NSW GOVERNMENT

Transport Access Program

Hawkesbury River Station Upgrade

Review of Environmental Factors

Artist's impression of the proposed Hawkesbury River Station Upgrade, subject to change during detailed design.

June 2019

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Abbreviations

Term	Meaning
AHIMS	Aboriginal Heritage Information Management System
AS	Australian Standard
ASS	Acid Sulfate Soils
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEMP	Construction Environmental Management Plan
CCTV	Closed circuit TV
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CNVMP	Construction Noise and Vibration Management Plan
CTMP	Construction Traffic Management Plan
DBH	Diameter Breast Height
DDA	*Disability Discrimination Act 1992* (Cwlth)
DSAPT	*Disability Standards for Accessible Public Transport 2002*
ECM	Environmental Controls Map
EMF	Electromagnetic Fields
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)
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
FM Act	*Fisheries Management Act 1994* (NSW)
GREP	Government Resource Efficiency Policy
Heritage Act	*Heritage Act 1977* (NSW)
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
LEP	Local Environmental Plan

Term	Meaning
LGA	Local Government Area
NES	National Environmental Significance (refers to matters of National Environmental Significance under the EPBC Act)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
PoEO Act	*Protection of the Environment Operations Act 1997* (NSW)
REF	Review of Environmental Factors (this document)
Roads Act	*Roads Act 1993* (NSW)
SEPP	State Environmental Planning Policy
SoHI	Statement of Heritage Impact
SHI	State Heritage Inventory
SHR	State Heritage Register
SREP	Sydney Regional Environmental Plan
TfNSW	Transport for NSW
TPZ	Tree Protection Zone
UDP	Urban Design Plan
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)
WM Act	*Water Management Act 2000* (NSW)
WMP	Waste Management Plan

Definitions

Term	Meaning
Asset Standards Authority	The Asset Standards Authority is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets.
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.
Concept design	The concept design is the preliminary design presented in this REF, which would be refined by the Construction Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance).
Determining Authority	A Minister or public authority on whose behalf an activity is to be carried out or public authority whose approval is required to carry out an activity (under the EP&A Act).
Disability Standards for Accessible Public Transport	The Commonwealth *Disability Standards for Accessible Public Transport 2002* (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 Standards cover premises, infrastructure and conveyances, and apply to public transport operators and premises providers.
Ecologically Sustainable Development	As defined by clause 7(4) Schedule 2 of the EP&A Regulation. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Feasible	A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.
Interchange	Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.
Kiss and ride bay	A kiss and ride bay allow for quick entry and exit which helps minimise congestion and risk when used properly. These types of bays operate under the same conditions as no parking zones, which means a customer may stop to drop off or pick up others for a maximum of two minutes. They are required to remain in, or within three metres of their vehicle (Service NSW, 2016).
Out of hours works	Defined as works *outside* standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).
Proponent	A person or body proposing to carry out an activity under Division 5.1 of the EP&A Act.

Term	Meaning
Trackwork period	Trackwork period 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.
The Proposal	The construction and operation of the Hawkesbury River Station Upgrade.
Vegetation Offset Guide (TfNSW, 2016b)	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 New South Wales (TfNSW) is proposing to undertake the Hawkesbury River Station Upgrade (the Proposal). Transport for New South Wales is the government agency responsible for the delivery of major transport infrastructure projects in NSW and is the proponent for the Proposal.

The Proposal forms part of the Transport Access Program, a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure. The Proposal would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage. Key features of the Proposal include:

- lift access to the station platforms
- a new accessible path between the Dangar Road car park and the station, including a pedestrian crossing
- improved amenities such as a new ambulant toilet and family accessible toilet
- provision of a new kiss and ride bay and a compliant accessible car space.

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

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

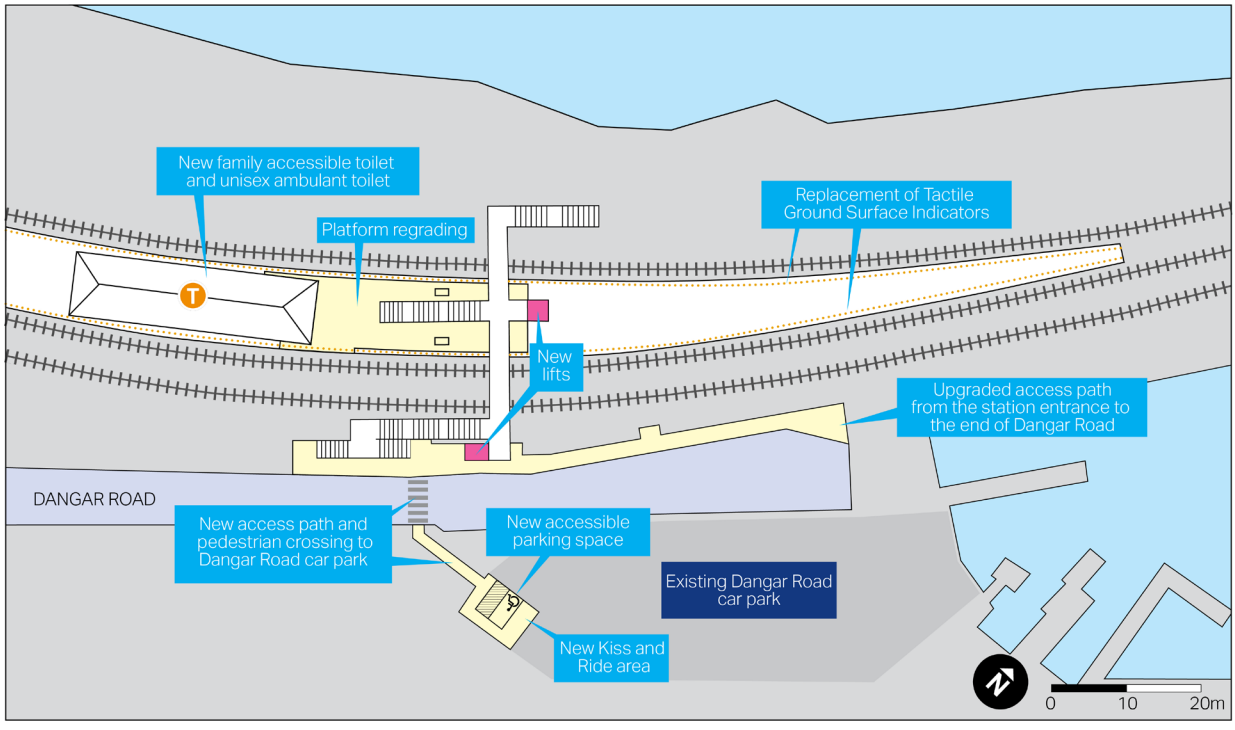

Figure 1 Proposed Hawkesbury River Station Upgrade (indicative only - subject to detailed design)

Need for the Proposal

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

The Proposal is designed to drive a stronger customer experience outcome, to deliver improved travel to and between modes, encourage greater public transport use and better integrated interchanges with the role and function of town centres.

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

Community and stakeholder consultation

Community consultation activities for the Proposal would be undertaken during the public display period of this REF and the public would be invited to submit feedback to help TfNSW understand what is important to customers and the community. The REF would be displayed for a period of three weeks.

During this period a Project Infoline (1800 684 490) and email address (projects@transport.nsw.gov.au) would be also available for members of the public to make enquiries, and an information session would be held to allow community members to meet with the project team and discuss details of the Proposal. A newsletter would be circulated to the local community providing information on the Proposal, where to view the REF, and how to provide feedback.

TfNSW would review, assess and respond to all feedback received during the public display period, prior to determining whether or not to proceed with the Proposal. All submissions received in the public display period will be addressed in a Determination Report which will be made public prior to any construction work.

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

Feedback can be sent to:

- projects@transport.nsw.gov.au
- Transport Access Program – Hawkesbury River

  Associate Director Environmental Impact Assessment

  Transport for NSW
  Locked Bag 6501
  St Leonards NSW 2065

Or submitted:

- in person at a project community information session
- TfNSW website:
  - www.transport.nsw.gov.au/projects/current-projects/hawkesbury-river-station-upgrade
- via NSW Government Have Your Say www.nsw.gov.au/improving-nsw/have-your-say/

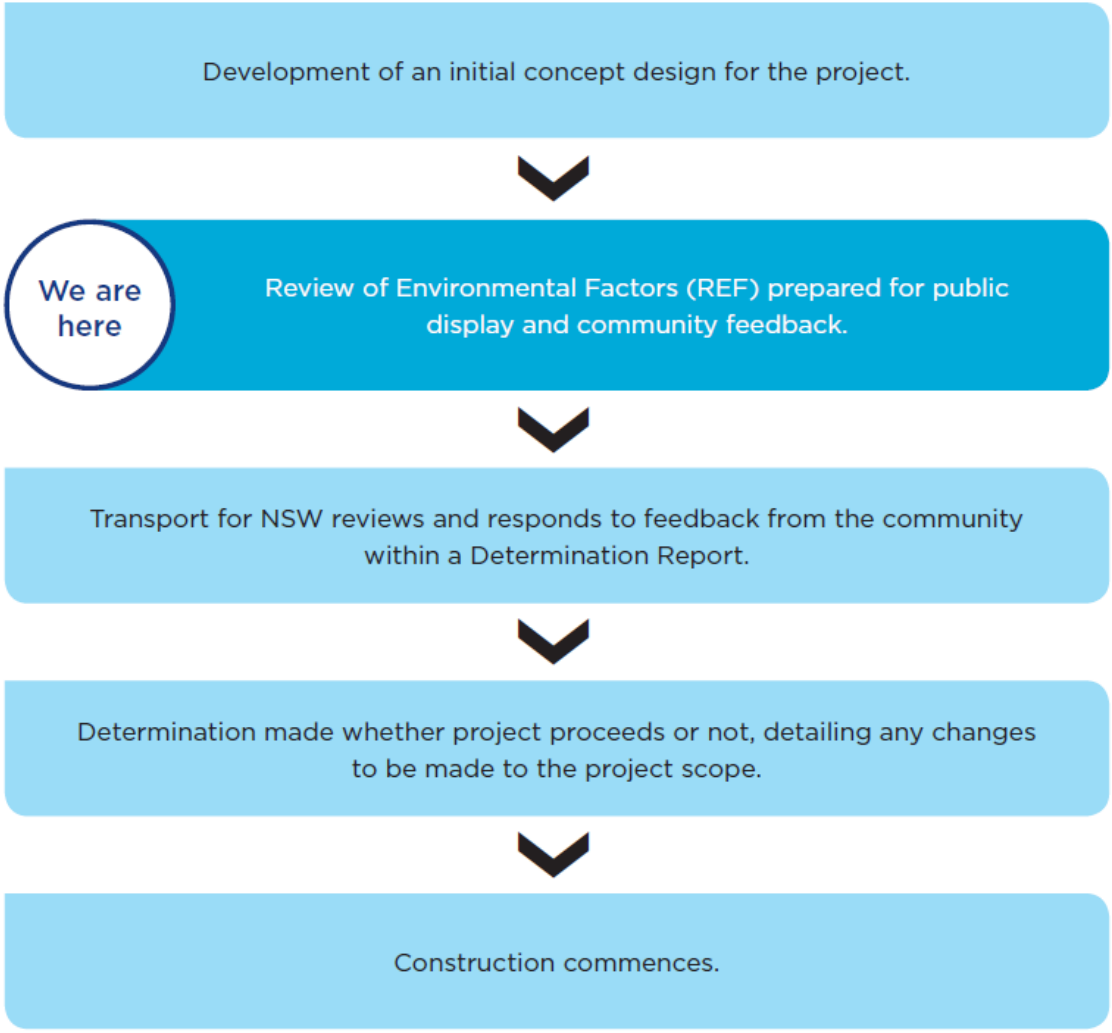

Figure 2 Planning approval and consultation process for the Proposal

Further information about these specific activities is included in Section 5 of this REF.

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:

- two new lifts to provide access to the station platform
- provision of a new kiss and ride bay and a compliant accessible car space
- a new access path and pedestrian crossing to the Dangar Road car park
- a regraded access path from the station to the end of Dangar Road
- a new family accessible toilet and unisex ambulant toilet
- improvements to CCTV and lighting to increase safety and security

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

- temporary changes to vehicle and pedestrian movements in and around the station during the construction of the Proposal

- temporary changes to parking arrangements within the Dangar Road car park and Brooklyn Road commuter car park during construction
- visual amenity impacts through the introduction of two lifts at the station
- temporary noise and vibration impacts from the construction works
- removal of two small trees and one medium tree from the vegetated area adjacent to the rail corridor

Further information regarding these impacts and mitigation measures are provided in Chapter 6 and Chapter 7 of the REF. A photomontage of the Proposal to demonstrate its indicative design is illustrated in Figure 3.

Conclusion

This REF has been prepared having regard to sections 5.5 to 5.7 of the EP&A Act, and clause 228 of the *Environmental Planning and Assessment Regulation 2000* (*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 concept design for the Proposal has been developed in accordance with the project targets identified in the program wide TAP 3 Sustainability Strategy and the *NSW Sustainable Design Guidelines - Version 4.0* (TfNSW, 2017a).

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 adverse impacts on the environment.

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

Figure 3 Photomontage of Hawkesbury River Station facing east on Dangar Road (indicative only - subject to detailed design)

1 Introduction

Transport for NSW (TfNSW) was established in 2011 as the lead agency for integrated delivery of public transport services across all modes of transport in NSW. TfNSW is the proponent for the Hawkesbury River Station Upgrade (the Proposal).

1.1 Overview

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

The Transport Access Program is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

Hawkesbury River Station and some access paths and the Dangar Road car park do not meet key requirements of the DSAPT or the DDA.

The island platform is currently only accessed by two sets of stairs from the station entries/exits to a footbridge with stairs down to the platform. The stairs do not provide an accessible path of travel for people including those with a disability, limited mobility, parents/carers with prams and customers with luggage. In addition, the surrounding pedestrian access paths between the Dangar Road car park and the station are not DSAPT compliant.

The Proposal would provide safe and equitable access to the island platform and the access paths between the Dangar Road car park and the station and would improve customer facilities and amenity. The improvements would in turn assist in supporting the growth in public transport use and would provide an improved customer experience for existing and future users of the station.

1.1.1 Objectives of the Transport Access Program

The Transport Access Program aims to provide:

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

1.2 The Proposal

The Proposal forms part of the Transport Access Program. The key features of the Proposal are summarised as follows:

- construction of two new lifts to provide access to the existing footbridge and station platforms, including associated landings and support structures

- provision of a kiss and ride space and an accessible parking space within the Dangar Road car park as well as an access path and pedestrian crossing from the car park to the station entrance
- regrading of the footpath at the access points to the station on the Dangar Road side of the station and extending approximately 50 metres (m) north east from the station entrance, to the end of Dangar Road
- construction of a new family accessible toilet, a new unisex ambulant toilet, and a new staff toilet within the existing toilet facilities
- installation of a horizontal glass canopy over the entrance of the family accessible toilet
- installation of a new padmount transformer as well as ancillary electrical works to supply the station and new lifts with electricity
- ancillary works including adjustment to lighting, electrical upgrades, improvement to station communications systems (including CCTV cameras), hearing loops, wayfinding signage and installation of tactile ground surface indicators (TGSIs) as required.

Subject to planning approval, construction is expected to commence in late 2019 and take around 18 months to complete.

A detailed description of the Proposal is provided in Chapter 3 of this Review of Environmental Factors (REF). An overview of the key features of the Proposal is also provided in Figure 1.

1.3 Location and existing infrastructure

Hawkesbury River Station is located on Dangar Road, Brooklyn. Hawkesbury River Station services the Central Coast & Newcastle railway line travelling between Newcastle and Central Station as part of the Intercity Trains Network, approximately 57 kilometres from Sydney's Central Station. The location of the Proposal in the context of the region is shown in Figure 4.

The suburb of Brooklyn is located in the Hornsby Shire Council Local Government Area (LGA). Brooklyn fringes the Hawkesbury River and is generally bounded by densely vegetated National Park areas.

The station is zoned as SP2 Rail Infrastructure Facility. The zoning is shown in Figure 5. Immediately adjoining Hawkesbury River Station is a mixed-use area comprising a café and community facilities (health centre, leisure and learning centre, art gallery) to the south east. The Hawkesbury River Marina and Brooklyn Public Wharf are located immediately to the east of the station while Brooklyn village lies to the south. The Hawkesbury River forms the western and northern boundary of the Proposal area.

Hawkesbury River Station is a single island platform (Platform 1 and 2) accessed from Dangar Road via stairs leading to an over-line footbridge. Both platforms have two to four services during peak periods (AM – 07:00 to 09:00 and PM – 16:00 to 18:00) respectively. Both platforms 1 and 2 are currently used for through train services in each direction.

There is a single station building located on the island platform, which is a single-storey brick faced building with a corrugated iron gable roof. The building contains a customer information window and staff area, lobby area for the existing female toilets, toilets, store room and station master's area.

The closest car park is located directly opposite the station off Dangar Road. There is currently no pedestrian crossing to cross Dangar Road from the car park. Further, there are no current accessible car parking spaces within close proximity to the station or a kiss and ride space. A second car park is located off Brooklyn Road approximately 100 metres west of the station entrance.

A bus stop is located along Dangar Road within walking distance to the station. Three bus routes service the bus stop, which is operated by Transdev NSW.

To provide context of the existing infrastructure of the station and the surrounding environment Figure 6, Figure 7, Figure 8, Figure 9, Figure 10 and Figure 11 have been provided below.

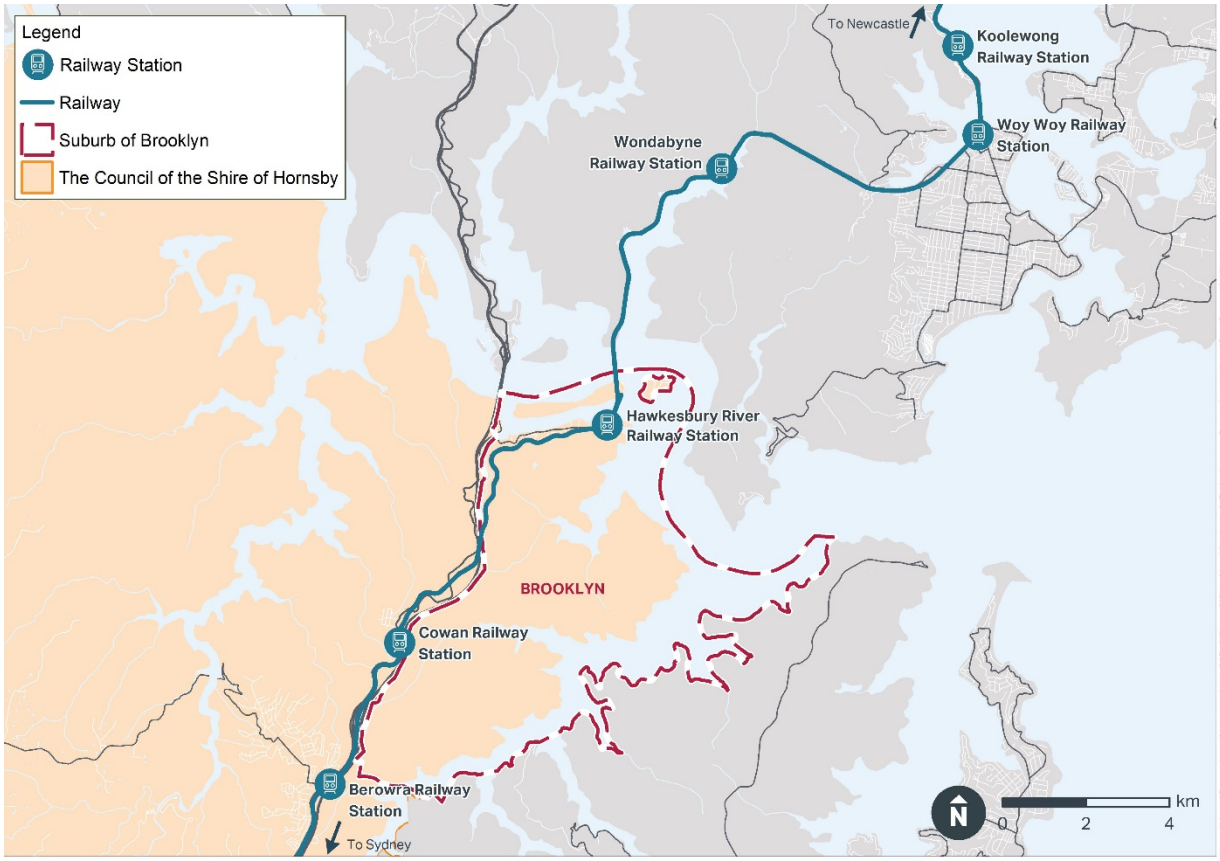

Figure 4 Regional context

Figure 5 Site locality map

Figure 6 View looking north from 'Fitzies' Fish and Chips towards Hawkesbury River Station pedestrian overpass (Source: AECOM)

Figure 7 View of rail corridor facing south west from Hawkesbury River Station (Source: AECOM)

Figure 8 View of Dangar Road Car park from the top of the stairs leading to the footbridge (Source: AECOM)

Figure 9 View of Dangar Road looking south west towards 'Fitzies' Fish and Chips (red-tiled roof with cars parked in front) (Source: AECOM)

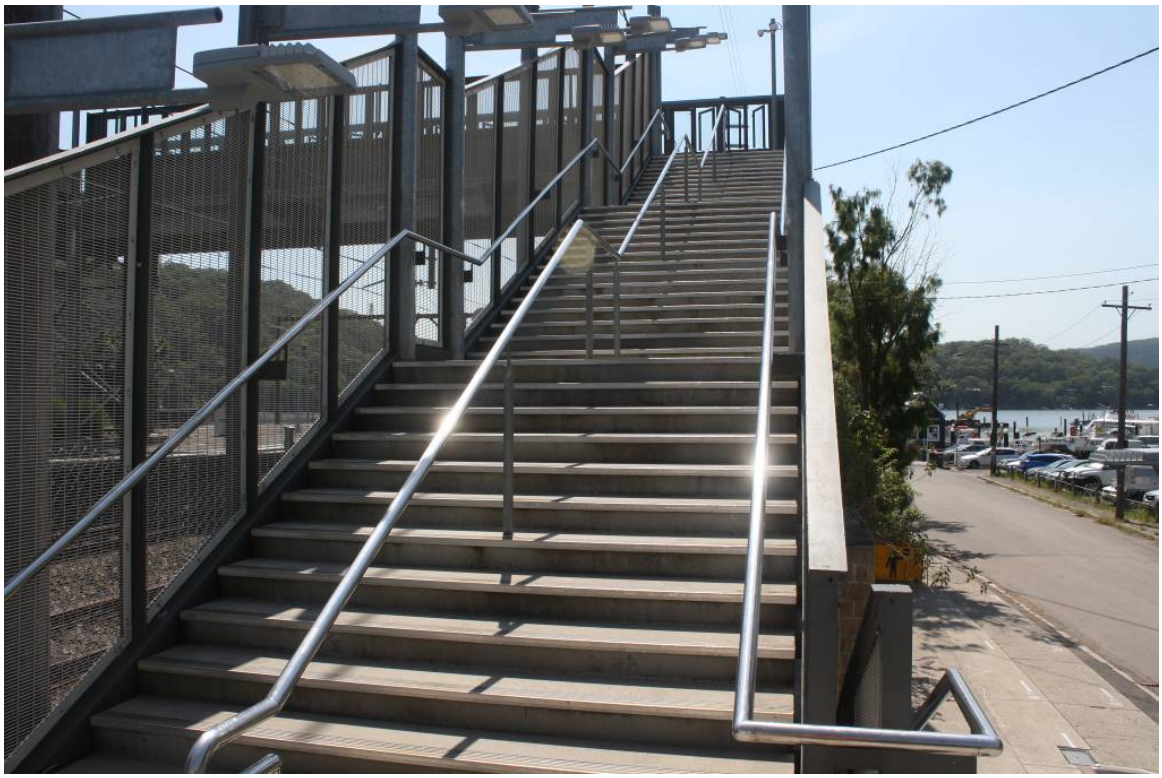

Figure 10 Stairs to access station footbridge from Dangar Road (Source: AECOM)

Figure 11 External view of existing station building facing south west (Source: AECOM)

1.4 Purpose of this Review of Environmental Factors

This REF has been prepared by AECOM Australia on behalf of TfNSW to assess the potential impacts of the Hawkesbury River Station Upgrade. For the purposes of these works, TfNSW is the proponent and the determining authority under Division 5.1 of the EP&A Act.

The purpose of this REF is to describe the Proposal, to assess the likely impacts of the Proposal having regard to the provisions of section 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 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 has considered the potential for the Proposal to have a significant impact on matters of National Environmental Significance (NES) or Commonwealth land, and the need to make a referral to the Commonwealth Department of the Environment and Energy for any necessary approvals under the EPBC Act. Refer to Chapter 4 for more information on statutory considerations.

2 Need and options considered

Chapter 2 discusses the need and objectives of the Proposal, having regard to the objectives of the Transport Access Program (refer to Section 1.1.1).

2.1 Strategic justification

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 Hawkesbury River Station Upgrade, the subject of this REF, forms part of the Transport Access Program. This Program is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. The Proposal would improve accessibility of the station in line with the requirements of the DDA and the DSAPT.

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

One of the 12 priorities identified as part of *NSW: Making It Happen* relates to investment in building infrastructure. The ongoing development and investment in transport infrastructure is identified as part of the wider building infrastructure priority.

The Proposal assists in meeting the priority by improving accessibility to public transport and encouraging greater use of public transport.

The NSW Government has developed *Future Transport Strategy 2056* (Transport for NSW 2018a). This plan provides a comprehensive strategy for all modes of transport across NSW over the next 40 years, while also delivering on current commitments.

Data forecasts indicate that there would be significant growth in population and employment from now up to 2036 in the area within the station catchment. The Proposal accommodates the forecast Sydney Trains patronage growth (an increase of 10 per cent to 2036) and changing travel patterns.

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

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.

Key NSW Government strategies current at the time of preparing this REF are included in Table 1.

Table 1 Key NSW Government policies and strategies applicable to the Proposal

Policy / Strategy	Overview	How the Proposal aligns
Future Transport Strategy 2056 (TfNSW, 2018a)	*Future Transport Strategy 2056* is an update of NSW's *Long Term Transport Master Plan*. It outlines strategies and plans for transportation to be developed in conjunction with other relevant NSW strategies (e.g. *NSW State Infrastructure Strategy*) to provide an integrated vision for the state. *Future Transport Strategy 2056* identifies 12 customer outcomes to guide transport investment in Greater Sydney. These outcomes include transport providing convenient access, supporting attractive places and providing 30-minute access for customers to their nearest centre by public transport. Customer outcomes relevant to the Proposal includes: • a safe transport system for every customer with the aim for zero deaths or serious injuries on the network by 2056 • fully accessible transport for all customers.	The Proposal aligns with the *Future Transport Strategy 2056* by providing accessible services for people who find it difficult to access public transport services. New lifts and access paths as proposed under the Proposal would provide a more physically accessible and safe network allowing greater choice for people with mobility constraints to access public transport.
Premier's Priorities and State Priorities (Department of Premier and Cabinet, 2019)	The NSW Government has identified 12 Premier's Priorities and 18 State Priorities that are focused on growing the NSW economy, delivering infrastructure, protecting the vulnerable and improving health, education and public services across the State. A key Premier Priority is the delivery of infrastructure, specifically noting the importance of every NSW community receiving its fair share of local projects and extra services.	The Proposal is aligned with the Premiers' Priorities as it is a part of the wider delivery of key infrastructure projects across NSW.
Disability Inclusion Action Plan 2018 – 2022 *(TfNSW, 2017b)*	The *Disability Inclusion Action Plan 2012-2017* 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 *Disability Inclusion Action Plan* discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job and provides a solid and practical foundation for future progress over the next five years.	The Proposal has been developed with consideration of the objectives outlined in this Plan and seeks to improve and provide equitable access to public transport facilities.

