NSW GOVERNMENT

Transport Access Program

Beecroft Station Upgrade

Review of Environmental Factors

Artist's impression of Beecroft Station Upgrade, subject to detailed design

October 2018

Beecroft Station Upgrade Review of Environmental Factors

Transport Access Program
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Contents

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Tables

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)
CAMBA	China Australia Migratory Bird Agreement
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* (TfNSW, 2018)
CPTED	Crime Prevention Through Environmental Design
dBA	A-weighted decibel
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
EMS	Environmental Management System

Term	Meaning
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
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
Hornsby LEP	Hornsby Local Environmental Plan 2013
HV	High Voltage
JAMBA	Japan Australia Migratory Bird Agreement
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2000).
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
L_{xxx}	See 'noise averaging periods' in Definitions section below
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
LV	Low Voltage
NCA	Noise catchment area
NES	National Environmental Significance
NML	Noise management level
Noxious Weeds Act	*Noxious Weeds Act 1993* (NSW)
NPfI	*Noise Policy for Industry* (EPA, 2017)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage

Term	Meaning
OHLE	Overhead line equipment
OHWS	Overhead Wire Structure
OOHW	Out of hours works
PA system	Public Address system
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)
RoKAMBA	Republic of Korea Australia Migratory Bird Agreement
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
TCP	Traffic Control Plan
TfNSW	Transport for NSW
TGSI	Tactile Ground Surface Indicators (“tactiles”)
TMP	Traffic Management Plan
TPZ	Tree Protection Zone
TVM	Ticket Vending Machine
UDP	Urban Design Plan
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)

Definitions

Term	Meaning
'A' Frequency weighting	Frequency weightings are used to adjust sound level meters so that they are measuring and reporting noise levels that represent what humans hear. The human ear is more sensitive to midrange frequencies between 500Hz and 6kHz (for example a child's scream) and less sensitive to very low or very high pitch noises. Sound level meters have inbuilt frequency weighting networks that very roughly approximate the human loudness response at low sound levels. It should be noted that the human loudness response is not the same as the human annoyance response to sound. Here low frequency sounds can be more annoying than midrange frequency sounds even at very low loudness levels. The 'A' weighting is the most commonly used frequency weighting for occupational and environmental noise assessments.
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.
B-Double	A B-double is a combination of a prime mover towing two semi-trailers all connected by B-couplings
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).
Decibel (dB)	The decibel (dB) is a unit used to measure the intensity of a sound by comparing it to a given value on a logarithmic scale. The logarithmic scale allows a wide range of values to be compressed into a more comprehensible range, typically 0–120 dB. Noise levels in decibels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dB, and another similar machine is placed beside it, the level will increase to 53 dB (from 10 log10 (10(50/10) + 10(50/10)) and not 100 dB. The human ear has a vast sound-sensitivity range of over a thousand billion to one so the logarithmic decibel scale is useful for acoustical assessments.
dBA	see 'A' Frequency weighting
Design and Construct Contract	A method to deliver a project in which the design and construction services are contracted by a single entity known as the Construction Contractor. The Construction Contractor completes the project by refining the concept design presented in the REF and completing the detailed design so that it is suitable for construction (subject to TfNSW acceptance). The Construction Contractor is therefore responsible for all work on the project, both design and construction.
Detailed design	Detailed design broadly refers to the process that the Construction Contractor undertakes (should the Proposal proceed) to refine the concept design to a design suitable for construction (subject to TfNSW acceptance).

Term	Meaning
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.
Frequency	The number of oscillations or cycles of a wave motion per unit time. 1 Hz is equivalent to one cycle per second. 1000 Hz is 1 kHz.
Hertz (Hz)	The unit used to measure frequency of sound expressed by cycles per second.
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 averaging periods	Noise can be measured over various periods of time. The five 'averaging periods' used in this report are described below: ○ $L_{Aeq(15\ min)}$ describes an average noise level across a period of time (either day, evening, night, or over a 15-minute period). It accounts for the full range of noise levels encountered in a given area over a given period. ○ L_{A90} describes the noise level that occurs for 90 per cent of the time and therefore describes the background noise level. ○ L_{A10} describes the noise level that occurs for 10 per cent of the time and therefore describes what the environment is like during the nosiest periods. ○ L_{Amax} describes the average maximum noise level recorded at any point in time.
Noise catchment area (NCA)	Areas containing noise sensitive receivers that have been categorised based on a similar noise environment.
Noise management level (NML)	An NML is a criteria for managing noise levels associated with an activity. They are site/project specific and are calculated based on the level of ambient noise (represented by the rating background level (RBL)) already at the site. An NML will consist of the RBL plus an allowable increase in noise emissions (e.g. RBL + 10dB). If noise emissions increase above the NML, sensitive receivers are likely to be disturbed. There are usually two types of NML, 'noise affected' and 'highly noise affected.' The noise affected level represents the point above which there may be some community reaction to noise. The highly noise affected level represents the point above which there may be strong community reaction to noise.

Term	Meaning
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).
NSW Train Link	From 1 July 2013, NSW Trains (NSW Train Link) became the new rail provider of services for regional rail customers.
Opal card	The integrated ticketing smartcard introduced by TfNSW.
Out of hours works	Defined as works *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).
Overhead line equipment	A system of masts and overhead wires used to supply electricity to trains and light rail vehicles.
Proponent	A person or body proposing to carry out an activity that requires environmental assessment under Division 5.1 of the EP&A Act - in this case, the proponent for the Beecroft Station Upgrade is 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 Beecroft 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

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

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

Description of the Proposal

The key features of the Proposal are summarised as follows:

- construction of two new lifts; one from ground level to the pedestrian subway at the Wongala Crescent entrance, and one between the existing pedestrian subway and platform level through the former booking office, which will involve raising of the existing canopy roof of the booking office by about three metres to accommodate the lift shaft
- modifications to the existing non-compliant ramp from Wongala Crescent to provide an accessible path of travel from Wongala Crescent to the new lift. Modifications would include re-grading the existing ramp and adding new stairs to comply with the changes in level.
- provision of a new bridge-slab over the existing staircase, extension of the western platform (Platform 2) and movement of the existing platform fence/gate at the northern end of the platform to accommodate a new pedestrian circulation area in front of the new lift
- upgrades to accessible parking spaces within the Sutherland Street car park to allow for two accessible parking spaces
- upgrade of the existing footpaths along the eastern side of Wongala Crescent, and between the Sutherland Road car park and Beecroft Station
- provision of a new kiss-and-ride zone along Wongala Crescent
- relocation of the existing taxi zone from Hannah Street to Wongala Crescent, adjacent to the existing bus stop
- relocation of the communications room to the existing space adjacent to the family accessible toilet within the station building
- landscaping works around the western lift shaft and along eastern side of Wongala Crescent
- ancillary works including adjustments to lighting, electrical upgrades, minor drainage works, new seating, improvement to station communications systems (including CCTV cameras), hearing loops, wayfinding signage and installation of tactile ground surface indicators (TGSIs).

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

Need for the Proposal

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

The upgrades are designed to 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.

Beecroft Station does not currently meet key requirements of the Disability Standards for Accessible Public Transport (DSAPT) or the *Commonwealth Disability Discrimination Act 1992* (DDA). It also does not allow for equitable access to the station platforms. The Proposal would fulfil the Transport Access Program objectives by proposing to provide:

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

The Proposal is consistent with NSW planning strategies, including *NSW: Making It Happen* (NSW Government 2015) and the *Future Transport Strategy 2056* (TfNSW 2018). The Proposal would also ensure that Beecroft Station would meet legislative requirements under the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

Design options considered

Three upgrade options were developed and considered by key stakeholders such as Sydney Trains and Hornsby Shire Council to address access issues and deficiencies. A number of general improvements were applicable to all three options developed that would enhance the customer experience and support the interchange between transport modes, which included:

- provision of equitable access to the station platforms
- upgrading of accessible parking spaces.
- upgrading the footpath on Wongala Crescent.
- upgrading the footpath between the eastern station entry and the Sutherland Road car park.
- provision of kiss and ride spaces in the Wongala Crescent commuter car park.
- relocation of the existing taxi zone from Hannah St to Wongala Crescent.
- Upgrading the existing stairs between the pedestrian subway and station platforms with compliant features.

The key differences between the three options related to the arrangement for the accessible access to the western side of the station between Wongala Crescent and the pedestrian subway. A summary of the differences between the proposed options area summarised as follows:

- Option 1 would achieve DDA compliant access to the station platforms through provision of a lift from the southern side of the existing pedestrian subway to platform level. The station platform would be extended to provide extra circulation space at the northern end, and connect to a new pedestrian bridge through the original booking office at platform height which lift users would exit onto. A second lift would be provided from ground level to the pedestrian subway at the Wongala Street entrance. The option included a new station plaza on Wongala Crescent with new and upgraded stairs to replace the existing non-compliant ramp, lift access to the pedestrian subway and weather protection.
- Option 2 would achieve DDA compliant access to the station platforms through provision of a new lift adjacent to the pedestrian ramp at the car park on the western side of the station. This option maintained the existing non-compliant path to the station. Similar to Option 1, a second lift would be installed between the existing pedestrian subway and the station platform level within the original booking office.
- Similar to Option 1, Option 3 would achieve DDA compliant access to the station platforms through provision of two lifts. The first would be provided adjacent to Wongala Crescent, providing accessibility from the road level to the existing subway. A secondary lift would be located at the southern side of the existing pedestrian subway to the island platform level within the existing communications room. The existing non-compliant ramp would be replaced with stairs with the width of the ramp being maintained (key difference between Option 1 and Option 3).

The design options were assessed in a multi-criteria analysis that included consideration of factors such as customer experience, accessibility, safety, engineering constraints, modal integration and cost to select a preferred option. A series of design workshops were also undertaken in January and February 2018.

As part of the stakeholder workshops, the preferred concept design underwent a process of further refinement in consultation with TfNSW and Sydney Trains. Changes were made to the designs for aspects both within the station confines, the station plaza and interchange areas.

It was subsequently determined that Option 3 would be further developed as the preferred Concept Design as it would:

- achieve DDA compliance
- have no major impacts on existing services
- result in minimal impacts to existing vegetation
- provide direct access from the existing bus stops and pedestrian crossing to the station entrance.

Statutory considerations

The EP&A Act provides for the environmental impact assessment of development in NSW. Division 5.1 of the EP&A Act generally specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which do not require development consent under the EP&A Act.

The *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP) is the primary environmental planning instrument relevant to the proposed development and is the key environmental planning instrument which determines that the permissibility of the Proposal under the EP&A Act.

Clause 79(1) of the Infrastructure SEPP states that

> *'Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land*.'

Clause 78 defines 'rail infrastructure facilities' as including elements such as:

> *'(d) railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms*
>
> *(e)'public amenities for commuters*
>
> *(f) associated public transport facilities for railway stations…'*

As TfNSW is a public authority and the proposed activity falls within the definition of rail infrastructure facilities under the Infrastructure SEPP, the Proposal is permissible without development consent. Consequently, the environmental impacts of the Proposal have been assessed by TfNSW under Division 5.1 of the EP&A Act.

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

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

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

Community and stakeholder consultation

Under the Infrastructure SEPP, consultation is required with local councils or public authorities in certain circumstances, including where Council-managed infrastructure is affected. Consultation has been undertaken with Sydney Trains, Hornsby Shire Council and Building Code of Australia (BCA)/DDA specialists during the development of design options and the preferred option. Consultation with these stakeholders would continue through the detailed design and construction of the Proposal.

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

- direct notification to community stakeholders
- public display of the REF at various locations
- pop-up community information sessions at the station.

Community consultation activities for the Proposal would be undertaken during the public display period of this REF. The REF would be displayed for a period of approximately two weeks. Further information about these specific activities is included in Section 5.4 of this REF.

During this period, the REF would also be available for viewing at the following locations:

- Pennant Hills Branch Library and Community Centre (Hornsby Council)
  Yarrara Road and Ramsay Road, Pennant Hills NSW 2120
  (02) 9847 6100
- TfNSW Office
  Level 5, Tower A, Zenith Centre
  821 Pacific Highway
  Chatswood 2067.

The REF would also be available to download from the TfNSW website[1] and a Project Infoline (1800 684 490) would be available for members of the public to make enquiries.

TfNSW would review and assess all feedback received during the public display period, prior to determining whether or not to proceed with the Proposal. Responses will be provided to all submissions. These would be available in the Determination Report. TfNSW would review and assess all feedback received during the public display period, prior to determining whether or not to proceed with the Proposal. Feedback can be sent to:

- projects@transport.nsw.gov.au

  Transport Access Program – Beecroft

  Associate Director, Environmental Impact Assessment
  Transport for NSW
  Locked Bag 6501
  St Leonards NSW 2065

Should the Proposal proceed to construction, the community would be kept informed throughout the duration of the construction period.

Figure 1.1 presents an overview of the consultation and planning process and the current status of the Proposal.

Figure 1.1 Planning approval and consultation process for the Proposal

[1] http://www.transport.nsw.gov.au/projects-tap

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 Proposal would provide the following benefits:

- a station that is accessible to people with a disability, limited mobility, parents with prams and people with luggage
- upgraded buildings and facilities for all modes that meet the needs of a growing population
- a modern interchange along Wongala Crescent that supports an integrated network and allows seamless transfers between all modes for all customers.

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

- temporary impacts on local traffic flow associated with construction traffic and the works to the pedestrian crossing and Wongala Crescent
- impacts to the heritage fabric of the station and visual environment from the introduction of new elements, such as the lifts
- temporary disruptions to station facilities and amenities during construction, including potential weekend closures of the Beecroft Station as part of scheduled possessions
- temporary changes to vehicular, bus, bicycle and pedestrian access to, through and movements around the station
- potential temporary loss of time-restricted parking on nearby streets and in the Council car park
- removal of two trees near the bus shelter on Wongala Crescent
- potential sediment runoff, dust generation and erosion risk during construction.

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

Conclusion

This REF has been prepared having regard to section 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.

The detailed design of the Proposal would also be designed in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017 and relevant requirements of the *Infrastructure Sustainability Rating Scheme - Version 2.0 (Infrastructure Sustainability Council of Australia (ISCA), 2018)* taking into account the principles of ecologically sustainable development (ESD).

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

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

1 Introduction

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

1.1 Overview of the Proposal

1.1.1 The need for the Proposal

The NSW Government is committed to facilitating and encouraging use of public transport, such as trains, by upgrading stations to make them more accessible, and improving interchanges around stations with other modes of transport such as buses, bicycles and cars. The Transport Access Program is an initiative targeted at achieving compliance with the Disability Standards for Accessible Public transport (DSAPT) Regulations across the Network.

Beecroft Station has been identified for an accessibility upgrade as it currently does not accommodate mobility impaired access to rail services, or meet key requirements of the DSAPT or the Commonwealth *Disability Discrimination Act 1992* (DDA).

The following accessibility issues have been identified at Beecroft Station and have been addressed in the design of the upgrade:

- access to Beecroft Station is currently via stairs only and it does not have accessibility for wheelchairs
- the existing paths from public domain footpaths to station entries are not currently compliant with DDA standards
- the existing paths facilitating interchanges between modes are not currently compliant with DDA standards
- existing handrails on the platform-to-subway stairs are non-compliant with DDA standards
- existing accessible parking spaces within the Sutherland Road car park are similarly non-compliant
- the existing taxi rank on Hannah Street is non-compliant as the gradient is non-compliant for wheelchair users.

1.1.2 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- construction of two new lifts; one from ground level to the pedestrian subway at the Wongala Crescent entrance, and one between the existing pedestrian walkway and the station platforms through the former booking office, which will involve raising of the existing canopy roof of the booking office by about three metres to accommodate the lift shaft
- modification to the existing non-compliant ramp from Wongala Crescent to provide an accessible path of travel from Wongala Crescent to the new lift. Modifications would include re-grading the existing ramp and adding new stairs to comply with the changes in level.

- provision of new bridge-slab over the existing staircase, extension of the western platform (Platform 2) and movement of the existing platform fence/gate at the northern end of the platform to accommodate a new pedestrian circulation area in front of the new lift
- upgrades to accessible parking spaces within the Sutherland Street car park to allow for two accessible parking spaces
- upgrade of the existing footpaths along the eastern side of Wongala Crescent and between the Sutherland Street car park and Beecroft Station
- provision of a new kiss-and-ride zone along Wongala Crescent
- relocation of the existing taxi zone from Hannah Street to Wongala Crescent, adjacent to the existing bus stop
- relocation of the communications room to the existing space adjacent to the family accessible toilet within the station building
- landscaping works around the western lift shaft and along eastern side of Wongala Crescent
- ancillary works including adjustments to lighting, electrical upgrades, minor drainage works, new seating, improvement to station communications systems (including CCTV cameras), hearing loops, wayfinding signage and installation of tactile ground surface indicators (TGSIs).

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

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

1.2 Location of the Proposal

Beecroft Station is located on the Main Northern Line (T1 service), about 27 kilometres by rail from Central Station. It is within the Hornsby local government area (LGA) in Sydney's north-west. The station is surrounded a combination of urban and natural environments. On the western side of the station is the Beecroft Railway Station Gardens, which is a local heritage item listed under the *Hornsby Local Environmental Plan 2013* (Hornsby LEP), and includes a children's playground.

Beecroft Town Centre is immediately to the west of the Proposal. Byles Creek and its associated unnamed drainage lines are located about 600 metres to the north-east of the Proposal, and is surrounded by mature, native vegetation in Pennant Hills Park.

The Proposal study area is generally bounded by Wongala Crescent to the west and Sutherland Road to the east, which run parallel to the rail line, as well as Copeland Road East Bridge around 25 metres to the south. The Proposal is located within the station itself, the shared path on the east side of Wongala Crescent, a small section of kerb on the western side of Wongala Crescent, and the station car park and access footpath on Sutherland Road. The location of the Proposal in the regional context is shown in Figure 2.

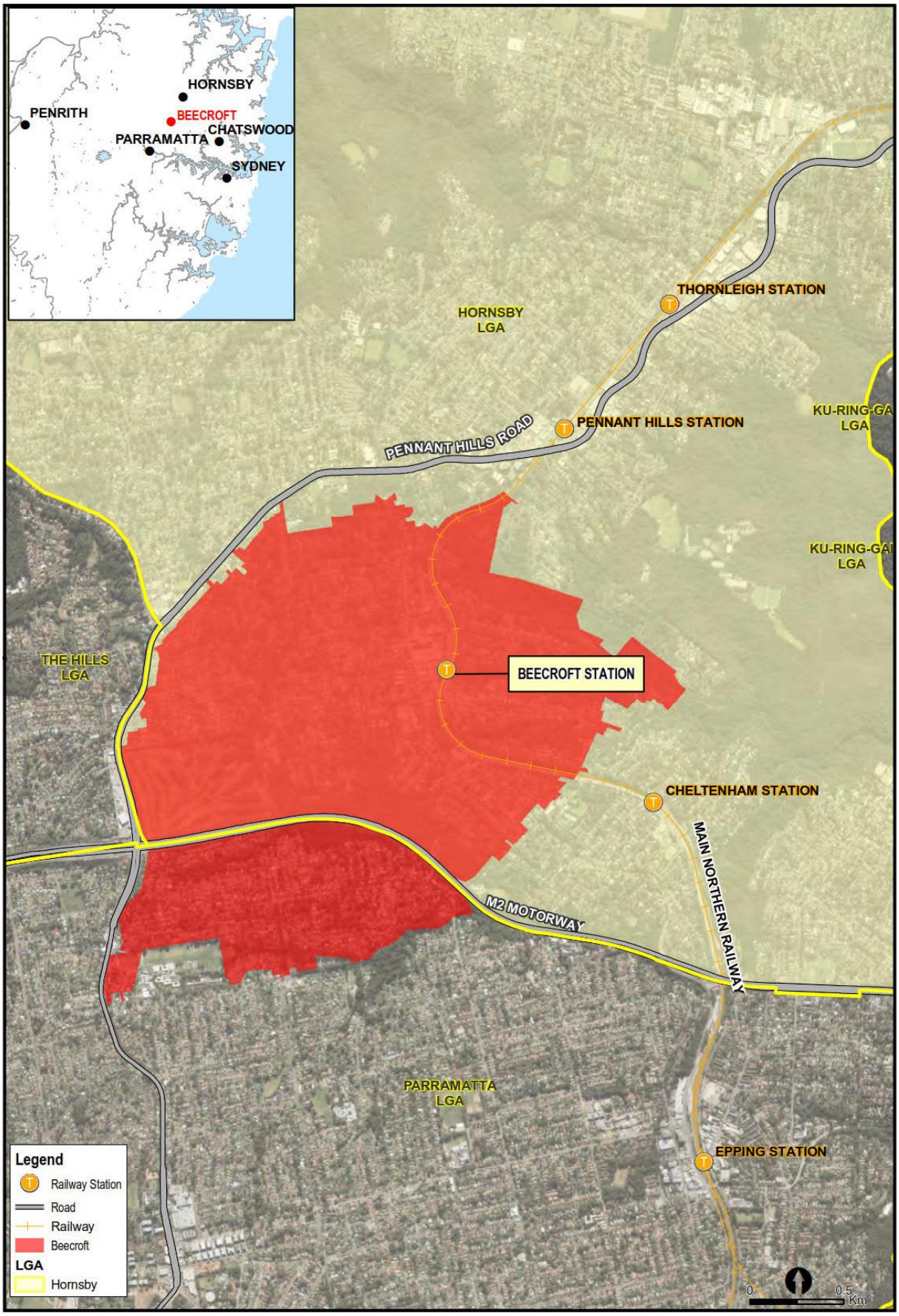


Figure 1.1 Regional context

1.3 Existing infrastructure and land uses

Beecroft Station consists of a single island platform configuration consisting of two platforms. The station platforms are accessed from a pedestrian subway connecting the western and eastern sides of the station. The subway is located at the northern end of the platforms as shown in Figure 1.2.

Platforms 1 and 2 are located on each side of the island platform configuration. Trains arriving on Platform 1 proceed to the city via Epping and North Strathfield. Trains on Platform 2 proceed towards Hornsby. Prior to the closure of the Epping to Chatswood tunnel (to allow for construction of the Sydney Metro Northwest) customers could also travel to the city on this line via Chatswood. However, trains between Epping and Chatswood have currently been replaced by temporary Station Link buses (from 30 September 2018). Following completion of construction works, the Station Link services would be ceased.

A station building is located within the middle of the platform and contains a ticket booking office, staff meal room/kitchen, store room, staff toilet facilities, and an existing Family Accessible Toilet at the southern end of the building. Other existing customer facilities within the station precinct include Opal card readers, ticket vending machine(s) and seating. Weather protection (canopy structure) is provided for commuters between the existing stairs and the southern end of the station building. Seating benches and real time passenger information displays are located on each platform.

1.3.1 Station access

Entrance to the station is via the pedestrian subway which connects Wongala Crescent on the west, to a footpath parallel to Sutherland Road on the east. Customers arriving from the west currently proceed down stairs or down a steep ramp to access the subway. Customers arriving at the subway via the eastern side arrive at the same level as the subway. The pedestrian subway provides 24-hour access to the station platforms as well as an unpaid connection across the railway line from the eastern residential parts of Beecroft to the village centre and bus stops. Once inside the subway, access to the platforms is via stairs.

The pedestrian infrastructure on approach to the station includes footpaths on both sides of the station, signalised pedestrian crossings on the western side and zebra crossings on the eastern and southern sides of the station.

There are extensive footpaths on approach to the station from the western side but along the eastern side of the station on Sutherland Road there is a missing footpath (west side of road). There is also a potential desire line that is missing a footpath through the area of thick scrub and tall vegetation; a direct link between the station entrance and Sutherland Road. Footpath condition is varied, with uneven footpaths along Wongala Crescent and high edges along the footpath from the Sutherland Road car park.

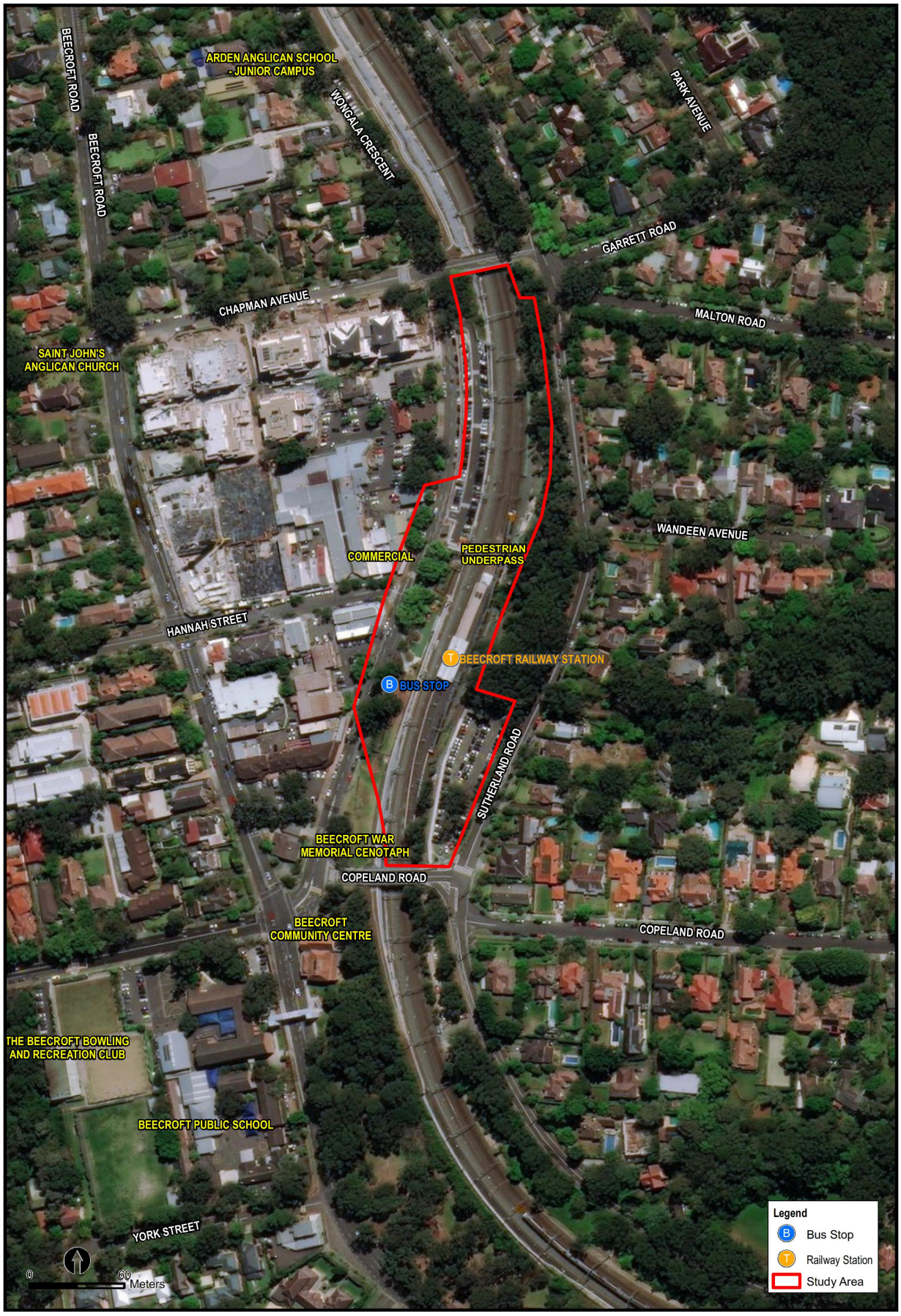


Figure 1.2 Site locality map

1.3.2 Interchange facilities

Public transport and other interchange facilities surrounding the station include:

- bus stops located on the western side of the railway line on Wongala Crescent
- a designated taxi rank on the north side of Hannah Street, close to the intersection of Wongala Crescent (currently with capacity for around three taxis)
- two commuter car parks including:
  - western side of the station, along Wongala Crescent (north) with a capacity of 91 spaces
  - eastern side of the station, along Sutherland Road with a capacity of 98 cars, including two accessible parking spaces.

