeholders including representatives from the Sydney Trains Heritage unit, TfNSW and Sydney Trains were consulted regarding the various options in order to determine the final configurations.

All options were considered to be equally beneficial for the provision of upgrade facilities such as staff amenities, passenger services and other systems (eg electrical, communication systems). The differences between all options was the way in which accessible access would be provided to the station in particular the location of DDA compliant car spaces and the new lift and walkway/ structure.

Option 1 was identified as the preferred option as it would provide two methods to access the station (stair and lifts) and would not require temporary stairs during construction. This would also mean in the event of any issues with the lifts during operation, an alternative (however non-accessible) access between the platform and the footbridge would still be maintained.

The lift landing for Option 1 connects the existing footbridge to the new lift structure, and is curved to provide for an accessible path of travel around the existing stairs. This creates sight lines from both the Railway Parade entry and the pedestrian footbridge over the Great Western Highway towards the lift shaft.

Option 2 is similar to Option 1 in that the lift is positioned in the same location, however instead of retaining the existing stairs, these would be demolished and replaced, requiring temporary stairs to be provided for 12 months while the new works are completed. Longer rail possession periods and construction staging would also be negatively affected in comparison to Option 1. Option 2 would also result in additional heritage and visual impact.

Option 3 would incur lower construction costs and reduced impacts (physical and visual), however this option would result in approximately 10% of platform 1 being unusable and have poor maintenance and sight clearance outcomes.

Option 4 provides access to the lift via an alternate elevated route separate from the existing footbridge. This option would retain the existing stairs and meet horizontal and vertical safety clearance requirements.

However the proposed footings structures would encroach upon existing railway services and utilities under Railway Parade, and also would result in a number of urban design and equitability issues. In July 2018 further refinements were made to Option 4 to create a more equitable design solution based on desire sight lines from the station entries (similar to Option 1), however this still did not provide sufficient clearance from the existing services under Railway Parade.

2.4 Justification for the preferred option

As outlined in Section 2.3.3, Option 1 was confirmed as the preferred option as it provided the required accessibility requirements, had minimal urban design issues, and limited the disruption to customers by retaining the existing stairs during construction and operation.

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 Hazelbrook Station as part of the Transport Access Program which would improve accessibility and amenities for customers.

The Proposal would include the following key elements:

- installation of a new lift, glazed awnings and a new lift landing from the existing footbridge to the platform
- modification to the existing levels within the commuter car park, Railway Parade pedestrian crossing (including new road humps) and footbridge to provide DDA compliant pedestrian routes to the proposed new lift
- regrading the existing platform surfaces to provide DDA compliant pedestrian routes between new lift, station building, toilets and the boarding zone on the platform
- upgrade of two DDA compliant parking spaces to the commuter car park
- relocation of the existing bike storage and construction of a retaining wall within the existing commuter car park
- new canopies around the lift and over the new family accessible toilet (FAT)
- installation of new rail corridor fencing
- removal of some plants and gardens within and surrounding the station to allow for works
- modification of existing station building layout to allow for new amenities and SSER
- ancillary works including adjustments to lighting and additional opal card readers, new anti-throw screens, handrails, electrical upgrades, minor drainage works, landscaping, improvements to station communications systems including closed circuit TV (CCTV) cameras, hearing loops, wayfinding signage, emergency help points and installation of TGSIs
- a new padmount and upgrade of the low voltage system for the new lift.

Figure 11 shows the general layout of key elements for the Proposal. The layout of the new pedestrian overpass extension and lift landing the Proposal is shown in Figure 12.

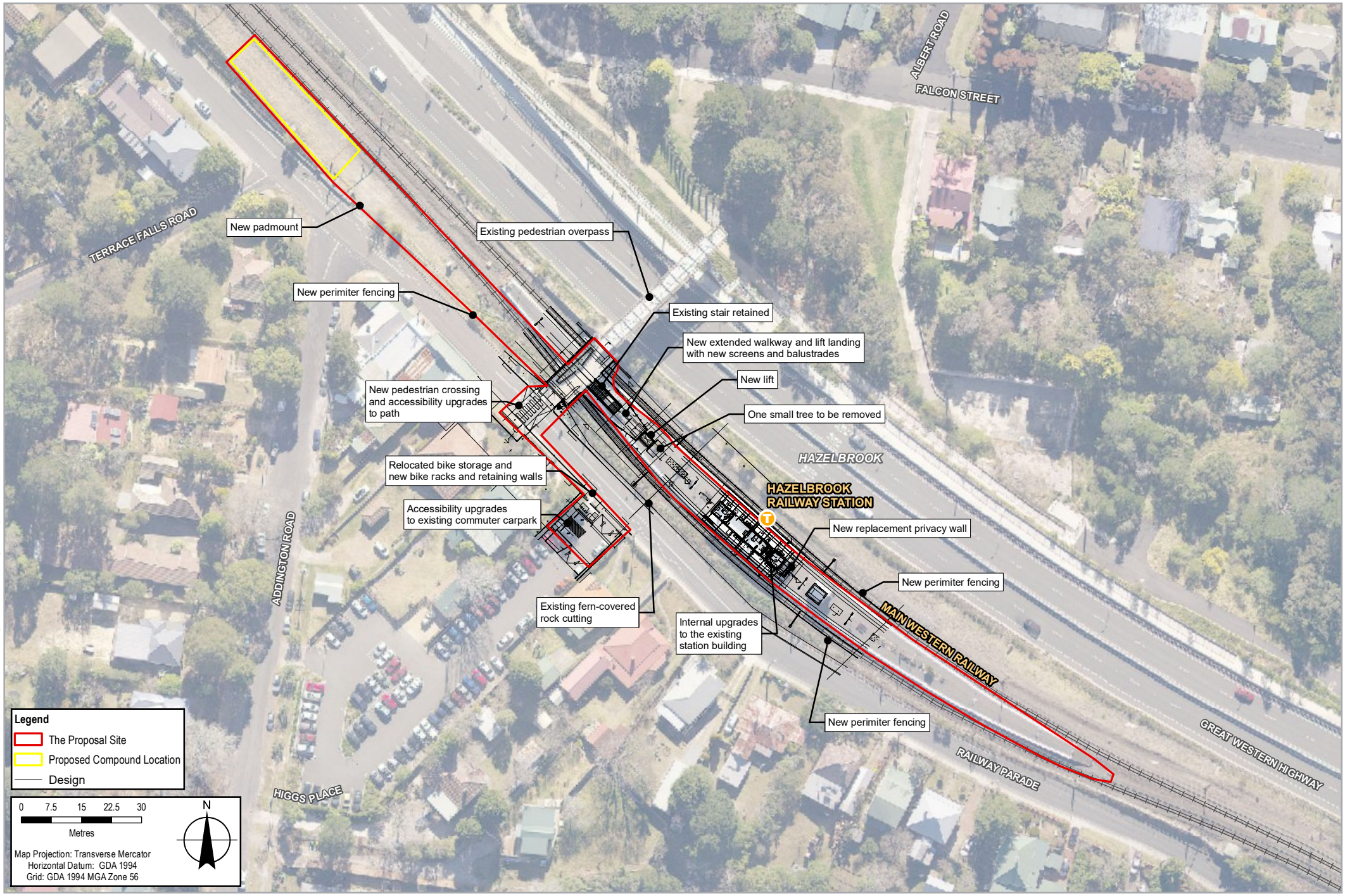


Figure 11: General layout of the key elements of the Proposal (Indicative only, subject to detailed design)

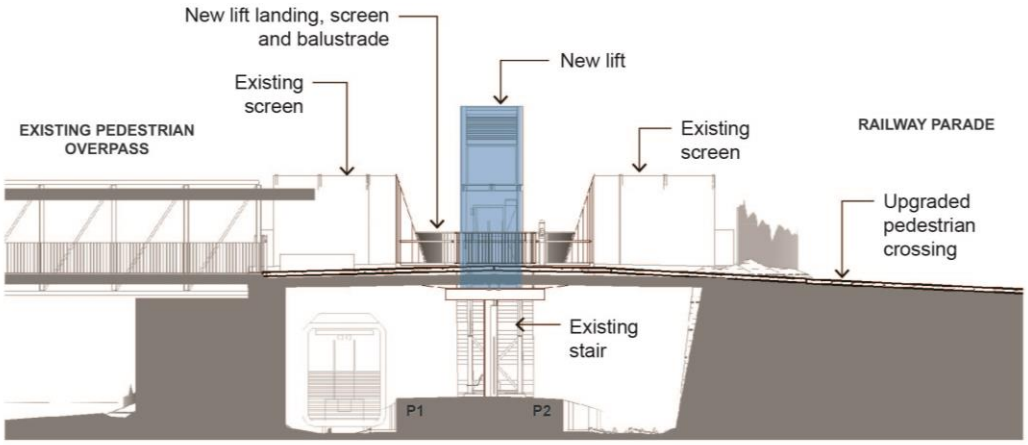
3.1.1 Scope of works

Station upgrade

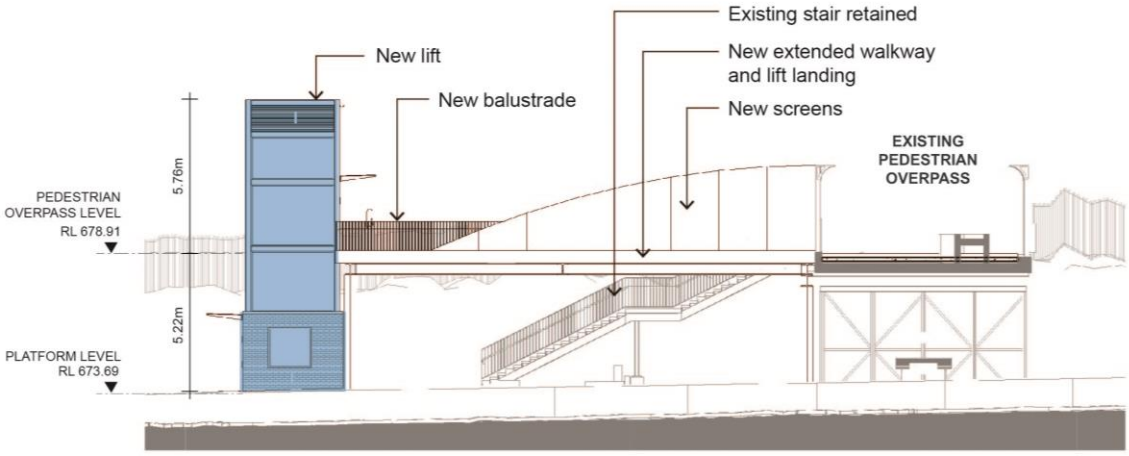
The upgrade to the station facilities would include:

- installation of a lift at the station entrance to connect to the platform
- construction of a new bridge extension to access the new lift
- new handrails, nosings and TGSIs to the stairs connecting the pedestrian footbridge to platform 1 and 2
- new canopies around the lift and over the new FAT
- reconfiguring the existing male and female toilet into one FAT and one unisex accessible toilet
- installation of wayfinding and TGSIs throughout the station, including platforms and stairs
- provision of CCTV and lighting
- service relocation and adjustments to stormwater drainage and electrical infrastructure
- adjustment to station ticketing facilities, including new Opal card readers
- new/upgraded wayfinding signage and provision of the statutory/regulatory signage
- adjustments to rail corridor boundary fencing
- a new padmount and upgrade of the low voltage system for the new lift
- landscaping work including the removal and replacement of some garden beds on the platform.

Figure 12 Proposed pedestrian overpass extension and lift (indicative only, subject to detailed design)



CROSS SECTION THROUGH PEDESTRIAN OVERPASS LOOKING EAST



ELEVATION VIEW FROM STATION PLATFORM 1 LOOKING SOUTH TOWARDS RAILWAY PARADE

Interchange facilities

The proposed works to improve accessibility and customer experience include:

- upgrading of pedestrian facilities between Hazelbrook Station and the commuter car park located on Railway Parade with footpath improvements south of the station between the DDA car spaces and footpath and new pedestrian crossing
- upgrading commuter car park facilities with an extension of retaining walls, kerb, gutter and footpath along Railway Parade to accommodate the parking spaces and provide safe access for customers
- upgrading the two existing accessible parking spaces located in the car park at Railway Parade
- relocation of the bicycle locker located within the commuter car park to a location immediately north of its current location.

Materials and finishes

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

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

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

- lift shafts – steel beams and columns, brick cladding and framed glass
- pedestrian footbridge – concrete base with transparent anti-throw screens, decorative panels and roof
- amenities and platform canopies – steel frame and glass.

The concept design has been reviewed and accepted by TfNSW's Urban Design Review Panel. An Urban Design Plan (UDP) and/or Public Domain Plan (PDP) would also be prepared by the Contractor, prior to finalisation of detailed design for endorsement by TfNSW's Precincts and Urban Design Team.

Figure 13 Architectural platform view (looking west)

3.1.2 Engineering constraints

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

Existing structures: the placement and integrity of existing structures needed to be considered during the development of the design. These structures included the platforms, station buildings, access structures and footbridge.

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

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

- Sydney Water recorded sewer and water assets located within the Proposal area
- A Jemena gas main is located along the Great Western Highway, with a secondary main along Railway Parade
- RMS assets within the Great Western Highway alignment
- Telecommunications infrastructure
- NBN cabling within the Great Western Highway/ rail corridor
- Endeavour Energy assets below ground.

Heritage: Hazelbrook Station is listed on RailCorp's Section 170 Heritage and Conservation Register and the Blue Mountains LEP. The proposed works are predominantly inside the Hazelbrook Station group listing boundary. The proposed works in the commuter car park and Railway Parade are outside the listing boundary.

The Proposal would impact on the stairs, platform, physical and visual connections to the street and precinct.

Constructability: availability of land for the use of cranes for the construction and installation of the new lift and lift landing.

3.1.3 Design standards

The Proposal would be designed having regard to the following:

- *Disability Standards for Accessible Public Transport 2002* (issued under the *Commonwealth Disability Discrimination Act 1992*)
- Building Code of Australia
- relevant Australian Standards
- Asset Standards Authority standards
- Sydney Trains standards
- *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017)
- *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
- council standards where relevant.

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 the TfNSW Environmental Management System (EMS) and the *NSW Sustainable Design Guidelines - Version 4.0* (TfNSW, 2017) which groups sustainability into seven themes:

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

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

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

3.2 Construction activities

3.2.1 Work methodology

Subject to approval, construction is expected to commence in early 2019 and take around 18 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. The staging is also dependent on the Contractor's preferred methodology, program and sequencing of work.

Table 1 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works	• establish a site compound within the rail boundary (erect fencing, site offices, amenities and plant/material storage areas)
	• establish temporary facilities as required (e.g. temporary pedestrian access to station, temporary toilets)
	• vegetation clearing to allow for works
	• provide temporary power supply to site compound
	• relocation of station services affected by the works
Footbridge, lift and platform works	• construct main deck of footpath extension
	• install handrails to ramps and stairs
	• construction of lift shaft including piling and foundations for lift shaft
	• construct lift shaft
	• install lift structure including top landing, roof louvres and glazing
	• lift fitout and commissioning
	• platform regrading in localised areas
	• install power and communications systems
	• install fixtures, lighting, signage and CCTV cameras for the station areas
Station building works	• reconfigure station building for new amenities and fit out of SSER
	• install new canopy over FAT

Stage	Activities
Interchange works	• relocation of bike locker
	• upgrade DDA spaces at commuter car-park
	• Railway Parade footpath regrading
	• new padmount and upgrade to low voltage power system
Finalisation and commissioning	• install wayfinding signage, replanting/landscaping and fencing works
	• Station commissioning

3.2.2 Plant and equipment

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

- trucks
- jack hammer
- chainsaw
- piling rig
- franna/mobile cranes
- bobcat
- excavator
- demolition saw
- concrete pump
- concrete truck
- lighting tower
- coring machine
- water cart
- suction trucks
- rail mounted elevated work platform
- forklift
- hi-rail plant
- vibrating roller/compaction plate
- road rail excavator
- hand tools
- skip trucks
- hammer drills
- torque wrenches and impact wrenches
- grinders and bar benders
- elevated work platform
- crane

3.2.3 Working hours

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

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

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

Out of hours 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 five rail possessions would be required to facilitate activities including the following:

- piling of footings
- installation of lift structures and landing
- installation of anti-throw screens
- delivery of lift equipment
- resurfacing of platform.

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

3.2.4 Earthworks

Excavations and earthworks would generally be required for the following:

- excavation of the existing platform for new lift pit
- services relocation
- piling works for lift and landing
- civil works for the DDA spaces at the carpark
- railway Parade footpath regrading
- fencing and drainage upgrade works
- pedestrian crossing modification.

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

There would be about 70 cubic metres of spoil removed from piling works, communications installation and lift pit. There would be about five cubic metres of concrete from regrading works.

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, 2017). 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:

- impact to pedestrian and bicycle rider movements on both sides of the station due to the movement of construction material, traffic diversions and the location of crane/s during construction
- temporary pedestrian access
- increased vehicle movements may reduce safety
- access would be maintained to the station during all operating times with the exception of track possessions
- loss off-street parking at the commuter car park located off Railway Parade
- loss of on-street car parking locations
- interruptions to traffic movements on Railway Parade.

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 rail corridor (refer Figure 11). The area nominated for the compound is on land owned by TfNSW. Impacts associated with utilising this area have been considered in Section 6 including requirements for rehabilitation.

3.2.8 Public utility adjustments

The Proposal has been designed to avoid relocation of services where feasible, however further investigation may be required. It is likely some services may require relocation, however this is unlikely to occur outside of the footprint of the works assessed in this REF. In the event works would be required outside of this footprint, further assessment would be undertaken. The appropriate utility providers would be consulted during the detailed design phase.

3.3 Property acquisition

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 the new station/interchange is subject to further discussions with NSW Trains, TfNSW and Blue Mountains City Council. Structures constructed under this Proposal would be maintained by Sydney Trains. However it is expected that adjacent garden/landscape areas would continue to be maintained by Blue Mountains City Council.

4 Statutory considerations

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

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

4.2 NSW legislation and regulations

4.2.1 Environmental Planning and Assessment Act 1979

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

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

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has 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
Contaminated Land Management Act 1997 (CLM Act) (NSW)	Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8).
Crown Lands Act 1987 (NSW)	The Proposal does not involve works on any Crown land.
Disability Discrimination Act 1992 (DDA Act) (Cwlth)	The Proposal would be designed having regard to the requirements of this Act.
Heritage Act 1977 (Heritage Act) (NSW)	• 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. A heritage assessment has been undertaken for the Proposal and is summarised in Section 6.5. Consultation has been undertaken with Sydney Trains Heritage regarding the impacts of the Proposal on the heritage values of Hazelbrook Station. This would continue throughout the next phase of design development.
National Parks and Wildlife Act 1974 (NPW Act) (NSW)	Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4). However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease and appropriate advice sought.
Biosecurity Act 2015 (NSW)	There are no noxious weeds that have been identified in the Proposal area (refer Section 6.7).
Protection of the Environment Operations Act 1997 (PoEO Act) (NSW)	The Proposal does not involve a 'scheduled activity' under Schedule 1 of the PoEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal. However, in accordance with Part 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Construction Contractor.
Roads Act 1993 (Roads Act) (NSW)	Section 138 of the Roads Act requires consent from the relevant road authority for the carrying out of work in, on or over a public road. 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 not result in any impacts on any classified roads and therefore consent is not required under Section 138 of the Roads Act.
Sydney Water Act 1994 (NSW)	The Proposal would not involve discharge of wastewater to the sewer.
Biodiversity Conservation Act 2016(BC Act) (NSW)	The site does not contain suitable habitat for any listed threatened species or community and is unlikely to have a significant impact on any threatened species or community (refer Section 6.7).

Applicable legislation	Considerations
Waste Avoidance and Resource Recovery Act 2001 (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.
Water Management Act 2000 (NSW)	The Proposal would not involve any water use (from a natural source e.g. aquifer, river – only from the network), water management 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 Division 5.1 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 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 the Infrastructure SEPP prevails over all other environmental planning instruments except where *State Environmental Planning Policy (Major Development) 2005* and *State Environmental Planning Policy (Coastal Management) 2018* applies. The Proposal does not require consideration under these SEPPs and therefore do not require further consideration as part 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 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.

4.3.3 State Environment Planning Policy (Sydney Drinking Water Catchment) 2011

The Proposal site is located on land mapped within the Sydney Drinking Water Catchment, as defined by this SEPP. There is not expected to be adverse impacts to water quality as a result of the construction or operation of the Proposal as identified in the Neutral or Beneficial Effect (NorBE) assessment undertaken (refer Appendix D).