Policy / Strategy	Overview	How the Proposal aligns
NSW State Infrastructure Strategy 2018-2038 (Infrastructure NSW, 2018)	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* 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 - Greater Sydney Region Plan (Greater Sydney Commission, 2018)	The *Greater Sydney Region Plan* is the NSW Government's 40-year land use plan for Sydney. It establishes a vision for a metropolis of three cities – the Eastern Harbour City, Central River City and Western Parkland City. Specifically, the metropolis of three cities plan promotes access to transport through its objectives. This includes: Objective 3: *Infrastructure adapts to meet future* needs, Objective 4: *Infrastructure Use is optimised* and Objective 6: *Services and infrastructure meet communities' changing needs.*	The Proposal is aligned with *A Metropolis of Three Cities – Greater Sydney Region Plan* as it recognises the nature of Sydney's ageing population and the diversity of access needs within the wider community. It also provides greater access to Hawkesbury River Station for people with a disability and people otherwise unable to access the station without lifts or appropriate paths.
North District Plan (Greater Sydney Commission, 2018)	The *North District Plan* is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. Accessibility, including access to public transport is a key issue of the plan especially due to demographic factors such as the rapidly ageing nature of the population and the North District including over 27,500 people with a disability.	The Proposal would ensure that greater access is provided to Hawkesbury River Station through the provision of lifts, access paths and facilities and safer mobility on the station and within the vicinity of the station.
Building Momentum – State Infrastructure Strategy 2018-2038 (Infrastructure NSW, 2018)	The *State Infrastructure Strategy 2018-2038* makes recommendations for each of NSW's key infrastructure sectors including transport. This strategy contains general strategic directions, and sector (transport) specific objectives that relate to the delivery of accessible infrastructure for the rail network.	The Proposal aligns with the general and transport strategic directions of the strategy by aims to delivering accessible infrastructure to Hawkesbury River Station, as part of the broader Transport Access Program which is delivering accessible stations across NSW. This is a crucial program of works that will increase the use of NSW's public transport system in a

Policy / Strategy	Overview	How the Proposal aligns
		manner that is financially sustainable. Further, by providing increased access, the Proposal would increase the use of the existing Station, improving connectivity around the Sydney Metropolitan area, using available and new technology.
Draft Older Persons Transport and Mobility Plan 2018 – 2022 *(TfNSW, 2018)*	The *Draft Older Persons Transport and Mobility Plan 2018 – 2022* is one of a suite of social inclusion plans that supports the core objective of the *Future Transport Strategy 2056* of providing access for all, no exceptions. This plan makes it clear that older customers must be able to physically access train stations.	The Proposal aims to provide better access to Hawkesbury River Station through the provision of lifts, upgraded pathways and accessible parking spaces. It provides upgraded security to ensure the safety of older customers.

2.2 Objectives of the Proposal

The objectives of the Proposal have been prepared with consideration of the overarching objectives of the Transport Access Program (refer to Section 1.1.1).

TfNSW commissioned the development of a scoping design for the Hawkesbury River Station Upgrade that would improve accessibility in and around the station and meet key architectural, engineering and urban design objectives (Aurecon, 2019).

The assessment identified a number of deficiencies with the existing station and surrounding area:

- no existing kiss and ride space or disabled car space within close proximity to the station
- there are no lifts to access the station of platforms
- no existing accessible or ambulant toilets
- there are several non-compliances at the station with regards to access for persons with a disability including existing platform grading and entrances to the station building facilities.

Both options initially considered that the regrading of the footpath on the station side of Dangar Road would be from the station access points to the ferry wharf, rather than finishing at the end of Dangar Road. Extending the footpath regrading works to the ferry wharf was considered however it was identified that the installation of a footpath beyond Dangar Road would disturb the existing sea wall and therefore result in extensive works required to be carried out to the sea wall. Any future works to the seawall would likely form a project in itself and would need to be done in conjunction with Council who manage the seawall.

The needs and opportunities at Hawkesbury River Station were then considered in the development of options for the scoping design, with the preferred option to be further refined during detailed design, subject to approval.

The specific objectives of the Hawkesbury River Station Upgrade are to provide:

- a station that is accessible to people with a disability, limited mobility and parents with prams

- safe access paths between the accessible parking space and kiss and ride space to and from the station
- car parking options for people with a disability
- improved customer safety and security
- improved wayfinding in and around the station.

2.3 Options considered

Options for improving access to Hawkesbury River Station were developed following a series of workshops with TfNSW and the project design team. Two scoping design options were developed from those workshops.

Improvements common to both options included; the installation of lifts to a footbridge from the pathway and to the platform from a footbridge, creation of accessible parking spaces and a kiss and ride space, platform regrading, provision of accessible toilets, CCTV adjustments and improvements of wayfinding signage.

The key differences between the options are the installation of a new footbridge or retention of the existing footbridge, the location of the accessible and kiss and ride parking spaces, and options regarding the toilet facilities.

2.3.1 Option 1 (preferred option)

Option 1 proposed retaining the existing footbridge and providing a new lift at the centre of the footbridge (providing access to and from the platform) and a new lift adjacent to the existing stairway on Dangar Road (providing access to and from the footbridge). The existing station access stairs would be retained, maintaining the existing access points. Option 1 proposed the creation of accessible parking space and kiss and ride space in the Dangar Road car park with an access path and pedestrian crossing connecting the parking spaces to the station.

2.3.2 Option 2

Option 2 proposed a new footbridge, stairway and lifts at the southern end of the Station platform. This option also proposed the regrading of the Brooklyn Road commuter car park and the development of accessible and kiss and ride car spaces.

2.3.3 The ‘do-nothing’ option

Under a ‘do-nothing’ option, Hawkesbury River Station and on-station facilities would continue to be inaccessible for customers with a disability and low mobility.

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 to be suitable as it is inconsistent with NSW Government objectives to encourage the use of public transport, and inconsistent with Commonwealth legal requirements including the DDA. Further, it would not meet the needs of the communities of Brooklyn, Dangar Island and other customers who make use of Hawkesbury River Station.

2.4 Justification for the preferred option

The options were quantitatively and qualitatively assessed using TfNSW's Multi Criteria Assessment (MCA) framework by TfNSW and its stakeholders. The options were assessed quantitatively by comparing the whole-of-life costs for each option. Each option was then assessed against multiple pre-determined non-cost criteria provided by TfNSW.

Weightings were applied to each criterion to better evaluate each option against TfNSW's key objectives and drivers. Qualitative criteria that was used to evaluate the options included:

- accessibility
- infrastructure
- facility operations and maintenance
- deliverability
- customer experience
- transport integration
- urban design and precinct planning
- environment, sustainability and heritage.

This assessment resulted in Option 1 being nominated as the preferred option. In each category for the MCA framework, Option 1 either met the essential requirements, or met both essential and desirable requirements. Option 2 was determined to be not as favourable as Option 1, as it did not meet the essential requirements in six out of eight criterion in the MCA.

3 Proposal description

Chapter 3 describes the Proposal and summarises key design parameters and construction methodology. The description of the Proposal is based on the scoping design and is subject to detailed design.

3.1 Scope of works

As described in Sections 1.1 and 1.2, the Proposal involves an accessibility upgrade of Hawkesbury River Station as part of the TAP which would improve accessibility and amenity for customers. Key features of the Proposal are listed in this Section.

Figure 12 shows the Proposal area and key features of the Proposal.

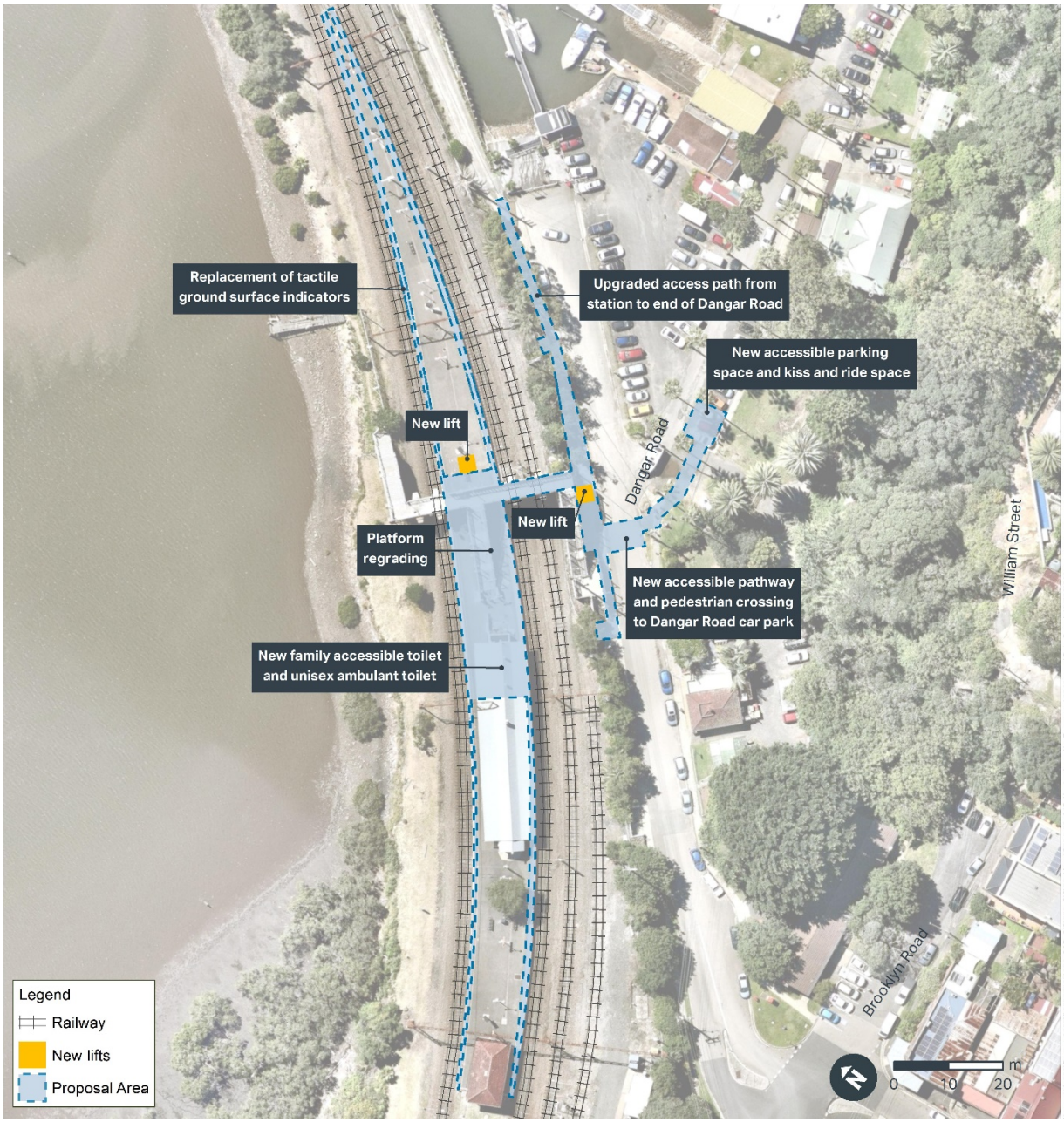

Figure 12 Proposal area and key features of the Proposal

3.1.1 Station accessibility upgrade

Details of the Proposal to improve accessibility include:

- construction of two new lifts to provide access to the existing footbridge and station platforms, including associated landings and support structures
- provision of a kiss and ride space within the Dangar Road car park
- provision of a new accessible parking space within the Dangar Road car park
- provision of a new access path and pedestrian crossing from the new accessible parking / kiss and ride spaces in the Dangar Road car park to the station entrance
- re-grading of the footpath at the access points to the station on the Dangar Road side of the Station and extending to the end of Dangar Road
- construction of a new family accessible toilet, a new unisex ambulant toilet, and a new staff toilet within the existing toilet facilities and installation of false walls to accommodate toilet cisterns
- re-grading of the station platform surfaces to provide compliant access to station amenities
- installation of a resting zone along the Dangar Road pedestrian footpath adjacent to the rail corridor. The exact location of the resting zone would be confirmed during detailed design.

3.1.2 Other works

- installation of mechanical ventilation systems for new toilets and lifts
- installation of signage and line-marking for the new accessible parking space, kiss and ride space and pedestrian crossing
- installation of Closed-Circuit Television (CCTV) cameras and Public Address (PA) systems to areas impacted by the construction contractor's activities
- relocation and/or repositioning station Help Points and telephone so that they are accessible to all customers
- relocation and provision of additional Opal card readers
- relocation of services as required by the construction contractor's activities
- installation of a glass canopy over the entrance to the proposed family accessible toilet.

3.1.3 Electrical work

Electrical work required to support the Proposal includes:

- installation of a new padmount transformer to supply electricity the Station and new lifts
- installation of all related cabling works connecting from Sydney Trains main switchboard to the distribution padmount transformer
- installation of a new service pole within the rail corridor, near the distribution padmount transformer to take the existing electricity supply to the new transformer
- provision of a new distribution board, including installation of circuit breakers and switches
- disconnect and remove the overhead aerial lines between Sydney Trains pole No. 11 and Ausgrid pole BR83732

- removal of Sydney Trains pole No. 11 to facilitate the installation of the lift on Dangar Road.

3.1.4 Drainage

Drainage work required to support the Proposal includes:

- the installation of lift downpipe system to support the new lifts and sanitary drainage,
- potable water adjustments for the station toilets
- a downpipe from the proposed canopy over the entrance to the proposed family accessible toilet.

It is proposed that drainage is discharged to the existing stormwater drainage and not the track drainage system. The sanitary drainage for the upgraded toilets would be extended and connected to the existing sanitary drainage system.

3.1.5 Materials and finishes

Materials and finishes for the Proposal have been selected based on the criteria of durability, low maintenance, cost effectiveness, and ensuring it is aesthetically pleasing and sympathetic to the existing heritage fabric (refer Section 3.2.1 and Section 6.5 for further information). Consideration has also been given to life cycle impacts of the materials. The life cycle impacts are calculated by looking at the environmental impacts of materials from the point of extraction, through to transportation, use, operation and end of life.

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

- platform floor: asphalt
- ceiling inside toilet areas: ripple iron to match existing
- downpipe and gutter on lifts: paint finish to match the colour of the steel frames
- handrail: 30-50mm diameter handrail on stainless steel brackets or stainless-steel pins to supporting structure, finished with stainless steel
- lift glazing: clear glass
- lift base wall: non-combustible short-blast concrete block – size: 100mm; quarter stretcher bond, natural grey in colour (subject to product sample review)
- lift door, control button and indicator: polished stainless steel
- lift ventilation louvre: horizontal storm proof louvre, dark charcoal grey in colour
- lift roof: metal roof sheeting, dark charcoal grey in colour
- lift canopy and platform glass canopy: glazed canopy
- lift landing protection screen: mesh screen with boundary steel frame, colour to match existing footbridge protection screen
- lift steel frame: painted steel frame, dark charcoal grey in colour
- toilet floor: floor tiles to match existing
- toilet wall: wall tiles and skirting to match existing.

3.2 Design development

3.2.1 Engineering constraints

There are several constraints which have influenced the design development of the Proposal, including the following:

Existing structures: the proposed locations of the lifts are constrained by the existing footbridge with few locations available in the immediate proximity for new lift shafts. The Dangar Road lift needs to be position away from the high-voltage overhead wires.

The fixed level of the platform coping edge and the finish floor levels of the platform building present challenges to achieving the compliant grading for accessible paths on the platforms.

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 overhead wiring, electrical bonding and safe working provisions.

Heritage: Hawkesbury River Station is bound by heritage constraints. The station is listed on the State Heritage Register (SHR) ('Hawkesbury River Railway Station Group') and there are also a number of other heritage items within 100 metres of the Proposal.

The 'Hawkesbury River Railway Station Group' would be directly impacted by the Proposal. This heritage item comprises the station building (1910), platform (1887), footbridge (1910), wharf, store room (c1930), water spout and movable heritage items.

Construction access: existing footbridge access would be retained throughout most of the construction works. When required, footbridge closures to allow construction would take place during scheduled track possessions. The existing Dangar Road car park would be mostly accessible throughout construction with traffic control measures in place as required, however there would be partial closures car park during some works including the creation of the accessible parking space and kiss and ride space and lift installation works involving a crane.

Access to the Brooklyn Road commuter car park would be temporarily impacted during construction works due to construction compound requirements within the car park. Access to this carpark would be restricted during works undertaken during scheduled track possessions but would be retained at all other times with the exclusion of approximately 12 parking spaces.

Drainage and flooding: existing structures and level interfaces were taken into consideration when designing drainage connections. This includes the connection of new drainage lines to existing drainage systems. As the Proposal area is located within an area of future predicted flooding (1 in 100-year average recurrence interval flood under a predicted 40-centimetre sea-level rise by 2050), the station may experience flooding events in the future. The design of the Proposal has taken potential flooding into account.

Earthing bonding and electrolysis: future lightning systems have been designed to maintain a minimum two metre separation to overhead wiring structures.

3.2.2 Design standards

The Proposal would be designed having regard to the following design standards:

- DSAPT (issued under the Commonwealth DDA)
- National Construction Code (NCC)
- relevant Australian Standards (AS)
- Asset Standards Authority standards

- Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability Rating Scheme (v1.2)
- *TfNSW Urban Design Guidelines*
- *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008).
- Crime Prevention Through Environmental Design (CPTED) principles
- other TfNSW policies and guidelines
- relevant council standards.

3.2.3 Sustainability in design

TfNSW is committed to minimising the impact on the natural environment and utilises the Infrastructure Sustainability (IS) rating tool. The IS rating tool was developed and is administered by ISCA. It is an independently verified and nationally recognised rating system for evaluating sustainability across design, construction and operation of infrastructure.

The Hawkesbury River Station Upgrade is one of a number of projects within the Transport Access Program that is using version 1.2 of the IS rating tool and targeting an 'Excellent' rating. This requires the achievement of between 50 and 75 points out of a possible 100. The rating scheme provides an independent and consistent methodology for the application and evaluation of sustainability outcomes in infrastructure projects.

The development of the concept design for the Proposal has been undertaken in accordance with the project targets identified in the program wide TAP 3 Sustainability Strategy and the *NSW Sustainable Design Guidelines - Version 4.0* (TfNSW, 2017a). The Sustainability Strategy sets targets across the following key issues:

- climate change adaptation and resilience
- renewable energy
- waste
- materials
- supply chain management
- community connection
- social procurement and workforce.

Key design elements and strategies developed during the scoping design will be used to further develop the design and construction, thus facilitating achievement of the 'Excellent' target rating.

3.3 Construction activities

3.3.1 Work methodology

Subject to approval, construction is expected to commence in late 2019 and take around 18 months to complete. The construction methodology would be further developed during the detailed design of the Proposal by the construction contractor in consultation with TfNSW.

The proposed construction activities for the Proposal are identified in Table 2. This staging is indicative and is based on the current scoping design and may change once the detailed design methodology is finalised.

Table 2 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works	• establishment of construction compound (i.e. erect hoardings and fences, tree protection zones (TPZs) (if necessary), site offices, amenities and plant/material storage areas) • establishment of temporary facilities as required (e.g. temporary toilets etc.)
Utility relocation	• identification of existing below ground utilities • relocation of utilities • disconnect overhead wires from Sydney Trains Pole No. 11 connecting to Ausgrid Pole BR83732 • remove Sydney Trains Pole No. 11 • temporary diversion of low voltage line and other affected services • set up and install padmount transformer in the rail corridor adjacent to Dangar Road in preparation for power cutover • install new services pole inside the rail corridor to connect services to the padmount transformer
Earthworks, piling works and initial lift installation works	• for both lift locations, commence site preparation. The crane for both lifts would be set up in the car park off Dangar Road • mobilisation of piling rigs to access lift locations • temporary earthworks and dismantling of fencing and barriers to allow piling rigs to reach desired location
Lift installation works	• construction of foundation slab including excavation for lifts • removal of existing fencing and barriers • excavation of lift shaft well and establishment of foundations and formworks • insertion of piles at both locations for new lift foundation • construction of lift shafts • installation of lifts • installation of drainage systems • installation of cladding, fixtures, lighting, signage and CCTV cameras for the lift areas

Stage	Activities
Station and toilet reconfiguration works	• reconfiguration of the existing male toilet to create a family accessible toilet and reconfiguration of the existing female toilet, to create a unisex toilet including a unisex ambulant toilet • installation of a horizontal glass canopy over the entrance to the existing male toilet • regrading the existing platform near to the Station building and to the proposed platform lift to match the level of the buildings and amenities • demolition of old and installation of new anti-throw screens on station footbridge near the locations of the proposed lifts • services and fit-out works and electrical works (including any re-directed services/utilities)
Station surrounds works	• line-marking of the accessible car space in the Dangar Road car park and one kiss and ride space • installation of signage, pedestrian crossings and tactiles as required • regrading of footpath at the Station entrance points on the Dangar Road side of the Station
Demobilisation	• dismantling of construction compounds/hoarding areas
Testing and commissioning	• testing electrical, communications and signalling components • commissioning of new lifts

3.3.2 Plant and equipment

An indicative list of plant and equipment that would be required is provided in Table 3. Additional equipment that would likely to be used would be identified during detailed design by the Construction Contractor.

Table 3 Plant and equipment

Plant and Equipment		
• trucks (semi-trailer and tipper) • generator • bobcat • hand tools • concrete pump • piling rig • concrete truck • hirail (a truck that is able to travel on railway tracks) • wacker packer	• nail gun • impact drill • excavator (with auger) • line marking truck • coring machine • demolition saw • jack hammer • grinder • manitou (forklift)	• scissor lift • franna crane • lighting tower • mobile crane • plate compactor • vacuum truck • mini excavator • 250-tonne crane

3.3.3 Working hours

Most of the work 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.

Certain works may need to occur outside standard hours. These would include night works and works during routine track possessions. Works would be carried out during scheduled Sydney Train maintenance periods that would occur regardless of the Proposal when part of the rail network is temporarily closed, and trains are not operating. It is estimated that approximately five routine weekend track possessions would be required. Activities to be carried out during track possession periods may include:

- modification and relocation of electrical cables
- installation of piles (using track-mounted piling rig) for the lifts
- concreting foundation for lift shafts
- installation of lift shafts.

Works outside of standard hours may also be scheduled outside track possession periods for activities such as:

- delivery of oversized loads to the site such as construction plant and portable construction compound buildings, lift shaft components, steel beams and precast concrete elements
- construction activities involving crane setups.

Approval from TfNSW would be required for any out of hours work. The affected community would be notified of the work and the relevant mitigation measures outlined in the TfNSW *Construction Noise and Vibration Strategy* (TfNSW, 2018b) (refer to Section 6.3 for further details) would be used.

3.3.4 Earthworks

Excavations and earthworks would generally be required for the following:

- foundations and pits for the new lift shafts and lifts which would require excavation at each proposed lift location
- the construction of upgraded footpaths
- earthworks to accommodate the temporary shoring walls (support walls).

It is estimated that approximately 270 cubic metres of spoil would be generated by the Proposal. Spoil would be managed in accordance with the mitigation measures outlined in Sections 6.8.3 and 6.11.3.

3.3.5 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 ISCA Infrastructure Sustainability Rating Scheme (v1.2). Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

3.3.6 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 temporary delays to buses due to changed traffic conditions
- temporary impacts to pedestrians and rail customers through changes in station access during construction
- pedestrian movement on the station platform would be temporarily impacted given the restricted space resulting from hoardings and temporary material lay down areas or construction work
- Dangar Road car park:
    - the temporary closure of access points into the car park during lift works. Access along Dangar Road would be retained if possible
    - the partial closure of the car park to allow the construction of the new kiss and ride and accessible car park
- Brooklyn Road commuter car park:
    - approximately 12 existing parking spaces would be affected by the part use of the Brooklyn Road commuter car park as a construction compound (Figure 13). The car park would also be inaccessible during works that would be scheduled to occur during scheduled track possessions.
- work zones to construct the proposed access paths along Danger Road may require temporary or partial lane closures and/or traffic diversions
- minor increase in traffic on the local road network due to plant and equipment and construction workers
- vehicles used for the construction of the Proposal and by construction workers would use existing parking spaces in the Brooklyn Road car park as well as on street parking, temporarily reducing the available parking spaces for the public.

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

3.3.7 Temporary site facilities

Construction hoardings would be required at both of the proposed lift shafts. Construction hoardings would be carefully considered and installed, having regard to pedestrian activity that occurs during peak periods. Three temporary construction compound areas are proposed to accommodate a site office, amenities, laydown and storage area for construction materials. The locations of these compound areas are illustrated in Figure 13. No vegetation would be removed to accommodate the temporary construction compound areas.

A small area for temporary storage/laydown may also be required on the Station platform around the proposed lift location.

Impacts associated with using these areas have been considered in Chapter 6.1 of this REF.

Figure 13 Proposed work areas and construction compound locations

3.3.8 Service relocation and adjustments

To facilitate the installation of the lift on Dangar Road, the overhead aerial lines between Sydney Trains pole No. 11 and Ausgrid pole BR83732 need to be turned off and disconnected. Following the removal of those lines, Sydney Trains Pole No. 11 would be

removed. A new service pole would be installed near the Brooklyn Road commuter car park to take the existing electricity supply to the transformer.

Any additional service relocation and adjustment would be undertaken by the construction contractor as required. This would be confirmed during detailed design and would be planned and undertaken with the relevant service provider.

3.4 Property acquisition

TfNSW does not propose to acquire any property as part of the Proposal. Work would be undertaken entirely within the rail corridor (including the construction compound area on land owned by RailCorp) and land owned by Hornsby Shire Council. Temporary occupation of council land would be required to facilitate construction and would be reinstated upon completion.

3.5 Operation and maintenance

The future operation and maintenance of Hawkesbury River Station is subject to further discussions with Sydney Trains, TfNSW and Hornsby Shire Council. Structures constructed under this Proposal and works completed on RailCorp land (i.e. the two proposed lifts) would be maintained by Sydney Trains. However, it is expected that adjacent landscape areas and facilities including the bus stops, footpaths and crossing on Dangar Road and the Dangar Road car park would continue to be maintained by Hornsby Shire Council.

4 Statutory considerations

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

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The 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 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.

As the Proposal would not impact on any matters of NES or on Commonwealth land, a referral to the Commonwealth Minister for the Environment and Energy is not required.

4.1.2 Other Commonwealth legislation

Table 4 provides a list of other relevant Commonwealth legislation applicable to the Proposal.

Table 4 Other Commonwealth legislation applicable to the Proposal

Applicable legislation	Considerations
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	There is an obligation on a person who discovers anything which he or she has reasonable grounds to suspect are Aboriginal remains to report that discovery to the Minister, giving particulars of the remains and their location. Mitigation measures have been proposed in Section 6.4.3 to ensure that should items of Aboriginal heritage, or Aboriginal remains be uncovered, they are dealt with appropriately and in accordance with applicable legislation. Due diligence searches for existing Aboriginal heritage has been carried out and appropriate mitigation measures have been proposed so that nearby heritage items are not impacted.
Disability Discrimination Act 1992 (DDA Act)	This Act aims to eliminate as far as possible, discrimination against persons on the ground of disability in areas including access to premises and the provision of facilities, services and land. The Proposal would provide lifts to access the station, as well as upgrade some surrounding footpaths and upgrade general station infrastructure to make it more accessible for persons with a disability.
Native Title Act 1983	This Act aims to provide for the recognition and protection of Native Title, how Native Title land is used and establishes a mechanism for determining claims to Native Title. There are no pending or approved Native Title claims over the Proposal land.

4.2 NSW legislation and regulations

4.2.1 Transport Administration Act 1988

The *Transport Administration Act 1988* establishes TfNSW as a public authority who is to exercise its functions in a matter that promotes certain common objectives, including promoting the delivery of transport services in an environmentally sustainable manner.

This REF has been prepared having regards to, among other things, the specific objectives of TfNSW under the *Transport Administration Act 1988*:

a) to plan for a transport system that meets the needs and expectations of the public

b) to promote economic development and investment

c) to provide integration at the decision making level across all public transport modes

d) to promote greater efficiency in the delivery of transport infrastructure projects

e) to promote the safe and reliable delivery of public transport and freight services.

4.2.2 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 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 is likely to have 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.

4.2.3 Other NSW legislation and regulations

Table 5 provides a list of other relevant legislation applicable to the Proposal.

Table 5 Other NSW legislation applicable to the Proposal

Applicable legislation	Considerations
Biodiversity Conservation Act 2016 (BC Act)	The BC Act establishes a framework for assessing and protecting environmental and biodiversity interests. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Section 6.6 of this REF outlines that potential impacts to biodiversity resulting from the Proposal would not be significant.