1.3.3 Surrounding land use

Under the Hornsby LEP, the proposed works associated with the station platform and buildings would be located in an area zoned as SP2 Infrastructure (Rail). Works outside of the station platform and buildings, including the works to footpaths and access points, would be located in areas zoned R2 Low Density Residential and B2 Local Centre. Areas within around 200 metres of the Proposal consist of a mix of R2 Low Density Residential, R4 High Density Residential, RE1 Public Recreation, RE2 Private Recreation and B2 Local Centre zoned land.

Land use surrounding the Proposal includes the Beecroft Town Centre immediately to the west, which comprises low scale retail and commercial uses and housing of mixed density. The residential areas to the east of the station generally comprise single storey and two storey houses on tree lined streets. Beecroft Primary School is located approximately 100 metres south-west of the Proposal.

Photos of the existing station and surrounding area are shown in Figure 1.3 to Figure 1.7.

Figure 1.3 Wongala Street entrance to pedestrian underpass

Figure 1.4 Bus stop and playground on Wongala Crescent

Figure 1.5 Pedestrian crossing over Wongala Crescent to station entrance

Figure 1.6 Sutherland Road entrance to pedestrian underpass

Figure 1.7 Pedestrian access path to station entrance, off Sutherland Road

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of the Beecroft 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 Beecroft 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 2018a), 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 predict significant growth in population and employment in Hornsby Shire Council LGA (Cardno, 2018a) of approximately 2,000 new residents per annum. This forecast only provides an estimate for the whole Hornsby LGA, and growth in different suburbs will vary, depending on the planned density levels. The Beecroft population growth is expected to be somewhat lower than the whole Hornsby LGA area due to the typically low density residential land zoning of most of the suburb.

The Proposal is designed to accommodate the forecast Sydney Trains patronage growth (an increase of 15 per cent to 2036) and changing travel patterns.

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

Public transport is viewed as critical to urban productivity, expanding employment opportunities by connecting people to jobs, reducing congestion, and supporting delivery of urban renewal.

Further details of the application of NSW Government policies and strategies are discussed in Section 4 of this REF.

2.1.2 Objectives of the Transport Access Program

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

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

2.1.3 Objectives of the Proposal

The specific objectives of the Beecroft Station Upgrade are to:

- provide a station that is accessible to those with a disability, the ageing and parents/carers with prams and customers with luggage
- upgrade customer experience to improve accessibility for those with mobility issues (better interchange facilities and visual appearance)
- 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
- maintain/create cross corridor access/pedestrian links to the bus interchange, Wongala Crescent, Sutherland Road, and the Beecroft Town Centre.

2.2 Design development

In 2018, Cardno was engaged to prepare a Concept Design Report. The report found the following key access constraints and issues at Beecroft station:

- access to Beecroft Station is currently via stairs and it does not have accessibility for wheelchairs
- the paths from public domain footpaths to station entries are DDA non-compliant
- paths facilitating interchange between modes are DDA non-compliant
- non-compliant handrail on platform to subway stairs
- non-compliant accessible parking spaces in Sutherland Road car park
- the existing taxi rank on Hannah Street is non-compliant and contains non-compliant cross falls.

2.3 Alternative options considered

To develop a preferred option for the precinct accessibility upgrade at Beecroft Station that addressed the project objectives and identified issues, a multi-criteria assessment process was undertaken. Three upgrade options were developed and considered by key stakeholders to address access issues and deficiencies.

A number of general improvements were applicable to all three options developed that would enhance the customer experience and support the interchange between transport modes, which included:

- provision of equitable access to the station platforms
- upgrading of accessible parking spaces
- upgrading the footpath on Wongala Crescent
- upgrading the footpath between the eastern station entry and the Sutherland Road car park
- provision of kiss and ride spaces in the Wongala Crescent commuter car park
- relocation of the existing taxi zone from Hannah St to Wongala Crescent
- Upgrading the existing stairs from the subway to the platform with compliant features.

The key differences between the three options related to the arrangement for the accessible access to the western side of the station between Wongala Crescent and the pedestrian subway. A summary of the differences between the proposed options area summarised as follows:

- Option 1 would achieve DDA compliant access to the station platforms through provision of a lift from the southern side of the existing pedestrian subway to platform level. The island platform would be extended to provide extra circulation space at the northern end, and connect to a new pedestrian bridge through the original booking office at platform height which lift users would exit onto. A second lift would be installed between ground level and the pedestrian subway on the Wongala Street entrance. The option included a new station plaza on Wongala Crescent with new and upgraded stairs to replace the existing non-compliant ramp, lift access to the pedestrian subway and weather protection.

- Option 2 would achieve DDA compliant access to the station platforms through provision of a new lift adjacent to the pedestrian ramp at the car park on the western side of the station. This option maintained the existing non-compliant path to the station. Similar to Option 1, a second lift would be installed between the existing pedestrian subway and the station platform level within the original booking office.
- Similar to Option 1, Option 3 would achieve DDA compliant access to the station platform through provision of two lifts. The first lift would be provided adjacent to Wongala Crescent, providing accessibility from the road level to the existing subway. A second lift would be located at the southern side of the existing pedestrian subway to the island platform level within the existing communications room. The existing non-compliant ramp would be replaced with stairs, with the width of the ramp being maintained (key difference between Option 1 and Option 3).

A 'do nothing' option was also considered for comparative purposes to the proposed options.

2.3.1 The 'do-nothing' option

Under a 'do-nothing' option, existing access to the platform would remain the same and there would be no changes to the way the station, interchange, and car park currently operate.

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

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

2.3.2 Assessment of identified options

The design options were assessed in a multi-criteria analysis that included consideration of factors such as customer experience, accessibility, safety, engineering constraints, modal integration and cost to select a preferred option. A series of design workshops were also undertaken in January and February 2018.

As part of the stakeholder workshops, the preferred concept design underwent a process of further refinement in consultation with TfNSW and Sydney Trains. Changes were made to the designs for aspects both within the station confines, the station plaza and interchange areas.

In particular, aspects of the design which were refined during this phase included:

- relocation of the communications room to the existing space adjacent to the family accessible toilet on the station platform
- provision of a new kiss-and-ride spaces on Wongala Crescent
- consolidating the two bus stops on Wongala Crescent and locating bus stops closer to the station entrance.

Following further consultation with TfNSW and other government agencies, the following concept design refinements were included in the preferred option:

- the existing heritage roof at the northern end of the station would be raised by around three metres and the extension to the walls would be set inside the existing brick wall. The heritage roof would also be retained
- reducing the use of glazing for the proposed lifts to more closely align with the existing heritage nature of the station building and surrounds.

2.4 Justification for the preferred option

It was subsequently determined that Option 3 would be further developed as the preferred Concept Design. Option 1 was ruled out as would require significant reconstruction and realignment of the existing ramp. This would result in potential impacts to existing services and would have a larger impact in comparison to the other options.

The location of the proposed lift in Option 2 was also considered to be likely to require the relocation of a number of services. The proposed ramp would have also required new stairs at the subway entrance which were not preferred as customers with prams/accessibility issues may assume the access to be DDA compliant.

Option 3 was selected as the preferred option as it would:

- achieve DDA compliance
- have no major impact on existing services
- result in minimal impact on existing vegetation
- provide direct access from the existing bus stops and pedestrian crossing to the station entrance.

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 further detailed design.

3.1 The Proposal

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

The Proposal would include the following key elements:

- construction of two new lifts:
  - one at the Wongala Crescent entrance to access the existing pedestrian subway
  - one located within the former booking office to provide access between the pedestrian subway and platforms. The canopy roof of the existing booking office would be raised by about three metres to accommodate the lift shaft
- modification to the existing non-compliant ramp from Wongala Crescent to provide an accessible path of travel from Wongala Crescent to the new lift. Modifications would include regrading the existing ramp and adding in new stairs to comply with the changes in level
- upgrades to accessible parking spaces within the Sutherland Road car park to allow for two accessible parking spaces
- upgrade of the existing footpaths along the eastern side of Wongala Crescent and between the Sutherland Street car park and Beecroft Station
- provision of a new kiss-and-ride zone along Wongala Crescent
- relocation of the existing taxi zone from Hannah Street to Wongala Crescent, adjacent to the existing bus stop
- relocation of the communications room to the existing space adjacent to the family accessible toilet within the station building
- landscaping works around the western lift shaft and along eastern side of Wongala Crescent
- ancillary works including adjustments to lighting, electrical upgrades, minor drainage works, new seating, improvement to station communications systems (including CCTV cameras), hearing loops, wayfinding signage and installation of TGSIs.

Figure 3.1 shows the general layout of key elements for the Proposal. Figure 3.2 to Figure 3.5 provide a series of elevations of the Proposal.

An artist's impression of the raised station building roof is provided in Figure 6.13.

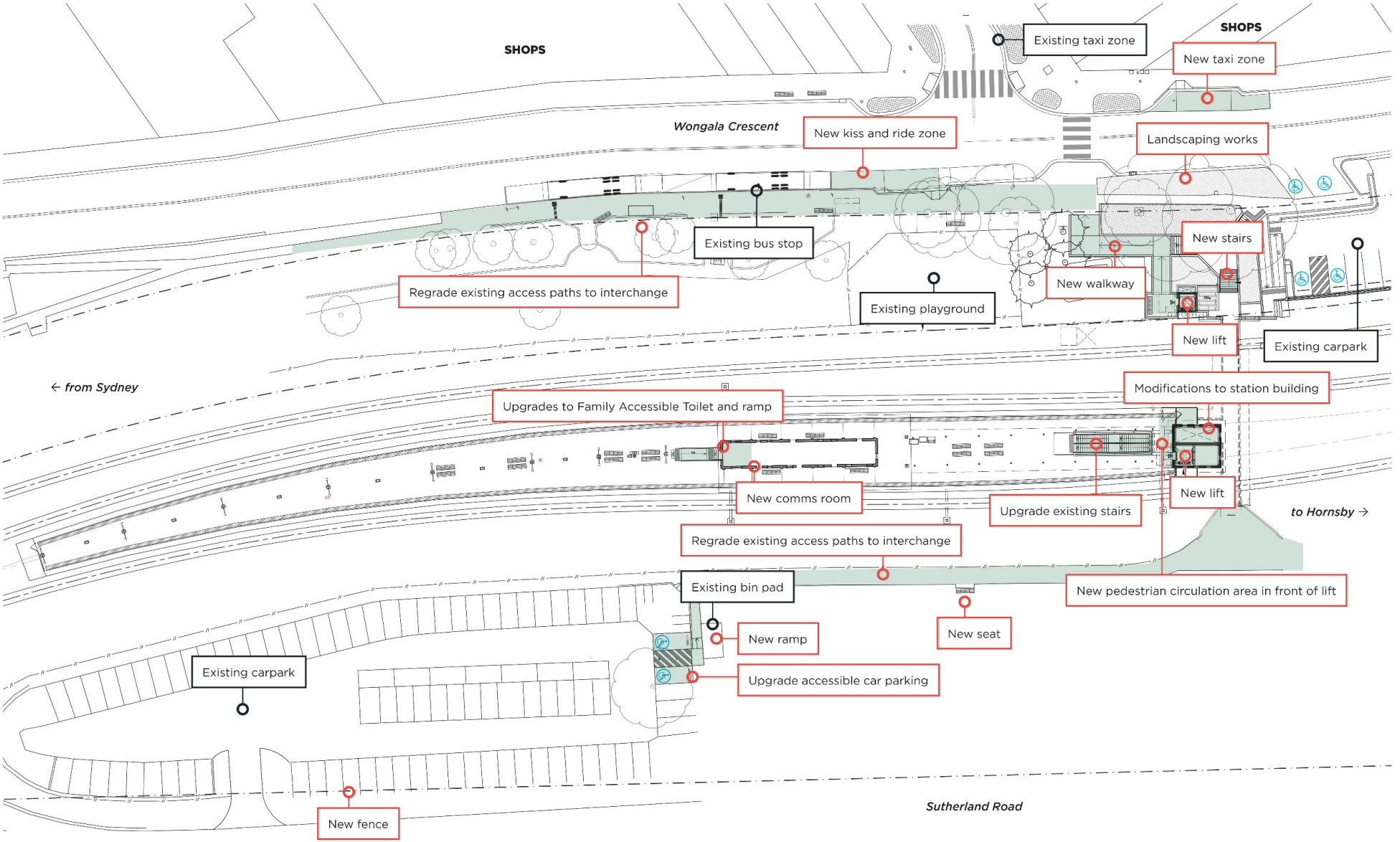


Figure 3.1 Overview of proposed upgrades

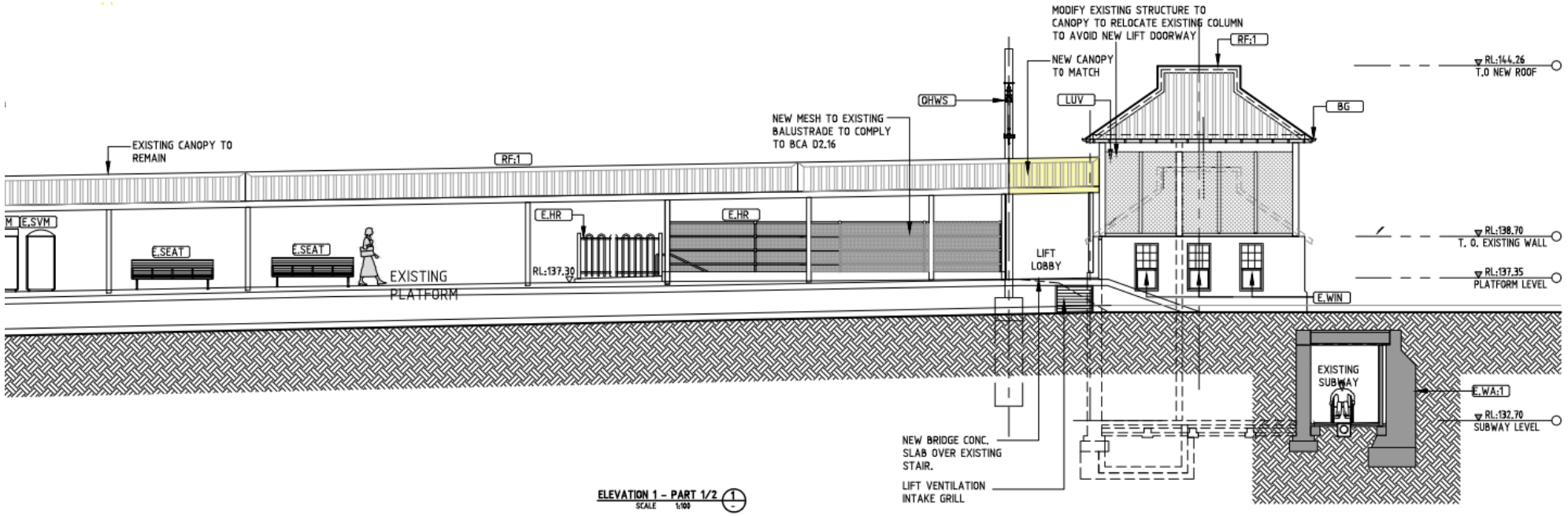


Figure 3.2 Indicative elevation of the Proposal looking west showing the northern end of the platform

Notes:

- *Source: CCG Architects, 2018*
- *Indicative only, subject to detailed design*
- *Legend:*
  - *E.xxx = existing fixture or structure*
  - *SVM = snack vending machine*
  - *RF:1 = roof (metal)*
  - *T.O. = top of*
  - *B.O = bottom of*
  - *RL = reduced level*
  - *BG = box gutter*
  - *HR = handrail*
  - *OWHS = overhead wiring structure*
  - *LUV = louvres*
  - *WIN = window*
  - *WA:1 = retaining wall*

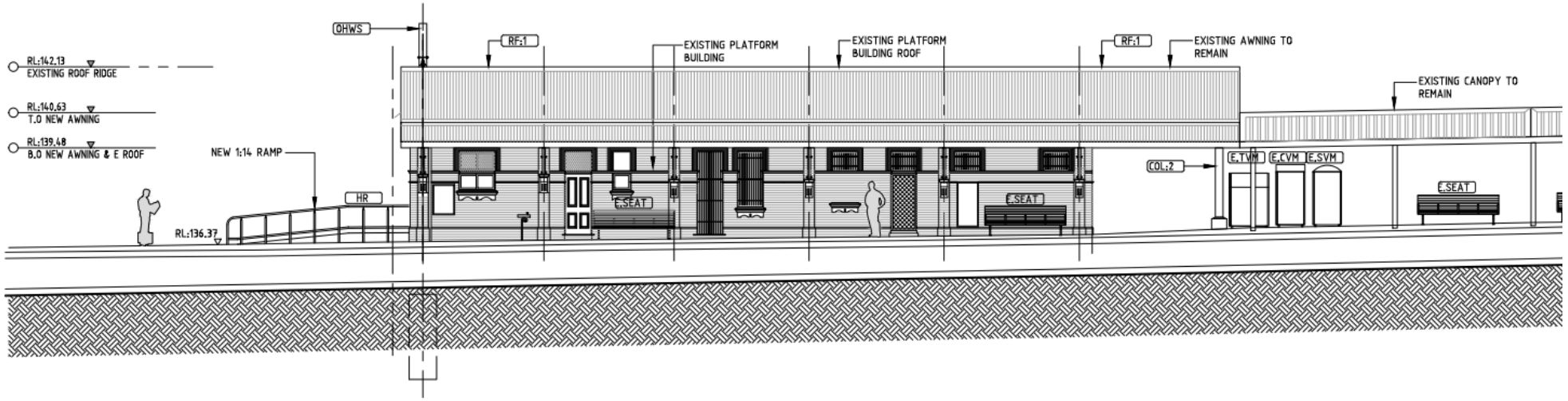


Figure 3.3 Indicative elevation of the Proposal looking west showing the southern end of the platform and station building

Notes:

- *Source: CCG Architects, 2018*
- *Indicative only, subject to detailed design*
- *Legend:*
    - *E.xxx = existing fixture or structure*
    - *SVM = Snack Vending Machine*
    - *CVN = cold drinks vending machine*
    - *TVN = ticket vending machine*
    - *RF:1 = Roof (metal)*
    - *T.O. = Top of*
    - *B.O = Bottom of*
    - *RL = Reduced level*
    - *COL2 = column (steel)*
    - *HR = handrail*
    - *OWHS = overhead wiring structure*
    - *WA:1 = retaining wall*

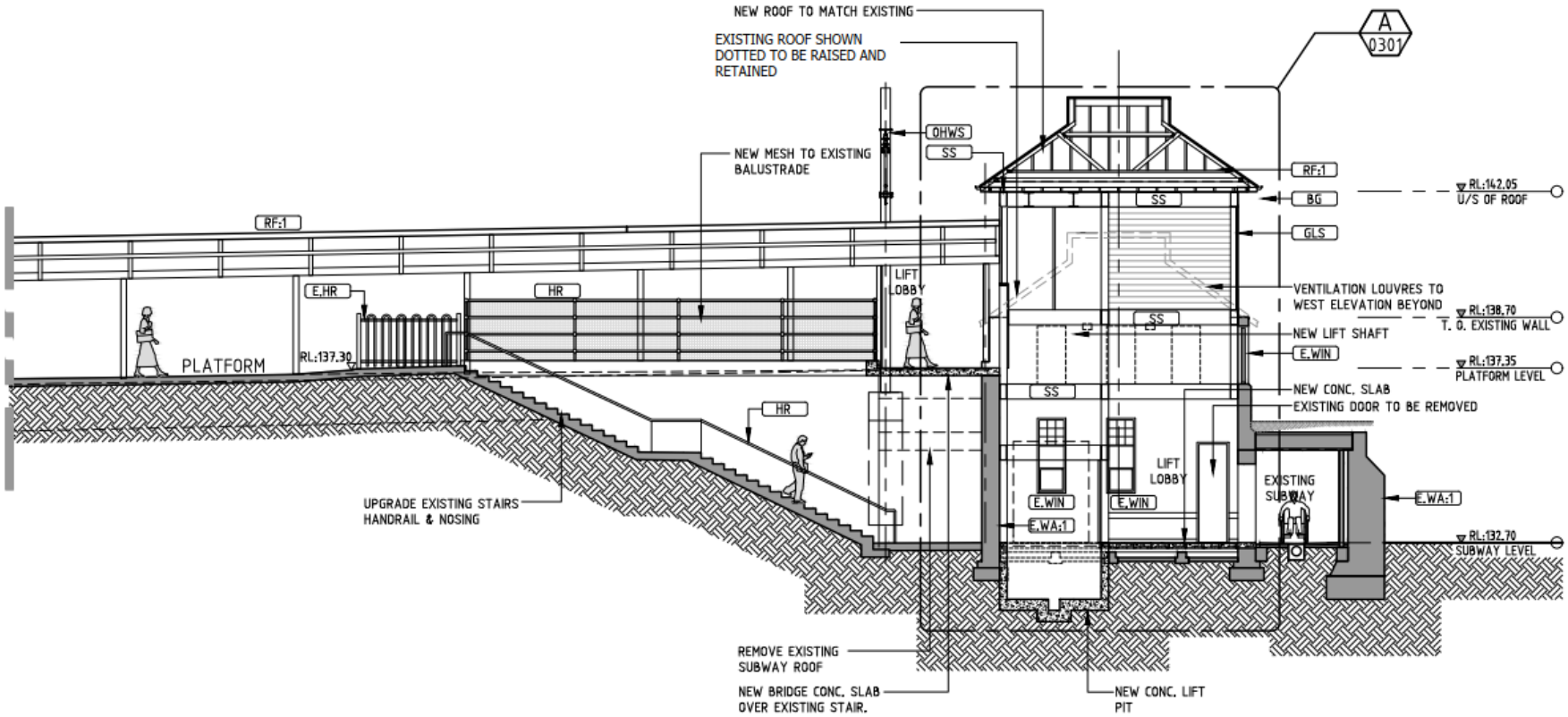


Figure 3.4 Indicative elevation of the Proposal showing the proposed lift at the northern end of the platform

Notes:

- *Source: CCG Architects, 2018*
- *Indicative only, subject to detailed design*
- *Legend:*
  - *E.xxx = existing fixture or structure*
  - *RF:1 = Roof (metal)*
  - *T.O. = Top of*
  - *RL = Reduced level*
  - *HR = handrail*
  - *OWHS = overhead wiring structure*
  - *WA:1 = retaining wall*
  - *SS = structural steel*
  - *WIN = window*
  - *BG = box gutter*
  - *GLS = clear story glass panels*
  - *CONC. = concrete*
  - *U/S = underside*

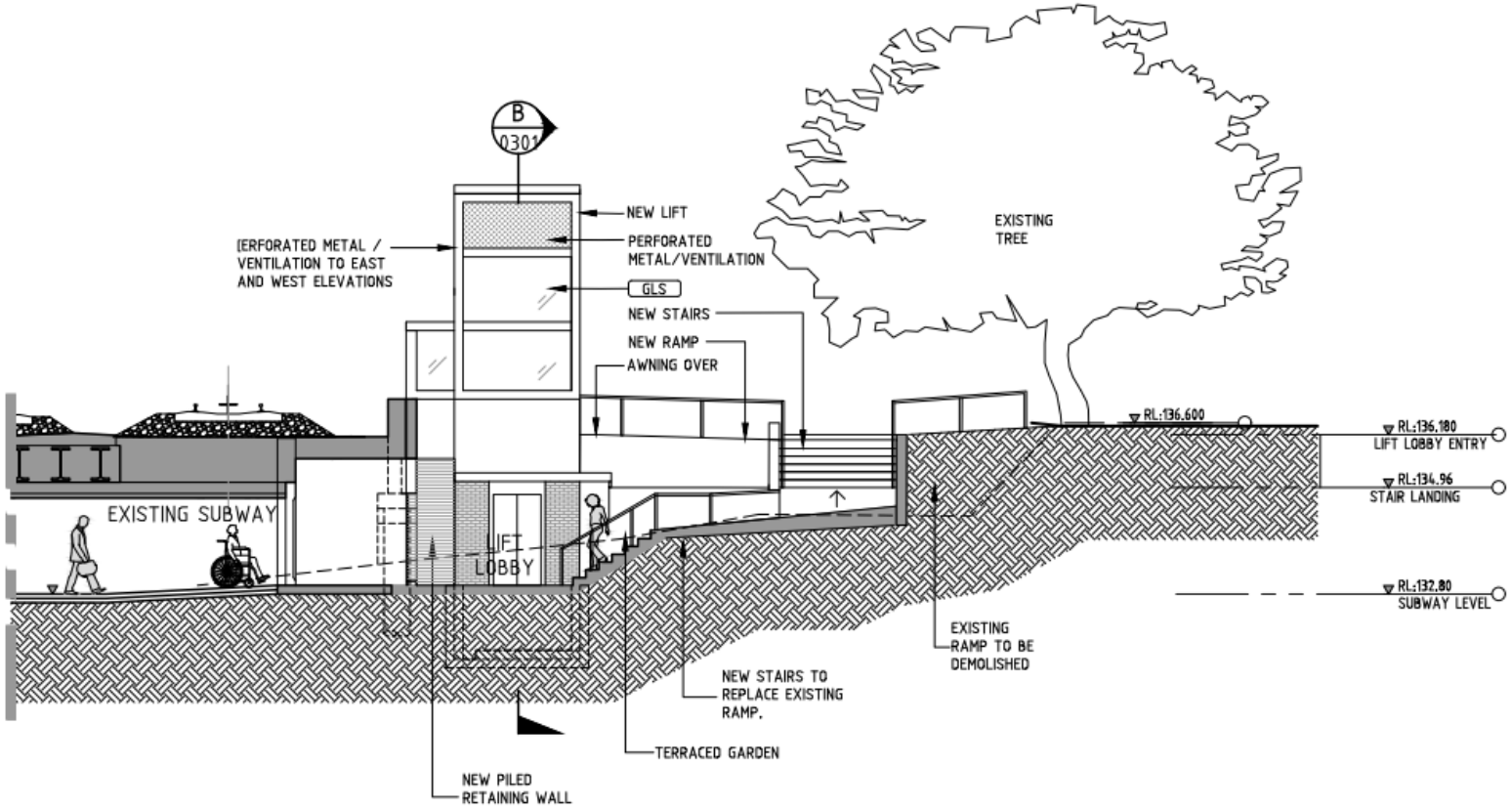


Figure 3.5 Indicative elevation of the Proposal looking south showing the western lift arrangement

Notes:

- *Source: CCG Architects, 2018*
- *Indicative only, subject to detailed design*
- *Legend:*
    - *RL = reduced level*
    - *GLS = clear story glass panels*

3.1.1 Scope of works

Station upgrade

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

- construction of two lifts:
  - lift 1 would be installed between the road level and the existing pedestrian subway on the western side of the station, within the existing garden area to the west of the existing retaining wall
  - lift 2 would be installed lift between the existing pedestrian subway and station platform within the existing communications room contained within the former booking office. This would involve raising the former booking office roof by around three metres and installation of new glass walls
- provision of new bridge over the existing staircase, extension of the western platform (Platform 2) and movement of the existing platform fence/gate at the northern end of the platform to accommodate a new pedestrian circulation area in front of the new lift
- replacement of the existing non-compliant ramp on the Wongala Crescent entry with new walkway and stairs
- upgrade the existing stairs from the subway to the platform to achieve compliance
- relocation of the existing communications room to the existing space adjacent to the family accessible toilet within the station building
- replacement of the existing non-compliant ramp to the family accessible toilet on the station platform with a compliant ramp
- creation of a new layout for the family accessible toilet at the southern end of the station building

Upgrades to accessible parking spaces

The two existing accessible parking spaces on the Sutherland Road car park would be upgraded to achieve compliance. The spaces would be upgraded with the required shared zones, line-marking, signage and bollards.

