Review of Environmental Factors
Rural and Regional Interchange
Byron Bay Bus Interchange

Transport
Sydney Trains

Document Control

Title	Rural and Regional Interchange – Byron Bay Bus Interchange Review of Environmental Factors				
Number	30011906-EN-R-01				
Version	0				
Status	Final for client issue				
Review Process	**Company**	**Name**	**Title**	**Signature**	**Date**
Draft prepared by:	SMEC	M. Laginha	Experienced Scientist		21/06/18
Draft reviewed by:	SMEC	M. Quinn	Senior Associate Scientist		21/06/18
Final prepared by:	SMEC	M. Laginha	Experienced Scientist		12/11/18
Final reviewed by:	SMEC	M. Quinn	Senior Associate Scientist		12/11/18
Approved for Issue by:	SMEC	B. Lariviere	Technical Officer		13/11/18
Final incorporating client comments:	SMEC	K. Bigland	Experienced Scientist		17/05/19
Reviewed by:	SMEC	M. Quinn G. Tallentire	Senior Associate Scientist Principal Environmental Scientist		09/05/19 10/05/19
Approved for issue by:	SMEC	B. Lariviere	Technical Officer		17/05/19

Executive Summary

Byron Bay is the second most popular visitor destination in NSW after Sydney. Nearly 1.5 million people visit Byron Bay each year placing pressure on the existing transport infrastructure for residential, commercial, industrial and tourist road users, particularly during the peak holiday periods.

Traffic congestion has been identified as a significant issue in the Byron Bay Town Centre Master Plan (Byron Shire Council 2016). The Byron Bay public transport service is characterised by a disused rail line, a congested town centre and an infrequent local bus service.

Sydney Trains is proposing to construct a new bus interchange ("the proposal") at Byron Bay as part of the Transport Access Program (TAP). The TAP is an initiative by Transport for NSW to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most. The aim of the program is to provide commuters with an integrated transport system where customers are able to change from one mode of transport to another with ease.

It is proposed that the interchange be constructed at a location along Butler Street, adjacent to the rail corridor. The proposal area currently contains a locally listed heritage item, the *Former railway water tower* (I1064), which and is covered by dense regrowth vegetation. The proposal involves the construction of a covered canopy area to accommodate up to three buses/coaches at a time, public amenities and kiss and ride facilities. The proposal would also include structural works to stabilise and refurbish the water tower at the proposal area which currently demonstrates evidence of weathering and corrosion

The proposal has been assessed in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act), and clause 228 of the *Environmental Planning and Assessment Regulation 2000* as well as relevant State Environmental Planning Policies and the principles of ecologically sustainable. An assessment has been undertaken as to whether the proposal is likely to have a significant impact on Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The Review of Environmental Factors (REF) assesses the potential impacts associated with the project with particular reference to non-Aboriginal heritage, noise and traffic and biodiversity.

A Statement of Heritage Impact prepared for the proposal concluded the proposed works would not have any substantive adverse impact on the heritage significance of the *Byron Bay Railway Station and Yard Group*. The necessary stabilisation works and reactivation of the immediate area would improve the physical condition and future conservation of the water tower. In many respects, the proposed works would result in a substantive benefit to the heritage significance of the station, restoring its former role and importance.

An operational noise assessment was prepared based on the predicted operational noise of the proposal. Operational noise levels associated with the proposal in isolation was found to result in minor exceedances of the Noise Policy for Industry (NPI) noise criteria by up to 2 dB at the nearest receivers along Butler Street. During average traffic conditions, noise levels are predicted to comply with all criteria at all affected sensitive receivers. The noise assessment also considered the cumulative noise of the proposal and approved Byron Bay bypass in operation. When considered with the bypass, the operational noise levels associated with the proposal were found to be negligible.

The proposal would involve the removal of all vegetation at the proposal area. This would involve the removal of removal of 0.46 ha of native vegetation, including 0.22 ha of an

endangered ecological community listed under the NSW *Biodiversity Conservation Act 2016*. The biodiversity assessment concluded that the proposal is not likely to have a significant impact on the endangered ecological community or threatened species. Mitigation measures have been provided to minimise potential impacts on threatened vegetation and species.

Overall, the environmental assessment concluded that the proposal would have minor impacts providing key control measures are implemented.

The proposal is aimed to encourage people to use public transport, meet the demand of the patronage growth and make it easier for customers, especially those with a disability, the elderly and parents with prams, to use public transport. It is envisaged that the bus interchange would help to relieve some of the traffic congestion from tourist, interstate and intercity coaches currently travelling through the town centre along Jonson Street which has been identified as a strategy in the Byron Bay Town Centre Masterplan.

On balance, the benefits derived from the proceeding with the proposal are considered to outweigh the potential impacts and hence the proposal is considered to be justified.

Abbreviations and Definitions

Abbreviation	
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
ASA	Asset Standards Authority
ASS	Acid Sulphate Soil
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BOF	Biodiversity Offset Fund
Byron LEP	*Byron Local Environmental Plan 2014*
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CMP	Conservation Management Plan
CMS	Conservation Management Strategy
CNR	John Holland Rail Country Rail Network
DA	Development Approval
DPI Water	Department of Primary Industries – Water
EEC	Endangered Ecological Community
EHC Act	*Environmentally Hazardous Chemicals Act 1985* (NSW)
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
ICNG	Interim Construction Noise Guidelines published by the NSW Department of Environment and Climate Change (now OEH)
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
JHR	John Holland Rail
LCVIA	Landscape Character and Visual Impact Assessment
LCZ	Landscape Character Zone
LEP	Local Environmental Plan – A local government level EPI
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013* (NSW)
MEM Act	*Marine Estate Management Act 2014* (NSW)
MNES	Matters of National Environmental Significance

Abbreviation	
MSDS	Material Safety Data Sheet
NCB	Noise Control Barrier
NPI	Noise Policy for Industry
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NT Act	*Native Title Act 1993* (Cth)
OEH	NSW Office of Environment and Heritage
POEO Act	*Protection of the Environment Act 1997* (NSW)
PCT	Plant Community Type
PPE	Personal Protective Equipment
PSI	Preliminary Site Investigation
RA	*Roads Act 1993* (NSW)
REF	Review of Environmental Factors
s170 Register	Heritage and Conservation Register, a list of heritage items made under s170 of the Heritage Act 1977
SEPP	State Environmental Planning Policy – a state level EPI
SHR	NSW State Heritage Register
SMEC	SMEC Australia Pty Ltd
SOHI	Statement of Heritage Impacts
SSF	Swamp Sclerophyll Forest
TA Act	*Transport Administration Act 1988* (NSW)
TAP	Transport Access Program
TMP	Traffic Management Plan
WM Act	*Water Management Act 2000* (NSW)
WSUD	Water Sensitive Urban Design

Table of Contents

Table of Figures

List of Tables

Appendices

Appendix G – Landscape Character and Visual Impact Assessment (DesignInc 2019)

Appendix H – Bus Bay Capacity Assessment (DCI 2018)

Appendix I – Council correspondence regarding land use

Appendix J – ISEPP Correspondence

Appendix K - Proposal layout (DesignInc 2019)

1 Introduction

1.1 Introduction

Sydney Trains has identified several stations throughout the rural network that will be upgraded as part of the Transport Access Program (TAP). The TAP is an initiative by Transport for NSW (TfNSW) to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

The TAP will deliver customer focused and high-quality public transport interchanges through upgrades and improvements, providing customers with easier travel connections and access to the different transport services.

This Review of Environmental Factors (REF) has been prepared to address the potential impacts associated with the proposal; a new bus interchange in Byron Bay that would be delivered as part of the TAP.

1.2 Proposal location

The proposal area is located along Butler Street, approximately 772 km north of Sydney, in the Byron Local Government Area (LGA) (refer to Figure 1-1). Byron Bay Beach is located 560 m north of the proposal area and Belongil Creek is located 200 m to the south. The Cumbebin Swamp Nature Reserve is located approximately 500 m to the west of the proposal area. The Byron Bay town centre is located approximately 80 m to the north east of the site, and is primarily retail and commercial in nature.

The majority of the proposal area is located on a parcel of land owned by TfNSW, adjacent to the former Murwillumbah rail corridor. A small section of the western boundary of the proposal area, adjacent to the road corridor is owned by Byron Shire Council. Sydney Trains has received an in-principle agreement with Council to utilise this area for the proposed interchange (Appendix I).

The proposal area is bound to the west by Butler Street and an informal car park. An unnamed drainage line that connects to Belongil Creek is located north and south of the proposal area. To the south, there is a partially sealed road with informal car parking and pedestrian walkway over the rail corridor extending from Butler Street to Jonson Street, and dense vegetation beyond this. To the south east, the proposal area extends into a carpark adjacent to the Railway Friendly Bar and Woolworths.

Surrounding the proposal area to the south west and west are low and medium density residential properties. Commercial premises are located to the north, east and south east.

The Murwillumbah rail corridor is non-operational, having closed in May 2004. In December 2017, a small extent (approximately three kilometres) of the disused train line was reactivated for the operation of a solar train.

The proposal area is largely undeveloped with regrowth vegetation covering most of the site. Derelict railway infrastructure is present at the proposal area including the former railway water tower, a buried turntable and remnants of an ashpit. Most of the proposal area is bordered by a chain link fence, restricting public access.

Photographs of the associated vegetation and infrastructure located at the proposal area are provided in Figure 1-2 to Figure 1-7.

The proposal area contains a locally-listed heritage item, *Former Railway Water Tower* (Item #I064), listed on the *Byron Local Environmental Plan 2014*. The proposal area is also

located within the *Byron Bay Railway Station and yard group*, which is listed on the State Heritage Register (SHR) (Item #01107) and the John Holland Rail Country Rail Network (CRN) Heritage and Conservation Register as *Byron Bay Railway Precinct* (Item 01107) (Appendix A).

The proposal area is located within two locally-listed conservation areas; *Railway precinct, Byron Bay Conservation Area* and *Burns Street Conservation Area*.

A search of the NSW EPA Contaminated Land records on 16 May 2019 indicated there are seven contaminated sites notified to the NSW EPA within the Byron Shire Council area. Of these seven, only one site is considered to be located in close proximity to the Proposal site. 'Butler Street Reserve' is located approximately 30m to the north east of the Proposal and is currently listed as 'Under Assessment'. Based on historical activities and investigations conducted at Butler Street Reserve and as outlined in Preliminary Investigation Order 20181009, the EPA reasonably suspects that the specified land is contaminated with methane, carbon dioxide, and metals (Appendix F).

There are currently no NSW EPA contaminated land notices for the proposal area.

A search of the NSW EPA Protection of the Environment Operations (POEO) database on 16 May 2019 within the Byron Bay Shire Council found that there are no 'issued' environmental protection licences (EPL) for sites within 1km of the Proposal.

The proposal area lies within the boundaries of registered Native Title claim NC2001/008 lodged by the Byron Bay Bundjalung People. The Extract from the Register of Native Titles can be found in Appendix E.

A search of the AHIMS database was undertaken in May 2019 (Appendix E). No Aboriginal sites or places are previously documented within the proposal area. The potential occurrence of Aboriginal heritage at the proposal area is low considering the previous land use at the proposal area as a railway facility. Whether or not any formal Native Title processes under the *Native Title Act 1993* (NT Act) would be activated by the proposal is beyond the scope of this assessment.

1.3 Purpose of REF

This REF has been prepared by SMEC Australia Pty Ltd (SMEC) on behalf of Sydney Trains The purpose of the REF is to:

- Describe the proposal;
- Document, examine and take into account to the fullest extent possible the likely impacts of the proposal on the environment;
- Detail mitigation measures to be implemented;
- Determine whether an Environmental Impact Statement or Species Impact Statement is required in relation to the proposal; and
- Determine whether the proposal can proceed.

For the purposes of the proposal, Sydney Trains is both the proponent and the determining authority for this REF under Division 5.1 (formerly Part 5) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposed works and associated environmental impacts have been described in the context of clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), the *Biodiversity Conservation Act 2016*, the *Fisheries Management Act 1994* (FM Act), other relevant NSW legislation and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so the REF helps to

fulfil the requirements of section 5.5 of the EP&A Act, for Sydney Trains to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Infrastructure under Division 5.2 – State significant infrastructure of the EP&A Act;
- The significance of any impact on threatened species as defined by the *Biodiversity Conservation Act 2016* and/or *Fisheries Management Act 1994* and therefore the requirement for a Species Impact Statement; and
- The potential for the proposal to significantly impact a Matter of National Environmental Significance (MNES) or Commonwealth land and the need to make a referral to the Commonwealth Department of the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

Figure 1-1: Proposal location

Figure 1-2: Vegetation present at the centre of the proposal area (facing north)

Figure 1-3: Inundated vegetation along the northern boundary of proposal area

Figure 1-4: Former railway water tower at proposal area (facing south)

Figure 1-5: Concrete plinths adjoining the buried turntable within the proposal area

Figure 1-6: Informal car parking along southern boundary of proposal area

Figure 1-7: Graffiti concrete plinth along the southern boundary

2 The proposal

2.1 Need and objectives of the proposal

Byron Bay is the second most popular visitor destination in New South Wales (NSW) after Sydney. Nearly 1.5 million people visit Byron Bay each year placing pressure on the existing transport infrastructure for residential, commercial, industrial and tourist road users, particularly during the peak holiday periods.

Traffic congestion has been identified as significant issue in the Byron Bay Town Centre Master Plan (Byron Shire Council 2016). The Byron Bay public transport service is characterised by a disused rail line, a congested town centre and an infrequent local bus service.

The Byron Bay Railway Station ceased to operate in May 2004 when the Murwillumbah to Casino rail line was closed. Previously, the station building was used as a Countrylink coach terminal and the refreshment room was a licensed bar. Due to prevalence of online ticket purchasing, the coach terminal was closed and sectioned off from the public in 2017. The existing road network within the township of Byron Bay has little to no spare capacity and is restricted by the rail line, which runs parallel to Jonson Street.

In December 2017, a solar train was officially launched reactivating three kilometres of the rail corridor between Byron Beach to North Beach. Nine services are currently available each day. The re-activation of a small extent of the disused rail corridor is not expected to minimise the existing need for improved public transport within the locality. The solar train is unable to take trips longer than three kilometres without regular recharging stations along the route, which is currently unavailable.

To relieve some of the traffic congestion from tourist, interstate and intercity coaches currently travelling through the town centre, a road bypass ‘Butler Street bypass’ has been approved for construction to the west of the rail corridor. The bypass aims to improve traffic efficiency via a number of upgrades along Shirley Street, Lawson Street and Butler Street, including the construction of a new road and level rail crossing (Figure 2-1).

To support the approved bypass, Sydney Trains is proposing to construct a new bus interchange at Byron Bay as part of the TAP. The TAP is an initiative by TfNSW to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most.

The TAP will deliver customer focused and high quality public transport interchanges through upgrades and improvements, providing customers with easier travel connections and access to the different transport services. The TAP, with its customer focus, will transform interchanges to a people focus and in doing so improve the comfort and ease for all interchange users.

Byron Bay Station has been included in Package 1 Rural and Regional Interchanges after being identified through an evidence-based selection process. Byron Bay continues to experience patronage growth and various improvements are required to improve the experience for customers.