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 *Blue Mountains Local Environmental Plan 2015* (Blue Mountains LEP) were considered.

4.4.1 Blue Mountains Local Environmental Plan 2015

The Blue Mountains LEP is the governing plan for the Blue Mountains LGA, including Hazelbrook. Table 3 summarises the relevant aspects of the Blue Mountains LEP applicable to the Proposal. Figure 14 shows the relevant section of the zoning map from the Blue Mountains LEP, with the indicative location of the Proposal.

Table 3 Relevant provisions of the Blue Mountains LEP

Provision description	Relevance to the Proposal
SP2 Infrastructure (Railway), SP2 Infrastructure (Classified Road), R4 High Density Residential	The Proposal is located in land zoned SP2 Infrastructure (Railway), SP2 Infrastructure (Classified Road) and R2 Low Density Residential. The land use objectives within the SP2 zone include: • to provide for infrastructure and related uses • to prevent development that is not compatible with or that may detract from the provision of infrastructure The land use objectives within the R2 zone include: • to provide for the housing needs of the community within a low density residential environment • to enable other land uses that provide facilities or services to meet the day to day needs of residents • to promote residential development in locations that are accessible to services and facilities • to ensure that development maintains and improves the character of residential areas in a manner that minimises impacts on existing amenity and environmental quality • to allow a range of non-residential land uses that are consistent with the predominant scale and height of adjoining buildings and do not unreasonably detract from the amenity of adjacent residents. The Proposal is consistent with the objectives of both zones as it would provide required infrastructure for the community in the form of works to improve access. All works are also located on rail land or land occupied by existing roads.
Clause 5.10 – Heritage conservation	The LEP aims to conserve heritage significance of heritage items in the Blue Mountains. Hazelbrook Station, the local rail corridor and the area surrounding the station include a number of locally listed heritage items and the Railway Parade Conservation Area located to the south of the station. The Proposal is being developed with consideration of heritage values of the station and local area and more information is included in Section 6.5.
Clause 5.12 – Infrastructure development and use of existing buildings of the Crown	The LEP does not restrict or prohibit the carrying out of development by, or on behalf of a public authority, that is permitted with or without consent, or is exempt development under the Infrastructure SEPP.
Clause 6.1(2)c – Environmental sensitive water supply catchment	The Proposal area is located within the Sydney drinking water catchment. It is considered that the construction and operation of the Proposal would not have an adverse effect on water quality – refer Section 6.9 and Appendix D.

Provision description	Relevance to the Proposal
Clause 6.19(4)f - Design excellence	TfNSW is committed to delivering projects of a high design excellence. The project addresses the relevant matters discussed in the associated clause, including: • the suitability of the land for development • existing and proposed uses and use mix • heritage issues and streetscape constraints • the relationship of the development with other development (existing or proposed) on the same site or on neighbouring sites in terms of separation, setbacks, amenity and urban form • the achievement of the principles of ecologically sustainable development • pedestrian, cycle, vehicular and service access, circulation and requirements • the impact on, and any proposed improvements to, the public domain The matters have been considered through the development and assessment of the Proposal.
Clause 7.5 – Hazelbrook precinct	This clause identifies the objectives for development on land identified as Hazelbrook Precinct B2-HB01. The Proposal is consistent with the objectives of the Hazelbrook Precinct B2-HB01.

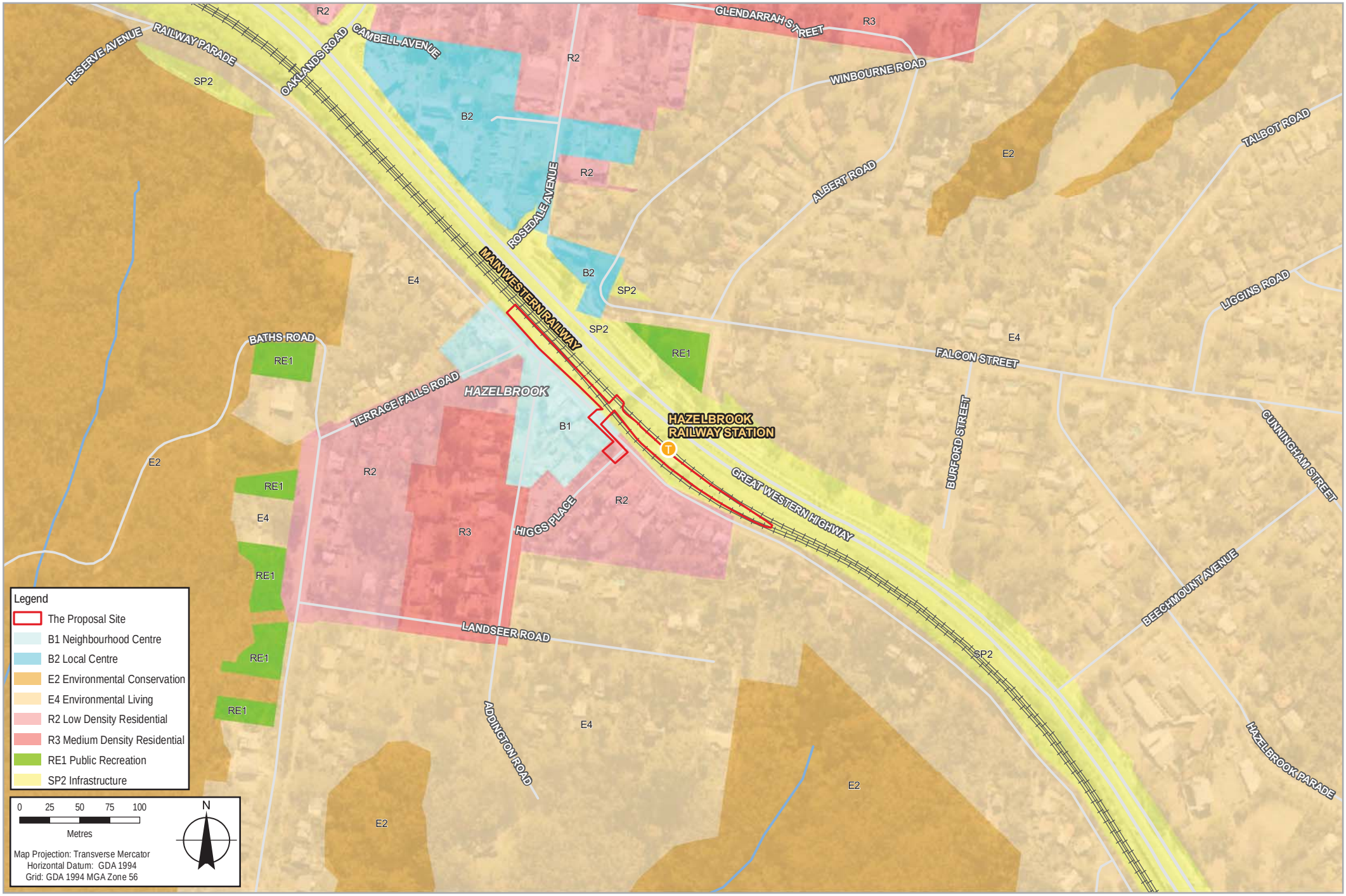


Figure 14: Blue Mountains LEP zoning

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
Future Transport Strategy 2056 (Transport for NSW 2018b)	*Future Transport 2056* (Transport for NSW 2018b) is an overarching strategy that ensures transport in NSW is prepared for rapid changes in technology and innovation to create and maintain a world class, safe, efficient and reliable transport system over the next 40 years. Future Transport 2056 ensures that we are prepared for rapid changes in technology and innovation to create and maintain a world class, safe, efficient and reliable transport system. The strategy is supported by a range of sub plans which are outlined in the below sections. The strategy has been developed to ensure land use and transport strategies are in line with one another through the strategy being development in consultation with the Greater Sydney Commission, Infrastructure NSW, Department of Premier and Cabinet and Department of Planning and Environment.	The Proposal would assist in meeting the following State wide outcomes detailed in Future Transport 2056: • encouraging active travel (walking and cycling) and using public transport • A fully accessible network that enables barrier-free travel for all.

Policy/Strategy	Commitment	Comment
Greater Sydney: Services and Infrastructure Plan (TfNSW, 2018b)	The Greater Sydney Services and Infrastructure Plan builds on the strategic initiatives outlined in Future Transport 2056 (discussed above). This plan provides a detailed look at the initiatives with the Greater Sydney area including identifying specific project which have bene identified as assisting in delivering Future Transport 2056.	The Transport Access Program, to which the Proposal forms part is identified in the services and infrastructure plan as a key initiative with a commitment for the works to occur in the next 10 years.
Disability Inclusion Action Plan 2018-2022 (TfNSW, 2017)	The Disability Inclusion Action Plan was developed as part of Future Transport 2056. The plan builds on the objectives regarding accessibility to transport as outlined in Future Transport 2056.	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. The Transport Access Program, of which the Proposal forms part is identified in the plan as a key action of ensuing the transport networks in Sydney are accessible for all potential users.
Building Momentum: State Infrastructure Strategy 2018-2038 (Infrastructure NSW, 2018)	The NSW government has devised a 20-year strategy to improve the current state of NSW's infrastructure. The *State Infrastructure Strategy* (Infrastructure NSW 2018) identifies policies and strategies for infrastructure needed to meet the demands of a growing population and economy.	The Proposal supports investment in rail infrastructure as identified in the strategy.
Greater Sydney Region Plan: A Metropolis of Three Cities ***Our Greater Sydney 2056: Western City District Plan – connection communities*** (Greater Sydney Commission, 2018)	A Metropolis of Three Cities guides the future growth of Greater Sydney. The plan includes a number of objectives related to transport networks including: • provision of transport infrastructure to support future growth • optimising existing infrastructure where possible. The Proposal is located within the Western City District as outlined in the plan. Further discussion of the Proposal in relation to the Western City is outlined below.	The Proposal would assist in meeting these objectives as it would provide a more accessible rail network which would include the availability of the network to a wider range of commuters. It would also involve the upgrade of existing infrastructure (i.e. stations) to enable them to better serve growth without the need for new investment.

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 Hazelbrook 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

Key stakeholders for Hazelbrook Station, comprising TfNSW, Sydney Trains and Blue Mountains City Council, were engaged in the development of the Concept Design Plan to provide insights into the station's deficiencies and future development and growth plans, and to also participate in the development and assessment of the station improvement options.

Workshops and meetings undertaken during development of the concept design included:

- options assessment workshops with relevant TfNSW and Sydney Trains representatives
- TfNSW design and sustainability panel presentation
- safety meetings.

The following meetings were undertaken as part of the design development:

- Stakeholder workshop 1 – Options Assessment. Attendees included representatives from a range of TfNSW divisions and Sydney Trains
- design and sustainability presentation to TfNSW Design and Sustainability Panel
- safety meeting
- Stakeholder workshop 2 – Preferred option development. Attendees were as workshop 1.

5.2 Consultation requirements under the Infrastructure SEPP

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

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

Table 5 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 13 | Consultation with Councils – development with impacts on council related infrastructure and services	Consultation is required where the Proposal would result in: • substantial impact on stormwater management services • generating traffic that would place a local road system under strain • involve connection to or impact on a council owned sewerage system • involve connection to and substantial use of council owned water supply • significantly disrupt pedestrian or vehicle movement • involve significant excavation to a road surface or footpath for which Council has responsibility.	The Proposal includes works that would • require connections or impacts the stormwater system • disrupt pedestrian and vehicle movements • impact on road pavements under Council's care and control • impact on Council-operated footpaths. Consultation with Blue Mountains City Council would be undertaken and would continue throughout the detailed design and construction phases.
Clause 14 | Consultation with Councils – development with impacts on local heritage	Where railway station works: • substantially impact on local heritage item (if not also a State heritage item) • substantially impact on a heritage conservation area.	Hazelbrook Station Group is listed on the Blue Mountains LEP. The Proposal would impact this item. Consultation with Council would be undertaken regarding the Proposal and would continue through the next stages of the Proposal. Refer to Section 6.5 for further information on potential heritage impacts.
Clause 15 | Consultation with Councils – development with impacts on flood liable land	Where railway station works: • impact on land that is susceptible to flooding – reference would be made to *Floodplain Development Manual: the management of flood liable land.*	The Proposal is not located on land that is susceptible to flooding. Accordingly, consultation with Council is not required in regard to this aspect. Refer to Section 6.9.
Clause 15AA Consultation with State Emergency Service – development with impacts on flood liable land	Where railway station works: • Involve development on flood liable land	The Proposal is not located on land that is susceptible to flooding. Accordingly, consultation with State Emergency Service is not required in regard to this aspect. Refer to Section 6.9

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

5.3 Consultation strategy

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

The objectives of the consultation strategy are to:

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

5.4 Public display

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

- public display of the REF
- distribution of a project newsletter at the station, and to local community and rail customers, outlining the Proposal and inviting feedback on the REF
- advertisement of the REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback

- consultation with Blue Mountains City Council, Sydney Trains, NSW Trains, Roads and Maritime and other non-community stakeholders.
- 'pop-up' community information sessions near the station.

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 at the following locations:

- Blue Mountains City Council (Upper Mountains Office)

  2-6 Civic Place, Katoomba NSW 2780

  (02) 4780 5000
- Blue Mountains City Council (Lower Mountains Office)

  104 Macquarie Road, Springwood NSW 2777

  (02) 4723 5000
- Lawson Library (City of Blue Mountains)

  Loftus Street, Lawson NSW 2783

  (02) 4780 5903,
- Transport for NSW Office, Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood

The REF would also be available on the TfNSW website[1]. Information on the Proposal would be available through the Project Infoline (1800 684 490) or by email[2]. During this time feedback is invited. Following consideration of feedback received during the public display period, TfNSW would determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

5.5 Aboriginal community involvement

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the area covered by the Proposal (the area around Hazelwood Station) plus a 200 metre radius, on 4 October 2018. The closest Aboriginal site was 0.83 kilometres away and therefore 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 the archaeological potential of the area is low. Aboriginal stakeholders are invited to provide feedback on this Proposal as part of the REF display period. Further details on the assessment of the potential impacts on Aboriginal heritage are outlined in Section 6.4 including relevant mitigation measures.

5.6 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respondent. The feedback raised by the respondents would be

[1] https://www.transport.nsw.gov.au/projects/current-projects/hazelbrook-station-upgrade/
[2] yoursay.transport.nsw.gov.au/Hazelbrook

considered by TfNSW before determining whether to proceed with the Proposal (refer **Figure 2**).

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 feedback 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 (TT&AI) was prepared for the Proposal in October 2018 (GHD, 2018a). The TT&AI provides an assessment of the traffic and transport impacts associated with the construction and operation of the proposed station upgrade. The scope included an assessment of the proposed upgrade arrangements on pedestrian flows at pinch points in the pedestrian network and was prepared with reference to the static Fruin Level of Services (LoS) criteria.

On site observations of existing pedestrian demands at the station were identified through undertaking weekday morning and afternoon peak pedestrian surveys on Thursday 16 August 2018. The weekday morning peak period survey occurred between 6.00 – 9.00 AM and the afternoon peak period survey occurred between 3.00-6.00 PM.

No traffic modelling, intersection or mid-block assessment of traffic impacts were undertaken as part of the assessment as there are no additional car parking proposed. The proposed upgrade of Hazelbrook Station is expected to result in negligible traffic impacts on the surrounding road network.

The findings of the assessment are summarised in this section.

6.1.1 Existing environment

Hazelbrook Station

Hazelbrook station is located 93 kilometres west of the Sydney Central Business District (CBD) in the suburb of Hazelbrook and is serviced by the Blue Mountains Line. Platform 1 provides train services east to the Sydney CBD and Platform 2 provides train services west to Katoomba, Mount Victoria and Lithgow. The station is located within the Blue Mountains LGA, between Railway Parade and the Great Western Highway.

Train services in the Blue Mountains are operated by NSW Trains who are a service delivery agency of Transport for NSW. The majority of the population centres in the Blue Mountains are serviced by the Blue Mountains Line, however some services terminate at Mount Victoria, Katoomba and Springwood.

Hazelbrook Station is included in the peak hour express services, which do not stop at the minor stations on the Blue Mountains Line.

Train services typically operate with 15 to 30 minute frequencies during peak morning and evening periods and 60 minute frequencies in off-peak periods.

The journey times between Hazelbrook Station and Central Station are approximately 98 minutes for normal services and 91 minutes for express services.

Road network and traffic

Great Western Highway (A32)

The Great Western Highway (A32) is an arterial road, located north of Hazelbrook Station. It has two traffic lanes in each direction, separated predominately by a raised median strip and by a steel barrier within vicinity to the station.

Approximately 450 metres to the west of Hazelbrook Station, the Great Western Highway forms a signal controlled intersection with Oaklands Road. Signal controlled pedestrian crossings are provided at each approach at this intersection.

On the northern side of the Great Western Highway, bus stops are provided approximately 450 metres to the east of Hazelbrook Station (at the front of Hazelbrook Public School) and 250 m to the west of the station.

Railway Parade

Railway Parade functions as a collector road providing access to Hazelbrook Station in the south and has connectivity to the local roads in Hazelbrook (south of the Great Western Highway) and the Great Western Highway. Running parallel to the railway line, Railway Parade has one traffic lane in each direction.

A pedestrian (zebra) crossing is located adjacent to the station to provide a safe crossing for pedestrians.

No Parking and No Stopping zones are the primary parking restriction implemented either side of Railway Parade in the vicinity of Hazelbrook Station. However, out the front of the several local businesses located on the south of Railway Parade a 1/2P parking (8.30am to 6.00pm between Monday to Friday and 8:30am to 12:30pm on Saturday) is available.

Access to the off-street commuter car park located to the south of Hazelbrook Station is provided from Railway Parade.

Railway Parade has a sign posted speed limit of 50 km/h in both directions.

Oaklands Road

Oaklands Road functions as a collector road providing indirect access to Hazelbrook Station via the Great Western Highway. It runs in a north-south direction across the Great Western Highway and the railway line providing connections to local roads and residential properties.

Oaklands Road has one traffic lane in each direction separated by a solid double line (BB line). Bus stops are located off each carriageway approximately 84 metres north of the Oaklands Road signalised intersection with the Great Western Highway.

Falcon Street

Falcon Street is located northeast of Hazelbrook Station. It functions as a local road and provides indirect access to Hazelbrook Station primarily for pedestrians. Falcon Street has one traffic lane in each direction.

Unrestricted parallel parking is provided on either side of Falcon Street. A bus stop is located in the westbound direction of Falcon Street.

Falcon Street does not have a sign posted speed limit, so a default urban speed limit of 50 km/h applies.

Public transport

Buses

A bus stop servicing Hazelbrook Station is located on the south side of Railway Parade. The following bus services operate from this stop:

- Bus route 685H – Springwood to North Hazelbrook
- Bus route 690K – Springwood to Katoomba, Blue Mountains

Bus stops servicing areas within a 500 metre radius of Hazelbrook Station are located on each side of the Great Western Highway. The following bus services operate from these stops:

- Bus route 685H (northern side of Great Western Highway) – Springwood to North Hazelbrook
- Bus route 690K (northern side of Great Western Highway) – Springwood to Katoomba, Blue Mountains
- Bus route 690K (southern side of Great Western Highway) – Katoomba, Blue Mountains to Springwood.

Pedestrian network

Pedestrian access to Hazelbrook Station from the north is provided via the footbridge overpass (Campbell Bridge) over the Great Western Highway. In the south, access to the station is provided via Railway Parade.

Footpaths are provided along the southern side of Railway Parade in the vicinity of the station. A pedestrian (zebra) crossing provides a crossing opportunity from the footpath to the station entrance. A shared path is provided along the northern side of the Great Western Highway which has linkages to Falcon Street and other local streets in the area.

Signal controlled pedestrian crossings are provided at each approach at the Great Western Highway / Oakland Road intersection.

As part of the TT&AI pedestrian counts were undertaken at key locations within the Hazelbrook Station precinct on Thursday 16 August 2018. Pedestrian counts were completed during the morning weekday peak period (6.00-9.0am) and the evening weekday peak period (3.00-6.00pm). Analysis of the pedestrian survey data collected indicated:

- The weekday morning peak hour was between 7.05am-8.05am. The peak five minute period was 6.10am-6.15am with pedestrian volumes accounting for 15 per cent of the peak hour pedestrian movements (total recorded movements)
- The weekday evening peak hour was between 3.25pm-4.25pm. The peak five minute period was 3.5 pm-3.5pm with pedestrian volumes accounted for 15 per cent of the peak hour pedestrian movements (total recorded movements).