Interchange facilities

Details of the proposed works at the interchanges to improve accessibility and customer experience include:

- the existing access paths to the interchange facilities would be upgraded or regraded to remove the uneven surface
- the two bus stops on Wongala Crescent would be consolidated to make room for the kiss-and-ride area. Rail replacement buses (when in use) will be located close to the station entrance
- a new formal kiss-and-ride area would be provided on Wongala Crescent between the existing bus stop and existing mail zone. The kiss-and-ride area would accommodate two spaces and have an accessible path to the station

- the existing taxi zone on Hannah Street would be relocated to the western side of Wongala Crescent north of the existing zebra crossing to allow for an accessible path of travel from the station to the taxi zone. The existing taxi zone on Hannah Street would be converted to one hour parking
- the footpath on the east side of Wongala Crescent would be upgraded between the station entry plaza and the accessible parking spaces, kiss-and-ride zone and bus stops
- the footpath between the station's eastern entry and the Sutherland Road commuter car would be upgraded to achieve DDA compliance.

Ancillary works

The following ancillary works may also be required as part of the upgrade:

- services relocation and/or adjustments, including lighting and communications systems (e.g. CCTV), stormwater drainage, retaining walls, and overhead wiring
- station power supply upgrade works, which could include an upgrade to the Ausgrid power supply and earthing/bonding provisions (specific power requirements to be determined during detailed design)
- adjustment to station ticketing facilities, including new/relocated Opal card readers
- new/upgraded wayfinding signage and provision of the statutory/regulatory signage
- landscaping works to amend the garden layout to match the new stairs
- adjustments to boundary fencing (where required)
- temporary site compounds for storage of materials and equipment
- temporary works (where required) during construction would maintain pedestrian access to the station, Materials and finishes

Materials and finishes for the Proposal have been selected to accord with heritage requirements, to minimise visual impacts, to be aesthetically pleasing, and to satisfy durability/maintenance requirements and cost effectiveness.

Availability and constructability are also important criteria to ensure that materials are readily available and the structure can be built with ease and efficiently. 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 key materials:

- lift shafts – precast concrete panels (to be placed inside the walls of the former booking office), glass panels, heritage brick and roof elements will be retained where possible for lift 2, and weather board and glass cladding for upper lift shaft
- lift car – flooring to match adjacent public area flooring, stainless steel and glass doors
- platform canopy extension – steel frame and cladding to match existing
- stairs – concrete base, metal handrails and tactiles to match existing
- western ramp – stainless steel handrails, steel frame balustrades, flooring to match adjacent existing flooring
- gutters, downpipes, doors and doorframes will be colour matched to existing colour scheme.

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

3.1.2 Engineering constraints

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

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, and subway.

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.

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

- electrical services (aboveground)
- telecommunication services (underground)
- stormwater, water and sewer
- rail utilities, including signalling cabling and overhead wiring
- gas.

Other considerations: Beecroft Railway Station, the adjacent gardens, and the adjacent bushland corridor, are listed as having heritage significance under the Hornsby Shire Council LEP and the Railcorp Section 170 Heritage and Conservation register (refer to section 6.5). In particular, the exterior of the Platform building and the fabric of the subway including walls and stairs are of high heritage significance.

Beecroft Station is also within a Heritage Conservation area, and has a large number of individual heritage items within the area around the station. The area surrounding Beecroft Station contains many areas of landscaped vegetation, which were incorporated into design considerations due to their visual significance for Beecroft residents and rail passengers. The leafy suburban character of the wider Beecroft area was also considered to be an important feature to maintain, and visual impacts of station upgrades were minimised.

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
- relevant Hornsby Shire Council standards for design, codes and guidelines.

3.1.4 Sustainability in design

The development of the concept design for the Proposal has been undertaken in accordance with the project targets identified in TfNSW's Environmental Management System (EMS) and the *NSW Sustainable Design Guidelines - Version 4.0* (TfNSW, 2017) which groups sustainability into seven themes:

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

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

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

A shortlist of compulsory initiatives has been developed by TfNSW specifically for Transport Access Program projects, which includes the Beecroft Station Upgrade.

These compulsory initiatives have been reviewed and incorporated into the concept design.

The proposal is targeting a rating of 'Excellent' using the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability (IS) Rating Scheme (v2.0). The rating scheme provides an independent and consistent methodology for the application and evaluation of sustainability outcomes in infrastructure projects. The sustainability outcomes address environmental, social, economic and governance aspects.

The IS Rating Scheme is grouped into six key themes:

- management and governance
- using resources
- emissions, pollution and waste
- ecology
- people and place
- innovation.

These sustainability themes are divided into 15 performance categories, against which the Proposal would be independently assessed and assigned a rating level. The proposal would need to achieve at least 50 points to be certified as 'Excellent'.

3.2 Construction activities

3.2.1 Work methodology

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

The proposed construction activities for the Proposal are identified in Table 3.1. 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 Construction Contractor's preferred methodology, program and sequencing of work.

Table 3.1 Indicative construction staging for key activities (subject to detailed design)

Stage	Activities	Timing
Site establishment and enabling works	• establishment of site compounds (i.e. erect fencing, tree protection zones, site offices, amenities and plant/material storage areas) • establishment of temporary facilities as required (e.g. temporary access stairs, temporary toilets, temporary construction lights etc.) • erect site hoarding around the different work fronts at Beecroft Station • installation of power where required.	Standard hours
Lift 1 works	• excavation of existing garden bed to accommodate area for new lift shaft • waterproofing (as required), installation of reinforcement, formwork and concrete to form the lift pit • erection of glass and steel shaft structure • lift installation and commissioning • architectural fit-out around lift shaft including new awning over the lift.	Standard hours or 48-hour rail shutdown during scheduled Sydney Trains track maintenance weekends
Lift 2 works	• removal and relocation of existing communications equipment • removal of existing roof above pavilion building • demolition of required areas of existing brick wall associated with platform-facing section of pavilion building to make space for the new lift shaft/entry • raise roof of platform building by around three metres • waterproofing (as required), installation of reinforcement, formwork and concrete to form the lift pit • erection of glass and steel shaft structure • lift installation and commissioning • architectural fit-out around lift shaft including new pavilion roof to match existing awning.	Standard hours or 48-hour rail shutdown during scheduled Sydney Trains track maintenance weekends

Stage	Activities	Timing
New walkway and stairs construction	• demolition of existing non-compliant ramp and stairways (where required) • excavation and regrading of existing walkway areas • stair construction and fitout.	Standard hours or 48-hour rail shutdown during scheduled Sydney Trains track maintenance weekends
Interchange upgrades	• regrading of existing pedestrian paths to interchange locations • reconfiguration of the existing roadway (kerb, line marking, etc.) to accommodate the proposed kiss-and-ride • installation of new kerb and ramps at the proposed kiss-and-ride, car park, and taxi zone locations.	Standard hours
Station building works	• reconfiguration of internal station buildings to allow for a new communications/equipment room and new Family Accessible Toilet and conversion	Standard hours
Platform modification works	• installation of new ramp to family accessible toilet • installation of new mesh to existing balustrade • provision of new bridge over the existing staircase, extension of the western platform (Platform 2) and movement of the existing platform fence/gate at the northern end of the platform to accommodate a new pedestrian circulation area in front of the new lift	Standard hours or 48-hour rail shutdown during scheduled Sydney Trains track maintenance weekends
Demobilisation	• installation of ancillary features and landscaping • removal of hoardings • clearing of site.	Standard hours

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 and truck
- lighting tower
- coring machine
- water cart
- suction trucks
- rail mounted elevated
- forklift
- hi-rail plant (EWP/flatbed/hiab)

- 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 (EWP).

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:

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

Certain works may need to occur outside standard hours and would include night works and works during routine rail 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 (a possession is a scheduled Sydney Trains track maintenance weekend) would be required to facilitate the following:

- detailed site survey, services investigations and/or geotechnical investigations within and around the tracks
- construction works including removal of existing structures, excavation and installation of lift shafts, installation of stairs, regrading and installation of walkway, service relocations
- testing and commissioning of communications systems and equipment, along with testing and commissioning/cutover of new lifts and upgraded power supply.

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 mitigation measures outlined in the TfNSW *Construction Noise and Vibration Strategy* (TfNSW, 2018) (refer to Section 6.3 for further details) would be used.

3.2.4 Earthworks

Excavations and earthworks would generally be required for the following:

- the construction of lift 1 would require open cut excavations through the existing garden bed including excavation into the existing soil/fill at this location
- the construction of upgraded footpath areas and retaining walls on the western side of the station would require some minor excavation and regrading
- other minor civil works including footings and foundations for structures, drainage/stormwater works, and trenching activities for service adjustments and relocations.

Excavated material would be reused onsite where possible or disposed of in accordance with relevant legislative requirements. It is estimated that around 160 cubic metres of earthworks would be required to accommodate the lift shafts, ramp construction and other ancillary works. A majority of the earthworks would be required to install the western lift where excavation of the existing planted garden would be required.

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:

- potential higher level of platform and pedestrian subway congestion arising from restricted access to these areas during construction
- temporary increase in walking distance for rail customers on the station platform during construction works due to placement of construction hoarding and work sites
- higher road safety risk levels associated with construction vehicle-pedestrian interactions
- congestion at the bus interchange due to the reduced operational and circulation areas for buses and passenger pick-up and set-down
- potential confusion among bus customers as a result of changes to bus stop locations
- conflicts between buses and construction related vehicles accessing the site compound at the bus interchange
- minor disruptions to pedestrian/cyclist movements in and around the station and bus interchange
- a minor increase in traffic on the local road network.

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 adjacent to the rail corridor to the north of Beecroft Station, with access via Sutherland Road (refer Figure 14). Further temporary laydown areas and construction car parking may be located at the southern end of the station car park on Wongala Crescent, or the northern end of the station car park on Sutherland Road.

The area nominated for the compound is on land owned by Sydney Trains (existing rail corridor – refer Figure 14). Impacts associated with utilising this area have been considered in the environmental impact assessment including requirements for rehabilitation.

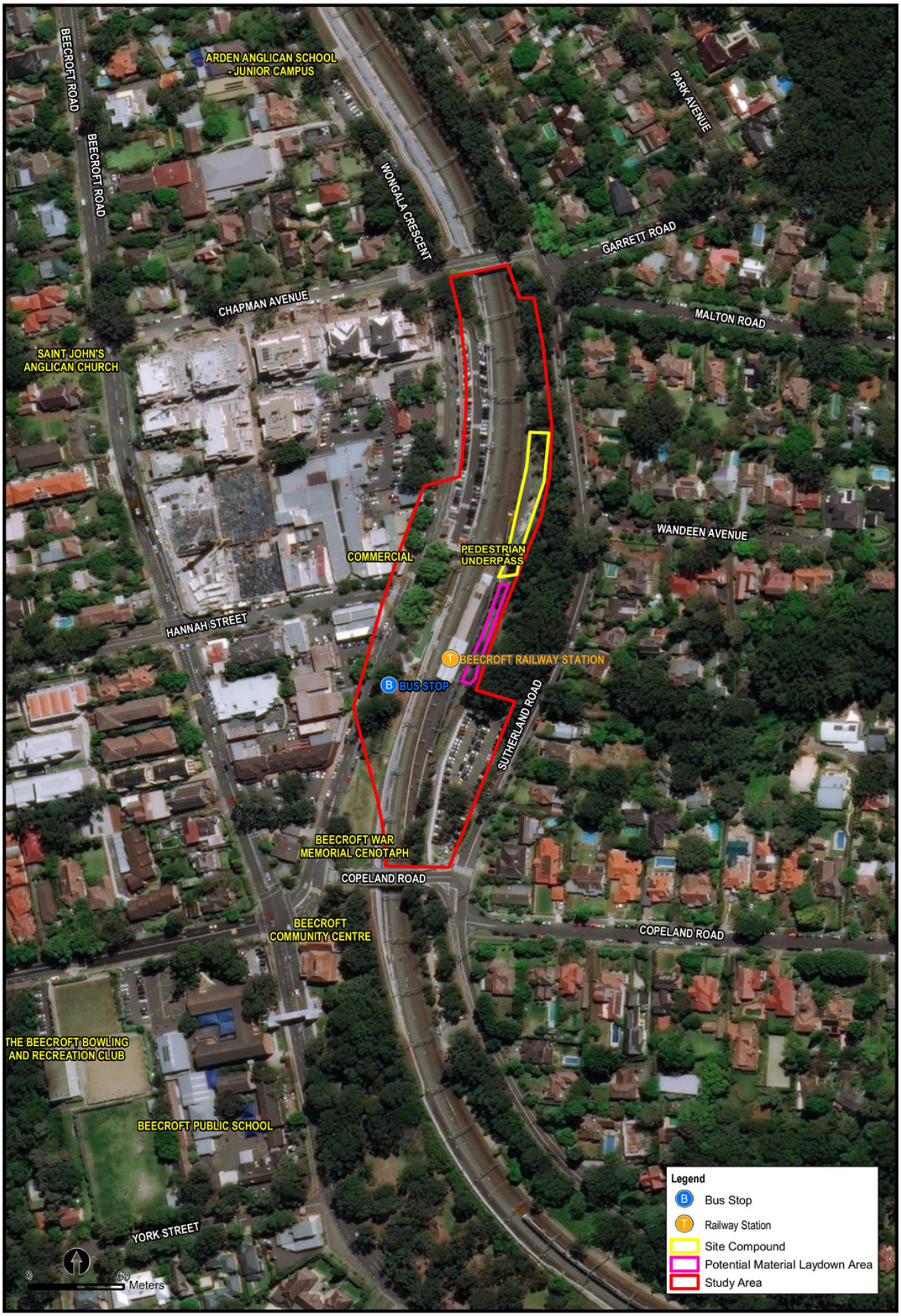


Figure 3.6 Construction compounds and laydown areas

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, including existing electrical, water and sewer services where they are located within the vicinity of proposed works for the upgrades to the existing toilet facilities and communications room facilities.

Such relocation is unlikely to occur outside of the footprint of the works assessed in this REF. In the event that works would be required outside of this footprint, further assessment would be undertaken. The appropriate utility providers would be consulted during the detailed design phase.

Relocation or other works that may affect services would be undertaken in consultation with the respective utility authorities.

3.3 Property acquisition

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

3.3.1 Operation management and maintenance

Ongoing operation of the existing station would remain unchanged with Sydney Trains operating and maintaining the station. Structures constructed under this Proposal would be maintained by Sydney Trains. However, it is expected that adjacent garden and landscaped areas on Council land would continue to be maintained by Hornsby Shire Council.

4 Statutory considerations

Chapter 1 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 4.1 provides a list of other relevant legislation applicable to the Proposal.

Table 4.1 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.

Applicable legislation	Considerations
Disability Discrimination Act 1992 (DDA Act) (Cwlth)	The Proposal would be designed having regard to the requirements of this Act. The key objective of the project is to improve the accessibility of Beecroft Station which is consistent with the objectives of this Act.
Heritage Act 1977 (Heritage Act) (NSW)	Three listed heritage items, which are of local heritage significance and may have the potential to be impacted by the Proposal, are within the Proposal site: • Beecroft Railway Station and Gardens, which is listed on the Hornsby LEP 2013 heritage register (item 142) • Beecroft Railway Station Group and Bushland Corridor, which is listed on the RailCorp Section 170 Heritage and Conservation Register (item 4801062) • Bushland, which is listed on the Hornsby LEP 2013 heritage register (item 139). A heritage impact assessment has been undertaken for the Proposal and is summarised in Section 6.5. The archaeological assessment concluded that there is a low risk of exposing historical archaeological relics during construction and that no archaeological approvals under Section 139 would be required. However, if unexpected archaeological items are discovered during the construction of the Proposal, all works would cease and appropriate advice sought, in accordance with the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2016b). Formal notification is to be provided by the asset owner to the Heritage Council regarding the demolition of structures associated with the Beecroft Station Group at least 14 days prior to the demolition of these structures in accordance with section 170A(1)(c) of the Heritage Act. No items State heritage significance were identified near the Proposal, and therefore an approval under Section 60 of the Heritage Act would not be required.
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. Additionally, as identified in Table 5.1 below, the Proposal would not involve impacts to land reserved for, or adjacent to, land reserved under the NPW Act.
Biosecurity Act 2015 (NSW)	No Priority Weeds listed under the *Biosecurity Act 2015* for the Greater Sydney Region were identified in the study area.
Protection of the Environment Operations Act 1997 (PoEO Act) (NSW)	The Proposal does not involve a 'scheduled activity' under Schedule 1 of the PoEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal. However, in accordance with Part 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Contractor.

Applicable legislation	Considerations
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 majority of roads surrounding the Proposal site are local roads, managed and maintained by Hornsby Shire Council (refer to Section 6.1 for more information). The Proposal would involve works on Wongala Crescent north of the overbridge which is not a classified road. No approvals under the Roads Act are therefore expected to be required. However, the works would be undertaken in consultation with Hornsby Shire Council including obtaining Road Occupancy Licence(s) for temporary road closures to facilitate works (where required).
Sydney Water Act 1994 (NSW)	The Proposal would not involve discharge of wastewater to the sewer.
Biodiversity Conservation Act 2016 (BC Act) (NSW)	Although the site is adjacent to known occurrences of threatened species and endangered ecological communities, 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 for further detail).
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 certain types of development to be carried out 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). Specifically, Clause 79(1) of the Infrastructure SEPP states that

> *'Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land*.'

Clause 78 defines 'rail infrastructure facilities' as including elements such as:

> *'(d) railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms*
>
> *(e)'public amenities for commuters*
>
> *(f) 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 of this REF discusses the consultation undertaken under the requirements of the Infrastructure SEPP.

It is noted that the Infrastructure SEPP prevails over all other environmental planning instruments except where *State Environmental Planning Policy (Major Development) 2005* or *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 not expected that any large-scale remediation (Category 1) work would be required as part of the Proposal. The proposed land use does not differ to the existing use and is, therefore, unlikely to be affected by any potential contaminants that exist within the rail corridor.

4.4 Local environmental planning instrument and development controls

The Proposal is located within the Hornsby 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 *Hornsby Local Environmental Plan 2013* were considered.

4.4.1 Hornsby Local Environmental Plan 2013

The *Hornsby Local Environmental Plan 2013* (Hornsby LEP) is the governing plan for the Hornsby LGA, including Beecroft. Table 4.2 summarises the relevant aspects of the Hornsby LEP applicable to the Proposal.

Figure 4.1 shows the relevant section of the zoning map from the Hornsby LEP, with the indicative location of the Proposal.

Table 4.2 Relevant provisions of the Hornsby LEP

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Table	**Applicable land zones** Under the Hornsby LEP, the Proposal is located in areas zoned as: • SP2 Infrastructure (Rail) for the proposed works associated with the station platform and buildings, and car park off Sutherland Road • B2 Local Centre for the proposed works associated with the footpaths and access points on Wongala Crescent.

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Table (cont.)	**Zone objectives** The objectives of the applicable land zones are as follows: • SP2 Infrastructure (Rail) – to provide for infrastructure and related uses and to prevent development that is not compatible with or that may detract from the provision of infrastructure • B2 Local Centre – to provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area and to encourage employment opportunities in accessible locations. The Proposal is consistent with the objectives of these zones. **Permissible development within land zones** Development for the purposes of a rail infrastructure facility is permissible with consent under the provisions of the SP2 Infrastructure (Rail) zone, and road development is permissible with consent under the B2 Local Centre zones. However, as the provisions of the Infrastructure SEPP prevail over the Hornsby LEP, development consent from Hornsby Shire Council is not required.
Clause 5.10 – Heritage Conservation	Clause 5.10 of the Hornsby LEP provides for the protection of items, places and archaeological sites which have been identified in the Hornsby LEP as having heritage significance. Beecroft Railway Station and Gardens (item 142) and Bushland (item 139) are listed on the heritage schedule of the Hornsby LEP. Several other heritage items are listed on the Hornsby LEP in the immediate vicinity of the Proposal including: • Beecroft Treasure House (item 150) • House (item 146) • House (item 147). A discussion of potential impacts to local heritage and the requirements for consent is provided in Section 6.5.
Clause 6.1 - Acid Sulfate Soils (ASS)	The Proposal site is not located on land that is mapped as having potential for ASS.
Clause 6.2 - Earthworks	Clause 6.2 of the Hornsby LEP aims to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land. By virtue of clause 5(3) and 79 of the Infrastructure SEPP, the Proposal is permissible without development consent. Consideration of the potential impacts and mitigation measures for earthworks for the Proposal is outlined in Section 6.8.
Clause 6.3 – Flood planning	The Proposal site is not located on land that is mapped as flood prone.
Clause 6.4 – Terrestrial biodiversity	The Proposal is not anticipated to impact on any land that is mapped as having terrestrial biodiversity, refer to Section 6.7.

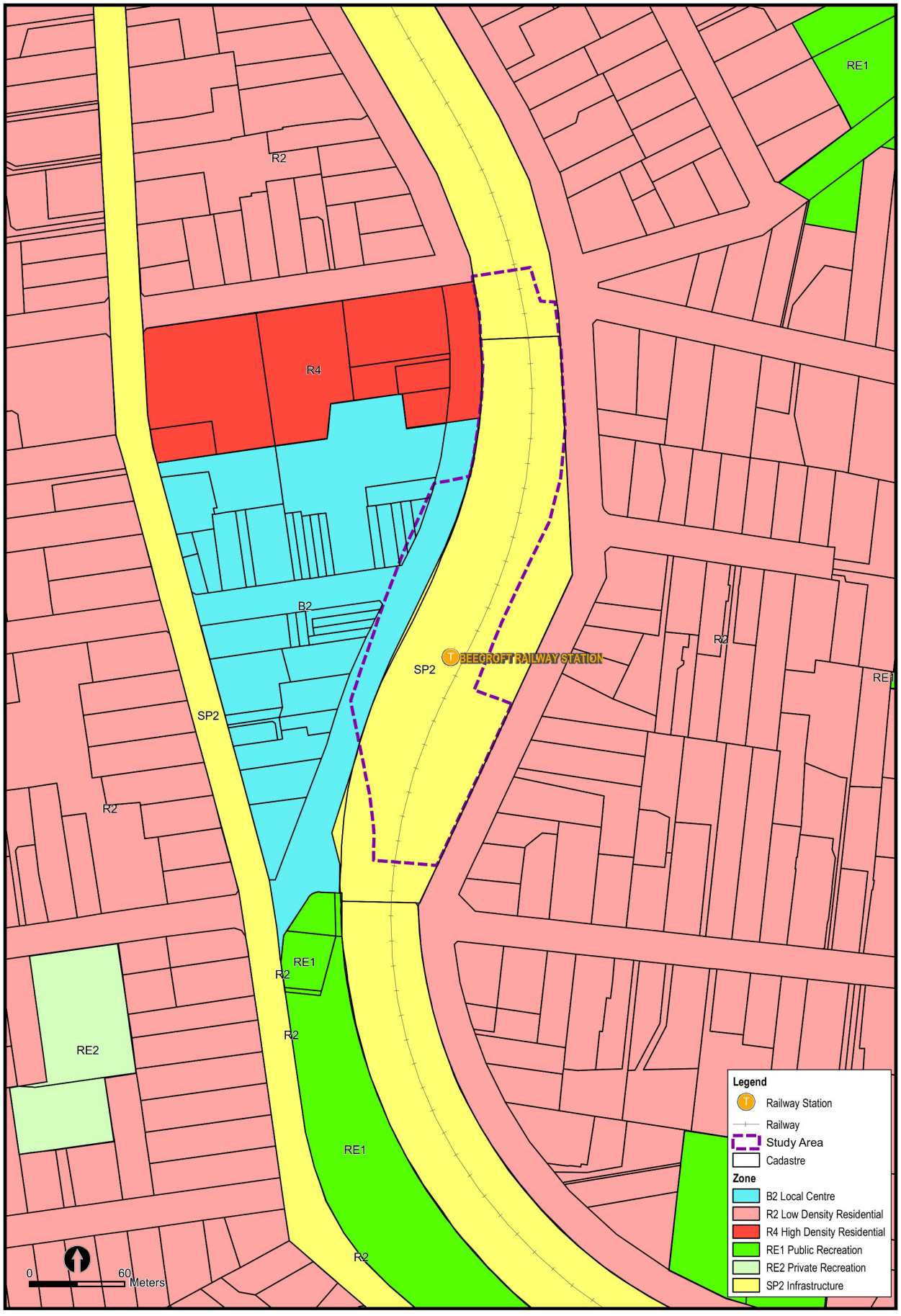


Figure 4.1 Hornsby LEP zoning map

4.5 NSW Government policies and strategies

Table 4.3 provides an overview of other NSW Government policies and strategies relevant to the Proposal.

Table 4.3 NSW Government policies and strategies applicable to the Proposal

Policy/Strategy	Commitment	Comment
Future Transport Strategy 2056 **(TfNSW, 2018a)**	Future Transport 2056 is an update of NSW's Long Term Transport Master Plan. It is a suite of strategies and plans for transport to provide an integrated vision for the state. The strategy places the customer at the centre of works undertaken by TfNSW. It includes issue specific and place based supporting plans that seek to integrate transport modes. The strategy outlines 6 state-wide outcomes • customer focused • successful places • a strong economy • safety and performance • accessible services • sustainable	The Proposal supports the vision of the *Future Transport Strategy* by providing accessible services for people who find it difficult to access public transport services. New lifts and accessible paths as proposed by the Proposal would provide a more physically accessible network allowing greater choice for people with mobility constraints to access public transport. Greater accessibility would also mean better connections to places and opportunities for employment, education, business and enjoyment.
Disability Action Plan 2012-2017 (TfNSW, 2012b)	The *Disability Action Plan 2012-2017* was developed by TfNSW in consultation with the Accessible Transport Advisory Committee, which is made up of up of representatives from peak disability and ageing organisations within NSW. The Disability Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job, and provides a solid and practical foundation for future progress over the next five years.	The Proposal has been developed with consideration of the objectives outlined in this Plan and seeks to improve and provide equitable access to public transport facilities.
Sydney's Walking Future - Connecting people and places (TfNSW, 2013b)	*Sydney's Walking Future* outlines the NSW government's efforts to: • promote walking for transport • connect people to places through safe walking networks around activity centres and public transport interchanges.	The Proposal would facilitate walking by removing physical barriers to accessible public transport and by providing accessible cross-corridor access, hence contributing a relative reduction in local trips via private cars.