Applicable legislation	Considerations
Biosecurity Act 2015	Clause 22 requires that any person who deals with a biosecurity matter has a duty to ensure that in so far as is reasonably practicable, the potential biosecurity risk is prevented, eliminated or minimised. Appropriate management methods would be implemented during construction if declared noxious weeds in the Hornsby LGA are identified (refer to Section 6.6).
Coastal Management Act 2016	This Act provides for the protection of the coastal environment for the benefit of both present and future generations. It divides the coastal zone into four coastal management areas (coastal wetlands and littoral rainforests area; coastal vulnerability area; coastal environment area; and coastal use area). The Proposal area falls within a Coastal Environment Area and Coastal Use Area. The Proposal therefore needs to have regard to the management objectives of the coastal environment area and coastal use area under sections 8 and 9 of this Act respectively. The Proposal will not be carried out directly adjacent to the waterline and would include mitigation measures to protect water quality, biodiversity and aquatic values of the surrounding coastal zone through appropriate erosion and sedimentation and vegetation clearing controls. The Proposed would also incorporate finishes that would be sympathetic to the existing station building and not detract from the scenic values of the surrounding coastal zone. Section 23 of the Act requires public authorities to have regard to coastal management plans when exercising their functions. The Proposal area is located in the area subject to the *Lower Hawkesbury Management Plan* (Hornsby Shire Council, 2008). The Proposal would therefore take the Plan into consideration with the implementation of appropriate mitigation measures and design finishes to minimise impacts to the surrounding coastal zone during construction and operation.
Contaminated Land Management Act 1997 (CLM Act)	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. 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. It can therefore be expected that some contamination may be present from this historical use of the area as a railway corridor. As there is potential for onsite contamination, chemical testing and visual characterisation in accordance with the NSW EPA *Waste Classification Guideline* (EPA, 2014) would be undertaken to confirm the composition and nature of excavated material that is suspected of being contaminated. Where spoil is classified as unsuitable for reuse, it would be transported to an appropriately licensed offsite facility. Refer to Section 6.8 for further information.

Applicable legislation	Considerations
Heritage Act 1977 (Heritage Act)	The following sections of the Act are relevant to the Proposal: • Sections 57 and 60 (approval) where items listed on the SHR are to be impacted • Sections 139 and 140 (permit) where relics are likely to be exposed • Section 170 where items listed on a government agency Heritage and Conservation Register are to be impacted. The Hawkesbury River Station Group would be impacted by the Proposal. As the Hawkesbury River Station Group is listed on the SHR, a Section 60 approval to undertake the works associated with the Proposal is required from the Heritage Council of NSW. The Statement of Heritage Impact would be submitted to the NSW Heritage Branch, together with the requisite application forms, for assessment prior to the commencement of any works. The Hawkesbury River Station Group is also listed on the Railcorp Section 170 Heritage Register.
National Parks and Wildlife Act 1974 (NPW Act)	Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Aboriginal objects. The Proposal would not involve the destruction or damage of any known Aboriginal objects. The nearest recorded Aboriginal object (an above ground rock carving) is approximately 25 metres from the extent of the Proposal works. The mitigation measures proposed in Section 6.4 would prevent potential impacts to the Aboriginal object.
Protection of the Environment Operations Act 1997 (PoEO Act)	The Proposal does not involve a 'scheduled activity' under Schedule 1 of the PoEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal. However, in accordance with Part 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Construction Contractor.
Roads Act 1993 (Roads Act)	The Proposal would require works on Dangar Road (a Council road). 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 other than a Crown road to exercise the public authority's functions over that road. On this basis, consent from Hornsby Shire Council by way of a Road Occupancy Licence or other form of licence is not required, however Council would be consulted by the construction contractor with regard to the Proposal.
Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.

Applicable legislation	Considerations
Water Management Act 2000 (WM Act)	Approval under the WM Act is required for certain types of developments and activities that are carried out in or near a river, lake or estuary. Clause 41 of the *Water Management (General Regulation) 2018* exempts a public authority from requiring approval under section 91E (1) of the WM Act which relates to works within 40m of a waterway. Geological investigations undertaken at the Project site identified groundwater at a depth of 1m (AHD) below the surface. It is likely that groundwater would be encountered during excavations for the lift shafts. An aquifer interference approval may be required under the WM Act, as the excavations involved the penetration of an aquifer. However given the small scale of construction disturbance, it is unlikely that the Proposal would exceed minimal impact considerations for groundwater impact under the Aquifer Interference Policy. The need for approval would be confirmed prior to the commencement of construction by the construction contractor.

4.2.4 Key State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy* (*Infrastructure*) (*Infrastructure* SEPP) is the key Environmental Planning Instrument (EPI) which determines the permissibility of the Proposal and under which part of the EP&A Act an activity or development may be assessed.

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

The Proposal meets the definition of 'rail infrastructure facilities' under Clause 78 of the Infrastructure SEPP. Therefore, in accordance with Clause 79 of the Infrastructure SEPP development consent (from Council) is not required for the Proposal and it should be 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, State Emergency Services and public authorities other than councils 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 EPIs except where *State Environmental Planning Policy (State Significant Precincts) 2005* or *State Environmental Planning Policy (Coastal Management) 2018* applies. These SEPPs do not apply to the Proposal area or proposed activity and therefore do not require further consideration as part of this REF.

State Environmental Planning Policy (Coastal Management) 2018

The Coastal Management SEPP replaces SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), and seeks to balance social, economic and environmental interests by promoting a coordinated approach to coastal management.

The Coastal Management SEPP gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. It defines the four coastal management areas in the Act through detailed mapping and specifies assessment criteria that are tailored for each

coastal management area. Councils and other consent authorities must apply these criteria when assessing proposals for development that fall within one or more of the mapped areas.

The Proposal area is located within a coastal environment area and a coastal use area under the Coastal Management SEPP. The provisions of the Infrastructure SEPP prevail over the Coastal Management SEPP except in areas identified as coastal wetlands, littoral rainforests, and where coastal protection works are to be undertaken. As the Proposal is not within an area identified as a coastal wetland or littoral rainforest, and coastal protection works are not being undertaken, the provisions of the Coastal Management SEPP do not apply to this Proposal,

Notwithstanding, Part 6 of this REF, considers the relevant aspects of the abovementioned Coastal Management SEPP (including potential impacts in relation to water quality, Aboriginal heritage, biodiversity, and scenic values) that would have been applicable to the Proposal, but for the prevailing nature of the Infrastructure SEPP.

State Environmental Planning Policy No 19—Bushland in Urban Areas

A public authority shall not disturb bushland for a purpose referred to in clause 6(2) unless it has first had regard to the aims of this Policy.

The Hornsby LGA is covered by this SEPP. The Proposal area is not located within bushland, and is not immediately surrounded by bushland. The suburb of Brooklyn is enclosed by the Ku-ring-gai National Park to the south and Muogamarra Nature Reserve to the west. These areas are a national park and nature reserve respectively, and the Bushland in Urban Areas SEPP does not apply to these areas. The proposal would not affect any national park or conservation areas.

The REF has considered the general aim of this SEPP through the assessment of biodiversity and bushfire risk in this REF (refer Section 6.6 and Section 6.12), including measures to minimise clearing of native vegetation as far as possible (and offset cleared vegetation where required).

State Environmental Planning Policy No 44—Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of natural vegetation areas that provide habitat for koalas to ensure that permanent, free living areas are maintained over their present range. The policy applies to a number of LGAs across NSW, including the Hornsby LGA which is within the Proposal area. However, as the Proposal is to be assessed under Division 5.1 of the EP&A Act, SEPP 44 does not apply. Notwithstanding the provisions of SEPP 44 have still been considered in the preparation of this REF.

The biodiversity assessment in Section 6.6 assessed whether the Proposal area is likely to comprise potential koala habitat (where koala feed trees comprise 15% of the vegetation stratum) and if so, if it is likely to constitutes core koala habitat (evidence of a resident koala population). The assessment found:

- the area to be modified by the Proposal is less than one hectare; and
- only one potential feed tree species (*Eucalyptus haemastoma*) was identified in the Proposal area. This tree would not be removed or modified as a part of the Proposal.

State Environmental Planning Policy 55 – Remediation of Land

State Environmental Planning Policy No.55 — Remediation of Land (SEPP 55) provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment. While consent for the Proposal is not required, the provisions of SEPP 55 have still been considered in the preparation of this REF.

Section 6.8 of this REF contains an assessment of the potential contamination impacts of the Proposal. It is unlikely that any large-scale remediation (Category 1) work would be required as part of the Proposal. While the proposed land use does not differ to the existing use, there is potential for contaminants to be present within the soils given the historical use of the station as a rail corridor. As there is potential for onsite contamination, chemical testing and visual characterisation in accordance with the NSW EPA Waste Classification Guideline (EPA, 2014) would be undertaken to confirm the composition and nature of excavated material that is suspected of being contaminated. Where spoil is classified as unsuitable for reuse, it would be transported to an appropriately licensed offsite facility. Further consideration of potential contamination impacts is provided in Section 6.8.

Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997)

The aim of the Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River (No 2 – 1997) (Hawkesbury-Nepean River SREP) is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. The Proposal is located within the Hornsby LGA which is managed by the Hawkesbury-Nepean River SREP.

The key provisions of this SREP are listed in Clause 6, which outlines the specific planning policies and recommended strategies for development in and around the catchment and rivers. The provisions of the Infrastructure SEPP prevail over the Hawkesbury-Nepean River SREP. However, the provisions of the SREP have been taken into consideration and addressed in Table 6.

Table 6 Summary of Clause 6 Strategies and their application to the Proposal

Provision description	Relevance to the Proposal
Total Catchment Management	This REF has considered the impact of the Proposal on the catchment, including within the context of cumulative impacts on the surrounding community and ecological factors in Section 6. The assessment found that the Proposal would not have a significant impact on the catchment environment, and therefore a referral to Hornsby Shire Council or downstream councils is not required.
Environmentally Sensitive Areas	This provision relates to the protection and enhancement of the environmental quality of environmentally sensitive areas within the Hawkesbury-Nepean catchment. The relevant strategies under this policy relate to the impacts upon water quality and consideration of acid sulfate soils (ASS), which have been considered in Section 6.
Water Quality	This provision relates to future development not impacting on the use of the river for primary contact recreation (such as swimming) and protection of the aquatic ecosystem. In having regard to this policy, this REF has assessed potential impacts to water quality and hydrology and found that there would not be a significant impact.
Water Quantity	This provision relates to flow characteristics of surface or groundwater. The Proposal would not significantly impact water flow characteristics through the removal of surface or groundwater or the introduction of increased stormwater flow.
Cultural Heritage	This provision relates to the protection of cultural heritage including Aboriginal and non-Aboriginal heritage items. This Proposal does not cause a significant impact to either form of heritage values.

Provision description	Relevance to the Proposal
Flora and Fauna	This provision relates to the management of flora and fauna communities so that the diversity of species and genetics is conserved and enhanced. The Proposal would not have a significant impact upon flora or fauna and is located in an already disturbed area.
Riverine Scenic Quality	This provision relates to the protection of the scenic quality of the riverine corridor. In consideration of the riverine scenic quality, the Proposal has where available, used unobtrusive, non-reflective material and is consistent with colour and design of existing infrastructure.
Agriculture/Aquaculture and Fishing	This provision does not relate to the Proposal.
Rural Residential Development	This provision does not relate to the Proposal.
Urban Development	This provision requires the assessment of environmental impacts of urban development. This proposal does not involve urban development.
Recreation and Tourism	This provision relates to the protection of the riverine corridor as a significant recreational and tourist area. The Proposal supports this policy through the accessibility upgrades to the station which would allow greater access to the suburb of Brooklyn. Furthermore, mitigation measures proposed as part of the Proposal would protect the surrounding riverine corridor.
Metropolitan Strategy	This provision requires development to complement the vision, goals, key principles and action plan of the Metropolitan Strategy. The Proposal is considered to be generally consistent with the overall objectives of the Metropolitan Strategy as it would promote public transport by providing for greater accessibility at stations. The REF has considered the potential impacts of the Proposal including water quality, air quality, waste disposal and climate change and recommended measures to manage and minimise impacts so as not to result insignificant impacts to the environment, which is a key requirement of the strategy.

4.2.5 Hornsby Local Environmental Plan 2013

The Proposal is located within the Hornsby LGA, and therefore within the scope of the *Hornsby Local Environmental Plan 2013* (HLEP 2013). The provisions of the Infrastructure SEPP prevail over the permissibility provisions of the applicable zoning under the HLEP 2013. Notwithstanding, during the preparation of this REF, the relevant provisions of the HLEP 2013 were taken into consideration.

Table 7summarises the relevant aspects of the HLEP 2013 that are applicable to the Proposal, while Figure 5 shows the land zone that applies to the Proposal area.

Table 7 Relevant provisions of the Hornsby LEP

Provision description	Relevance to the Proposal
Land Use Table	The Proposal is located within land zoned as SP2 – Infrastructure and RE1 – Public Recreation. The Proposal is aligned to the objective of both land zones. Specifically, the Proposal provides for infrastructure and related uses through the upgrading of an existing rail infrastructure facility and is compatible with existing and future infrastructure. Further, the car park component of the Proposal enables surrounding land to be used for recreational purposes.
Clause 5.10 - Heritage Conservation	Clause 5.10 is aimed at conserving the environmental heritage of Hornsby by conserving heritage items and conservation areas including associated fabric, settings and views, conserving archaeological sites and Aboriginal objects and Aboriginal places of heritage significance. The Proposal area contains State and Locally listed heritage items, specifically the Hawkesbury River Station Group. There are also 15 heritage items within 100 metres of the Proposal. A complete analysis of Aboriginal and non-Aboriginal heritage is undertaken in sections 6.4 and 6.5 respectively.
Clause 5.12 - Infrastructure development and use of existing buildings of the Crown	This Clause outlines that the HLEP does not restrict or prohibit, or otherwise enable the restriction or prohibition of any development by or on behalf of a public authority that is permitted to be carried out without development consent under the Infrastructure SEPP. The Proposal would be undertaken by a public authority, in this case, TfNSW and is permitted without development consent.
Clause 6.1 - Acid Sulfate Soils	The Proposal is located within an area classed as both 1 and 2 under the ASS map. Consideration of the potential effects of ASS is provided within section 6.8 of this REF.

4.3 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 Hawkesbury River Station upgrade. Section 3.2.3 summarises how ESD has been incorporated in the design development of the Proposal. Section 6.13 includes an assessment of the impact of the Proposal on sustainability, and Section 7.2 lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.

5 Community and stakeholder consultation

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

5.1 Stakeholder consultation during concept design

As part of the scoping design development for the Proposal, TfNSW and Sydney Trains held several workshops with key stakeholders to develop and discuss design options and identify a preferred option. These included:

- constructability workshop – 5 September 2018
- scope direction meeting – 14 September 2018
- MCA workshop – 20 September 2018
- safety in design workshop – 10 October 2018.

5.2 Early consultation

Early community consultation was undertaken on 11 December 2018, through a community information session held at Hawkesbury River Station. During this consultation, community members were provided with an opportunity to raise feedback for the Proposal, which was considered in the further development of the early concept design. Key themes raised during consultation included:

- support for the Proposal
- questions regarding access from the private wharf
- focus on pedestrian safety in the shared zone and Dangar Road car park
- the need for improvements to car parking availability and condition.

5.3 Consultation requirements under the Infrastructure SEPP

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

Table 8 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.

Table 8 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: • temporarily generate traffic that may place Brooklyn Road and Dangar Road under strain • disrupt pedestrian and vehicle movement through the upgrading of footpaths, and the construction of a pedestrian crossing • involve excavation to Dangar Road and the footpath along Dangar Road Consultation with Hornsby Shire Council has been undertaken in accordance with clause 13 of the Infrastructure SEPP and would continue throughout the detailed design and construction phases
Clause 14 | Consultation with Councils – development with impacts on local heritage	Where railway station works: • substantially impact on local heritage item (if not also a State heritage item) • substantially impact on a heritage conservation area.	The Proposal would not have an impact on heritage items of Local significance, but it would have moderate and minor negative impacts on an item of State significance. Further considerations of impacts are within section 6.5 of this REF. Consultation with Hornsby Shire Council is not required under this clause as consultation is only required where a locally listed item is not also a state listed heritage item.
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.*	Hawkesbury River Station is not currently located on land that has been mapped by the HLEP as being susceptible to flooding. Consultation with Hornsby Shire Council is not required.
Clause 15A | Consultation with Councils – development with impacts on certain land within the coastal zone	Where railway station works: • impact on land within a coastal vulnerability area and is inconsistent with certified coastal management program that applies to that land.	The Proposal is not located within a coastal vulnerability area and would not have an impact upon land within a coastal vulnerability area. Consultation with Hornsby Shire Council is not required.

Clause	Clause particulars	Relevance to the Proposal
Clause 15AA | Consultation with State Emergency Service – development with impacts on flood liable land	Where railway station works: • impact on flood liable land – written notice must be given (together with a scope of works) to the State Emergency Service. Any response to the notice received from the State Emergency Service within 21 days after the notice is given must be taken into consideration.	The Proposal would not occur on or have an impact upon flood liable land. Consultation with the State Emergency Service is not required.
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 NPW 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: • Sydney Trains • NSW TrainLink • OEH.	The Proposal is not considered to be specified development under Clause 16 of the Infrastructure SEPP. Consultation with specified authorities including the OEH is not required. Coordination throughout the design process has been undertaken with Sydney Trains and OEH and would continue to occur throughout the duration of the Proposal. Dangar Road is managed by Hornsby Shire Council. Relevant permits and/or approvals would be obtained from the relevant road authority as required.

5.4 Consultation strategy

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

The objectives of the consultation strategy are to:

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

5.4.1 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 summary of the Proposal and information on how to provide feedback
- consultation with council/s, Sydney Trains, NSW Trains and other non-community stakeholders
- 'pop-up' community information sessions near the station.

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

The REF would be placed on public display digitally on the TfNSW website[1], NSW Government Have Your Say website[2] and hard copies at the following locations: - Drafting Note – TfNSW to confirm

- Transport for NSW Office Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood
- Hornsby Shire Council: 296 Peats Ferry Road, Hornsby
- Berowra Library Community Centre, The Gully Road, Berowra.

Further information on the Proposal may be requested by contacting the Project Infoline (1800 684 490) or by email[3].

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

- Mail: Hawkesbury River Station Upgrade
  Associate Director, Environmental Impact Assessment
  Transport for NSW
  Locked Bag 6501
  St Leonards NSW 2065
- Email: projects@transport.nsw.gov.au
- TfNSW website www.transport.nsw.gov.au/projects/current-projects/hawkesbury-river-station-upgrade.

Following the consideration of feedback received during the public display period, TfNSW would determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

[1] www.transport.nsw.gov.au/projects/current-projects/hawkesbury-river-station-upgrade
[2] www.nsw.gov.au/improving-nsw/have-your-say
[3] projects@transport.nsw.gov.au

5.5 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal (refer Figure 2).

Should TfNSW determine to proceed with the Proposal, the Determination Report would be made available on the TfNSW website and would summarise the key impacts identified in this REF, demonstrate how TfNSW considered 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, Council and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community 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 Impact Assessment was prepared by AECOM for the Proposal (AECOM, 2019a). The report provides a high-level assessment of the potential impacts of the Proposal on transport, traffic, access and road safety. The findings of the assessment are summarised in this section.

6.1.1 Existing environment

Hawkesbury River Station

Hawkesbury River Station is served by the Central Coast & Newcastle Line on the Intercity Trains Network, providing connections to the Sydney Trains network (intercity and suburban). The station entrance is from Dangar Road.

The station is currently not accessible for people with mobility issues. Stairs provide the only means of access from the footbridge to the island platform, and from Dangar Road to the footbridge. The footbridge and stairs also provide a means for pedestrian and cyclists to cross the railway corridor. There are no canopies for weather protection above the footbridge and stairs.

The station has one island platform (Platform 1 and 2). Both platforms have two to four services during peak periods (AM - 07:00 to 09:00, PM – 16:00 to 18:00) respectively and based on Opal data provided by TfNSW, Hawkesbury River Station recorded approximately 496 trips per weekday based on May 2017 averages. Both platforms are currently used for through train services in each direction.

Pedestrian facilities

Pedestrian access to Hawkesbury River Station is provided from Dangar Road, via stairs and a footbridge over the railway line, leading to stairs that provide access to the station platforms.

Footpaths are located along both sides of Dangar Road. No formal pedestrian crossing is provided to connect the access paths opposite the main station entrance, such as the bus stop and Dangar Road car park. The footpath on the western side of Dangar Road connects the commuter car park located along Brooklyn Road to the station. However, no formal crossings are provided at the intersection of Dangar Road / Brooklyn Road.

Cycling facilities

Cycle connectivity to Hawkesbury River Station is currently limited with no formal cycle routes in the vicinity of the station and no bicycle racks provided at the station. Bicycle racks are however provided at nearby businesses. Site observations showed there may be a demand for bicycle storage facilities at the station with cyclists informally securing their bikes to nearby poles.

Bus services and facilities

A bus stop located on Dangar Road is within walking distance to the station. Three bus routes serve the bus stop, which is operated by Transdev NSW. These routes include:

- Route 592: Loop service: Brooklyn to Mooney Mooney
- Route 8003: School buses: Hawkesbury River Station to Brooklyn Public School
- Route 8013: School buses: Brooklyn to Wideview Public School.

These bus routes connect residential areas to local transport interchanges, as well as schools, employment and retail areas. The bus stop east of Dangar Road provides seating and shelter. However, no seating or shelter is provided at the bus stop west of Dangar Road. The bus stops also cater for temporary bus services during track work.

Ferry services

Brooklyn Wharf is located approximately 100m northeast of Hawkesbury River Station. It is serviced by the Brooklyn Ferry Service, a private ferry company operating a loop service on the Hawkesbury River between Brooklyn, Dangar Island and Little Wobby. The western footpath on Dangar Road links to the ferry wharf.

During weekdays, there are four services departing the wharf in AM peak period (6am-10am) and five services in PM peak period (3pm-7pm).

Parking facilities

A dedicated off-street commuter car park is provided to the south of the station, along Brooklyn Road. Car parking spaces are unmarked and informal parking occurs in the car park, with capacity for up to 20 car parking spaces. Kerbside parking also occurs along Brooklyn Road near the entrance of the car park. No clearly demarcated accessible parking spaces are provided within the commuter car park.

A Council car park is also provided on Dangar Road, adjacent to the ferry wharf. The car spaces within the off-street parking area are also unmarked with parking occurring informally. This parking area is used by locals living on Dangar Island, business owners/customers, as well as commuters.

Kiss and ride facilities

There is currently no signposted kiss and ride zone for Hawkesbury River Station Precinct. Short-term parking and no parking zones along Dangar Road are likely to be used as informal kiss and ride areas.

Taxi facilities

There are no taxi facilities in the Hawkesbury River Station Precinct.

Road network and traffic

The key existing roads in the vicinity of the Proposal include Brooklyn Road and Dangar Road as shown in Figure 5.

Brooklyn Road is a local road with one lane in each direction linking to Dangar Road to the north and Bridge Street to the south. The three roads create a four-way intersection, with entering traffic from Bridge Street and Dangar Road required to give way. The road provides connectivity to the state road network with a link to Pacific Highway, Cowan to the west. This road is the main road providing access to residential and commercial properties in Brooklyn. The sign-posted speed limit and associated road markings is 50km/h.

Dangar Road is a local road, which provides one traffic lane in each direction. The road links to Brooklyn Road and Bridge Street to the south and provides access to Hawkesbury River

Station and Brooklyn Wharf. The default urban speed limit of 50km/h applies in the vicinity of the station as there is no posted speed limit sign.

Travel mode choice

Travel data obtained from the Bureau of Transport Statistics provides an insight into the Journey to Work characteristics of residents in Brooklyn. The 2011 Journey to Work data shows that most of the trips from Brooklyn were by car, with approximately 54 per cent of trips taken by car, and 13 per cent of trips by train.

6.1.2 Potential impacts

Construction phase

Public Transport

Bus services near the Proposal would not be significantly affected during construction. Bus services along Dangar Road would continue to operate during construction activities, however may experience minor impacts, such as delays due to road works and temporary lane closures (e.g. for use of a crane) or temporary relocations to enable construction activities.

Any potential changes to the location of the bus stop during construction would be implemented in consultation with the bus operator and communicated to the public via signage or appropriate methods. Diversions or changes to bus services would be adequately sign-posted with appropriate community notification of any changes.

Pedestrians

During construction, works would be undertaken in a manner to ensure that public access routes to the station are maintained and pedestrian diversions are minimised. The Proposal is expected to cause temporary disruptions to the existing pedestrian facilities surrounding the station precinct, particularly when construction works for the lift and upgrade to the footpaths are being undertaken. This has the potential for increased safety risks for pedestrians, due to potential interactions with construction plant and vehicles. Construction works would be staged to ensure pedestrian access to the station is maintained.

Appropriate signs and/or traffic controllers would be positioned to notify pedestrians of the temporary arrangements. Any interaction between construction vehicles and pedestrians would be managed and controlled by traffic controllers. Impacts to pedestrians during construction would be managed through the development of a Construction Traffic Management Plan (CTMP). Wherever possible, the community would be notified in advance of any planned works which would impact pedestrian movements through regular project notifications.

Pedestrian movement on the station platform would be temporarily impacted given the reduced circulation area resulting from ancillary construction facilities or construction work. The reduced space on the platform may increase pedestrian congestion and reduce the amount of standing area for customers, however the likelihood of this occurring is low given the current patronage at Hawkesbury River Station.

Cyclists

Since there are currently no dedicated bicycle storage facilities for the Hawkesbury River Station Precinct, it is expected impacts to cyclists would be minimal during construction.

Kiss and ride / taxi

There is currently no signposted kiss and ride zones or taxi spaces provided near Hawkesbury River Station. Short-term parking and no parking zones along Dangar Road are more likely to be used as drop off and pick up areas. The construction of the proposed accessible carpark

and path as well as the pedestrian crossing may affect some drop off and pick up areas. Alternative arrangements would be provided during construction.

Parking

The operation of both car parking facilities within the Hawkesbury River Station Precinct would be temporarily impacted during the construction of the Proposal. During construction, the following parking impacts are expected to occur:

- Dangar Road car park:
    - the temporary closure of access points into the car park during lift works. Access along Dangar Road is to be retained if possible
    - the partial closure of the car park to allow certain construction activities to occur
- Brooklyn Road unsealed car park:
    - partial closure / reduced parking spaces (approximately 12) may occur to accommodate access a construction compound.

These impacts at both off-street parking facilities would increase demand on surrounding roads. There is street parking available surrounding the station (to accommodate the parking spaces that would be unavailable at the Brooklyn Road car park for example), however this is limited and the public parking at the end of Dangar Road associated with the Hawkesbury Bay Marina may also be relied upon for commuters. This impact would be temporary and is not expected to be significant, however prior notice should be provided to commuters if a temporary loss to existing car parking is required during construction.

Parking provisions are not proposed for staff vehicles within or adjacent to the construction compound, therefore construction workers would be encouraged to car-pool or use adjacent public transport services. However, it is expected that some workers would travel by car which may also marginally increase the demand for parking surrounding the station in local roads. This impact may cause inconvenience to the public however is not expected to be significant in accordance with the low number of light vehicles expected (about 20 – 30 per shift). Workers would be encouraged to park away from the station where possible to alleviate this impact, and construction workers would not park within the commuter carpark. Provisions for parking management and community notification would be included in the CTMP.

Traffic

Traffic generated by construction vehicles, including staff vehicles, is likely to be low given the nature of the works proposed and would fluctuate dependant on the construction stage. For works undertaken during a track possession period up to five heavy vehicles and 30 light vehicles per shift are expected to travel to and from the Proposal area, while during a normal week day up to three heavy vehicles and 20 light vehicles are expected. It is anticipated that this level of traffic would not have a significant impact on existing traffic conditions.

Localised traffic control during construction would be essential to maintaining functionality of the road network particularly during peak holiday periods and weekends where high numbers of tourists visit the area.

Work zones to construct the proposed access paths along Danger Road may require temporary or partial lane closures and/or traffic diversions. Consultation with Hornsby Shire Council would be undertaken. Road works would be undertaken progressively and in the minimum area and timeframe required to undertake the particular phase of work. Signage would be displayed around work areas to inform the public.

Property access

Property access would be maintained, where possible, to minimise the impact to local residents and businesses. An accessway to a property is located adjacent to the proposed accessible car park and kiss and ride space. Should the Proposal proceed, the works to

formalise these car parking spaces and the creation of an access path would likely temporarily disrupt access to this property via the accessway. The owner and/or occupier of the property would be appropriately consulted prior to works being carried out, and arrangements put in place to limit this disruption as far as practically possible.

Prior to construction, the Construction Contractor would obtain any licences / approvals required for operating a crane within private airspace where required. Proposed works within private airspace would be undertaken in accordance with the requirement of any relevant licences / approvals and in consultation with affected property owners and the contactor would adhere to all relevant requirements to ensure the safe operation of the crane.

Emergency vehicle access

Access for emergency vehicles would be maintained at the construction compounds 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 road closures.

Operation phase

Public transport

The Proposal does not include changes to bus or rail services as part of the works and would not impact on the operation (service operation or timetabling) of public transport near Hawkesbury River Station. The Proposal includes improved access paths to Hawkesbury River Station, which may increase rail patronage.