Bicycle network

A bicycle locker hire box and bike racks are located to the south of Hazelbrook Station. As shown in Figure 15, the bicycle locker hire is located near the entrance to the commuter car park. Bike racks are located at the southern access to the footbridge adjacent to the pedestrian crossing.

Figure 15 Existing bicycle locker located near the entrance to the commuter car park

Source: TfNSW

The bicycle network around the vicinity of Hazelbrook Station is limited. Two on road paths of high difficulty are provided within the road shoulder along the westbound and eastbound carriageways of the Great Western Highway (Figure 16). Visual observations of the path network surrounding Hazelbrook Station indicate paths leading to the station along Railway Parade and the Great Western Highway would be moderately difficult.

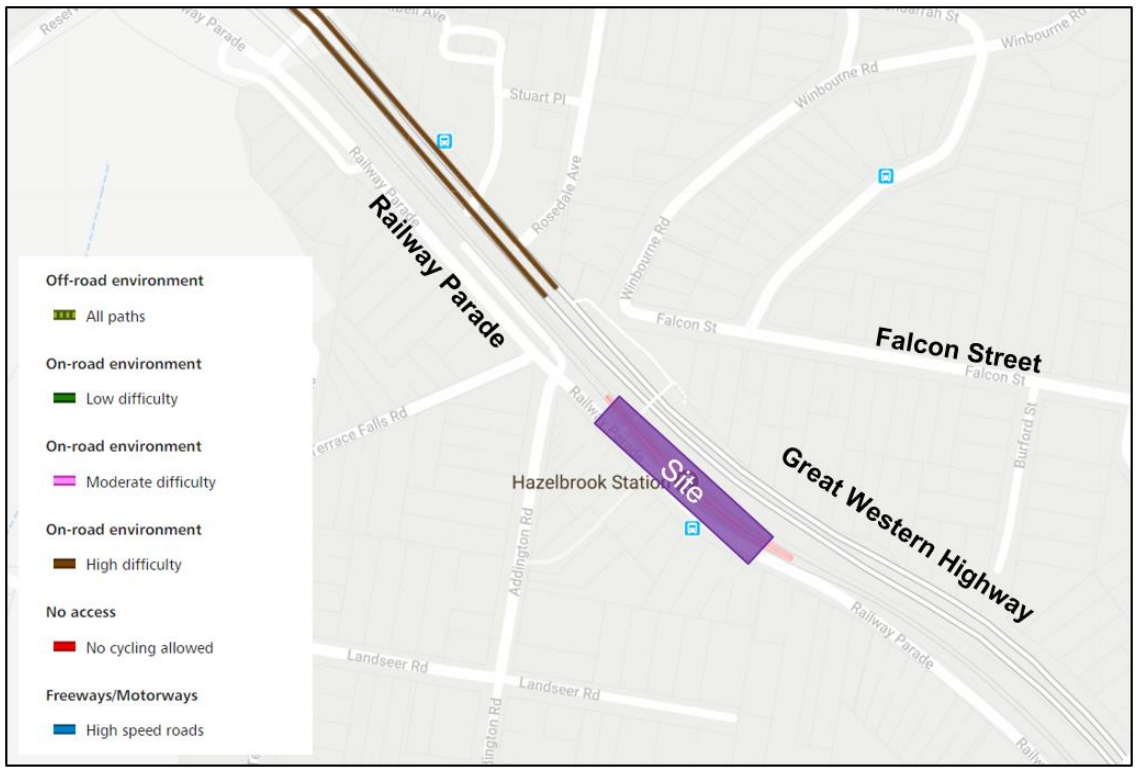


Figure 16 Existing bicycle routes

Source: www.rms.nsw.gov.au/maps/cycleway_finder - Modified by GHD

Car parking

Off-street commuter car parking is provided on the southern side of Hazelbrook Station, off Railway Parade. On street parking on Railway Parade approximately 45 metres southwest of the station has 30 minute time restriction, within the following periods:

- Monday to Friday: 8:30am to 6:00pm
- Saturday: 8:30am to 12:30pm.

Further west of the station (approximately 15 metres), unrestricted on-street parking is available on both sides of Railway Parade. East of the station, unrestricted on-street parking is available on the southern side of Railway Parade.

To the north of Hazelbrook Station, on-street parking is available on Falcon and Burford Streets as well as Albert Road.

Taxi

No formal taxi zones are provided within the vicinity of Hazelbrook Station.

Kiss and ride facilities

A formal “No Parking” zone/ kiss and ride facility is available at Hazelbrook Station, which can accommodate one vehicle. This “No Parking” zone is also signed as a “Pick Up and Set Down area” and is located on the southern side of the station on Railway Parade northwest of the pedestrian overbridge. A “No Stopping” zone is located on the opposite side of Railway Parade.

6.1.2 Potential impacts

Construction phase

Traffic generated by construction activities for the Proposal would include heavy vehicles associated with construction plant, deliveries and removal of materials along with light vehicles from construction workers.

The duration of the construction activities for Hazelbrook Station is around 18 months.

Heavy vehicles

The types of heavy vehicles to be used during the construction period are expected to include medium and large rigid vehicles. Oversize vehicles may also be required for transporting lifts and pre-cast structures.

For the purposes of this assessment, the number of heavy vehicles accessing the site has been assumed to be up to 10 heavy vehicles per day. Heavy vehicles are expected to access the site outside of the AM and PM peak hours. As a conservative approach, however, it has been assumed 20 per cent of construction heavy vehicle traffic would access the site during the weekday AM and PM peak hours (i.e. two vehicles).

All construction storage containment would be within the proposed construction compound, however this would be confirmed in the detailed construction planning stage.

This increase in heavy vehicle traffic is expected to result in minimal impacts to the operation of the surrounding road network and fall within typical daily traffic fluctuations.

Light vehicles

For the purpose of this assessment, it has been assumed there would be up to 30 construction workers at the site during peak periods, with around 20 workers at the site on a typical day. For a worst case scenario it is assumed there would be a typical car driver rate of 100 per cent (i.e. each individual worker driving a car), however it is expected a significant proportion of workers would arrive by train or carpool. Application of this car driver rate to the

assumed workforce yields a traffic generation in the order of up to 60 light vehicles per day (30 inbound and 30 outbound).

In conjunction with the standard hours of construction (7.00am to 6.00pm Monday to Friday; 8.00am to 1.00pm Saturdays), it is expected workers would arrive at the site before and during the observed road network AM peak hour (7-8am), while an assumed 50 per cent of workers would depart during the PM peak hour (5-6pm). These peak hours were observed based on traffic data provided from the Roads and Maritime Traffic Volume Viewer Website for the Great Western Highway. This small increase in light vehicle traffic is expected to result in minimal impacts to the operation of the surrounding road network and fall within typical daily traffic fluctuations.

Construction light vehicles are expected to park on-street if required, with limited offsite parking available and would be required during day work to park outside a designated exclusion zone of approximately 400 metres. This would need to be addressed in greater detail in a Construction Traffic Management Plan (CTMP) for the proposed works. Construction light vehicles are expected to park on the road network in proximity to Hazelbrook Station during the construction period. It is recommended workers are encouraged to use alternate transport options such as public transport to access the site. Construction workers would not park in the commuter car park.

Construction vehicle access routes

Access options to the site are limited due to the restricted access roads off the Great Western Highway. To reduce the potential impacts on the performance of the intersections in the vicinity of the site (and to minimise right turn manoeuvres at unsignalised intersections), it is recommended construction vehicles (heavy and light vehicles) access the site from the east along the Great Western Highway and utilise the left turn into Park Road before travelling along Railway Parade.

Egress is likely to be to the west, along Railway Parade to Oaklands Road where the existing signal controlled intersection allows for all turn manoeuvres onto the Great Western Highway. This recommended route is shown in Figure 17. Should access be required from the west, this route could be reversed to access the site via Oaklands Road and egress via Park Road.

Temporary road closures could occur on Railway Parade at various times during the construction period. Vehicles may need to take alternate routes during this time. A detailed CTMP would address how traffic would be redirected if required.

Access to the construction compound located in the rail corridor and the construction site is available through the rail corridor access point north-west of Hazelbrook Station off Railway Parade.

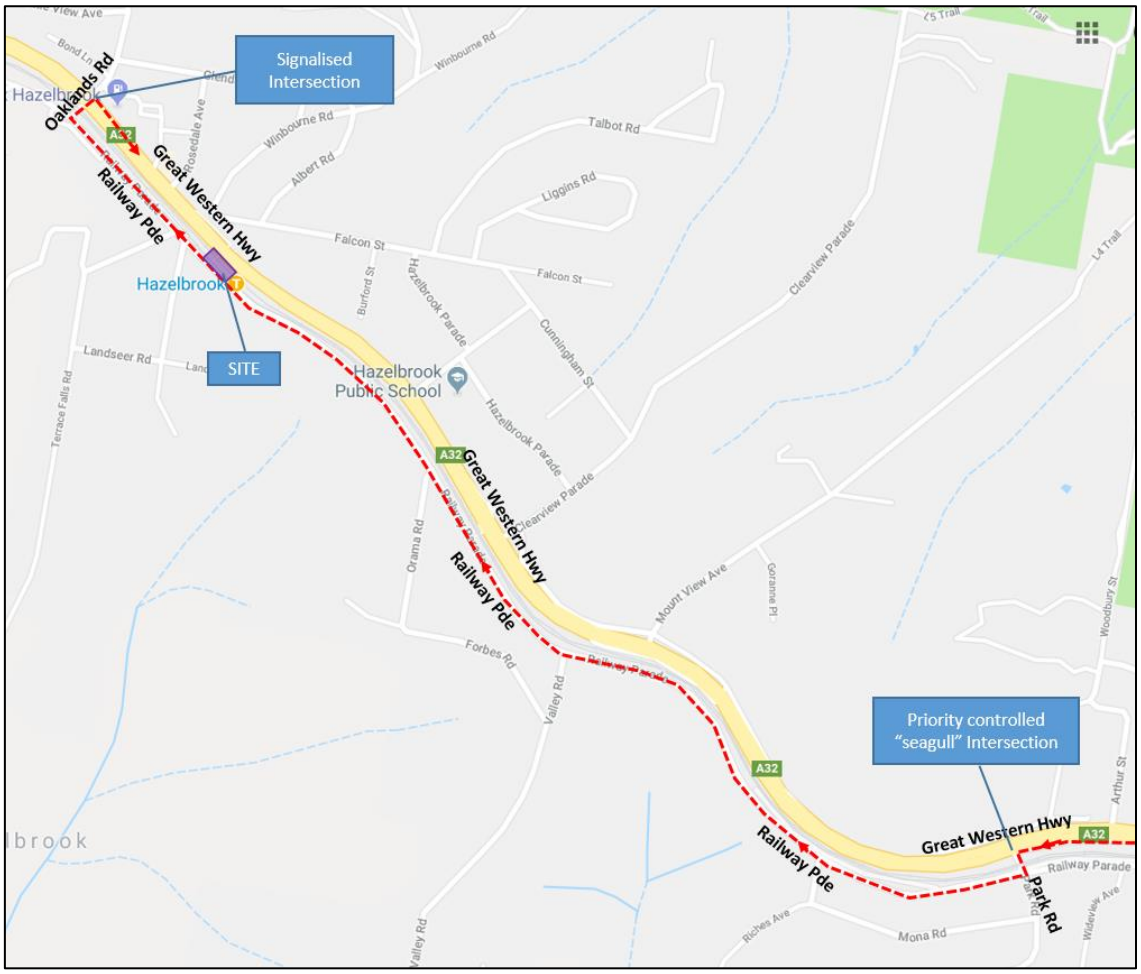


Figure 17 Construction vehicle access routes (to / from the east) map

Source: Google maps – modified by GHD

Pedestrian and bicycle rider impacts

Access to the station is expected to be maintained at all times during the construction period except during scheduled rail track possessions. However, pedestrians and bicycle riders on Railway Parade are anticipated to be affected by the proposed construction activities.

Potential interactions between construction traffic and pedestrians and bicycle riders include:

- impact (disruption) to pedestrian and bicycle rider movements due to the movement of material, traffic diversions and the location of crane/s during construction
- temporary changes to pedestrian access is likely to occur due to the upgrade works for the new Station access, pedestrian crossing and footpath at Railway Parade
- increased vehicle movements may reduce safety.

Public transport impacts

Impacts to bus services operating in the vicinity of the site are expected to be minimal, with services to continue to operate along the Great Western Highway and Railway Parade in the vicinity of the station during construction activities.

It is recommended consideration be given to possible traffic control requirements near the bus stop at Railway Parade during construction to minimise the potential for impacts to bus services.

Car parking impacts

The construction compound would be located to the north-west of Hazelbrook Station in the cleared area directly beside the railway lines within the rail corridor. The number of off-street

parking spaces that would be required by the compound and potential construction worker parking is currently unknown. This would need to be identified and addressed as part of the detailed CTMP and further analysis of the project impacts as part of the detailed design stage.

It is expected some workers would also park in on-street parking locations in the vicinity of the construction compound. This may reduce the available on-street parking, currently used by commuters and visitors in the vicinity of Hazelbrook Station. A parking exclusion zone for workers would be detailed in the CTMP to reduce impact to commuters in the area immediately surrounding the train station.

On-street parking in the vicinity of the works is anticipated to be sufficient to cater for temporary parking losses during construction. This would be assessed as part of the detailed CTMP and further analysis of the project impacts as part of the detailed construction design stage.

It is recommended workers be encouraged to use alternate transport options such as public transport to access the site to reduce impacts on the parking demand. Construction workers would not park in the commuter car park.

Taxi / kiss and ride impacts

A kiss and ride facility is located on the south-western side of Railway Parade to the north of the pedestrian crossing. Should alteration to the kiss and ride facility be required as part of the constructions works, this would be managed through the development of a detailed CTMP and traffic control measures.

There is currently no formal taxi zone at Hazelbrook Station. As such, the impacts to taxis would be negligible.

Operational phase

Traffic impacts

As no additional car parking is proposed, the proposed Hazelbrook Station upgrade is expected to result in negligible traffic impacts in the vicinity of the station.

Parking

The existing two disabled parking spaces within the commuter car park at Railway Parade are proposed to be modified to provide DDA compliant spaces. No car spaces will be lost in the car park.

No other changes to off-street and on-street car parking is proposed.

Pedestrian and bicycle rider impacts

Pedestrian access to Hazelbrook Station would be improved by upgrading the footpath and pedestrian crossing (zebra crossing) at Railway Parade, allowing for improved access to the existing commuter car park.

A new lift to the station platform and an upgrade to the existing stairs between the platform and pedestrian overbridge would also be provided to improve accessibility to the station.

No changes to the bicycle network or bicycle parking are proposed.

Bus impacts

No changes are proposed to the existing bus stop facilities or bus services at Hazelbrook Station. The proposed pedestrian access improvements to the pedestrian crossing and footpath would provide better accessibility to the station, improve interchange between different modes of transport and encourage public transport use.

Taxi / kiss and ride impact

The “No Parking” zone kiss and ride facility at Railway Parade would be maintained with no taxi zone proposed. The proposed pedestrian access improvements to the footpath and

pedestrian crossing would provide better accessibility to the station, including between the kiss and ride zone and station entry at Railway Parade.

6.1.3 Mitigation measures

Mitigation measures for ensuring pedestrian and bicycle rider access and safety are not compromised would include traffic control near the pedestrian and bicycle access points on the northern and southern side of Hazelbrook Station, particularly when large vehicles need to access the site during construction.

A detailed CTMP would be prepared prior to the commencement of works with site induction for construction personnel being undertaken to outline the requirements of the CTMP. The aim of the CTMP is to maintain the safety of all workers and road users within the vicinity of the site and outline mitigation measures of construction traffic impacts. The CTMP will be prepared by the Contractor in consultation with TfNSW and provided to Blue Mountains City Council and Roads and Maritime Services.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.2 Urban design, landscape and visual amenity

The *Hazelbrook Station Landscape and Visual Impact Assessment* (LVIA) was prepared by GHD in October 2018 for Transport for NSW (GHD, 2018b). The LVIA assessed the landscape character and visual impact of the Proposal, including the landscape and visual effects of both construction and operational stages. The findings of the assessment are summarised in this section.

6.2.1 Existing environment

The study area for the LVIA has been defined as land within 600 metres of the Proposal. A total of seven landscape character types were identified within the 600 metre study area, including village commercial, local commercial, community facilities, local park, residential, transport infrastructure and conservation area. The landscape character types are shown in Figure 18 and discussed further below.

Key views and viewshed

Key views in the study area include distant views to the north towards the Blue Mountains from elevated locations including along Railway Parade east of the station. Other views of note include views of the Great Western Highway to the north-west from the pedestrian overpass bridge and from the platform.

The viewshed refers to an area that is visible from a particular location. The viewshed for the Proposal, which forms the study area for the visual impact assessment, is defined as the area of land surrounding and beyond the Proposal, which could be potentially affected by the Proposal.

Visually prominent features within the study area include the pedestrian overbridge, particularly when viewed from the station platforms and from the northern side of the rail line. The elevated streetscape along Railway Parade provides a continuous backdrop to the station precinct when viewed from the north. Also of note are the large retaining walls associated with the Great Western Highway.

The presence of large mature trees, particularly exotics such as conifers and pines, combined with built form elements such as houses and the Great Western Highway retaining walls, shield the majority of southerly views towards the Proposal from the residential areas to the north-east of the Great Western Highway. There is also an existing fern-covered rock cutting on the southern side of the station.

Landscape character types

Based on the assessment of natural and cultural influences shaping the landscape, Landscape Character Types (LCT's) have been identified for the study area:

- LCT1 Village commercial
- LCT2 Local commercial
- LCT3 Community facilities
- LCT4 Local park
- LCT5 Residential
- LCT6 Transport infrastructure
- LCT7 Conservation area

Refer to Figure 18 for landscape character types plan.

Figure 18: Landscape character types plan

Sensitive visual receivers

Sensitive visual receivers within the Proposal viewshed include the following:

- residents on Railway Parade
- businesses on Railway Parade and fronting onto the Great Western Highway
- shared path users on the Great Western Highway, including children commuting to Hazelbrook Primary School, and commuters accessing the pedestrian overpass bridge
- pedestrians on Railway Parade
- pedestrian overpass bridge users
- commuters using Hazelbrook Station
- visitors to the upper section of Memory Park, north of the Great Western Highway (LCT4)
- Road users on Railway Parade and the Great Western Highway.

Viewpoint locations

Viewpoints which represent views from the most sensitive visual receivers are provided in Figure 19 and Table 6.

Table 6 Viewpoint locations

Viewpoint	Location	Description	Representative photo of viewpoint
VP1	Railway Parade (west)	This view represents residents, road users and pedestrians west along Railway Parade.	
VP2	Railway Parade and Terrace Falls Road	This view represents residents, road users and pedestrians west along Railway Parade.	

Viewpoint	Location	Description	Representative photo of viewpoint
VP3	44 Railway Parade	This view represents residents, road users, pedestrians and commuter car park users, along Railway Parade.	
VP4	Railway Parade (east)	This view represents residents, road users and pedestrians along Railway Parade.	

Viewpoint	Location	Description	Representative photo of viewpoint
VP5	Great Western Highway (east)	This view represents shared path users on the Great Western Highway.	
VP6	Great Western Highway (pedestrian overpass)	This view represents shared path users on the Great Western Highway and those accessing the pedestrian overpass bridge.	

Viewpoint	Location	Description	Representative photo of viewpoint
VP7	Great Western Highway (west)	This view represents a small number of businesses, shared path and road users on the Great Western Highway, particularly those accessing the local shopping centre.	

Figure 19: Viewpoint location plan

6.2.2 Potential impacts

a) Construction phase

Construction works would result in temporary landscape and visual impacts which may extend beyond the Proposal site. Landscape and visual impacts associated with construction activities are generally of greater magnitude than those associated with operation, however are temporary in nature.

Landscape and visual impacts during construction resulting from those activities outlined in Section 3.2 may include:

- the presence of a crane required for lift construction
- the presence of an excavator, crane truck, piling rig, concrete truck and concrete pump
- temporary safety screens between the work being undertaken and the public domain, platform and pedestrian overbridge
- presence of construction traffic and workers
- temporary parking areas
- importation and storage of construction equipment and plant
- materials stockpiling and the presence of incomplete structures
- construction activities to the existing pedestrian overpass, lift and stair, which may be visible above safety screens from street level.