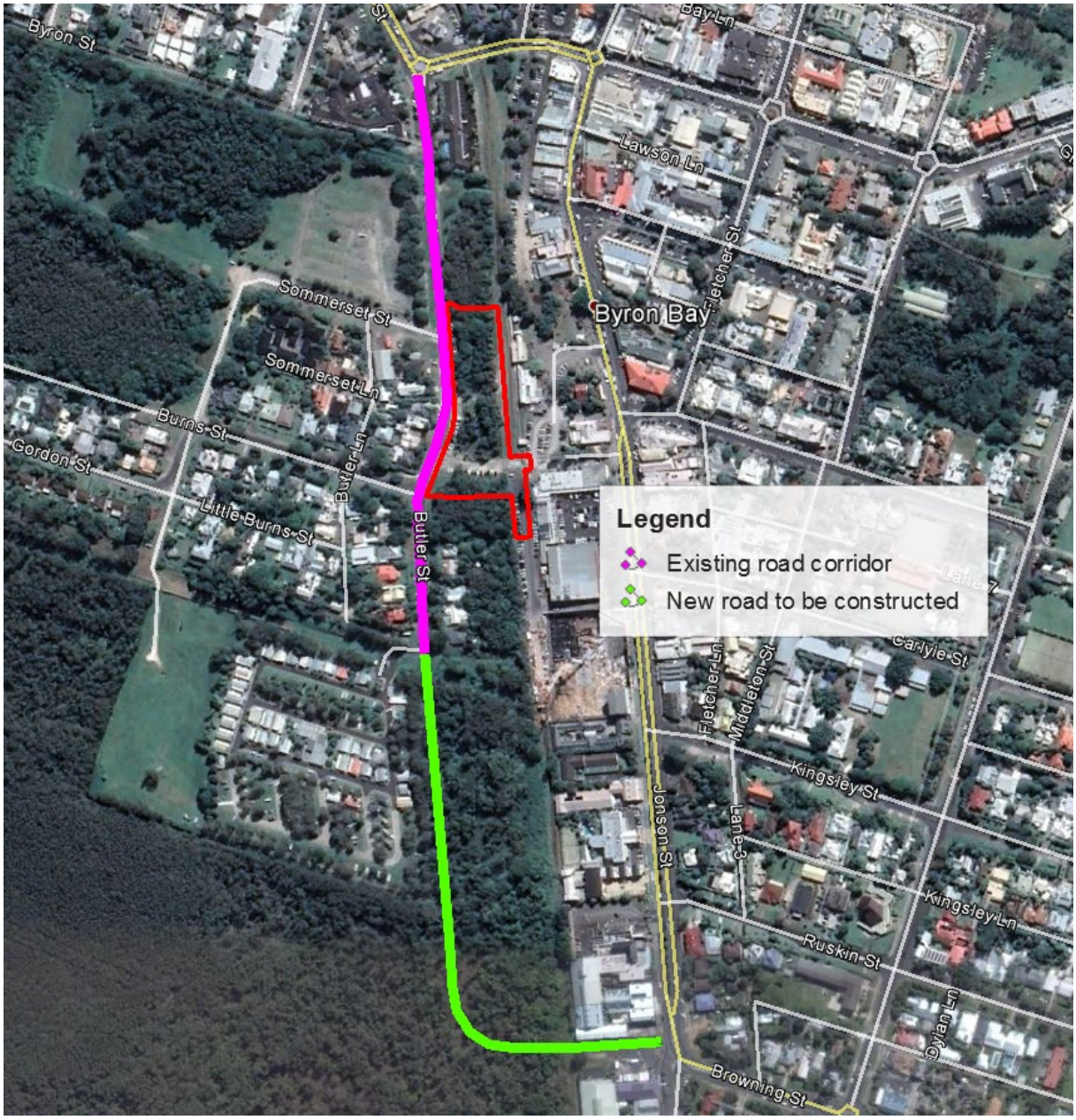

Figure 2-1: Butler Street bypass, west of the rail corridor (Byron Shire Council, 2017)

The TAP encompasses the associated interchange facilities and passenger access between those facilities and the service buildings. It includes interchange platforms, buildings, gates, pedestrian and cycle access paths, pedestrian linkages to the adjacent streets and the commuter car park, bus stops and shelters, taxi stands, kiss and ride locations and bicycle facilities.

The aim of the program is to provide:

- Interchange precincts that are accessible to the mobility impaired, elderly and people with prams
- Inclusive interchange and facilities for all modes that meet the needs of a growing population

- Modern interchanges that support an integrated network and allow seamless transfers between all modes of customers
- Safety improvements including extra lighting, help point, fences and security measures for car parks and interchanges, including bus stops
- Signage improvements so customers can easily use public transport and transfer between modes at interchanges
- Other improvements and maintenance such as painting, new fencing and roof replacements.

The proposal objectives, as described in section 2.2, are consistent with the TAP objectives outlined above.

2.2 Description of proposal

The proposal would include the following elements:

- Provision of three dedicated stops for regional coaches within the interchange
- Associated customer facilities such as covered canopies, shelters, waiting areas
- Provision of a disability car parking spot, two taxi ranks and two kiss and rides
- Public amenities
- Accessible paths to key interchange elements
- Landscaped areas within the interchange.

Table 2-2 provides an outline of the proposed new bus interchange at Byron Bay. The proposal layout is provided in Appendix K.

Table 2-1: Proposed works as part of the bus interchange

Stage	*Detail*
Bus interchange	• Construction of bus interchange • Install Tactile Ground Surface Indicators (TGSI) at boarding points. • Crossings to be designed in accordance with Australian Standards • Provide allocated seating space for wheelchair users • Provide accessible passenger information, signage and wayfinding for bus service customers • Provide a shared kiss and ride / taxi zone. • Build new amenities and associated lay-over buildings • Construct accessible paving for access to carpark, bus shelters and buildings • Install drainage at the proposal area
Refurbish the Heritage Water Tower	• Remove intrusive vegetation, repair brickwork / reset loose bricks / repoint brickwork as required / re-render copings; • Heli-bar stitching required for cracking through wall in two locations • Remove graffiti / remove rubbish from tower exterior and interior; • Remove trees and loose rust and mud from interior of tank; • Seal window and door openings with new wire frames, securely fixed to prevent removal and to exclude entry;

Stage	*Detail*
	• Remove loose (40 mm) 2-inch gal pipe and other loose sheet metal • Stabilise exterior (80 mm) 4-inch cast iron pipe near top of tank
Security, electrical and CCTV	• Installation of CCTV, Emergency Help Points, lighting and signage • Provide electrical switchboards to comply with current standards • Install fire and smoke seals to all distribution boards • Provide smoke and thermal detectors in accordance with required standards • Provide emergency lighting, exit and directional signage as required • Provide upgraded power points and mechanical ventilation to toilets
Landscaping	• Retain existing trees where possible • Replanting and landscaping where designated

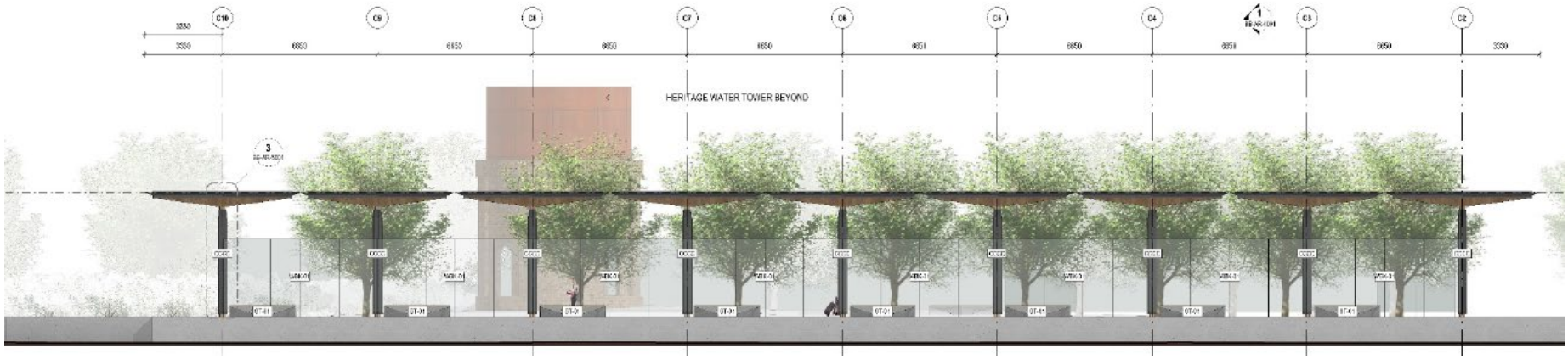

Figure 2-2: Eastern elevation of the proposal area (DesignInc 2019)

Figure 2-3: East-west sectional elevation of the proposal area (vegetation has been shown indicatively only) (DesignInc 2019)

Figure 2-4: Western elevation of the proposal area (vegetation has been shown indicatively only) (DesignInc 2019)

2.3 Construction Methodology

2.3.1 Work methodology

Construction of the proposal would be undertaken in stages. The construction methodology would be further developed during the detailed design of the proposal by the nominated Contractor in consultation with Sydney Trains.

The proposed construction activities for the proposal are identified below in Table 2-2. This staging is indicative and is based on the current design and may change once the Contractor has been nominated.

Table 2-2: Indicative construction methodology

Stage	*Activity*
Site establishment and setup	• Installation of a site fence around the perimeter of the proposal area • Install temporary noise screening (i.e. noise blankets) along western boundary of proposal area • Install erosion and sediment controls • Set-up site office and lay-down areas within the existing car park to the south • Establish pedestrian management and signage
Structural Repair of the Heritage Water Tower	• Remove intrusive vegetation, repair brickwork / reset loose bricks / repoint brickwork as required / re-render copings; • Remove graffiti / remove rubbish from tower exterior and interior; • Remove trees and loose rust and mud from interior of tank; • Heli-bar stitching required for cracking through wall in two locations • Seal window and door openings with new wire frames, securely fixed to prevent removal and to exclude entry; • Remove loose (40 mm) 2-inch gal pipe and other loose sheet metal • Stabilise exterior (80 mm) 4-inch cast iron pipe near top of tank.
Demolition and earthworks	• Clearing and grubbing of proposal area • Remove top soil and stockpile • Removal of unsuitable fill materials (if encountered) • Bulk excavation to subgrade • Importation of fill material • Removal of existing turntable plinths
Drainage	• Install drainage pipework with Gross Pollutant Traps (GPT's) • Amenities shall include a water sensitive urban design (WSUD) drainage system.
Electrical and site services	• Trench for new conduits to service carpark, amenities and associated lay-over buildings • Add new luminaires and run conduit as required • Test and upgrade switchboard breakers where required. • Decommission and make safe any disused equipment • Installation of services for buildings and interchange, including electricity, water etc.

Stage	*Activity*
Road works	• Build access and egress to the bus interchange from Butler Street, and internal interchange circuit • Line-marking and sign posts to be included as required for all of the above • Construct new footpaths and plaza to provide suitable access for pedestrians.
Structural work	• Erect bus interchange canopy • Construct new amenities building and associated lay-over buildings
Landscaping	• Undertake landscaping • Installation of park / street furniture
Site clean-up	• Undertake finishing works and remove materials, laydown areas and any site-offices

2.4 Plant and equipment

The following plant and equipment are considered typical for this kind of work and may be used in the construction of the proposal:

- Trucks
- Franna crane (20 t)
- Mobile crane (<100 t)
- Welding equipment
- Air compressor
- Water truck
- Asphalting truck
- Elevated Working Platform (EWP)
- Concrete saw
- Generator
- Compactors
- Excavator (8 - 44 t)
- Jack hammer
- Concrete pump
- Lighting tower
- Line marking machine
- Concrete truck
- Vibratory roller (7-18 t)
- Grinder
- Concrete vibrator
- Elevated work platform
- Chain saw

2.5 Timing and duration

It is expected that the proposal would commence in August 2019 and expected to take approximately 14 months to construct. The proposal would include the establishment of site compound, preparation of the site, vegetation removal, minor civil works, pavement works, line removal and marking, installation of signage, strengthening/stabilisation of water tower, relocation/ installation of infrastructure and installation and connection of electrical and communications fittings.

All works would occur within standard working hours and timed to avoid peak periods wherever possible.

The standard working hours for this proposal would be:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- No work on Sundays or public holidays.

Appropriate mitigation measures would be implemented to minimise noise impacts.

2.6 Construction traffic

Approximate daily traffic generation during the establishment and construction of the proposed works are as follows:

- 10 two-way heavy vehicle movements (trucks delivering equipment and materials)
- 10 two-way light vehicle movements (worker vehicles).

During construction, trucks and light construction vehicles would access the proposal area via Butler Street. Traffic control would be required at this location.

2.7 Site compound and personnel parking

A site compound for the office, amenities and construction personnel parking would be located within the car park to the south adjacent to the Railway Friendly Bar and Woolworths. This location is currently leased from TfNSW by the Council as a laydown and depot area. During construction, the location would also contain a material storage and laydown area (illustrated as the yellow polygon in Figure 2-5). The proposed works would displace about 70 informal car parking spaces along Butler Street (the western boundary of the proposal area) and walking thoroughfare.

Figure 2-5: Location of site compound area (yellow polygon)

2.8 Services and utilities

Relevant plans from the different authorities have been obtained via a DBYD search and have been considered in the design. The proposed works are likely to have minimal impact to the existing underground services.

There is still potential for unidentified services to be found during construction, and the contractor should identify and confirm the underground services prior to any excavation works. If potential clashes are of concern, the proposal design may require amendments to the proposed locations of drainage and infrastructure.

2.9 Interchange alternatives considered

2.9.1 Option 1 – Upgrade existing facilities at Jonson Street

Upgrading the existing facilities at Jonson Street was developed as the preferred preliminary option and the initial concept design. This option involved upgrades to the existing facilities at Jonson Street and providing a designated coach interchange off Jonson Street in front of the old Byron Bay railway station. This option would involve a redevelopment of the existing facilities and would separate coach services from local services, provided passengers with a dedicated single stop and adjacent amenities.

The intention of this option was to address the shortfalls with the current joint bus and coach stop at Jonson Street, however this option does not address vehicular congestion in the town centre. This option does not support the approved Butler Street bypass or sub-strategies identified in the Byron Bay Town Centre Masterplan.

Given the limited ability of this option to reduce vehicular congestion within the town centre, this option is not aligned with the objectives of the proposal and therefore not considered appropriate.

2.9.2 Option 2 – Bus interchange at Butler Street Reserve

This option proposes the new interchange be located within the existing council car parking area at Butler Street Reserve, between Butler Street and Somerset Street. The reserve is the location of the Byron Community Markets and Byron Farmer's Markets. This option would require the relocation of the markets during both construction and operation.

This option would support the future Butler Street bypass however the reserve is located within a flood prone area and is the location of a former Council landfill.

A drainage line is located to the north of the reserve. This option would result in the bus interchange being inundated during a 1 in 100-year storm event with flood depths greater than those allowed in Roads and Maritime design standards. Major earthworks (including raising the site) would be required to mitigate the frequency of inundation at this location. Flood modelling has identified that raising of the proposal area would have hydraulic impacts on adjacent residential properties along the northern side of the creek and potentially in-stream impacts.

The reserve was utilised as a domestic landfill from 1971 to 1977. A Detailed Site Investigation (DSI) (SMEC 2017) identified a mixture of anthropogenic wastes and fill underlining the entire horizontal extent of the proposal area. The DSI identified contamination in the soil, groundwater at the reserve and the potential risk of landfill gas.

A southern configuration of the interchange at the reserve was also considered to mitigate flooding impacts however modifying the configuration would not avoid the contamination risk at the reserve. On this basis, the reserve was not considered suitable given the environmental constraints of the site.

2.9.3 Option 3 – Bus interchange adjacent to rail corridor (*preferred option)*

This option investigates relocating the existing bus interchange to a parcel of land located between Butler Street and the disused rail line. The interchange would include the construction of a covered canopy area to house up to three buses/coaches at a time, public amenities and kiss and ride facilities.

This option would reduce vehicular congestion in the town centre and provide reliable public transport services for the community. This option would provide easier pedestrian connections to Jonson Street than option 2. The preliminary concept design for the proposed bus interchange at this location is shown below in Figure 2-6.

Both option 2 and option 3 would support the future Butler Street bypass, however option 3 does not pose the same flooding, contamination and social risks as option 2.

This option would have potential environmental impacts which must be considered. This option would require the removal of native vegetation and would increase the ambient noise in the locality during construction and operation. The proposed location is also the subject of local and state-listed heritage that have the potential to be impacted both during construction and during operation. Potential environmental impacts are discussed further in Chapter 5.