Pedestrians

The Proposal would improve facilities and offer significant benefits to pedestrians, including:

- installation of two new lifts to provide an accessible path of travel to the station platform
- provision of a new pedestrian crossing from the Dangar Road car park to the station entrance
- regrading of the footpath on the Dangar Road (station side) and extending approximately 50m north from the station entrance
- regrading of the station platform surfaces near the station building to provide compliant accessible paths and ramps to Station amenities.

The Proposal would improve the user experience in the vicinity of the station with the potential to encourage more customers to walk to the station. The 2036 patronage forecasts (obtained from TfNSW's Transport Performance and Analytics modelling) show over half (57 per cent) of rail passengers would by then be walking to the station. In addition, the pedestrian modelling undertaken for the Concept Design by Aurecon (*Hawkesbury River Pedestrian Flow Assessment Report*) indicates the footbridge, stairs and platform area achieves a level of service (LoS) A (where normal walking speed can be freely selected and slower pedestrians can be easily overtaken). Therefore, no upgrades are proposed to the footbridge.

Cyclists

The Proposal does not propose to provide any bicycle storage facilities for the Hawkesbury River Station precinct. Hawkesbury River Station is classified as a Level C[4] interchange, which requires a minimum of 10 bicycle rack spaces.

[4] Bike and Ride Program, Minimum Bicycle Parking Requirements, TfNSW 2015

Based on site observations, there is currently a need for bicycle storage facilities with cyclists securing their bikes onto nearly poles. Where possible, consideration should be given to providing bicycle racks near the station entrance on Dangar Road during detailed design. This would meet the objectives of the NSW Government's Bike and Ride initiative, which encourages improved cycling facilities at transport interchanges.

Kiss and ride / taxi

The 2036 patronage forecasts shows 15 per cent of rail passengers would be dropped off at the station. The Proposal would provide opportunity for these passengers to use kiss and ride and taxi facilities near Hawkesbury River Station.

The Proposal includes the provision of a formalised kiss and ride space within the Dangar Road car park, located close to the station entrance. The provision of the kiss and ride facility in the Dangar Road car park would provide a safe and formal area to pick-up and drop-off passengers. The proposed kiss and ride space would have a minor impact on parking availability within the car park however it is noted that the location is currently an informal parking area with no line-marking.

No formal taxi zone has been proposed as part of the Proposal. Taxi activity for the station precinct is likely to be limited. However, taxis are expected to use the kiss and ride zone or car parking area to pick-up and drop-off passengers.

Parking

The Proposal improves accessible parking near Hawkesbury River Station by providing one formal accessible parking space and a kiss and ride space within the Dangar Road car park. Two unmarked parking spaces within the Dangar Road car park would be lost as a result. This would have a minor impact as there are a number of short term on-street and off-street parking spaces available in the area.

Traffic

The Proposal would assist in making public transport infrastructure more accessible to rail customers and in providing an improved transition between transport modes, which would likely increase patronage. It is anticipated the improved commuter experience and upgraded facilities are likely to result in a marginal increase in traffic (with more patrons using the station and driving to the station). This may result in a negligible impact on the surrounding road network.

Property access

No changes to private property access would be required as part of the operation of the Proposal.

6.1.3 Mitigation measures

Mitigation measures would be implemented to minimise traffic, transport and access impacts during construction and operation of the Proposal.

Prior to the commencement of construction, a CTMP would be prepared as part of the Construction Environmental Management Plan and would include as 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 the station and residential properties is maintained (unless affected property owners have been consulted and appropriate alternative arrangements made)
- managing requirements around operating cranes in the airspace of adjacent properties (including any relevant permits or licences)
- managing impacts and changes to on- and off-street parking and requirements for any temporary replacement provision, if a significant number of parking spaces are displaced during construction
- managing parking for construction workers by encouraging construction workers to carpool or use public transport. If not possible, parking locations should be located away from the station and residential areas
- considering routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses
- providing details of relocated bus stops, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired
- communicating with the community and local residents to inform them of changes to parking, pedestrian access and/or traffic conditions including vehicle movements and anticipated impacts on the local road network relating to site works
- scheduling/staging construction works to minimise temporary loss of interchange facilities and available parking
- managing traffic flows around the area affected by the Proposal, including as required regulatory and directional signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the CTMP.
- the owner and/or occupier of the property whose driveway is adjacent to the proposed accessible car park and kiss and ride space would be appropriately consulted prior to works being carried out, and arrangements put in place to limit this disruption as far as practically possible.

Consultation with the relevant roads authorities would be undertaken during preparation of the CTMP. The performance of all project traffic arrangements must be monitored during construction.

6.2 Landscape and visual amenity

A Landscape and Visual Impact Assessment (LVIA) undertaken for the Proposal (AECOM, 2019) he assessment included a desktop review, visual envelope mapping, site visit (4 March 2019), landscape character assessment, assessment of landscape and visual effects and preparation of photomontages. The photomontages provide an indication of what the Proposal may look like from a key viewing area upon completion and the likely scale of the Proposal's features. Materials and finishes are indicative and would be further investigated during detailed design.

The method for the LVIA was developed with reference to Guidelines for Landscape and Visual Impact Assessment (GLVIA3), Third Edition (2013), developed by the Landscape Institute and Institute for Environmental Management (UK). GLVIA3 is widely recognised as comprising an example of 'best practice' in this field.

The LVIA assesses the Proposal at operation using GLVIA3. It also provides a brief high-level commentary around visual impacts arising from the construction process. The method distinguishes between the:

- 'impact', defined as the action being taken, and the

- ‘effect’, defined as the change resulting from that action.

An impact grading matrix for sensitivity and magnitude was used to assess both landscape and visual impacts. Sensitivity relates to the ability of the landscape to accept a change (such as the introduction of lifts) without adverse impact on its character. Magnitude relates to the degree of change affecting a landscape. The matrix is used to combine the ratings for sensitivity and magnitude to provide an overall ‘Significance of Landscape Effects’ finding and ‘Significance of Visual Effects’ finding, both described as being: High; High-Moderate; Moderate; Moderate-Low; Low; Negligible or No Impact. Ratings of High and High-Moderate are considered to be significant. This matrix is presented in Table 9.

Table 9 Landscape character and visual impact grading matrix

	HIGH CHANGE	MODERATE CHANGE	LOW CHANGE	NEGLIGIBLE CHANGE
HIGH	HIGH	HIGH-MODERATE	MODERATE	NEGLIGIBLE
MODERATE	HIGH-MODERATE	MODERATE	MODERATE TO LOW	NEGLIGIBLE
LOW	MODERATE	MODERATE TO LOW	LOW	NEGLIGIBLE
NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

6.2.1 Existing environment

Landscape Character

As outlined in Section 1.3, the suburb of Brooklyn is located on the Hawkesbury River about 60km north of Sydney. The village is set within an exceptional landscape next to the Hawkesbury River, and bordered to the south by Ku-ring-gai Chase National Park, to the west by Muogamarra Nature Reserve and to the north by Sandbrook Inlet and Long Island Nature Reserve, and to the east by the Hawkesbury River and the forested and populated Dangar Island.

Brooklyn comprises an area 1.5 square kilometres centred on Hawkesbury River Station. Key features within the study area comprise:

- Brooklyn village to the south of Hawkesbury River Station, which is set against the rugged, forested backdrop of Ku-ring-gai Chase National Park
- McKell Park and Parsley Bay to the east, both of which comprise popular recreational day visitor locations, and are a focus of boating activity including berthing of small pleasure craft at Hawkesbury River Marina, and substantial boat ramp facilities at Parsley Bay
- Sandbrook Inlet and Long Island Nature Reserve, linked by the Main Northern Railway land bridge
- Brooklyn riverside settlement comprising free-standing housing and a small marina, set between the Main Northern Railway and Sandbrook Inlet.

Landscape Character Zones

A Landscape Character Assessment was undertaken, which identified what makes Brooklyn and Hawkesbury River Station distinctive, without necessarily assigning a value to it. To provide a framework for more clearly describing the area, and assessing how the Proposal would affect the elements that make up the landscape, the aesthetic and perceptual aspects of

the landscape and its distinctive character, distinct parts of the overall landscape have been separately defined and mapped as ‘Landscape Character Zones’ (LCZ).

Based on desktop analysis and site inspection, five landscape character zones in Figure 14 have been identified which have the potential to be affected by the Proposal comprising:

- LCZ 1 – Wooded / Disturbed foreshore
- LCZ 2 – Rail Corridor
- LCZ 3 – Village Main Street
- LCZ 4 – Riverfront Street
- LCZ 5 – Marina.

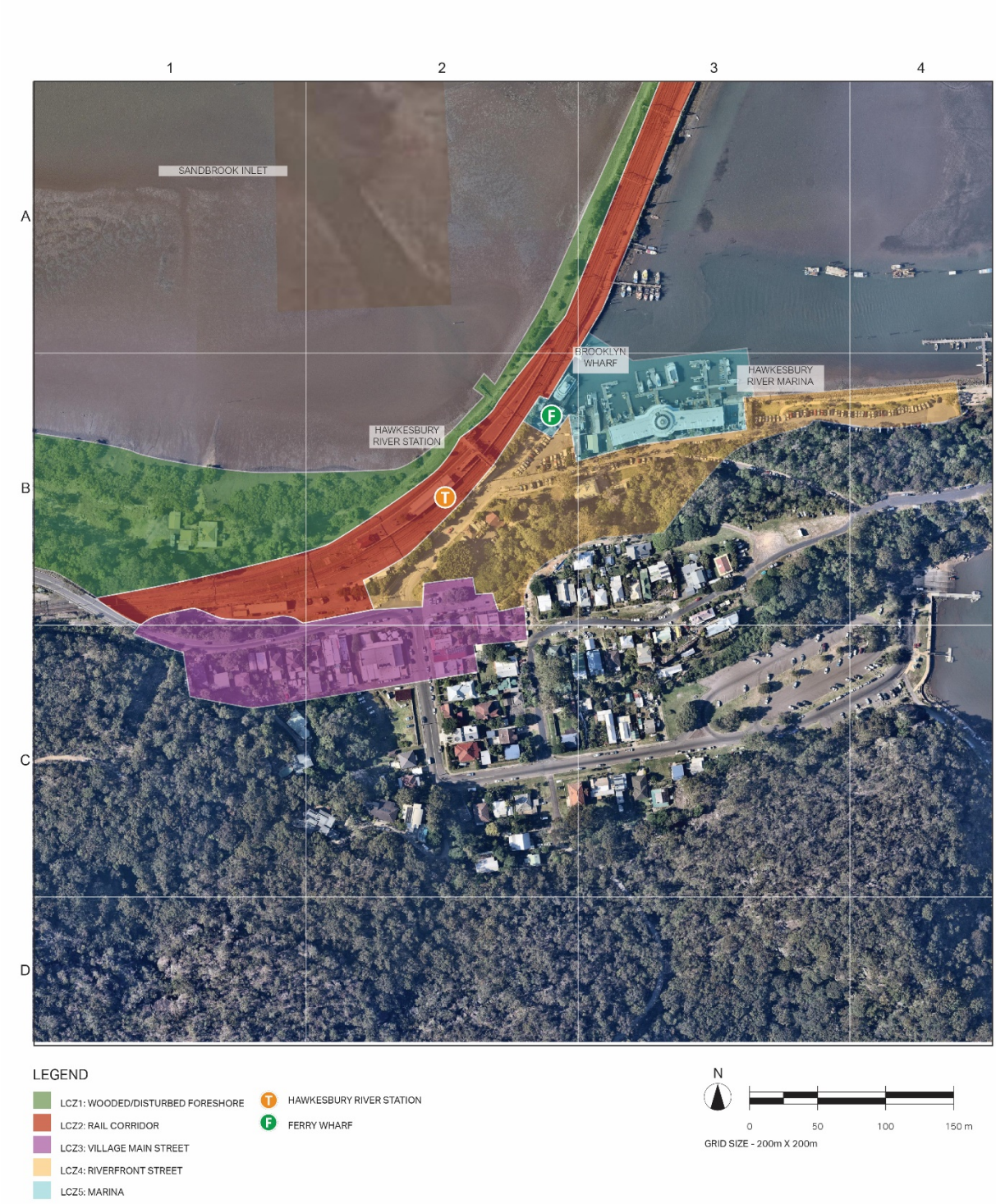

Figure 14 Landscape Character Zones

Visual Envelope

The visual envelope of the Proposal shown in Figure 15 is the area from which the Proposal can be seen. Figure 15 shows it is relatively small, broadly comprising:

- the Brooklyn Road crossing of the Main Northern Railway
- a limited part of the main street which has a view down Dangar Road to the station
- Hawkesbury Marina and adjacent areas
- Hawkesbury River Station
- the land bridge to Long Island (up to the fenced off area)
- the slashed area along the northern edge of the station
- an area used by watercraft on Sandbrook Inlet and Brooklyn Channel entering and leaving Brooklyn Wharf.

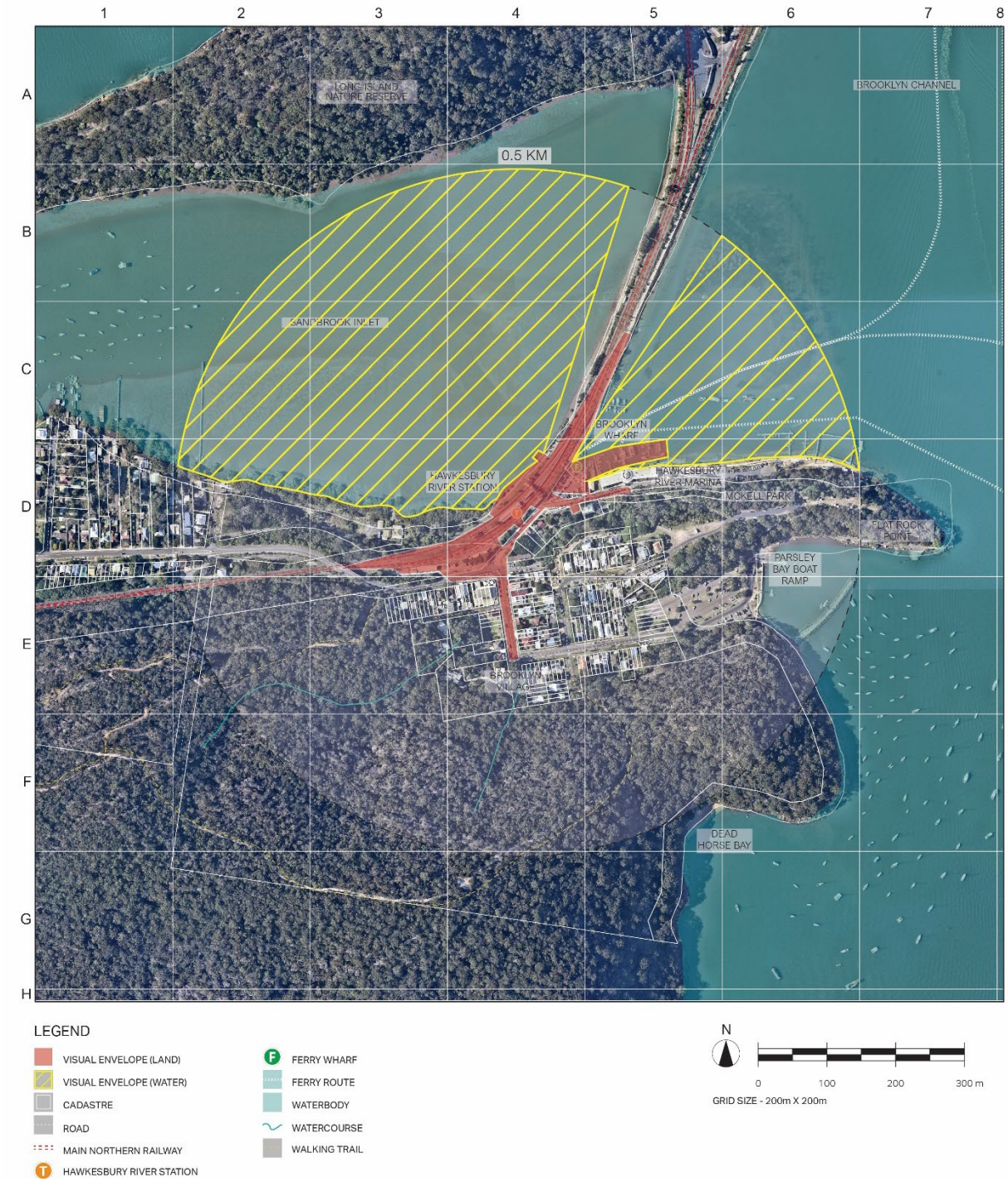

Figure 15 Visual Envelope Map showing key areas from which the Proposal would be seen

Visual Receptors

Visual receptor locations are derived from the visual envelope map. Visual receptors are individuals and/or groups of people whose views may be affected by the Proposal. Key visual receptors include: tourists / day visitors to Brooklyn and local residents / rail commuters.

Five visual receptor locations have been identified for assessment purposes that are representative of the visual envelope identified above. The locations are described in Table 10 and shown in Figure 16.

Table 10 Visual receptors for the Proposal

No.	Visual receptor	Description
VR 1	McKell Park Entry	Representative view for day visitors as they leave McKell Park, and rail commuters who drive and park within McKell Park and walk back towards the station.
VR 2	Brooklyn Public Wharf	Representative view for local and river residents who use this wharf, and for the River Postman jetty, where tourists board and alight from the River Postman ferry.
VR 3	Fitzies Fish & Chips	Representative view for tourists / day visitors to Brooklyn, and local / river residents.
VR 4	Brooklyn Road	Representative view for tourists / day visitors walking along the main street, and patrons within the Anglers Rest Hotel beer garden.
VR 5	Hawkesbury River Station	Representative view for local rail commuters

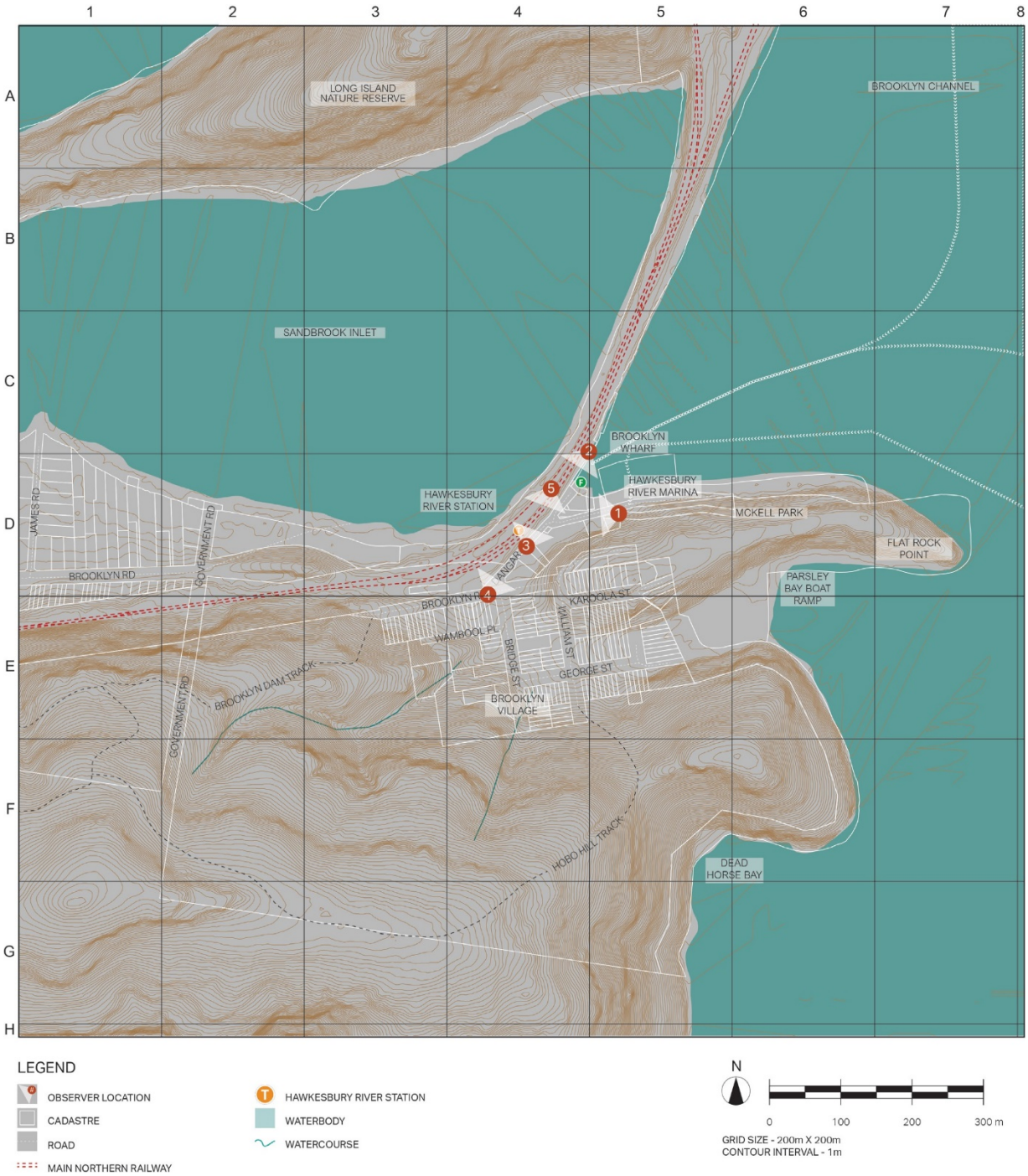

Figure 16 Plan of visual receptor locations

6.2.2 Potential impacts

Landscape Character Zones

A landscape character assessment was undertaken as part of the LVIA (AECOM, 2019) to determine the impacts of the Proposal to the five LCZs identified in Figure 14. A summary of potential impacts to LCZs using the impact grading matrix (Table 9) is shown in Table 11.

Table 11 Impacts to Landscape Character Zones

Zone	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9)
LCZ 1 – Wooded / Disturbed Foreshore	There would be no physical change to LCZ 1, however the LCZ 1 heritage setting would change with the addition of two modern steel-framed glass lifts	The sensitivity of LCZ 1 to the anticipated change is considered to be Low (adverse) as: • the Proposal would not detract from its aesthetic qualities or landscape condition • the LCZ has a local level of landscape value, however it is highly modified	The magnitude of change for LCZ 1 is considered to be Low (adverse) as • there would be no loss or addition of features within LCZ. The aesthetic quality of LCZ 1 would perceptibly change in response to the change in the aesthetic/heritage quality of the adjoining LCZ 2 with the addition of modern lift elements • the geographical effects would be minor in this LCZ. • the change would be long-term with a low chance of reversibility	Low (adverse)
LCZ 2 – Rail Corridor	The key change to the LCZ would be the introduction of the two modern steel-framed glass lifts, with the roadside tower having a width of 2.3m and length of 3.0m, projecting 15.2m above footpath level	The sensitivity of LCZ 2 to the anticipated change is considered to be Moderate (adverse), as: • the Proposal would in some measure change the character of the station with the modern lifts being uncharacteristic of the fabric and aesthetic of the Hawkesbury River Railway Station Group • the LCZ has a high level of landscape value given the State Heritage listing of the Station Group, particularly with regard to SHR significance criteria	The magnitude of change for LCZ 2 is considered to be Low (adverse) as: • the Proposal would not change the key characteristics of the landscape which are critical to its distinctive character • the geographical extent of the area over which the effects of the Proposal would be felt is considerable • the duration of the Proposal would be long-term with low potential for reversibility	Moderate-Low (Adverse)

Zone	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9)
LCZ 3 – Village Main Street	There would be no physical change to LCZ 3 arising from the Proposal. Landscape effects would be limited to potential perceptions of heritage character quality within the LCZ arising from the addition of modern steel-framed glass lifts within the immediate setting (LCZ 4)	The sensitivity of LCZ 3 to the anticipated change is considered to be Low (adverse), as: the ability of LCZ 3 to accommodate the Proposal without undue consequences for the maintenance of its existing landscape character is high given there is no impact within the Village Main Street the LCZ has a high level of landscape value given the number of heritage listed buildings within the LCZ and the distinctive, open colonial street pattern	The magnitude of change for LCZ 3 is considered to be Low (adverse) as: there would be no loss of elements within the LCZ the geographical extent of the area over which the effects of the Proposal would be felt would be highly localised along the Brooklyn Road frontage of the Anglers Rest Hotel the duration of the Proposal would be long-term ~ 50-60 years, with a low potential for reversibility	Low (adverse)
LCZ 4 – Riverfront Street	The key changes to LCZ 4 would be the introduction of two lifts, and the proposed access path, car park and kiss and ride may compromise landscape curtilage of key features around the station	The sensitivity of LCZ 4 to the anticipated change is considered to be Moderate (adverse), as: • the ability of the LCZ to accommodate the Proposal without undue consequences for the maintenance of its existing landscape character is high • the LCZ has a high level of value within the context of the heritage items within it, and its distinctive qualities	The magnitude of change for LCZ 4 is considered to be Moderate (adverse) as: • the size or scale of change likely to be experienced in the landscape would be moderate • the geographical extent of the area over which the effects of the Proposal would be felt would comprise a substantial addition, but affecting a localised area. Notwithstanding, the effects would influence several LCZs • The duration of the Proposal would be long-term, with low potential for reversibility	Moderate (adverse)

Zone	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9)
LCZ 5 - Marina	There would be no physical change to LCZ 5 arising from the Proposal. Landscape effects would be limited to potential for perceptions of impact on the quality of this LCZ arising from the addition of two lifts	The sensitivity of LCZ 5 to the anticipated change is considered to be Low (adverse), as: • the ability of the LCZ to accommodate the Proposal without undue consequences for the maintenance of its existing landscape character is moderate to High • The Marina comprises a high amenity / high value landscape	The magnitude of change for LCZ 5 is considered to be Low (adverse) as: • the size or scale of change likely to be experienced in the landscape would be low • the geographical extent of the area over which the effects of the Proposal would be felt would be localised. The effects would have an influence at the level of the immediate setting of the LCZ • the duration of the Proposal would be long-term, with low potential for reversibility	Low (adverse)

Visual Impact Assessment

Construction Phase

Visible construction elements would be expected to include a range of site sheds, hoardings, plant – including for excavation of lift wells, a crane to place the lifts, and heavy vehicles bringing in and unloading materials. Traffic management would periodically be in place given the location of the Dangar Road lift in particular, and for the commuter parking areas east of the Proposal.

These visual impacts would be substantial but would be temporary over a period of about 18 months until completion of the Proposal.

Operation phase

The Proposal would introduce new elements and built forms in the visual environment including two new lifts, walkways, and upgraded car parking.

An assessment of the visual sensitivity and magnitude of change at each visual receptor location was undertaken for the operational phase of the Proposal. The results of this assessment are provided in Table 12.