Operational phase

Potential visual impacts relate to the introduction of new elements in the landscape. The key features of the Proposal are described in Section 3.1. Once constructed, the potential visual impacts of the Proposal would be mainly associated with:

- the upgraded station facilities, including the new lifts, landings and canopies
- new rail corridor perimeter fencing to the south of the rail corridor
- new privacy screen on the eastern side of the stations building
- associated landscaping.

A photomontage providing an indication of the appearance of the Proposal are included in Section 3.1.1 as Figure 12.

Landscape character impacts

Operational landscape impacts were assessed to be either negligible or no impact and the Proposal would result in a built form generally consistent with the existing landscape character of the study area.

Table 7 provides a summary of landscape character impacts for the Proposal at each LCT**.**

Table 7 Summary of landscape impacts

LCT	Description	Sensitivity to change	Magnitude of change	Overall Rating
LCT1	Village commercial	Moderate	Low	**Moderate-Low**
LCT2	Local commercial	N/A	N/A	**No impact**
LCT3	Community facilities	N/A	N/A	**No impact**
LCT4	Local park	N/A	N/A	**No Impact**
LCT5	Residential	Moderate	Low	**Moderate-Low**
LCT6	Transport infrastructure	Moderate	Moderate	**Moderate**
LCT7	Conservation	N/A	N/A	**No impact**

Visual impacts

The significance of the potential visual impacts was determined by assessing the magnitude of potential impacts for each receiver in combination with the sensitivity of the receiver. Significant impacts are considered to be those with a rating of high-moderate or above. A summary of the results of the visual impact assessment for those receivers with the potential to be impacted by the Proposal is provided in Table 8.

In summary, the Proposal is not expected to create an overall significant deterioration in the amenity of the existing views. The assessed significance of impacts for the receivers with the potential to be impacted by the Proposal ranged from negligible to high-moderate, with six of the seven viewpoints assessed having an overall rating of between negligible and moderate.

The most significant impact was found to be high-moderate from viewpoint location three representing views from residential houses in close proximity to the Proposal. These residences are within the heritage conservation area and located on a higher elevation of Railway Parade, with existing distant views across the station precinct towards the Blue Mountains.

Table 8 Summary of visual impacts

LCT	Description	Sensitivity to change	Magnitude of change	Overall Rating
VP1	Railway Parade (west)	Moderate	Negligible	**Negligible**
VP2	Railway Parade and Terrace Falls Road	Moderate	Low	**Moderate-Low**
VP3	44 Railway Parade	High	Moderate	**High-Moderate**
VP4	Railway Parade (east)	High	Low	**Moderate**
VP5	Great Western Highway (east)	Low	Low	**Low**
VP6	Great Western Highway (pedestrian overpass)	Low	Moderate	**Moderate-Low**
VP7	Great Western Highway (west)	Low	Low	**Low**

6.2.3 Mitigation measures

Mitigation measures below should be investigated and implemented throughout detailed design phase (where applicable) include:

- utilise design strategies to minimise the visual prominence of new Proposal components affecting views to and from Railway Parade conservation area, for example maximise the transparency of the lift shaft, new screening to the extended walkway and lift landing, and utilise light grey or similar colour finish to the new balustrades to the lift landing. Consider maintaining the existing height of the proposed perimeter fencing (1.2 metres), and reduce the visual prominence of the proposed fencing by utilising a light grey or similar colour finish as opposed to black
- ensure Proposal design, siting and materiality is of high quality and sympathetic to the existing heritage context of the station precinct and Railway Parade, and contributes positively to the existing landscape character values
- incorporate new landscape planting to soften the visual impact of additional paving areas and perimeter fencing. Consider additional planting to 1.5 metres high to the batter slope north of the platforms within the rail corridor, to improve visual amenity of VP6 and surrounds. Ensure any new landscape planting enhances the public realm and aligns with Crime Prevention Through Environmental Design principles
- ensure landscape and urban design contributes positively to the existing landscape character and principles outlined in the Sustainable Design Guidelines, Around the Tracks: urban design for heavy and light rail, Managing Heritage: issues in rail projects guidelines, Hazelbrook Village Centre Public Domain Masterplan, and Blue Mountains Development Control Plan 2015 specific to Hazelbrook Village Precincts.

Construction activity and storage

- General considerations for the construction phase include:
- take all practical measures to ensure construction equipment, stockpiles, and other visible elements are located away from key views to or from the sensitive visual receivers identified in this assessment. Should such equipment or stockpiles be located in a visually prominent location for any reasonable period of time, incorporate screening measures and practices to ensure sites are kept tidy.

Retention of visually important vegetation

General considerations for vegetation retention include:

- as the design of the Proposal progresses, the extent of disturbance on visually important buffer vegetation along the rail corridor boundary must be considered, and practical measures should be given to enable retention of this vegetation wherever possible
- ensure the retention and protection of the existing fern-covered rock cutting on the southern side of the station to retain the positive landscape character and visual amenity attributes it provides within the station precinct (refer to VP6 for location).

Signage and poles

General consideration for signage and poles include:

- avoid locating permanent signage which may impede views or reduce the character and amenity of views, for example along Railway Parade
- minimise the amount of services poles in the public realm and station precinct by utilising built form mounting and combining services on shared poles
- ensure design and materiality of services components such as poles, signage and lighting contribute positively to the heritage context.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.3 Noise and vibration

The *TAP 3 – Hazelbrook Station Noise and Vibration Impact Assessment* (NVIA) was prepared by GHD in October 2018 for Transport for NSW (GHD, 2018c). The NVIA provides an assessment of the noise and vibration impacts for the construction and operational phases of the Proposal. The findings of the assessment are summarised in this section.

Nearby noise and vibration sensitive receivers were identified and unattended noise measurements were completed to characterise the existing noise environment. The measured noise levels were used to establish construction and operational noise management levels. Construction and operational noise impact assessments were then completed to assess the impacts of the proposed works associated with the Proposal.

6.3.1 Existing environment

The existing noise environment in the vicinity of Hazelbrook Station is dominated by existing road traffic primarily from the Great Western Highway. Rail noise from the Train Link Blue Mountains Line also contributes to the background noise level. Intermittent PA system announcements at Hazelbrook Station also contribute to the background noise levels.

Noise sensitive receivers

The following sensitive receivers and land uses have been identified in close proximity to the Proposal:

- residential properties located in the area surrounding the station including Railway Parade which is located 10 metres to the south of the Station; and Falcon Street and Winbourne Road which are located about 90 metres to the north of the station
- commercial precincts located to the south of the Proposal along Railway Parade and north west along Campbell Avenue
- Hazelbrook Uniting Church located 130 metres north of the Proposal
- Hazelbrook Public School located on the corner of Beechmount Avenue and the Great Western Highway about 400 metres south of the Proposal.

All modelled sensitive receivers are shown in Figure 20.

Background noise levels

Background noise monitoring was undertaken at two locations considered to be representative of the nearby sensitive receivers. Long term monitoring was undertaken for a period of seven days between 6 August and 14 August 2018 at the locations listed below. Additional monitoring was undertaken from 17 August to 28 August at Location 2 due to corrupted noise logger data:

- Location 1 - 7 Falcon Street, Hazelbrook: about 100 m north-east of the Proposal.
- Location 2 - 9 Landseer Road, Hazelbrook: about 110 m south-west of the Proposal.

These locations are shown on Figure 20.

A detailed monitoring methodology and daily noise level charts are located in the NVIA prepared by GHD (GHD, 2018c).

The measured noise monitoring data were used to determine the Rating Background Levels (RBL) for the assessment during the day, evening and night-time periods in accordance with the *Noise Policy for Industry* (NPI) (EPA, 2017). A summary of the measured RBL and ambient noise levels is provided in Table 9.

The monitoring data from Location 2 is the more conservative of the two locations and has been used for this assessment. This is likely due to the monitoring location being set back from the Great Western Highway and is therefore suitably shielded from road traffic noise from the highway.

Table 9 Summary of measured noise levels, dBA

Location	Rating background level, L_{A90}			Ambient level, L_{Aeq}		
	Day 7am to 6pm	Evening 6pm to 10pm	Night 10pm to 7am	Day 7 am to 6 pm	Evening 6pm to 10pm	Night 10pm to 7am
Location 1	42	39	28	52	50	48
Location 2	33	33	26	51	46	46

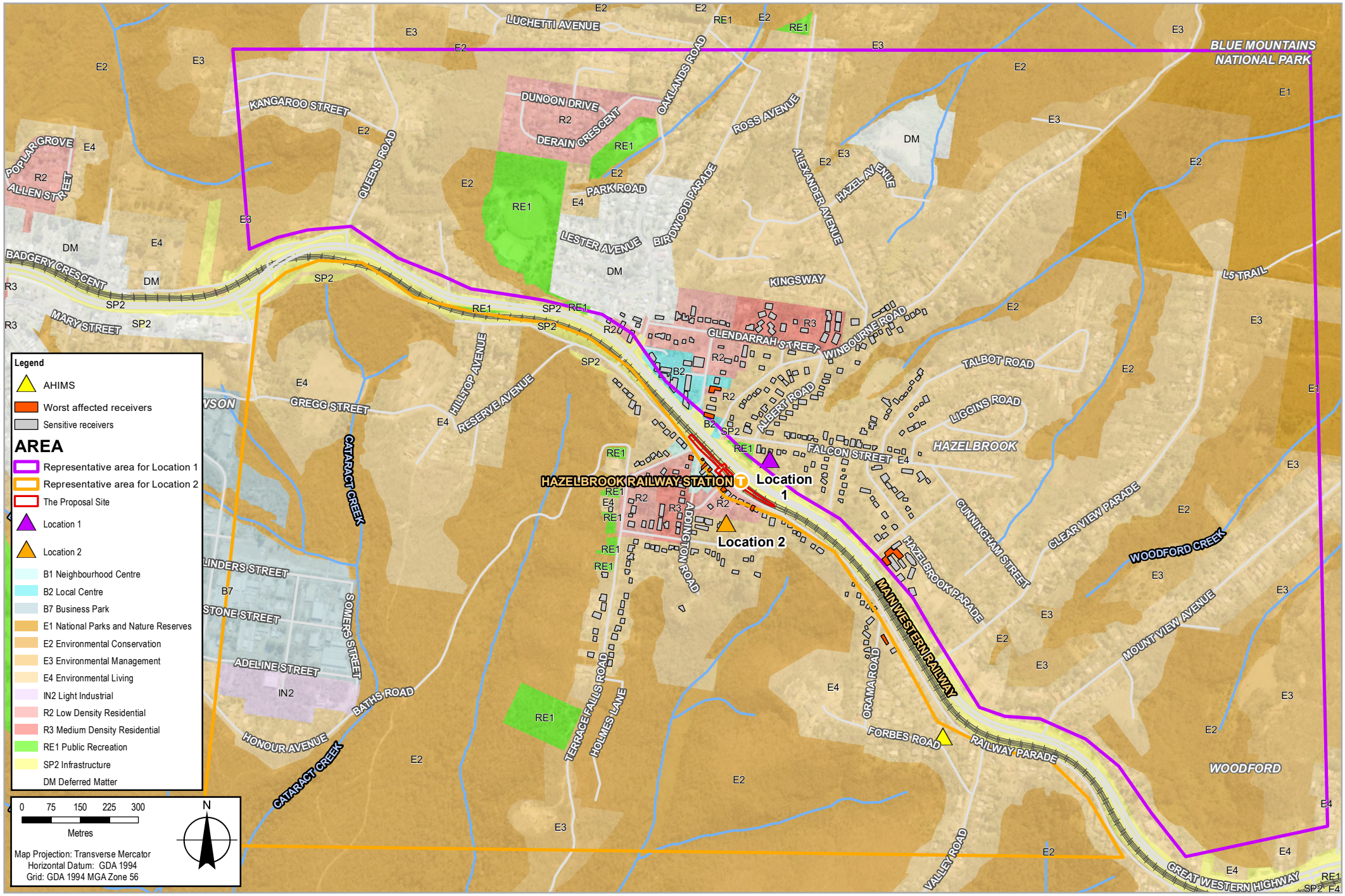


Figure 20: Sensitive noise receivers & monitoring locations

6.3.2 Criteria

Construction noise

Construction noise management levels

The construction noise management levels for the Proposal are based on the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and the *Construction Noise and Vibration Strategy* (CNVS) (TfNSW, 2018a). The ICNG specifies the method used to determine the noise management levels for residential receivers during standard construction hours and out of hours works. A fixed noise management level is set by the ICNG for receiver types classed as commercial, schools and places of worship.

Guidelines to determine the noise management levels for residential receivers, during and outside of standard recommended hours provided in the ICNG, are summarised in Table 10.

Table 10 Construction noise management level guidelines for residences

Time of day	Noise management level $L_{Aeq(15min)}$
Recommended standard hours	Noise affected: Rating background level + 10 dBA
	Highly noise affected: 75 dBA
Outside recommended standard hours	Noise affected: Rating background level + 5 dBA

Noise management levels for other sensitive land uses are provided in Table 11. These levels only apply when the relevant land use is in use.

Table 11 Noise management levels for other sensitive land uses

Land use	Noise management level, $L_{Aeq(15min)}$
Commercial premises	70 dBA (external)
Industrial premises	75 dBA (external)
Educational institutes	45 dBA (internal)
Hospital wards and operating theatres	45 dBA (internal)
Places of worship	45 dBA (internal)
Active recreation areas	65 dBA (external)
Passive recreation areas	60 dBA (external)

The specific construction noise management levels are outlined in Table 12.

Sleep disturbance

The ICNG recommends that maximum noise level events and the frequency of maximum noise level events exceeding the RBL should be assessed where construction works are planned to extend over two or more consecutive nights.

The NPI (EPA, 2017) provides the most updated guidance for the assessment of sleep disturbance. The NPI recommends a maximum noise level assessment to assess the potential for sleep disturbance impacts which include awakenings and disturbance to sleep stages. An initial screening test for the maximum noise levels events should be assessed to the following levels.

- $L_{Aeq(15\ min)}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is greater, and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is greater.

If the screening test indicates there is a potential for sleep disturbance then a detailed maximum noise level assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Specific construction noise management levels

A summary of the construction noise management levels for each identified sensitive receiver type is provided in Table 12.

Table 12 Construction noise management levels

Receiver type	Time of day	Management level (dBA)
Residential	Recommended standard hours	Noise affected: 45[2]
		Highly affected: 75
	Outside recommended standard hours[1]	Day: 40[2]
		Evening: 38
		Night: 35[3]
Commercial	When in use	70 dBA (external)
Educational institutes		45 dBA (internal)
Hospital wards and operating theatres		45 dBA (internal)
Places of worship		45 dBA (internal)
Active recreation areas		65 dBA (external)

Note 1: The *Noise Policy for Industry* (EPA, 2018) defines day, evening and night time periods as:

- Day: the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays.
- Evening: the period from 6pm to 10pm.
- Night: the remaining periods.

– Note 2: Measured background levels during the day were below the minimum background noise level from the *Noise Policy for Industry* (EPA, 2017). The minimum background level of 35 dBA has been used to calculate the noise management levels during the day-time period
– Note 3: Measured background levels during the night were below the minimum background noise level from the *Noise Policy for Industry* (EPA, 2017). The minimum background level of 30 dBA has been used to calculate the noise management levels during the night-time period

Construction vibration

Human comfort

Acceptable vibration levels for human comfort have been set with consideration to *Assessing Vibration: a Technical Guideline* (DEC, 2006) which is based on the guidelines contained in British Standard *BS 6472 – 1992, Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*.

Typically, construction activities generate ground vibration of an intermittent nature. Intermittent vibration is assessed using the vibration dose value. Acceptable values of vibration are presented in Table 13 for sensitive receivers.

Table 13 Human comfort intermittent vibration limits (BS 6472-1992)

Receiver type	Period	Intermittent vibration dose value ($m/s^{1.75}$)	
		Preferred value	Maximum value
Residential	Day (7 am and 10 pm)	0.2	0.4
	Night (10 pm and 7 am)	0.13	0.26
Offices, schools, educational institutes and places of worship	When in use	0.4	0.8

Structural damage to buildings

The effects of transient vibration on structures is considered in *BS 7385 Part 2 – 1993 Evaluation and measurement for vibration in buildings*. The criteria provided in BS 7385 are presented in Table 14.

Table 14 Transient vibration guide values – minimal risk of cosmetic damage (BS 7385-2)

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

Heritage buildings and structures would be assessed using the guide values in Table 14. A heritage building or structure should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criterion of 2.5 mm/s peak component particle velocity (from DIN 4150) should be considered.

Construction traffic

The *Road Noise Policy* (RNP) (DECCW, 2011) provides road traffic noise criteria for residential land uses affected by construction traffic on the public road network.

The *Road Noise Policy application notes* state that any increase in the total noise level at existing residences and other sensitive land uses affected by traffic generation on existing

roads should be limited to two dBA above current levels. This limit only applies when the noise level without the development is within two dBA or exceeds the road traffic noise criterion provided in the RNP.

Where construction traffic increases the existing road traffic noise levels by more than two dBA then further assessment against the road traffic noise criteria in Table 15 is required.

Table 15 Roads traffic noise criteria

Type of development	Day 7am to 10pm	Night 10pm to 7am
Existing residence affected by additional traffic on arterial roads generated by land use developments	60 $L_{Aeq(15\ hour)}$	55 $L_{Aeq(9\ hour)}$
Existing residence affected by additional traffic on local roads generated by land use developments	55 $L_{Aeq(1\ hour)}$	50 $L_{Aeq(1\ hour)}$

Operational noise

Operational noise is assessed in accordance with the *Rail Infrastructure Noise Guideline* (RING) (EPA, 2013). The RING refers to the *NSW Industrial Noise Policy* (INP) (EPA, 2000) for the assessment of fixed facilities including railway stations. The INP has since been superseded by the *Noise Policy for Industry* (NPI) (EPA, 2017).

Operational noise is assessed in accordance with the *Noise Policy for Industry* (NPI) (EPA, 2017). The NPI addresses noise emanating from fixed facilities through assessing its intrusiveness based on the rating background noise level, and is presented below in Table 16.

Table 16 NPI Noise intrusiveness criteria

Time of day	RBL ($L_{A90,15min}$), dBA	Intrusiveness trigger level
7am-6pm (daytime)	35	40 (RBL + 5 dB)
6pm-10pm (evening)	33	38 (RBL + 5 dB)
10pm-7am (night time)	30	35 (RBL + 5 dB)

Table 17 outlines the recommended amenity noise levels for different land uses for operational noise.

Table 17 Operational noise - amenity noise levels

Receiver	Noise amenity area	Time of day	L_{Aeq}, dBA
Residential	Suburban	Day	55
		Evening	45
		Night	40

Receiver	Noise amenity area	Time of day	L_{Aeq}, dBA
Commercial	All	When in use	65
Industrial	All	When in use	70
Educational	All	Noisiest 1 hour	35 (internal)
Hospital/Medical	All	When in use	35 (internal) 50 (external)
Place of Worship	All	When in use	40 (internal)
Passive recreation	All	When in use	50
Active recreation	All	When in use	55

6.3.3 Potential impacts

a) Construction phase

Construction noise

A number of construction noise scenarios were considered as part of the construction noise and vibration assessment. A summary of these scenarios is provided in Table 18.

Table 18 Construction scenarios

Construction scenario	Construction phase	Time frame
CS01	Site establishment and relocation of services	Standard hours OOHW Period 1 OOHW Period 2
CS02	Vegetation	Standard hours
CS03	Piling works	Standard hours
CS04	Stairs and lift upgrades	Standard hours OOHW Period 1 OOHW Period 2
CS05	Station fit out and systems	Standard hours OOHW Period 1 OOHW Period 2
CS06	Platform level works	Standard hours OOHW Period 1 OOHW Period 2

Construction scenario	Construction phase	Time frame
CS07	Construction compound	Standard hours OOHW Period 1 OOHW Period 2
CS08	Car park works	Standard hours OOHW Period 1 OOHW Period 2

Exceedances of the construction noise management levels are typical for construction projects of this scale. The noise impacts would be limited to the construction period only and would not have lasting effects on the community. The maximum noise impacts would be expected during works at the platform level involving the use of a concrete saw.

Impacts during standard hours

Residences located within 400 metres of the Proposal site are expected to be noise impacted at some point during construction. The noise management level is predicted to be exceeded by up to 21 dBA due to the low background noise levels and the receiver's proximity to the proposed construction. The CNVS considers this level of exceedance as 'highly intrusive' and the additional mitigation measures discussed in Section 6.3.4 should be implemented at the affected receivers.