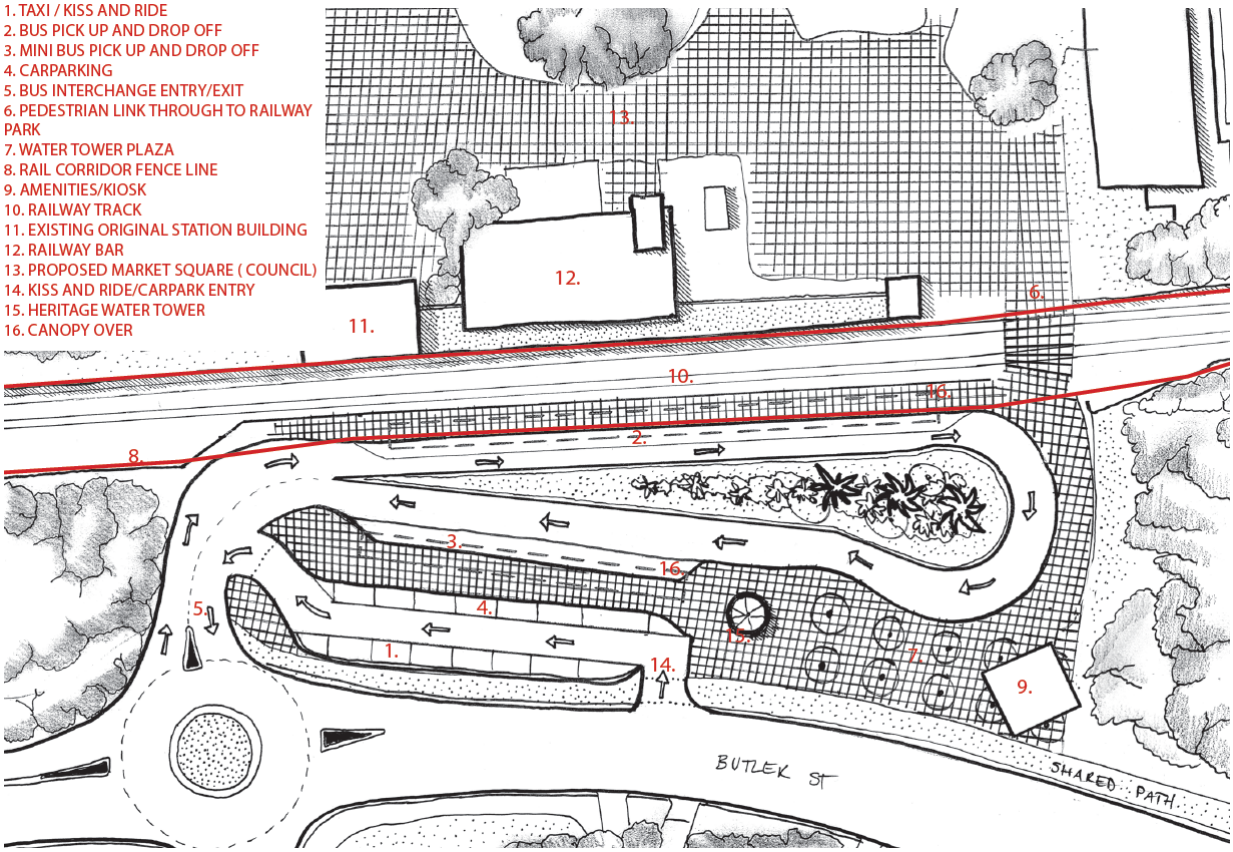

Figure 2-6: Option 3 – sketch of the proposed bus interchange adjacent to rail corridor

2.9.4 'Do nothing' option

The 'do nothing' option would not address TfNSW's responsibility to the travelling public to improve the accessibility to Byron Bay or address the patronage growth and various improvements required to improve the experience for these customers. It would also not accord with TfNSW's vision to improve customer experience with rail transport services or to create and foster an environment that improves accessibility and safety.

The 'do nothing' option would not achieve the proposal objectives and has not been further considered.

2.10 Justification of preferred option

The preferred option is *Option 3 – Bus interchange adjacent to rail corridor*. Option 3 would utilise the land between Butler Street and the disused rail corridor, and would service the Butler Street bypass. Option 3 does not pose the same flooding, contamination or social implications as option 2.

The Byron Bay Town Centre Master Plan (Byron Shire Council, 2016) identified the proposal area as a potential link route that could be used to accommodate vehicles and local buses, reducing traffic pressure on Lawson Street.

As discussed in section 2.9.3, this option would require the removal of mature regrowth vegetation from the proposal area. Mitigation measures including revegetation with native flora species have been provided with section 5.4.3 to minimise potential impacts on threatened vegetation and species.

The proposal has included key heritage considerations in consultation with a heritage specialist as part of the concept design. The reactivation of the proposal area as an active public transport centre is consistent with the heritage values of Byron Bay Railway Station and would reinvigorate the vicinity as an important locality within the town.

The preferred option is also considered the most appropriate in that:

- It achieves the objective of providing for improved accessibility for commuters including the mobility impaired, elderly and people with prams.
- It is an inclusive interchange that facilitates all modes to meet the needs of a growing population
- It supports an integrated network and allows seamless transfers between all modes of customers
- Provides safety improvements including extra lighting, help point, fences and security measures including CCTV
- Alleviates vehicular congestion in the town centre attributed to bus and coach movements.

3 Statutory Requirements

3.1 State Environmental Planning Policies

3.1.1 *State Environmental Planning Policy (Infrastructure) 2007*

The Infrastructure SEPP (ISEPP) aims to assist in the effective delivery of public infrastructure across the State by improving certainty and regulatory efficiency through a consistent planning assessment and approvals regime for public infrastructure and services and through the clear definition of environmental assessment and approval processes for public infrastructure and services facilities.

Clause 94 of the ISEPP permits development on any land for the purpose of road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. Under clause 93 of the ISEPP, road infrastructure facilities are defined as:

- *(a1) associated public transport facilities for roads used to convey passengers by means of regular bus services within the meaning of the Passenger Transport Act 1990,*
- *(a2) bus layovers that are integrated or associated with roads (whether or not the roads are used to convey passengers by means of regular bus services within the meaning of the Passenger Transport Act 1990.*

As the proposal is for the purpose of road infrastructure facilities and is to be carried out by Sydney Trains on behalf of TfNSW, it can be assessed under Division 5.1 of the EP&A Act, development consent from Byron Shire Council is therefore not required.

Part 2 of the Infrastructure SEPP contains provision for public authorities to consult with local councils and other agencies prior to the commencement of development, as described in section 4.1.

The project is not located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) and does not affect land or development regulated by *State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (State Significant Precincts) 2005.*

3.2 Local Environmental Plans

3.2.1 *Byron Local Environmental Plan 2014*

The *Byron Local Environmental Plan 2014* (LEP) applies to land on which the proposal would be undertaken.

Land Zoning

The majority of the proposal area is located on land zoned SP2 Infrastructure (Rail Corridor), however land zoned R2 Low Density Residential and RE1 Public Recreation borders the western boundary (refer to Figure 3-1).

The relevant matters associated with this zone are summarised in Table 3-1.

Table 3-1: Relevant zoning to the proposal area

Zone SP2 Infrastructure	
(1) Objectives of zone	To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure.
(2) Permitted without consent	Environmental protection works
(3) Permitted with consent	Aquiculture, Environmental facilities; Roads; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose.
(4) Prohibited	Any development not specified in item 2 or 3.
Zone R2 Low Density Residential	
(1) Objectives of the zone	To provide for the housing needs of the community within a low density residential environment. To enable other land uses that provide facilities or services to meet the day to day needs of residents.
(2) Permitted without consent	Environmental protection works; Home-based child care; Home occupations
(3) Permitted with consent	Attached dwellings; Bed and breakfast accommodation; Boarding houses; Business identification signs; Centre-based child care facilities; Dual occupancies; Dwelling houses; Group homes; Health consulting rooms; Home industries; Multi dwelling housing; Neighbourhood shops; Oyster aquiculture; Pond-based aquiculture; Respite day care centres; Roads; Secondary dwellings; Seniors housing; Tank-based aquiculture; Any other development not specified in item 2 or 4
(4) Prohibited	Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Entertainment facilities; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Function centres; Health services facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Information and education facilities; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Passenger transport facilities; Public administration buildings; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Residential care facilities; Restricted premises; Rural industries; Service stations; Sewage treatment plants; Sex services premises; Signage; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Warehouse or distribution centres; Waste or resource management facilities; Water recreation structures; Water recycling

	facilities; Water supply systems; Wharf or boating facilities; Wholesale supplies
Zone RE1 Public Recreation	
(1) Objectives of the zone	To enable land to be used for public open space or recreational purposes. To provide a range of recreational settings and activities and compatible land uses. To protect and enhance the natural environment for recreational purposes.
(2) Permitted without consent	Environmental protection works
(3) Permitted with consent	Aquiculture; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Centre-based child care facilities; Community facilities; Emergency services facilities; Entertainment facilities; Environmental facilities; Flood mitigation works; Function centres; Horticulture; Information and education facilities; Jetties; Kiosks; Markets; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Restaurants or cafes; Roads; Signage
(4) Prohibited	Any development not specified in item 2 or 3

The proposal is consistent with the objectives of Zone SP2 and Zone R2 as the works are for infrastructure, road-related uses and maximising public transport patronage. However, the proposal is inconsistent with the objectives of Zone RE1.

The proposal, including the interchange buildings and associated infrastructure would largely be contained with the land zoned SP2. Only a small area of RE1 zoned land, designated for landscaping, would be impacted by the proposal. The use of the land for landscaping is considered consistent with the objectives of RE1.

As discussed in section 3.1.1, the proposal is permissible under clause 94(1) of the Infrastructure SEPP and can be carried out by or on behalf of a public authority without consent on any land.

Heritage conservation (Clause 5.10)

The proposal area contains the locally-listed heritage item '*I064 – Former railway water tower*' on Schedule 5 of the Byron LEP.

Two conservation areas are located within the proposal area, including:

- C002: *Burns Street Conservation Area*; local significance
- C004: *Railway precinct, Byron Bay Conservation Area*; local significance.

Heritage items listed on the Byron LEP is demonstrated in Figure 3-2.

Acid sulphate soils (Clause 6.1)

The proposal area is located in an area classified as Class 3 for acid sulphate soils (ASS) on the Byron LEP map. Clause 6.1 of the LEP states that development consent is required for:

- Class 3 - works more than 1 m below the natural ground surface; works by which the watertable is likely to be lowered more than one metre below the natural ground surface.

While the ISEPP applies to the proposal and development consent from Council is not required, if ASS are encountered, ASS would be managed appropriately. This is discussed further in section 5.5.

A summary of control measures is provided in Chapter 7.

Flood planning (Clause 6.3)

Clause 6.3 of the LEP aims to minimise the flood risk to life and property associated with the use of land, to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change, and to avoid significant adverse impacts on flood behaviour and the environment. It applies to land at or below the flood planning level defined as 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard. No flood mapping is provided as part of the LEP.

Based on flood mapping contained within the 'Belongil Creek Flood Planning Levels' (BMT WBM 2015) the proposal area is not located on land that would be subject to flood planning under clause 6.3.

Figure 3-1: LEP zoning at the proposal area

3.3 NSW State legislation

3.3.1 *Environment Planning and Assessment Act 1979*

In NSW, the EP&A Act and the EP&A Regulation regulate the majority of planning and environmental impact assessment requirements.

Under section 5.5 of the EP&A Act, Sydney Trains as a determining authority is required to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of its activities.

Clause 228 of the EP&A Regulation identifies factors to be considered by Sydney Trains in order to assess the likely impacts of the project on the natural and built environment in producing the REF. The factors to be taken into account when consideration is being given to the likely impact of an activity on the environment are outlined in subclause 2 of the EP&A Regulation and include, among other things, those that may have any environmental impact on a community, ecosystems and have any effect on a locality with cultural, historical and social significance. The clause 228 factors are considered in section 6.

As the proposal is for the purpose of road infrastructure facilities and is to be carried out by Sydney Trains, it can be assessed under Division 5.1 of the EP&A Act. Under 5.1 of the EP&A Act, an 'activity' means the carrying out of a work. Sydney Trains is considered both the proponent and determining authority for this proposal.

3.3.2 *Heritage Act 1977*

The *Heritage Act 1977* (Heritage Act) provides protection for items of State heritage significance that are listed on the SHR, as well as for unlisted archaeological relics. Section 57 of the Act requires that works proposed for items protected by the *Heritage Act 1977* are approved by the Heritage Council of NSW or its delegates, as appropriate.

The proposal area is located within the heritage curtilage of the *Byron Bay Railway Station and yard group*, which is listed on the SHR (Item #01107). The location of the SHR heritage curtilage is demonstrated in Figure 3-2. Consequently, proposed works and changes to the site need to be assessed and approved by the NSW Heritage Council in accordance with section 57(1). The form and process for applying for approval is set out in section 60.

Furthermore, section 170 of the Heritage Act requires that all Government departments or agencies must maintain a Heritage and Conservation Register, which includes all property and assets owned or in the care and control of the relevant department or agency that are of State or Local heritage significance. The *Byron Bay Railway Station and yard group* is included in the John Holland Rail Country Rail Network (CRN) section 170 Heritage and Conservation Register. Under the provisions of section 170A of the Heritage Act, the Heritage Council is to be notified if an item listed on a section 170 register is to be removed, transferred or no longer occupied.

As the works would occur within the curtilage of an area listed on the NSW State Heritage Register and are not considered exempt, an application is required to be submitted in accordance with section 60 to the NSW Heritage Council for approval. As the proposed works do not involve the removal, transfer or loss of occupation, the Heritage Council does not need to be notified regarding changes to the section 170 Register.

A SOHI was prepared for the proposal and is provided in Appendix A. The findings of the SOHI are discussed in section 5.2.

Figure 3-2: Heritage items at the proposal area

3.3.3 *Biodiversity Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) came into effect on 25 August 2017. The BC Act provides for the conservation and protection of threatened species, populations and ecological communities of animals and plants through specific objectives relating to the conservation of biodiversity and promoting ecologically sustainable development.

A Biodiversity Assessment Report (BAR) was prepared for the proposal and is provided in Appendix C. The findings of the BAR are discussed in section 5.4.

The proposal would involve removal of 0.22 ha of native vegetation listed as *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* under the BC Act. The BAR also considered the potential impact of the proposal on threatened species listed under the BC Act including, Pale-vented Bush-hen, Eastern Blossom-Bat, Grey-headed Flying-fox and several microbat species. Although there are koala records within 10 km of the proposal area, this species was considered unlikely to be utilise the proposal area, due to the lack of Eucalyptus trees observed on site. As these are the sole foraging trees for this species, the koala has not been further assessed in section 5.4

Assessments of significance (five-part-tests) were undertaken based on the assumption that the management recommendations, including offsets, would be implemented. Potential biodiversity offset options have been provided section 5.4 and Appendix C. The assessments concluded that the proposal is not likely to have a significant impact on endangered ecological communities (EEC) or threatened species listed under the BC Act.

3.3.4 *Biosecurity Act 2015*

The *Biosecurity Act 2015* (Biosecurity Act) provides a framework to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants. The Biosecurity Act is a wide ranging legislation that outlines the responsibilities of government, councils, private landholders and public authorities in the management of biosecurity matters. Priority weeds are regulated under the Biosecurity Act. Section 21 of the Biosecurity Act provides for a general duty to prevent, eliminate or minimise any biosecurity risks they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.

The BAR (Appendix C) provides mitigation measures to manage weeds at the proposal area. This is discussed further in section 5.4.3.

3.3.5 *Protection of the Environment Operations Act 1997*

The *Protection of the Environment Operations Act 1997* (POEO Act) aims to protect the quality of the environmental, reduce risk to human health and prevent the degradation of the environment. The POEO Act administers the regulation and authorisation of certain activities which may adversely impact the environment through the issue of an Environment Protection Licence (EPL) for activities listed under Schedule 1 of the Act. Sydney Trains holds an existing licence (12208) which regulates all Sydney Trains activities.

The proposal does not involve any ‘scheduled activities’ under Schedule 1 of the POEO Act, however the proposal would take into consideration the requirements of the existing EPL. In addition, in accordance with Part 5 of the POEO Act, Sydney Trains would notify the NSW EPA if any pollution incidents occur on the site. This would be managed in the Construction Environmental Management Plan (CEMP) prepared by the construction contractor.

3.3.6 *Rural Fires Act 1997*

The *Rural Fires Act 1997* aims to prevent, mitigate and supress bush and other fires in the local government areas and other parts of the State constituted as rural fire districts. The Act seeks, among other things, to provide for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires.

The proposal area is not located on bush fire prone land however is located within NSW Fire and Rescue response area. It is not anticipated that the construction and operation of the proposal would exacerbate the risk of bush fires occurring within the locality.