Policy/Strategy	Commitment	Comment
NSW State Infrastructure Strategy 2018-2038 (NSW Government, 2018b)	The *NSW State Infrastructure Strategy 2018–2038* builds on the NSW Government's major long-term infrastructure plans over the last seven years. The strategy sets out the government's priorities for the next 20 years, and combined with the *Future Transport Strategy 2056*, the *Greater Sydney Region Plan* and the *Regional Development Framework*, brings together infrastructure investment and land-use planning for our cities and regions. 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.	The Proposal supports investment in rail infrastructure, and aligns with the need to continue to provide urban public transport to support Sydney's increasing population. The Proposal is also consistent with overall aims and objectives of the *Future Transport Strategy 2056* to improve transport infrastructure across NSW.
A Metropolis of Three Cities – The Greater Sydney Region Plan (Greater Sydney Commission, 2018)	*A Metropolis of Three Cities* is a plan designed to complement the *Future Transport 2056* plan and *State Infrastructure Strategy* by aligning land use, transport and infrastructure planning. It aims to reshape Greater Sydney as three unique but connected cities. The Proposal would form part of the proposed Central River City, which would be focused around Greater Parramatta. It is important for this Central River City to invest in a wide variety of infrastructure and services and improve amenity.	The Proposal particularly supports Objective 6 of the Three Cities Plan, which is to ensure 'services and infrastructure meet communities' changing needs', as it would increase the accessibility of places and transport for all people that use Beecroft Station.
NSW: Making It Happen (NSW Government, 2015)	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 would assist in meeting the priority to develop and invest in transport infrastructure by improving accessibility to public transport and encouraging greater use of public transport.

Policy/Strategy	Commitment	Comment
Community Strategic Plan 2018-2028 (Hornsby Council, 2018)	The *Community Strategic Plan* identifies the main priorities and aspirations for the future of Hornsby LGA. Community Outcome 1.1 of the plan is to ensure the Infrastructure meets the needs of the population. This includes ensuring that disability services and facilities are adequate.	The Proposal would assist in meeting the objectives of the Hornsby *Community Strategic Plan*, as it would make public transport facilities in Hornsby Shire more accessible for people with a disability.
Disability Inclusion Action Plan 2017-2020 (Hornsby Council, 2017)	Hornsby Council's *Disability Inclusion Action Plan* is aimed at improving opportunities for people of all ages who live with disabilities to access the full range of services and activities available in the community. Outcome 2 Liveable Communities of the plan includes to "provide and maintain accessible paths, kerb ramps, crossings and toilets to support independent travel across the Shire".	The Proposal would assist in implementing two of the actions identified in the plan, which would help to achieve Outcome 2: • Action 2.1.2 Provide and maintain continuous accessible paths of travel across the Shire, in consultation with people with disability • Action 2.1.7 Advocate for increased provision and improved local accessible public transport.

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 Beecroft 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 Beecroft Station, comprising TfNSW divisions, Sydney Trains and Hornsby Shire Council, were engaged in the development of the Concept Design Plan (Cardno, 2015) 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 the development of the concept design included:

- Options assessment workshop with relevant stakeholders including TfNSW, Sydney Trains and a heritage conservation architect
- TfNSW Design and Sustainability panel presentation
- Safety in design meetings
- Preferred option development workshop with relevant stakeholders from TfNSW and Sydney Trains.

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

Table 5.1 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: • disrupt pedestrian and vehicle movements • impact on road pavements under Council's care and control • impact on Council-operated footpaths. Consultation with Hornsby Shire Council would be undertaken throughout the detailed design and construction phases.

Clause	Clause particulars	Relevance to the Proposal
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.	Beecroft Railway Station and Gardens is listed on the Hornsby LEP 2013 heritage register (refer to Section 6.5). Consultation with Hornsby Shire Council would be undertaken throughout the detailed design and construction phases.
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. Consultation with Hornsby Shire Council is not required in regard to this aspect. Refer to 6.9.
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.	Consultation with other public authorities as specified in this clause is not required. However, consultation with Sydney Trains would be ongoing through the next stage(s) of the Proposal.

5.2 Consultation strategy

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

The objectives of the consultation strategy are to:

- provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- raise awareness of the various components of the Proposal and the specialist environmental investigations
- ensure that the directly impacted community are aware of the REF and consulted where appropriate
- provide opportunities for stakeholders and the community to express their view about the Proposal
- understand and access valuable local knowledge from the community and stakeholders

- record the details and input from community engagement activities
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach.

5.3 Public display

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

- public display of the REF at various locations
- distribution of a project 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 of the Proposal and information on how to provide feedback
- consultation with Hornsby Shire Council, Sydney Trains, NSW Train Link and other key stakeholders
- pop-up community information session

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:

- Pennant Hills Branch Library and Community Centre (Hornsby Council)
  Yarrara Road and Ramsay Road, Pennant Hills NSW 2120
  (02) 9847 6100
- TfNSW Office
  Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood 2067.

Face to face activities such as pop-up stalls would be conducted with the community to encourage feedback and provide opportunities for the community to ask questions and be informed by the Project team. The community and stakeholders would be advised about these activities via advertisements in the local paper, distribution of flyers and a dedicated project page on the TfNSW website.

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

5.4 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal (refer Figure 1.1).

[2] http://www.transport.nsw.gov.au/projects-tap
[3] projects@transport.nsw.gov.au

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

Should TfNSW determine to proceed with the Proposal, the project team would keep the community, councils and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community would be undertaken in accordance with a Community Liaison Management 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 Assessment* was prepared by WSP in August 2018 for this proposal, consisting of a desktop analysis and site visit. The following sections assess the potential impacts to road and rail users during the construction and operation stages of the Proposal, and provide mitigation measures to reduce these impacts.

6.1.1 Existing environment

Site context

The T1 Northern Line operates between Hornsby and Chatswood via Epping and Macquarie University. The existing road network around the station mainly comprises of local roads (residential streets). Road access from the west is via Wongala Crescent and Hannah Street while access from the east is via Sutherland Road.

A bus stop and bus shelter are located on the eastern side of Wongala Crescent, just south of the entrance of Beecroft Station.

A pedestrian crossing adjacent to the entrance of Beecroft Station on Wongala Crescent provides access to the shops on the western side of Wongala Crescent and the taxi bay on Hannah Street. At the southern end of the car park on Sutherland Road, another pedestrian zebra crossing allows access from residential areas to the station.

Beecroft Station is supported by two commuter car parks located on Wongala Crescent at the northern extent of the Station and on Sutherland Road at the southern end of the Station.

Station access

Access to Beecroft Station is provided via a stair and ramp arrangement connecting both Wongala Crescent and Sutherland Road to a pedestrian subway connecting to the island platform via stairs.

Present access to Beecroft Station is currently not compliant with Disability Standards for Accessible Public Transport (DSAPT) 2002, resulting in its consideration for an upgrade.

Surrounding development

Due to finish in September 2018, construction was undertaken along Beecroft Station Gardens by Hornsby Shire Council, situated on the Eastern side of Wongala Crescent, (Hornsby Council, 2018). Construction works included:

- construction of the path to Beecroft Village Green
- construction of the Community Centre unloading area and parking area
- recycled brick and new sandstone paving in the Station Gardens
- recycled and new sandstone walls and garden edges in the Station Gardens

- installation of a timber deck and seating adjoining the Cenotaph in the Station Gardens
- construction of a timber shade pergola with seating wall and table settings
- installation of tables and bench seats throughout the Station Gardens and along the Wongala Crescent street frontage.

Surrounding road network

Beecroft Station is located between Wongala Crescent to the west and Sutherland Road to the east (refer to Figure 6.1). Chapman Avenue overbridge crosses the train line to the north of Beecroft Station, and the line is crossed to the south by Copeland Road overbridge that connects to both Wongala Crescent and Sutherland Road.

Most roads surrounding the site are local roads, managed and maintained by Hornsby Shire Council. However, the following roads and sections of roads are designated as classified roads under the care, control and maintenance of Roads and Maritime Services:

- Copeland Road overbridge south of Beecroft Station
- Wongala Crescent between the overbridge and Beecroft Road
- Beecroft Road
- Copeland Road (east) to the junction with Beecroft Road
- Sutherland Road, south of the junction with Copeland Road overbridge.

(Source: NearMap, 2018)

Figure 6.1 Beecroft Station – Surrounding road network

Parking

Beecroft Station has two dedicated commuter car parks. One is located on western side of the station, along Wongala Crescent (north) and has a capacity of 91 spaces. There are an additional 20 short term spaces directly outside this commuter car park which are Council-owned including two accessible car spaces which are currently non-compliant. On the eastern side of the station, there is a commuter car park close to the Copeland Road and Sutherland Road intersection which has the capacity for 98 vehicles, including two accessible parking spaces.

Along the side streets on the eastern side of the station, there are around 195 unrestricted on-street parking spaces available within a 400-metre radius of the station.

Figure 6.2 shows the locations of unrestricted parking, both commuter and on-street, close to Beecroft Station.

(Source: Cardno, 2018)

Figure 6.2 Existing parking within the vicinity of Beecroft Station

Public transport

Rail

Beecroft Station operates under the T1 Northern Line, providing services toward Penrith, Richmond, Macquarie Park, North Sydney and Hornsby. On average Beecroft Station experiences 4,600 passenger trips daily (combined entry and exit) based on an average weekday in 2013.

Bus

Beecroft Station services three bus routes from Wongala Crescent. These routes include:

- 553 (Beecroft Loop)
- 635 (Castle Hill to Beecroft)
- 651 (Castle Hill to City).

All bus stops associated with the station are located on the western side of the railway line on Wongala Crescent.

Pedestrian infrastructure

Taxi

There is a designated taxi rank on the north side of Hannah Street, close to the intersection of Wongala Crescent. The taxi zone has capacity for approximately three taxis.

Kiss-and-ride facilities

Beecroft Station does not currently have a formal kiss-and-ride facility. Informal kiss-and-ride is most likely to occur along Wongala Crescent, adjacent to the station entrance.

Cyclist infrastructure

A bike rack is provided on the eastern side of the station, adjacent to the station subway. A bike locker is also provided at the southern end of Sutherland Road car park (located north of Sutherland Road and Copeland Road intersection). This has capacity for storage of four bicycles. No formal cycleways were identified within the vicinity of the station precinct.

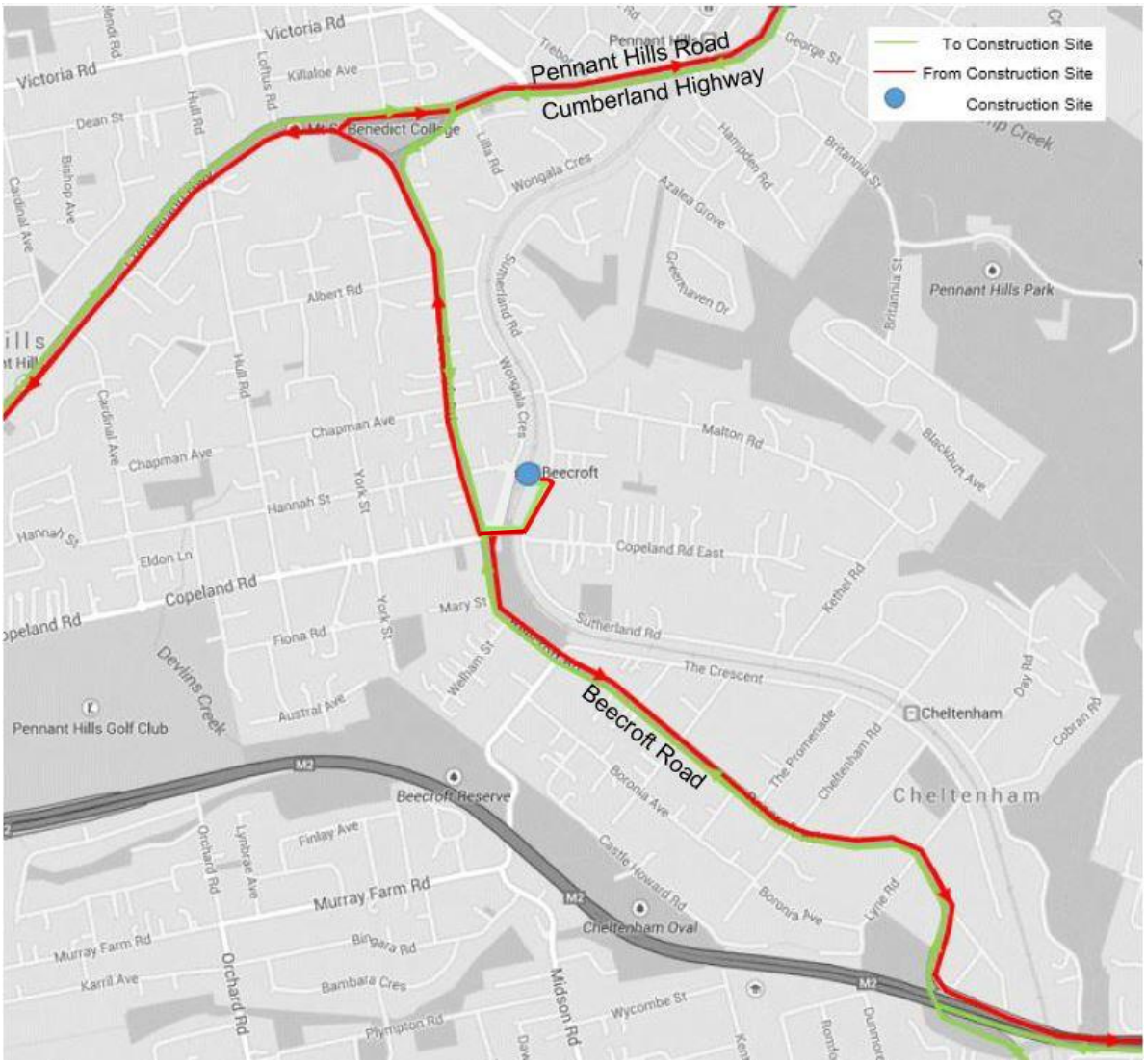
6.1.2 Potential impacts

a) Construction phase

Site compound haulage routes

As described in section 3.2, the main site compound would be located adjacent to the rail corridor to the north of Beecroft Station, with access via Sutherland Road compound area adjacent to the eastern side of the existing rail corridor (refer to Figure 3.6).

The road network surrounding Beecroft Station is well serviced by RMS approved B-Double routes with M2 Hills Motorway, Beecroft Road and Cumberland Highway approved to cater for 25/26 metre B-Doubles vehicles. Heavy vehicles can access the interchange via the west, north and east. As no definitive haulage route has been identified at this stage, indicative haulage routes that can suitably cater for heavy vehicle access to and from the construction site have been identified (refer to Figure 6.3).



(Source: Cardno, 2018)

Figure 6.3 Indicative haulage routes

Traffic

The vehicles generated onto the road network as a result of the construction works are expected to be mostly light vehicles from construction workers with minimal heavy vehicle trips for delivery and removal of materials, plants, and equipment when required. The traffic generated as a part of the construction works is not expected to exceed 20 light vehicles and 10 heavy vehicles per day during peak construction periods.

Given the minimal traffic generated during construction, including both staff light vehicle trips and construction heavy vehicle trips, the surrounding road network and intersections would comfortably sustain project related vehicle trips and continue to perform within capacity.

Construction works are predominately going to be undertaken within the RailCorp boundary, with minimal works expected to be undertaken that would impact the traffic on the external road network.

The construction and raising of the pedestrian crossing and the realignment of the parking spaces on Wongala Crescent are projected to have short timelines and as such, any delays resulting from the proposed scope of works are expected to be brief and non-detrimental to the traffic flow on the external road network with the implementation of mitigation measures.

Parking

The proposed construction works, including construction site and access points, would be designed to avoid impacts on parking provisions (where possible). Part-time loss of parking spaces may occur during the scope of works, including on Wongala Crescent, with the closure expected to be dependent on the works undertaken.

Part-time loss of up to six car spaces are expected within the Sutherland Road car park, during the formalisation of two compliant accessible parking spaces. However, the loss in parking is expected to be short term.

Pedestrians and cyclists

Construction work is expected to have a minor impact on the pedestrian and cycle network given the restricted space in which construction works are to be carried out. It is expected that there may be restrictions and disruptions to pedestrian and bicycle manoeuvrability as a result of the following construction activities:

- installation of the proposed lift and upgrading staircase access to Beecroft Station from Wongala Crescent which would impede customer access during the construction
- installation of the proposed lift between the existing OPAL card readers and the station platform which would impede pedestrian ingress and egress
- upgrading of the footpath between the station and Sutherland Road car park.

Construction works to be undertaken in close proximity to the existing footpaths and cycle facilities would occur infrequently with closures expected to be temporary, with safe and suitable detours provided as a part of the construction traffic control management to be implemented during the construction period.

Emergency vehicle access

Access for emergency vehicles would be maintained at the construction sites in accordance with emergency vehicle requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes. Advice would include information about upcoming traffic disruptions, anticipated delays to traffic, extended times of work and locations of any road possessions.

b) Operational phase

Pedestrians

It is anticipated that the pedestrian movement would remain consistent with the proposed upgrades to the interchange as one of the intentions of the proposed design is to maintain/improve pedestrian manoeuvrability throughout the interchange. The Proposal would also allow for accessible movement within the interchange across all transport modes, in particular to and from the train station platform and external road network, bus stops and accessible parking spaces.

Traffic

The proposed scope of works is not anticipated to have a direct increase in traffic generation during operation. It is anticipated that as a result of the works, access to and from the station would be slightly shifted towards active forms of transport given the upgrade and increase in infrastructure surrounding the interchange, which would encourage safe and easy walking alternatives over vehicle transport modes.

Parking

Current car park demand surrounding Beecroft Station is typically high with unrestricted parking spaces generally fully utilised in the commuter car parking facilities at the southern car park and on Wongala Crescent as well as on-street parking along Wongala Crescent and Sutherland Road (Cardno, 2018).

The Proposal would result in minimal changes to the parking supply within the station precinct with a net increase in one parking space. As results of the proposed amendment of existing restricted parking to a dedicated taxi rank to the western side of Wongala Crescent, two time-restricted parking spaces would be removed. However, up to three time- restricted parking spaces are proposed to be provided on Hannah Street in place of the existing taxi rank. Additionally, the proposed realignment of the parking spaces within the Sutherland car park to provide two compliant accessible spaces is anticipated to have a positive impact for customers.

No other changes are expected to the existing parking nature surrounding Beecroft Station.

Public transport and pedestrian infrastructure

Buses

The two existing bus zones located along the eastern verge of Wongala Crescent are proposed to be formalised into one dedicated bus zone with commuter shelter to cater for the three existing bus services. The changes to the bus stop zone along Wongala Crescent are expected to have negligible impact on the bus services along Wongala Crescent during operation and would allow a formalised kiss-and-ride zone to be located within close proximity to train, bus and taxi transport modes.

The location of the bus stops located just south of the train station entry plaza on Wongala Crescent are considered suitable as the proposed upgrades to the pedestrian path would improve connectivity between train and bus services, providing a greater comfort and ease of access to and from the various transport modes within the station as well as local shops located on Wongala Crescent and Hannah Street.

Cyclists

The Proposal is not anticipated to result in any adverse impacts to cyclists during operation.

Kiss-and-ride

A formalised kiss-and-ride zone is proposed along Wongala Crescent, located approximately 40 metres to the western entry plaza of the station adjacent to the bus zone. The location of the kiss-and-ride zone and its close proximity to other transport modes is considered suitable and effective in its purpose of mitigating current behavioural patterns of motorists frequently stopping at informal locations to allow passengers to disembark/embark from the vehicles which leads to traffic congestion.

Taxi

The provision of a new taxi zone along Wongala Crescent would provide close access to the western station entrance and allow for up to an additional three parking spaces on Hannah Street which would provide greater connectivity to the local shops. Connectivity to the taxi rank is proposed to be upgraded as a part of the relocation, with adequate accessible paths improving manoeuvrability between the various transport modes and the taxi rank.

6.1.3 Mitigation measures

The following mitigation measures are recommended to be implemented to minimise impacts during the construction of the Proposal. Refer to Table 7.1 for a complete list of mitigation measures.

General Mitigation Measures

The following general mitigation measures are recommended for implementation, to minimise impacts during the construction of the Proposal.

- Prior to the commencement of construction, a Construction Traffic Management Plan would be prepared as part of the Construction Environmental Management Plan and would include at a minimum:
    - Ensuring adequate regulatory road signage, line marking and all other traffic control devices necessary 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
    - Ensuring access to railway stations, businesses, recreational 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
    - 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 kiss-and-ride, taxi ranks and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Provisions would also be considered for the accessibility impaired.
    - Consultation with the relevant roads authorities would be undertaken during preparation of the construction TMP and obtaining necessary Road Occupancy Licences for temporary road closures. The performance of all project traffic arrangements must be monitored during construction.
- Communication would be provided to the community and local residents via notifications and signage 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.
- Suitable vehicle and pedestrian paths would be maintained throughout the construction of the proposed upgrade to ensure safe and easy access throughout the interchange
- Suitable pedestrian provisions would be made to ensure that pedestrian connectivity between various transport modes and the bus stop is not impacted as a part of the works and that suitable and safe paths are provided
- Qualified traffic controllers would be used during construction works to ensure safe and efficient movement of vehicle and pedestrian traffic on the external road as well as in and out of the construction site
- Fencing and barriers would be installed between construction site and outside construction zone to ensure safe and easy navigation of pedestrians and cyclists.

- During construction works to the staircases at the Wongala Crescent entrance, at least one of the existing staircases should be maintained at all times. Where possible, works to the southern portion of the staircase/ramp would be considered in parallel to construction activities for the installation of the western lift to minimise the footprint of construction activities and reduce the direct impact to customers accessing the station
- A suitable path of travel from the Sutherland car park to the station should be provided during works to the existing footpath to allow pedestrians to safely bypass construction works
- To ensure the adequate installation of the accessibility parking within the Sutherland Road car park, the footprint of the existing bin pad should be reduced to ensure a sufficient kerb side ramp width and path access to the existing footpath. The design of the accessible parking should consider opportunities to maintain the existing tree, situated behind the proposed accessible car parking.

Operation

The proposed upgrades to Beecroft Station are expected to improve the integration of the various transport modes within the interchange and are anticipated to provide a safer passage for all users between the transport modes.

No specific mitigation measures during operation of the Proposal have been identified.

6.2 Urban design, landscape and visual amenity

This section provides a summary of the *Visual Impact Assessment* prepared by IRIS Visual Planning + Design (2018) (Technical Paper 1). The methodology used to undertake this assessment is provided in section 6 of the visual impact report.

The assessment included a desktop analysis and site inspection to identify the potential visual impacts of the Proposal on views to the station from surrounding publicly accessible areas.

6.2.1 Existing environment

Beecroft Station is located between Wongala Crescent and Sutherland Road, Beecroft. The visual importance of the station is reflected in its listing as a local heritage item and on the NSW heritage register (s170 RailCorp Heritage and Conservation Register) as an example of railway station architecture from 1895 to 1914.

Within the study area, the landform is generally undulating. The landform surrounding the station rises to a small ridgeline in the west. The station is slightly elevated above the existing bushland and Sutherland Road in the east and level with Wongala Crescent to the west.

The landform rises to the north and south. The railway corridor goes into a cutting and passes beneath the Chapman Avenue overbridge in the north, and Copeland Road overbridge in the south. This cutting reduces as the line approaches the station and becomes an embankment. The cuttings and rail corridor are vegetated in parts, creating a leafy setting to the corridor.

Areas to the east and west of the rail corridor are characterised by a mix of heritage character and modern residential and commercial buildings.

The existing visual conditions of the study area are described in the following paragraphs and illustrated in Figure 6.4.

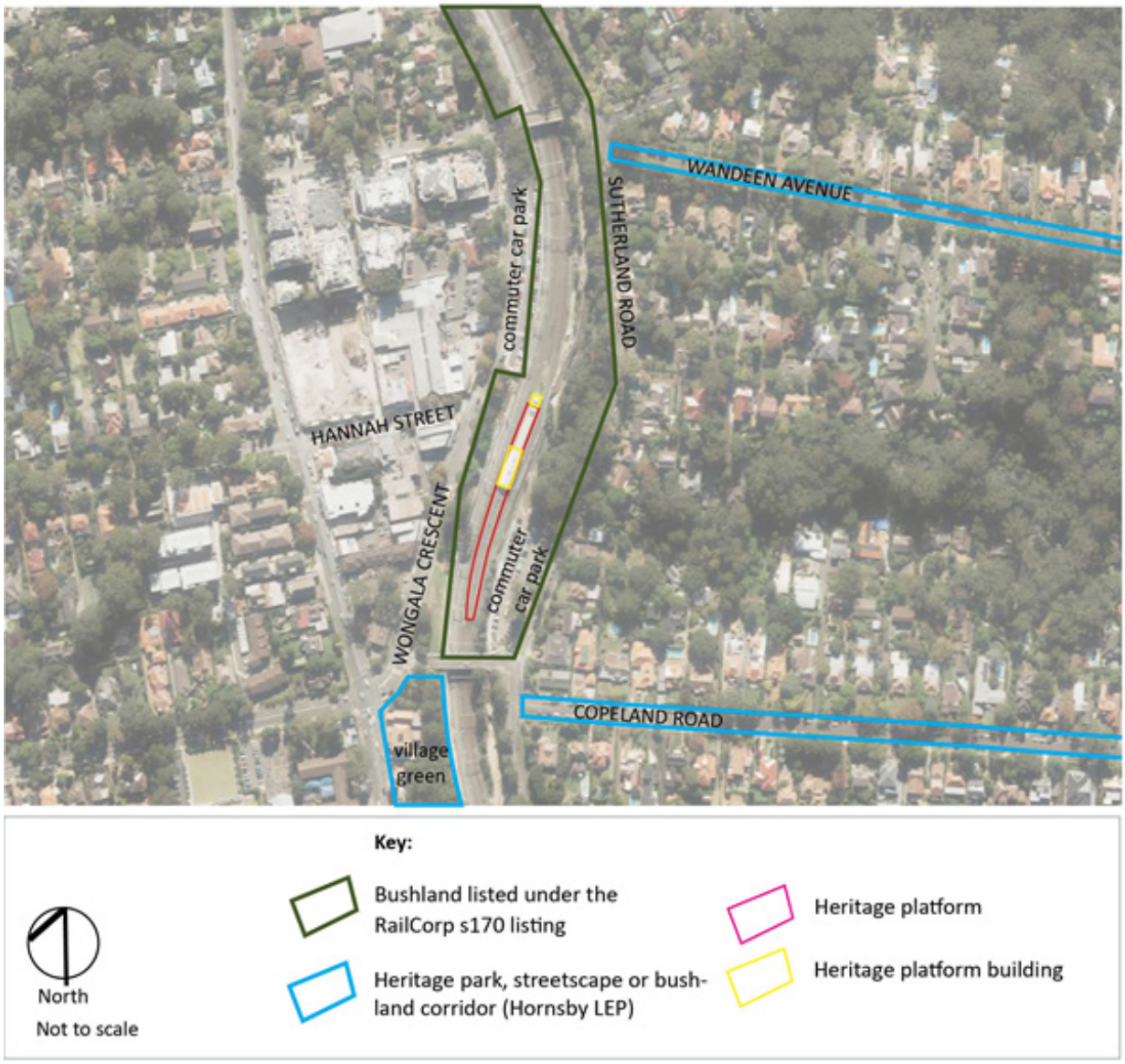


Figure 6.4 Landscape and visual features of the site

Beecroft Station precinct

Beecroft Station (c. 1895 to 1914) includes an island platform, station platform building with booking office, and subway. The station features a single-storey Victorian style red brickwork platform building, with gabled corrugated iron roof, curved cast iron brackets and decorative timber valances.