Table 12 Operational visual impact assessment

Visual Receptor	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9
VR 1 McKell Park Entry	Introduction of the two steel lift shafts into the view of the station from McKell Park	The sensitivity of VR 1 to the anticipated change in the view is considered to be Low (adverse) due to: • the primary visual receptors which would be recreational day visitors to McKell Park and/or Brooklyn as well as rail commuters, both of which would expect to see elements they associate with a station building such as lifts • the value attached to VR1 is moderate because of the heritage listing of the station and the avenue of cabbage tree palms	The magnitude of change is considered to be Moderate (adverse) as: • the size or scale of change likely to be experienced in the view would be moderate because of the introduction of two lifts • the geographical extent of the visual effect from VR 1 would be low • the duration of the Proposal would be long-term, with low potential for reversibility	Moderate-Low (adverse)
VR 2 Brooklyn Public Wharf	The key elements would comprise of different sections of the two lift shafts	The sensitivity of VR 2 to the anticipated change in the view is considered to be Moderate due to: • the susceptibility of the visual receptors to the proposed change is considered to be low (adverse). • The landscape value attached to VR2 is moderate	The magnitude of change is considered to be low (adverse) as: • the size or scale of change likely to be experienced in the view would be low • the geographical extent of the visual effect from VR 2 would be low • the duration of the Proposal would be long-term, with low potential for reversibility	Moderate-Low (adverse)

Visual Receptor	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9
VR 3 Fitzies Fish & Chips	The Dangar Road lift would be seen in full view, however it would have a good visual fit with the existing infrastructure elements of the footbridge and steps. The station platform lift would be effectively screened from view because of existing rail corridor edge screen planting	The sensitivity of VR 3 to the anticipated change in the view is considered to be Low (adverse) as: • recreational day visitors would have a moderate level of their attention focussed on the view and visual amenity while rail commuters would have a low level of their attention. The nature of the change in the view results in the susceptibility of the primary visual receptors (recreational day visitors and rail commuters) to change is considered to be moderate and potentially low • the value attached to VR3 is considered to be high	The magnitude of change is considered to be Low (adverse) as: • the size or scale of change likely to be experienced in the view would be low • the geographical extent of the visual effect from VR 3 would be low • the duration of the Proposal would be long-term, with low potential for reversibility	Low (adverse)
VR 4 Brooklyn Road	The key changes to the view of the station precinct from VR4 comprise of the Dangar Road lift	The sensitivity of VR 4 to the anticipated change in the view is considered to be Moderate (adverse) as: • the susceptibility of the primary visual receptors including tourists/day visitors and patrons of the Anglers Rest Hotel, to the proposed change is considered to be moderate • the landscape value attached to VR 4 is considered to be low to moderate	The magnitude of change is considered to be Moderate (adverse) as: • The size or scale of change likely to be experienced in the view would be moderate due to the addition of the lift on Dangar Road • the geographical extent of the visual effect from VR 4 would be low • the duration of the Proposal would be long-term, with low potential for reversibility	Moderate (Adverse)

Visual Receptor	Anticipated change	Sensitivity to change	Magnitude of change	Rating (refer to Table 9
VR 5 Hawkesbury River Station	The key changes to the view from VR 5 are a result of the new platform lift and the top of the Dangar Road lift	The sensitivity of VR 5 to the anticipated change in the view is considered to be Moderate (adverse) as: • the susceptibility of the primary visual receptors (rail commuters) to the proposed change is considered to be low • the landscape value attached to VR 5 is high due to the SHR listing of the Hawkesbury River Railway Station Group and the views to Sandbrook Inlet	The magnitude of change is considered to be Low (adverse) as: • the size or scale of change likely to be experienced in the view would be moderate • the geographical extent of the visual effect from VR 5 would be low • the duration of the Proposal would be long-term, with low potential for reversibility	Moderate-Low

Figure 17 and Figure 19 show existing views from ‘Fitzies’ Fish & Chips’ and the station platform facing south west. Figure 18 and Figure 20 show an indicative photomontage of the Proposal from those locations. The photomontages are conceptual; however, they illustrate the likely visual changes when viewed from those locations. The materials and finishes shown are indicative only and subject to further consideration during detailed design.

Figure 17 Panorama of existing view looking north from ‘Fitzies’ Fish & Chips’ to the Proposal

Figure 18 Photomontage of the Proposal from ‘Fitzies’ Fish & Chips’

Figure 19 Panorama of existing view looking south-west from the station platform to the Proposal

Figure 20 Photomontage showing the proposed view with the Proposal in place

The effects of the Proposal on both landscape character and views and visual amenity fell between the rating values of Low (Adverse) and Moderate (Adverse). As such, this report finds that there was no significant effect on landscape character arising from the Proposal (i.e. no rating of High (Adverse), or Moderate–High (Adverse)), nor was there a significant effect on views and visual amenity arising from the Proposal.

The key reason for the above findings is that the design of the Proposal has been well-considered within the context of the SHR listing for the Hawkesbury River Railway Station Group, including the recently upgraded station steps and footbridge, which sympathetically reflect the structural and material character of much of the heritage item. These comprise a well-considered family of elements including steel grey balustrades and throw screens with substantially 'transparent' mesh, and consistent steel grey mounting of modern elements including lighting, signage, and the mounting of moulded stainless steel hand rails.

The Proposal lift shafts draw upon the same family elements including steel grey framing and a lift base made from non-combustible short-blast concrete block, natural grey in colour, with transparent glass panels to much of the lift height reflecting the backdrop of sky and vegetation, giving the structure a visual 'lightness' of form and mass.

6.2.3 Mitigation measures

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

- An Urban Design Plan is to be submitted to TfNSW and endorsed by the Precincts and Urban Design team. The Urban Design Plan is to address the fundamental design principles as outlined in 'Around the Tracks' – urban design for heavy and light rail, TfNSW, Interim 2016. The Urban Design Plan shall:
    - Demonstrate a robust understanding of the site through a comprehensive site analysis to inform the design direction, demonstrate connectivity with street networks, transport modes, active transport options, and pedestrian distances
    - Identify opportunities and challenges
    - Establish site specific principles to guide and test design options
    - Demonstrate how the preferred design option responds to the design principles established in 'Around the Tracks', including consideration of Crime Prevention through Environmental Design Principles.

- The Urban Design Plan is to include the Public Domain Plan for the chosen option and will provide analysis of the:
    - Landscape design approach including design of pedestrian and bicycle pathways, street furniture, access paths, new planting and opportunities for public art
    - Materials Schedule including materials and finishes for proposed built works, colour schemes, paving and lighting types for public domain, fencing and landscaping
    - An Artist's Impression or Photomontage to communicate the proposed changes to the precinct
- construction lighting placed to minimise upward spread of light. Care should be taken when selecting luminaires to ensure that light spill and glare are kept to a minimum. Cut-off or directed lighting to be used with and outside of the construction compound, with lighting location and direction considered to ensure glare and light spill is minimised
- limit disturbance of vegetation to the minimum amount necessary to construct the Proposal
- 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*
- provide well-presented and maintained construction hoarding and site fencing with shade cloth (or similar material) (where necessary) to minimise visual impacts on key view points during construction
- temporary hoardings, barriers, traffic management and signage removed when no longer required
- during construction, graffiti would be removed in accordance with TfNSW's Standard Requirements provide detail design integration of the new access path and pedestrian crossing from the Dangar Road station entry to the kiss and ride space and accessible car park, including with the existing Governor Phillip monument, e.g. align the footpath with the base of the monument, and provide a sufficient landscape curtilage around it, and/or provide other intervention that recognises and responds to the monument, e.g. artist integration within the new footpath that recognises and responds to the monument.
- establish TPZs around trees to be retained. Tree protection would be undertaken in line with AS 4970-2009 Protection of Trees on Development Sites and would include exclusion fencing of TPZs construction personnel to keep the construction areas clean and tidy including refuse placed in appropriate receptacles
- measures taken to ensure no tracking of dirt and mud into public roads and other public spaces
- ongoing maintenance and repair of constructed elements
- consider further cleaning of the lime leaching from the small section of recently constructed rough- stacked, battered sandstone wall adjoining the new faux sandstone block wall at the southern end of the Dangar Road pedestrian steps, to lift the presentation of the station entry
- consider pressure cleaning the existing faux sandstone block retaining wall to improve the presentation of the station entry

- for the lift base wall, consider the use of a darker, 'heavier' colour that more closely reflects the dark charcoal grey colour predominant within the pedestrian overbridge, and provides increased visual strength / weight to the base of the shaft
- consider minor relocation and realignment of the Governor Phillip monument away from the proposed access path, e.g. 1-2 metres south, to provide an improved landscape curtilage for this historic element.

6.3 Noise and vibration

A Noise and Vibration Impact Assessment (AECOM, 2019c) undertaken for the included the following scope:

- establish the existing background noise management levels and vibration limits that would apply to the Proposal
- predict environmental noise and vibration levels at nearby residential and other sensitive receivers due to the Proposal
- predict noise levels from additional off-site construction traffic generated by the Proposal
- recommend mitigation measures, where necessary, to reduce and manage noise and vibration impacts from the Proposal to comply with established construction noise management levels and vibration limits
- consider noise from the operation of the upgraded Hawkesbury River Station.

The Noise and Vibration Impact Assessment. The findings of this assessment are summarised below.

6.3.1 Existing environment

Hawkesbury River Station is located within a mainly residential suburban environment in the suburb of Brooklyn. The closest residential receivers are located on Brooklyn Road and William Street. Brooklyn Community Health Centre and Fitzies Fish and Chips are located to the south and south-east respectively of the station on the opposite side of Dangar Road.

To provide a comprehensive assessment, 14 representative residential receivers surrounding the Proposal were selected to describe the noise impacts associated with the Proposal. The receivers were chosen as they are the closest to the boundary of the Proposal area on each block and were considered the potentially worst affected receivers. The representative residential receivers within 100 metres of the Proposal are:

- R1 - 214 Brooklyn Road, Brooklyn – approximately 16 metres from the boundary Proposal area
- R2 - 139 Brooklyn Road, Brooklyn – approximately 16 metres from the boundary of the Proposal area
- R3 - 206 Brooklyn Road, Brooklyn – approximately 21 metres from the boundary of the Proposal area
- R4 - 192 Brooklyn Road, Brooklyn – approximately 26 metres from the boundary of the Proposal area
- R5 - 3 William Street, Brooklyn – approximately 50 metres from the boundary of the Proposal area.

The remainder of the representative residential receivers are located further than 100 metres from the Proposal, but within 500 metres. These receivers are located on Karoola Street, Bridge Street, George Street, Brooklyn Road, Government Road and James Road.

The closest representative non-residential receivers to the boundary of the Proposal area are:

- N1 - Fitzies Fish and Chips – approximately 11 metres from the boundary of the Proposal area
- N2 - Brooklyn Community Health Centre – approximately 16 metres from the boundary of the Proposal area
- N3 - The Teahouse, 12 Dangar Road, Brooklyn (currently closed) – approximately 17 metres from the boundary of the Proposal area
- N4 - The Anglers Rest – approximately 23 metres from the boundary of the Proposal area
- N5 - Brooklyn Milk Bar – approximately 36 metres from the boundary of the Proposal area N6 - Brooklyn Marina – approximately 39 metres from the boundary of the Proposal area.

To assist in determining noise criteria for the receivers surrounding the Proposal, a single noise catchment area (NCA) was identified as the noise environment and each of the residential receivers within the NCA is considered to have a similar noise environment. The NCA is shown in Figure 21.

Figure 21 Representative receiver locations

Background noise levels

Long term unattended and short term attended measurements were undertaken to establish the existing ambient and background noise environment at potentially affected receivers.

Unattended noise monitoring

Long-term unattended noise monitoring was conducted between 1 and 11 March 2019. One noise logger was placed at a representative location at 1 Bridge Street, Brooklyn. Table 13 presents the existing overall representative L_{Aeq} ambient noise level and the background L_{A90} noise levels for the day evening and night periods. The L_{A90} noise levels are the levels exceeded for 90% of the measurement period, while the L_{Aeq} level is the equivalent continuous sound level.

Table 13 Existing background and ambient noise levels

NCA	Period[1]	Rating Background Level (RBL) (L_{A90}) [2]	Ambient noise levels (L_{Aeq}) [3]
NCA 1	Day	39	55
	Evening	39	52
	Night	33	51

Notes:

1. *Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays & Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday & Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays & Public Holidays.*
2. *The rating background level (RBL) (L_{A90}) represents the noise level exceeded for 90 per cent of the monitoring period*
3. *The ambient noise level represents the average noise level over the monitoring period.*

Attended noise monitoring

Attended noise measurements were conducted at the unattended monitoring location on 1 March 2019. The measurement was conducted over a 15-minute period. Weather conditions were overcast on the day of monitoring, with no wind. The results of the attended noise monitoring are presented in Table 14.

Table 14 Attended noise measurements

Logger	Date	Time	L_{Aeq} dB(A)	L_{A90} dB(A)	Comments
1	1/03/2019	12:18	52	41	Freight train pass-by 55-60 dB(A). Pub voices clearly audible 43-45 dB(A). Slight bird noise and wind noise contributes to noise environment. Cicadas 40 dB(A). Local vehicle traffic 45-50 dB(A).

Summary

The acoustic environment is dominated by natural sounds and local vehicle traffic. Intermittent rail noise is also audible. These characteristics are typical of a suburban environment.

6.3.2 Noise assessment criteria

Construction Noise Criteria

The EPA's *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) is the principle guideline for the assessment and management of construction noise in NSW. As the proposed works are expected to continue for a period of

more than three weeks and are near noise sensitive receivers, a quantitative assessment, based on 'reasonable' worst case construction scenarios, has been carried out for these works.

The ICNG recommends standard hours of construction as:

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

For residential receivers, the ICNG recommends the following noise management levels (NML) during standard construction hours: the applicable RBL + 10 dB(A). Where NMLs are predicted to be exceeded the INCG recommends feasible and reasonable measures to be implemented to minimise adverse impacts. Where construction noise levels reach 75 dB(A) at residences (during standard construction hours), residential receivers can be considered as 'highly noise affected' and the proponent may be required to consider restricting hours of very noisy works to provide respite periods.

Outside of recommended standard hours the ICNG recommends the following NMLs for residential receivers: the applicable RBL + 5 dB(A).

The ICNG recommends separate NMLs for non-residential sensitive receivers, which applies when the applicable receiver is in use.

The construction NMLs developed for the Proposal for residential and non-residential sensitive receivers are listed in Table 15 and Table 16.

Table 15 Construction NMLs – Residential receivers

NCA	Period	RBL, L_{A90} dB(A)	Standard hours noise management levels, $L_{Aeq.\ 15min}$, dB(A)		Out of hours noise management levels, $L_{Aeq,\ 15mins}$, dB (A)
NCA 1	Day	39	49	75 (highly noise affected level)	44
	Evening	39	-		44
	Night	33	-		37

Table 16 Construction NMLs – Non-residential receivers

Land use	Noise management levels, $L_{Aeq,15min}$ (applies when properties are in use)
Community Hall	55 dB(A)[1]
Commercial premises (including offices, retail outlets)	70 dB(A)

Notes:

1. *These external management levels are based upon a 45 dB(A) internal noise management level and a 10 dB reduction from outside to inside through an open window.*

Sleep Disturbance Criteria

Sleep disturbance noise goals have also been established for residential receivers which are based on the NSW Road Noise Policy (Department of Environment, Climate Change and

Water, 2011). Based on the Policy, the sleep disturbance criteria for the NCA are a screening level of 48 dB(A) $L_{A1(1\ minute)}$ and an awakening reaction level of 60 to 65 dB(A) $L_{A1(1minute)}$.

Construction Traffic Noise Criteria

To assess noise impacts from construction traffic an initial screening test should be undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A), in line with the *Road Noise Policy*. Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion (in this case, 55 dB(A) as both Dangar and Brooklyn Roads are sub-arterial roads) then noise mitigation should be considered for those receivers affected.

Construction Vibration Criteria

Vibration assessment criteria relate to human comfort (tactile vibration) and structural or building damage.

Structural damage to buildings

No Australian Standards exist for the assessment of building damage caused by vibration at present. The German standard (DIN 4150) provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are presented in Table 17. DIN 4150 states that buildings exposed to higher levels of vibration than recommended limits would not necessarily result in damage.

Table 17 DIN 4150: Structural damage safe limits for building vibration

Group	Type of structure	At foundation - Less than 10 Hz	At foundation - 10 Hz to 50 Hz	At foundation - 50 Hz to 100 Hz1	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

1. *At frequencies above 100 Hz, the values given in this column may be used as minimum values*

Human comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline A*ssessing Vibration: A Technical Guideline* is based on Vibration Dose Values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred VDVs for intermittent vibration arising from construction activities are listed in Table 18. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 18 Preferred and maximum vibration dose values for intermittent vibration (m/s$^{1.75}$)

Location	Daytime [1] Preferred	Daytime Max	Night time Preferred	Night time Max
Critical areas (examples include hospital operating theatres and precision laboratories where sensitive operations are occurring)	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions, commercial premises and places of worship	0.4	0.8	0.4	0.8
Workshops or factory environments	0.8	1.6	0.8	1.6

Notes:

1. Day is defined as 7:00 am to 10:00 pm. Night is defined as 10:00 pm to 7:00 am

Operational Noise Criteria

The *Noise Policy for Industry* provides guidance in relation to acceptable noise limits for industrial noise emissions, which includes, but is not limited to, noise emissions from mechanical plant (NSW EPA, 2017).

The assessment procedure in the *Noise Policy for Industry* has two components:

- controlling intrusive noise impacts in the short term for residences. Intrusive noise criteria comprise the applicable RBL+ 5 dB(A).
- maintaining noise level amenity for residences and other land uses. Recommended amenity noise levels are specified in Table 2.1 of the Noise Policy for Industry depending on land use.

Both components are assessed at the boundary of the noise sensitive receiver site, or if the site boundary is more than 30 metres from the noise sensitive building, a distance of 30 metres from the noise sensitive building.

The specific noise levels established for the operation of the Proposal are summarised in Table 19 and are based on the lower of the intrusive and amenity criteria. The criteria apply to environmental noise emissions from plant and equipment installed as part of the Proposal.

Table 19 Summary of environmental noise emission criteria

Location	Time of day	Intrusive Criteria L_{Aeq}, dB(A)	Amenity Criteria $L_{Aeq\ (15\ minutes)}$ dB(A)	Project Specific Noise Levels[1] Criteria L_{Aeq}, dB(A)
NCA 1	Day	44	53	44
	Evening	44	48	44
	Night	38	43	38
Community Hall	When in use	-	58[2]	68
Commercial premises	When in use	-	68	58

Notes:

1. *Project Specific Noise Levels represent the lower of the intrusive and amenity criteria.*
2. *External noise levels are based upon a 10 dB reduction from outside to inside through an open window.*

6.3.3 Potential impacts

Construction phase

Noise

Eight distinct work packages, each consisting of a number of construction activities, have been assumed for the Proposal. These work packages are listed above in Table 2. All work packages have been assessed with the exception of the final package – testing and commissioning as it is expected to be a relatively low noise impact activity. The work packages would occur in line with the following scheduling:

1. site establishment and enabling woks – standard hours
2. utility relocation – standard hours
3. earthworks and piling works – standard hours and track possession periods
4. lift installation works – standard hours and track possession periods
5. toilet and waiting area reconfiguration works – standard hours
6. station surrounds works – standard hours and outside standard hours
7. demobilisation – standard hours
8. testing and commissioning – standard hours.

Noise from activities within the construction compounds has been assumed to be minor in comparison to the noise generated by the worst case construction scenarios assessed.

In order to assess noise impacts from the site during construction, a noise model was created to represent 'reasonable' worst periods of upgrade works. Construction was modelled in SoundPLAN Version 8.0, with the model being based on ground topography, ground absorption and reflection, buildings (residential and commercial), receivers (Figure 21) and from the use of plant and equipment listed in Table 3.

A summary of the predicted construction noise levels for each scenario during standard working hours for residential receivers is shown in Table 20.

Table 20 Predicted noise impacts at representative residential receivers for each work package

Receiver ID	Approximate Distance (metres)	NML - SH	NML – Night (3, 4 and 6)	Work Package						
				1	2	3	4	5	6	7
R1	16	49	38	**59**	**61**	**61**	**67**	**52**	**55**	**60**
R2	16	49	38	50	**59**	**59**	**62**	**52**	55	46
R3	21	49	38	**55**	**64**	**58**	**63**	**52**	**54**	**59**
R4	26	49	38	**54**	**62**	**58**	**62**	**50**	**52**	**54**
R5	50	49	38	**45**	**52**	**62**	**61**	**58**	**70**	**50**
R6	112	49	38	46	49	**51**	**56**	43	**47**	47
R7	130	49	38	<38	43	**52**	**51**	**50**	**59**	<38
R8	145	49	38	41	48	**49**	**50**	47	**53**	48
R9	189	49	38	<38	<38	<38	**43**	<38	<38	<38
R10	160	49	38	<38	47	**46**	**49**	45	**45**	39
R11	210	49	38	<38	46	**45**	**46**	45	**48**	<38
R12	301	49	38	<38	45	**44**	**46**	42	**45**	<38
R13	390	49	38	<38	<38	<38	<38	<38	<38	<38
R14	415	49	38	<38	44	**43**	**45**	44	**47**	0

Notes:

1. *Items in **BOLD BLUE** indicate the predicted noise impact at this receiver during this work stage exceed the night-time NML. (note: Night works would only be undertaken during work packages 3, 4 and 6)*
2. *Items in **BOLD RED** indicate the predicted noise impact at this receiver during this work stage exceed both the daytime and night-time NMLs.*
3. *Night works would only be undertaken during work packages 3, 4 and 6*

Table 21 Predicted noise impacts at representative non-residential receivers

Receiver ID	Distance (metres)	NML	1	2	3	4	5	6	7
N1	11	70	50	58	65	64	61	67	52
N2	16	55	**56**	**57**	**60**	**65**	**56**	**61**	**59**
N3	17	70	44	54	62	62	56	**72**	48
N4	23	70	60	58	64	68	54	58	61
N5	36	70	56	54	60	64	51	59	59
N6	39	70	40	54	56	58	53	64	46

Notes:

1. *Items in **BOLD ORANGE** indicate predicted noise impact at this receiver during this work stage exceed the NML.*

Table 20 shows that construction noise levels are predicted to exceed the noise management levels during standard hours for all assessed construction work packages at the closest representative receivers (R1 to R8 and R10). The largest numbers of exceedances occur during Work package 4 – Lift installation works however the highest noise levels are experienced during Work package 6 - station surrounds works at R5. No residential receivers are predicted to be 'highly affected' during standard work hours.

During night works, construction noise levels exceed the NMLs at residential receivers during construction work packages 3, 4 and 6. For Work package 4 construction noise levels are expected to exceed the NMLs at all representative receivers within the NCA (with the exception of R13).

The largest number of exceedances occur during Work package 4 – Lift installation works however the highest noise levels are experienced during Work package 6 - station surrounds works at R5. Noise levels at receivers R1, R3, R4, R5 and R6 are predicted to exceed the noise management levels by more than 25 dB(A) at times. However these exceedances would be limited to four rail possession periods and some night works for Stage 6. In addition night works would not be undertaken for more than two consecutive nights at a time.

Table 21 details construction noise levels at non-residential receiver locations. Two non-residential receivers are predicted to be exposed to noise levels which exceed the NMLs. These are the Brooklyn Meeting Room during all the assessed work packages and the Teahouse at 12 Dangar Road during Work package 6 – station surrounds works. Key noisy activities include the use of concrete saws, coring machines and jack hammers.

Sleep Disturbance

The awakening reaction criterion of 65 dB(A) is predicted to be exceeded at residences along Brooklyn Road, William Street and Karoola Street (those within about 100 m of the construction compound including receivers R1 to R5) for Work packages 3, 4 and 6.

The typical outdoor to indoor noise reductions provided by most standard dwellings (i.e. without acoustical treatment) is generally accepted as being 10 dB with windows slightly open and a minimum of 20 dB with windows closed. Therefore, by closing their windows during noisy activities residents can potentially attenuate external noise levels by 20 dB.

In addition, the predicted construction noise levels are typically the worst case noise levels, therefore the majority of the actual $L_{A1(1min)}$ noise levels are likely to be less than those predicted. Also as noted previously, night works would not be undertaken for more than 2 consecutive nights at a time.

Construction Traffic

The numbers of construction vehicles have been estimated by TfNSW to be up to 30 light and five heavy vehicles per day during peak construction periods. Vehicles would access the site via Brooklyn Road and Dangar Road.

Traffic noise levels during construction may increase by more than 2 dB on Brooklyn Road and Dangar Road however the overall traffic noise level (including construction traffic) is expected to be less than 55 dB(A) during the daytime, which complies with the *Road Noise Policy* criteria.

Construction Vibration

During construction, vibration would be generated using the following equipment:

- jackhammer
- bored piling rig
- wacker packer.

The minimum working distances of this equipment from off-site receivers are shown in Table 22 which is based on recommendations of the TfNSW *Construction Noise and Vibration Strategy*. If these minimum working distances are complied with no adverse impacts from vibration intensive works are likely in terms of human response or cosmetic damage.

It is unlikely that construction works would be undertaken within the minimum buffer distances to nearby heritage residential and commercial properties, however works may be unavoidable within these recommended buffer distances within the heritage-listed station complex.

If vibration intensive works are required within the minimum buffer distances, mitigation measures (including site specific vibration monitoring and dilapidation surveys) would be implemented to ensure no impact to relevant structures.

Table 22 Minimum working distances of vibration intensive equipment to be used during the Proposal

Plant	Rating/ Description	Cosmetic damage – residential/ commercial	Cosmetic damage - heritage	Human response
Jackhammer	Handheld	1 m (nominal)	1 m (nominal)	Avoid contact with structure
Wacker packer[1]	Handheld	5 m	8 m	15 m to 20 m
Bored piling	≤ 800 mm	2 m	4 m	N/A

Notes:

1. *No recommendations provided in the Construction Noise and Vibration Strategy for a wacker packer (assumed to be the same as a small roller)*

Operation phase

The changes to the station including the addition of two lifts would not produce significant noise emissions. As such, the operational noise environment is expected to remain largely unchanged. Standard noise controls such as appropriate selection of mechanical plant would

reduce any impacts. If required, operational noise emissions shall be addressed during the detailed design phase to comply with operational noise criteria as per the *Noise Policy for Industry.*

6.3.4 Mitigation measures

Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009), Construction Noise Strategy (TfNSW, 2018b) and the Noise and Vibration Impact Assessment for the Proposal (AECOM, 2019) 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:

- 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.
- identification of nearby residences and other sensitive land uses
- description of approved hours of work
- description and identification of all construction activities, including work areas, equipment and duration
- description of what work practices (generic and specific) would be applied to minimise noise and vibration
- a complaint handling process
- noise and vibration monitoring procedures, including for heritage structures
- overview of community consultation required for identified high impact works
- loading and unloading of materials/deliveries as far as possible from sensitive receivers.
- site access points and roads selected as far as possible away from sensitive receivers.
- dedicated loading/unloading areas shielded if close to sensitive receivers.

- delivery vehicles fitted with straps rather than chains for unloading, wherever possible.
- reducing where possible noise from mobile plant through additional fittings including:
    - residential grade mufflers
    - silencing of air parking brake
- maximising on-site storage capacity to reduce the need for truck movements during sensitive times.

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
- the noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels.

Work 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 work outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An OOHW application form would need to be prepared by the Construction Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.

Where the $L_{Aeq\ (15minute)}$ construction noise levels are predicted to exceed 75 dBA and/or 30 dBA above the RBL 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.

Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding would take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible.

If vibration intensive equipment is to be used within the minimum working distances for cosmetic damage, as presented in Table 22, then:

- it is recommended that attended vibration measurements are undertaken when work commences, to determine "site specific minimum working distances". The minimum working distances for cosmetic damage from Table 22 are generally considered to be conservative and working within them would not necessarily result in damage however as factors such as work practices and intervening structures can affect vibration levels.
- vibration intensive work should not proceed within the site specific minimum working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators (e.g. via flashing light, audible

alarm, SMS) when vibration levels are approaching the peak particle velocity objective. It is also advisable to carry out building condition surveys of sensitive historical structures before construction works begins.

Vibration resulting from construction and received at any structure outside of the Proposal area 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).

Section 6.3.2 identified that some exceedances of RBLs would result from the Proposal. Table 23 presents additional mitigation that should be considered when the exceedances occur.

Table 23 Additional mitigation measures matrix

		Action level[1]	Mitigation measures	Mitigation measures	Mitigation measures
	Time period	**0 – 10 dB(A) Noticeable**	**10 – 20 dB(A) Clearly audible**	**20 – 30 dB(A) Moderately intrusive**	**>30 dB(A) Highly intrusive**
Standard	Weekday (7am-6pm) Saturday (8am-1pm) Sun/Public Holiday (Nil)	-	-	• Letterbox drops • Monitoring	• Letterbox drops • Monitoring
Out of Hours Work	Weekday (6pm-10pm) Saturday (7-8am) and (1-10pm) Sun/Public Holiday (8am-6pm)	-	• Letterbox drops	• Letterbox drops • Monitoring	• Letterbox drops • Monitoring • Individual briefings • Proposal specific respite offer • Phone calls • Specific notifications
Out of Hours Work	Weekday (10pm-7am) Saturday (10pm-8am) Sun/Public Holiday (6pm-7am)	• Letterbox drops	• Letterbox drops • Monitoring	• Letterbox drops • Monitoring • Individual briefings • Phone calls • Specific notifications	• Letterbox drops • Monitoring • Individual briefings • Phone calls • Specific notifications • Alternative accommodation

Notes: 1. Action level is $L_{Aeq(15\ minute)}$ noise level above background (RBL) - qualitative assessment of noise levels.

6.4 Aboriginal heritage

6.4.1 Existing environment

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the area covered by the Proposal (the area around Hawkesbury River Railway Station) plus a 200-metre radial buffer on 4 March 2019. Three Aboriginal sites were identified within 200 metres of the Proposal:

- 45-6-2906: Open site – Art (pigment or engraved)
    - Site is an engraving of a fish on the vertical rock face of a boulder in proximity of the Proposal.
- 45-6-0428: Closed site – Art (pigment or engraved)
    - Site was previously recorded as a shelter with art, within proximity of the Proposal. However the extensive search card for this record notes that the previous description of the location of this site places it well outside of the Proposal area, beneath residential development, and also notes that the site's current condition is now unknown and possibly destroyed.
- 45-6-0433: Open site – Art (pigment or engraved)
    - Site was previously recorded as a rock engraving within proximity of the Proposal. However the extensive search card for this record notes that the previous description of the location of this site places it well outside of the Proposal area, beneath residential development, and also notes that the site's current condition is now unknown and possibly destroyed or otherwise extant under grass or bitumen.