3.3.7 Transport Administration Act 1988

The aims of the *Transport Administration Act 1988* (TA Act) with respect transport services provided to the people of NSW includes, among other things, to provide an efficient and accountable framework for the government for the delivery of transport services, the integration of transport services and to enable effective planning and delivery of transport infrastructure services. Another objective of the TA Act is to facilitate the mobilisation and prioritisation of key resources across the transport section and coordinate the activities of those engaged in the delivery of transport services. The TA Act also aims to maintain independent regulatory arrangements for securing the safety of transport services.

The objectivise of the proposal are aligned and governed by aspects of the TA Act.

3.4 Commonwealth Legislation

3.4.1 *Environment Protection and Biodiversity Conservation Act 1999*

Matters of National Environmental Significance (MNES) are protected under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Sydney Trains must not take an action that has, will have or is likely to have a significant impact on any MNES without approval from the Commonwealth Minister for the Environment. An action defined under section 523 of the EPBC Act as a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things.

The BAR (Appendix C) considered MNES, particularly relating to threatened species and ecological communities listed under the EPBC Act. A test of significance was also conducted for the Grey-headed Flying-fox using the EPBC Significant Impact Guidelines.

The assessment found that the proposal would not, and is not likely to, have a significant impacts on MNES under the EPBC Act and would not have a significant impact on the environment of Commonwealth land, provided the recommended management measures are implemented. Accordingly, the proposal has not been referred to the Australian Government Department of Environment and Energy.

MNES are discussed further in section 6.

3.4.2 *Native Title Act 1993*

The *Native Title Act 1993* (NT Act) provides a framework for the determination of native title claims within Australia, and for negotiations and decision making regarding the use and management of native title lands and waters. Exclusive rights to land are only available on certain unallocated or vacant Crown lands.

A Native Title Registrar is responsible for maintaining three Registers under the Act: the National Native Title Register, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements (ILUAs).

As discussed previously, the proposal area lies within the boundaries of registered Native Title claim NC2001/008 lodged by the Byron Bay Bundjalung People (Appendix E). There are no Aboriginal sites previously registered within the proposal area or its immediate vicinity and their potential occurrence is low considering the previous land use at the proposal area as a railway facility (Appendix E). Whether or not any formal Native Title processes under the Native Title Act 1993 would be activated by the proposal is beyond the scope of this assessment.

3.5 Ecologically Sustainable Development

Ecologically sustainable development entails using, conserving and enhancing the community's environmental resources in a manner that sustains and improves ecological processes, and hence the quality of life, for present and future generations.

Section 5(2)(e) of the TA Act states that an objective of Sydney Trains is that where its activities affect the environment, it must conduct its operations in compliance with the principles of ecologically sustainable development contained in section 6(2) of the *Protection of the Environment Administration Act 1991* (POEA Act).

Section 6(2) of the *POEA Act* requires compliance with the following four principles of ecologically sustainable development, where an activity affects the environment.

1. **The precautionary principle:** For example, if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
2. **Inter-generational 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.
3. **Conservation of biological diversity and ecological integrity** should be a fundamental consideration of the decision to undertake the activity.
4. **Improved valuation, pricing and incentive mechanisms:** For example, the users of goods and services should pay prices that include the use of natural resources and assets and the ultimate disposal of any waste generated by the provision of that good or service, and that environmental goals, having been established, should be pursued in the most cost effective way.

Sydney Trains is committed to ensuring that its projects are consistent with the principles of ecologically sustainable development. The principles of ecologically sustainable development have therefore been an integral consideration in the project. Table 3-2 outlines the how the principles of ecologically sustainable development have been applied to the project.

Table 3-2: The principles of ecologically sustainable development applied to the proposal

ESD Principle	*Application to the Project*
Precautionary principle	The risks associated with the proposal are generally known. Serious and irreversible environmental damage is not expected due to the limited physical scope of the works. It is expected that adverse impacts associated with the proposal would be minor. Measures to reduce adverse impacts as far as practicable have also been identified within this REF.
Intergenerational equity	The proposal is expected to benefit future generations through the provision of an accessible and secure

ESD Principle	*Application to the Project*
	integrated network that allows for seamless transfers between all modes for all customers travelling to and from Byron Bay. The new features would provide improved and more equitable facilities for all train users including the mobility impaired, elderly, people with prams.
Conservation of biological diversity and ecological integrity	This REF includes an assessment of the clause 228 EP&A Regulation factors that broadly consider biological diversity and ecological integrity of the proposal area. A BAR (Appendix C) was conducted to assess any potential biodiversity impacts associated with the proposal. The proposal would require the removal of 0.46 ha of native vegetation. Mitigation measures to minimise impacts on threatened species, fauna and vegetation communities have been provided in section 5.4.3. The assessment concluded that the proposal would not have a significant impact on the biological diversity and ecological integrity of the proposal area and locality.
Improved valuation and pricing of environmental resources	Sydney Trains recognises the value of environmental resources and aims to minimise the impacts of its activities by ensuring that appropriate control measures are implemented for all aspects of the proposal.

The proposal would have minimal impact on climate change. Most activities associated with the proposal would involve the use of electric, pneumatic or petrol powered plant and equipment, which all produce greenhouse gas emissions. The removal and recycling of waste would also consume energy and contribute to such emissions.

The proposal may result in long-term climate change benefits through encouraging the use of public transport and the associated avoidance of vehicle emissions.

3.6 Licences, Approvals and Permits

3.6.1 Environmental Protection Licence (EPL 12208)

Sydney Trains operates the metropolitan train network under EPL 12208 issued under the POEO Act, administered by the EPA. EPL 12208 authorises the carrying out of rail systems activities on the NSW Rail Network (as defined by the TA Act).Rail Systems Activities (RSA) are defined under clause 33(5) of schedule 1 of the POEO Act as including “the installation, on site repair, on-site maintenance or on site upgrading of track, including the construction or significant alteration of any ancillary works”. However the construction of public transport facilities for railway stations is not listed as an ancillary works in Schedule 1(33)(5).

As such, the proposal does not fall within the scope of activities outlined in Schedule 1 of the POEO Act. While a new EPL may not be required, the Contractor would need to consider the existing operational EPL to the extent applicable to the proposed works. Although the EPL 12208 would not be relevant for the proposed works, the principals of sounds environmental management presented in the ELP would still be applied throughout the project where reasonable and feasible.

The EPL contains requirements for contractors to implement reasonable and feasible noise control measures to minimise any offensive noise likely to be generated by construction

activities. These have been addressed in section 5.3 (Noise and Vibration). The existing Sydney Trains EPL does not allow for the discharge of polluted waters, therefore water (including groundwater) encountered during construction works would need to be managed on-site or disposed of off-site at an appropriately licensed facility.

3.7 Summary of Statutory Requirements

The following table summarises the statutory requirements for the project.

Table 3-3: The statutory requirements relevant to the project

Aspect	*Legislation*	*Section/Clause*	*Approval authority*	*Comment*
Planning Pathway	EP&A Act	Division 5.1	Sydney Trains	Determination and approval required by TfNSW.
	Infrastructure SEPP	Division 17, clause 94	Sydney Trains	The proposal is classified as 'Road Infrastructure'. The proposed works may be carried out without consent.
Licensing	POEO Act (EPL 12208)	Schedule 1	NSW EPA	The works are not listed on Schedule 1 of the POEO Act and therefore, and EPL would *not* be required. .
Other approvals	Heritage Act 1977	Section 60	Heritage Branch, OEH	Application under section 60 is required as the proposed works occur within the curtilage of an area listed on the SHR.
		Section 139(2)	Heritage Branch, OEH	Not required. The only element from which some in-ground evidence may be expected is the original well. Physical evidence of these structures would be classed as "material evidence from demolished buildings, works or former structures which provide evidence of prior occupations". They would not generally be considered to be 'relics' as defined in the Heritage Act. However should a relic be discovered or exposed, an Excavation Permit must be obtained before any further work is undertaken.

4 Consultation

4.1 Proposal stakeholders

The primary stakeholders for the proposal are:

- Sydney Trains, as the proponent and determining authority
- Transport for NSW (TfNSW), as land owner
- Byron Shire Council, as the agent that would operate the proposal
- Nearby residents and business owners
- Bus and coach commuters.

4.1.1 Infrastructure SEPP Consultation

The *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) contains provisions for public authorities such as Sydney Trains to consult with local councils and other public authorities prior to the commencement of certain types of development. Sydney Trains must take consideration of any responses received within 21 days after notification.

A summary of the Infrastructure SEPP consultation requirements is detailed below in Table 4-1.

Table 4-1*:* **Summary of Infrastructure SEPP consultation**

Is consultation with council or other agencies required under clauses 13-16 of the Infrastructure SEPP?	
Are the works likely to have a substantial impact on the stormwater management services which are provided by council? Agency – Byron Shire Council	No. The proposed works are not located within the 1 in 100 flood zone. The proposal has been designed with reference to the applicable Byron Shire Council stormwater management plans and does not involve major changes to existing stormwater infrastructure or flow regimes.
Are the works likely to generate traffic to an extent that will strain the existing road system in a local government area? Agency – Byron Shire Council	No. The proposal construction and operation may result in the minor adjustment of existing traffic regimes along Butler Street. However, construction is planned to coincide with the construction of the approved bypass. The proposal therefore is not considered to generate traffic to an extent that would strain the existing road systems in the area.

Is consultation with council or other agencies required under clauses 13-16 of the Infrastructure SEPP?	
Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system? Agency – Byron Shire Council	Yes. The construction site compound would require connection to council owned sewerage system, however this would be temporary. The interchange includes the construction and operation of an amenities building that would also need to connect to the council owned sewerage system. It is unlikely that the proposal would have a substantial impact on the capacity of the system.
Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water? Agency – Byron Shire Council	Yes. The construction site compound would require connection to council owned water supply system, however this would be temporary. The interchange includes the construction and operation of an amenities building that would also need to connect to the council owned water supply system. It is unlikely that the proposal would require the use of a substantial volume of water.
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow? Agency – Byron Shire Council	Yes. The proposal would involve construction works along the informal pedestrian access way (at the southern extent of the proposal area) that serves as a thoroughfare for pedestrians accessing the town centre from Butler Street. The thoroughfare would be formalised as part of the works. During construction, the walking thoroughfare between Butler Street and Woolworths would remain accessible to pedestrians. There may be occasional changes to the path alignment during different stages of the work, however all attempts will be made to minimise this occurrence.

Is consultation with council or other agencies required under clauses 13-16 of the Infrastructure SEPP?	
	Approximately 70 informal parking spaces along Butler Street would be lost upon commencement of the construction stage of the proposal. These parking spaces would not be reinstated. However, there are about 250 car parking spaces at Butler Street Reserve, just north of the proposal area. During several site inspections, it was noted that the existing car park facilities at the reserve are not heavily utilised during weekdays (1-3 cars parked within the reserve at any one time). For this reason, the proposed works are not expected to adversely impact the availability of parking in the area.
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance? Agency – Byron Shire Council	Yes. The proposal would involve minor excavation of the road as a result of driveway connections. The proposal would involve the reformation of the partially sealed informal pedestrian thoroughfare that extends between Butler Street and the Woolworths parking lot. As this thoroughfare is not sealed, however, the works would not constitute more than a minor excavation.
Are the works located on flood liable land? If so, will the works change flooding patterns to a more than minor extent? Agency – Byron Shire Council	No. The proposal is not located on flood liable land as per 'Belongil Creek Flood Planning Levels' (BMT WBM 2015)
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation item in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than minor or inconsequential? Agency – Byron Shire Council	Yes. The proposal area contains a locally-listed heritage item, *Former Railway Water Tower* (Item # I064). The proposal is also located within two locally-listed heritage conservation areas; Burns Street Conservation Area (C002) and Railway Precinct Conservation Area (C004). A SoHI has been prepared for the proposal. The proposal seeks to

Is consultation with council or other agencies required under clauses 13-16 of the Infrastructure SEPP?	
	reinstate and stabilise the existing water tower, and would not impact on either conservation area.
Are the works located on land that is within a coastal vulnerability area? If so, are the works inconsistent with a certified coastal management program that apply to the land on which it is located? Agency – Byron Shire Council	No. The proposal is not located within a coastal vulnerability area.
Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974?* Agency – NSW Office of Environment and Heritage (OEH)	No.
Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone? Agency – OEH	No. The proposal is located on land zoned as SP2, R2 and RE1 under the Byron LEP.
Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994?* Agency – Marine Parks Authority	No.
Are the works adjacent to a declared marine park under the *Marine Estate Management Act 2014?* Agency – Department of Industry	No.
Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998?* Agency – Sydney Harbour Foreshore Authority	No.
Do the works involve the development of a fixed or floating structure in or over navigable waters? Agency – Roads and Maritime Services	No.
Are the works for the purpose of residential development, as educational establishment, a health services facility, a correctional facility or group home in bush fire prone land? Agency – NSW Rural Fire Service	No.
Are the works located on land within the dark sky region as identified on the dark sky region map? If so, will the works increase the amount of artificial light in the night sky?	No.

Is consultation with council or other agencies required under clauses 13-16 of the Infrastructure SEPP?	
Agency – Director of the Observatory	
Are the works located on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument? Agency – Secretary of the Commonwealth Department of Defence	No.
Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*? Agency —the Mine Subsidence Board.	No.

The above table has identified that consultation with Byron Shire Council is required under the ISEPP as the proposal may involve:

- Connection to a council owned sewerage system
- Connection to a council owned water supply system
- Installation of a temporary structure on, or the enclosing of, a public space which is under local council management or control
- The presence of a local heritage item (that is not also a state heritage item) or a heritage conservation item within the proposed area of works
- Minor excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance.

Sydney Trains has participated in ongoing consultation with Council, in particular regarding the development of the concept design and location of the proposed interchange.

As discussed in section 1.2, the majority of the proposal area is located on a parcel of land owned by TfNSW, however a small section of the western boundary of the proposal area, adjacent to the road corridor is owned by Byron Shire Council. Sydney Trains has received an in-principle agreement with Council to utilise this area for the proposed interchange (Appendix I).

Byron Shire Council was invited to comment in a letter dated 20/11/2018. The letter provided an overview of the proposed works and a copy of the SOHI. Correspondence from Council regarding information contained within the letter can be found at Appendix J.

4.1.2 Other Agency and Community Consultation

As the works would occur within the curtilage of an area listed on the NSW State Heritage Register and are not considered exempt, an application in accordance with section 60 (s60) to the NSW Heritage Council for approval.

SMEC has been in consultation with NSW Heritage Council since May 2018. The SOHI was provided the NSW Heritage Council as part of the s60 application process. Conditions of the s60 approval were received April 2019.

Submissions were received by Sydney Trains from various stakeholders within the Byron Bay community. Issues raised related to impacts of the project, including environment, heritage, the location of the proposal and traffic. Sydney Trains reviewed submissions and in response, have developed an additional community consultation strategy. While it is not a

legal requirement of the proposal, SMEC have been engaged to undertake further formal consultation for the proposal beginning May 2019. The objectives of the consultation process would be to:

- Provide the community and stakeholders with clear instruction about what feedback Sydney Trains is seeking, when, and why
- Be honest and upfront about previous engagement and the objectives of this new wave of consultation
- Provide clear instruction on how this feedback can be supplied and of its intended use
- Operate transparently, honestly and with the utmost respect for the community and its stakeholders
- Engage in a collaborative, innovative, adaptive and sustainable manner.

5 Environmental Impact Assessment

5.1 Assessment of applicable environmental factors

A scoping exercise has been completed for the proposal. The scoping exercise has considered the potential environmental impacts of the project to identify those environmental factors requiring environmental impact assessment within this REF. The environmental factors relevant to the project are summarised in Table 5-1. For environmental factors that do not require further environmental assessment standard control measures are identified in section 7.