There are two commuter car parks in the vicinity of the station, one to the northwest on Wongala Crescent and one to the southeast of the station on Sutherland Road.

The rail corridor includes overhead line equipment and corridor security fencing which create some visual clutter particularly to the north of the station, beside the commuter car park, where there is no planting along the rail corridor.

The station is surrounded by dense corridors of bushland and mature trees to the east and west. The adjoining landscaped areas and native bushland and cultural plantings … "provide an attractive setting for the station and assist to maintain the historic character of the station, by providing a visual buffer from surrounding urban modernisation" (NSW State Heritage Register, 2009). These trees are also considered to be … "visually significant for rail passengers" (NSW State Heritage Register, 2009).

Beecroft local centre and village green

To the west of the station, Wongala Crescent is aligned generally parallel to the railway corridor. Hannah Street extends west from Wongala Crescent and is the main street of the Beecroft village. It is characterised by early twentieth century single and two-storey commercial buildings with retail at street level.

Near the station the streetscape is characterised by mature street trees and a local park and playground located between the rail corridor and Wongala Crescent. The parkland trees include bunya and hoop pines, jacarandas, camphor laurels, London plane trees and brush box. This grouping of trees is a local visual feature associated with views to the station.

These trees filter and frame views to the historic station platform buildings in views from Wongala Crescent and Hannah Street. Closer range views to the platform buildings are also partly obstructed by trees, the playground walls and fencing.

The Beecroft village green is located to the south of the station, between the rail corridor and Wongala Crescent. Upgrades to this park are currently under construction. This park includes a Boer War, WWI and WWII memorial (local heritage items), picnic areas, lawns and ornamental trees. There would be views to the station from this park in the future.

To the north of the station, as the landform rises towards the Chapman Avenue overbridge, there are four to five-storey modern brick residential units in Wongala Crescent. These residences have recently been constructed and would have views over Beecroft Station and the Proposal site.

Bushland corridor

A corridor of bushland, located to the north and east of the station, provides an attractive visual setting to the station and village centre. This includes a dense corridor of mature native trees in the rail reserve, including Blue Gums, Blackbutt and Grey Ironbark. The corridor also includes more recent plantings of Peppercorn and Silky oaks.

These trees are described in the local heritage listing as having … "aesthetic appeal" which forms a … "pleasant backdrop to the train line" (NSW OEH Heritage Register, 2018). The bushland corridor is listed as a local heritage item in the NSW OEH Heritage Register.

Residential areas surrounding the station

The residential area surrounding Beecroft Station are part of the *Beecroft — Cheltenham Heritage Conservation Area*. To the east of the station, this area is characterised by detached federation style houses, set within tree-lined streets. Views to the station are generally filtered or blocked by the bushland vegetation along the rail reserve. Several bushland tracks provide informal access to and from the station through this vegetation.

6.2.2 Potential impacts

The following viewpoints were selected as representative of the range of views to the site and the proposed development:

- Viewpoint 1 – View north from Beecroft Station platform
- Viewpoint 2 – View south from Wongala Crescent commuter car park
- Viewpoint 3 – View east along Hannah Street
- Viewpoint 4 – View north from Wongala Crescent
- Viewpoint 5 – View south from footpath to the east of the station
- Viewpoint 6 – View north from the Sutherland Road commuter car park.

Photographs of these viewpoints are provided below (Figure 6.6 to Figure 6.11), and the location of each is shown on Figure 6.5.

Figure 6.5 Viewpoint location plan

a) Construction phase

Viewpoint 1 – View north from Beecroft Station platform

During construction, two visually separate construction sites would be established in the middle ground of the view, one at the end of the island platform, and on to the west of the corridor. The works would include construction of the western entry lift and extending the platform and works to add an additional level to the heritage former booking office building. The character of this construction activity would contrast with the heritage and leafy character of the station and be seen in close proximity to commuters.

This would result in a considerable reduction in the visual amenity of this view and a *moderate adverse visual impact* during construction.

Figure 6.6 View north from Beecroft Station platform

Viewpoint 2 – View south from Wongala Crescent commuter car park

Two visually separate construction sites with would be established in the middle ground of the view, one at the end of the island platform, and to the west of the corridor (right of view). The works would include some demolition for the construction of the lifts, extension the platforms and platform awning, and adjustments to the former booking office. This work would be seen through intervening elements including fences, overhead line equipment, light posts, and intermittent trains. The character of this construction activity would contrast somewhat with the heritage and leafy character of the station.

This would result in a minor reduction in visual amenity and a *moderate adverse visual impact* during construction.

Figure 6.7 View south from Wongala Crescent commuter car park

Viewpoint 3 – View east along Hannah Street

Construction at the station would be seen in the background of the view. The works would include works to construct the western lift, reconfigured ramp and stair access and upgrading of the kerbside facilities on Wongala Crescent. Beyond this, there would be some views to construction of the platform lift, works to extend the platform and platform awning. The view of the former booking office building would be temporarily removed.

The character of this construction activity would contrast with the heritage and leafy character of this view. However, the work would be somewhat screened by intervening vegetation, and viewed at a distance.

This would result in a minor reduction in visual amenity and a *minor adverse visual impact* during construction.

Figure 6.8 View east along Hannah Street

Viewpoint 4 – View north from Wongala Crescent

The construction sites would be visible in the middle ground of this view, one at the end of the island platform, and one on Wongala Crescent. The works would include the removal of some understorey vegetation at the western station entry, demolition works and construction of a new lift pavilion. In the middle ground, the reconfiguration of the ramp and stair access to the subway would be visible, as would works to upgrade the kerbside facilities on Wongala Crescent.

Works to construct the lift within the former booking office may be glimpsed beyond this work and through the existing trees. Whilst some of the work would be screened by intervening vegetation, the character of this construction activity would contrast with the leafy character of this view.

This would result in a minor reduction in visual amenity and a *minor adverse visual impact* during construction.

Figure 6.9 View north from Wongala Crescent

Viewpoint 5 – View south from footpath to the east of the station

A construction site would be established in the middle and background of the view, at the northern end of the station platform. Work to construct the lift would be visible above the brick walls.

A construction support site is proposed to be established within the grassed area to the east of the rail corridor (left) and towards the northern end of the commuter car park (associated with proposed works at this location).

The character of this construction activity would contrast with the heritage and leafy character of the view and be seen in close proximity to the viewer.

This would result in a considerable reduction in the amenity of this view, and a *moderate adverse visual impact* during construction.

Figure 6.10 View south from footpath to the east of the station

Viewpoint 6 – View north from the Sutherland Road commuter car park

A construction site would be established in the middle to background of the view, at the northern end of the island platform. A support site would be established within the grassed area to the east of the rail corridor and towards the northern end of the commuter car park (associated with proposed works at this location).

The western lift construction and works to the southern end of the heritage platform building would not be visible from this location. However, works to construct the western lift and adjustments to the former booking office building, and extending the platform and platform awning would be visible to the north of the main station platform building. The character of this construction activity would contrast with the heritage and leafy character of the view.

This would result in a minor reduction in visual amenity and a minor adverse visual impact during construction.

Figure 6.11 View north from the Sutherland Road commuter car park

Views at night

At night, the study area is an area of moderate district brightness, with the existing commercial centre, roads, station and railway corridor creating a moderately well-lit environment at night.

During construction, the work sites and adjacent construction support areas would be lit for security, however, it is unlikely that the site would be used on an ongoing basis for construction activity during evening hours (other than for specific activities or where works are undertaken during the approximately six possession periods).

Generally, the character of the construction works and support sites at night would be visually absorbed into the surrounding brightly lit environment. The works would create a minor reduction in amenity and result in negligible visual impact during construction.

Urban design and landscape character

Due to the potential reduction in station accessibility and legibility during construction, and removal of two small trees, there would be a temporary minor reduction in the urban design functionality of the station precinct and a minor adverse urban design and landscape impact during construction.

b) Operational phase

Viewpoint 1 – View north from Beecroft Station platform

To the north (right) of the view, the roof of the former booking office building would be raised to accommodate the new lift structure and the hipped and gabled roofline would be reinstated. The proposed addition to the roof of the former booking office would be a combination of glazing and louvres, contrasting with the heritage brickwork, and allowing views through to the lift. New handrails and balustrade mesh would be seen around the stairs at the platform level. The existing platform canopy awnings would be retained and extended to meet the new storey of the heritage building, the platform would be extended to create a lift lobby.

To the west (left) of the view, a new lift would be visible between the playground and commuter car park, replacing the existing area of garden. This new structure would be a simple rectangular shape, with perforated metal ventilation panels to the upper section of the eastern elevation and glazing in the mid-section. The roof of the pavilion would rise one story above the rail corridor level. The lift lobby to the south of the lift would be covered by an awning, visible in front of the pavilion in this view. This lift would be viewed against the retained vegetation along Wongala Crescent.

The addition to the former booking office building would increase its visual prominence somewhat, which would improve the character of this view. The western lift structure would be seen in a developed context and be visually contained by the leafy backdrop of trees. The proposed works would be visually compatible with the existing character of the station and adjacent built elements in this view.

This would result in a minor reduction in the amenity of this view and a *minor adverse visual impact* during operation.

Viewpoint 2 – View south from Wongala Crescent commuter car park

From this location, the new western lift pavilion would be visible in the middle ground of the view. The lift pavilion would be a rectangular shaped column, rising about one storey above street level. This lift would partly obstruct views to the heritage platform building in the background. The upper portion of the lift would have perforated metal ventilation louvres, with glazing in the mid-section and around the lift lobby, creating a visually light structure. The existing trees would be retained, and the gardens refreshed with planting to improve the Wongala Crescent station entrance.

The roof to the (current) former booking office building, at the northern end of the platform, would be raised to accommodate the new platform level lift. The roof of this lift would rise above the platform awning. A new hipped and gabled roofline would be reinstated and the visible walls would be louvres (to the west) and glazing (to the north) above the existing brickwork.

Overall, there would be some obstruction of views to the platform station building, which reduces the amenity of the view, however, the visual prominence of the former booking office and station entrance would be increased, improving the heritage character of the view.

On balance, this would result in no change in visual amenity and a n*egligible visual impact* during operation.

Viewpoint 3 – View east along Hannah Street

The lift within the former booking office at the northern end of the station platform would be more prominent in the centre, background of this view which improves the view by enhancing this local focal point.

The western lift would be located closer to the viewer, and largely screened by existing street trees on Wongala Crescent and Hannah Street. This new lift would rise one storey above the street level and be seen adjacent to the two storey commercial buildings on Hannah Street and Wongala Crescent, visible in the foreground of this view. Minor reconfigurations and the provision of a kiss-and-ride bay on the street would be absorbed into the middle ground of this view.

Overall, the proposed station works would be in character with the developed nature of the station precinct and increase the visual prominence of the former booking office.

On balance, this would result in no change to the amenity of this view, and a *negligible visual impact* during operation.

Viewpoint 4 – View north from Wongala Crescent

The upgraded Wongala Crescent station entrance would be more prominent in this view, located to the east (right) of the zebra crossing. Much of the existing vegetation at the station entrance would be retained and there would be some modified understorey planting and station signage identifying the station entry. The new western lift pavilion would be set back from the road, and partly screened by existing trees (refer to Figure 6.12). The station entry would be reconfigured, opening up views to the station. Improved kerbside facilities including a new kiss-and-ride bay would be seen in the foreground of this view, to the south of the mail zone, in Wongala Crescent. The existing playground and perimeter security fencing would be retained (right of view).

The new platform lift structure at the northern end of the station would be glimpsed through streetscape vegetation. The hipped and gabled roofline of the existing former booking office would be raised to accommodate a lift and the original roof form would be reinstated.

The station buildings would not be prominent in this view, being largely screened by intervening vegetation. Where visible, these new built elements would be generally in character with the developed nature of station and improve the legibility of the station entrance. This would result in no change in visual amenity and a *negligible visual impact* during operation.

(Note: Designs and finishes are indicative and are subject to detailed design)

Figure 6.12 Beecroft Station eastern entrance, artist's impression

Viewpoint 5 – View south from footpath to the east of the station

The grassed area to the east of the station and the commuter car park, in the middle and background of this view, would be returned to its current condition. The extension to the former booking office building would be visible above the brick walls (refer to Figure 6.13). This built form would be seen against the sky and would be prominent in this view.

The introduction of glazing and louvres to the extension of the former booking office, would reduce the visual mass of the building. The existing vegetation along the rail corridor would be retained and continue to provide screening to the station.

On balance, this new built form would be absorbed into the view, creating a new visual feature, consistent with a view to the entrance of a railway station. Therefore, there would be no change in the amenity of this view and a *negligible visual impact* during operation.

(Note: Designs and finishes are indicative and are subject to detailed design)

Figure 6.13 Beecroft Station eastern entrance, artist's impression

Viewpoint 6 – View north from the Sutherland Road commuter car park.

The commuter car park, in the middle and foreground of this view, would be returned to its current condition. The heritage listed platform building and awnings would also be retained and remain as the focus of this view. The roofline of the former booking office building at the northern end of the platform would be raised to accommodate the new lift and become more prominent in this view as the reinstated hipped and gable roofline would be seen above the awning.

Whilst the new lift structure would be taller than the existing heritage platform building, it would be visually separated from the existing heritage platform building by the existing platform canopy, so that it would not obstruct the view to the platform building roofline. It would also increase the visual prominence of the former booking office building by reinstating the heritage building's roof form. This enlarged building would not overwhelm or dominate the character of the view.

The new western lift would be visible in the background, rising above the heritage station platform building, set back some 50 metres from the central platform. The existing vegetation along the rail corridor would be retained and continue to provide a leafy backdrop to the station. Due to the distance, and selection of materials to reduce the visual mass of the building, these changes would be absorbed into the character of the station in this view.

This would result in no change in visual amenity and a *negligible visual impact* during construction.

Views at night

During operations, the upgraded station would continue to be brightly lit for security and safe use at night. The new platform lift pavilion would be seen in context with the existing station lighting, commercial buildings and street lights along Wongala Street and within the commuter car parks. It is expected that there would, however, be additional light visible at the western station entry and platform lift due to additional glazing and architectural finishes.

The station is likely to create minor additional sky glow above the site. However, this would be somewhat enclosed by surrounding vegetation and absorbed into the brightly lit commercial setting of the station in views from the east.

Existing vegetation to the east of the station would largely screen views to the addition lighting associated with the station from the residential areas to the east. Due to the separation of the station from surrounding residential and commercial areas however, there would be limited potential for any light trespass on residential properties to the east of the site.

Overall, this would result in no change in the amenity of views at night, resulting in a negligible visual impact at night during operation.

Urban design and landscape character

The proposed station upgrade is generally consistent with the design intent and strategies identified in the Hornsby DCP (2013). Whilst the requirements of the DCP are not directly relevant to this approval, the following assessment uses the requirements of the DCP as a guide.

The bulk, scale, height, form and materials of the Proposal would be sympathetic to the existing built form of the station, and characteristic of the surrounding conservation area.

Whilst the proposed lifts would be taller than the existing heritage platform building, the lifts are physically and visually separate from the platform building.

The repurposing of the former booking office building and the reinstatement of the heritage roof form would retain the character of the northern end of the station precinct.

The materials selected for the lift structures include glass, louvres and perforated metal screens, which will not visually dominate the heritage buildings.

The western lift and associated works to Wongala Crescent would enhance the streetscape and improve the prominence of the station entry when viewed along Wongala Crescent and Hannah Street.

Overshadowing of adjacent properties would be limited during the winter months, due to:

- The separation of the station precinct from neighbouring commercial areas by Wongala Crescent in the west, and corridor of bushland to the east of the site.
- The distance between the station and nearby residential properties to the northwest and east.

Station access and legibility would be substantially improved by the Proposal. The increased visibility of the former booking office building from Wongala Crescent and Hannah Street, would improve legibility of the station and mark the entry to the station. Whilst the introduction of lifts and improvements to the surrounding footpaths would provide compliant access to the station for all users.

On balance, the Proposal would result in a minor improvement in the urban design functionality of the station precinct and a minor beneficial urban design and landscape impact during operation.

6.2.3 Mitigation measures

The following mitigation measures would be implemented to reduce the visual impacts of the Proposal:

- 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 Sustainability and 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.

- 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 Sustainability and 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 *NSW Sustainable Design Guidelines -Version 4.0* (TfNSW, 2017) and any relevant *Infrastructure Sustainability Rating Scheme - Version 2.0* (ISCA, 2018) requirements
    - identification of design and landscaping aspects that will be open for stakeholder input, as required.
- 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.
- The detailed design of the Proposal would comply with Crime Prevention Through Environmental Design principles.
- Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.
- Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
- During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.3 Noise and vibration

This section provides a summary of the *Noise and Vibration Impact Assessment* undertaken by WSP in 2018 (Technical Paper 2).

The assessment included background ambient noise monitoring and noise modelling for various stages of construction works to predict the potential impacts of Proposal on noise and vibration.

6.3.1 Existing environment

Sensitive receivers and noise catchment areas

Receivers potentially sensitive to both noise and vibration in the following categories as defined in *Noise Policy for Industry* (NPfI) (EPA, 2017) and *Interim Construction Noise Guideline* (ICNG) (DECCW, 2009) have been identified in the surrounding area:

- Residential
- Commercial
- Medical
- Education institutions
- Community centre
- Places of worship
- Active recreation areas.

Sensitive receivers for both noise and vibration were identified in the area surrounding the Proposal and were organised into Noise Catchment Areas (NCAs) based on a similar noise environments within these areas. These are summarised in Table 6.1 and shown on Figure 6.14.

Table 6.1 Noise catchment areas

NCA	Receiver type	**Address**	Receiver ID
1	Residential	16 Hannah Street, Beecroft	R1A
	Residential	12 Wongala Crescent, Beecroft	R1B
	Medical	Beecroft Medical Centre	M1
	Commercial	17 Wongala Crescent, Beecroft	C1
2	Residential	29 Wongala Crescent, Beecroft	R2
3	Residential	28 Hannah Street, Beecroft	R3
4	Place of Worship	Beecroft Uniting Church	P1
	Residential	84 Beecroft Road, Beecroft	R4
5	Residential	29 Wongala Crescent, Beecroft	R5
	Active Recreation	Beecroft Bowling Club	AR1
6	Residential	100 Beecroft Road, Beecroft	R6
7	Residential	136 Copeland Road, Beecroft	R7
	Community Centre	Beecroft Community Centre	CC1
	Educational	Beecroft Public School	E1
8	Residential	100 Sutherland Road, Beecroft	R8

NCA	Receiver type	**Address**	Receiver ID
9	Residential	1 Malton Road, Beecroft	R9

Figure 6.14 Noise catchment areas

Background and ambient noise levels were recorded at two locations near Beecroft Station, at 88 Beecroft Road, and 6 Wandeen Avenue. The existing noise environment is typical of an urban setting. Background levels at Beecroft Road are characterised by consistent traffic along Beecroft Road and ambient noise levels are affected by vehicle pass-bys along Beecroft Road, with train pass-bys and aircraft fly-overs contributing. At Wandeen Avenue, background noise levels are characterised by distant road traffic and ambient noise levels are influenced by bird noise, train pass-bys, occasional traffic along Wandeen Avenue, and aircraft fly-overs.

The results of the un-attended and attended noise surveys and observations are detailed in Table 7 and Table 8. Due to an equipment malfunction, the NM02 attended L_{eq} and L_{90} measurements are not available, however the contributors to the acoustic environment have been identified and the noise environment characterised below.

Table 6.2 Summary of unattended noise monitoring results

LOCATION	RATING BACKGROUND LEVEL (RBL) dBA1,2			AMBIENT NOISE LEVEL dBA Leq, 15 minute		
	Day	Evening	Night	Day	Evening	Night
NM01	57	54	40	68	67	63
NM02	39	39	36	51	48	48

1. Rating Background Level (RBL) The overall single-figure background level representing each assessment period (daytime/evening/night-time) as defined in the NPfI.
2. Time periods defined as – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening: 6pm to 10pm; Night: 10pm to 7am Monday to Saturday, 10pm to 8am Sunday.

Table 6.3 Summary of attended noise measurement results

Location	Time	dBA Leq(15min)	dBA L90(15min)	Observations
NM01	2:00pm – 2:15pm	66	57	Helicopter: up to 67 dBA Car pass-bys: up to 61 dBA Birds: up to 52 dBA

Proposal specific noise criteria

The results of the survey were used to set Noise Management Levels in accordance with the ICNG and noise triggers for operational noise in accordance with the NPfI.

The ICNG prescribes levels for certain receiver types such as commercial and schools, and a method for establishing NMLs for residential receivers (rating background level (RBL) + 10 dbA for standard construction hours; and RBL + 5 dBA for out of hours). Under the ICNG, the 'highly noise affected' level for all residential receivers is 75 dBA. Proposal specific noise criteria have been developed for residential noise catchment areas (NCAs) surrounding Beecroft Station as per the procedures in the ICNG. These are detailed in the *Noise and Vibration Impact Assessment* (WSP, 2018) in *Technical Paper 2 – Noise and Vibration Report*.

6.3.2 Potential impacts

a) Construction phase

Predicted noise levels

Predicted noise levels were modelled using the SoundPLAN 8 Industrial Module implementing the ISO9613-2 algorithm. The noise modelling is considered to be conservative as it assumes all equipment operating simultaneously at their closest point within the work area to the receivers.

The predicted noise levels for each scenario are presented in Table 6.4 outlining the noise level within each NCA for each representative receiver type. Predicted noise levels at buildings within each NCA is presented in Appendix B of the *Noise and Vibration Impact Assessment* (WSP, 2018).

The maximum noise level assessment is presented in Table 6.5. The predicted noise levels have been assessed at the closest affected representative receiver within each NCA.

The calculations are conservative as they include all equipment operating simultaneously at their closest point to the receiver in a worst case 15-minute period. Actual noise levels from the construction site would be expected to be lower. Where a predicted noise level exceeds a less stringent management level, it follows that the more stringent management levels are also exceeded.

The formatting within the construction noise assessment tables indicates the following:

- The orange shaded cells show exceedances of the standard hours day period.
- The yellow shaded cells show exceedances of the out-of-hours day period.
- The green shaded cells show exceedances of the out-of-hours evening period.
- The blue shaded cells exceedances of the out-of-hours night period.
- The **cells with red text** show exceedances of highly noise affected noise management levels.

Where a predicted noise level exceeds a less stringent management level, it follows that the more stringent management levels are also exceeded.

The formatting within the maximum noise level table indicates the following:

- The grey shaded cells show exceedances of the RBL + 15 criteria.
- The blue shaded cells show exceedances L_{max} criteria.

Table 6.4 Predicted construction noise levels

NCA	RECEIVER ID	RECEIVER TYPE	NML				ACTIVITY PREDICTED NOISE LEVEL dBA $L_{eq,\ 15\ minute}$						
			STANDARD HOURS	OUT-OF-HOURS DAY	OUT-OF-HOURS EVENING	OUT-OF-HOURS NIGHT	ESTABLISH SITE	LIFT 1 WORKS	LIFT 2 WORKS	WALKWAY AND STAIRS	INTERCHANGE UPGRADES	STATION BUILDING WORKS	PLATFORM WORKS
1	R1	Residential	67	62	59	45	62	63	72	75	***76***	***76***	63
	C1	Commercial	70				***81***	75	***79***	***87***	***> 90***	***> 90***	72
	M1	Medical	55				50	48	59	60	64	64	52
2	R2	Residential	67	62	59	45	52	49	65	66	66	66	57
3	R3	Residential	67	62	59	45	54	55	65	67	68	68	57
4	P1	Place of Worship	55				39	36	48	51	53	53	44
	R4	Residential	67	62	59	45	52	37	50	51	66	66	46
5	R5	Residential	67	62	59	45	35	31	43	43	46	49	40
	AR1	Active Recreation	65				39	33	44	47	48	53	44
6	R6	Residential	67	62	59	45	49	46	58	58	61	63	54
7	R7	Residential	49	44	44	41	55	47	64	63	68	69	60
	CC1	Community Centre	55				54	50	57	62	68	68	59
	E1	Educational	55				54	51	62	63	66	68	59
8	R8	Residential	49	44	44	41	70	58	73	71	***84***	***84***	71
9	R9	Residential	49	44	44	41	53	54	65	66	67	67	57

Note: Activities 2, 3, 4 and 7 occur during Standard Hours and Out-Of-Hours Works. Activities 1, 5, and 6 only occur during Standard Hours.

Table 6.5 Predicted sleep disturbance assessment

NCA	RECEIVER ID	NML		ACTIVITY PREDICTED MAXIMUM NOISE LEVEL L_{MAX} DBA			
		RBL +15 SCREENING CRITERIA	MAXIMUM NOISE LEVEL EVENT	LIFT 1 WORKS	LIFT 2 WORKS	WALKWAY AND STAIRS	PLATFORM WORKS
1	R1	55	65	71	76	78	71
2	R2	55	65	57	69	69	65
3	R3	55	65	63	69	70	65
4	R4	55	65	45	54	54	54
5	R5	55	65	39	47	46	48
6	R6	55	65	54	62	61	62
7	R7	51	65	55	68	66	68
8	R8	51	65	66	77	74	79
9	R9	51	65	62	69	69	65

Assessment of predicted noise levels

During the majority of the construction activities, the predictions indicate that construction noise levels could significantly impact the closest receivers. This is expected to occur during the worst case 15 minutes when works are carried out during standard hours or rail possessions. These impacts include exceedance of noise management levels, highly noise affected properties, and in some cases sleep disturbance. However, works are expected to take place intermittently over a 12-month period, so these exceedances will not occur continuously over the duration of the proposal. Out of hours works generally should only take place during rail possessions (occurring over a 48 hour period on a weekend) with only four rail possessions expected to occur over the duration of the proposal.

The predictions are based on a worst case 15-minute period. As these predictions are highly conservative and it is understood that the proposed works are short term in nature, actual noise levels from the construction site are expected to be lower.

Residential receivers

Three-dimensional computer noise modelling predicts that the NMLs are likely to be exceeded during certain construction activities at the following residential receivers, as summarised in Table 6.6. However, this prediction is based on all machinery operating simultaneously at the closest point within the work area to the receivers. In reality, noise emissions are likely to be lower and short term.

Table 6.6 Summary of predicted NML exceedances in residential receivers

Construction activity	NCAs in which NML is predicted to exceed	NCAs predicted to be highly noise affected
Site establishment and enabling works	7, 8, and 9	none
Lift 1 works	1, 2, 3, 6, 7, 8, and 9	none
Lift 2 works	1, 2, 3, 4, 6, 7, 8, and 9	none
New walkway and stairs construction	1, 2, 3, 4, 6, 7, 8, and 9	none
Interchange upgrades	1, 3, 7, 8, and 9	1 and 8
Station building works	1, 3, 7, 8, and 9	1 and 8
Platform modification works	1, 2, 3, 4, 6, 7, 8, and 9	none

Non-residential receivers

NMLs for non-residential receivers are predicted to be exceeded in NCAs 1 and 7 during Lift 2 works, walkway and stair construction, interchange upgrades, station building works, and platform modification works. NMLs at non-residential Receiver C1 are predicted to be exceeded during all construction activities. However, this prediction is based on all machinery operating simultaneously at the closest point within the work area to the receivers. In reality, noise emissions are likely to be lower and short term.