Construction noise impact zones for typical (CS02) and worst-case (CS06) construction activities are provided in Figure 21 and Figure 22. The figures also show the worst affected receivers for all construction scenarios.

Construction noise contours for all modelled scenarios are provided in the NVIA prepared by GHD (GHD, 2018c).

Impacts outside standard hours

Works outside standard construction hours are expected during rail possessions to complete installation works for the lift, stair rails, roofing and anti-throw screens. Works during the rail possession have been assessed for all modelled scenarios during the day, evening and night-time assessment periods. The rail possessions would be required to limit the effect on normal rail operations and to improve worker safety.

Residences located within 1200 metres of the Proposal are expected to experience noise impacts during construction. These impacts would be over a short term period and limited to the proposed rail possession periods (weekend closures). Five rail possessions are anticipated to complete the proposed construction.

The noise management levels are predicted to be exceeded by up to 42 dBA (OOHW Period 1, day), 45 dBA (OOHW Period 1, evening) and 47 dB(A) (OOHW Period 2, night) during works outside of standard hours.

The CNVS considers these level of exceedances as 'highly intrusive' and the additional mitigation measures discussed in Section 6.1.2 should be implemented at the affected receivers.

Construction noise impact zones for typical (CS04) and worst-case (CS06) construction activities are provided in Figure 23 and Figure 24 for construction activities during OOHW period 2 (night). The figures also show the worst affected receivers for all construction scenarios.

Construction noise contours for all modelled scenarios are provided in the NVIA prepared by GHD (GHD, 2018c).

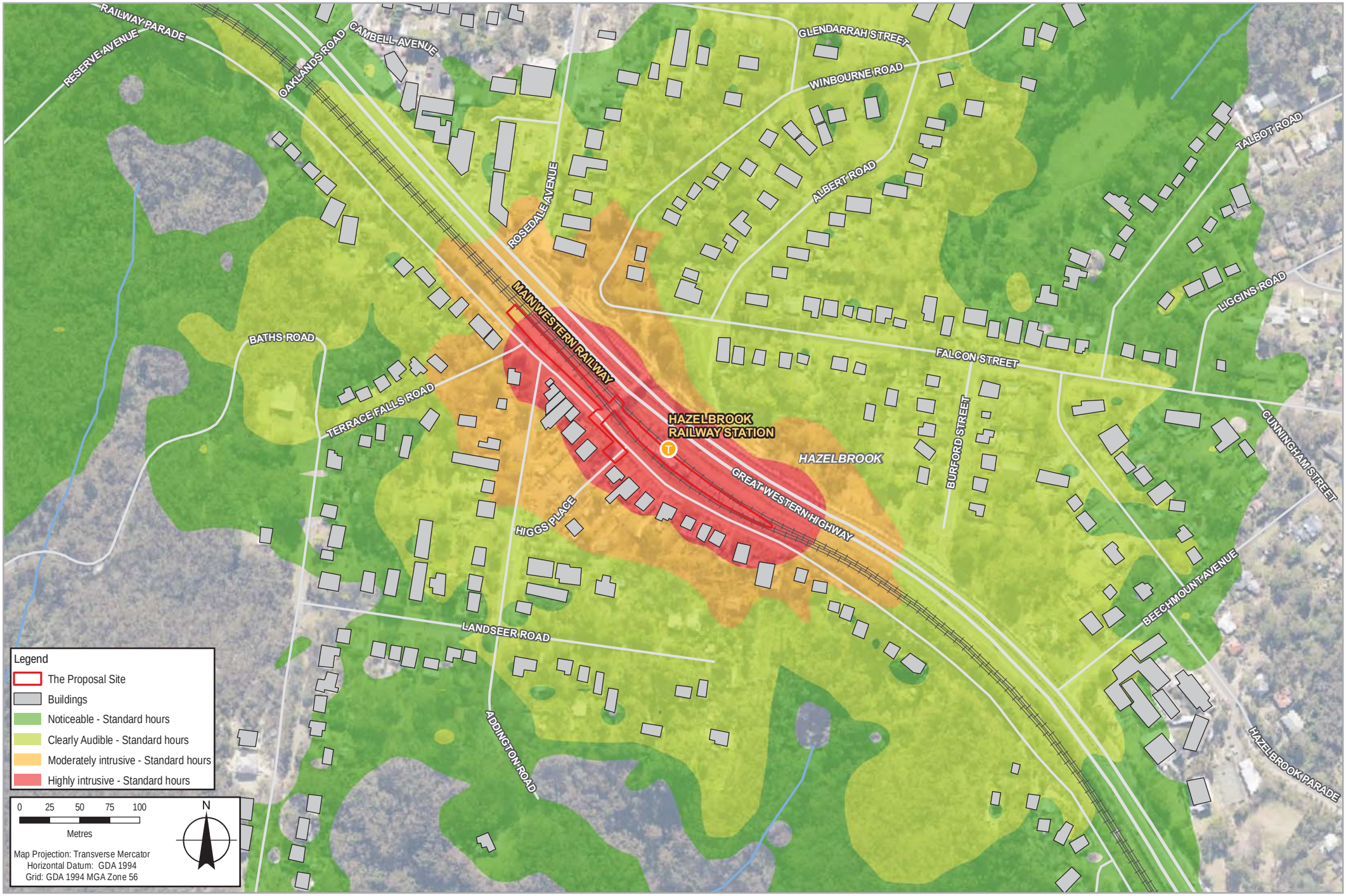


Figure 21: Construction noise impact zones (typical)

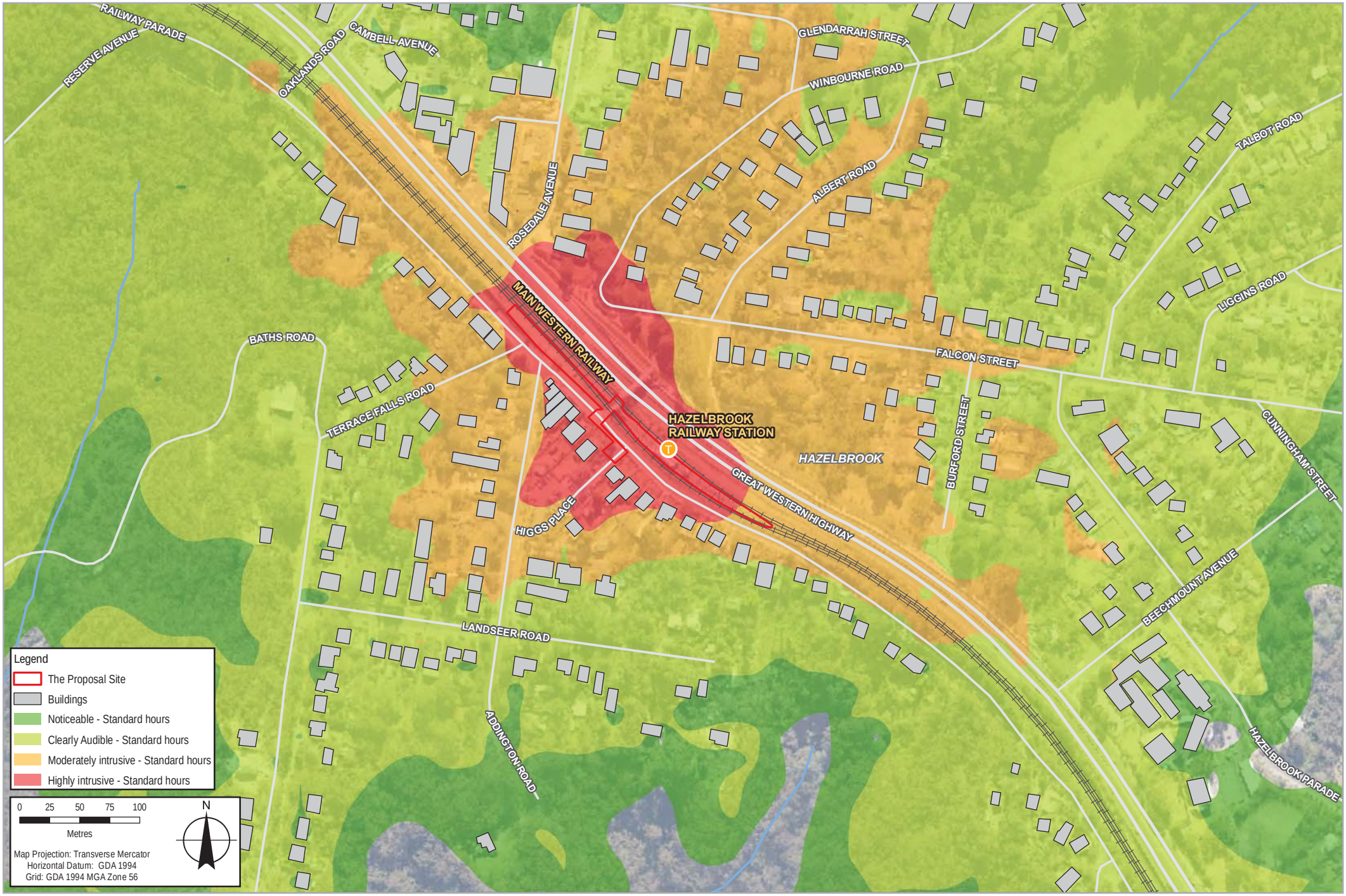


Figure 22: Construction noise impact zones (worst-case)

Figure 23: Construction noise impact zones for OOHW (typical)

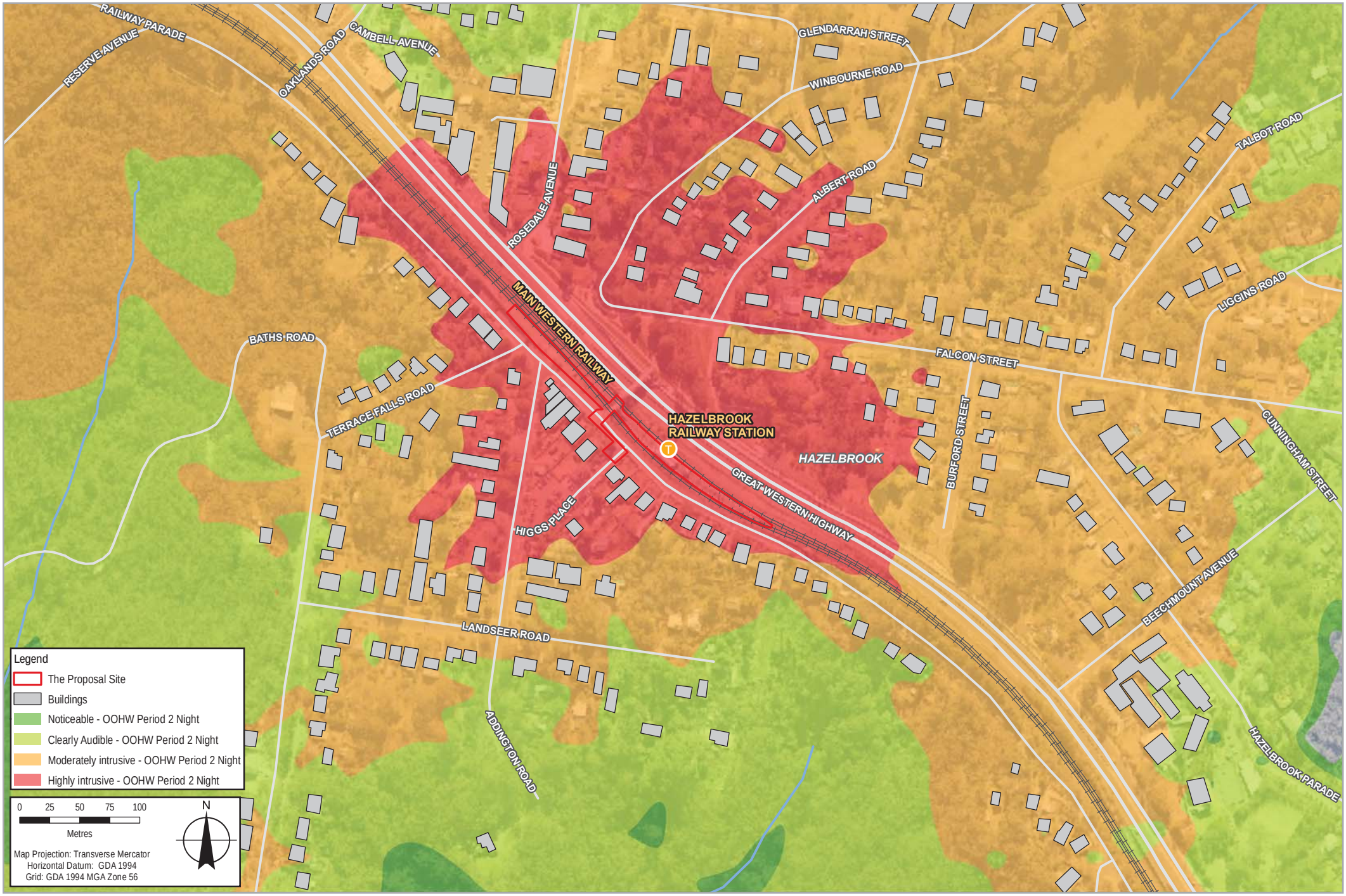


Figure 24: Construction noise impact zones OOHW (worst case)

Sleep disturbance impacts

Construction activities are expected outside standard construction hours to minimise the impacts on the rail network during construction. The sleep disturbance screening criteria of 52 dBA is predicted to be exceeded at 105 residential receivers. Therefore a detailed maximum noise level assessment has been undertaken. The RNP states that maximum internal noise levels between 50 to 55 dBA are unlikely to awaken people from sleep. Using a conservative assessment where windows are assumed to be partially opened, a 10dBA reduction is applied.

Based on this assessment 27 receivers would potentially experience sleep disturbance impacts. The exceedances would be limited to during construction scenarios CS05 (station fit out and systems) and CS06 (Platform level works). The details of these receivers where exceedances are found are outlined in the NVIA prepared by GHD (GHD, 2018c). These impacts would be minimised with the implementation of mitigation measures which included scheduling noisier activities outside the sensitive parts of the night time period.

Construction traffic

Construction traffic movements would be limited to along the Great Western Highway and Railway Parade which have significant existing traffic flows. A significant increase in traffic volume would be needed in order to increase road traffic noise by two dBA (a doubling in traffic corresponds to about a three dBA increase). The construction traffic increase is not considered likely to result in a doubling of traffic and therefore noise increase would be less than two dBA and further assessment of construction traffic noise is not required.

Construction vibration

The CNVS specifies a safe working buffer distance of 22 metres for standard structures. The following standard structures, which are commercial receivers, have been identified within 22 metres of the construction area:

- 35 – 53 Railway Parade
- 8 Addington Road.

The following residential structures have been identified within 100 m of the construction activities and could potentially experience human comfort impacts:

- 32 – 54 Railway Parade
- 1 – 19 Addington Road
- 3 Winbourne Road.

Impacts on these properties would be minimised through the implementation of mitigation measures outlined in Table 25 in Section 7.2.

Impacts for heritage structures

The CNVS provides specific criteria for heritage structural damage criteria. The safe working buffer distance of 44 metres should apply for heritage listed structures in the vicinity of the Proposal based on the use of an 18-34 tonne excavator. Heritage structures within the safe working buffer are listed in Table 19.

Table 19 Heritage listed structures

Heritage item	Address	Approximate distance from Proposal site
H004: The Willows	15 Addington Road	40 m
H007: Hazelbrook Railway Station	Within Proposal site	N/A
H008: Railway Parade Group	46, 47, 49, 51 Railway Parade	20 m
H009: Selwood House and Grounds	41 Railway Parade	20 m
H014: Edition and Shop	33-34 Railway Parade	40 m
H015: Store	35 Railway Parade	20 m
H016: Commercial Group of Buildings	37, 38, 39 Railway Parade	20 m
H020: Budgeecumbah	17-19 Addington Road	40 m
Masonry Retaining Wall	Great Western Highway, north side east of Falcon Street	35 m

A building dilapidation survey is required if an excavator is used within 44 metres of the structures listed in Table 19.

If the building dilapidation survey indicates the heritage buildings are structurally unsound, then the conservative vibration criteria of 3 mm/s provided by DIN 4150-3 should be used. Otherwise the vibration criteria provided by BS 7385 should apply.

Vibration impacts to heritage structures may be reduced by using smaller equipment or alternative work methods.

Impacts on heritage listed structures would be minimised through the implementation of mitigation measures outlined in Table 25 in Section 7.2.

Operational phase

The proposed station upgrades would not increase the operations of the rail line and there would be no increase from the rail noise of Hazelbrook station due to the operation of the station upgrades. All other operational noise impacts from the station (lift, plant, PA systems) are not expected to increase noise levels past the operational noise criteria.

6.3.4 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, 2018a).

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

Noise management zones have been calculated for each construction stage showing the recommended additional mitigation measure for each time period. Noise management zones are shown for levels that are moderately intrusive and highly intrusive for distances up to one kilometre from the site as it is assumed distances greater than this would not be feasible or reasonable to implement in practice (GHD, 2018c).

The CNVMP would also be supported by the Community Liaison Plan to be prepared for the Proposal, which would detail community notification requirements.

Refer to Table 25 in Section for a full list of proposed mitigation measures as per the TfNSW Construction Noise and Vibration Strategy (TfNSW, 2018a). All mitigation measures are to be incorporated into the CEMP.

Additional noise mitigation measures

The CNVS provides the following information regarding further mitigation measures for certain receivers exceeding noise management levels, these are outlined in Table 6-2 of the NVIA prepared by GHD (GHD, 2018c).

The CNVS outlines the various trigger levels to warrant these mitigation measures, and such is presented below in Table 20.

The predicted noise levels for each receiver, and hence any additional noise mitigation measures, are presented in Appendix B of the NVIA prepared by GHD (GHD, 2018c).

Table 20 Triggers for Additional Mitigation Measures - Airborne Noise

Construction hours	Receiver perception	dBA above RBL	dBA above NML	Additional management measures
Standard hours Monday – Friday (7am-6pm) Saturday (8am-1pm)	Noticeable	5 to 10	0	-
	Clearly audible	> 10 to 20	< 10	-
	Moderately intrusive	> 20 to 30	> 10 to 20	PN, V
	Highly intrusive	> 30	> 30	PN, V
	75 dBA or greater	N/A	N/A	PN, V, SN
OOHW Period 1 Monday – Friday (6pm-10pm)	Noticeable	0 to 10	< 5	-
	Clearly audible	> 10 to 20	5 to 15	PN

Construction hours	Receiver perception	dBA above RBL	dBA above NML	Additional management measures
Saturday (7am-8am, 1pm-10pm) Sunday/PH (8am-6pm)	Moderately intrusive	> 20 to 30	> 15 to 25	PN, V, SN, RO
	Highly intrusive	> 30	> 25	PN, V, SN, RO, RP[1], DR[1]
OOHW Period 2 Monday – Saturday (12am-7am, 10pm-12am) Sunday/PH (12am-8am, 6pm-12am)	Noticeable	0 to 10	< 5	PN
	Clearly audible	> 10 to 20	5 to 15	PN, V
	Moderately intrusive	> 20 to 30	> 15 to 25	PN, V, SN, RP, DR
	Highly intrusive	> 30	> 25	PN, V, SN, AA, RP, DR

Note 1: Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only.
Note 2: PN = Periodic Notification, V =verification monitoring, SN = specific notification, RO = respite offer, AA = alternative accommodation, AC = alternative construction methodology, RP = respite period, DR = duration reduction. A more detailed description of the additional management measures mentioned above are located TfNSW CNS.

Construction vibration

Where construction is required within the safe working buffer distance alternative work methods are required, such as smaller equipment should be considered. If no alternative work method is feasible or reasonable, then compliance vibration monitoring should be undertaken where works are required within the safe working buffer distance and include:

- Site tests to review of the measured frequency content to determine the structural damage criteria as per Table 14 for standard dwellings.
- Continuous vibration monitoring with a visual alarm installed to warn the equipment operator when the structural damage vibration criteria (considering frequency content) is exceeded.

These mitigation measures pertain to the structures identified within the safe working buffer distance as outlined in Section 6.3.3.

6.4 Indigenous heritage

6.4.1 Existing environment

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 4 October 2018 covering a one kilometre radius around Hazelbrook Station. The closest Aboriginal site identified was in excess of 800 metres away and therefore 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 the archaeological potential of the areas is low. Therefore it was not considered necessary to undertake specific Aboriginal consultation or archaeological field survey.