Table 5-1: Applicable environmental factors

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
Non-Aboriginal heritage	The proposal area is located within the *Byron Bay Railway Station and yard group*, which is listed on the SHR (Item #01107) and RailCorp section 170 Heritage and Conservation Register. The proposal area also contains a locally-listed heritage item, *Former Railway Water Tower* (Item # I064), listed on the Byron LEP 2014. Two locally-listed conservation areas are also present within and adjacent to the proposal area; *Railway precinct, Byron Bay Conservation Area* and *Burns Street Conservation Area* A SOHI was prepared for the proposal (Appendix A). The SOHI concluded the proposal would not have any substantive adverse impact on heritage significance.	Yes	☒	Section 5.2, SOHI (Appendix A) and standard control measures in section 7
		No	☐	
Noise and vibration	Residential receivers are located to the south west and west of the proposal area. The town centre and commercial premises are located to the east. Construction impacts associated with the proposal are expected to be minor given that the majority of works would be conducted during standard hours and temporary screening would be erected along the western boundary.	Yes	☒	Section 5.3, Operation Noise Assessment (Appendix B) and standard control measures in section 7
		No	☐	

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
	Operational noise levels associated with the proposal in isolation would result in minor exceedances of NPI noise criteria by up to 2 dB at the nearest receivers along Butler Street. During average traffic conditions, noise levels are predicted to comply with the NPI criteria at all affected sensitive receivers. In conjunction with the operation of the future bypass, the operational noise levels associated with the proposal were found to be negligible. This is discussed further in section 5.3.			
Biodiversity	The proposal would involve the removal of all vegetation at the proposal area. This would involve the removal of removal of 0.46 ha of native vegetation, including 0.22 ha of an EEC listed under the BC Act. The BAR at Appendix C concluded that the proposal is not likely to have a significant impact on EECs or threatened species. Mitigation measures, including offsets have been recommended to minimise the potential impacts of the proposal on threatened vegetation and species. This is discussed further in section 5.4.	Yes	☒	Section 5.4, BAR (Appendix C) and standard control measures in section 7
		No	☐	
Landforms, geology and soils	The proposal would require minor earthworks to enable the construction of the bus interchange and associated buildings The proposal has the potential to have minor erosion and sedimentation impacts through the exposure of soils during construction. The proposal would not be expected to expose any acid sulfate soils.	Yes	☒	Section 5.5 and standard control measures in section 7
		No	☐	

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
	With the implementation of erosion and sedimentation controls potential erosion and sedimentation impacts would be appropriately managed. This is discussed further in section 5.5.			
Water quality and hydrology	An assessment of the 'Belongil Creek Flood Planning Levels' has been prepared previously by BMT WBM (May 2015) which includes the proposal area. The proposal area is not located within the 1 in 100-year flood level. The proposal would increase the amount of hardstand and permeable surfaces within the proposal area however a proposed drainage system would manage on-site flows. Based on the drainage assessment the proposal would not have adverse impacts on the local flooding.	Yes	☒	Section 5.6 and standard control measures in section 7
		No	☐	
Air quality	During construction there is a minor potential for the release of dust from earthworks and from vehicle /plant emissions. During operation, the proposal would relocate the existing bus services approximately 80 m to the west, from Jonson Street to the proposal area. The operation of the proposal promotes the use of bus facilities within the Byron Bay area, connecting residents and visitors with local commercial centres and residential areas. Overall the proposal would provide alternative, less polluting methods of transportation to the community and is unlikely to impact the surrounding air quality. Appropriate control measures would be implemented during	Yes	☐	
		No	☒	Standard control measures in section 7

Environmental Factors	*Comments*	*Detailed discussion in REF?*		*Where?*
	construction and operation of the proposal to mitigate potential impacts to air quality.			
Aboriginal heritage	An Aboriginal Heritage Due Diligence Assessment was prepared for the proposal (Appendix D). The assessment concluded that no known cultural materials either within or in close proximity to the subject area, and a high level of previous ground disturbance, which has significantly reduced the potential for Aboriginal objects or deposits to survive if they were ever present. A search of the AHIMS database in November 2018 indicated that there are no Aboriginal sites at the proposal area (Appendix E). The proposal is unlikely to impact on any Aboriginal heritage sites and would include the implementation of Unexpected Finds Procedures (listed in section 7) to mitigate any potential impacts to Aboriginal heritage.	Yes	☐	
		No	☒	Aboriginal Heritage Due Diligence Assessment (Appendix D), AHIMS (Appendix E) and standard control measures in section 7
Contaminated land and hazardous materials	A search of the NSW EPA Contaminated Land records on 16 May 2019 indicated only one site is considered to be located in close proximity to the proposal area. 'Butler Street Reserve' is located approximately 30m to the north east of the proposal and is currently listed as 'Under Assessment'. A preliminary site investigation (PSI) was conducted at the proposal area (Appendix F). Based on the results of the PSI including soil and groundwater laboratory analytical results, the PSI concludes that remedial action is not required with regard to soil and/or groundwater contamination.	Yes	☒	Section 5.7, PSI (Appendix F), Standard control measures in section 7
		No	☐	

Environmental Factors	*Comments*	*Detailed discussion in REF?*		*Where?*
	The PSI recommends that any construction activities be managed via an Unexpected Finds Protocol included as a sub-plan for the Construction Environmental Management Plan (CEMP) during site construction works. This is discussed further in section 5.7.			
Waste management	The majority of waste generated from the proposal would arise from the excavation of residual soil that is unable to be reused on-site, green waste and the removal of buried rail infrastructure (where encountered). All waste would be disposed of responsibly, in accordance with the POEO Act and other relevant legislation.	Yes	☒	Section 5.7 and standard control measures in section 7
		No	☐	
Visual aesthetics and urban design	The proposal would change the visual nature of the proposal area. The visual impact is higher in areas that are located close to the proposed interchange and in more sensitive residential areas. The urban and landscape design proposed for the proposal has been developed to be sympathetic to the surrounding landscape, including where feasible the retention of existing mature trees and the planted areas. This is discussed further in section 5.8.	Yes	☒	Section 5.8, Landscape Character and Visual impact Assessment (LCVIA) (Appendix G) and standard control measures in section 7
		No	☐	
Traffic and access	The proposal would result in adjustments to traffic flows in and around the Byron Bay town centre, primarily as a result of the redistribution of traffic, with bus and shuttle services able to avoid the busy town centre. During construction there would be slight increases to traffic in the locality due to the transportation of materials and machinery however	Yes	☒	Section 5.9, Bus Bay Capacity Assessment (BBCA) (Appendix H) and standard control measures in Chapter 7
		No	☐	

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
	this would be conducted outside of peak times to avoid congestion. The construction of the proposal would not impact on local roads, as the majority of works would be wholly contained within the proposal area. During construction, the walking thoroughfare between Butler Street and Woolworths would remain accessible to pedestrians. There may be occasional changes to the path alignment during different stages of the work, however all attempts will be made to minimise this occurrence. The operation of the proposal would alleviate traffic congestion along Jonson Street by relocating bus and shuttle services outside of the town centre. However, the proposal would increase the volume of traffic currently utilising the existing road network along Butler Street, potentially affecting local residents accessing adjacent properties.			
Socio-economic effects	During construction, there would be minor disruption to pedestrians accessing the informal path connecting Butler Street to the town centre. Construction would also involve the removal of car parking spaces along the pedestrian thoroughfare, along the western boundary adjacent to Butler Street and within the existing car park to the south near Woolworths. Approximately 70 informal car spaces would be lost during construction. These spaces would not be reinstated. The operation of the proposal would have positive impacts for the community by improving the accessibility to bus services and thus enabling a larger proportion of the community to use public	Yes	☒	Section 5.9 and standard control measures in Chapter 7
		No	☐	

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
	transport. The provision of facilities such as kiss and ride bay and a taxi bay would also allow customers to shift between different modes of transport with ease. During construction, the walking thoroughfare between Butler Street and Woolworths would remain accessible to pedestrians. There may be occasional changes to the path alignment during different stages of the work, however all attempts will be made to minimise this occurrence. Overall, on balance the proposal would benefit the Byron Bay community and all customers using the bus services to access and depart from Byron Bay.			
Demand on resources	The resource management hierarchy principles embodied section 3(b) of the *Waste Avoidance and Resource Recovery Act 2001* would be adopted for the proposal. The proposal would not require the use of any resources that are, or likely to become, in short supply.	Yes	☐	
		No	☒	Standard control measures in Chapter 7
Cumulative environmental effects	The proposal is one of several key road and infrastructure projects occurring in the Byron Bay LGA. The aim of the upgrades is to deliver accessible, modern, secure and integrated transfer infrastructure while also providing easier travel connections and access to the different transport services. The projects are also in response to the strategies listed in the Byron Bay Town Centre Master Plan (Byron Sire Council 2016) including one of the key objectives to redirect traffic away from the centre. Short-term cumulative impacts are anticipated due to the concurrent nature of the projects however	Yes	☒	Section 5.11 and standard control measures in Chapter 7

Environmental Factors	***Comments***	***Detailed discussion in REF?***		***Where?***
	long-term impacts are anticipated to be beneficial on balance by improve the experience for public transport customers by allowing for greater accessibility, improved interchange facilities, safety improvements, signage improvements and maintenance improvements.			

5.2 Non-Aboriginal heritage

A SOHI was prepared by Extent Heritage Pty Ltd (Extent) for the proposal in November 2018 (refer to Appendix A). The purpose of the report is to assess the potential impacts of the proposal on the heritage significance of the *Byron Bay Railway Station and yard group*, which is a place of state heritage significance listed on the NSW State Heritage Register (SHR).

The SOHI was prepared in accordance with the principles and definitions as set out in the guidelines to *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* and the latest version of the Statement of Heritage Impact Guidelines (2002), produced by the OEH.

5.2.1 Existing environment

The proposal area is located between the Byron Bay railway station to the east and Butler Street to the west, on Lot 4729 in DP1228104.

In the 1890's the proposal area was used as a 'Loco Service siding' to the railway station, west of the main line. The area was equipped with the key elements necessary for facilitating steam locomotives including a water tower, coal stage, ash pit and turntable. Later, the loco siding was used for loading and unloading live animals, usually pigs.

As discussed in section 3.3.2, the proposal area is included within the heritage curtilage of the *Byron Bay Railway Station and yard group*, which is listed on the SHR (Item #01107). In addition, the *Byron Bay Railway Station and yard group* is listed on the CRN Heritage and Conservation Register (Item 01107).

A number heritage items and conservation areas listed in 'Schedule 5 - Environmental Heritage' of the Byron LEP 2014 are located in close proximity of the proposal area. The only heritage items located within the proposal area is the locally-listed '*Former railway water tower'* (#1064). The location of heritage items is provided in Figure 3-2.

Despite not being individually listed, a number of other historic features and elements were identified on or in the ground at the proposal area including:

- The circle of brick/concrete at ground level which is the top of the wall of the turntable pit
- The concrete slab pier on the north side of the turntable pit
- The large concrete slab pier on the southern side of the turntable pit, outside of the fence within the side road
- A concentration of coal ash in the soil in the vicinity of the location of the ash pit
- Scatters of old rail and remains of railway fence lines
- The turntable pit and concrete piers are related items, with the concrete piers supporting the railway track where it crossed over the edge of the pit.

These items are discussed in further detail in the following sections and illustrated in Figure 5-4.

Former railway water tower

Several types of water tanks were used on the NSW railway system to facilitate steam locomotives, varying depending on the era, local conditions and the economics of the individual lines. No estimate of the total number of water tanks erected in NSW has been attempted but, based upon existing knowledge, it would be in the vicinity of approximately two hundred.

The water tower at Byron Bay is a circular steel tank on a brick tower. This type of water tank was built between 1892 and 1898 and had two variants, only twelve of the first type (including Byron Bay) and six of the second type were built. Of the eighteen water tanks originally built, Byron Bay is one of three survivors and one of two of the more numerous sub-type.

This water tower is the most prominent of the surviving examples of its type in relation to its urban context, where it is a minor local landmark within the township of Byron Bay (Figure 5-1 and Figure 5-2). It provides evidence of the early period of the operation of the Casino – Murwillumbah Railway Line, when Byron Bay was one of the larger stations on the line, with locomotive service and refuelling facilities.

Figure 5-1: Pigs being loaded onto a train at Byron Bay circa 1930s (Source: J. Hackett via Byron Shire News 12/06/2016)

Figure 5-2: Byron Bay Railway Station and water tower in the 1970s (Source: EJ Wright Collection – Richmond Tweed Regional Library)

The water tower is a circular steel tank on a brick tower 6.5 m in height, surmounted by a riveted wrought iron water tank of 6.4 m diameter and 3.3 m height. The brick tower has expressed pilasters framing eight recessed panels, with a strong, simple cornice around the top. Every second panel features a semi-circular arched opening, each with two rows of brick voussoirs, infilled with wire mesh, with the one on the eastern side larger in dimensions to form a person opening.

Currently, the interior of the brick tower is empty, with only the base of the tank and the pipework visible overhead. Exterior pipework is located on the eastern side, with the outlet pipe projecting through the brickwork at approximately 4 m above ground and the inlet pipe running from ground level up the side of the tower and tank to the top of the tank.

The brickwork is generally in good condition except around the cornice, where vegetation has become established in the mortar of the coping and between bricks. The steel plates of the tank are very corroded, with many pinholes in the sides.

Evidence of corrosion and deterioration of the brick work is demonstrated in Figure 5-3.

Figure 5-3: Evidence of corrosion of the upper horizontal tank and deterioration in the brick work (Extent 2018)

The Turntable Pit

The turntable located at the proposal area was a 15.4 m diameter railway turntable, comprising a central iron or steel bridge revolving on a central pivot and an outer circular rail. In this case, the turntable was specifically for the purpose of reversing the direction of locomotives and a single line of track approached the turntable from the northern side. A short length of track is shown on drawings on the opposite (south) side, provided as an end siding for flexibility on working the locomotives on and off the turntable.

The turntable bridge is missing and the pit has been filled with soil to its uppermost level, leaving only a circle of bricks and concrete visible in the ground. Consequently, it is unknown what remains within the pit. Typically, turntable pits had a slightly concave conical concrete floor with the pivot bearing in the centre and an outer circular rail, which may be located on the floor or may be located on a step on the outer wall.

To support the weight of the locomotive, the railway track at the edges of the pit was supported by sturdy piers. At Byron Bay, these piers are of mass concrete, approximately 2 m long and 30 cm thick, with the height above present ground level indicating that the track was carried on an embankment which has subsequently been removed.

Possible Ash Pit

An ash pit is shown on historic plans for the proposal area, located adjacent to the water tower. Ashes were typically hot and were characteristically dropped into a brick-lined pit excavated below the railway track, between the rails. The size of the pit varied according to the typical size of engine being serviced and the frequency of use.

During the site inspection, there was no obvious evidence of a brick structure visible at ground level at the proposal area, although there was a distinct concentration of coal ash observed in the location shown in Figure 5-4. The ash pit may have been removed or may be buried.

Scattered artefacts

At the proposal area various items of railway origin were noted as scattered artefacts. These included a collection of old rails sitting on the ground, pieces of rail used as fence posts and odd pieces of track furniture. No obvious evidence of the coal stage was observed, nor was any other structure, such as the stockyards and races or the pump house or well.