Along with the identified Aboriginal sites, certain landscapes features such as waterways, sand dune systems, ridge tops, ridge lines, headlands, cliff faces and rock caves/shelters can indicate the likely presence of Aboriginal objects. As the Proposal is adjacent to the Hawkesbury River, there is the potential for other Aboriginal sites or objects to occur within the Proposal area that have not been previously identified. However, the Proposal area has undergone significant landscape modification and high level of disturbance through the development of rail infrastructure, local roads and the Hawkesbury River Marina complex. Because of this previous development, it is unlikely that further Aboriginal objects or sites would be located within the Proposal area or works areas.

6.4.2 Potential impacts

Construction phase

Construction of the Proposal would involve excavation and other ground disturbance for the following activities:

- the foundations and pits for the new lift shafts, requiring excavation at each proposed lift location
- construction of upgraded footpaths, accessible car park, kiss and ride spot and pedestrian crossing over Dangar Road.

There is a low potential for ground disturbing activities or construction works to affect Aboriginal objects or sites within or in the vicinity of the Proposal area. Impact to sites 45-6-0428 and 45-6-0433 would be avoided as no development would occur near where these sites were recorded. All site personnel would be made aware of the location, sensitivity and management requirements for the protection of Site 45-6-2906 as part of site inductions. The

site is to be clearly identified as a no-go area in the CEMP and site plans. In addition, the likelihood that unrecorded artefacts exist within the Proposal area is low due to the highly modified and disturbed setting of the Proposal.

Operation phase

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

6.4.3 Mitigation measures

All construction staff would undergo an induction in the recognition of Aboriginal cultural heritage material. This training would include information such as the importance of Aboriginal cultural heritage material and places to the Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal cultural heritage material and sites.

If unforeseen Aboriginal objects are uncovered during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council.

If human remains are found, work would cease, the site secured and the NSW Police and the OEH notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.

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

6.5 Non-Aboriginal heritage

A Statement of Heritage Impact (SoHI) was prepared by AECOM for the Proposal (AECOM, 2019d). The SoHI was prepared in order to provide an understanding of the impact of the Proposal to heritage items within the Proposal area, namely the Hawkesbury River Station Group.

6.5.1 Existing environment

A desktop search of relevant heritage registers was undertaken to determine whether non-Aboriginal heritage items are located at or around the Proposal. This involved a search of the following heritage registers:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- Register of the National Estate (non-statutory)
- SHR
- RailCorp Section 170 Heritage and Conservation Register
- Hornsby LEP 2013.

The results of these searches are presented below in Table 24 and indicate that Hawkesbury River Station has been identified as holding State significance and is listed on the SHR, RailCorp Section 170 Heritage and Conservation Register and Hornsby LEP 2013. In addition, the register search was extended to 100 metres from the curtilage of Hawkesbury River

Station to establish if there were surrounding registered items or conservation areas that may be affected by the Proposal.

Table 24 Heritage items near the Proposal

Heritage register	Item	Distance from Proposal	Significance
State Heritage Register	Hawkesbury River Railway Station Group (SHR#01166)	Within Proposal area	State
RailCorp Section 170 Heritage and Conservation Register	Hawkesbury River Railway Station Group (SHI #4801021)	Within Proposal area	State
	Hawkesbury River Railway Station Group (SRA#21), Footbridge (SRA#663)	Within Proposal area	State
Hornsby LEP 2013	Hawkesbury River Railway Station Group/Brooklyn Railway Platform and Station (#227)	Within Proposal area	State
	Hawkesbury River Railway Station Group/Brooklyn Railway Station, including Platform (#A16)	Within Proposal area	State
	McKell Park, Lower/Upper, Cabbage Palms and WWII Gun and Emplacements (#225)	30 metres	Local
	Governor Philip Memorial (#A15)	30 metres	Local
	House (#229)	30 metres	Local
	Hawkesbury River Rail Bridge and Long Island Group (#A19)	50 metres	State (LEP Listing)
	Railway Shelter Shed (#228)	30 metres	Local
	House (#234)	60 metres	Local
	House (#236)	70 metres	Local
	House (#237)	80 metres	Local
	Station Master Cottage (#249)	80 metres	Local
	Shop (#197)	80 metres	Local
	Shop (#198)	90 metres	Local

Heritage register	Item	Distance from Proposal	Significance
	Shop (#199)	100 metres	Local
	Shop Fronts (#224)	90 metres	Local
	Footpath (#233)	90 metres	Local

Historical Context

In the mid-1800s railway lines in the north and south were extended towards the Hawkesbury River. By 1883, land on the southern bank of the Hawkesbury River was resumed for the advent of the future railway station. Parish maps from 1885 show that the railway line extended east along the southern bank of the Hawkesbury River before leaving the coast at 'Brooklyn Station'. In 1887, the station was renamed as 'Hawkesbury River Station' and was officially opened to the public. Since then, Hawkesbury River Station and the surrounding railway line have undergone several modifications including:

- construction of the platform in 1887
- the Hawkesbury River Rail Bridge and Long Island tunnel were officially opened in May 1889, allowing for a fully uninterrupted rail journey from Sydney to Newcastle
- alteration of the station layout to accommodate the duplication of the line in the early 1900s
- replacement of the timber station building with a brick building and replacement of timber side platforms with an island platform in 1903
- duplication of the line in 1909
- construction of a pedestrian footbridge in 1910, and an extension to the footbridge to provide access to the adjacent wharf on the river in 1912
- construction of a new station building in 1910
- extension of station building in the 1920s
- rebuild of the Up platform in the late 1930s with a steel rail post and reinforced concrete panel retaining wall
- electrification of the line and subsequent station changes including the raising of the platforms and footbridge from the late 1950s. opening in 1960
- addition of awnings and structures to the station platform and rebuilding of station steps in the late 1980s and early 1990s.

Recent Changes to the Hawkesbury River Railway Station Group

Major upgrades to Hawkesbury River Station occurred between 2016 and 2017 and involved a restoration of the station as a whole. A Statement of Heritage Impact (SoHI) prepared for those works indicated that those works would not have an adverse heritage impact to the station building or to the heritage significance associated with the property.

Hawkesbury River Railway Station Group

Hawkesbury River Station Group comprises the station building (1910), platform (1887), footbridge (1910), wharf, store room (c1930), water spout and movable heritage items. A full description of the Station Group is included in the SoHI.

Significance Criteria

The Hawkesbury River Station Group has been assessed against the SHR criteria in the SHR and the RailCorp Section 170 Heritage and Conservation Register to determine the level of significance and related statutory protection. The existing assessed significance is provided in Table 25.

Table 25 Hawkesbury River Station Group significance assessment

Significance Criteria	Application of Criteria (Existing Assessment)
Historical significance SHR criteria (a)	*The Hawkesbury River Railway Station was the terminus for the first section of the Short North from Strathfield for two years until the first Hawkesbury River bridge was completed in 1889. As such it has historic associations with the rail linkage of Sydney and Newcastle, which was a major event in the history of NSW railways. It forms part of a significant railway landscape including the Long Island Maintenance Depot, land bridge and tunnels, the current and former Hawkesbury River Rail bridges and railway worker accommodation in Brooklyn township.* *The station facilitated the development of Brooklyn as a settlement for workers constructing the line. The associated housing (not owned by RailCorp) increases the significance of the Brooklyn Railway precinct, representing the provision of railway workers accommodation for construction and permanent ongoing operation of the railway, a practice that is no longer occurring.* *Like many historic railway stations in NSW the station complex is able to evoke a former era of travel, communication and trade. This is heightened by the presence of a water spout at the southern end of the station from the former days of steam powered railway travel and the jetty, which forms an interface between transport on land and sea.*
Historical association significance SHR criteria (b)	The item does not meet this criterion.
Aesthetic significance SHR criteria (c)	*The station group has an outstanding degree of aesthetic significance. It has a particularly picturesque setting on the edge of the Hawkesbury, with views over the water to the east and west and to Long Island to the north. The station affords a view of the land bridge between Brooklyn and Long Island and the portals of the current and former Long Island tunnels, providing a rare opportunity to easily view some of the technical achievements of the Short North line construction. Its waterside setting is unusual and as such it is one of the most picturesque station settings in NSW.* *The station building is an 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.*
Social significance SHR criteria (d)	*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.*
Technical/Research significance SHR criteria (e)	The item does not meet this criterion.

Significance Criteria	Application of Criteria (Existing Assessment)
Rarity **SHR criteria (f)**	*The Hawkesbury River station complex is a common station Type 11 (standard A8-10), well represented elsewhere in the Sydney metro network. Its waterside setting is however rare, providing one of the most picturesque station settings in NSW.* *The station group also forms part of an unusual late nineteenth and early twentieth century railway landscape of outstanding significance clustered around the Hawkesbury River, which includes the Long Island tunnels and maintenance depot, the current and former Hawkesbury River railway bridges and worker accommodation in Brooklyn township.*
Representativeness **SHR criteria (g)**	*The platform building, island platform and footbridge are representative of structures built at Sydney railway stations between 1892 and 1929. The station building is a good representative example of Type A8-10 stations due to its high degree of intactness and integrity. The later Relay Room is representative of rail infrastructure of the 1950s era, designed to accommodate significant technological change in signalling and electrification of the line at this time.* *The footbridge was identified as an item of moderate heritage significance in the comparative analysis from the 2016 'Railway Footbridges Heritage Conservation Strategy'.*
Integrity/Intactness	*The station group is intact and maintains its historic relationship with the Hawkesbury River setting, the Long Island Group, the current and former Hawkesbury River Rail Bridges and workers accommodation in Brooklyn township. The station building is intact with most original fittings and fixtures. The footbridge has been raised to accommodate electric trains but maintains its original steel support structure.*

The existing Statement of Significance reads as follows:

Hawkesbury Railway Station has State significance. The station group has an outstanding degree of aesthetic significance. It has a particularly picturesque setting on the edge of the Hawkesbury, with views over the water to the east and west and to Long Island to the north. The station affords a view of the land bridge between Brooklyn and Long Island and the portals of the current and former Long Island tunnels, providing a rare opportunity to easily view some of the technical achievements of the Short North line construction. Its waterside setting is unusual and as such it is one of the most picturesque station settings in NSW.

Hawkesbury River Station has historical associations with the construction of the Short North line in the late 1880s and the Hawkesbury River Bridge in 1889, which was a major event and a significant engineering achievement in the history of NSW railways. The station facilitated the development of Brooklyn as a settlement for workers constructing the line and the station forms part of an extensive railway landscape of outstanding significance clustered around the Hawkesbury River, which includes the Long Island tunnels and maintenance depot, the current and former Hawkesbury River railway bridges and worker accommodation in Brooklyn township.

The platform building, island platform and footbridge are representative of structures built at Sydney railway stations between 1892 and 1929 and especially the period between 1909 and 1917. The station building is a good representative example of its type due to its high degree of intactness and integrity. (NSW Heritage Division, 2009)

This Statement of Significance was last updated 16 October 2009.

Grading of Significant Elements to the Hawkesbury River Railway Station Group

As part of the heritage assessment undertaken for the Proposal, features of the Hawkesbury River Railway Station group were graded in accordance with the NSW Heritage Division (NSW

Heritage Office, 2001:11) grading criteria, in the following descending order from greatest to lowest (detracting) contribution to the item's heritage significance:

- exceptional
- high
- moderate
- little
- intrusive.

Features within the Hawkesbury River Railway Station group have been graded as follows (refer AECOM, 2019d):

- **exceptional**: Station Building (1910)
- **high**: Platforms (c1903 and c1938); and Water Spout (1910)
- **moderate**: Footbridge (1910); Wharf (c1884 – 1910); Relay Room (c1950s); and Movable Heritage items
- **little**: nil
- **intrusive**: Footbridge balustrades including metal balustrades with operable glass.

Archaeological Potential

Hawkesbury River Station Group has been assessed as having low potential for significant archaeological remains. Archaeological potential was identified immediately to the north of the footbridge on the eastern (Dangar Road) side of the station that is currently covered in vegetation. There are no areas of archaeological potential identified within the road and footpath area along the Dangar Street steps, where upgrade to the existing footpath and kerb are proposed.

There are no other areas of archaeological potential identified within the proposed construction area and construction compound locations.

Railway Footbridges Heritage Conservation Strategy

The NSW Government Architects Office was commissioned by Sydney Trains in 2016 to prepare a conservation management strategy for railway footbridges that were previously identified as having heritage value, and were located within railway station precincts. A total of 68 railway footbridges were assessed as they were previously identified as having exceptional, high, moderate and little or no heritage value. From these investigations, the strategy created conservation management policies to assist with future development and management to these footbridges (NSW Government Architect's Office Heritage Group, 2016).

The report assessed the Hawkesbury River Station Footbridge as being of Moderate significance as it is a:

"…representative example from the period. It has been modified including being raised to accommodate electric trains, but maintains its original steel support structure and contributes visually to the SHR listed precinct. Precinct is SHR, s170 & LEP listed."

The significance assessment for the footbridge states the footbridge, while being highly modified, contributes to the overall heritage railway station precinct. As such, the conservation strategy states that these footbridges should be carefully conserved and adapted (NSW Government Architect's Office Heritage Group, 2016).

6.5.2 Potential impacts

Construction phase

Historical significance criteria

The construction of the lifts, the toilet refurbishment works, installation of a glass canopy over the entrance of the existing male toilet and the station platform regrading works would have little or no impact to the historical significance of Hawkesbury River Station. These works would not impact significant original fabric of the station, allowing key heritage elements of the Hawkesbury River Station Group to remain intact.

Aesthetic significance criteria

The construction of the proposed lifts would have a moderate adverse impact on the aesthetic significance of the Hawkesbury River Railway Station Group as the current open views to and from the station would be enclosed. Impacts have been minimised through the placement of the lifts, however the modern nature of a lift shaft would change the overall early twentieth century aesthetic of the station. Further, the materials and finishes selected for the lifts would have an impact on the aesthetic of the station, including to the Hawkesbury River Railway Station Group as a whole, and to the setting of the station.

The use of dark grey colour palette for the steel works and cladding around the base of the lifts has been chosen to match the existing steel works associated with the footbridge and to soften the appearance of the new structures. This has also extended to the use of steel and glass, with the steel used to match the framing of the footbridge supports, and the glass to allow for a lighter appearance.

Removing sections of the existing footbridge balustrade to allow for access to the lifts and landings would have a negligible impact on the aesthetic significance of the station. These balustrades have been previously altered and are contemporary fittings.

The removal of all of the existing toilet fixtures and fittings would not have an impact to the aesthetic significance associated with this station. Both male and female toilets were upgraded in 2017/18 as part of the station refresh works. The existing toilets, including hand basins and partitions are not considered to be of heritage significance.

The new works to create the family accessible toilet, ambulant and unisex toilets in the existing male and female toilet area would be contained within the existing refurbished area. The installation of new toilets, hand basins, partitions and false wall to hide cisterns would not impact on the early twentieth century design of the station as the works are contained to areas that have been previously modified and proposed works would be distinguished from the original fabric by their contemporary and sympathetic form and fabric.

The removal of the existing privacy screen to the male toilet is considered to have a negligible impact. The current privacy screen is not original and previous screens have been built in the same location as the present, but in varying timber styles. The glass canopy would be installed below the height of the awning and would not detract from the current roof of the station building. The canopy would not impact any fabric associated with the station building.

The regrading works in the vicinity of the existing toilet entrances from the platform would not have an impact to the original fabric, or aesthetics associated with this station. The regrading works would not impact on the view to or from the existing station building, and would not result in modifications to any significant fabric associated with the station.

The relocation of the existing public telephone and vending machines would also not have an impact on the heritage significance of the station under this criterion.

Social significance criteria

The construction of lifts would provide equitable access to the island platform, which would allow a wider range of the community to appreciate the heritage significance of the station.

The installation of the new lifts would allow for the continued use of the station, and would retain the connection between the local community, the railway station and the wider rail network.

The proposed removal of the current male and female toilet fittings and fixtures, installation of family accessible toilet and canopy are unlikely to have a negative impact on the social significance associated with this station as the proposed alterations would make the toilets more user friendly. It is anticipated that the construction of the family accessible toilet would have a positive impact on the local community by providing essential amenities for equitable access.

Rarity criteria

The construction of the new lifts would not have a direct impact on the station building, however it would have a moderate negative impact on the waterside setting of the station that has been identified as a rare feature. The inclusion of the new lift wells above the height of the pedestrian overbridge would enclose the views to and from the station. These impacts have been moderated through the placement of the new platform lift in the centre of the platform on the opposite side of the stairs, and through the use of steel and glass materials.

The new lifts would also impact on the station group, as the station at present forms part of an unusual late nineteenth and early twentieth century railway cluster. The addition of the new lifts would introduce intrusive elements into the station group.

The proposed re-grading of the platform in the vicinity of the current male and female toilets, relocation of the public telephone and vending machines would have a negligible impact to the overall heritage significance but would have no impact to the rarity of the station.

Representativeness criteria

The construction of the new lifts would not have a direct impact to the station building, but would have a minor impact to the platform in relation to the placement of the new lift, and a minor impact to the pedestrian overbridge. The direct impacts to the footbridge are reversible, as the new lift wells would be independent structures, with only a new landing connection between the bridge and the lift. The impact to the platform would be via the installation of the new lift well. This impact is considered to be minor as the location of the lift would not impact on the platform coping or other significant elements.

The inclusion of a glass canopy would not be likely to impact on the intactness of the station building, or the heritage significance under this criterion.

The proposed re-grading of the platform in the vicinity of the current male and female toilets, relocation of the public telephone and vending machines would have a negligible impact to this significance criterion associated with the station.

Impact to Railway Footbridges Heritage Conservation Strategy

There are nine identified heritage strategies outlined in the footbridge heritage conservation strategy, that are relevant to the Proposal and against which the Proposal has been assessed. The potential impacts and mitigation measures are outlined below in Table 26.

Table 26 Assessment of impacts to the strategies identified in the Railway Footbridges Heritage Conservation Strategy

Heritage Conservation Strategy	Impact Assessment
Strategy 9: Retain footbridges of Moderate significance as a first preference	The only impact to the existing footbridge would be from the removal of the modern balustrades where the new lifts would be built. The remainder of the footbridge would be retained, including the original steel beams and box trestle footings.
Strategy 11: Setting	The setting of the footbridge would not be altered. No buildings (including the booking office) are located on the footbridge.
Strategy 12: Interpretation	There is no heritage interpretation present on the platform or on the station at present. The installation of the new lifts would create an opportunity for interpretation to be installed.
Strategy 13: Conservation, maintenance and new works	The construction of the new lifts to the footbridge would utilise modern materials. There would be a clear differentiation between the footbridge and the new materials associated with the lifts.
Strategy 16: Change	The two new lifts would be constructed as independent, self-supporting structures, including the cantilevered platform linking the two structures. As such, the lifts could be removed in the future and have no impact to the remaining footbridge structure.
Strategy 18: Heritage Specialist	This assessment has been prepared by Ameera Mahmood, Senior Heritage Architect at AECOM, and Chris Lewczak, Senior European Heritage Specialist at AECOM.
Strategy 20: Inductions	A mitigation measure identified for this Proposal is that all project inductions must include a heritage component, detailing the significance of the station and all significant elements.
Strategy 21: Design phase	Two previous heritage studies were undertaken as part of the design process. This included a Statement of Heritage Impact by PTW Architects (2018), and a Preliminary Environmental Assessment prepared by AECOM (2018).
Strategy 22: Heritage assessments	Impacts as identified in the design are assessed in Section 6.

Summary of Heritage Impacts

From the assessment against the NSW Heritage Division guidelines (NSW Heritage Office, 2002), the potential impacts to the Hawkesbury River Railway Station group have been assessed against those guidelines. A summary of the impacts and their grading is as follows:

Major negative impacts

- none

Moderate negative impacts

- construction of proposed lifts

Minor negative impacts

- none

Negligible or no impacts

- reconfiguration of toilets

Minor positive impacts

- none

Major positive impacts

- improved safety and accessibility
- enhancement of station overall.

Operation phase

The operation of the Proposal would not substantially impact non-Aboriginal or archaeological heritage. While there would be minor permanent visual impacts on the heritage setting of the station, this would be offset by the long term benefits by improving accessibility at Hawkesbury River Station.

6.5.3 Mitigation measures

A number of mitigation measures are proposed to minimise the heritage impact of the Proposal on the Hawkesbury River Station Group, including:

- a heritage conservation architect should be engaged to provide ongoing heritage and conservation advice throughout detailed design and any subsequent relevant design modifications. The nominated heritage conservation architect shall provide supervision of areas identified as contributory elements within the scope of works and ensure that the final design adheres to the *Sydney Trains Footbridge Heritage Conservation Strategy*, *Heritage Platforms Conservation Management Strategy*, the *Station Access Heritage Conservation Guide* and the *Painting Station Guide*
- archival recording of the station as a whole prior to the commencement of construction should follow NSW Heritage Division guidelines *Photographic recording of heritage items using film or digital capture* (NSW Heritage Office, 2006) and *How to prepare archival records* (NSW Heritage Office, 1998). Copies should be provided to NSW Heritage Division, the State Library, Hornsby Council and Sydney Trains for future reference. In particular the following elements should be concentrated on:
    - views and vistas to and from the current station
    - footbridge and its original fabric
    - station building
- in accordance with Section 170A of the Heritage Act, Sydney Trains should provide notification of the works to Heritage Division 14 days prior to the commencement of the works
- in the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
- a specialist contractor well versed in working with heritage fabric should be engaged during the construction stage of the project

- care should be taken when undertaking all demolition works so as not to damage significant fabric
- repair fabric where feasible. This would include repointing using the same method and style that is present today
- any new brickwork should match the original in terms of brick colour, mortar composition and brick orientation (bricks should be laid in the Flemish bond – alternating between header and stretcher alignment)
- new services, outlets, wall units and brackets (etc.) should be located in areas already modified and/or consolidated in one location. Existing openings in ceilings are the preferred location for the installation of new services. New services and fittings should use existing fixing points or be located at mortar joints
- the painting colour scheme for the new toilets should follow the Conservation Guide: *Painting Station Buildings* approved colour scheme. Specific heritage paint schemes have been developed for station buildings, and the painting scheme outlined for station buildings built 1910 to 1920 should be followed
- the glass canopy should be freestanding and not come into contact with the station building. The height of the canopy should be raised to coincide with the existing louvre highlight above the entry door to the male toilets. Further design considerations should be investigated during detailed design. This should be done in conjunction with the heritage conservation architect
- new partitions should be lightweight with a reversible construction to ensure significant fabric is protected and conserved. They should also not extend the full height to the ceiling
- re-grading of the station platform should not cover any existing wall vents that have been installed along the lower course of the brickwork to the station building. If cast iron gratings are removed, these should be stored for future reuse
- further considerations should be investigated during detailed design regarding the relocation options for both the public telephone and vending machines
- ensure that movable items are tagged and recorded (photographs and written description) and included in the Sydney Trains register of movable items
- installation of new heritage interpretation signage at the new station entrances should be developed and installed and designed as part of broad signage and wayfinding upgrade works for the station and its facilities
- as the Hawkesbury River Station Group is listed on the SHR, a Section 60 approval to undertake the works associated with the Proposal is required from the Heritage Council of NSW. It is recommended that this SOHI be submitted to the NSW Heritage Branch, together with the requisite forms, for assessment.
- following completion of works, the SHR listing description and historical context should be updated to accurately reflect the significance of the station and the new works and elements within the precinct
- a heritage induction should be provided to all on-site staff and contractors involved in the Proposal. The induction should clearly describe the heritage constraints of the site
- the CEMP should include stop work procedures in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (Transport for NSW, 2015) to manage activities in the unlikely event that intact archaeological relics or deposits are encountered.

6.6 Biodiversity

6.6.1 Existing environment

Landscape context

The Proposal is located within the suburb of Brooklyn on the Hawkesbury River about 60km north of Sydney. Vegetation within Brooklyn and near the Proposal has mostly been heavily modified as a result of construction and on-going use of the town and the rail corridor.

Brooklyn is bounded to the south by Ku-ring-gai Chase National Park and to the west by Muogamarra Nature Reserve. The surrounding landscape of Brooklyn is heavily vegetated with native and exotic plant species.

The area around the Proposal contains native mature trees such as *Angophora costata; Jacaranda mimosifolia; Araucaria bidwillii* and *Araucaria cunninghamii*. A key feature of the Proposal area, particularly within Dangar Road car park is a line of mature *Livistona australis* (cabbage tree palms). The surrounding area also contains other native and exotic vegetation as a result of landscaping activities on both public and private land.

Database searches

Database searches do not provide the exact species that are located within or around the Proposal area. They provide an indication of the species that may, are likely, or known to occur in the area based on species' sightings, favoured habitats and behaviours.

A search of the Atlas of NSW Wildlife (NSW BioNet) on 29 April 2019 found records of 52 threatened species and 18 ecological communities listed under the BC Act within a 10 square kilometre area around Hawkesbury River Station. None of the individual species are recorded to occur within, or in the area immediately surrounding the Proposal. The nearest recorded threatened species to the Proposal is *Artamus cyanopterus cyanopterus* (Dusky woodswallow), which was recorded approximately 200m to the east of the Proposal.

A further search was undertaking using the EPBC Act Protected Matters Search Tool (29 April 2019). The search was undertaken for the Proposal area and a 1km buffer around the Proposal area. The search identified the following:

- One national heritage place
    - Ku-ring-gai Chase National Park
- Two listed threatened ecological communities
    - Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community – community may occur within area
    - Coastal Upland Swamps in the Sydney Basin Bioregion – community likely to occur within area
- 77 listed threatened species
- 53 listed migratory species
- 74 listed marine species
- 10 whales and other cetaceans
- 44 invasive species.

Site inspection

A site inspection was carried out on 11 March 2019 by AECOM and TfNSW.

Flora

The Proposal would impact vegetation along the rail corridor adjacent to Dangar Road, from the eastern face of the footbridge to the end of Dangar Road. Vegetation within this area consists of:

- *Casuarina glauca* / *Casuarina cunninghamiana* (swamp oak / she-oak)
- *Livistona australis* (cabbage tree palm)
- *Lantana camara* (lantana)
- *Ageratina adenophora* (crofton weed)
- *Banksia integrifolia* (coastal banksia)
- *Cinnamomum camphora* (camphor laurel)
- *Angophora costata* (Sydney red gum)
- *Macrozamia communis* (Burrawang)
- *Ligustrum lucidum* (large-leaved privet)
- *Asparagus aethiopicus* (asparagus fern)
- *Eucalyptus haemastoma* (scribbly gum).

None of the above species were identified within the protected matters search tool and are not threatened species. This area of vegetation has been modified from its original condition due to the construction and ongoing maintenance of the rail corridor. The vegetation found in this area does not consist of remnant vegetation.

Fauna

Targeted surveys for threatened or migratory fauna were not conducted during the site inspection. The Proposal area is located adjacent to the Main North Rail Line and near to an existing marina within the village of Brooklyn and is subject to ongoing human activity including train, boat, vehicle and pedestrian movements throughout the day and night. As such the potential habitat value for threatened or migratory fauna is likely to be low.

Despite this, certain threatened fauna that are adapted to urban environments may still occasionally use this area, such as Grey-headed Flying-fox or threatened microbats. Given that the Proposal would result in limited impacts on mature native vegetation, the potential for the Proposal to affect core elements of habitat for these species is low.

Overall the Proposal is considered unlikely to result in a significant impact on individuals or the habitat of threatened or migratory fauna.

6.6.2 Potential impacts

Construction phase

An assessment of the potential impacts of the Proposal on biodiversity factors is provided in Table 27. A likelihood rating of known, high, moderate, low or none has been assigned to each of the potential impacts. Table 27 illustrates that the Proposal would result in the removal or modification of native vegetation but would have a likelihood rating of none to low for all other potential impacts.