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:

- foundations and pits for the new lift shaft would require excavation into soils/fill and shale rock up to a depth of around three metres
- regrading of the footpath and pedestrian crossing.
- 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 and no high risk landscape features are located at or near the Proposal site, the potential for unknown items to be present is considered to be low. As such, the Proposal is unlikely to impact 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

Mitigation of Indigenous heritage impacts is not expected to be required as no known Indigenous heritage items or high risk landscape features have been identified near the Proposal area. Mitigation would therefore be limited to the management of any unknown impacts to non-Indigenous heritage through worker inductions and protocols for unexpected finds.

Refer to Table 25 for a list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.5 Non-Indigenous heritage

The Hazelbrook Railway Station Accessibility Upgrade Statement of Heritage Impact was prepared by Extent Heritage for Transport for NSW in October 2018 (Extent Heritage, 2018). The assessment included a desktop assessment and a site inspection. The findings of the assessment are summarised in this section.

6.5.1 Existing environment

Previously identified heritage items located in and around the Proposal area were identified through a search of heritage registers including the

- National Heritage List
- Commonwealth Heritage List
- State Heritage Register
- State Heritage Inventory
- RailCorp Section 170 Heritage and Conservation Register
- Blue Mountains LEP 2015 (heritage schedules).

Heritage items located within the Proposal site or in the vicinity of the Proposal are listed in Table 21 and are shown in Figure 25.

Table 21 Heritage items/areas within the vicinity of the proposed works

Heritage item	Address	LEP listing	Section 170 listing
Hazelbrook Railway Station Group	Railway Parade, Hazelbrook	H007	4801914
Railway Parade Group	46, 47, 49 and 51 Railway Parade	H026	N/A
Ortona	46 Railway Parade	H023	N/A
Selwood House and grounds	4 Addington Road and 41 Railway Parade	H009	N/A
Commercial Group of buildings	37, 38 and 39 Railway Parade	H016	N/A
Store	35 Railway Parade	H015	N/A
Railway Parade Conservation Area	N/A	H008	N/A

Non-Indigenous heritage

Figure 25 Heritage items

Figure 25: Heritage items

Hazelbrook Railway Station Group

The Hazelbrook Railway Station Group consists of the station building, lamp room, platform and overbridge; and landscaping.

Hazelbrook Railway Station Group is of local significance as part of the early construction phase of railway line duplication on the upper Blue Mountains demonstrating the technological and engineering achievements in railway construction at the beginning of the 1900s.

Station building

The island platform station building, built in 1902 is constructed of face brickwork with corrugated metal gabled roof extending as awnings to both platforms. Some windows and doors have been covered with metal grilles for security purposes. A number of fanlights have been fitted with window-mounted air conditioner units. There are some areas in the brickwork that require some repointing and exhibit typical signs of wear and tear expected as an operational railway station, however generally the condition of the building is good.

Internally, the station has retained a number of its original detailing and finishes despite more recent 20th century operational upgrades. The original floor layout including a waiting room, booking office and ladies room are still present.

Lamp room

The Lamp Room, also built in 1902 is a small square building located further south of the platform from the main building. It is face brick and features similar moulded string course detailing to the main station building. There is no opening on the northern elevation of the building. It is currently being used as a store room, and incorrectly identified in the State Heritage Inventory as an Out-of Shed.

Platform and overhead footbridge

The island platform curves towards the northeast at the south end of the platform. The platform is concrete faced with concrete deck and asphalt finish. It has been previously extended. Garden beds are present along the length of the platform planted with shrubs and a number of mature trees. The platform also features modern light fittings, timber bench seating, modern signage and aluminium palisade fencing located at both ends of the platform.

The overhead pedestrian footbridge, built in 1980, provides overhead access across the rail corridor between the Great Western Highway to the north, and Railway Parade to the south. The bridge is constructed of steel beams on steel columns supporting a concrete deck. There is a brick abutment on one end. The stairs leading down to the platforms feature metal balustrades while the bridge is secured by wire mesh and pipe balustrade.

Station Landscaping

The station precinct has an established formal landscape that contributes to the precinct's visual and contextual aesthetic. The historic photographs show that the station platform has featured platform gardens since the island platform was constructed in 1902. They occupied the same position along the centre of the platform, but originally appeared to have no edging.

The photographic evidence shows that while the original outline of the garden beds are in place, the plantings and style of edging changed according to trends and perhaps availabilities at the time. The current plantings themselves are not original but do compliment the highly landscaped setting of the station group and the strong character of vegetated landscapes of the local Blue Mountains area.

There are no historic style lamps, lighting and platform furniture remaining on the platform at Hazelbrook Station.

Views and setting

Hazelbrook Station is set within the commercial and public centre of the suburb of Hazelbrook. The southern edge of the station along Railway Parade comprises residential suburban developments with a few shops near the station entrance. Railway Parade is topographically higher than the Great Western Highway, as a result views from the island platform include rocky outcrops with a partial view of houses along Railway Parade.

Views of the Great Western Highway are at the same level as the Platform. The station is visible from the Great Western Highway with the footbridge, known as Campbell Bridge forming a backdrop to the station. From Railway Parade there are very clear views of the station buildings and platform. The footbridge connects the two sides of the suburb over the station and across the Great Western Highway. It is accessible at road level along Railway Parade with a ramp and a staircase leading down to the footpath along the Great Western Highway.

6.5.2 Potential impacts

a) Construction phase

Hazelbrook Railway Station Group

The objectives of the Proposal are to improve the amenity and accessibility at Hazelbrook Station through a range of upgrade works; some of which have the potential to directly impact existing heritage elements of the station. Others, like the addition of a new lift, canopies and anti-throw screens may alter the visual environment thereby potentially having an indirect impact to the station and other heritage items/conservation areas.

Lift, awnings and lift landing

Whilst the proposed installation of a lift would result in changes to the station, the location of the lift on the platform at some distance from the station buildings, reduces the overall impact upon the station buildings and their immediate setting.

The lift shaft will affect views to and from the station as it will extend above the footbridge and will be an additional feature in views to the station from Railway Parade. It will be most noticeable from the southern section of Railway Parade, as the vertical nature of the lift shaft and its height will be most visible from residences along this part of the road and will interrupt views to the established horizon.

The new curved anti- throw screens to the new lift landing will also be visible from Railway Parade and will stand out in terms of the more rectilinear language of the existing station elements including the existing screens to the footbridge.

While the lift and new lift landing with new curved anti-throw screens, will be visible from the Great Western Highway, and the shared path along the Highway, its impact on viewers in the fast-moving vehicular traffic and transitional pedestrian traffic will be low.

Despite these impacts it should be noted that the installation of the lift adapts the station to current and compliant DDA standards, ensuring equitable access.

Railway Parade/Great Western Highway

Works around the station include:

- modification to existing levels within the existing commuter carpark, Railway Parade pedestrian crossing (including new road humps) and footbridge to provide DDA compliant parking and pedestrian routes
- relocation of existing bike storage within the existing commuter car park
- new footpath from the existing commuter car park to the existing pedestrian crossing on the southern side of Railway Parade
- new 2.1 metre high palisade style rail corridor fencing 50 metres past either end of the station platforms

The upgrades to the commuter carpark, the pedestrian crossing, and footbridge would enhance the accessibility of the station precinct. All the elements form part of the railway precinct but are all recent additions, and therefore these proposed works would not impact any significant fabric.

The resurfacing of the footbridge would match existing patterns and colours. The bike storage is not part of original or early fabric, therefore its relocation would not impact the railway precinct.

New footpaths would improve access to the station and no significant fabric would be affected by the works.

The fencing is not original or early fabric and therefore its replacement would not impact the railway precinct. Moreover, the proposed fencing is a palisade fence which matches the existing fence and is in keeping with the Federation period station buildings. The visual impact of the fence will be noticeable along Railway Parade, more so to the southern section overlooking the station. The new fence will be more prominent, less transparent and will create a perceived visual barrier between the road the station.

Platform works

Works along the station platform include the modification of the existing station building layout to allow for a new amenities and storage room. The platform would also be resurfaced to provide DDA compliant pedestrian routes between new lifts, station building and station entry/exit. A new canopy over the family accessible toilet in the station building is also proposed.

The conversion of the existing store room to an accessible toilet would involve partial modification to a small section of the floor of the existing store room. This work is considered minor in nature.

The construction of the family accessible toilet would involve lowering the existing floor. As the floor has been modified previously to accommodate the existing male toilet, there is little original fabric remaining. The tiles, flooring, fixtures and partitions to the existing male toilets are all recent introductions, therefore their removal and replacement with an accessible toilet and associated fixtures would not impact any significant fabric.

The installation of the new glass canopy over the family accessible toilet entrance is in accordance with *Design Guidelines for Heritage Stations: Canopies and Shelters* (*Sydney Trains,* 2016). These Guidelines identify steel as the common structural material used for new canopies, with glass being increasingly used for roofing of the canopies. The glass canopy would be supported on steel posts, beam and outriggers and not attached directly to the

station building. The design detailing of the canopy is sympathetic to the station building in that it would be placed behind the bargeboard of the gable end of the building. This would reduce the overall impact on the external façade of the building. The low (five degree) pitch of the canopy would also lessen the visual bulk of the canopy.

The conversion of the existing women's toilet into a communications room would involve the removal of significant movable fabric notably the 1902 women's waiting room seat. However, as this is movable fabric its conservation at an alternative location is possible. Therefore the removal of the seat and other recent fabric including the toilet fixtures and finishes would not impact the overall significance of the station building.

The proposed fire-rating lining to the internal walls and ceiling will impact the existing original fabric of the walls, the ripple iron ceilings, ceiling rose and joinery. However, as details of these works are not provided it is difficult to assess the full impact on the original fabric.

The regrading of the platform surfaces is required for DDA compliance, and as the surfaces of the platforms have been resurfaced previously, there would be minimal impact on any significant fabric. The concept design for the proposed regrading indicates clearances which would be maintained from the Station building and the garden bed, so as to mitigate impact on these items. The stairs are not original or early fabric and the upgrades proposed would ensure the stairs are DDA complaint.

Landscaping

The Proposal would require removal of existing plants and gardens within and surrounding the station.

The planter box to be removed is not considered significant but as complementing the setting of the station. The planter to be removed would be replaced by another planter further east along the platform. Therefore, its removal would not detract from the setting, more so as there are other planters on the platform.

Ancillary works

Installation of smoke alarms, hearing loops, warning indicators and establishment of site compounds would result in negligible impacts to heritage fabric and will improve the user experience, safety and accessibility at the station.

Visual impacts

The Proposal would create a new vertical element associated with the lift structure. However as the location of the lift is limited to the side of the station group which has the more recent footbridge, this would help ensure that views to the original station buildings and platform are not impaired.

While the lift would be visible from Railway Parade and the Great Western Highway, its contemporary and simple design with a largely transparent glass body would reduce its visual impacts when viewed from the surroundings. The use of the brick base for the lift shaft is a sympathetic response to the exposed brick station buildings. However, the 11 metre high lift will affect views to and from the station. The top of the lift shaft will be approximately six metres higher than the footbridge (from pavement level) and will be an additional feature in views to the station from Railway Parade.

The new curved anti- throw screens to the new lift landing will also be visible from Railway Parade. Overall the lift and extended landing will have a considerable but not adverse impact on the surroundings. The installation of a glass canopy to the family accessible toilet entrance

would have minimal impact on the station building, as a result of the sensitive detailing of the canopy, its joinery with the building fabric and its overall bulk minimised.

Heritage items in the vicinity

There would be no impacts to heritage items located in the vicinity as listed in Table 21. The proposed works would not have any substantive impact upon the heritage significance of the Railway Parade Conservation Area.

Degree of impacts

The assessment of the degree of impacts to the Hazelbrook Railway Station Group has been modelled on *ICOMOS Guidance on Heritage Impact Assessments for Cultural Work Heritage Properties*. The guide for assessing magnitude of impact to built heritage and historic urban landscapes are summarised in Table 22. Overall, the proposed works would have a number of minor impacts on the heritage significance of Hazelbrook Railway Station Group. These impacts are summarised in Table 23. None of these minor impacts are of a substantive nature and they are balanced by the social equity value of the outcomes.

Table 22 Guide for assessing magnitude of impact to built heritage

Impact Grading	Built heritage or Historic Urban Landscape attributes
Major	Change to key historic building elements that contribute to OUV, such that the resource is totally altered. Comprehensive changes to the setting.
Moderate	Changes to many key historic building elements, such that the resource is significantly modified. Changes to the setting of an historic building, such that it is significantly modified.
Minor	Change to key historic building elements, such that the asset is slightly different. Change to setting of an historic building, such that it is noticeably changed.
Negligible	Slight changes to historic building elements or setting that hardly affect it.
No Change	No change to fabric or setting.

Table 23 Summary of impacts at Hazelbrook Railway Station Group

Component	Grading of significance	Degree of impact to heritage fabric
Station building	High	Potential moderate impact to internal original fabric including walls, ripple iron ceiling, ceiling rose and joinery to the women's waiting room as a result of proposed fire-proofing. The bulk, detailing and joinery of glass canopy is sensitive to station building fabric and façade, and is therefore considered to have minor impact.
Lamp room	High	No change

Component	Grading of significance	Degree of impact to heritage fabric
Platforms	Moderate	Moderate impact to small section of concrete slab affected by lift installation as impact is to 1902 platform fabric; Minor impact to platform surfaces as these have been resurfaced before
Overhead footbridge	Moderate	Minor impact – the lift landing would be an extension to the footbridge and would change its setting noticeably; Negligible impact – protection screens are recent fabric therefore removal would not impact the overall historic fabric and setting of the station.
Landscaping - gardens	Moderate	Negligible impact – the planter complements the setting of the station and its removal would hardly affect the overall setting of the platform.
Landscaping – lights and furniture	Moderate	Negligible impact to lighting Minor impact in terms of removal of bench as it would involve removal of original fabric but the change would not be noticeable in terms of the station buildings or overall setting of station.
Landscaping – fencing	Low	Negligible impact – the new fencing to be used would be a palisade fence that matches the existing fence, therefore the overall setting of the station would be not be affected. Minor impact to station as the fencing is not original or early fabric and therefore its replacement will not impact the railway precinct. Moderate impact to setting around station as the visual impact of the 2.1 metre high fence will be noticeable along Railway Parade, more so to the southern section overlooking the station. The new fence will be more prominent, less transparent and will create a perceived visual barrier between the road and the station.

Archaeological impacts

There would be no archaeological impact associated with the excavation of the platform for the installation of the lift shaft as this section of platform is part of the original 1902 platform and has no archaeological potential. However, there is possible archaeological potential to the north-east and south-west platform extensions as these sections were added on during the 1940s.

a) Operational phase

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

6.5.3 Mitigation measures

The detailed design of the proposed works must consider various heritage guidelines such as Sydney Trains *Heritage Technical Note: Installation of New Electrical and Data Services at Heritage Sites* and TfNSW *Managing Heritage in Rail Projects Urban Design Guideline*.

A heritage architect should be engaged for the detailed design process and to inform the detailed design recommendations. Specifically:

- The heritage architect should advise on the materials and finishes palette
- The heritage architect should advise on the fireproofing of the proposed SSER so as to mitigate the impacts of proposed works on the original fabric of the women's waiting room. The original ripple ceiling and ceiling rose should be removed and reinstated for fireproofing of the ceiling. Care should also be taken to ensure that fireproof lining to the walls in designed in a manner that has least impact on the fabric of walls
- The heritage architect should advise on the design of the curved anti-throw screen to the lift landing
- Consideration should be given to the preparation of Heritage Interpretation Plan which specifically addresses the history and significance of the women's waiting room
- A Photographic Archival Recording documenting the Station precinct and its significant built and landscape environment should be undertaken. In order to record the changes that the Station will undergo, recording should include before, during and after works photography.

Construction

- Prior to the commencement of works, contractors must be briefed on the heritage sensitive nature of the site and informed of any recommended mitigation measures or controls required. Any accidental damage to a heritage item is to be treated as an incident, with appropriate recording and notification followed as per the CEMP
- Potential impacts to non-Indigenous heritage during construction would be managed through the implementation of the CEMP prepared by the Contractor that would map and protect nearby non-Indigenous heritage items and prescribe management measures to ensure these items are not affected
- If archaeological deposits are uncovered during development, work would cease in the vicinity of the find and procedures in the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2015a) would be followed. The TfNSW Project Manager and TfNSW Environment and Planning Manager would be notified immediately to assist in co-ordinating next steps which would be likely to involve consultation with an archaeologist and OEH. Further archaeological work and/or consents would be obtained for archaeological deposits prior to works recommencing at the location, where required

- The removal of the women's waiting room seat should be documented and as it is classified as movable heritage, arrangements should be made to relocate it or store it in a Sydney Trains moveable heritage storage facility
- On completion of works, an update would be prepared for the Section 170 Heritage and Conservation Register.

6.6 Socio-economic impacts

6.6.1 Existing environment

Hazelbrook is a village located within the Blue Mountains, which is a major tourism destination in NSW. To the northwest of Hazelbrook Station, beyond the Great Western Highway, there is a mixture of commercial properties with a Shopping Centre (off Rosedale Avenue) and Service Station. Immediately west and south of the station there is a mixture of commercial properties and residential housing.

In 2016, the Blue Mountains area received nearly 2.9 million domestic daytrip visitors (Destination NSW, 2018). The largest proportion of trips were for holiday purposes (65 per cent). This was followed by visits to friends and relatives (26 per cent) and business (six per cent).

A review of the 2016 Australian Bureau of Statistics (ABS) Census data was undertaken for Hazelbrook. Hazelbrook had a population of 4,974 people with a relatively even age distribution.

The need for assistance as a result of a disability was reported by 5.4 per cent of residents within Hazelbrook. This is slightly lower than the wider Blue Mountains LGA of which 5.8 per cent of the population require assistance.

The population of Hazelbrook is heavily dependent on private vehicles as the primary mode of travel to work with 68.1 per cent of the population being the driver or passenger. About 12 per cent of the population utilised public transport to travel to work, with 8.2 per cent (of the total population) utilising trains. While car usage is considered high, use of cars to work for Hazelbrook is similar to the NSW and Australian averages and the Blue Mountains LGA percentage of 66.9 per cent. The use of vehicles is reflected in the 92.9 per cent of the population that own at least one vehicle which is slightly higher than the NSW average and the Blue Mountains LGA average of 90.9 per cent.

6.6.2 Potential impacts

b) Construction phase

The Proposal has the potential to temporarily impact customers, pedestrians and the surrounding community as a result of:

- temporary changes to bicycle and pedestrian access to and around the station (i.e. including along platforms)
- temporary impacts to local traffic movements
- increased truck movements delivering materials and equipment and transporting waste
- construction amenity impacts such as noise, vibration, dust and visual impacts.

The above impacts on the community are expected to be relatively short term in nature. These impacts would be further reduced as many of the proposed impacts would likely occur during possession periods when movements in the vicinity of the station would be lower as a result of the trains not operating.

The Proposal would not result in any acquisition and would not result in any impacts to any adjacent land uses as works would be located on RailCorp land.

Operational phase

The Proposal would provide positive, long term socio-economic benefits to the broader Hazelbrook community, including:

- improved accessibility for station customers and pedestrians, particularly people with a disability, limited mobility and those with prams or luggage
- improved customer amenity and facilities, including accessible toilets, increase in area within the footbridge to improve flow
- improved access to transport interchange facilities through improved paths to meet DDA requirements
- improved safety for customers on the station platform, including upgrade of station systems including CCTV, emergency help points

The Proposal would improve the overall accessibility of the station. The Proposal would also ensure the station would be able to handle the predicted increase in patronage in 2036.

No adverse impacts are considered to result from the Proposal.

6.6.3 Mitigation measures

Potential impacts on the community would be managed through ensuring that access to, from and around the station would be maintained at all times, albeit with potential changes to access. The community would be provided with information of any changes in advance and would also be provided with contact details to make any complaints regarding the construction of the Proposal.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures (including traffic, transport and access measures). All mitigation measures are to be incorporated into the CEMP.

6.7 Biodiversity

An Ecology Assessment of Hazelbrook Station was prepared by GHD in October 2018 (GHD, 2018d). A desktop review of existing information was undertaken prior to the site inspection to identify biodiversity values that may be of relevance to the Proposal. A site inspection was completed by a GHD ecologist on 7 August 2018 to identify vegetation, conservation significance, and habitat. The findings of the assessment are summarised in this section.

6.7.1 Existing environment

The Proposal is located within a highly urbanised and modified landscape. There is no native vegetation present within the Proposal site.