Construction traffic noise

Construction traffic noise impacts were assessed according to the *Road Noise Policy* (RNP) (EPA, 2011) and are expected to be negligible due to the proportionally minor increase in traffic generated by construction of the Proposal, when compared to current traffic volumes along Beecroft Road.

Construction traffic is expected to travel along Beecroft Road to reach the project site. Traffic data from the nearest Roads and Maritime Services count station (Station ID: 74229) indicates an annual average daily traffic of 30,000 vehicles along Beecroft Road. A worst-case scenario of 10 heavy vehicle and 20 light vehicle movements generated by the construction work occurring within a one hour period was assessed. As a 60 per cent increase in traffic is required to increase traffic noise levels by more than two dB, it is expected that construction traffic due to the Proposal will comply with the requirements of the RNP.

Vibration

Certain construction activities would require the use of vibration intensive equipment that may affect the nearest sensitive receivers. The vibration intensive plant nominated as part of the work is jack hammering (necessary for lift works, demolition of existing stairs, interchange upgrades, and station building works).

Table 6.7 presents the indicative minimum working distances for the nominated construction plant to minimise the risk of structural damage and human comfort for sensitive receivers, based on the data provided in the CNVS.

The minimum working distances are based on the typical distance from receivers' work permitted to be carried out to meet standards for cosmetic damage to structures and human perception. The distances are indicative only and results may vary depending on the activity, equipment, local ground, and receiver conditions.

Table 6.7 Recommended minimum working distances for vibration intensive plant

Plant item	Rating/Description	Minimum working distance	
		Cosmetic Damage	**Human response**
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

If minimum working distances are complied with, no adverse impacts are expected for cosmetic damage or human response on nearby sensitive receivers. If works occur within these minimum working distances, mitigation measures outlined in Section 6.3.3 would be implemented.

b) Operational phase

With the exception of the proposed reconfiguration, the operation of Beecroft Station would remain unchanged as a result of the Proposal. There would be no expected changes to operational rail and hence, this has not been assessed.

During the operation of the Proposal, there may be minor changes to Wongala Crescent due to changes in bus and taxi locations, however this is not expected to significantly change noise emissions.

New plant and equipment associated with the upgrade to Beecroft Station includes two new lifts, and equipment for the communications/equipment room and Family Accessible Toilet.

Operational noise from the Proposal would be designed to meet the NPfI noise goals (see Section 3.1 of Technical Paper 2). While specific mechanical plant details are yet to be finalised, it is expected that mechanical noise and vibration emissions would not have a significant impact on the surrounding environment, and that the use of standard controls such as quiet plant selection, and duct lining and/or attenuators, would allow mechanical plant noise to be reduced to acceptable levels.

If required, operational noise and vibration emissions will be addressed during the detailed design phase in order to comply with operational noise criteria as per the NPfI.

6.3.3 Mitigation measures

The TfNSW *Construction Noise and Vibration Strategy* (CNVS) outlines standard measures for mitigating and managing construction noise and vibration to be implemented across all TfNSW construction projects where reasonable and feasible.

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 CNVS. The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.

The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include:

- 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.
- 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
- Works would generally be carried out during standard construction hours (i.e. 7.00 am to 6.00 pm Monday to Friday; 8.00 am to 1.00 pm Saturdays). Any works outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An Out of Hours Work application form would need to be prepared by the Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours

- Where the $L_{Aeq\ (15minute)}$ construction noise levels are predicted to exceed 75 dBA and/or 30dB above the Rating Background Level at nearby affected sensitive receivers, respite periods would be observed, where practicable, and in accordance with the CNVS. This would include restricting the hours that very noisy activities can occur
- 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 and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged
- Vibration resulting from construction and received at any structure outside of the project would be managed in accordance with:
    - for structural damage vibration - British Standard *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings* and for structurally unsound heritage items German Standard *DIN 4150: Part 3 – 1999 Structural Vibration in Buildings: Effects on Structures*.
    - 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 *6472:1992 Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).*
- Property conditions surveys would be completed prior to any vibration intensive work being carried out at or within the minimum distances set out in the CNVS. Where a heritage item is determined to be structurally unsound and a reassessment of the minimum working distances would be required. Minimum working distances should be confirmed prior to carrying out any vibration intensive work on site.

Where all reasonable and feasible standard mitigation measures have been applied and exceedances are still predicted to occur, the CNVS provides guidance on additional mitigation measures to be implemented for each receiver depending on how far the predicted noise level is above the RBL and NML. Additional mitigation measures and guidance on when to implement them is outlined in the *Noise and Vibration Impact Assessment* (Technical Paper 2).

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.4 Indigenous heritage

6.4.1 Existing environment

An assessment was undertaken for the Proposal with consideration of the requirements identified in the *Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010). An AHIMS search was undertaken for the area covered by the Proposal plus a 200-metre radius, on 2 August 2018. No Aboriginal sites were identified within the area of the search.

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

6.4.2 Potential impacts

a) Construction phase

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

- the foundations and pits for the new lift shaft and lift at the western side of the station would require excavation into rock, soils and fill up to a depth of around three metres
- minor excavation for the construction/re-grading for compliant ramps at the Wongala Crescent station entrance

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 site and no high-risk landscape features are considered to be within the Proposal site, the potential for unknown items to be present is considered to be low. As such, the Proposal is unlikely to affect Indigenous heritage during construction

b) Operational phase

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

6.4.3 Mitigation measures

The following mitigation measures are proposed with respect to potential Indigenous heritage impacts:

- All construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to the Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
- If unforeseen unidentified Indigenous objects are uncovered during construction, the procedures contained in the TfNSW *Unexpected Heritage Finds Guideline* (TfNSW, 2015b) 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.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.5 Non-Indigenous heritage

This section provides a summary of the *Statement of Heritage Impact* (Technical Paper 3) prepared by Extent Heritage Advisors (2018). The methodology used to undertake this assessment is provided in section 1.3 of Technical Paper 3.

6.5.1 Existing environment

Historical background

Beecroft Station was opened in conjunction with the opening of the Strathfield to Hornsby section of the Northern line on 17 September 1886.

The original single line brick-faced platform was on the down (western) side of the line, around 200 metres closer to Strathfield than the present day platform. Two timber-faced side platforms were built 200 metres north of the original platform with the duplication of the line between Strathfield and Hornsby in March 1892.

In 1914, a new island platform and standard station building were provided at Beecroft on a slightly new alignment but in approximately the same location as the side platforms. Access to the platforms was provided via a subway and set of stairs at the northern end. A booking office was also provided in the subway at the lower level, which was later replaced by a new booking office on the platform. A signal lever was installed on the platform under the awning to control signals and points at Beecroft.

Changes since 1914 include the installation of automatic signalling between Epping and Thornleigh on 3 April 1925 and electrification of the main lines between Strathfield and Hornsby (opened 21 January 1929). Both these improvements were carried out at Beecroft. Automatic signalling replaced the operation of the lever frame on the platform.

Beecroft Station has seen a number of further changes during the last 50 years. Whilst the standard brick station building, island platforms and most other structures remain intact, additional shelters for passengers have been constructed between the subway / steps and the station building in more recent years. During the year 2008, the brick / steel overbridge at the southern (Sydney) end of the platforms was demolished, and new bridge with improved road alignment and approaches was completed in the last weeks of 2008.

Between 2011 and 2015, an additional track was constructed on the western side of the rail corridor through the station as part of the Epping to Thornleigh Third Track project. A range of other ancillary works were also undertaken as part of the project within and adjacent to the station precinct, including extension of the pedestrian subway, amendments to the children's playground, construction of noise barriers, and reconfiguration of the commuter car park on the eastern side of Wongala Crescent.

Listed heritage items

The desktop search did not identify any heritage items listed on the World, Commonwealth or National Heritage Lists, the Register of the National Estate or State Heritage Register within proximity of the Proposal.

There are four heritage items listed in the Hornsby LEP in the vicinity of the Proposal, shown in Table 6.8 and Figure 6.15. The Proposal is also within the Beecroft—Cheltenham Heritage Conservation Area.

Table 6.8 Heritage items in the vicinity of the Proposal

Item	Address	Item Number	Significance	Distance from Proposal
"Treasure House"	1–3 Wongala Crescent	150	Local	13 metres
Beecroft Post Office	5B Hannah Street	101	Local	65 metres
Beecroft Community Centre	111 Beecroft Road	53	Local	45 metres
House	2 Wandeen Avenue	147	Local	20 metres

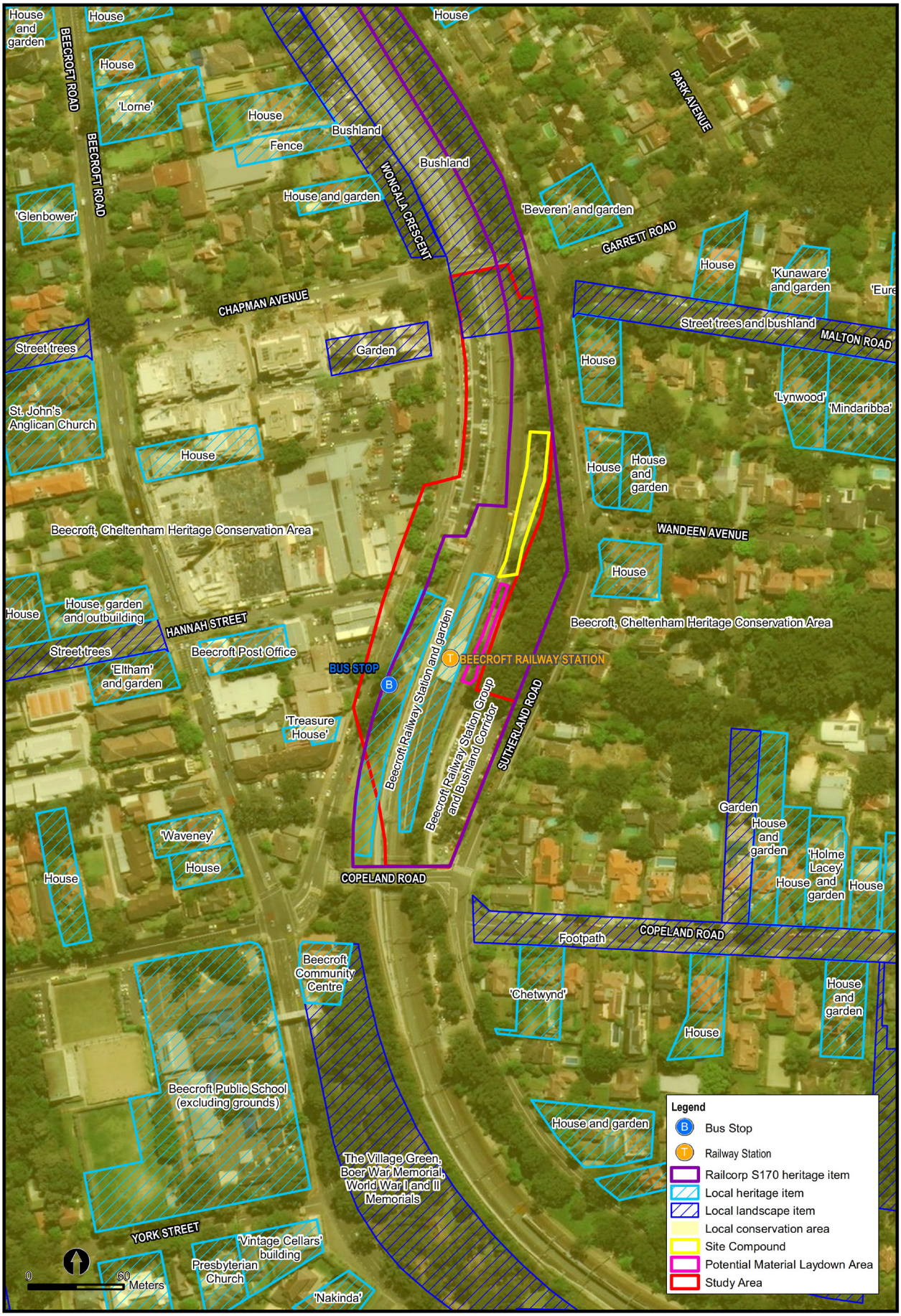


Figure 6.15 Heritage items within the vicinity of Beecroft Station

Of the sites identified, two are located within the proposal area. A summary of the existing nature of these items is provided below with additional information included in *Technical Paper 3 – Statement of Heritage Impact*.

Beecroft Railway Station Group and Bushland Corridor

The Beecroft Railway Station Group and Bushland Corridor are listed on the RailCorp Section 170 Heritage and Conservation Register (4801062). The station and gardens are also listed in the Hornsby LEP (2013).

The following Statement of Significance for Beecroft Railway Station Group and Bushland Corridor has been reproduced from the RailCorp Heritage and Conservation Register, as provided in the online State Heritage Inventory database:

> *Beecroft Railway Station has heritage significance at a local level. The station at Beecroft dates from the opening of the single line from Strathfield to Hornsby in 1886, an event which led to the rapid subdivision and development of the area. The site has a high degree of integrity from its original phase of construction and early modification when the line was duplicated. The grouping of the station building, platform, pedestrian subway and surrounding parks and bushland remains unchanged.*

Beecroft railway station has a high degree of aesthetic significance and the station building is a good example of early twentieth century railway station design with fabric and details typical of this period throughout the Sydney region. The bushland and surrounding park areas have aesthetic appeal and provide an attractive setting for the station and train line. The Beecroft-Pennant Hills bushland corridor comprises many mature indigenous trees including Bluegums, Blackbutt, and Grey Ironbark, as well as more recent plantings including a line of Silky Oaks.

Beecroft Railway Station and Gardens

The following Statement of Significance for Beecroft Railway Station and Gardens has been reproduced from the Hornsby Shire Heritage Study, 1993 by Perumal Murphy Pty Ltd, as provided in the online State Heritage Inventory database:

> *Two late Victorian railway buildings. Typical examples of Sydney railway buildings of the period. Social and historical significance as a record of the development of the area which paralleled the opening of the railway in 1886.*

Assessment of significance of existing heritage environment

Assessment of Significance – a publication developed by the Heritage Office and former NSW Department of Urban Affairs and Planning provides the basis for an assessment of heritage significance of an item or place. This is achieved by evaluating the place or items significance in reference to specific criteria, which can be applied at a national, state or local level.1 The significance of the study area is assessed against the criteria below.

> *Criterion (a) An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);*
>
> *Criterion (b) An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);*
>
> *Criterion (c) An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);*
>
> *Criterion (d) An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;*

Criterion (e) An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (f) An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (g) An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments. (or a class of the local area's cultural or natural places; or cultural or natural environments.)

Table 6.9 provides an assessment of significance is provided in the State Heritage Inventory database for Beecroft Railway Station Group and Bushland Corridor (OEH, 2018).

Table 6.9 Assessment of heritage significance of Beecroft Railway Station Group and Bushland Corridor

Criteria	Assessment of significance
a) [historical significance]	The railway station at Beecroft has historical significance at a local level. The station at Beecroft is an original stop on the Short North line from Strathfield opened in 1886, although the current station is on a new site, moved when the line was duplicated in 1892. Nevertheless, the designation of a station at Beecroft was an event which led to the rapid subdivision and development of the area.
b) [cultural significance]	Not provided
c) [aesthetic significance]	Beecroft Railway Station has aesthetic significance at a local level. The railway station building is a good example of early twentieth century railway station design with fabric and details typical of this period and is similar to other rail buildings of the late nineteenth and early twentieth century in the Sydney region. The adjoining landscaped areas with native bushland to the east and a park to the west provide an attractive setting for the station and assist to maintain the historic character of the station, by providing a visual buffer from surrounding urban modernisation. The Beecroft-Pennant Hills bushland corridor comprises a remnant of native forest and forms a visual backdrop to the Beecroft shopping centre and northern rail line. The site contains many mature indigenous trees including Bluegums, Blackbutt, and Grey Ironbark, as well as more recent plantings including a line of Silky Oaks. The site has aesthetic appeal and forms a pleasant backdrop to the train line.
d) [social significance]	The place has the potential to contribute to the local community's sense of place and can provide a connection to the local community's history.
e) [research potential]	The archaeological research potential of the site is low. There may be some evidence of former railway activity associated with the former roadside platform and former location of the station, but this is unlikely to provide significant new information about the design of railway stations or railway infrastructure of the late nineteenth century.

Criteria	Assessment of significance
f) [rarity]	The Beecroft station subway and double height booking office and foyer have rarity value from an architectural and historical viewpoint in that they are the only known example of this type in the Metro North region. In an era of standard railway station designs that were replicated throughout the state, to find a building as highly individual and original as this at a small suburban station is rare. The use of high level windows to illuminate a subway and the resulting gambrel roof at platform level offer an original solution to the problem of station access.
g) representativeness	The station building, platform and landscaping are representative of structures built at Sydney railway stations in the late nineteenth and early twentieth centuries. The bushland is representative of many other sections of the Metro North line existing as similar sections of native bushland.
Integrity/intactness	The site as a whole has a high degree of integrity. The original platform remains from its first phase of construction and the majority of the station dates from the early period of modification when the line was duplicated. The grouping of the station building, platform, pedestrian subway and surrounding parks and bushland remains unchanged from the time of construction. The building of a new overbridge at Copeland Street has had only a minor impact upon the integrity of the station precinct. While the exterior is largely intact, the interior of the station building has been modified to cater for modern requirements, although the general internal layout of the station remains. The former brick overbridge has been removed. The subway tunnel has been tiled. While the booking office remains in in original condition, it is in need of thorough restoration.

6.5.2 Potential impacts

a) Construction phase

Assessment of construction impacts

Table 6.10 identifies the individual components of the proposed works and considers the potential impacts of the works upon the heritage significance of Beecroft Railway Station.

Table 6.10 Potential impacts to heritage associated with the Proposal

Component		Assessment
Western entrance / Wongala Crescent		
Bus stop	• relocate and shorten existing bus stop westbound up Wongala Crescent • relocate existing bus zone, bus zone signage and time table • install new bus head tactile indicators	There is no heritage fabric associated with this bus stop or the proposed new location. There are no significant views or vistas impacted by these changes. This component of the proposal would have no heritage impact.
Kiss-and-ride	• install formal kiss-and-ride zone on the eastern side of Wongala Crescent, to the north of the existing bus stop	There is no heritage fabric associated with this Kiss-and-ride location. There are no significant views or vistas impacted by these changes. This component of the proposal would have no heritage impact.
Accessible paths – Wongala Crescent	• upgrade / regrade existing accessible paths from Wongala Crescent to interchange	There is no heritage fabric associated with these pedestrian paths on the eastern side of Wongala Crescent. There are no significant views or vistas impacted by these changes. This component of the proposal would have no heritage impact.
Taxi bay	• relocate taxi bay from Hannah Street to the western side of Wongala Crescent	There is no heritage fabric associated with the taxi bay on the northern side of Hanna Street, nor with the proposed location on the western side of Wongala Crescent. There are no significant views or vistas impacted by these changes. This component of the proposal would have no heritage impact.

Component		Assessment
Stairs, ramp upgrade and installation of new through lift	• regrade existing ramp/ pathway to a DDA Act compliant gradient. • install two new stair accesses between Wongala Crescent and subway. • remove the existing terraced garden to allow for the construction of the new lift in this location. Excavate to an estimated depth of up to 2-3 metres to allow for the construction of a new lift pit. • construct a new piled retaining wall. • construct a new “through lift” lift located between the termination of the existing subway and the existing ramp to Wongala Crescent (in place of existing terraced garden). Connect the new lift to Wongala Crescent via a new pathway, between the lift and the existing walkway on Wongala Crescent and include an awning over the lift structure.	The gradient of the ramped pathway does not meet current standards for accessibility. There is no heritage fabric associated with the pathway and terraced garden. The new piled retaining wall would not affect any heritage fabric. The proposed new lift tower will be a new vertical rectangular structure standing approximately four metres above Wongala Crescent level. Whilst this will have an impact upon views north and south along the western side of the Railway Station, the view from the west towards the Station is limited owing to short sightlines and existing mature trees between Wongala Crescent and the location of the proposed lift. It will interrupt views across the tracks to the Platform Building from the pedestrian pathways leading to the railway underpass, however, these are short range views which are of less significance than the views north-east from Wongala Crescent. (see Figure 28 to Figure 33). Overall, this impact is considered to be minor. There are no significant views from the eastern side of the railway station that will be affected by the Proposal.

Component		Assessment
Platform area		
Installation of new lift between the platform and existing subway	• remove roof and door of the existing supply room to allow for construction of lift • excavate floor of the existing supply room to an estimated depth of up to 2 metres and construct a new lift pit • construct the lift and install a new roof on top of lift shaft	These works require the raising of the existing roof (where considered feasible as part of ongoing detailed design) by approximately three metres. The walls of the existing pavilion structure would be retained, with an added section of wall approximately three metres high above the present brickwork. These new walls would be finished with either glazing (north and south walls) or narrow metal ventilation louvres (east and west walls). The existing windows are proposed to be retained. These works, therefore, largely preserve the existing historic fabric of the pavilion structure, with additional new fabric inserted between the existing walls and the new roofline and the installation of the lift. The retention of the existing roof profile will maintain the architectural character of the present structure, with the new work clearly delineated by material differences. As the subway level of this pavilion structure is currently unused, the installation of the lift represents an adaptive reuse of a redundant element, which is consistent with its historic function as access to the platforms. The use of the pavilion structure in this manner will also ameliorate the appearance of the upper level of the new lift, making it appear as part of the existing fabric of the station. For this reason, whilst this work is extensive and represents a change to the existing fabric, its heritage impact is assessed as neutral. The removal of the door to the store room at subway level (leaving the opening free) represents the removal of a non-original door which is intrusive in its design and materials. Whilst it is not a return to the original arrangement, the opening, with fanlight, will be clearly a remnant of the original door and will present better than the present door. This represents a minor positive heritage impact.

Component		Assessment
	• remove existing subway roof. • connect lift to the island platform via a new elevated/upper lift lobby consisting of a concrete slab over the northern end of the stairway void. • Remove final (northernmost) panel of balustrade on each side of stair	The subway roof to be removed is the short section of skillion roof clad with corrugated steel over the stairs between the platform and the subway. The space above this roof (and the lower end of the platform-to-subway stairs) would have a concrete slab laid across, connecting the east and west sides of the platform. There would be a minor adverse impact in the loss of the original arrangement of subway access stairs and rain protection but this is a minor change to what is minor fabric of low visibility the arrangement of the northern end of the platform and low importance, historically and aesthetically. The southern edge of the concrete slab should be detailed to match the current concrete coping along the sides of the stairwell. The removal of these sections of the original balustrade is an adverse impact. This impact should be mitigated by utilising the removed sections of balustrade to form the continuation of the balustrade around the north end of the stairs. All removed elements should be reused in this manner, although rails may be adjusted in length, if necessary. Reuse of the components will mitigate this alteration to a minor adverse impact arising from the loss of originality but this is balanced, to some extent, by the increased operability and ongoing utility of the Station overall.
	• connect lift to the existing subway by new opening in northern wall of supply room at subway level. • create opening in upper end of the southern wall of the supply room to connect the upper lift landing to the platform • demolish existing platform canopy and supporting columns directly within the area required for the new lift and replace with new glass and metal canopy and new steel columns • upgrade existing stairs, handrails and nosings • new mesh to balustrade.	This brickwork is of ordinary finish and is tiled on the subway side and painted in the interior side. The creation of an opening in this wall would be a relatively minor work which would not affect any fabric of high significance. Similarly, this section of brickwork is undistinguished and the creation of an opening from platform level to eaves height would be a relatively minor work which would not affect any fabric of high significance. This canopy and columns are of recent origin and there would be no adverse impact to these existing elements. The upgrade to existing stairs, nosings and handrail to the stairs between platform and subway are minor works which will affect non-original fabric (paving and nosings) and the current handrail is also non-original. There would be no adverse impact to any fabric of high significance. The addition of ‘mesh’ to the existing balustrade is subject to detailed design. Adaptation of the existing balustrade by the addition of mesh over the openings between rails is a minor adverse heritage impact which is acceptable as a means of conserving the existing fabric. The nature of the mesh and the materials utilised will be key factors in achieving an acceptable outcome. The mesh should be as open and transparent as possible within the requirements for compliance. Attachment to the existing fabric should be non-intrusive and reversible.

Component		Assessment
Platform and platform buildings		
Platform and platform buildings	• demolish the existing wall in the communications store room to extend the room, allowing for the relocation of the communication facilities from the former old booking office • construct new family accessible toilet on the southern side of the existing communications room • upgrade existing ramp to family accessible toilet	This element of the Proposal would involve the removal of one original internal wall and its replacement with a new wall further south, reducing the size of the southern room and increasing the size of the northern room. None of this work would be apparent on the exterior of the building. Functions within these rooms would not change; only the relative dimensions of the two spaces. Whilst this interior wall is a relatively minor element in a larger building, the outcome represents a change to the original layout of rooms in this platform building and a reduction in the original fabric and integrity of the building. This would be a minor adverse heritage impact. Some mitigation would be achieved by the use of 'ripple-iron ceiling sheeting, which is characteristic of the interior of the building but has been replaced in the southern-most room with plain plasterboard. Reinstatement throughout the two rooms would provide a more authentic visual context within the rooms. Upgrades to the external concrete ramp would represent modifications to a new (and relatively intrusive) element. As such, there would be no additional heritage impacts resulting from this component of the proposal.

Summary of potential construction impacts

The elements of the Proposal outside the station building would not have any impact upon significant fabric of Beecroft Station, as they are related to the roadside and pedestrian access pathways leading to the Station.

The installation of the pedestrian lift from the subway to the platform level would result in a number of changes to the fabric of the former booking office (current Supply Room), in particular the raising of the existing roof by around three metres. However, this structure is no longer used for its original purpose and the Proposal would serve to reintegrate this structure into the active operation of the station. The works have been designed to minimise changes to significant fabric, retain the existing brickwork walls, allow the restoration of the existing windows and recreate the present roof appearance at a higher level. There would be minor adverse heritage impacts in this work, arising from changes to original fabric, however, this fabric has already been previously altered and the impacts are confined to those areas of least significance.

The placement of a concrete slab over the northern end of the platform-to-subway stair, resulting in the removal of the existing skillion roof structure, is a minor addition which, whilst altering the layout of the northern end of the platform, would not have a substantial impact upon any significant fabric, views or architectural character. The removal of the skillion roof would simplify the visual presentation of the stairway. The alterations to the original balustrade are a minor adverse impact which will be largely mitigated by the reuse of the removed sections to form the necessary new balustrading along the northern extremity of the platform.

The alteration to one interior wall within the Platform building will change the original interior layout of the building, which has already undergone a number of alterations. However, these spaces are the least significant interior spaces within the building, and the alterations would not be apparent from the exterior. This work would represent a minor adverse impact and would be mitigated by the reinstallation of ripple-iron ceilings to both spaces.

The Proposal would have no impacts to heritage items in the vicinity or to the heritage significance of the Beecroft—Cheltenham Heritage Conservation Area.

Overall, the works would have a number of minor adverse impacts, none of which are of a substantive nature, and would be balanced by the social equity value of the Proposal outcomes.

b) Operational phase

The Proposal would create two new vertical elements associated with the two lift structures.

Views of the station will not be significantly impacted as the sightlines are currently either obscured by existing vegetation (from Wongala Crescent) or are oblique and constrained (from the western pedestrian entry to the subway). In the light of the general suburban railway context, these structures would not have a substantive adverse impact upon the setting of the railway station buildings.