Table 27 Assessment of direct and indirect impacts because of the Proposal

Impact	Extent of impact because of the proposed activity
Direct Impacts	
Removal or modification of native vegetation	**Known:** Native vegetation would be removed in order to facilitate works to install the Dangar Road lift. The native species that would be removed are: • 1 x *Casuarina glauca* / *Casuarina cunninghamiana* • 1 x *Livistona australis* • 1 x *Pittosporum undulatum* Note – this may also be camphor laurel or large-leafed privet. The survey was unable to get close enough to the plant to determine. Vegetation would also be required to be trimmed to accommodate the installation of the rest area adjacent to the Dangar Road footpath, and overhanging branches over that footpath. The exact extent of trimming would be further refined during detailed design.
Loss of individuals of a threatened species	**Low:** No threatened flora species observed during site inspection. Lack of key shelter/breeding resources for threatened fauna. Further, due to ongoing human activity, the Proposal area is unlikely to contain habitat for threatened fauna.
Removal or modification of threatened species habitat other than native vegetation (micro-habitat features)	**None:** Due to ongoing maintenance and human activity, the Proposal area is unlikely to provide habitat for threatened species.
Death through trampling or vehicle strike	**Low:** Death of biodiversity through trampling or vehicle strike may occur where animals cross roads used by construction traffic.
Death through poisoning	**Low:** No poisons would be used as part of the proposed activity. Harmful substances used in construction would all be controlled as per required A S.
Fragmentation	**Low:** The removal of vegetation for the Proposal would not further fragment vegetation.

Impact	Extent of impact because of the proposed activity
Indirect Impacts	
Predation by domestic and/or feral animals	**None:** The proposed activity is not likely to increase the presence of domestic or feral animals in the local area
Loss of shade/shelter	**Low:** The removal of vegetation would result in a minor loss of shade and shelter. This would be a minor impact given the extent of available vegetation immediately surrounding the Proposal area that can provide shade/shelter.
Loss of individuals through starvation	**Low:** The vegetation to be removed is not considered likely to cause loss of individuals through starvation. This is due to the small area of impact, and the abundant foraging areas that exist in the highly vegetated areas within and surrounding Brooklyn.
Loss of individuals through exposure	**Low:** The vegetation to be removed at each site is not considered likely to cause loss of individuals through exposure. Given the areas of vegetation in national parks, nature reserves and other areas immediately surrounding the vegetation to be removed/trimmed in the Proposal area, and the consistent use of the area by humans, it is unlikely that there is fauna dependent on the vegetation to be removed as a shelter resource for survival.
Edge effects (noise, light, traffic)	**Low:** Although the works would take approximately 18 months to complete, the impact of noise, light and traffic would be minor as construction activities would not occur continuously during that 18-month period, providing periods of respite for potential fauna occurring within the Proposal area. Further, Hawkesbury River Station currently functions at night time, creating existing ambient impacts regarding noise and light exposure.
Harmful hydrological changes	**Low:** The proposed activity is unlikely to cause alterations to existing flow regimes or result in un-contained nutrient-laden sedimentation with the implementation of the mitigation measures outlined in Section 7.

Impact	Extent of impact because of the proposed activity
Weed invasion	**Low:** Unlikely to be greater than current impact through the use of the rail corridor and the community of Brooklyn.
Increased human activity within or directly adjacent to sensitive habitat areas	**None:** The Proposal would not occur within or directly adjacent to sensitive habitat areas.

Operation phase

The operation of the Proposal is not likely to impact biodiversity in the local or wider region.

6.6.3 Mitigation measures

A number of mitigation measures are proposed to minimise the biodiversity impact of the Proposal including:

- construction of the Proposal must be undertaken in accordance with TfNSW's *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2018c) and TfNSW's *Fauna Management Guideline* (TfNSW, 2018d)
- all workers are to 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
- disturbance of vegetation is to be limited to the minimum amount necessary to construct the Proposal. Trees/vegetation nominated to be removed in the Proposal plans 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
- tree protection would be undertaken in line with AS 4970-2009 *Protection of Trees on Development Sites* and would include exclusion fencing of TPZs
- in the event of any tree to be retained becoming damaged during construction, the Construction Contractor is to 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 Construction Contractor is required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval
- weed control measures, consistent with TfNSW's *Weed Management and Disposal Guideline* (TfNSW, 2015), are to be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015*.

The TfNSW *Vegetation Offset Guide* (TfNSW, 2016b) provides a framework for a consistent approach to offsetting impacts to vegetation on applicable TfNSW projects. The guide also allows for appropriate offsets to be provided for one tree or a group of trees that do not form part of a vegetation community, regardless of whether they are native or not. Trees are to be retained where possible.

Two small trees (diameter at breast height (DBH) of less than 15cm) and one medium tree (DBH greater than 15cm, but less than 60cm) may require removal. In accordance with the vegetation offset guide, it is recommended that a minimum of eight trees are planted to meet TfNSW's offset ratios. Any additional trees that require removal during construction of the Proposal would need to be approved by TfNSW for removal and offsetting (at a ratio of at least 2:1 for small trees, 4:1 for medium trees and 8:1 for large trees (DBH greater than 60cm). The offsetting location would be determined at the detailed design stage.

6.7 Socio-economic impacts

6.7.1 Existing environment

Land uses within the Brooklyn township generally comprise of low density residential developments and small-scale commercial uses including a hotel, pub, cafés, take away food premises and restaurants and retail premises. Hawkesbury River Marina, which comprises of mixed commercial uses is located approximately 104 metres north east of the station entrance.

The closest residential property to the Proposal area is located on Brooklyn Road, approximately 16 metres to the south of the Proposal area boundary. This property is on an elevated position above an existing shop. The closest non-residential land use is a take away food premises located approximately 11 metres from the Proposal area boundary.

A review of the Australian Bureau of Statistics 2016 Census date indicates the suburb of Brooklyn has a population of 722 people, with a median age of 48 years. Over half (52.6%) of the population are male and 56.5% of the population is employed in some capacity. The majority of the population of Brooklyn (76.6%) were born in Australia, and 86.8% of the population speak only English at home. Of employed persons at Brooklyn, 19% use public transport as at least one of their methods to travel to work, 12.3% being via train and 4.3% being via train and car. People aged 65 years or over made up 19.1% of the population.

According to the TfNSW Transport Performance and Analytics data, the average daily patronage at Hawkesbury River Station in 2017 was 496 passengers and is forecast to increase to 635 passengers by 2036, which includes an additional 15% to accommodate unforeseen growth.

6.7.2 Potential impacts

Construction phase

Construction of the Proposal has the potential to temporarily impact customers, pedestrians, residents, motorists, local businesses and other receivers because of:

- temporary changes to pedestrian access to, through and around the station
- temporary disruptions to local traffic movements near the station
- temporary loss of parking around the station in the adjacent Dangar Road car park
- increased truck movements due to the delivery of materials and equipment and the transportation of waste
- construction noise, vibration, dust and visual impacts.

Station access would be maintained at all times during construction, except when construction works occur during a track possession. This includes pedestrian access to the station via the existing station stairs on the Hawkesbury River and Dangar Road sides. Track possessions are standard practice for works in the rail corridor that cannot be undertaken while there are regular train movements. The track possessions would occur regardless of the Proposal being undertaken.

The closest business to the Proposal, a takeaway food and drink premises (Fitzies' Fish and Chips) across the road from the Station is unlikely to be negatively affected by the works. There is potential for a minor temporary increase in business from construction workers during the works.

The required disconnection of the overhead aerial line between Sydney Trains pole No. 11 and Ausgrid pole BR83732 (to facilitate the installation of the lift on Dangar Road) and subsequent replacement of the Sydney Trains pole would need to be done in conjunction with Sydney Trains and the electricity supplier, in order to minimise potential disruptions or impacts.

Operation phase

Operation of the Proposal would provide positive socio-economic benefits to the Brooklyn community and the wider Hornsby LGA including:

- improved accessibility for customers at Hawkesbury River Station by providing new lifts, family accessible and ambulant toilets and an accessible route from the Dangar Road car park to the station
- improved customer connectivity within Brooklyn by providing upgrade footpaths along Dangar Road, a formalised pedestrian crossing from the existing car park to the station entrance and a kiss and ride facility to be provided at the current bus stop on Dangar Road
- improved facilities due to the reconfiguration of the platform building toilet to provide DSAPT compliant amenities
- potential economic improvements to surrounding businesses because of increased patronage to the Station as a result of increased access.

6.7.3 Mitigation measures

A number of environmental safeguards would be implemented to minimise potential impacts on the community with a particular focus on keeping the community informed including:

- mitigation measures in respect of potential impacts on amenity (e.g. noise, dust and visual) as listed in Section 7.2
- establishment of sustainability criteria for the Proposal to encourage construction personnel to purchase goods and services locally to support the local community
- development of a Community Liaison Management Plan (by the Construction Contractor prior to construction) which would identify potential stakeholders and the best-practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where possible
- feedback through the submissions process to facilitate opportunities for the community and stakeholders to have input into the project, where practicable
- informing the community of construction progress, activities and impacts in accordance with the Community Liaison Management Plan
- providing contact details for a 24-hour construction response line, Project Infoline and email address to enable ongoing stakeholder contact throughout the construction phase.

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

6.8 Contamination, geology and soils

A Detailed Site Investigation (Contamination Report) was undertaken for the Proposal (Coffey, 2019). The contamination report involved a desktop study of the Proposal area, a site walkover survey and intrusive ground investigation works that targeted areas that would be disturbed during the proposed works to assess the significance of potential contamination.

6.8.1 Existing environment

The platform is elevated relative to the rail track bed and land surrounding the rail corridor. In general, the topography of the site slopes down towards the Hawkesbury River foreshore to the west and northeast of the site.

The architectural plan provided by TfNSW indicates the elevation of the footpath where the Dangar Road lift, lift shaft is to be constructed is 1.66m AHD. The elevation of the station platform where the platform lift, lift shaft would be constructed is 4.70m. The elevation of the remainder of the platform increases gradually to 4.97m AHD in the southern part of the site (Coffey, 2019).

The Hawkesbury River Station site is located at the boundary of Erina and Disturbed Terrain landscapes. It is expected that the ground conditions comprise a combination of both landscapes, with disturbed terrain overlying Erina landscape soils. The limitations of the disturbed terrain landscape depend on the nature of the fill material and include mass movement hazard, unconsolidated low wet strength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials.

The *1:100,000 Geological Map of Sydney* indicates that the geology underlying the Proposal is made up of Newport Formation and Garie Formation of the Narrabeen Group formed during the early-late Triassic period, which typically comprises interbedded laminate, shale and quartz to lithic-quartz sandstone: Clay pellet sandstone (Department of Minerals and Energy, 1991). Above this, the geological setting comprises Cenozoic Sedimentary Province (Qh), which comprises anthropocene deposits varying from large man-made clasts (concrete blocks to building demolition rubble) to quarried natural boulders, with interstitial sand-sized to clay matrix.

Acid Sulfate Soils

Acid Sulfate Soils (ASS) contain sulphides, predominantly iron sulfide. If these soils are exposed to oxygen, the iron sulfides react with the oxygen to form sulfuric acid. These types of soils are common in the coastal areas of NSW. The acid within these soils causes metals in the soil such as iron and aluminium to mobilise at toxic levels.

The Proposal area is mapped as containing ASS under the HLEP 2013. The classes of ASS in the Proposal area vary from Class 1 within close proximity to the Hawkesbury River, to Class 5 by the southern commuter parking area. The classification of land under the HLEP 2013 is an indication of the likelihood of ASS being encountered. Class 1 areas have the greatest likelihood of occurrence, while Class 5 has the least likelihood of occurrence. The majority of proposed works would occur in areas mapped as Class 2 ASS where ASS are likely to be found immediately below the natural ground surface. To confirm the HLEP 2013 mapping, a search of the Australian Soil Resource Information System (ASRIS) was undertaken. ASRIS ASS mapping indicates that there is a low to high probability of ASS occurrence across the Proposal area.

Salinity

The Proposal location is situated within the Hawkesbury Hydrogeological Landscape. This area is characterised by low land salinity, low salt export and low electrical current. Accordingly, the risk of salinity in this location is considered to be low.

Contamination

A search of the List of Contaminated Sites Notified to NSW EPA as of 17 May 2019 identified the Former Oyster Farm at 139 Brooklyn Road, adjacent to the west of the station as a contaminated site. No results were identified in the EPA Contaminated Land - Record of Notices for the suburb of Brooklyn.

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

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

The Proposal area has been within and around an active railway corridor since the opening of a rail connection to Sydney in 1887. 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. It can therefore be expected that some contamination may be present from this historical use of the area as a railway corridor. Possible contamination could include:

- fill materials
- degraded hazardous materials from structures
- historical use of pesticides
- asbestos dust from brake pads.

Coffey (2019) provides information about potential contamination risks associated with the proposed works. Existing ground conditions were investigated through the use of boreholes. Fill material was encountered in a borehole created through the existing station island platform to a depth of 4 metres below ground surface. The fill consisted of orange-brown sandy clay with fine sandstone. Fill material was not encountered below the concrete of the other borehole which was created on the footpath area at the station entrance on Dangar Road.

No evidence of contamination through smell or visual observation of soils was noted in the investigation locations. No materials suspected to contain asbestos were observed in the investigation locations. No odours were noted in any of the investigation locations, except for a hydrogen sulfide (rotten egg) odour associated with natural alluvial soils from 2m to 3m below ground surface at the borehole created at the station entrance area footpath on the Dangar Road side of the station.

There is a low potential for volatile organic compounds to be present in the soil samples taken at the borehole locations. No man-made inclusions were noted within the fill.

The investigation resulted in the following key findings:

- there is low potential for volatile organic compounds to be present within the soil at the Project site
- the soil conditions encountered within the site are unlikely to pose unacceptable risks to human health and the surrounding environment. This conclusion assumes that the work sites would be set up to restrict access to pedestrians/commuters, suppress dust emissions and restrict surface water entering the work sites

- natural estuarine soils beneath the site are assessed to comprise Potential Acid Sulfate Soil (PASS)
- the soil materials that would be displaced during construction of the proposed lift shafts are preliminarily classified as General Solid Waste (non-putrescible). Waste classification needs to be confirmed by close observation to confirm that asbestos containing materials and other man-made inclusions in the soil are not present.

6.8.2 Potential impacts

Construction phase

The Proposal would require excavation work for the installation of foundations and footings for new lift shafts and lifts, platform modifications and resurfacing. Other construction works may be required for footpath works, relocation of services, drainage connection works and ground levelling works.

Soil disturbance, erosion and sedimentation

Excavation and other earthworks, if not adequately managed, could result in the following impacts:

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

Such impacts can potentially lead to adverse environmental impacts on biodiversity, for example through the introduction of sediment into the Hawkesbury River.

These impacts are considered to be minor given the limited level of ground disturbance required for the Proposal and the relatively flat surrounding topography however the close proximity of the station to the Hawkesbury River poses a risk regarding sediment run off and loose material entering stormwater drains. 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 and other earthworks have the potential to expose contaminants, which, if not appropriately managed, can present a health risk to construction workers and the community. Contaminants can also pose an environmental risk if they are to enter nearby waterways through the stormwater infrastructure. As there is potential for onsite contamination, chemical testing and visual characterisation in accordance with the NSW EPA *Waste Classification Guideline* (EPA, 2014) would be undertaken to confirm the composition and nature of excavated material. Where spoil is classified as unsuitable for reuse, it would be transported to an appropriately licensed offsite facility.

Given that the proposal area contains the rail station precinct, there is potential for ground contamination and groundwater contamination, if groundwater is encountered, in the fill or upper soil layers. In particular, the potential for asbestos is considered high within the rail station site.

The disturbance and mobilisation of contaminated land has the potential to result in environmental and human health impacts. The Proposal has the potential to result in the following risks to soils and contamination:

- uncovering of ASS during excavations
- potential mobilisation of contaminated soils associated with historic railway use and Former Oyster Farm into the Hawkesbury River.

The risk of impacts from contamination (if any) on human health and the receiving environment from construction activities would be reduced and managed through the mitigation measures identified in Section 6.8.3 and Section 7.2. Further, the extent of potential contamination is unlikely to be significant enough to preclude the Proposal as there would be no change to the existing land use post-development,

Operation phase

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

6.8.3 Mitigation measures

A number of environmental safeguards would be implemented to minimise potential impacts resulting from ground or water contamination and sediment run-off. These include:

- a site-specific Erosion and Sediment Control Plan would be prepared and implemented in accordance with the (*Managing Urban Stormwater: Soils and Construction – Landcom, 2004*) (Blue Book). The Erosion and Sediment Control Plan would be established prior to the commencement of construction and be updated and managed according to the activities occurring during 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
- all fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with A S, EPA Guidelines and TfNSW's *Chemical Storage and Spill Response Guidelines* (TfNSW, 2018e)
- should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the Waste Classification Guidelines (EPA, 2014) and TfNSW's Water Discharge and Reuse Guideline (TfNSW, 2017c)
- prepare an ASS Management Plan (ASSMP) in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soils management and Advisory Committee, 1995) if excavation of potential ASS is anticipated to occur for the Proposal. If natural estuarine soils are displaced, they will require treatment through the addition of lime, to enable disposal offsite
- closely observe spoil excavated from the work sites to confirm it is consistent with that described within the borehole logs. If material is encountered that is inconsistent with the soil materials described above, or unexpected contamination is encountered, such materials should be segregated and subject to reassessment to confirm the waste classification
- in the event of a pollution incident, works would cease in the immediate vicinity and the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act
- an appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as

required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with WorkCover requirements.

6.9 Hydrology and water quality

6.9.1 Existing environment

Surface Water

Hawkesbury River Station is located within the Hawkesbury River catchment. The Hawkesbury River is located about 20 metres from the Station building. Despite the scale and urban development within the Hawkesbury River Catchment, water quality adjacent to the station is largely moderated through tidal flushing and as a result, the River at the Brooklyn Baths monitoring site has been given an Overall Waterway Health Grade of A in both the 2012 and 2015 Hornsby Shire Council Water Quality Monitoring Program Report. An Overall Waterway Health Grade of A indicates clean water and a healthy ecosystem.

Flooding

A flooding assessment was undertaken during the scoping design (Aurecon, 2014). The assessment looked at the flood risk for the station for a 1% Annual Exceedance Probability (AEP) or 1 in 100 year design flood event. The flood risk was also reviewed from a local perspective using LiDAR data. The assessment found that:

- the station is not located in a sag point
- the station is currently elevated above road level on the southern side and
- there is a potential overland flow path running parallel to the rail alignment
- the site has potential to be susceptible to tidal flooding.

Although no council flood planning area map was available for the Proposal area, the Proposal area is within an area identified by the CSIRO to be covered by a 1 in 100 year average recurrence interval flood with a modelled 40 centimetre sea-level rise, as predicted to occur by 2050. It is therefore possible that the station may experience flooding events in the future.

Groundwater

Based on the available geotechnical information, the ground conditions at Hawkesbury River Station are expected to comprise fill (disturbed terrain) overlying quaternary alluvial deposits, residual clay and sandstone or siltstone.

Groundwater is likely to occur as an unconfined aquifer within the fill and alluvial soil deposits. A deeper confined aquifer is expected within the sandstone bedrock. Any groundwater is expected to flow towards the Hawkesbury River. Drilling carried out by Coffey (2019) identified groundwater at approximately 1m AHD, at two drilling locations over the Proposal area.

6.9.2 Potential impacts

Construction phase

The construction phase of the Proposal has the potential to impact on hydrology and water quality.

Excavations to construct lifts and upgrade footpaths and commuter parking areas have the potential to result in the run-off of contaminated sediments into the Hawkesbury River resulting in a decline of water quality and potential impacts to aquatic health.

Pollutants (fuel, chemicals or wastewater from accidental spills and sediment from excavations) could potentially reach the Hawkesbury River. Activities which would disturb soil during construction work also have the potential to impact on local water quality as a result of erosion and run off sedimentation.

Groundwater is likely to be encountered during the Proposal works, especially during excavations for the lift shafts and piling works. Without the implementation of appropriate mitigation measures, groundwater is likely to be exposed to increased sedimentation and in some cases (where contaminated fill is encountered) to contamination. This may change the behaviour of groundwater flow, and also change the physical and/or chemical characteristics of the groundwater. Further, as ASS are likely to be encountered during the Proposal works, there is the potential for iron sulfides to become oxygenated, leading to the formation of sulfuric acid. This process may mobilise heavy metals within the soil, potentially contaminating groundwater sources. Mitigation measures are outlined in Section 6.9.3 to minimise the potential for groundwater runoff and contamination.

Given the relatively small scale of construction disturbance, aquifer interference by the proposal is expected to be minimal and unlikely to exceed minimal impact considerations under the Aquifer Interference Policy. The NSW Department of Primary Industry – Water would be consulted and the need any water licences would be confirmed prior to the commencement of construction by the construction contractor.

Direct impacts to the underground stormwater network may occur from demolition and construction activities. Appropriate controls would be detailed in the CEMP to ensure the drainage points are adequately protected during construction activities.

The Proposal has not been mapped as being within an existing flood prone area. There is potential for low lying points in the Proposal area including the sag points next to the tracks, and pits created by excavation works for the lift shafts to be subject to inundation during heavy rain events. Consideration would be given during detail design and construction planning to the installation of appropriate mitigation measures such as bunds and/or other water control devices during rainfall events.

Operation phase

The Proposal does not change the elevation of the area in a way that would modify the storage capacity or behaviour of potential flood waters currently, or in the predicted future scenario of a 2 per cent sea level rise by 2050.

6.9.3 Mitigation measures

As noted in Section 6.8.3, an Erosion and Sediment Control Plan in accordance with the requirements of the Blue Book (Landcom, 2004) would be prepared and implemented for the Proposal to manage risks to water quality. This would include specific controls to protect the stormwater network around Hawkesbury River Station.

- 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, 2018e) 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 Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act
- should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2017c).
- the NSW Department of Primary Industry - Water would be consulted and the need for any water licences would be confirmed prior to the commencement of construction by the construction contractor

- the existing drainage systems would remain operational throughout the construction phase
- plant and equipment would be regularly inspected to check for oil leaks
- if refuelling is deemed necessary, refuelling of vehicles or machinery would occur within a hardstand area designed to prevent the escape of spilled substances to the surrounding environment
- any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* (TfNSW, 2018g) with details included in the CEMP and location marked on the Environmental Controls Map (ECM).

Refer to Section 7.2 for a list mitigation measures. All measures would be incorporated into the CEMP.

6.10 Air quality

6.10.1 Existing environment

The existing air quality is considered to be characteristic of a suburban/semi-rural environment. Sensitive receivers in the vicinity of the Proposal include staff and customers at Hawkesbury River Station, residential properties along Dangar Road and Brooklyn Road and the staff and customers of the Brooklyn Wharf (including the Brooklyn Ferry Service).

A search of the National Pollutant Inventory undertaken on 4 March 2019 for the 2016 to 2017 reporting period identified 23 air polluting substances from six sources in the Hornsby LGA. The closest source was the Brooklyn Sewage Treatment Plant located at Lot 4 Brooklyn Road.

Other contributors to air quality within the study area would include emissions from motor vehicles on the surrounding road network and boats including the Brooklyn Ferry Service.

6.10.2 Potential impacts

Construction phase

Temporary air quality impacts that have the potential to occur during construction include minor increases in dust and emissions of carbon monoxide, sulphur dioxide, particulate matter, nitrous oxides, volatile organic compounds and other substances associated with excavation and the combustion of diesel fuel and petrol from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- grading for access
- excavation for the lift shafts
- demolition works within the platform building such as the toilet modifications
- excavation for the footpath works
- loading and transfer of material from trucks
- other general construction activities.

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

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

Operation phase

Overall impacts on air quality during operation would be negligible as the Proposal would not result in a change in land use or introduce activities that impact upon air quality. As the Proposal would increase access to public transport, the use of public transport would be expected to lead to a relative reduction in private vehicle emissions in the long-term, contributing to an improvement in local air quality.

6.10.3 Mitigation measures

Section 7.2 provides a list of mitigation measures that are proposed to manage air quality issues during construction. They include measures regarding maintenance and efficient operation of plant equipment and for dust suppression including watering, covering loads and appropriate management of tracked dirt/mud on vehicles. These measures would be provided in the CEMP and include:

- air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's *Air Quality Management Guideline* (TfNSW, 2018f)
- 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. 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 compound and securely fix tailgates of road transport trucks prior to loading and immediately after unloading.

6.11 Waste and resources

6.11.1 Existing Environment

Sydney Trains manages the day to day operations of Hawkesbury River Station. According to the Sydney Trains Annual Report 2017 – 2018, waste management is guided by the requirements of the *Government Resource Efficiency Policy* (GREP). Currently, waste is managed through the implementation of co-mingled recycling bins at the station, use of signs to assist customers with locations for waste receptacles and the purchasing of recycled or part-recycled products where available. Resources are also managed through the GREP and reductions to the use of resources through more efficient techniques have been implemented where possible.

6.11.2 Potential impacts

Construction phase

Construction of the Proposal may result in the generation of the following waste materials:

- excavated spoil

- asphalt and concrete
- surplus building materials and building waste (metal, timber, plastics, etc.)
- electrical wiring and conduit waste
- hazardous waste (chemicals and potentially asbestos)
- green waste (including weeds)
- general waste, including food scraps generated by construction workers.

Operation phase

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

6.11.3 Mitigation measures

A Waste Management Plan is to be prepared as part of the CEMP to 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
- an appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal and would be undertaken in accordance with WorkCover requirements
- 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
- all spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal
- any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* (TfNSW, 2018g) with details included in the CEMP and location marked on the Environmental Controls Map
- the handling, storage, transport and disposal of asbestos (if required) and hazardous waste (including lead waste, if found) would be in accordance with the requirements of relevant EPA and Safe Work NSW guidelines
- waste management targets in accordance with the *ISCA IS Rating Tool v1.2 (2017)* would be developed for the Proposal and would include reuse and recycling.

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

Mitigation measures to address waste generated during construction of the Proposal are found in Section 7.2. All measures would be incorporated into the CEMP.

6.12 Hazard and risk

6.12.1 Existing environment

Three key potential hazards present risks to the Proposal: bushfire, flooding and overhead electrical wiring.

Bushfire

Bushfire areas in the Hornsby LGA have the following ratings:

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Buffer.

If land falls under any of those ratings it is considered to be bushfire prone land. The majority of the Proposal area is not located within bushfire prone land, with the exclusion of the construction compound locations. These areas fall within the vegetation buffer zone, which is the lowest risk zone of the three. The station building (as a central point of the overall Proposal area) is located within 200 metres of the nearest Vegetation Category 2 and Category 1 areas, and within 250 metres of the nearest major source of Vegetation Category 1 bushfire area which is the Ku-ring-gai Chase National Park.

Flooding

Refer to Section 6.9.

6.12.2 Potential impacts

Bushfire

Bushfire has the potential to impact both the construction and operation phase of the Proposal. For the construction phase, fire may occur at the construction compound locations. This would lead to damage and/or destruction of key equipment and resources to be used for the Proposal. Further, Brooklyn Road is the only road leading in and out of Brooklyn and by extension Hawkesbury River Station (via Dangar Road). Most of Brooklyn Road is located within bushfire prone land, with sections directly between separate Vegetation Category 1 areas. If a bushfire were to occur during the construction phase at a time where works were being undertaken it may result in no access being available to the Proposal area, and damage and/or destruction of equipment and resources. If a major bushfire were to begin locally, it may result in workers not being able to leave Brooklyn except via water transport.

During operation of the Proposal, a major bushfire may potentially impact the Proposal through wind transport of embers leading to fire within the station precinct.

Flooding

Refer to Section 6.9.

Electrical

During the construction phase of the Proposal, overhead electrical lines may pose the following hazards:

- injury or death to workers through electrocution
- disruptions to the localised electrical network as a result of a localised shut down of electricity supply to facilitate line relocation or unexpected damage to the lines.

It is not anticipated that the Proposal would generate impacts resulting from electricity through its normal operation where safe operating protocols are in place. With regards to electromagnetic fields (EMF), the installation of a new 200kVa padmount transformer and

reconfiguration of the overhead wire connecting Ausgrid pole BR83732 and Sydney Trains pole No. 11, may modify the existing EMF around the station.

In Australia, ARPANSA has advised that *"The scientific evidence does not establish that exposure to the ELF EMF found around the home, the office or near powerlines and other electrical sources is a hazard to human health"* (ARPANSA, 2015) *and "There is no established evidence that the exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects"* (ARPANSA, 2015). The World Health Organisation has advised that *"…current evidence does not confirm the existence of any health consequence from exposure to low level electromagnetic fields"*.

All electrical components would be designed to meet the relevant ARPANSA guidelines relating to EMF and designed so that EMF around the station is within the International Commission on Non-Ionizing Radiation Protection) guidance limits so as not pose a risk to rail workers or commuters.