The following planted vegetation occurs within the Proposal site and is shown in Figure 26:

- mown exotic grass within the rail corridor at the proposed substation location
- a planter box containing low shrubs and groundcover on the pedestrian overpass
- a planter box containing planted Camellia species and groundcover on the station platform
- low cover of exotic ferns and grasses on the cutting adjacent to the station

- planted Crepe Myrtle (*Lagerstroemia* sp.) and a large Deodar Cedar (*Cedrus deodara*) located in the grounds of the Selwood House Veterinary Hospital along the fence line adjoining the car park
- a small planted Crepe Myrtle near the entrance to the commuter car park.

Planted trees in landscaped areas (including the large Deodar Cedar in the grounds of the Selwood House Veterinary Hospital) do not provide suitable or important habitat for the threatened fauna that have been previously recorded in the locality. The large Deodar Cedar may provide nesting habitat for a range of common bird species, but would be unsuitable for threatened fauna. Records of threatened fauna from the wider locality are associated with more extensive areas of intact native vegetation associated with regional reserves and riparian corridors.

6.7.2 Potential impacts

a) Construction phase

The Proposal would result in the removal of some planted exotic species in planter boxes and low fern cover on the cutting adjacent to the station for the upgrade of facilities at the station.

A large Deodar Cedar would be retained within the Proposal site, however it may be subject to impacts resulting from works within the Tree Protection Zone (and structural root zone) including regrading works in the carpark and the construction of a retaining wall near the northern fence line. Specific tree protection measures are recommended in Section 6.7.3 for implementation by an arborist during and following the car park upgrade works to minimise the potential for adverse impacts on this tree.

It is possible that removal of a smaller area of vegetation would be required than indicated on Figure 26 on the southern side of the station, dependent on final design and access requirements for machinery. For the purpose of this report, the largest potential impact area has been assessed.

The Proposal would not remove or modify any stands of intact native vegetation or important habitat for common native fauna that may occur at the site on occasion. The small patches of planted trees do not comprise suitable habitat for threatened flora or fauna species and no threatened fauna species would be reliant on these areas for their survival in the locality. Therefore the Proposal would not have a significant impact on any threatened biota listed under the BC Act or the EPBC Act.

Operational phase

The proposed works are located within a highly modified urban landscape and would have very limited impacts on biodiversity values. Impacts during the operational phase on biodiversity would be negligible.

6.7.3 Mitigation measures

The objective is for the protection of an optimal proportion of the Tree Protection Zone (TPZ) of the Deodar Cedar tree located within the veterinary hospital along the fence line adjoining the car park during excavation and levelling activities in the car park. An arborist should be available to assess impacts to the tree during the works by determining the proportion of TPZ loss, supervising and undertaking any root pruning and canopy trimming requirements and to carry out or recommend remedial actions and monitoring, as required.

The removal of individual trees for the Proposal would be offset in accordance with the TfNSW *Vegetation Offset Guide* (TfNSW, 2016) and outlined in

Table 24. Offsets would be implemented once the exact extent of the clearing required and the number of trees to be removed has been confirmed. Under the TfNSW *Vegetation Offset Guide* (TfNSW, 2016), trees are defined as a 'woody plant greater than two metres tall with a single stem or branches above the base'.

Table 24 Offsetting for individual tree removal

Size of tree (Diameter at Breast Height)	Offset required
Large tree (DBH>60cm)	Plant minimum of 8 trees
Medium tree (DBH 15-60cm)	Plant minimum of 4 trees
Small young tree (DBH<5cm)	Plant minimum of 2 trees

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

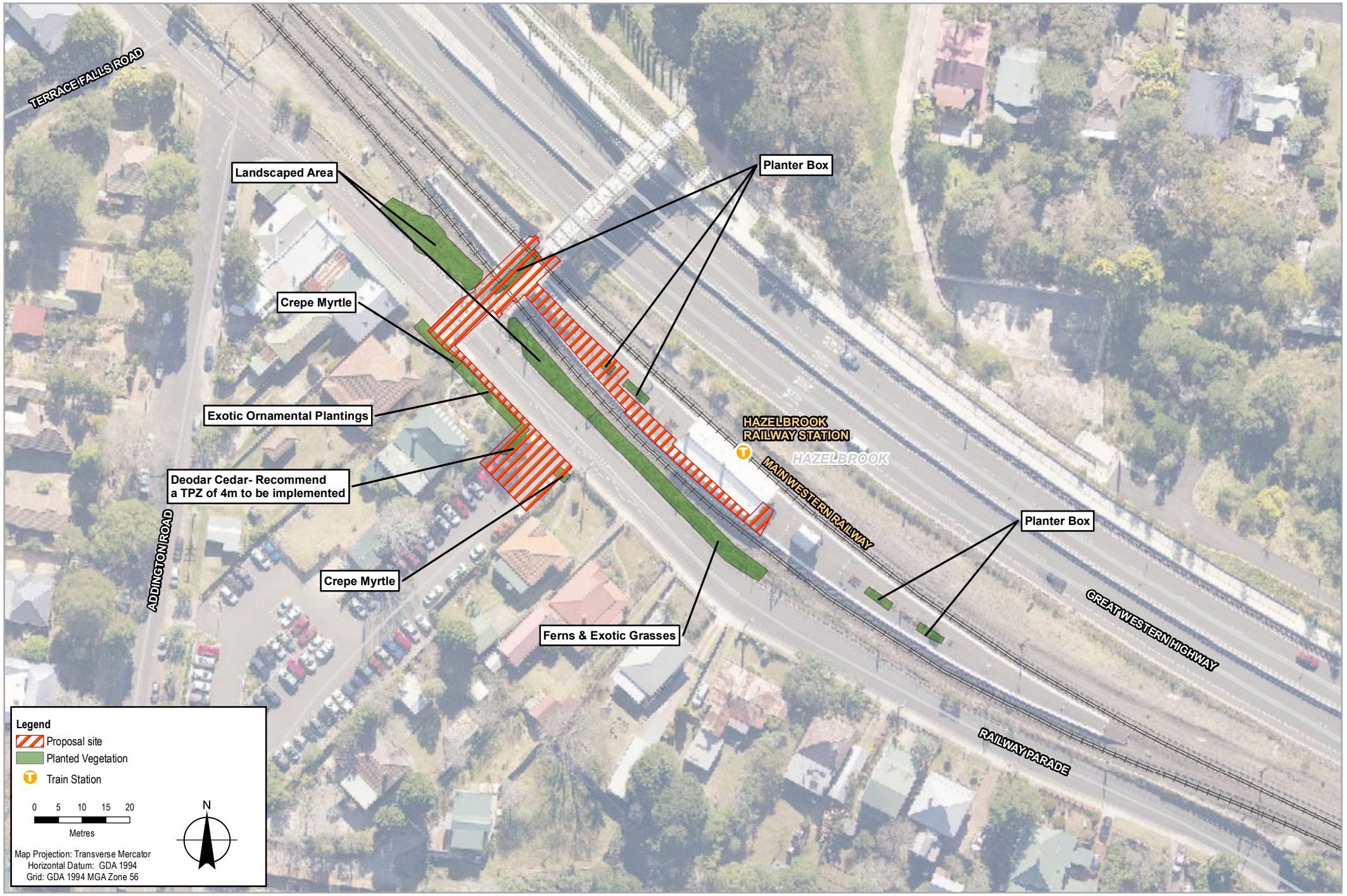


Figure 26: Planted vegetation at Hazelbrook Station

6.8 Contamination, landform, geology and soils

A desktop assessment was undertaken as part of the REF and included a search of Australian Soil Resource Information System, the Environmental Protection Authority contaminated lands register and the Environmental Protection Authority contaminated lands in progress list. A Preliminary Geotechnical Assessment memorandum produced by Beca (September 2018) was also reviewed. The findings of the assessment are summarised in this section.

6.8.1 Existing environment

Landform

Hazelbrook Station has been constructed within a cutting below Railway Parade.

Soils and geology

The published geological series sheet for the area (Katoomba 1:50,000) indicates the site solid geology comprises Hawkesbury Sandstone. Subsurface soil/rock profiles and the general description of materials below the existing platform level likely to be encountered are:

- Platform fill – uncontrolled fill to a depth of around 0.7 – 1.2 metres below the existing platform level
- Bedrock – up to a depth of 1.7 – 2.3 metres below platform level after platform fill material (1.0 – 1.1 metres thick) is expected to comprise Very Low and Low Strength Sandstone and then Medium Strength Sandstone comprising moderately to slightly weathered and slightly fracture rock mass (Beca, September 2018).

A search of the Australian Soil Resource Information System on 4 October 2018 showed the site to be in a built up area with extremely low probability of and very low confidence of acid sulfate soils.

Contamination

The EPA contaminated lands register was searched on 4 October 2018. No identified contaminated lands are located within the village of Hazelbrook. The List of NSW Contaminated Sites Notified to the EPA was also searched (list current at 2 August 2018). The Caltex Service Station located about 385 metres to the North West on the Great Western Highway is listed. Regulation under the *Contaminated Land Management Act 1997* is not required.

Hazelbrook station may contain contaminated materials with the fabric of the existing buildings including:

- asbestos
- lead paint
- polychlorinated biphenyls in light fittings
- synthetic mineral fibres.

There may be contaminated fill present onsite, in particular beneath the hardstand of the platform and within the footprint of the railway corridor. Soils underlying the railway corridor may have also been impacted from previous spills or leaks.

6.8.2 Potential impacts

a) Construction phase

Erosion and sedimentation

The Proposal would require some excavation work for the installation of the lift shaft pits, new footpaths, new extended walkway and lift landing, and associated sign posts. Other trenching or excavation may be required for the relocation of services or vegetation removal.

Excavation and other earthworks such as trenching can result in erosion and sedimentation if not undertaken with appropriate controls. Such impacts can also lead to an adverse effect on water quality and biodiversity through the introduction of sediments into waterways. Erosion and sedimentation risks for the Proposal are considered to be low, as erosion would be adequately managed through the implementation of mitigation measures outlined in Table 25 in Section 7.2.

Contamination

Excavation has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. Contaminants would also pose an environmental risk if they were to enter nearby waterways through the stormwater infrastructure. As there are no confirmed contaminated sites within close proximity of the Proposal site, contamination is not expected to be encountered.

During construction works, there is the potential for soil to become contaminated through accidental chemical or fuel spills and leaks from construction plant and equipment. Such impacts would be managed with the implementation of mitigation measures outlined in Table 25 in Section 7.2.

Prior to works commencing on any existing buildings or structures, a hazardous materials survey for lead paint, asbestos and other potentially hazardous materials would be required.

Operational phase

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

6.8.3 Mitigation measures

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

An environmental risk assessment is to be undertaken prior to construction and must include a section on contamination. Measures to mitigate potential impacts from any contaminated soil/materials during construction would be developed and implemented through an unexpected contamination finds procedure and Waste Management Plan as part of the CEMP.

Prior to works commencing on buildings and structures a hazardous materials survey would be completed. Remediation would be undertaken if identified contamination poses a risk to human health or the environment. All waste would be managed in accordance with relevant legislation.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface water and groundwater

The Proposal site is located on land mapped within the Sydney Drinking Water Catchment. The nearest protected riparian area identified on the riparian lands map under the Blue Mountains LEP is around one kilometre to the east of the Proposal. The nearest water bodies identified by aerial mapping are:

- Woodford Creek about 500 metres to the east of Hazelbrook Station
- unnamed creek about 300 metres to the south west of Hazelbrook Station.

Both creeks are likely to collect stormwater runoff from surrounding green space and roads. Woodford Creek ultimately drain into Bulls Creek about 3.5 kilometres to the north east located within the Blue Mountains National Park.

Surface water in the vicinity of the Proposal site is managed by the Council stormwater drainage system consisting mainly of kerb and gutter drainage connected to an underground pipe network.

A review of the NSW Office of Water groundwater bores on 3 October 2018 identified two groundwater bores within 500 metres of the Proposal site. These did not provide any information on standing water level.

Flooding

According to the flood mapping in the Blue Mountains LEP, no part of the Proposal site is located within a flood prone area. No areas identified as flood prone are within the vicinity of the Proposal site.

6.9.2 Potential impacts

a) Construction phase

Without appropriate safeguards, pollutants (fuel, chemicals or wastewater from accidental spills, and sediment from excavations and stockpiles) could potentially reach nearby stormwater drains and flow into nearby waterways, including waterways that drain to the Blue Mountains National Park and form part of the Sydney Drinking Water Catchment. A Neutral or Beneficial Effect (NorBE) Assessment on water quality has been undertaken for the Proposal and is contained in Appendix D. The assessment found the Proposal to have a neutral effect on water quality.

Activities which disturb soil during construction work have the potential to impact upon local water quality (including waterways that drain to the Blue Mountains National Park) as a result of erosion and run off sedimentation.

Groundwater levels were not determined as part of this assessment, however impacts to groundwater are considered to be unlikely as the majority of works would not require deep excavation. Works such as excavation for lift shafts, while requiring deeper excavations, are still not considered likely to impact on groundwater. Should groundwater be encountered any dewatering activities would be undertaken in line with Transport for NSW's *Water Discharge and Reuse Guideline* (Transport for NSW, 2015b).

With the implementation of mitigation measures outlined Table 25 in Section 7.2, water quality impacts associated with the Proposal are considered to be manageable.

Operational phase

The Proposal is unlikely to substantially change the hydrology of the area surrounding the station. The existing stormwater system would continue to manage surface water around the station.

Further hydrological assessment would be undertaken during detailed design to ensure the Proposal would not be impacted by flooding and would not worsen local flooding patterns.

6.9.3 Mitigation measures

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

Surface water movement around the site would be maintained where possible. Any clean water flows would be diverted around the Proposal to avoid the polluting of these flows.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.10 Air quality

6.10.1 Existing environment

Air quality in and around the Proposal site is considered to be typical of a semi-urban setting. Air quality around the Proposal is influenced by being adjacent to a major road (Great Western Highway) and a rail corridor which is utilised by diesel services. Local air quality is also impacted by vehicles on the surrounding local network. Sensitive receivers in the vicinity of the Proposal site include:

- staff and customers at Hazelbrook Station
- residents to the north and south of the station
- occupants of commercial properties to the south and west of the station
- students, teachers and users of Hazelbrook Public School to the southeast of the station.

The Department of Environment's *National Pollutant Inventory* was searched on 3 October 2018, which showed no polluting facilities exist within the Hazelbrook postcode.

The OEH undertakes air quality monitoring for five key air pollutants as well as providing an hourly and daily regional air quality index. The Blue Mountains LGA is located adjacent to the Sydney North West monitoring region with air quality monitored from four fixed sites of which St Marys is the closest monitoring location, about 45 kilometres east of Hazelbrook Station.

The Regional Air Quality Index (RAQI) for Sydney North West is generally considered to be between fair and good for September 2018.

6.10.2 Potential impacts

a) Construction phase

The main air quality impacts that have the potential to occur during construction would be temporary and associated with dust particles from vehicle and machinery emissions from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- excavation for regrading of commuter carpark, Railway Parade pedestrian crossing, footbridge and platform
- excavation for the foundations and footings for the lift shaft pit and canopies
- other trenching or excavation may be required for footpath and road works, relocation of services, drainage works and tree removal
- stockpiling activities
- dust generated from the loading and transfer of material from trucks
- other general construction works.

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

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

Operational phase

There are no anticipated impacts to air quality during operation as the Proposal would not generate any pollutants during operation. In addition, as the Proposal would increase access to public transport, the use of public transport would be anticipated to increase and lead to a relative reduction in the amount of private vehicle related emissions in the long-term.

6.10.3 Mitigation measures

Table 26 in Section 7.2 lists mitigation measures to manage air quality issues during construction. Mitigation is aimed around maintaining and operating plant and equipment efficiently and implementing measures for dust suppression including watering, covered loads and appropriate management of tracked dirt/mud on vehicles.

These measures would be included in the CEMP to be prepared for the Proposal.

6.11 Other impacts

6.11.1 Waste

The construction of the Proposal would generate the following waste:

- earthworks spoil
- green waste
- asphalt and concrete
- various building material wastes (including metals, timbers, plastics, fencing etc)
- electrical wiring and conduit wastes (from electrical connections)
- hazardous wastes
- general waste, including food and other wastes generated by construction workers.

Waste management would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). A Waste Management Plan would be prepared to identify all potential waste streams associated with the works and outline methods of disposal

of waste that cannot be reused or recycled at appropriately licensed facilities along with other onsite management practices such as keeping areas tidy and free of rubbish.

Waste management targets would be developed for the Proposal through the application of the TfNSW *Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017b). These targets would include reuse and recycling.

The Proposal would not result in changes to operational waste management arrangements.

Refer to Table 25 in Section 7.2 for a full list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

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 West Joint Regional Planning Panel Development and Planning Register, and the Blue Mountains City Council Development Application Register on 4 October 2018 identified no major developments in the vicinity of the Proposal likely to be constructed at the same time.

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 the TfNSW *Carbon Estimate and Reporting Tool* (TfNSW, 2016e). The carbon footprint would be used to inform decision making in design and construction.

Due to the small scale of the Proposal and the short term temporary nature of the individual construction works, it is considered that greenhouse gas emissions resulting from the construction of the Proposal would be minimal. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures detailed in Table 25 in Section 7.2.

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

6.13.2 Climate change

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

Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall expected to occur in a 100-year average recurrence interval flood event would occur more frequently. Rainfall events and flooding are unlikely to impact on the Proposal (see Section 6.9 for an assessment on flood impacts).

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

6.13.3 Sustainability

The design of the Proposal would be based on the principles of sustainability, including the incorporation of the TfNSW *Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017) and the TfNSW *Environmental Management System* (EMS). These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.1.4 for more information regarding the application of these guidelines.

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

7 Environmental management

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

7.1 Environmental management plans

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

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed below in Table 25. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 25 Proposed mitigation measures

No.	Mitigation measure
	General
1.	A Construction Environmental Management Plan (CEMP) would be prepared by the Contractor in accordance with the relevant requirements of *Guideline for Preparation of Environmental Management Plans,* 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 Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	An Environmental Controls Map (ECM) would be developed by the Contractor in accordance with TfNSW's *Guide to Environmental Controls Map* (TfNSW, 2015c) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.
5.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
6.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.

No.	Mitigation measure
7.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.
	Traffic and site access
8.	Prior to the commencement of construction, a Construction Traffic Management Plan (TMP) would be prepared as part of the CEMP and would include at a minimum: • 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 relocating taxi / kiss and ride and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired • measures to manage traffic flows around the area affected by the Proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the CTMP. Consultation with the relevant roads authorities (Blue Mountains City Council, Transport for NSW and Roads and Maritime Services) would be undertaken during preparation of the CTMP. The performance of all project traffic arrangements must be monitored during construction.
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.

No.	Mitigation measure
	Urban design, landscape and visual amenity

11.	An Urban Design Plan (UDP) would be prepared by the 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:
	• 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:
	  ○ connectivity with surrounding local and regional movement networks including street networks, other transport modes and active transport networks. Existing and proposed paths of travel for pedestrians and bicycles 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.

12.	A Public Domain Plan (PDP) would be prepared by the 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: • materials, finishes, colour schemes and maintenance procedures including graffiti control for new walls, barriers and fences • location and design of pedestrian and bicycle pathways, street furniture including relocated bus and taxi facilities, bicycle storage (where relevant), telephones and lighting equipment • 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 the TfNSW *Sustainable Design Guidelines -Version 4.0* (TfNSW, 2017) • identification of design and landscaping aspects that will be open for stakeholder input, as required.
13.	All permanent lighting would be designed and installed in accordance with the requirements of standards relevant to *AS 1158 Road Lighting* and *AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting.*
14.	The detailed design of the Proposal would comply with Crime Prevention Through Environmental Design principles.