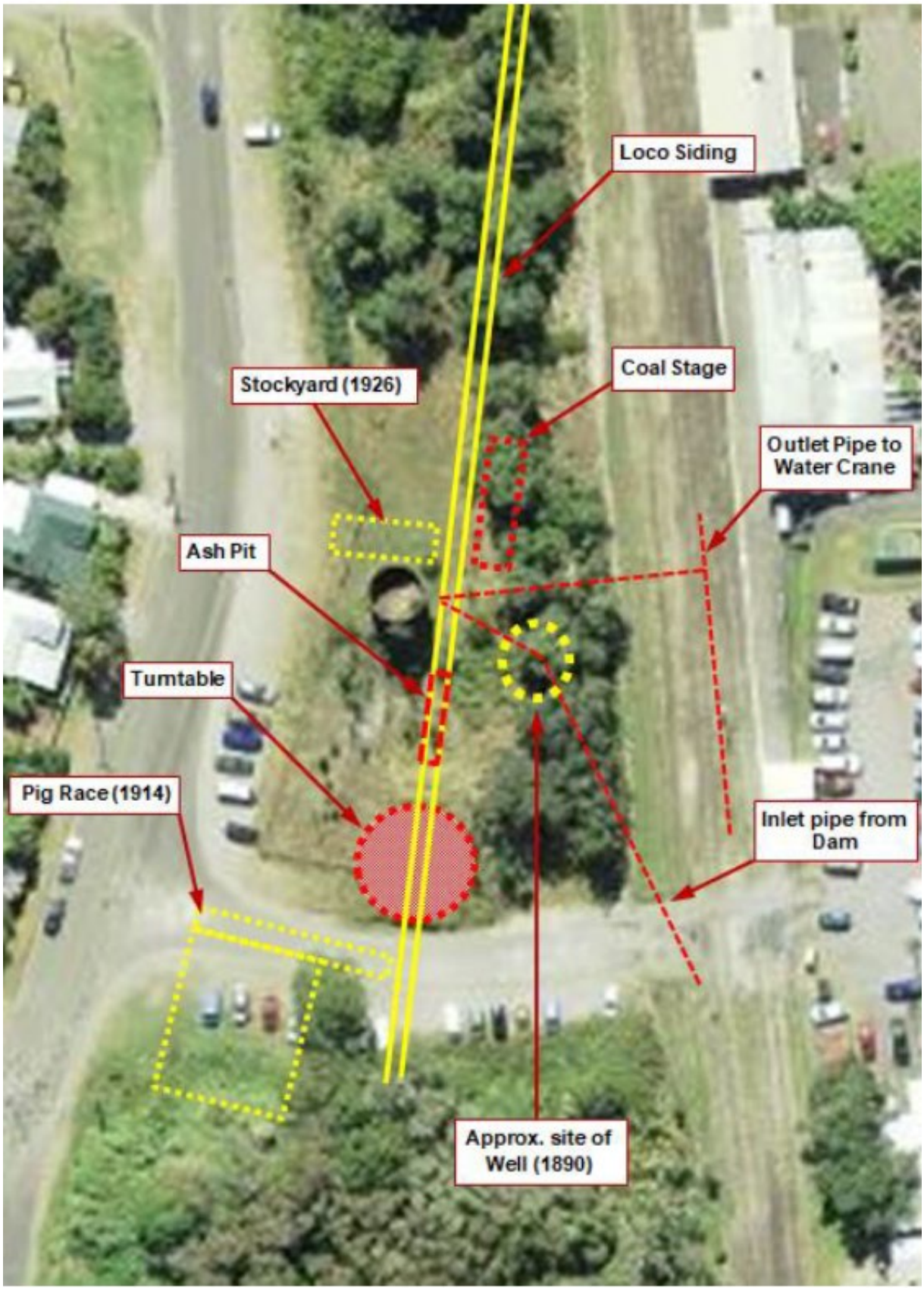

Figure 5-4: Overlay demonstrating locations of former structures within proposal area (Extent Heritage 2018a)

Conservation Management Plan

The *Byron Bay Draft Conservation Management Plan 2018* (Extent 2018b) provides an assessment of relative significance levels for Byron Bay Railway Station and its components. Three elements within the proposal area have been ranked in terms of significance (refer to Figure 5-5), these are:

- Water tower; exceptional significance
- Turntable: little significance
- Landscape and plantings; little significance.

Other elements within proposal area may include the possible surviving evidence of the ash pit, the coal stage, the stockyards and any surviving evidence of earlier water supply arrangements.

The presence of an ash pit and coal stage within the area of the works is shown on early plans but the nature and extent of any remaining evidence of these structures is unknown. The coal stage was a timber structure standing on timber posts and is likely to have been completely removed at the time of its demolition. Similarly, the stockyards and races were timber structures standing on timber posts and are likely to have been completely removed at the time of their demolition.

All of these elements are relatively common throughout the NSW Railway system and are generic to steam-locomotion world-wide (Extent, 2018b).

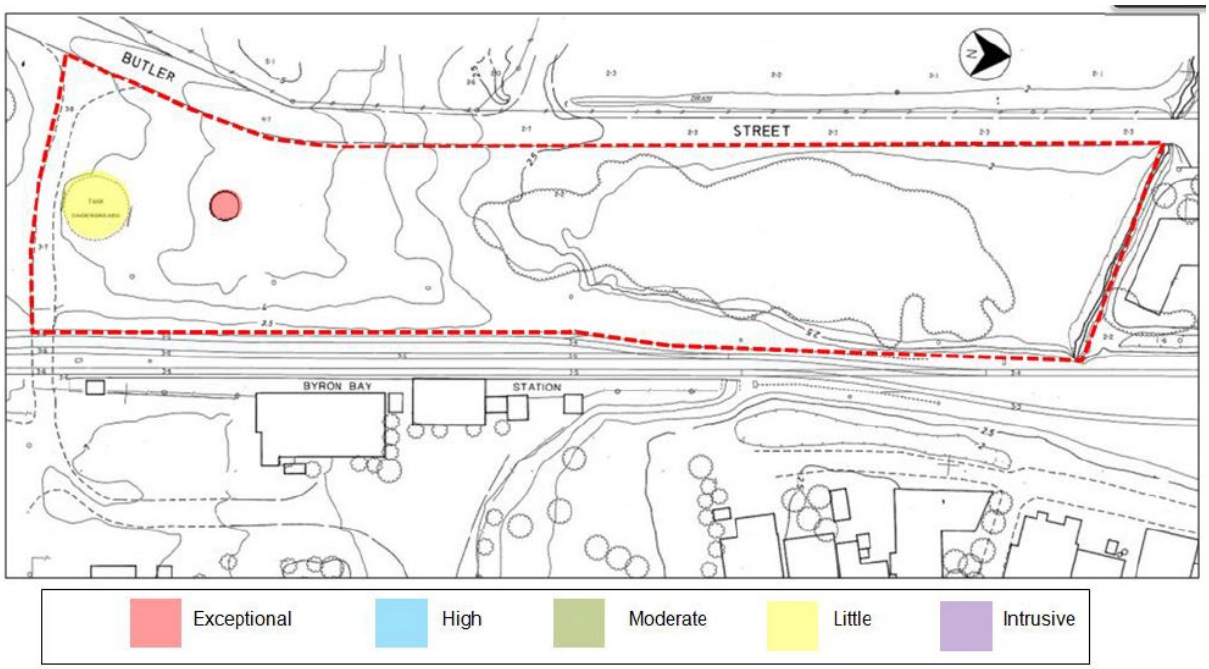

Figure 5-5: Significance of two physical elements; water tower and turntable remains (Extent Heritage 2018b)

5.2.2 Potential Impacts

The proposal would involve the following activities:

- Vegetation clearing
- Earthworks

- Installation of road elements
- Erection of interchange structures
- Canopy structures.

Construction would involve works in close vicinity to the water tower. In its current condition (refer to Figure 5-3), the water tower would most likely be adversely affected and potentially undermined by earthworks and associated vibrations. In order to protect the water tower during construction and operation and to ensure the safety and security of the structure, it first must be stabilised.

A structural assessment has been completed by SMEC to confirm the stability of the water tower, as well as under construction loading such as ground excitations induced by concrete vibration. Consequently, prior to the commencement of major works, a remediation program is proposed for the water tower.

Construction

Water tower (Masonry)

The following remedial works have been identified:

- Remove intrusive vegetation, repair brickwork / reset loose bricks / repoint brickwork as required / re-render copings
- Heli-bar stitching required for cracking through wall in two locations:
    - Below the cast iron pipe bearing on the brickwork (above the entry)
    - Vertical cracking at the top of the wall above the second window
- Remove graffiti / remove rubbish from tower exterior and interior
- Remove rubbish, trees and loose rust and mud from interior of tank
- Seal window and door openings with new wire frames, securely fixed to prevent removal and to exclude entry
- Remove loose (40 mm) 2 inch gal pipe and other loose sheet metal
- Stabilise exterior (80 mm) 4 inch cast iron pipe near top of tank.

Steel tank

The steel tank appears structurally stable under permanent actions, despite its poor physical condition. Stability is yet to be assessed under ultimate wind and earthquake loading, as well as under construction loading (the adjacent development could lead to ground excitation from concrete vibration).

The following activities are recommended to stabilise the rate of corrosion of the tank:

- Remove all loose scale by wire brush. Abrasive blasting should not be undertaken as the tank wall is not thick enough for this treatment
- Remove any existing loose paint noting that this paint is likely toxic lead paint and would need to be contained and disposed of safely
- Treat all surfaces with phosphoric acid
- Prime and paint all metal surfaces with an oil based weather resistant coating system. The paint system has a design life of 10 years and with regular touch up after that could make 20 years.

The tower will need to be completely stabilised with a scaffold or similar. The current condition of the tank floor is not weight bearing and workers will need to be suspended from an Elevated Work Platform for work within the tank.

Tank rim

The corrosion rate is estimated at 0.11mm per year (assuming the first perforations appeared in 1990). It is estimated the section loss at the rim is ~30%. A 'do nothing' option would eventually result in complete corrosion of the rim and it would become dislodged.

Based on the observed percentage of corrosion, it is recommended to bolt or weld discrete fin plates to stabilise the tank rim. Introduction of fin plates would also likely be beneficial in bracing the tank against lateral buckling. Welding involves the use of additional metal added to the joint and is likely, in this instance, to result in a lower level of material impact than the use of bolts through drilled holes

Tank floor

The floor of the tank is effectively disconnected from the sides of the tank but is supported by the central (180 mm) 9 inch cast iron outlet pipe, with some lateral stiffness provided by the branch pipe to the exterior of the tower. This arrangement appears to be stable for the present, however, the below-ground arrangement of the pipework has not been determined and, for this arrangement to be relied upon, the lower end of the pipe should be checked for its stability in the ground.

Two options for repair are proposed to remediate the tank floor, these are:

- Option 1: Leave floor in place and attach fin plate connection between tank walls and floor (2 per each radial member) using welded or bolted connections. The central pipe would need to be structurally assessed to confirm stability in its current arrangement (Figure 5-6).

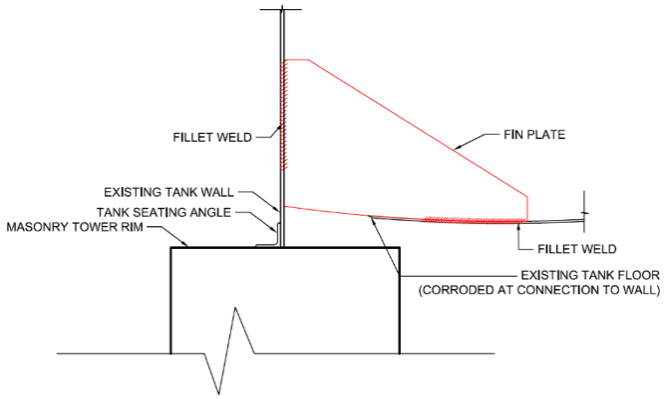

Figure 5-6: Option 1 – retention of tank floor

- Option 2: Remove floor and laterally restrain the tank – Steel C sections are proposed to stabilise the central cast iron pipe and brace the tank walls at the base. A ring beam option may also be feasible depending on the stability of the central pipe and degree of bracing required (to be confirmed based on structural assessment) (Figure 5-7).

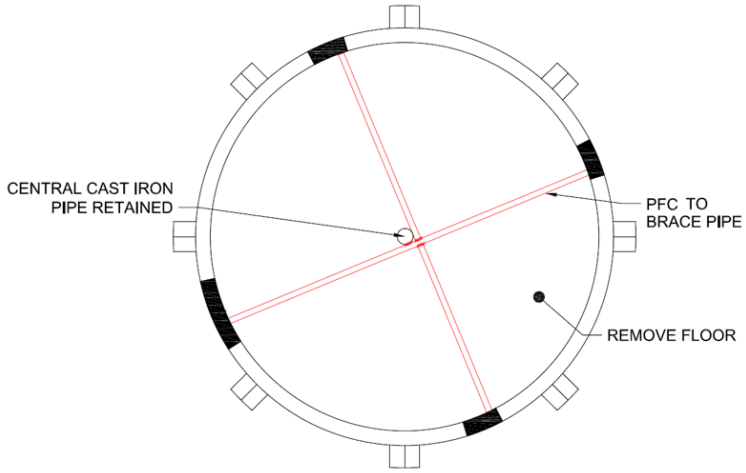

Figure 5-7: Option 2 – removal of tank floor

Both options are considered sympathetic from a heritage perspective. The tower appearance/ fascia would not be modified as a result (all works proposed are internal). Option 2 does involve the loss of some of the original fabric of the tank and the understanding of how the tank base was originally constructed. Based upon this analysis, Option 1 is preferred from a heritage perspective, however Option 2 has constructability, cost and future management advantages.

Tank drainage

Three pipes have been identified at the water tower:

- A 50 mm diameter retrofitted galvanised pipe up external side of eastern face (non - heritage)
- A 100 mm diameter cast iron pipe up external side of eastern face (considered to add to the heritage significance)
- A 250 mm diameter central cast iron pipe (considered to add to the heritage significance).

The central tank outlet pipe is approximately 100 mm above the floor of the tank. As the tank floor is spherically concave, rainwater has no means of escape and must evaporate, with consequent corrosion of the metal. In order to ensure that stormwater is directed into the drain pipe, it is proposed to install a block-out in tank. It will be necessary to determine where the current outlet of the drain pipe is located and the ultimate destination of the stormwater.

The following remediation strategies are proposed to the tower pipework assuming the tank floor is retained (Option 1 above):

- Introduce a blockout at the top of the central pipe so that water can drain. The subsurface drainage arrangement would need to be determined to confirm this pipe is connected to the main drainage system
- Confirm stability of central cast iron pipe following determination of subsurface arrangement
- Remove the loose 50mm galvanised steel pipe and brackets
- Stabilise and retain the exterior 100 mm cast iron pipe near top of tank using a typical post fixed bracket
- Potential to install a rubber expansion joint around the pipe penetrating the wall to allow thermal expansion of pipe.

The following remediation strategies are proposed to the tower pipework assuming the tank floor is removed (Option 2 above):

- Stabilise central cast iron pipe (bracing proposed). The internal foundation of the tower is assumed to comprise packed earth and is free draining
- Remove the loose 50mm galvanised steel pipe and brackets
- Stabilise and retain the exterior 100 mm cast iron pipe near top of tank using a typical post fixed bracket
- Potential to install a rubber expansion joint around the pipe penetrating the wall to allow thermal expansion of pipe.

Stormwater

As the floor of the tank has separated from the walls of the tank at the tank wall, stormwater is not retained in the tank and overflows the floor into the space within the tower or runs down the tank walls onto the inner brickwork of the tower. Attention should be given to management of stormwater within the tower. The following points would need addressing:

- The brickwork at the top of the tower, inside of the tank walls, was not designed for water run-off (as it was on the exterior). Depending upon detailed inspection and assessment, the top edge of the brickwork should be rendered with a coping or a form of flashing installed to direct water runoff over the edges and down the walls
- The inner walls of the tower are painted, however, the paint coating is in poor condition. To minimise the effects of stormwater on brickwork, this coating would be made good
- The floor of the tower appears to be packed earth and appears to be free-draining. At this stage, no works are proposed to the floor within the tower.

These remediation works would result in a physically stable structure which would be safe for the public to be in its vicinity. These works do not propose any adaptation or alteration to the current structure. In this condition, there would be no public access into the tower and signage to this effect would be installed.

Other elements - construction

The proposed works would require removal of the remnant evidence of the former turntable, primarily the two concrete piers and the brick and concrete surrounds of the turntable pit. These items were generally common and generic facilities associated with steam locomotion, the elements discussed above have heritage value primarily as part of an assemblage of railway elements in a local context, rather than as individual items (Appendix A).

The former are concrete monoliths which may be able to be removed as complete elements and retained for interpretation purposes. The existence of the turntable pit is inferred from the visible ring of brick and concrete at ground level but the nature and extent of the remains of the turntable pit are unknown at this time. In view of the absence of the turntable's major element, the locomotive bridge, the removal of its vestigial remains represents a minor adverse impact (Appendix A).

Operation

As outlined in the SOHI (Appendix A), there are two primary reasons for the proposed construction of the bus interchange in this location. The first and most compelling is that the present bus terminal is on Jonson Street, on the eastern side of the railway station and is both affected by, and a cause of, significant traffic congestion, both pedestrian and vehicular, in what is the effective town centre of Byron Bay. Relocation of the bus and coach services to

the western side of the railway station will be a significant contribution to improving the levels of traffic congestion currently experienced in Jonson St and at nearby intersections. The proposed location has the advantage of being in close proximity to the current bus terminal and will not require any relocation of the associated travel information, ticketing and amenities facilities.