6.12.3 Mitigation measures

The following mitigation measures would be implemented for the Proposal to reduce the risks posed by bushfire and electricity (mitigation measures relating to flooding are identified in Section 6.9):

- a bushfire survival plan would be implemented for the construction phase of the Proposal. This would include information on primary and alternate evacuation routes, keeping an attendance log, and staying up to date with the local conditions
- no hot-works would be carried out at the compound sites. If hot-works are deemed to be necessary at the compound sites, appropriate shielding would be put in place to ensure that sparks or flames are unable to reach vegetated areas
- works would cease or be re-scheduled if a bushfire is occurring near the Proposal and has a likelihood of impacting the suburb of Brooklyn
- electrical supply to the overhead electrical lines near the Proposal would be shut off and confirmed to be shut off prior to works being undertaken
- appropriate working safely near electricity work practices would be implemented during construction and operation to ensure safety of workers and customers at the station
- works would be undertaken in consultation with relevant electrical asset owners.

6.13 Sustainability

The design of the Proposal is based on the principles of sustainability, including aiming for an excellent rating as a program under the ISCA Infrastructure Sustainability Rating Tool Version 1.2 and the TfNSW Environmental Management System (EMS). These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.2.3 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 increasing the accessibility of public transport services.

6.14 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 Metropolitan and Central Coast regions can be assessed in terms of weather changes, storm and rainfall intensities, flooding and increased risk of fire.

The Hawkesbury River Station area may be impacted in future by an increase in maximum and minimum temperatures across all seasons, more days of extreme heat and heatwaves, changes in seasonal rainfall patterns and increased intensity of extreme rainfall events, increased drought conditions, and an increase in bushfire risk as a result of increased severe weather conditions (Aurecon, 2018).

A climate risk assessment was undertaken as part of the scoping design and identified nine climate risks that could impact the Proposal relating to temperature rise, bushfire, extreme rainfall and drought (Aurecon, 2018). No High or Very High risks were identified in the assessment. The climate risk assessment also provided recommendations for the Proposal to help mitigate for a changing future climate.

Climate change could lead to an increase in average temperatures as well as additional extreme heat days over 40°C and increased heatwaves (three consecutive days over 40°C). Impacts associated with extreme heat include compromising the structural integrity of road and access path surfaces, causing heat stress in passengers and staff at the station and heat stress to landscaped vegetation. Measures such as using use of roof materials that would assist in reducing temperatures inside the lifts, and the provision of landscaping to increase shade should be reviewed for feasibility during detailed design to help reduce impacts from extreme heat.

As well as increases in extreme heat events, climate change could lead to an increase in the frequency and intensity of fire weather leading to increased bushfires. The Proposal works areas are not situated on land mapped as bushfire prone or within a buffer zone. The three compound area locations are located on land mapped as a buffer zone. Areas surrounding the Proposal have been identified as buffer zones, while a Category 1 bushfire area has been identified within 200m of the Proposal. Category 1 areas have high combustibility and likelihood of forming fully developed fires, including heavy ember production. To mitigate against increased risk of fire, asset protection zones would be maintained, earthing and lightning protection would be provided to the buildings and ramps and paths would be constructed of concrete.

Climate change is also expected to lead to an increase in average rainfall, increase in extreme rainfall and increased average recurrence interval for hail events. Impacts associated with changes to rainfall include localised flooding and surface flow to the Hawkesbury River, damage to aboveground structures where hail and/or damaging winds occur with the rainfall event and damage to vegetation due to overwatering and/or impact damage. Measures such as constructing the lift shafts from precast concrete, the access paths from concrete and the establishment of a management plan to facilitate prompt repairs should be reviewed for feasibility during detailed design to help reduce impacts from extreme rainfall.

The Proposal area has been identified to be within a 1 in 100 year average recurrence interval flood if there is a 40 centimetre sea-level rise, as predicted to occur by 2050 because of climate change (Commonwealth Scientific and Industrial Research Organisation [CSIRO], 2011). Detailed design of the Proposal would take the potential impacts of the modelled 40 centimetre sea-level rise into account.

Climate change could lead to the increase in frequency and extent of drought. Impacts associated with increased drought include causing a decrease in soil moisture leading to soil movements. This has the potential to damage underground infrastructure, which could compromise serviceability. Further, extended drought conditions can damage or kill vegetation. Any excavated service locations would be backfilled with pervious materials allowing moisture to penetrate the ground.

6.15 Greenhouse gas emissions

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

The detailed design process would involve an AS 14064-2 (Greenhouse Gases - project level) compliant carbon footprint exercise in accordance with the *Greenhouse Gas Inventory Guide for Construction Projects* (TfNSW, 2013). The carbon footprint would to be used to inform decision making in design and construction, if the estimated greenhouse gas emissions are determined to be greater than the carbon dioxide equivalent value established by the National Greenhouse and Energy Reporting threshold.

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

It is anticipated that, once operational, the Proposal may result in an increase in use of public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Brooklyn. 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.

6.16 Cumulative impacts

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

A search of the Department of Planning and Environment's Major Projects Register, Planning Panel Development and Planning Register (Hornsby LGA), and Hornsby Council Development Application Register in April 2019 identified that no major development applications are listed in Brooklyn for approval at this time.

The search of the Hornsby Council Development Application register did reveal five minor development applications currently under assessment and nine development applications approved in the last six months in the suburb of Brooklyn. As these developments mostly relate to residential alterations and additions, and given the discrete locations of these developments, any contributions to cumulative impacts would be unlikely.

Should larger developments be approved or be identified in proximity to the Proposal closer to scheduled construction, potential cumulative impacts would be managed through consultation with relevant stakeholders and the implementation of the mitigation measures in Chapter 7. Through these measures, cumulative impacts would be negligible.

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

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.

7.1 Environmental management plans

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

The CEMP would incorporate but not be limited to the following key sub plans:

- Construction Traffic Management Plan
- Urban Design Plan
- Public Domain Plan
- Erosion and Sediment Control Plan
- Acid Sulfate Soils Management Plan.

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

7.2 Mitigation measures

Mitigation measures for the Proposal are listed in Table 28. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6 should the Proposal proceed.

Table 28 Proposed mitigation measures

No.	Mitigation measure
	General
1.	A Construction Environmental Management Plan (CEMP) would be prepared by the Construction Contractor in accordance with the relevant requirements of *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 Construction Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	An Environmental Controls Map (ECM) would be developed by the Construction Contractor in accordance with TfNSW's *Guide to Environmental Controls Map* (TfNSW, 2017b) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
4.	Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.

No.	Mitigation measure
5.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
6.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.
7.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.
	Traffic and transport
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 the station and residential properties is maintained (unless affected property owners have been consulted and appropriate alternative arrangements made) • managing requirements around operating cranes in the airspace of adjacent properties (including any relevant permits or licences) • managing impacts and changes to on- and off-street parking and requirements for any temporary replacement provision, if a significant number of parking spaces are displaced during construction • managing parking for construction workers by encouraging construction workers to carpool or use public transport. If not possible, parking locations should be located away from the station and residential areas • considering routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses • providing details of relocated bus stops, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired • communicating with the community and local residents to inform them of changes to parking, pedestrian access and/or traffic conditions including vehicle movements and anticipated impacts on the local road network relating to site works • scheduling / staging construction works to minimise temporary loss of interchange facilities and available parking • the owner and/or occupier of the property whose driveway is adjacent to the proposed accessible car park and kiss and ride space would be appropriately consulted prior to works being carried out, and arrangements put in place to limit this disruption as far as practically possible. • managing traffic flows around the area affected by the Proposal, including as required regulatory and directional signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the CTMP. Consultation with the relevant roads authorities would be undertaken during preparation of the CTMP. The performance of all project traffic arrangements must be monitored during construction.

No.	Mitigation measure
	Landscape and visual amenity
9.	An Urban Design Plan is to be submitted to TfNSW and endorsed by the Precincts and Urban Design team. The Urban Design Plan is to address the fundamental design principles as outlined in 'Around the Tracks' – urban design for heavy and light rail, TfNSW, Interim 2016. The Urban Design Plan shall: • Demonstrate a robust understanding of the site through a comprehensive site analysis to inform the design direction, demonstrate connectivity with street networks, transport modes, active transport options, and pedestrian distances • Identify opportunities and challenges • Establish site specific principles to guide and test design options • Demonstrate how the preferred design option responds to the design principles established in 'Around the Tracks', including consideration of Crime Prevention through Environmental Design Principles. The Urban Design Plan is to include the Public Domain Plan for the chosen option and will provide analysis of the: • Landscape design approach including design of pedestrian and bicycle pathways, street furniture, access paths, new planting and opportunities for public art • Materials Schedule including materials and finishes for proposed built works, colour schemes, paving and lighting types for public domain, fencing and landscaping • An Artist's Impression or Photomontage to communicate the proposed changes to the precinct The following design guidelines are available to assist and inform the Urban Design Plan for the Proposal: • TAP Urban Design Plan, Guidelines, TfNSW, Draft 2018 • Commuter Car Parks, urban design guidelines, TfNSW, Interim 2017 • Managing Heritage Issues in Rail Projects Guidelines, TfNSW, Interim 2016 • Creativity Guidelines for Transport Systems, TfNSW, Interim 2016 • Water Sensitive Urban Design Guidelines for TfNSW Projects, 2016.
10.	Construction lighting placed to minimise upward spread of light. Care should be taken when selecting luminaires to ensure that light spill and glare are kept to a minimum. Cut-off or directed lighting to be used with and outside of the construction compound, with lighting location and direction considered to ensure glare and light spill is minimised.
11.	Limit disturbance of vegetation to the minimum amount necessary to construct the Proposal.
12.	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.*
13.	Provide well-presented and maintained construction hoarding and site fencing with shade cloth (or similar material) (where necessary) to minimise visual impacts on key view points during construction.
14.	Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
15.	During construction, graffiti would be removed in accordance with TfNSW's Standard Requirements.
16.	Provide detail design integration of the new access path and pedestrian crossing from the Dangar Road station entry to the kiss and ride and accessible car park, including with the existing Governor Phillip monument, e.g. align the footpath with the base of the monument,

No.	Mitigation measure
	and provide a sufficient landscape curtilage around it, and/or provide other intervention that recognises and responds to themonument, e.g. artist integration within the new footpath that recognises and responds to the monument.
17.	Establish TPZs around trees to be retained. Tree protection would be undertaken in line with AS 4970-2009 Protection of Trees on Development Sites and would include exclusion fencing of TPZs.
18.	Construction personnel to keep the construction areas clean and tidy including refuse placed in appropriate receptacles.
19.	Measures taken to ensure no tracking of dirt and mud into public roads and other public spaces.
20.	Ongoing maintenance and repair of constructed elements.
21.	Consider further cleaning of the lime leaching from the small section of recently constructed rough- stacked, battered sandstone wall adjoining the new faux sandstone block wall at the southern end of the Dangar Road pedestrian steps, to lift the presentation of the station entry
22.	Consider pressure cleaning the existing faux sandstone block retaining wall to improve the presentation of the station entry.
23.	For the lift base wall, consider the use of a darker, 'heavier' colour that more closely reflects the dark charcoal grey colour predominant within the pedestrian overbridge, and provides increased visual strength / weight to the base of the shaft.
24.	Consider minor relocation and realignment of the Governor Phillip monument away from the proposed access path, e.g. 1-2 metres south, to provide an improved landscape curtilage for this historic element
	Noise and vibration
25.	Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009), *Construction Noise and Vibration Strategy* (TfNSW, 2018b) and the Noise and Vibration Impact Assessment for the Proposal (AECOM, 2019) The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.
26.	The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include: • regularly training workers and contractors (such as at the site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise • avoiding any unnecessary noise when carrying out manual operations and when operating plant • ensuring spoil is placed and not dropped into awaiting trucks • avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where practicable • switching off any equipment not in use for extended periods e.g. heavy vehicles engines would be switched off whilst being unloaded • avoiding deliveries at night/evenings wherever practicable • no idling of delivery trucks • keeping truck drivers informed of designated vehicle routes, parking locations and

No.	Mitigation measure

	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.
	• identification of nearby residences and other sensitive land uses
	• description of approved hours of work
	• description and identification of all construction activities, including work areas, equipment and duration
	• description of what work practices (generic and specific) would be applied to minimise noise and vibration
	• a complaint handling process
	• noise and vibration monitoring procedures, including for heritage structures
	• overview of community consultation required for identified high impact works
	• loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers
	• site access points and roads would be selected as far as possible away from sensitive receivers
	• dedicated loading/unloading areas would be shielded if close to sensitive receivers
	• delivery vehicles would be fitted with straps rather than chains for unloading, wherever possible
	• where possible noise from mobile plant would be reduced through additional fittings including:
	  ○ residential grade mufflers
	  ○ air parking brake engagement is silenced
	• on-site storage capacity would be maximised to reduce the need for truck movements during sensitive times.

27.	The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which would be considered, include: • maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances • using the most suitable equipment necessary for the construction works at any one time • directing noise-emitting plant away from sensitive receivers • regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc. • using non-tonal reversing/movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), and for any out of hours works • use of quieter and less vibration emitting construction methods where feasible and reasonable • the noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels.
28.	Work 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 work outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An Out of Hours Work application form would need to be prepared by the Construction Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.

No.	Mitigation measure
29.	Where the $L_{Aeq\ (15minute)}$ construction noise levels are predicted to exceed 75 dBA and/or 30 dBA above the Rating Background Level at nearby affected sensitive receivers, respite periods would be observed, where practicable, and in accordance with TfNSW's *Construction Noise and Vibration Strategy* (TfNSW, 2018b). This would include restricting the hours that very noisy activities can occur.
30.	Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding would take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible.
31.	Vibration resulting from construction and received at any structure outside of the Proposal area would be managed in accordance with: • for structural damage vibration - German Standard DIN 4150: Part 3 – 1999 *Structural Vibration in Buildings: Effects on Structures* and British Standard BS 7385-2:1993 *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)* • for human exposure to vibration the acceptable vibration - values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) which includes British Standard BS 7385-2:1993 *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).*
32.	If vibration intensive equipment is to be used within the minimum working distances for cosmetic damage, as presented in Table 22, then: • it is recommended that attended vibration measurements are undertaken when work commences, to determine "site specific minimum working distances". The minimum working distances for cosmetic damage from Table 22 are generally considered to be conservative and working within them would not necessarily result in damage however as factors such as work practices and intervening structures can affect vibration levels. • vibration intensive work should not proceed within the site specific minimum working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective. It is also advisable to carry out building condition surveys of sensitive historical structures before construction works begins.
33.	Where exceedances still occur after standard mitigation measures have been applied, additional mitigation measures are to be implemented. Refer to Table 23 and Table 24
	Aboriginal heritage
34.	All construction staff would undergo an induction in the recognition of Aboriginal cultural heritage material. This training would include information such as the importance of Aboriginal cultural heritage material and places to the Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal cultural heritage material and sites.
35.	If unforeseen Aboriginal objects are uncovered during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council. If human remains are found, work would cease, the site secured and the NSW Police and the OEH notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.

No.	Mitigation measure
36.	No machinery or equipment is to be stored or located within 10 metres of site 45-6-2906 and all workers would be made aware of site 45-6-2906 and its significance prior to any works being carried out
	Non-Aboriginal heritage
37.	A suitably qualified and experienced heritage conservation architect would be engaged to provide ongoing heritage and conservation advice throughout detailed design and any subsequent relevant design modifications. The nominated heritage conservation architect would provide specialist advice throughout the detailed design phase to ensure that the final design adheres to the *Sydney Trains Footbridge Heritage Conservation Strategy*, *Heritage Platforms Conservation Management Strategy*, the *Station Access Heritage Conservation Guide* and the *Painting Station Guide* and the design recommendations made in the SoHI (AECOM, 2019).
38.	Archival recording of the station as a whole prior to the commencement of construction following NSW Heritage Division guidelines *Photographic recording of heritage items using film or digital capture* (NSW Heritage Office, 2006) and *How to prepare archival records* (NSW Heritage Office, 1998). Copies should be provided to NSW Heritage Division, the State Library, Hornsby Council and Sydney Trains for future reference. In particular the following elements should be concentrated on: • views and vistas to and from the current station • footbridge and its original fabric • station building.
39.	In accordance with Section 170a of the Heritage Act, Sydney Trains should provide notification of the works to Heritage Division 14 days prior to the commencement of the works.
40.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2016a) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
41.	A specialist contractor well versed in working with heritage fabric should be engaged during the construction stage of the project.
42.	Care should be taken when undertaking all demolition works so as not to damage significant fabric.
43.	Repair fabric where feasible. This would include repointing using the same method and style that is present today.
44.	Any new brickwork should match the original in terms of brick colour, mortar composition and brick orientation (bricks should be laid in the Flemish bond – alternating between header and stretcher alignment).
45.	New services, outlets, wall units and brackets (etc.) should be located in areas already modified and/or consolidated in one location. Existing openings in ceilings are the preferred location for the installation of new services. New services and fittings should use existing fixing points or located at mortar joints.

No.	Mitigation measure
46.	The painting colour scheme for the new toilets should follow the Conservation Guide: *Painting Station Buildings* approved colour scheme. Specific heritage paint schemes have been developed for station buildings, and the painting scheme outlined for station buildings built 1910 to 1920 should be followed.
47.	The glass canopy should be freestanding and not come into contact with the station building. The height of the canopy should be raised to coincide with the existing louvre highlight above the entry door to the male toilets. Further design considerations should be investigated during detailed design. This should be done in conjunction with the heritage conservation architect
48.	New toilet partitions should be lightweight with a reversible construction to ensure significant fabric is protected and conserved. They should also not extend the full height to the ceiling.
49.	Re-grading of the station platform should not cover any existing wall vents that have been installed along the lower course of the brickwork to the station building. If cast iron gratings are removed, these should be stored for future reuse.
50.	Further considerations should be investigated during detailed design regarding the relocation options for both the public telephone and vending machines.
51.	Ensure that movable items are tagged and recorded (photographs and written description) and included in the Sydney Trains register of movable items.
52.	Installation of new heritage interpretation signage at the new station entrances should be developed and installed and designed as part of broad signage and wayfinding plan for the station.
53.	As the Hawkesbury River Station Group is listed on the SHR, a Section 60 approval to undertake the works associated with the Proposal is required from the Heritage Council of NSW. It is recommended that this SOHI be submitted to the NSW Heritage Branch, together with the requisite forms, for assessment.
54.	Following completion of works, the SHR listing description and historical context should be updated to accurately reflect the significance of the station and the new works and elements within the precinct.
55.	A heritage induction should be provided to all on-site staff and contractors involved in the Proposal. The induction should clearly describe the heritage constraints of the site.
56.	The CEMP should include stop work procedures in accordance with TfNSW's *Unexpected Heritage Finds Guideline* (Transport for NSW, 2015) to manage activities in the unlikely event that intact archaeological relics or deposits are encountered
	Biodiversity
57.	Construction of the Proposal must be undertaken in accordance with TfNSW's *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2018c) and TfNSW's *Fauna Management Guideline* (TfNSW, 2018d).
58.	All workers would be provided with an environmental induction prior to commencing work onsite. This induction would include information on the protection measures to be implemented to protect vegetation, penalties for breaches and locations of areas of sensitivity.

No.	Mitigation measure
59.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees/vegetation required to be removed 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.
60.	Tree protection would be undertaken in line with *AS 4970-2009 Protection of Trees on Development Sites* and would include exclusion fencing of Tree Protection Zones.
61.	In the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible.
62.	Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, the Construction Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval.
63.	Weed control measures, consistent with TfNSW's *Weed Management and Disposal Guideline* (TfNSW, 2015), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015.*
64.	In accordance with the vegetation offset guide, it is recommended that a minimum of eight trees are planted to meet TfNSW's offset ratios.
	Socio-economic
65.	Sustainability criteria for the Proposal would be established to encourage the Construction Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.
66.	Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
67.	A Community Liaison Management 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.
68.	Feedback through the submissions process to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.
69.	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.
70.	The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Management Plan to be developed prior to construction.
71.	The required disconnection of the overhead aerial line between Sydney Trains pole No. 11 and Ausgrid pole BR83732 (to facilitate the installation of the lift on Dangar Road) and subsequent replacement of the private pole would be done in conjunction with Sydney Trains and the electricity supplier, in order to minimise potential disruption or impacts.

No.	Mitigation measure
	Soils and water
72.	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* (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.
73.	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.
74.	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.
75.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with A S, EPA Guidelines and TfNSW's *Chemical Storage and Spill Response Guidelines* (TfNSW, 2018e).
76.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the Waste Classification Guidelines (EPA, 2014) and TfNSW's Water Discharge and Reuse Guideline (TfNSW, 2017c)
77.	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, 2018e) 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.
78.	In the event of a pollution incident, works would cease in the immediate vicinity and the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
79.	The existing drainage systems would remain operational throughout the construction phase.
80.	If refuelling is deemed necessary, refuelling of vehicles or machinery would occur within a hardstand area designed to prevent the escape of spilled substances to the surrounding environment.
81.	Any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* – (TfNSW, 2018g) with details included in the CEMP and location marked on the ECM.
82.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the *Waste Classification Guidelines* (EPA, 2014) and TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2017c).
83.	Development of contingency plan to manage unexpected finds of contamination during the Proposal, particularly when excavating fill material within the platform.
84.	If natural estuarine soils are displaced during the Project, they would require treatment through the addition of lime, to enable disposal offsite.

No.	Mitigation measure
85.	Develop an Acid Sulfate Soils Management Plan (ASSMP) as excavation of potential ASS is anticipated to occur for the Proposal.
86.	Close observation of spoil excavated from the work sites to confirm it is consistent with that described within the borehole logs. If material is encountered that is inconsistent with the soil materials described herein, or unexpected contamination is encountered, such materials should be segregated and subject to reassessment to confirm the waste classification.
	Air quality
87.	Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's *Air Quality Management Guideline* (TfNSW, 2018f).
88.	Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.
89.	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.
90.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
91.	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. 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
92.	A Waste Management Plan is to be prepared as part of the CEMP to 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.
93.	An appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with WorkCover requirements.
94.	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.
95.	All spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal.

No.	Mitigation measure
96.	Any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* – (TfNSW, 2018g) with details included in the CEMP and location marked on the ECM.
97.	The handling, storage, transport and disposal of asbestos (if required) and hazardous waste (including lead waste, if found) would be in accordance with the requirements of relevant EPA and Safe Work NSW guidelines.
98.	Waste management targets in accordance with the *ISCA IS Rating Tool v1.2 (2017)* would be developed for the Proposal and would include reuse and recycling.
	Hazard and Risk
99.	A bushfire survival plan would be implemented for the construction phase of the Proposal. This would include information on primary and alternate evacuation routes, keeping an attendance log, and staying up to date with the local conditions.
100.	No hot-works would be carried out at the compound sites. If hot-works are deemed to be necessary at the compound sites, appropriate shielding would be put in place to ensure that sparks or flames are unable to reach vegetated areas.
101.	Works would not be undertaken if a bushfire is occurring near the Proposal and has a likelihood of impacting the suburb of Brooklyn.
102.	Electrical supply to the overhead electrical lines would be shut off if works are required to be undertaken within the Safe Approach Distance (SAD) of the overhead electrical lines.
103.	Appropriate working safely near electricity work practices would be implemented during construction and operation to ensure safety of workers and customers at the station.
104.	Works would be undertaken in consultation with relevant electrical asset owners.
	Sustainability, climate change and greenhouse gases
105.	Detailed design and construction of the Proposal is to be undertaken in accordance with the ISCA Infrastructure Sustainability Rating Scheme (v1.2).
106.	The detailed design process would undertake an AS 14064-2 (Greenhouse Gases - project level) compliant carbon footprinting exercise in accordance with TfNSW's *Greenhouse Gas Inventory Guide for Construction Projects* (TfNSW, 2013). The carbon footprint would to be used to inform decision making in design and construction.
	Cumulative
107.	Consultation with relevant stakeholders including construction contractors of nearby works would be undertaken to ensure that cumulative impacts such as traffic and noise generation are minimal.

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:

- two new lifts to provide access to the station platform
- provision of a new kiss and ride bay and compliant accessible car space
- a new access path and pedestrian crossing to the Dangar Road car park
- a regraded access path from the station to the end of Dangar Road
- a new family accessible toilet and unisex ambulant toilet
- improvements to CCTV and lighting to increase safety and security.

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

- temporary changes to vehicle and pedestrian movements in and around the station during the construction of the Proposal
- temporary changes to parking arrangements within the Dangar Road car park and Brooklyn Road commuter car park during construction
- visual amenity impacts through the introduction of two lifts at the station
- temporary noise and vibration impacts from the construction works
- removal of two small trees and one medium tree from the vegetated area adjacent to the rail corridor.

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 detailed design of the Proposal would be carried out in accordance with the relevant requirements of the *Infrastructure Sustainability Rating Scheme - Version 1.2* (Infrastructure Sustainability Council of Australia (ISCA), 2017) taking into account the principles of ecologically sustainable development (ESD).

Should the Proposal proceed, 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 adverse impacts on the environment.

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Appendix A Consideration of matters of National Environmental Significance

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

Matters of NES	Impacts
Any impact on a World Heritage property? There are no World Heritage properties in the vicinity of the Proposal.	Nil
Any impact on a National Heritage place? There are no National Heritage places in the vicinity of the Proposal.	Nil
Any impact on a wetland of international importance? There are no wetlands of international importance in the vicinity of the Proposal.	Nil
Any impact on a listed threatened species or communities? It is unlikely that the development of the Proposal would significantly affect any threatened species or communities.	Nil
Any impacts on listed migratory species? It is unlikely that the development of the Proposal would significantly affect any migratory species.	Nil
Does the Proposal involve a nuclear action (including uranium mining)? The Proposal does not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? There are no Commonwealth marine areas in the vicinity of the Proposal	Nil
Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The Proposal is for a transport facility and does not relate to coal seam gas or mining.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The Proposal would not be undertaken on or near 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 temporary impacts to the community of Brooklyn resulting from increased traffic, noise and reduced visual amenity. Mitigation measures outlined in Section 7.2, would be implemented to manage and minimise adverse impacts.	Minor
(b) Any transformation of a locality? The Proposal would introduce new visible elements (two lifts) into the existing landscape. These new elements however would be consistent with the existing use of the station and are considered to be common features at train stations. The Proposal would likely have a positive contribution to the locality as it would deliver an access path to and from the station and facilitate better access to the station.	Minor
(c) Any environmental impact on the ecosystem of the locality? Environmental impacts are anticipated to be minor in nature and would not be expected to result in significant adverse impacts to the ecosystem of the locality.	Minor
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The Proposal would result in a short-term reduction of the aesthetic of Brooklyn and Hawkesbury River Station due to the presence of construction materials and equipment, and a longer-term impact to the heritage aesthetics of Hawkesbury River Station through the introduction of modern lifts; this impact is mitigated through the design of the lifts and existing stairs and footbridge. The Proposal would also result in a temporary reduction to environmental quality during construction through noise and traffic impacts. Most of these impacts would be temporary in nature, and all are considered to be minor.	Minor
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The Proposal would have an effect on a historical heritage item being the Hawkesbury River Station Group. Further, the two lifts would have a moderate negative impact on the aesthetic significance of the station as a picturesque setting on the edge of the Hawkesbury River.	Moderate
(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 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 endanger any species of animal, plant or other form of life 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 result in the degradation of the quality of the environment.	Nil
(j) Any risk to the safety of the environment? The Proposal could result in pollution or safety risks to the environment during construction. Provided the recommended management and mitigation measures are implemented, this risk is considered unlikely.	Minor
(k) Any reduction in the range of beneficial uses of the environment? The Proposal would not result in any reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The Proposal could result in pollution of the environment, however provided the recommended management and mitigation measures are implemented, this risk is expected to be minor.	Minor
(m) Any environmental problems associated with the disposal of waste? The Proposal in unlikely to result in environmental problems associated with the disposal of waste. Hazardous waste (including asbestos, if found) may be generated by the Proposal. Contamination identification would occur prior to construction to confirm the presence of hazardous materials. All waste would be managed and disposed of with a site-specific WMP prepared as part of the CEMP. Measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Minor
(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal is unlikely to increase demand on resources (natural or otherwise) that are, or are likely to become, in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? Cumulative environmental effects with other activities are discussed in Section 6.16. Based on the surrounding existing and proposed developments, cumulative effects are expected to be minor and be primarily related to traffic, noise and visual amenity.	Minor

Factor	Impacts
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal is located within the Coastal Environment Area in accordance with the *State Environmental Planning Policy (Coastal Management*) *2018*. It is unlikely to impact upon coastal processes and would be unlikely to be impacted by current coastal hazards. The Proposal is located within a future flooding area – within the 1% AEP flood area for the 40cm sea level rise predicted to occur by 2050. The Proposal however, does not change the level of the land and would be unlikely to influence the behaviour or storage capacity for flood waters.	Minor