6.5.3 Mitigation measures

The following mitigation measures are proposed with respect to potential non-Indigenous heritage impacts:

- 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.

- 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 Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
- Ripple-iron ceilings are a key characteristic material within the buildings. All ceilings being affected by the works should be established or reinstated with ripple-iron sheeting.
- Works affecting original fabric of the former booking office and platform building should be of a quality compatible with the original materials.
- Special attention should be given to the resolution of the arrangement of the balustrade around the platform stairs, both in the rearrangement of panels and in the addition of mesh infill between the rails.
- Special attention should be given to the design details for the upper level extension to booking office. Any new roof materials, cladding and arrangement should aim to reproduce the original as closely as possible.
- As Beecroft Station and Garden/Item 142 is listed on the heritage schedule of the Hornsby LEP, Hornsby Shire Council would be notified of the proposed works.
- Prior to works commencing, a Photographic Archival Recording should be prepared in accordance with the latest version of the Heritage Division Photographic Archival Recording guidelines.
- Any accidental damage to a heritage item is to be treated as an incident, with appropriate recording and notification.
- During construction, suitable measures would be put in place to ensure the retained heritage elements are protected from damage. Measures may include hoardings, use of spotters during the movement of equipment and other measures as necessary.
- A heritage conservation architect would be engaged for the detailed design process and to inform the detailed design recommendations. Specifically, the heritage architect would provide input into, and advice upon the:
    - materials and finishes palette.
    - design of the new upper addition of the former Booking Office. Any new materials should aim to reproduce the original as closely as possible.
    - design of the balustrade around the platform stairs. This is with respect to the relocation of panels and the design of mesh infill additions between the rails.
- Consideration should be given to the preparation of Heritage Interpretation Plan which specifically addresses the history and significance of the former Booking Office.
- On completion of works, an update would be prepared for the Section 170 Heritage and Conservation Register, with required details.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.6 Socio-economic impacts

6.6.1 Existing environment

Land use surrounding the Proposal is comprised of a mixture of commercial, residential, and community zones. The area immediately to the west of the station is the Beecroft Town Centre, which comprises small scale retail, business, and community uses and multi-storey residential dwellings. The residential areas to the east and further to the west of the station generally comprise single storey and two storey houses on tree lined streets. The closest residences are approximately 35 metres from the proposed works, on the eastern boundary. A number of community, religious and educational facilities are located within the broader area, including:

- Beecroft Primary School (100 metres south-west of the Proposal)
- Beecroft Community Centre (115 metres south of the Proposal)
- Beecroft Scout Hall (400 metres south of the Proposal)
- Beecroft Fire Station (75 metres south-west of the Proposal)
- Arden Anglican School (420 metres north of the Proposal)
- Beecroft Uniting Church (100 metres west of the Proposal)
- Saint John's Anglican Church (260 metres north-west of the Proposal)
- Beecroft Bowling and Recreation Club (210 metres south-west of the Proposal)
- Beecroft Lawn Tennis Club (380 metres south of the Proposal)
- five child care centres within 500 metres of Station
- various parks and green space, including Booth Park and Beecroft Station Gardens.

The broader area is currently subject to ongoing land use changes. Most notably, large scale medium to high density residential development which are currently occurring to the west along Beecroft Road. This is consistent with the strategic vision for the area which includes identifying the opportunity for key housing redevelopment around transport corridors, including the T1 Northern railway line.

6.6.2 Potential impacts

a) Construction phase

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

- temporary changes to vehicular, bus, bicycle and pedestrian access to, through and movements around the station
- weekend closures of Beecroft Station to construct new lifts, concourse extension and canopy installation (timing to occur during previously scheduled track possession)
- temporary loss of time-restricted parking on nearby streets and in the Council car park (should this location be required for a temporary construction compound)
- disruptions to station facilities and amenities (e.g. toilets and concourse building)
- increase in truck movements delivering site materials, plant and equipment
- temporary impacts to local traffic movements
- construction noise, dust and visual impacts.

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

Construction works would be undertaken to ensure pedestrian and cyclist access to and through the precinct would be maintained. Where works are carried out that may potentially disrupt the existing pedestrian facilities, appropriate signs or traffic controllers would be positioned to notify pedestrians of the temporary arrangements.

During the construction of the lifts, a work zones would also need to be created which may restrict some pedestrian movements within the station precinct and the northern end of the platform may be required to be closed off temporarily.

Refer to Sections 6.1, 6.2 and 6.3 for discussion on the potential traffic, access, visual and noise impacts arising from construction of the Proposal and the proposed management strategies. The Proposal would provide a minor benefit to the local community by bringing patronage to local businesses from construction workers.

b) Operational phase

Overall, the Proposal would provide positive socio-economic benefits to Beecroft and the Hornsby Shire LGA, including:

- improved accessibility for customers at Beecroft Station providing an accessible route to station platforms through the provision of upgraded footpaths and lifts and more disabled parking spaces
- improved customer amenity and facilities at the station including a redesigned family accessible toilet, improved weather protection over the station platform, new tactiles and wayfinding signage
- improved transport interchange facilities including new formalised kiss-and-ride areas and closer taxi rank
- potential increased use of public transport to and from Beecroft
- additional lighting and CCTV would provide positive CPTED outcomes for the area.

6.6.3 Mitigation measures

The following mitigation measures are proposed to manage potential socio-economic impacts:

- feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable
- a Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and the best practice methods for consultation with these groups during construction. The Plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable
- contact details for a 24-hour construction response line, Project Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase
- the community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan to be developed prior to construction.

Refer to Table 7.1 in Section 7.2for a full list of proposed mitigation measures.

6.7 Biodiversity

This section provides a summary of the *Biodiversity Assessment Report* (Technical Paper 4) prepared by WSP (2018) and the *Arboricultural Impact Assessment* (Technical Paper 5) prepared by Earthscape Horticultural Services (2018), which included a desktop assessment, literature review and site inspection of the study area. The detailed methodologies for the *Biodiversity Assessment Report* and the *Arboricultural Impact Assessment* are provided in Technical Paper 4 and Technical Paper 5 respectively.

6.7.1 Existing environment

Vegetation Communities

All vegetation observed within the area of proposed works comprised of ornamental planted exotic and native garden specimens that do not form part of any recognised native NSW Plant Community Type. A patch of remnant native vegetation comprising of intergrades between two threatened ecological communities, being Blue Gum High Forest and Sydney Turpentine Ironbark Forest, occur to the east of the exiting access path to the eastern car park. No works are proposed to occur within this area as part of the Proposal.

Photo 6.1 *Cinnamomum camphora (Camphor Laurel*) near proposed works**

Photo 6.2 *Jacaranda mimosifolia* (Jacaranda) near proposed works

Photo 6.3 Upgrade area of eastern entry footpath near Sutherland Road

Photo 6.4 Single *Syncarpia glomulifera* (Turpentine) in eastern car park

Fauna habitats

The fauna habitat within the study area is limited, with majority of vegetation in the form of planted ornamental native and exotic trees and shrubs. A majority of the original vegetation within the study area has been cleared for urban development and what remains is landscape gardens and plantings. The habitat and vegetation within the study area provides limited resources and lacks important features such as hollow bearing trees, rocky outcrops, dense litter layer or fallen woody debris.

The study area does not provide any significant habitat for fauna and species likely to utilise resources are those that are well adapted to urban environments or those species that are highly mobile (i.e. birds and bats). The surrounding trees (both native and introduced) provide some foraging habitat (i.e. fruits and blossom) for mobile species (i.e. birds and bats). It is unlikely that these resources are heavily utilised or relied upon by majority of fauna but instead are intermittently used whilst foraging within the greater locality.

Weeds

No Priority Weeds listed under the *Biosecurity Act 2015* for the Greater Sydney Region were identified in the study area.

Trees

A total of 23 trees on site were assessed for their tree retention value. Of these, eight were assessed as having high retention value, nine were assessed as having moderate retention value, and five were assessed as having low retention value. The location of these trees is shown in Appendix 5 of the *Arboricultural Impact Assessment* (Earthscape Horticultural Services, 2018)

Table 6.11 Trees to be removed

Tree ID Number	Species	Retention value	Location
1	*Pyrus calleryana* (Callery Pear)	Moderate	Road reserve (Hannah Street)
2	*Pyrus calleryana* (Callery Pear)	Moderate	Road reserve (Hannah Street)
3	*Pyrus calleryana* (Callery Pear)	Low	Road reserve (Hannah Street)
4	*Cinnamomum camphora* (Camphor Laurel)	Moderate	On site
5	*Platanus x hybrida* (London Plane)	High	On site
6	*Platanus x hybrida* (London Plane)	High	On site
7	*Pittosporum undulatum* (Native Daphne)	Low	On site
8	*Cinnamomum camphora* (Camphor Laurel)	Moderate	On site
9	*Cinnamomum camphora* (Camphor Laurel)	Low	On site
10	*Cinnamomum camphora* (Camphor Laurel)	Moderate	On site
11	*Jacaranda mimosifolia* (Jacaranda)	Moderate	On site

Tree ID Number	Species	Retention value	Location
11a	*Callistemon viminalis* (Weeping Bottlebrush)	Low	On site
12	*Jacaranda mimosifolia* (Jacaranda)	Moderate	On site
12a	*Elaeocarpus reticulatus* (Blueberry Ash)	Low	On site
13	*Lophostemon confertus* (Brushbox)	High	On site
14	*Araucaria cunninghamii* (Hoop Pine)	High	On site
15	*Araucaria bidwillii* (Bunya-bunya Pine)	High	On site
17	*Araucaria bidwillii* (Bunya-bunya Pine)	High	On site
18	*Araucaria cunninghamii* (Hoop Pine)	High	On site
18a	*Jacaranda mimosifolia* (Jacaranda)	Moderate	On site
21	*Syncarpia glomulifera* (Turpentine)	High	On site
22	*Eucalyptus saligna* (Sydney Blue Gum)	Moderate	Road reserve (Sutherland Road)

Threatened biodiversity

Threatened Ecological Communities

No threatened ecological communities were identified within the study area. All vegetation observed within the study area comprised of ornamental planted exotic and native garden specimens that do not form part of any recognised native NSW Plant Community Type.

A patch of remnant native vegetation comprising of intergrades between two threatened ecological communities, being Blue Gum High Forest and Sydney Turpentine Ironbark Forest, occur to the east of the exiting access path to the eastern car park.

Photo 6.5 Blue Gum High Forest and Sydney Turpentine Ironbark Forest adjacent to proposed works

Photo 6.6 Blue Gum High Forest and Sydney Turpentine Ironbark Forest adjacent to proposed works

Threatened Flora

No threatened flora species were identified during site inspections. Background investigations identified 42 threatened flora species listed under the BC Act and/or EPBC Act that were considered to have the potential to occur within the locality of the study area (Appendix A of the *Biodiversity Impact Assessment* in Technical Paper 4). Following field surveys, it is considered that the study area is unlikely to provide habitat to threatened flora species.

No specific assessment of significance for any threatened flora species listed under either the BC Act or EPBC Act are considered warranted to assess the impacts of the Proposal.

Threatened Fauna

No threatened fauna were identified during site inspections. Background investigations identified 79 threatened fauna species listed under the BC Act and/or EPBC Act that have been previously recorded or have the potential to occur within the locality (Appendix B of the *Biodiversity Impact Assessment* in Technical Paper 4). The likelihood of these species occurring within the study area was determined based on field investigations and fauna habitat available.

Some threatened fauna which have previously been recorded within the locality may intermittently occur within the study area.

Migratory species

Migratory species are protected under international agreements, to which Australia is a signatory, including the Japan Australia Migratory Bird Agreement (JAMBA), China Australia Migratory Bird Agreement (CAMBA), Republic of Korea Australia Migratory Bird Agreement (RoKAMBA), and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered Matters of NES and are protected under the EPBC Act.

A total of 33 species listed as migratory under the EPBC Act were identified during background investigations that have been previously recorded or have the potential to occur within the locality (Appendix B of the *Biodiversity Impact Assessment* in Technical Paper 4). Of these, no species are considered likely to utilise the habitat present within the study area.

The habitats within the study area are unlikely to constitute important habitat for any of the listed species. The habitat present is unlikely to support significant proportions of the population of any migratory species, nor are the habitats critical to any life stage of these species. Due to their mobile nature, the mentioned species are likely to utilise higher quality habitat within the greater locality and where more extensive tracts of native vegetation occur.

As such it is unlikely that the works would significantly affect migratory species and have not been considered further in this report.

6.7.2 Potential impacts

a) Construction phase

Impacts to native vegetation

The Proposal would not lead to an impact on any native vegetation, and would avoid any direct or indirect impacts on the patch of remnant native Blue Gum High Forest and Sydney Turpentine Ironbark Forest endangered ecological communities to the east of the exiting access path which leads to the eastern car park.

Impacts to threatened fauna

No threatened fauna is likely to be significantly impacted by the Proposal. It is unlikely that any threatened fauna identified within the locality would have a moderate to higher likelihood to utilise the habitat within the study area, nor are any threatened fauna likely to be reliant on the habitat to be removed or impacted.

Removal of vegetation

Impacts on vegetation would be limited to the removal/disturbance of lawns and landscape gardens, in particular the landscape area on the western side of the station near the pedestrian underpass. This disturbance would arise as a result of upgrading the access footpaths for a new walkway. These landscape features of this area are considered unlikely to provide important biodiversity value.

The vegetation to be impacted by the proposed activity does not contain important habitat features (i.e. hollows for breeding) for any potential threatened species known or predicted to occur within the locality. Given this, the Proposal is considered unlikely to significantly affect threatened species or ecological communities, or their habitats.

The proposed development would necessitate the removal of one tree of low retention value, a Weeping Bottlebrush (*Callistemon viminalis*), near the bus shelter on Wongala Crescent (T11a in Figure 6.16). This tree is not considered significant (being a planted native ornamental species) and does not warrant any specific measures to ensure its preservation.

The proposed development would also necessitate the removal of one tree of moderate retention value, a Blueberry Ash (Elaeocarpus reticulatus), near the bus shelter on Wongala Crescent being (T12a in Figure 6.16). This tree has no specific ecological or heritage significance, but is in good health and condition and makes a fair contribution to the amenity of the site. In order to compensate for loss of amenity resulting from the removal of this tree, replacement planting elsewhere within the site will be undertaken in accordance with the TfNSW *Vegetation Offset Guideline* (2016) (refer to section 6.7.3).

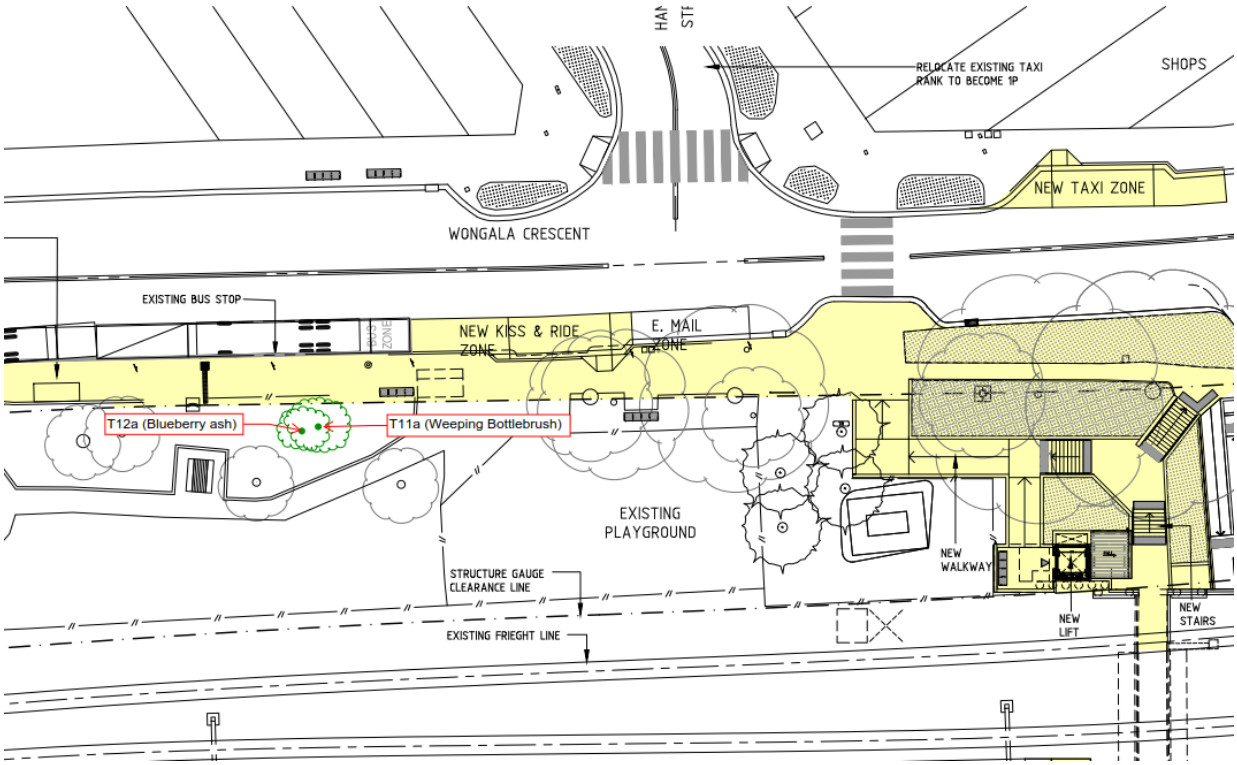


Figure 6.16 Trees to be removed

Various construction activities will occur within the tree protection zones (TPZ) of a number of other trees on site. These majority of these works would not result in any adverse impacts on the trees on site, provided the mitigation measures outlined in section 6.7.3 are implemented.

Potential environmental impact of noise, light and vibrations on wildlife

It is likely that noise from the existing rail corridor and arterial roads would already impact background levels of noise in the study area. However, construction and operation phases of the Proposal (along with its ancillary activities) may cause disturbance to animals. The impacts from noise emissions are likely to be localised close to the project and are not likely to have a significant long-term impact on wildlife populations, given that populations are already exposed to noise associated with the existing rail corridor. Furthermore, it is likely that most animal species would habituate to periodic noise disturbance from regular maintenance activities (Forman et al, 2000).

Weeds

The Proposal is unlikely to impact any Priority Weeds listed under the *Biosecurity Act 2015* for the Greater Sydney Region such that they would pose a risk to any areas of native vegetation.

Conclusion on construction impacts

Impacts to biodiversity as a result of the Proposal are considered negligible due to the existing disturbed nature of the available habitat and the nature of the construction works to be undertaken.

b) Operational phase

The operation of the Proposal is not anticipated to result in any further impacts to biodiversity.

6.7.3 Mitigation measures

Construction of the Proposal must be undertaken in accordance with the TfNSW *Vegetation Management (Protection and Removal) Guideline* (2015d) and the TfNSW *Fauna Management Guideline (2015e).* Various controls for the protection of biodiversity and trees on site would be incorporated into the Construction Environmental Management Plan (CEMP) and implemented during construction works, including:

- In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, a minimum number of four new trees capable of attaining a height of at least ten metres at maturity should be planted within an appropriate area of the site in accordance with Table 1 in Section 5.2 of the TfNSW *Vegetation Offset Guideline* (2016) In accordance with Section 5 of the guideline, four trees would be required to meet this offset requirement.
- 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.
- 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 *Noxious Weeds Act 1993.*
- For new landscaping works, mulching and watering would be undertaken until plants are established.

- Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed in the Arboricultural Impact Assessment (Earthscape, 2018) 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.
- TPZs would be established around trees to be retained, as nominated in the Arboricultural Impact Assessment (Earthscape, 2018). Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of TPZs
- All construction works, demolition works, excavations, and vehicle movements within the TPZs (see Appendix 6 of Technical Paper 5) will be carried out in accordance with the mitigation measures outlined in the Tree Protection Plan (Appendix 6 of Technical Paper 5).
- All demolition and excavation works within the TPZs would be undertaken under the supervision of a qualified Arborist.
- 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.
    - 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 the TfNSW *Removal or Trimming Application* form and submit it to TfNSW for approval.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures to be incorporated into the CEMP.

6.8 Contamination, landform, geology and soils

A *Geotechnical & Contamination Desktop Study* of the Proposal site was undertaken by Cardno in 2015. The following section summarises the findings of this study.

6.8.1 Existing environment

Landform, geology and soils

The *1:100,000 Geological Series Sheet Sydney 9130* (NSW Department of Mineral Resources, 1983) indicates that the Proposal is underlain by Ashfield Shale of the Winamatta Group, which comprises primarily black to dark-grey shale and laminite. The Hawkesbury Sandstone unit outcrops to the east of the site at a lower elevation within the within the Lane Cove River valley.

The natural topography in the vicinity of the station is a gentle slope toward the east and a more significant slope in a north–south direction. Localised filling is therefore likely to underlie the site to achieve the finished grades at the station.

Review of geological information obtained from the NSW Department of Primary Industries groundwater database indicates two licenced groundwater wells are situated 300 metres to the south and 900 metres to the north east of the station. The geology reported in the former consisted of sandy clay overlying sandstone. The latter borehole reported clayey sand over sandstone.

The ground modifications at the station include excavations, earth filling, construction of retaining walls, railway tracks and platforms and building of structures.

Reference to the *1:100,000 Soil Landscape Series Sheet* (Chapman et al, 2009) indicates that the Proposal site is underlain by the Glenorie Soil Landscape. This is described as an erosional soil landscape, occupying rolling low hills on Wianamatta Group Shales. The landscape comprises predominantly shallow to moderately deep soils, around 100 centimetres thick. Limitations associated with the soil landscape include high soil erosion hazard, localised impermeable highly plastic subsoil and moderate reactivity.

Acid sulfate soils

A review of the Australian Soil Resource Information System National Acid Sulfate Soils Database, accessed 23 July 2018, indicated that there is low probability of occurrence for acid sulfate soils within the vicinity of the Proposal.

Salinity

Based on the Australian Groundwater Explorer site (Australian Bureau of Meteorology, 2018), the likelihood of the occurrence of saline soil conditions is considered to be low.

Contamination

Given the historical use of the station as a rail corridor, there is potential for contaminants to be present within the soils underlying the station. Historic activities associated with rail corridors that have the potential to result in contamination include the introduction of fill materials including ash, fuel or oil spills and accidental leaks or spills from maintenance and operational activities. Given the age of the building, there is also potential for asbestos materials and lead paint to be encountered.

A search of the public register of notices issued by the NSW EPA under *Contaminated Land Management Act 1997* was conducted on 23 July 2018. Two sites were recorded within the Hornsby Shire Council LGA, Coles Express Hornsby and Shell Coles Express Pennant Hills West, both declared 'Significantly Contaminated Land'. The closest of the two, Shell Coles Express Pennant Hills West service station, is located around one kilometre north of the Proposal site.

There were no sites in the vicinity of Beecroft Station identified as contaminated to an extent that warrants regulation.

6.8.2 Potential impacts

a) Construction phase

The Proposal would require excavation work for the installation of foundations and footings for new lift shafts and lifts. Other trenching or excavation may be required for footpath and road works, relocation of services, drainage works, and other alterations to the station gardens (in particular within the vicinity of the western lift). There would also be earthworks required to build up existing levels.

Soil disturbance

Excavation and other earthworks such as trenching and stockpiling activities, if not adequately managed, could result in the following impacts:

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

Such impacts can be a nuisance to community members and/or lead to an adverse environmental impact on biodiversity, for example through the introduction of sediment into waterways. These impacts are expected to be minor due to the limited level of ground disturbance required for the Proposal and the relatively flat topography and stability of the Proposal site.

Erosion risks can be adequately managed through the implementation of standard measures as outlined in *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) (the Blue Book).

Contamination

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

The Proposal has the potential to disturb asbestos containing material and other hazardous substances (such as lead paint) from the reconfiguration of the communications room and family accessible toilet. There is also potential for construction activities to result in the contamination of soil through accidental fuel or chemical spills from construction plant and equipment

Appropriate mitigation measures would be implemented to manage hazardous substances during demolition works. This would include the removal of hazardous materials from the structure by appropriately licensed asbestos/hazardous waste removalists (refer to section 6.8.3 below).

b) Operational phase

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

6.8.3 Mitigation measures

The following mitigation measures are proposed with respect to potential soil and contamination impacts:

- 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.
- 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.
- 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.
- As there is potential for onsite contamination given historic activities associated with the railway land use, prior to construction commencing, a contamination investigation would be undertaken by a suitably qualified professional to confirm the composition and nature of excavated material.

- 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.
- An unexpected contamination 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 SafeWork NSW requirements.
- The handling, storage, transport and disposal of all asbestos and hazardous waste (if identified during construction) would occur in accordance with the requirements of the PoEO Act, WARR Act and other relevant guidelines. Further discussion regarding potential impacts and mitigation measures for waste management is provided in Section 6.11.1.
- 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 Environmental Controls Map (ECM).

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface water and drainage

The Proposal site is located within the Byles Creek and Devlins Creek catchments. Surface waterways within the vicinity of the Proposal site include Byles Creek to the east, Devlins Creek to the south and west and Tedbury Creek and Berowra Creek to the north. Byles Creek and Devlins Creek catchments drain eastwards and discharge into the Lane Cove River. Tedbury Creek and Berowra Creek drain northwards into the Hawkesbury River.

Water quality monitoring is undertaken at a number of locations within the Hornsby LGA, including in Berowra Creek at Calabash Bay. Based on the results of this monitoring, estuary health is graded from ‘very poor’ to ‘very good’. In the past 12 months, water quality at Calabash Bay has been:

- ‘very good’ 3 per cent of the time
- ‘good’ 17 per cent of the time
- ‘fair’ 39 per cent of the time
- ‘poor’ 31 per cent of the time
- ‘very poor’ 10 per cent of the time (NSW Government, 2018).

Water quality is not regularly monitored in the Byles Creek or Devlins Creek catchments.

Groundwater

Groundwater in the vicinity of the site is likely to be present as a shallow fractured rock aquifer within the Hawkesbury Sandstone underlying the site (Cardno, 2015). The station is situated on the eastern side of a ridge; the regional groundwater flow direction is expected to be to the east (towards the Lane Cove River).

Flooding

A review of the Hornsby LEP 2013 did not identify the railway corridor or any areas within 200 metres of the Proposal site as a flood planning area. Additionally, no flood control lots were identified within 200 metres of the Proposal site (Phillips et.al, 2012).

While no flood risks have been identified within the Proposal site, it was noted in the Beecroft preliminary environmental assessment (PEA) that the pedestrian subway and entrance area at Beecroft Station is a low-lying feature within the local landscape, and as such, may be subject to localised flooding during high rainfall events as a function of the low-lying topography.

6.9.2 Potential impacts

a) Construction phase

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

Activities that would disturb soil during construction work would have the potential to impact on local waterways as a result of erosion and sedimentation.

Additionally, while groundwater levels were not determined as part of this assessment, areas of excavation may need to be locally dewatered as a result of groundwater seepage or rainfall runoff (such as within the vicinity of the excavations for the western lift). Incorrect dewatering may pose risks to nearby waterways where run-off travels from the site to these areas.

b) Operational phase

The Proposal is unlikely to have a major impact on the hydrology of the surrounding area. Reconfiguration of the existing access ramp and stairs on the western side of the station, and regrading of other access footpaths within the station precinct may result in a minor alteration to the surface water flow regime where these areas result in a minor increase in overall hardstand area.

Alterations to the surface water flows would likely be within the capacity of the stormwater network and as such, impacts would be minor.