The proposed works have been formulated in the knowledge of and to be consistent with the proposed future town centre bypass to be developed with a southwards extension of Butler Street. This bypass will, when built, provide a more substantial carriageway and will have a more modern form and arrangements than the current roads, which have evolved from lightweight local facilities. In this respect, the future Butler Street roadway and its intersections will be better suited to the operation of larger coach services. The town centre bypass will also provide a better entrance and exit route for buses and coaches operating to and from Byron Bay.

A supporting motivation is that while the proposed interchange site houses heritage items, the area is currently unused and has become overgrown with invasive species and weeds over past two decades. It has also had a history of both illegal garbage dumping and 'bush' camping. The use and activation of this area would address what is currently a problem area within the town environs (Extent, 2018b).

The proposed works would have a minor adverse heritage impact upon the surviving evidence of the turntable and possibly also any buried evidence of other structures but, overall, the impact upon the significant fabric of *Byron Bay Railway Station and yard group* would be negligible. The remedial works would improve the physical condition and future conservation of the water tower and would return it to a position of prominence within the townscape. The concrete monoliths at the north and south of the turntable pit are to be retained for interpretation purposes and included in the interpretation plan. This will ensure that the proposed works are in accordance with Policy 13 of the Byron Bay Draft Conservation Management Plan.

The loco siding area of Byron Bay Railway Station was, until the late twentieth century, a cleared area whose lack of use has seen regrowth of native and exotic vegetation over the last two decades. There are no landscape elements of heritage significance in this area. The traditionally vegetated areas, to the north up to the Byron Motor Lodge Motel and south beyond the present informal side road, will not be affected to any significant degree by the proposed works. The current regrowth vegetation within the proposal are may function as a screen, essentially shielding residential properties along Butler Street from views of the town centre. The removal of regrowth vegetation would likely reduce the amount of visual protection experienced at these residences. Arguably; the removal of the unkept native and exotic regrowth could also be seen to reinstate views across the proposal area from either side, resulting in a key visual linkage for the town.

The reactivation of the area as an active public transport centre is consistent with the heritage values of Byron Bay Railway Station and would reinvigorate the vicinity as an important locality within the town. The creation of a new level of public activity in its vicinity of the water tower may also lead to opportunities for its adaptive reuse or, at least, a more active interpretation of its history and significance.

The proposed canopy over the bus terminal loading area is a minor structure which has been designed to fit unobtrusively into the existing visual landscape. It would be a roof structure carried on steel posts and existing views would be maintained through and around it, with decorated translucent panels between columns providing some weather protection and playing a role in the interpretation for the proposal area through the use of railway-themed silhouettes. The soffits of the roof would feature timber panelling, to reflect the timber character of the railway station buildings. The shapes, pitches and angles which form the canopy roof have been selected to be compatible with the existing angles, roof pitches and

rectangular shapes of the railway station buildings and the visually-predominant materials are selected to be unobtrusive yet consistent with the timber-fabric of the railway buildings.

The second canopy over the drop-off zone is similar in form and materials, yet of smaller overall dimensions, and would have a similarly minor impact upon views within and across the proposal area. The small amenities block adopts the same design-character, with dark, plain walls and a simple skillion roof but the primary visual elements would be its timber roof soffit, timber sight-screen and feature wall on the western side. The proposed location of the amenities building is not in the vicinity of any known prior structures and is beyond the end of the railway operations area.

5.2.3 Control Measures

Based upon the analysis and conclusions carried out above, the following recommendations and conclusions should be considered:

- Undertaken works in accordance with the SOHI and ALL conditions outlined in the NSW Heritage Council s60 approval (Appendix A).
- If unexpected archaeological deposits or relics not identified and considered in the supporting documents (SOHI and s60), work must cease in the affected area(s) and the Heritage Council of NSW must be notified. Additional assessment and approval may be required prior to the works continuing in the affected area(s) based on the nature of the discovery. The Sydney Trains Project Manager and Environment Division are to be notified.
- Final works design will include provision to undertake remedial stabilisation works to the brickwork and ironwork of the water tower prior to other works
- The water tower will need to be adequately protected during construction works
- Excavation works at the proposal area will be undertaken in the presence of an archaeologist to observe and record the remnants of the turntable and possible remnants of the ash pit and footings of the coal stage
- The proposal and associated landscaping will include interpretation information regarding the water tower, the railway station and the history of the Byron Bay region.

5.3 Noise and Vibration

The following section summarises the construction, operational and cumulative noise impacts for the proposal.

Methodology

Construction noise and vibration has been assessed in accordance with *Interim Construction Noise Guideline* (DECC 2009) and the *Maintenance Quantified Noise and Vibration Assessment tool (MQNVA)* (Sydney Trains EMS-09-FM-0166 Version 1.4)

An Operational assessment prepared by Pacific Environment (Appendix B) has been assessed in accordance with the *NSW Government's Noise Policy for Industry* (NPI) (EPA 2017).

Criteria for the assessment of road traffic noise are set out in the *Road Noise Policy* (RNP) (DECC 2011). Traffic associated with the proposal would generally be associated with traffic accessing the interchange from Butler Street. This assessment has been undertaken on the assumption that the condition of Butler Street has been upgraded by the bypass.

For existing residences affected by additional traffic on existing roads generated by land use developments, the criteria, applicable at 1m from the façade, are shown in Table 5-2.

Table 5-2: Road Traffic Noise Criteria, $L_{Aeq(period)}$, dB(A) (source: Pacific Environment 2018)

Type of development	***Day 7.00 am to 10.00 pm***	***Night 10.00 pm to 7.00 am***
Existing residence affected by additional traffic on arterial roads generated by land use developments	60 $L_{eq(15hr)}$	55 $L_{eq(9hr)}$
Existing residence affected by additional traffic on local roads generated by land use developments	55 $L_{eq(1hr)}$	50 $L_{eq(1hr)}$

A qualitative assessment of operational vibration was prepared due to the separation distance between the proposal and the nearest potentially affected receivers.

- Sleep disturbance - The NPI states that "the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. 'Sleep disturbance' considers both awakenings and disturbance to sleep stages." This REF presents limits for sleep disturbance impacts prior to triggering the need for a detailed maximum noise level event assessment. These limits are applied to the night time noise levels from the subject development at the nearest residential location:
    - L_{Aeq},15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
    - L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

For the proposal the sleep disturbance criterion for residential receivers would be $L_{Aeq,15min}$ 44 dB(A) and L_{AFmax} 54 dB(A). L_{AFmax} is a measure of the highest values measure by the sound level meter over a given period of time.

Sensitive receivers

The locations of the nearest affected sensitive receivers are detailed at Table 5-6 and are shown in along with the monitoring locations.

Table 5-3: Sensitive receivers in close proximity to proposal (source: Pacific Environment, 2018)

Receiver ID	*Address*	*Receiver Type*	*Approx. closest distance to proposal boundary*
R1	69 Butler Street	Residence	80 m to the south
R2	2 Burns Street	Residence	75 m to the south-west
R3	62 Butler Street8	Residence	30 m to the west
R4	60 Butler Street	Residence	30 m to the west
R5	58 Butlers Street	Residence	25 m to the west
R6	56 Butler Street	Residence	30 m to the west
R7	54 Butler Street	Residence	30 m to the west
R8	52 Butler Street	Residence	60 m to the west
R9	3 Somerset Street	Residence/ Backpackers	100 m to the west
R10	1 Butlers Street	Residence/ Aged Care Facility	200 m to the north
R11	11 Butler Street (Motor lodge)	Hotel	160 m to the north
R12	52 Jonson Street (Restaurant)	Restaurant/ Commercial	110 m to the north-east
R13	56 Jonson Street	Commercial area	70 m to the north-east
R14	86 Jonson Street Railway Station – disused1	Railway station	15 m to the east
R15	Railway Friendly Bar	Commercial area	20 m to the east
R16	Travel Centre	Commercial area	60 m to the east
R17	Commercial Area	Commercial area	40 m to the east
R18	Recreational Area	Recreational area	50 m to the north-west

[1] The railway station has been repurposed as a site office for Countrylink trains

A summary of the existing environment is presented in the following section.

5.3.1 Existing Environment

The proposal area is located approximately 80 m west of the Byron Bay town centre. The town centre is primarily retail and commercial in nature, with the main shopping strip are located on Jonson Street. The Byron Tourist Information Centre and Railway Friendly Bar are also found on the east side of Jonson Street. To the west and south of the proposal area, land use is low to medium density residential. The rail corridor is captured within the eastern boundary of the proposal. The rail corridor is disused and runs north to south.

The proposal area is undeveloped and vegetated, with a water tank located within the site. The ambient noise at the proposal was found to represent a 'suburban' noise amenity area (Table 5-4). The primary activities which dominate the local noise environment are road traffic, other suburban influences. The background noise environment was found to be affected by local traffic movements on Butler Street.

Table 5-4: Recommended L_{Aeq} Noise Levels from Industrial Noise Sources (source: Pacific Environment 2018)

Receiver type	***Noise amenity area***	***L_{90} dB(A)***		
		Day	***Evening***	***Night-time***
Residence	Suburban	55	45	40

Figure 5-8: Location of sensitive receivers and loggers

Background noise monitoring

The results of the unattended ambient noise surveys during October 2017 are summarised in Table 5-4 as the Rating Background Level (RBL).

Table 5-5: Unattended noise measurement results (source: Pacific Environment 2018)

Noise Logger	*L_{90} dB(A)*		
	Day	*Evening*	*Night-time*
Logger A (Pacific Environment 2017)	43	43	39

RBL - The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).

LA90 (15 min) – the A-weighted sound pressure level that is exceeded for 90% of the 15-minute measurement period, when measured in the absence of the construction works under consideration and excluding extraneous noise. This is considered to represent the background noise.

Attended noise monitoring

Attended measurements (refer to Table 5-5) of ambient noise were recorded during the noise logging survey (23 and 31 October 2017) to determine the various noise sources that may influence the existing noise environment. During each measurement the observer noted the various noise sources and the contributing noise level.

At each location the attended measurements were performed for 15 minutes using a calibrated NTi Audio XL2 Type 1 sound level meter. Weather conditions on both days included some cloud cover with light wind.

Table 5-6: Attended noise measurement results (source: Pacific Environment 2018)

Noise Logger	*L_{90} dB(A)*		
	Day	*Evening*	*Night-time*
Logger A (Pacific Environment 2017)	43	43	39
Logger B (Pacific Environment 2017)	42	NA	46
Location L2 (GHD 2016) ***Same location as Logger A***	52	49	42
Location L3 (GHD 2016)	42	47	46

LA90 (15 min) – the A-weighted sound pressure level that is exceeded for 90% of the 15-minute measurement period, when measured in the absence of the construction works under consideration and excluding extraneous noise. This is considered to represent the background noise.

5.3.2 Potential Impacts

Construction impacts

The construction noise assessment was undertaken with the following assumptions:

- The nearest residential dwelling is located about 15 m from the proposed construction area
- All works would be undertaken in standard hours

- Temporary Noise Control Barriers (NCB) or blankets would be installed along the western boundary of the proposal area. These blankets are designed to block noise attenuation between construction noise sources and nearby sensitive receivers during construction
- Where possible plant and machinery would utilise the use of ‘quackers’.

The assessed work scenarios noise risk ratings are demonstrated in Table 5-7and Table 5-8.

Table 5-7: Quantitative noise assessment for the proposal

Work Phase: Date(s)	Work Phase: Description of noisiest activity undertaken on the date(s)	Plant Category of noisiest plant	Noisiest plant to be used	Duration (days)	Receiver most likely to be affected	Distance to nearest receiver (m)	Most sensitive time of day noisiest plant will be operating[2)]	Is noisiest plant used intermittently? <7 mins in any 15-min period	Reversing beepers used in phase?	Work site noise screening
1	Site establishment	General	Truck	5	Residential: Suburban	15	Standard Hours	Yes	Yes - Beepers used	4. Natural screening and temporary worksite screening
2	Vegetation clearing	Vegetation	Chainsaw (electric)	5	Residential: Suburban	15	Standard Hours	Yes	NA - No reversing vehicles	4. Natural screening and temporary worksite screening
3	Earthworks	Excavator	Excavator (approx. 20 tonne)	40	Residential: Suburban	15	Standard Hours	No	No - 'Quackers' used	4. Natural screening and temporary worksite screening
4	Road and pavement installation	Concrete	Concrete Agitator / Mixer Truck	20	Residential: Suburban	15	Standard Hours	No	No - 'Quackers' used	4. Natural screening and temporary worksite screening
5	Structural work	General	Mobile Crane	40	Residential: Suburban	15	Standard Hours	Yes	No - 'Quackers' used	4. Natural screening and temporary worksite screening
6	Electrical and service installation	Earthworks	Bobcat	10	Residential: Suburban	15	Standard Hours	Yes	No - 'Quackers' used	4. Natural screening and temporary worksite screening

Work Phase: Date(s)	Work Phase: Description of noisiest activity undertaken on the date(s)	Plant Category of noisiest plant	Noisiest plant to be used	Duration (days)	Receiver most likely to be affected	Distance to nearest receiver (m)	Most sensitive time of day noisiest plant will be operating[2)]	Is noisiest plant used intermittently? <7 mins in any 15-min period	Reversing beepers used in phase?	Work site noise screening
7	Landscaping	General	Truck	10	Residential: Suburban	15	Standard Hours	Yes	Yes - Beepers used	4. Natural screening and temporary worksite screening
8	Site demobilisation	General	Truck	3	Residential: Suburban	15	Standard Hours	Yes	Yes - Beepers used	2. Natural screening between site and receiver (buildings, cutting)

'Standard Hours' = 7am-6pm Mon to Fri and 8am-1pm Sat

Table 5-8: Noise calculations for the proposal

Work phase	Sound pressure of noisiest plant at 10m	PNL (Predicted noise level at receiver)	NML (Noise Management Level)	Noise above NML (PNL-NML)	HAL (Highly Affected Level)	Noise above HAL (PNL-HAL)	Level of risk (High, Medium, Low)	Radius of noise above NML (m)	Radius of noise above HAL (m)	Confirm if a specialist noise study is needed for Phase?	Confirm if a specialist noise study needed for Proposal?	Vibration assessment required for Phase?
1	77	63	55	8	75	-	Low Risk	40	4	No	No	No
2	67	48	55	-7	75	-	No further assessment	7	1	No	n/a	No
3	77	63	55	8	75	-	Low Risk	40	4	No	n/a	No
4	81	67	55	12	75	-	Medium Risk	63	6	No	n/a	No
5	78	59	55	4	75	-	Low Risk	25	3	No	n/a	No
6	79	60	55	5	75	-	Low Risk	28	3	No	n/a	No
7	77	63	55	8	75	-	Low Risk	40	4	No	n/a	No
8	77	68	55	13	75	-	Medium Risk	71	7	No	n/a	No

The assessment indicated that construction of the proposal would result in a low to medium noise risk. The highest level of noise generation would be expected during the road and pavement installation and site demobilisation (following the removal of the temporary screening). All other work activities presented a low noise risk.

Noise levels near the proposal area would increase during construction predominately as a result of noise generated from machinery and equipment. To a lesser extent noise levels would also be affected by construction personnel at the site compound in the existing car park to the south, however these receivers are mostly commercial premises.

Standard noise mitigation measures are required for the proposal, identified in section 5.3.3 along with additional noise mitigation to be implemented as far as practical.

Operational impacts

Pacific Environment prepared an ONA for the operation of the proposal (Appendix B). Predictive modelling was completed based on site plans and predicted traffic volumes. The noise model was developed for two operational scenarios (refer to Figure 5-9 and Figure 5-10) to predict noise levels at the surrounding sensitive receivers.

No significant industrial noise influence was observed during observations on site and attended monitoring. The most stringent of the intrusive noise criteria and the amenity criteria was adopted as the proposal specific operational noise criteria for residential receivers. The proposed operational noise criteria are presented in Table 5-9 below.

Table 5-9: NPI operational noise criteria (EPA 2017)

Criteria type	***Receiver type***	***Operation noise criteria, dB(A)***		
		Day	***Evening***	***Night***
Intrusive	Residential	48 $L_{Aeq,15min}$	48 $L_{Aeq,15min}$	44 $LA_{eq,15min}$
Amenity	Residential	55 $L_{Aeq,15min}$	45 $L_{Aeq,15min}$	40 $L_{Aeq,15min}$

LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community. Other descriptors may be used providing they can be justified as representing the characteristics of the construction noise.