No.	Mitigation measure
15.	Take all practical measures to ensure construction equipment, stockpiles, and other visible elements are located away from key views to or from the sensitive visual receivers identified in this assessment. Should such equipment or stockpiles be located in a visually prominent location for any reasonable period of time, incorporate screening measures and practices to ensure sites are kept tidy.
16.	Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.
17.	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
18.	During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.
19.	Utilise design strategies to minimise the visual prominence of new Proposal components affecting views to and from Railway Parade conservation area, for example maximise the transparency of the lift shaft, new screening to the extended walkway and lift landing, and utilise light grey or similar colour finish to the new balustrades to the lift landing. Consider maintaining the existing height of the proposed perimeter fencing (1.2 metres), and reduce the visual prominence of the proposed fencing by utilising a light grey or similar colour finish as opposed to black.
20.	Ensure Proposal design, siting and materiality is of high quality and sympathetic to the existing heritage context of the station precinct and Railway Parade, and contributes positively to the existing landscape character values.
21.	Incorporate new landscape planting to soften the visual impact of additional paving areas and perimeter fencing. Consider additional planting to 1.5 metres high to the batter slope north of the platforms within the rail corridor, to improve visual amenity of VP6 and surrounds. Ensure any new landscape planting enhances the public realm and aligns with Crime Prevention Through Environmental Design principles.
22.	Ensure landscape and urban design contributes positively to the existing landscape character and principles outlined in the *Sustainable Design Guidelines, Around the Tracks: urban design for heavy and light rail, Managing Heritage: issues in rail projects guidelines, Hazelbrook Village Centre Public Domain Masterplan*, and *Blue Mountains Development Control Plan 2015* specific to Hazelbrook Village Precincts.
23.	General considerations for vegetation retention include: • as the Proposal design progresses, the extent of disturbance on visually important buffer vegetation along the rail corridor boundary must be considered, and practical measures should be given to enable retention of this vegetation wherever possible • ensure the retention and protection of the existing fern-covered rock cutting on the southern side of the station to retain the positive landscape character and visual amenity attributes it provides within the station precinct (refer Figure 2 for location).
24.	General consideration for signage and poles include: • avoid locating permanent signage which may impede views or reduce the character and amenity of views, for example along Railway Parade • minimise the amount of services poles in the public realm and station precinct by utilising built form mounting and combining services on shared poles • ensure design and materiality of services components such as poles, signage and lighting contribute positively to the heritage context.

No.	Mitigation measure
	Noise and vibration
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 *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009), *Construction Noise and Vibration Strategy* (TfNSW, 2018a) and the Noise and Vibration Impact Assessment for the Proposal (GHD, 2018c). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
26.	The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include: • regularly training workers and contractors (such as at the site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise • avoiding any unnecessary noise when carrying out manual operations and when operating plant • ensuring spoil is placed and not dropped into awaiting trucks • avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where practicable • switching off any equipment not in use for extended periods e.g. heavy vehicles engines would be switched off whilst being unloaded • avoiding deliveries at night/evenings wherever practicable • no idling of delivery trucks • keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site • minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite; no dropping of materials from height where practicable, no throwing of metal items and slamming of doors.
27.	The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which would be considered, include: • maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances • using the most suitable equipment necessary for the construction 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.	Works would generally be carried out during standard construction hours (i.e. 7.00am to 6.00pm Monday to Friday; 8.00am to 1.00pm 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 Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.

No.	Mitigation measure
29.	Where the $L_{Aeq\ (15minute)}$ 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 the TfNSW *Construction Noise and Vibration Strategy* (TfNSW, 2018a). This would include restricting the hours that very noisy activities can occur.
30.	To avoid structural impacts as a result of vibration or direct contact with structures, the proposed works would be undertaken in accordance with the safe work distances outlined in the Noise and Vibration Assessment (GHD, 2018c) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
31.	Vibration resulting from construction and received at any structure outside of the project would be managed in accordance with: • for structural damage vibration - German Standard DIN 4150: Part 3 – 1999 *Structural Vibration in Buildings: Effects on Structures* and British Standard *BS 7385-2:1993 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)* • for human exposure to vibration the acceptable vibration - values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) which includes British Standard BS *7385-2:1993 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).*
32.	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 50 metres from the works and all heritage listed buildings and other sensitive structures within 150 metres of the works (unless otherwise determined following additional assessment they are not likely to be adversely affected).
33.	Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding would take into consideration the location of residential receivers.
	Indigenous heritage
34.	If unforseen Indigenous objects are uncovered during construction, the procedures contained in the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2015a) would be followed, and works within the vicinity of the find would cease immediately. The 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
35.	The detailed design of the proposed works must consider various heritage guidelines such as Sydney Trains *Heritage Technical Note: Installation of New Electrical and Data Services at Heritage Sites* and TfNSW *Managing Heritage in Rail Projects Urban Design Guideline*.

No.	Mitigation measure
36.	A heritage architect should be engaged for the detailed design process and to inform the detailed design recommendations. Specifically: • The heritage architect should advise on the materials and finishes palette. • The heritage architect should advise on the fireproofing of the proposed SSER so as to mitigate the impacts of proposed works on the original fabric of the women's waiting room. The original ripple ceiling and ceiling rose should be removed and reinstated for fireproofing of the ceiling. Care should also be taken to ensure that fireproof lining to the walls in designed in a manner that has least impact on the fabric of walls. • The heritage architect should advise on the design of the curved anti-throw screen to the lift landing.
37.	Consideration should be given to the preparation of Heritage Interpretation Plan which specifically addresses the history and significance of the women's waiting room.
38.	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.
39.	A Photographic Archival Recording documenting the Station precinct and its significant built and landscape environment should be undertaken. In order to record the changes that the Station will undergo, recording should include before, during and after works photography.
40.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2015a) would be followed, and works within the vicinity of the find would cease immediately. The 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.
41.	Potential impacts to non-Indigenous heritage during construction would be managed through the implementation of the CEMP prepared by the Contractor that would map and protect nearby non-Indigenous heritage items and prescribe management measures to ensure these items are not affected.
42.	Any accidental damage to a heritage item is to be treated as an incident, with appropriate recording and notification.
43.	The removal of the women's waiting room seat should be documented and as it is classified as movable heritage, arrangements should be made to relocate it or store it in a Sydney Trains moveable heritage storage facility.
44.	On completion of works, an update would be prepared for the Section 170 Heritage and Conservation Register.
	Socio-economic
45.	Sustainability criteria for the Proposal would be established to encourage the Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
46.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.

No.	Mitigation measure
47.	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.
48.	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.
49.	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
50.	Construction of the Proposal must be undertaken in accordance with the TfNSW *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2015d) and the TfNSW *Fauna Management Guideline* (TfNSW, 2015e).
51.	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.
52.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed in the Ecological Impact/Arborist Assessment (GHD, 2018d) 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 and marked on the Environmental Control Map.
53.	An arborist should be available to assess impacts to the Deodar Cedar tree located within the veterinary hospital along the fence line adjoining the car park during the works. The arborist would determine the proportion of TPZ loss, supervise and undertake any root pruning and canopy trimming requirements and carry out or recommend remedial actions and monitoring, as required.
54.	Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the Ecological Impact/Arborist Assessment (GHD, 2018d). Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of TPZs.
55.	In the event of any tree to be retained becoming damaged during construction, the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible.
56.	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 Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval.
57.	For new landscaping works, mulching and watering would be undertaken until plants are established.
58.	Weed control measures, consistent with the TfNSW *Weed Management and Disposal Guideline* (TfNSW, 2015f), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015.*

No.	Mitigation measure
59.	The removal of individual trees for the proposal would be offset in accordance with the Vegetation Offset Guide (TfNSW 2016). Offsets would be implemented once the exact extent of clearing required and number of trees to be removed has been confirmed with TfNSW.
	Soils and water
60.	Prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of works and maintained throughout construction.
61.	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.
62.	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.
63.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and the TfNSW *Chemical Storage and Spill Response Guidelines* (TfNSW, 2015g).
64.	Adequate water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW *Chemical Storage and Spill Response Guidelines* (TfNSW, 2015g) 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.
65.	In the event of a pollution incident, works would cease in the immediate vicinity and the Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
66.	The existing drainage systems would remain operational throughout the construction phase.
67.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and the TfNSW *Water Discharge and Reuse Guideline* (TfNSW, 2015b).
	Air quality
68.	Air quality management for the Proposal would be undertaken in accordance with TfNSW's *Air Quality Management Guideline* (TfNSW, 2015h).
69.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
70.	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.

No.	Mitigation measure
71.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
72.	To minimise the generation of dust from construction activities, the following measures would be implemented and included in the CEMP: • 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
73.	The CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum: • identify all potential waste streams associated with the 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.
74.	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.
75.	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.
76.	All spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste (*EPA , 2014) prior to disposal.
77.	Any concrete washout would be established and maintained in accordance with the TfNSW *Concrete Washout Guideline* – draft (TfNSW, 2015i) with details included in the CEMP and location marked on the ECM.
78.	Hazardous material surveys are to be undertaken for the station to confirm the presence of any potentially hazardous materials.
79.	An environmental risk assessment is to be undertaken prior to construction and must include a section on contamination as per the Transport for NSW Standard Requirements.
	Climate change and sustainability
80.	Detailed design of the Proposal would be undertaken in accordance with the TfNSW *Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017).
	Cumulative impacts

No.	Mitigation measure
81.	The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed in the CEMP, and implemented as appropriate.

8 Conclusion

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

The Proposal would provide the following benefits:

- improved accessibility for customers at Hazelbrook Station, particularly people with a disability, elderly people and those with prams or luggage by providing:
    - a lift to the station platform
    - an accessible path, ramp and stairs between the station and commuter carpark on Railway Parade that is DDA compliant
- improved customer amenity and facilities at the station including upgrade toilet facilities, CCTV and works to the existing station buildings and platforms to make them accessible. improved access to transport interchange facilities through improved paths to meet DDA requirements and improved parking facilitates
- improved staff amenities
- improved safety and amenities for customers on the station platform, including upgrade of station systems including CCTV, emergency help points, new anti-throw screens and new handrails.

The likely key impacts of the Proposal are as follows:

- temporary noise and vibration impacts during construction
- temporary traffic impacts during construction
- temporary disruptions to station facilities and amenities during construction
- removal of vegetation that would require planting offsets
- impacts to heritage listed buildings
- visual impacts to sensitive receivers during operation including the introduction of new elements, such as lifts into the visual environment.

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

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

References

Beca Pty Ltd, 2018, *Transport Access Program 3.0 Accelerated Program – Hazelbrook Railway Station – Design Report* 10 August 2018

Department of Environment, 2018, *National Pollutant Inventory* http://www.npi.gov.au/npidata/action/load/map-search. Accessed 3 October 2018

Department of Environment and Climate Change, 2009*, Interim Construction Noise Guideline*, Sydney

Department of Environment and Conservation, 2006, *Assessing Vibration: A Technical Guideline*, Sydney

Department of Environment, Climate Change and Water, 2011*, NSW Road Noise Policy*, Sydney

Department of Infrastructure, Planning and Natural Resources, 2004, *Guideline for Preparation of Environmental Management Plans*, Sydney

EPA, 2000, *NSW Industrial Noise Policy,* Sydney

EPA, 2013, *Rail Infrastructure Noise Guideline* (RING)

EPA, 2014, *Waste Classification Guidelines*, Sydney

EPA, 2017, Noise Policy for Industry (NPI)

Extent Heritage, 2018. *Hazelbrook Railway Station Accessibility Upgrade Statement of Heritage Impact* October 2018

GHD, 2018a, *Transport Access Program – Hazelbrook Station Traffic, Transport and Access Impact Assessment* October 2018

GHD, 2018b, TAP 3 – *Hazelbrook Station Landscape and Visual Impact Assessment* October 2018

GHD, 2018c, *TAP 3 – Hazelbrook Station Noise and Vibration Impact Assessment* October 2018

GHD, 2018d, *Ecology Assessment of Hazelbrook Station* October 2018

ICOMOS 2011, *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*, January 2011

Infrastructure NSW, 2018, *Building Momentum: State Infrastructure Strategy 2018-2038*

Landcom, 2004, *Managing Urban Stormwater: Soils and Construction, Volume - 4th Edition*, Sydney

Ministry of Transport, 2008, *Guidelines for the Development of Public Transport Interchange Facilities*, Sydney

NSW Government, 2015, *State Priorities – NSW: Making It Happen*, Sydney

OEH, 2010, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW South Wales,* Sydney

OEH, 2011, *Guidelines for Consultants Reporting on Contaminated Sites*, Sydney

Sydney Trains, 2016, *Design Guidelines for Heritage Stations: Canopies and Shelters*, Sydney

TfNSW, 2015a, *Unexpected Heritage Finds Guideline,* Sydney

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

TfNSW, 2015c, *Guide to Environmental Controls Map*, Sydney

TfNSW, 2015d, *Vegetation Management (Protection and Removal) Guideline*, Sydney

TfNSW, 2015e, *Fauna Management Guideline*, Sydney

TfNSW, 2015f, *Weed Management and Disposal Guide*, Sydney

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

TfNSW, 2015h, *Air Quality Management Guideline,* Sydney

TfNSW, 2015i, *Concrete Washout Guideline - draft*, Sydney

TfNSW, 2016, *Vegetation Offset Guide*, Sydney

TfNSW, 2016e, Carbon Estimate and Reporting Tool

TfNSW, 2017, *NSW Sustainable Design Guidelines - Version 4.0*, Sydney

TfNSW, 2018a, *Construction Noise and Vibration Strategy*, Sydney

TfNSW, 2018b, *Future Transport Strategy 2056*

Appendix A Consideration of matters of National Environmental Significance

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

Matters of NES	Impacts
Any impact on a World Heritage property? The Greater Blue Mountains World Heritage Area occurs within the locality to the north and south of the Proposal and includes the Blue Mountains National Park which is more than three kilometres from the Proposal site. The Greater Blue Mountains World Heritage Area is unlikely to be impacted as it is separated by residential areas and the proposed activities are of a nature and scale that they are unlikely to impact the adjacent environment.	Nil
Any impact on a National Heritage place? The Blue Mountains National Park is listed on the Register of the National Estate (non-statutory). The Blue Mountains World Heritage Area is unlikely to be impacted as it is separated by residential areas, and the proposed activities are of a nature and scale that they are unlikely to impact the adjacent environment.	Nil
Any impact on a wetland of international importance? There are no wetlands of international importance in the vicinity of the Proposal.	Nil
Any impact on a listed threatened species or communities? It is unlikely that the Proposal would significantly impact on any listed threatened species or communities as none were identified within the Proposal site.	Nil
Any impacts on listed migratory species? It is unlikely that the development of the Proposal would significantly impact any listed migratory species.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? There are no Commonwealth marine areas in the vicinity of the Proposal.	Nil
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The Proposal is for a transport facility and does not relate to coal seam gas or mining.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The Proposal would not be undertaken on or near any Commonwealth land.	Nil

Appendix B Consideration of clause 228

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

Factor	Impacts
(a) Any environmental impact on a community? There would be some temporary impacts to the community during construction, particularly in relation to noise, traffic, access and visual amenity. Mitigation measures outlined in Section 7.2 would be implemented to manage and minimise adverse impacts.	Minor
(b) Any transformation of a locality? The Proposal would include the introduction of new visible elements in the landscape (including a new lift and footbridge, new drainage, new fencing and handrails). The appearance of the new elements would be consistent with the existing station elements and are considered to be common features in urban areas. Vegetation removal is limited to removal of one garden located on the pedestrian footbridge off Railway Parade.	Minor
(c) Any environmental impact on the ecosystem of the locality? The Proposal would require the removal of one garden area however this vegetation does not form part of any threatened ecological communities, or is likely to provide habitat for threatened species and so would have a negligible impact to the ecosystem. The extent of vegetation trimming and removal has been minimised as far as practicable. Any additional trees that are found to require removal, not assessed in this REF, would be subject to further assessment, offsetting and approval from TfNSW.	Nil
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be some temporary impacts during construction particularly in relation to noise, traffic and access and visual amenity. The removal of vegetation would also result in a visual change however this is limited, with new areas to be landscaped. Operational landscape impacts on the locality would be either negligible or would not impact on identified sensitive receivers. Operational visual impacts range from moderate to negligible.	Minor
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The Proposal would have a positive contribution to the locality by creating equitable access to the station and the platform. Non-Aboriginal heritage items are unlikely to be impacted by the Proposal. 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.	Nil

Factor	Impacts
(f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The Proposal is unlikely to have any impact on the habitat of protected fauna.	Nil
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The Proposal is unlikely to have any impact on endangering any species of animal, plant or other form of like, whether living on land, in water or in the air.	Nil
(h) Any long-term effects on the environment? The Proposal is unlikely to have any long-term effects on the environment.	Nil
(i) Any degradation of the quality of the environment? The Proposal is unlikely to have any degradation of the quality of the environment.	Nil
(j) Any risk to the safety of the environment? Provided the recommended mitigation measures are implemented, the Proposal is unlikely to cause any pollution or safety risks to the environment. Specific management measures would be implemented to manage asbestos and other hazardous materials that may be encountered during construction works.	Nil
(k) Any reduction in the range of beneficial uses of the environment? The Proposal is unlikely to have any reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The Proposal is unlikely to cause any pollution of the environment provided the recommended mitigation measures are implemented as outlined in Section 7.2.	Nil
(m) Any environmental problems associated with the disposal of waste? The Proposal is unlikely to cause any environmental problems associated with the disposal of waste. Hazardous waste and special waste may be generated from the Proposal. Prior to construction, contamination investigations would be undertaken to confirm the presence of contaminated material, particularly asbestos. 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.	Minor
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is unlikely to increase demands on resources that are, or are likely to become, in short supply.	Nil

Factor	Impacts
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative effects of the Proposal are described in Section 6.13. Where feasible, project activities and 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.	Nil
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal is unlikely to impact on coastal processes and coastal hazards, including those under projected climate change conditions.	Nil

Appendix C Sustainable Design Guidelines checklist

Compulsory initiatives

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 (Project CAPEX value is <$10M)
2	Energy and greenhouse gases	Buildings are required to be designed and built to reduce energy consumption: ○ Covered or uncovered areas shall meet prerequisite 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).	No (no new buildings)
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 (Project CAPEX value is <$10M)
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 (Project CAPEX value is <$10M)
5	Materials and waste	100% of usable spoil (by weight) to be beneficially reused for all projects generating >300m3 of spoil	No

Initiative	Theme	Description	Under consideration
6	Water	Treat all new effective impervious area with a continuous area >1000m^2 to the following treatment levels: o 90% gross pollutants o 85% suspended solids o 65% Total phosphorus o 45% Total nitrogen Maintain or reduce 1.5 year ARI.	No (impervious area <1000m^2
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 (Project CAPEX value is <$10M)
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	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.	Yes
11	Biodiversity	All projects with non-significant biodiversity impacts to comply with the Infrastructure and Services Vegetation Offset Guide as applicable.	Yes
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

Initiative	Theme	Description	Under consideration
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

Appendix D Neutral or Beneficial Effect Assessment

As required by Clause 12 of the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011, the table below outlines the Neutral or Beneficial Effect Assessment for the Proposal to be undertaken by public authorities and that is being assessed under Division 5.1 of the EP&A Act.

Criteria	Assessment
1. Are there any identifiable potential impacts on water quality? What pollutants are likely? Major potential pollutants are sediments (fine and coarse), nitrogen, phosphorus, pathogens and hazardous chemicals and contaminants such as oil/fuel. During construction and/or post construction?	During construction there is potential for: • Sediment from excavations and stockpiles to enter waterways through nearby drains • Oil spills from operation of equipment/ machinery There would be no operational risks to water quality.
2. For each pollutant list the safeguards needed to prevent or mitigate potential impacts on water quality (these may be SCA endorsed current recommended practices and/or equally effective other practices)?	Excavation works for the Proposal are minor and the risks to water quality have been assessed as low provided the mitigation measures identified in this REF are followed (refer to Section 6.8 and Section 6.9). Erosion and Sediment Control Plan/s would be prepared for the Proposal that would specify controls consistent with the 'Blue Book' *Managing Urban Stormwater, Soils and Construction* (Landcom, 2004). Dewatering would be undertaken in accordance with TfNSW procedures. Refuelling of equipment and maintenance would take place away from drains and spill kits would be available on site. These mitigation measures are to be included in the CEMP for the Proposal.
3. Will the safeguards be adequate for the time required? How will they need to be maintained?	Erosion and sedimentation controls would be established prior to commencement of works and would be maintained throughout the construction period.
4. Will all impacts on water quality be effectively contained on the site by the identified safeguards (above) and not reach any watercourse, waterbody or drainage depression? Or will impacts on water quality be transferred outside the site for treatment? How? Why?	It is considered that the proposed mitigation measures prescribed in this REF would be adequate to prevent impacts to other water bodies or water courses.
5. Is it likely that a neutral or beneficial effect on water quality will occur? Why?	The Proposal would have a neutral effect on water quality. The risks to water quality from the construction of the Proposal would be managed through the implementation of the soil and water mitigation measures contained in the CEMP. Operational effects would be managed through provision of new kerb and gutter infrastructure which would link into the existing stormwater network.