6.9.3 Mitigation measures

As noted in Section 6.8.3, a site-specific Erosion and Sediment Control Plan would be prepared and implemented for the Proposal to manage risks to water quality. Additional mitigation measures that would be required for construction include would include:

- 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.
- 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).
- 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.

- 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.
- The existing drainage systems would remain operational throughout the construction phase.

Operational risks associated with localised flooding from an increase to impervious areas from new/widened footpath and new vehicle bay would be addressed during detailed design of the Proposal.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.10 Air quality

6.10.1 Existing environment

Regional air quality

The broader Sydney East monitoring region provides the most representative air quality monitoring results for Beecroft, which sits roughly in between the Sydney East and Sydney North West air monitoring regions. The Sydney East region includes air quality monitoring sites at Macquarie Park, Chullora, Rozelle, Lindfield, Randwick and Earlwood.

A search of the daily regional air quality index for the Sydney East region for last year (July 2017 to July 2018) showed that the region experienced:

- very good air quality on 2.7 per cent of days
- good air quality on 66.1 per cent of days
- fair air quality on 21.3 per cent of days
- poor air quality on 5.5 per cent of days
- very poor air quality on 2.7 per cent of days
- hazardous air quality on 1.6 per cent of days.

Air pollutant sources

Based on the existing land uses surrounding the Proposal site, the existing air quality is considered to be characteristic of an urban environment. A search of the National Pollutant Inventory undertaken on 19 July 2018 for the 2016 to 2017 reporting period identified 21 air polluting substances from 5 sources in the Hornsby LGA. The closest source was identified at West Hornsby, about 5.5 kilometres from the Proposal site.

Other contributors to air quality within the study area would include emissions from motor vehicles on the surrounding road network, and the diesel trains on the adjoining rail corridor.

Sensitive receivers

Sensitive receivers in the vicinity of the Proposal include:

- staff and customers at Beecroft Station
- residential properties to the east of the station on Sutherland Road, Copeland Road, Malton Road, and Wandeen Avenue
- commercial establishments to the west of Beecroft Station, on Wongala Crescent, Hannah Street, and Beecroft Road

- residential properties to the west of the station on Chapman Avenue, Beecroft Road, and Hannah Street
- community facilities including the Beecroft Community Centre, Beecroft Scout Hall, Beecroft Fire Station, and various parks, sports clubs, and places of worship in the surrounding area
- educational facilities and childcare centres, including Beecroft Public School to the south and Arden Anglican School to the North.

6.10.2 Potential impacts

a) Construction phase

The main air quality impacts that have the potential to occur during construction would be temporary impacts associated with dust particles and emissions of carbon monoxide, sulphur dioxide, particulate matter (PM_{10}), nitrous oxides, volatile organic compounds, and polycyclic aromatic hydrocarbons associated with the combustion of diesel fuel and petrol from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- excavation for the foundations and footings of the lift shaft pits, stairs and canopies
- removal of the garden bed on Wongala Crescent
- other trenching or excavation for footpath and road works
- upgrade of surrounding interchange facilities
- stockpiling activities
- loading and transfer of material from trucks
- other general construction activities.

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

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

b) Operational phase

Overall impacts of air quality during the operation of the Proposal are considered minimal as the Proposal would not result in a significant change in land use.

Additionally, as the Proposal would increase access to public transport, the use of public transport is anticipated to increase and subsequently the amount of private vehicle related emissions would be reduced in the long term.

6.10.3 Mitigation measures

The following mitigation measures are proposed with respect to potential air quality impacts:

- Air quality management and monitoring for the Proposal would be undertaken in accordance with the TfNSW *Air Quality Management Guideline* (TfNSW, 2015h).
- Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.

- 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.
- Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
- To minimise the generation of dust from construction activities, the following measures would be implemented:
    - 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.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

6.11 Other impacts

6.11.1 Services/utilities

The Proposal has the potential to impact services such as from direct impact from excavation activities or from operation of other equipment, if services are not appropriately identified and protected or relocated. A DBYD search identified a number of utilities in the vicinity of the proposed works including:

- electrical services (aboveground)
- telecommunication services (underground)
- stormwater, water and sewer
- rail utilities, including signalling cabling and overhead wiring
- gas.

Key services that may be impacted as part of the Proposal would include:

- permanently relocating services from existing communications room (former booking office at the northern end of the platform) to the proposed modified room within the station building
- potential relocation/modification of existing Telstra and low voltage electricity services near the station entrance.

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

6.11.2 Waste

Construction

The construction of the Proposal would generate a range of waste streams including the following:

- asphalt and concrete
- earthworks spoil
- various building surplus material wastes (including metals, timbers, plastics, concrete and carpeting)
- electrical wiring and conduit waste (from electrical connections)
- fuels, liquids and chemicals
- green waste (including weeds)
- demolition waste from the existing access footpaths, and from the internal walls of the family accessible toilet, including potential asbestos and hazardous materials
- general waste, including food and other wastes generated by construction workers.

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

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

Waste management targets in accordance with the *Infrastructure Sustainability Rating Scheme - Version 2.0* (ISCA, 2018) would be developed for the Proposal and would include reuse and recycling.

Operation

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

Mitigation measures

The following mitigation measures are proposed with respect to potential waste impacts:

- 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.

Refer to Table 7.1 in Section 7.2 for a full list of proposed mitigation measures.

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.

6.12.1 Existing and future projects in the area

A search of the Department of Planning and Environment's Major Projects Register, North Sydney Joint Regional Planning Panel Development and Planning Register, and Hornsby Shire Council Development Application Register on 20 and 23 July 2018 identified a number of proposals and projects within the Hornsby Shire Council LGA.

In addition, several major infrastructure works have recently been completed near the Proposal site, including the construction of the mixed-use commercial development, 'Beecroft Place' on the corner of Beecroft Road and Hannah Street completed in 2018, and the multi-storey residential development on the corner of Beecroft Road and Chapman Street completed in 2017.

The following current and proposed projects have been identified as the most likely to contribute to cumulative impacts from the Proposal, due to their scale and/or proximity to the Proposal site:

- NorthConnex tunnel
- Sydney Metro Stage 1 Northwest
- Wahroonga Estate Redevelopment
- Cherrybrook Village Shopping Centre Redevelopment
- Beecroft Station Gardens Upgrade and Community Centre Car park construction
- Local footpath and cycle path upgrades at various locations around Hornsby LGA, including Wongala Crescent, Hull Road and Rodney Avenue in Beecroft, and Bishop Avenue in Pennant Hills.

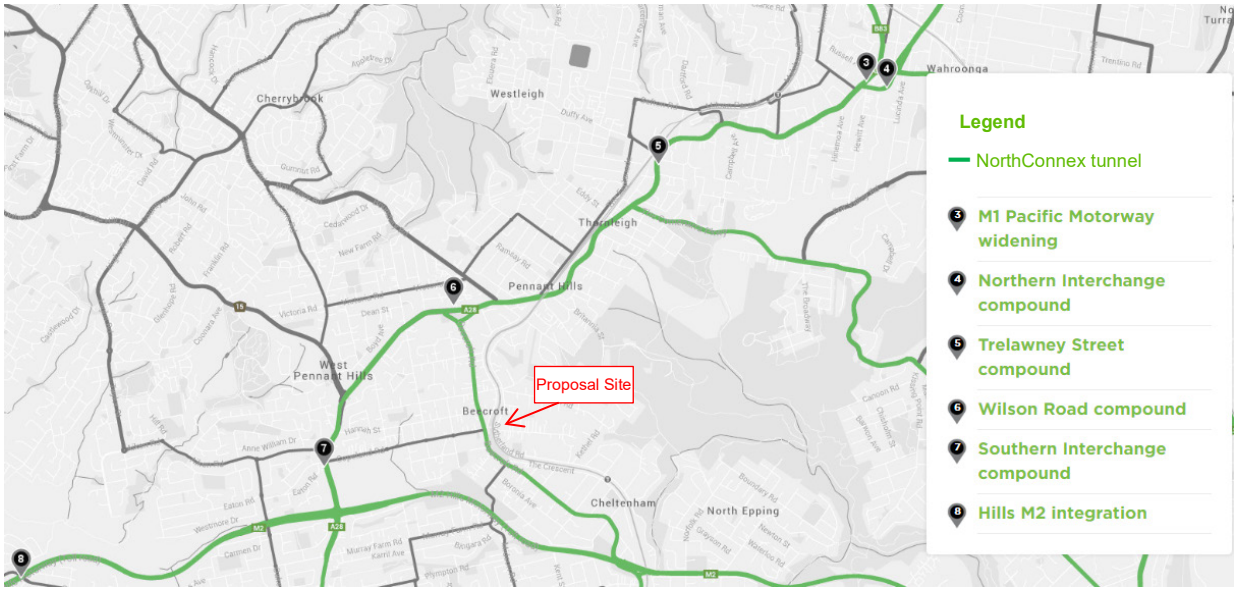
Wahroonga Estate Redevelopment

This is an ongoing development located approximately three kilometres north-east of the Proposal, and consists of expansions to the existing Sydney Adventist Hospital and Wahroonga Adventist School (stages of which have already been completed) and the construction of a new residential development. The expansions to the school are expected to be completed in January 2019, and construction of the residential development is set to occur in 2019 to 2021.

NorthConnex Tunnel

The NorthConnex Tunnel is a nine kilometre tunnel that will link the M1 Pacific Motorway at Wahroonga to the Hills M2 Motorway at West Pennant Hills (Figure 6.17). The aim of the project is to ease congestion by removing approximately 5,000 trucks off Pennant Hills Road each day. Tunnelling is now taking place 24 hours a day, seven days a week along the alignment at depths ranging between 8 and 90 metres below the surface.

The NorthConnex Tunnel passes to the north and west of the Proposal site, approximately 1 kilometre away at the closest point. Above-ground construction compounds near the Proposal site include the Southern Interchange compound on Copeland Road and Cumberland Highway (1.7 kilometres west of the Proposal) and the Wilson Road compound (1.2 kilometres north of the Proposal).



Source: NSW Government, 2018b

Figure 6.17 NorthConnex Tunnel Overview.

Sydney Metro Stage 1 Northwest

Sydney Metro Stage 1 is a 36-kilometre rail infrastructure project which includes eight new metro stations, five upgraded stations, and 4,000 commuter car spaces. Construction of the project is currently underway and is expected to be complete in the first half of 2019. All tunnelling for the project has been completed. There are several above ground construction sites and stations located close to the Proposal site, these include:

- Cheltenham Services Facility located on Kirkham Street and Castle Howard Road, approximately 1 kilometre south of the Proposal. The site is approximately 1 hectare in size and activities include tunnel systems fit-out, testing and commissioning, and services facility construction. Once Sydney Metro is complete, the site will be converted to a community facility, including sporting facilities, playground and a community building.
- Epping Services Facility located on Ray Road and Beecroft Road, approximately 2.7 kilometres south of the Proposal. The site is approximately 12,000 square kilometres and activities include services facility construction and tunnel systems fit-out.
- construction of Cherrybrook Station, located approximately 3.5 kilometres north-west of the Proposal.
- upgrades to Epping Station, located approximately 3 kilometres south-east of the site.

As part of the construction of the Sydney Metro Northwest, the train services between Epping and Chatswood were suspended on 30 September 2018 to allow for construction works to be undertaken at each station along this section of the existing line to convert the existing alignment to accommodate the new metro system. It is anticipated that the Epping to Chatswood section of the existing train line would be closed for a period of approximately seven months.

To maintain customer access to these stations, services are currently being replaced by temporary Station Link buses. One of the replacement bus services is currently operating between Beecroft Station and St Leonards (service SL3) from the bus stop (Stand A) along Wongala Crescent. These services are operating in peak hours as follows:

- To St Leonards
  6am to 10am: every 6 minutes
- To Beecroft
  3pm to 7pm: at least every 6 minutes

Following completion of construction works, the Station Link services would be ceased.

6.12.2 Potential impacts

Traffic

The overlap of construction activities could potentially result in a number of cumulative impacts for users of the road network and those living and working in and around the Proposal site. Construction-related traffic from the four Sydney Metro construction sites and compounds located within four kilometres of the site would likely use the same road network, which may increase traffic congestion in the area.

Two of the construction compounds for NorthConnex and four of the construction sites and compounds for Sydney Metro are located within four kilometres of the site and construction-related traffic would likely be using the same road network which may increase traffic congestion in the area.

With respect to the Station Link services, it is anticipated that the temporary operation of these services would have concluded prior to the commencement of works associated with the Beecroft Station upgrade.

Noise, vibration and air quality

It is highly unlikely that the community, residential, and commercial receivers near the Proposal site would be affected by noise or vibration from underground tunnelling of the NorthConnex tunnel, due to the distance from the alignment.

There is potential for air quality, noise and vibration impacts from both NorthConnex and Sydney Metro construction compounds to also affect sensitive receivers near the Proposal site, however due to the distance these impacts are unlikely to be significant.

6.12.3 Mitigation measures

In addition to the mitigation measures outlined in Table 7.1, Section 7.2designed to reduce the environmental impacts of the Proposal itself, the following mitigation measures would be implemented to ensure cumulative impacts from other construction works are minimised:

- Consultation and liaison would occur with Hornsby Shire Council, Sydney Trains, and other relevant stakeholders, in order to seek to minimise cumulative construction impacts such as traffic and noise.
- Operational traffic and transport impacts are likely to be positive, as traffic congestion may be slightly improved due to increased public transport use as a result of both the Proposal and the Sydney Metro project.
- 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.

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.

Projects are required to establish a baseline footprint using the Carbon Estimate and Reporting Tool (CERT) and demonstrate a reduction of construction related GHG emissions of at least 5% from the established project baseline (*Note: The project baseline is automatically generated within the CERT tool, refer to CERT user manual for details*).

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 7.1.

It is anticipated that, once operational, the Proposal may result in an increase in use of public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Beecroft. 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 excepted to occur in a 100-year average recurrence interval flood event would occur more frequently. Such changes in weather in the region are unlikely to impact on the operation of the Proposal with respect to issues such as increased flooding (for more information on flooding refer to Section 6.9).

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 aiming for an excellent rating as a program under the Infrastructure Sustainability Council of Australia's (ISCA) Infrastructure Sustainability (IS) Rating Tool Version 2.0 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 the TfNSW Environmental Management System (EMS). The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the Proposal would be managed, and 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 7.1. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 7.1 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 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 kiss-and-ride, taxi ranks 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 TMP. Consultation with the relevant roads authorities would be undertaken during preparation of the construction TMP. 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.
11.	During construction works to the staircases at the Wongala Crescent entrance, at least one of the existing staircases should be maintained at all times. Where possible, works to the southern portion of the staircase/ramp would be considered in parallel to construction activities for the installation of the western lift to minimise the footprint of construction activities and reduce the direct impact to customers accessing the station.
12.	A suitable path of travel from the Sutherland car park to the station should be provided during works to the existing footpath to allow pedestrians to safely bypass construction works
13.	To ensure the adequate installation of the accessibility parking within the Sutherland Road car park, the footprint of the existing bin pad should be reduced to ensure a sufficient kerb side ramp width and path access to the existing footpath. The design of the accessible parking should consider opportunities to maintain the existing tree, situated behind the proposed accessible car parking.

No.	Mitigation measure
	Urban design, landscape and visual amenity
14.	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 Sustainability and 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.
15.	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 Sustainability and 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 applicable requirements specified in the TfNSW *NSW Sustainable Design Guidelines -Version 4.0* (TfNSW, 2017) and any relevant *Infrastructure Sustainability Rating Scheme – Version 2.0* (ISCA, 2018) requirements • identification of design and landscaping aspects that will be open for stakeholder input, as required.
16.	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.*
17.	The detailed design of the Proposal would comply with Crime Prevention Through Environmental Design principles.
18.	Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.

No.	Mitigation measure
19.	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
20.	During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.
	Noise and vibration
21.	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, 2018b) and the Noise and Vibration Impact Assessment for the Proposal (WSP, 2018b). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
22.	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.
23.	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.

No.	Mitigation measure
24.	Works would generally be carried out during standard construction hours (i.e. 7.00 am to 6.00 pm Monday to Friday; 8.00 am to 1.00 pm Saturdays). Any works outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An Out of Hours Work application form would need to be prepared by the Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.
25.	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 TfNSW"s *Construction Noise and Vibration Strategy* (TfNSW, 2018b). This would include restricting the hours that very noisy activities can occur.
26.	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 (WSP, 2018b) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.
27.	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)*.
28.	Property conditions surveys would be completed prior to any vibration intensive work being carried out at or within the minimum distances set out in the TfNSW *Construction Noise and Vibration Strategy* (CNVS). Where a heritage item is determined to be structurally unsound and a reassessment of the minimum working distances would be required. Minimum working distances should be confirmed prior to carrying out any vibration intensive work on site.
	Indigenous heritage
29.	All construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to the Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
30.	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.

No.	Mitigation measure
	Non-Indigenous heritage
31.	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.
32.	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 Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
33.	Ripple-iron ceilings are a key characteristic material within the buildings. All ceilings being affected by the works should be established or reinstated with ripple-iron sheeting.
34.	Works affecting original fabric of the former Booking Office and Platform Building should be of a quality compatible with the original materials.
35.	Special attention should be given to the design details for the upper level extension to Booking Office. Any new roof materials, cladding and arrangement should aim to reproduce the original as closely as possible.
36.	Special attention should be given to the resolution of the arrangement of the balustrade around the platform stairs, both in the rearrangement of panels and in the addition of mesh infill between the rails.
37.	As Beecroft Station and Garden/Item 142 is listed on the heritage schedule of the Hornsby LEP, Hornsby Shire Council would be notified of the proposed works.
38.	Prior to works commencing, a Photographic Archival Recording should be prepared in accordance with the latest version of the Heritage Division Photographic Archival Recording guidelines.
39.	Any accidental damage to a heritage item is to be treated as an incident, with appropriate recording and notification.
40.	During construction, suitable measures would be put in place to ensure the retained heritage elements are protected from damage. Measures may include hoardings, use of spotters during the movement of equipment and other measures as necessary.
41.	A heritage conservation architect would be engaged for the detailed design process and to inform the detailed design recommendations. Specifically, the heritage architect would provide input into, and advice upon the:: o materials and finishes palette. o design of the new upper addition of the former Booking Office. Any new materials should aim to reproduce the original as closely as possible. o design of the balustrade around the platform stairs. This is with respect to the relocation of panels and the design of mesh infill additions between the rails.
42.	Consideration should be given to the preparation of Heritage Interpretation Plan which specifically addresses the history and significance of the former Booking Office.

No.	Mitigation measure
43.	On completion of works, an update would be prepared for the Section 170 Heritage and Conservation Register, with required details.
	Socio-economic
44.	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.
45.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
46.	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.
47.	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.
48.	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 and arboricultural
49.	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).
50.	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.
51.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed in the Arboricultural Impact Assessment (Earthscape, 2018) 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.
52.	A Tree Protection Plan and tree protection measures has been prepared for the Proposal (refer to the Arboricultural Impact Assessment report by Earthscape, 2018, in Technical Paper 5). Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the Arboricultural Impact Assessment (Earthscape, 2018). Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of TPZs.
53.	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.
54.	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 the TfNSW *Tree Removal or Trimming Application Form* and submit it to TfNSW for approval.

No.	Mitigation measure
55.	For new landscaping works, mulching and watering would be undertaken until plants are established.
56.	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 *Noxious Weeds Act 1993.*
57.	All construction works, demolition works, excavations, and vehicle movements within the TPZs (see Appendix 6 of Technical Paper 5) will be carried out in accordance with the mitigation measures outlined in the Tree Protection Plan (Technical Paper 5). All demolition and excavation works within the TPZs will be undertaken under the supervision of a qualified Arborist.
58.	The following activities would be avoided within the specified TPZs (Appendix 6 of Technical Paper 5): • Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade) • Soil disturbance, surface grading, compaction, ripping or cultivation of soil • Mechanical removal of vegetation, including extraction of tree stumps • Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works) • Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas) • Erection of site sheds (except where approved by the site arborist) • Affixing of signage, barricades or hoardings to trees • Storage of building materials, waste and waste receptacles • Stockpiling of spoil or fill • Stockpiling of bulk materials, such as soil, sand, gravel, road base or the like • Stockpiling of demolition waste • Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids • Other physical damage to the trunk or root system • Any other activity likely to cause damage to the tree.
59.	Care shall be taken when operating machinery near trees to avoid damage to tree canopies. Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.
60.	Trunk protection boarding shall be erected around Trees T4, T5, T6, T8, T9, T10 & T21 to avoid accidental damage, as indicated on the Tree Protection Plan (Appendix 6 of Technical Paper 5). Trunk protection shall be installed prior to any site works and maintained in good condition for the duration of the construction period.
61.	All proposed underground services should be located outside of TPZs or installed by alternative methods which do not interfere with or minimise interference with the tree's roots.

No.	Mitigation measure
62.	All tree pruning and removal works, including any root pruning, would be undertaken in accordance with Australian Standard AS 4373-2007*, Pruning of Amenity Trees*.
63.	The removal of Trees T11a & T12a shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.
64.	In order to compensate for loss of amenity resulting from the removal of trees T11a and T12a, a minimum number of four new trees capable of attaining a height of at least ten metres at maturity would be planted within an appropriate area of the site in accordance with TfNSW *Vegetation Offset Guideline* (2016). Selection of tree replacement species, size and planting locations (where required) would be undertaken in close consultation with Council and in accordance with the urban design and landscape plan to be developed for the project.
	Soils and water
65.	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.
66.	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.
67.	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.
68.	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).
69.	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.
70.	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.
71.	The existing drainage systems would remain operational throughout the construction phase.
72.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and the TfNSW *Water Discharge and Reuse Guideline* (TfNSW, 2015b).

No.	Mitigation measure
	Air quality
73.	Air quality management and monitoring for the Proposal would be undertaken in accordance with the TfNSW *Air Quality Management Guideline* (TfNSW, 2015h).
74.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
75.	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.
76.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
77.	To minimise the generation of dust from construction activities, the following measures would be implemented: • 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
78.	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.
79.	As there is potential for onsite contamination given historic activities associated with the railway land use, prior to construction commencing, a contamination investigation would be undertaken by a suitably qualified professional to confirm the composition and nature of excavated material.
80.	An unexpected contamination 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 SafeWork NSW requirements.
81.	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.
82.	The handling, storage, transport and disposal of all asbestos and hazardous waste (if identified during construction) would occur in accordance with the requirements of the PoEO Act, WARR Act and other relevant guidelines.

No.	Mitigation measure
83.	All spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste (*EPA, 2014) prior to disposal.
84.	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.
	Climate change and sustainability
85.	Detailed design of the Proposal would be undertaken in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017).
86.	Detailed design of the Proposal would target a rating of 'Excellent' using the ISCA Infrastructure Sustainability Rating Scheme (v2.0)
87.	The detailed design process would include a Greenhouse Gases (project level) compliant carbon footprinting exercise in accordance with AS14064-2 and the TfNSW *Greenhouse Gas Inventory Guide for Construction Projects* (TfNSW, 2013e). The carbon footprint would then be used to inform decision making in design and construction.
	Cumulative impacts
88.	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:

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

The likely key impacts of the Proposal are as follows:

- temporary impacts on local traffic flow associated with construction traffic and the works to the pedestrian crossing and Wongala Crescent
- impacts to the heritage fabric of the station and visual environment from the introduction of new elements, such as the lifts
- temporary disruptions to station facilities and amenities during construction, including potential weekend closures of the Beecroft Station
- temporary changes to vehicular, bus, bicycle and pedestrian access to, through and movements around the station
- potential temporary loss of time-restricted parking on nearby streets and in the Council car park
- removal of two trees near the bus shelter on Wongala Crescent
- potential sediment mobilisation, dust generation and erosion risk during construction.

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

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

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Appendix A Consideration of matters of National Environmental Significance

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

Matters of NES	Impacts
Any impact on a World Heritage property? Two World Heritage properties occur within a ten-kilometre radius of the site. Both heritage places are associated with the Old Government House and Domain located at Parramatta and would not be impacted by the Proposal.	Nil
Any impact on a National Heritage place? Two National Heritage places occurs within a ten-kilometre radius of the site. The places include Old Government House and Domain located at Parramatta and the Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves located north of Hornsby. These places would not be impacted by the Proposal.	Nil
Any impact on a wetland of international importance? No wetlands of international importance are located within a ten-kilometre radius of the site. One wetland of National importance is located within ten kilometres within Bicentennial Park, Homebush. This wetland would not be impacted by the Proposal.	Nil
Any impact on a listed threatened species or communities? Based on available habitat and the potential impacts of the Proposal, it is unlikely that any threatened species or community will be impacted.	Nil
Any impacts on listed migratory species? No listed migratory species are likely to utilise the habitat within the study area.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? The Proposal would not impact on a Commonwealth marine area.	Nil
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The Proposal is not related to coal seam gas or mining,	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The Proposal would not impact on Commonwealth land.	Nil

Appendix B Consideration of clause 228

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

Factor	Impacts
(a) Any environmental impact on a community? There would be some temporary impacts to the community during construction, particularly in relation to noise, traffic and access and visual amenity. Mitigation measures outlined in Table 7.1 would be implemented to manage and minimise adverse impacts.	Minor
(b) Any transformation of a locality? The Proposal would involve the introduction of new visible elements in the landscape (two new lifts, a raised station building roof, new pedestrian bridge over platform stairs, and new stairs to the pedestrian subway). The appearance of the new elements would be consistent with the existing station elements and are considered to be common features in urban areas. The Proposal would necessitate the removal of two trees from outside the Station entrance. However, the majority of vegetation around Beecroft Station would remain intact, and four new trees will be planted. The Proposal would have a positive contribution to the locality by creating accessible entrances to the station and station platforms.	Minor
(c) Any environmental impact on the ecosystem of the locality? The Proposal would require minor vegetation removal. However, given the Proposal's location within an urbanised environment and the low habitat value of the trees to be removed, impacts to biodiversity and ecosystems are expected to be negligible.	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. Minor vegetation removal would be required from the western side of the station. However, the number of trees to be removed has been minimised as far as possible.	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? Beecroft Station is listed on the RailCorp Section 170 Heritage and Conservation Register. The Proposal would retain the overall heritage values of the existing station.	Minor
(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

Factor	Impacts
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The Proposal is unlikely to have any impact on endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.	Nil
(h) Any long-term effects on the environment? The Proposal is unlikely to have any long-term effects on the environment.	Nil
(i) Any degradation of the quality of the environment? The Proposal is unlikely to have any degradation on the quality of the environment.	Nil
(j) Any risk to the safety of the environment? The Proposal is unlikely to cause any pollution or safety risks to the environment provided the recommended mitigation measures are implemented.	Nil
(k) Any reduction in the range of beneficial uses of the environment? The Proposal is unlikely to have any reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The Proposal is unlikely to cause any pollution or to the environment provided the recommended mitigation measures are implemented.	Nil
(m) Any environmental problems associated with the disposal of waste? The Proposal is unlikely to cause any environmental problems associated with the disposal of waste. All waste would be managed and disposed of with a site-specific Waste Management Plan. Mitigation measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Nil
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is to unlikely increase demands on resources that are or are likely to become in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative effects of the Proposal are described in Section 6.12. Where feasible, environmental management measures would be co-ordinated to reduce any cumulative construction impacts. The Proposal is unlikely to have any significant adverse long-term impacts.	Minor
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal would not affect or be affected by any coastal processes or hazards.	Nil