The operational assessment has considered the activities associated with the typical operation of the bus interchange based on buses, coaches, cars and taxis accessing the interchange area. Impacts at nearby receivers were assessed using the *ISO 9613 Acoustics – Attenuation of sound during propagation outdoors (ISO,1996)*. The potential noise impacts of the operational stage of the proposal have been considered under:

a. Peak hour operations from the proposal with all vehicle movements occurring during one peak hour period
b. Average vehicle movements over the day and night time periods.

The assumptions provided are as follows:

- The construction compound within the Woolworths car park would no longer remain operational
- Impacts were assessed based on the indicative timetable of the proposed interchange
- The vehicles would access the proposal from the west via Butler Street, via a roundabout to be constructed as part of the bypass, and access the turning circle

- No carparking spaces have been provided therefore the impacts of carparking (doors slamming, etc) have not been included in this assessment
- Current traffic flows were sourced from the Byron Bay – Bus Bay Capacity Assessment – Review of Scheduled Services and Capacity Assessment (Appendix H)
- 10 peak hour bus movements per peak hour period (equating to 3 bus movements per 15-minute period)
- A nominal assumption of 10 light vehicle movements (taxis or cars) were incorporated to account for kiss and ride movements / drop-offs / pickups in any 15-minute period
- Existing light vehicle movements from adjacent residences has not been considered as part of this assessment
- Modelling has assumed vehicle speed of 30 km/hr for the assessment, however it is likely that the operations would involve speeds closer to 20 km/hr.

For the purposes of this assessment, all residential receivers were considered to be within a 'suburban noise amenity' area as the noise monitoring indicated the local environment is dominated by some traffic. With reference to the NPI (EPA 2017) the evening and night time levels have also been classified as 'suburban amenity' areas.

Predicted noise levels at the nearest sensitive receivers are presented in Table 5-10. Noise levels for operational scenarios are predicted to comply with relevant criteria for day, evening and night time periods for all other receivers for peak hour movements. Major contributors are generally associated with bus idling within the proposal.

For peak hour movements, noise levels are predicted to comply with the ONA criteria for the day and evening periods. Minor exceedances (up to 2 dB) are predicted at R5 (58 Butlers Street) during day and night time periods (Figure 5-9 and Table 5-10). For all other receivers, noise levels for operational scenarios are predicted to comply with relevant criteria for day, evening and night time periods during peak hour movements.

Table 5-10: Predicted peak operational noise levels – all vehicle movements during one peak hour period (Pacific Environment 2018)

ID	Criteria $L_{eq\ 15min}$ dB(A)			Predicted Noise Level, $L_{Aeq,\ 15min}$		
	Day	Evening	Night	Day	Evening	Night
R1	48	48	44	40	38	36
R2	48	48	44	40	38	36
R3	60	50	45	46	44	41
R4	48	48	44	48	45	43
R5	48	48	44	50	48	45
R6	48	48	44	48	45	43
R7	48	48	44	47	44	41
R8	48	48	44	47	44	41
R9	60	50	45	41	39	36
R10	48	48	44	36	33	30

Note: Receivers R11-R18 are commercial receivers and as such are not assessed against the intrusive noise criteria. LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community. Other descriptors may be used providing they can be justified as representing the characteristics of the construction noise.

Predicted noise levels at the nearest sensitive receivers for average movements (over day, evening and night periods) are demonstrated in Table 5-11Table 5-11. Noise levels are not predicted to exceed the $L_{eq\ 15min}$ dB(A) noise criteria for average movements of the proposal.

Table 5-11: Predicted average operational noise levels – over day and night time periods

ID	Criteria $L_{eq\ period}$ dB(A)			Predicted Noise Level, $L_{Aeq,\ period}$		
	Day	Evening	Night	Day	Evening	Night
R1	55	45	40	37	35	30
R2	55	45	40	37	35	30
R3	60	50	45	42	40	35
R4	55	45	40	44	42	37
R5	55	45	40	46	44	39
R6	55	45	40	44	42	37
R7	55	45	40	42	40	36
R8	55	45	40	42	40	36
R9	55	45	40	37	35	31
R10	60	50	45	31	29	25
R11	60	50	45	34	31	27
R12	65	65	65	38	36	31

ID	Criteria $L_{eq\ period}$ dB(A)			Predicted Noise Level, $L_{Aeq,\ period}$		
	Day	Evening	Night	Day	Evening	Night
R13	65	65	65	40	38	33
R14	65	65	65	51	49	45
R15	65	65	65	52	49	45
R16	65	65	65	36	33	29
R17	65	65	65	37	35	31
R18	55	55	55	39	37	33

LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community. Other descriptors may be used providing they can be justified as representing the characteristics of the construction noise.

Noise contours for the proposal operating footprint for the day and night time periods are presented in Figure 5-9 and Figure 5-10.

Figure 5-9: Noise contours - average vehicle movements at the proposal operational footprint (daytime)

Figure 5-10: Noise contours - average vehicle movements at the proposal operational footprint (night time)

Based on the assessment of average vehicle movements at day, evening and night time periods, noise levels would comply with relevant criteria at all affected residential and non-residential receivers.

Peak-hour movements are considered as the worst-case hour over the site's weekday operations. Peak-hour movements at the proposal are estimated to occur between 4pm and 5pm. At this time, a large contributor to noise is generally expected to be buses idling within the proposal area. During the peak-hour period, noise levels are predicted to comply with noise amenity criteria for the day and evening at most affected receivers. Noise levels are expected to result in minor exceedances of the intrusive noise criteria by up to 2 dB at the nearest residence on Butler Street for day and night time periods.

As a result of these findings, noise management and mitigation measures are recommended as outlined in section 5.3.3.

Sleep disturbance

Sleep disturbance can potentially be caused by short, high-level noise emissions from the proposal during operation. An assessment of sleep disturbance has been completed based

on the occurrence of bus air brake release at night time. Based on the schedule traffic information, it is anticipated that night time use of the proposal will be limited to before midnight and after 4 am. In addition, vans and shuttles servicing the proposal do not generate air brake noise events and would be unlikely to cause sleep disturbance.

The predicted maximum noise level results at the most sensitive residential receivers are presented in Table 5-15. Noise levels are predicted to remain below the L_{max} criteria for all receivers with the exception of the nearest receivers on Butler Street (R4, R5 and R6). Exceedances over the $L_{eq,15min}$ limit up to 2 dB at receivers R4 and R6, and up to 4 dB above the NPI sleep disturbance criteria at R5.

It is noted that the number of maximum noise level events has been estimated assuming on event per vehicle during the worst-case hour, which is unlikely and can be managed using operational controls provided in section 5.3.3.

Table 5-12: Predicted maximum noise levels at residential receivers (source: Pacific Environment 2018)

ID	Criteria dB(A)		Predicted noise level dB(A)	
	$L_{Aeq,15min}$	L_{max}	$L_{Aeq,15min}$	L_{max}
R1	44	54	36	39
R2	44	54	37	39
R3	44	54	43	45
R4	44	54	46	47
R5	44	54	48	50
R6	44	54	46	48
R7	44	54	44	46
R8	44	54	44	46
R9	44	54	39	41
R10	44	54	33	35
R11	44	54	35	37

LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community. Other descriptors may be used providing they can be justified as representing the characteristics of the construction noise.

This assessment found that operational noise impacts associated with the proposal are expected to result in only minor exceedances of noise criteria of up to 2 dB at the nearest residence (receiver R5) during peak hour movements. During average traffic conditions, noise levels are predicted to comply with all criteria at all affected sensitive receivers.

Operational road traffic noise

Operational road traffic noise levels are predicted to result in a small increase in received noise levels at residences on Butler Street during the day period. This is due to an expected increase in heavy vehicles, such as buses and vans frequenting the proposal. However, the relative change is less than 2 dB based on noise levels without the proposal.

Operational vibration

Noticeable vibration can occur where heavy vehicles travel at speed over damaged pavement or road joints. Due to the separation distance between the proposal and sensitives

receivers and expected operational speeds, perceptible vibration is not expected and have not be considered further.

Cumulative operational noise – proposal and bypass

The Byron Bay bypass is an approved, separate project. The construction and operation of the bypass is anticipated to change the existing acoustic environment of Butler Street and surrounds. An Environmental Impact Statement (EIS) prepared by GHD (2016) included an operational noise assessment of the bypass. The assessment found that noise generated by the bypass in operation would be typical of an urban environment. Residents along Butler Street were predicted to experience similar noise levels to residents living on Shirley Street, Jonson Street and Bangalow Road.

The bypass operational noise assessment identified several residences on Butler Street that may qualifying for noise mitigation. The four receivers presented in Table 5-13 are the closest to the proposed bypass alignment and therefore most likely to experience increased noise once the bypass is operational. For comparison, the predicted noise impacts of the proposal at the same four locations was assessed by Pacific Environment (Appendix B).

Table 5-13: Predicted cumulative operational noise levels with proposal and bypass (source: Pacific Environment 2018)

ID	Criteria, $L_{Aeq,\ 15\ min}$[1] dB(A)			Predicted Noise Level, $L_{Aeq,\ period}$[2] dB(A)			Predicted Operational Road Noise Level, $L_{Aeq,\ period}$[3] dB(A)	
	Day	Evening	Night	Day	Evening	Night	Day[3]	Night[3]
R1	55	45	40	37	35	30	57	54
R7	55	45	40	42	40	36	54	51
R10	55	45	40	31	29	25	61	58
R11	55	45	40	34	31	27	59	57

1. Day (7.00am-6.00pm Monday to Saturday and 8.00am-6.00pm Sundays and Public Holidays), Evening (6.00pm-10.00pm), Night (10.00pm-7.00am, unless preceding a Sunday or Public Holiday).
2. Levels sourced from $L_{Aeq,\ period}$ predictions from Table 5-11
3. Operational road noise values sourced from GHD (2016), based on opening year 2018 traffic predictions.

LAeq (15 min) – the A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community. Other descriptors may be used providing they can be justified as representing the characteristics of the construction noise.

Comparison of the predicted impacts of the proposal and the bypass indicate that the noise associated with the proposal is likely to be negligible compared to the influence of the future bypass. Predicted noise impacts from the proposal are at least 10 dB lower than the equivalent noise impact from the bypass once it is operational.

Additionally, Condition 24 of the Development Approval (DA) for the bypass (10.2016.77.1) identifies 23 properties to be considered for mitigation as a result of operational noise impacts. Mitigation measures associated with the bypass included recommendations for architectural noise treatment. The below receivers affected by impacts from the proposal would therefore already benefit from architectural treatment as part of the bypass (Table 5-14)

Table 5-14: Receivers affected by the proposal and bypass

Receiver ID	Address	Receiver type
R5	58 Butler Street	Residential dwelling

R6	56 Butler Street	Residential dwelling
R7	54 Butler Street	Residential dwelling

Source: Development Application 10.2016.77.1
Note: 1. ID from Section 2.5.

Consideration of the cumulative impacts of the proposal and the bypass indicates that noise levels of the proposal on Butler Street and surrounds are likely be negligible compared to the influence of the Byron Bay bypass. Noise from the operation of the proposal would likely be masked by operational road noise of the bypass.

Cumulative traffic noise

Operational road traffic is predicted to result in a small increase in received noise levels at residences on Butler Street during the day. This is due to an anticipated increases in the percentage of heavy vehicles associated with the proposal. However, the relative change is less than 2 dB based on noise levels without the proposal (Table 5-15).

Table 5-15: Cumulative L_{Amax} noise levels at residential receivers (predicted)

ID	Criteria		Predicted noise level	
	$L_{Aeq,15min}$	L_{max}	$L_{Aeq,15min}$	L_{max}
R1	44	54	36	39
R2	44	54	37	39
R3	44	54	43	45
R4	44	54	46	47
R5	44	54	48	50
R6	44	54	46	48
R7	44	54	44	46
R8	44	54	44	46
R9	44	54	39	41
R10	44	54	33	35
R11	44	54	35	37

5.3.3 Control Measures

Construction

Noise control measures would be required to mitigate noise impacts from the proposed works.

All works would occur within standard working hours and timed to avoid peak periods wherever possible. The standard working hours for this proposal would be:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- No work Sundays or public holidays.

The Sydney Trains quantitative noise assessment triggered the noise controls listed in Table 5-16. The potential noise controls for the proposal includes the installation of temporary work screening (as discussed in section 5.3.2) and a 2-day respite every 14 days. The assessment did not identify a requirement to notify receivers via letterbox notification. Despite this, Sydney Trains would notify adjacent residents of works at least five days in advance of work commencing.

Any proposed out of hours works must be assessed using EMS-09-PR-0048 *Construction and Maintenance Noise and Vibration Management* or equivalent assessment process.

Table 5-16: Impact assessment triggered noise controls

Potential noise controls	*Triggered for proposal?*
Contact noise specialist to confirm if a specialist construction noise study required?	No
Recommended minimum letterbox notification distance	-

Communicate expected periods of particularly high noise to community in the letterbox drop?	No
Program in respite: Max 4 days > Highly Noise Affected in any 7 day period?	No
Program in respite: 2 days respite (no or all works below NML at receiver) for every 14 days?	Yes
Temporary work screening to be added as a control?	Yes

The quantitative noise assessment triggered a requirement to consider additional reasonable and feasible noise mitigation measures as per *Sydney Trains Construction and Maintenance Noise and Vibration Management* (EMS-09-PR-0048) are provided in Table 5-17.

Table 5-17: Additional construction noise mitigation measures

Possible construction noise mitigation measures	***Adopted?***	***Construction noise mitigation measures to be implemented during construction***
Undertake work during 'day' hours only	Yes	The proposed works would be undertaken within standard working hours, i.e. Monday to Friday 7am to 6pm; Saturday 8am to 1pm; and no work on Sundays or public holidays
Implement 1-hour respite for every 3-hour period for particularly noisy works	Yes	During the proposed works a 1-hour off to 3-hours on would be implemented during noisy works, such as road and pavement installation.
Plant used intermittently is to be throttled or shut down when not required	Yes	Plant not in use would be throttled or shut down when not in use.
Use alternative quieter equipment	Yes	Where possible, the nominated Contractor would endeavour to use smaller or quieter would be used.
Use temporary screening near noisy plant and activities (i.e. use mobile noise curtains to shield from sensitive receivers)	Yes	Temporary screening (such as noise blankets) to be erected along the western boundary of the proposal area between the work site and residential receivers on Butler Street.
Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver.	Yes	Construction personnel would minimise simultaneous operations where practicable.
Schedule deliveries to nominated hours only. Minimise disturbance arising from delivery of goods to construction sites.	Yes	It is anticipated that the majority of works (including deliveries) would be undertaken during standard working hours.

Possible construction noise mitigation measures	***Adopted?***	***Construction noise mitigation measures to be implemented during construction***
Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Loading/unloading areas to be shielded if close to sensitive receivers.	No	Loading and unloading would be required to occur at the proposal area. Given the nature of the proposal and the requirement for earthworks, deliveries would need to occur on Butler Street.
Carry out noisy fabrication work at another site (for example, within enclosed factory premises) and then transport to site.	No	Due to the size of the proposed bus canopy, the erection of the structure would need to occur at the proposal area.
Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.	Yes	Construction personnel would minimise the use of chains on delivery vehicles where practicable.
Select site access points and roads as far as possible away from sensitive receivers.	No	The access to the proposal area is located along Butler Street.
Place as much distance as possible between the plant or equipment and residences and other sensitive land uses.	No	As far as practicable, site offices, lay-down areas and plant would be located away from the residents on Butler Street however given the small size and constraints of the proposal area this may be difficult.
Direct noise-emitting plant away from sensitive receivers.	No	As above however temporary screening would be installed along the western boundary of the proposal area.
Notify residents and Sydney Trains customers of any proposed activities which are to be conducted outside normal business hours and which are likely to create offensive noise	Yes	Although not identified as part of the noise assessments, adjacent residents would be notified of works at least five days in advance of work commencing. A telephone contact number would be provided for residents to obtain details of the proposed activities.
Provide periods of quiet if activities occur for extended periods during the night.	N/A	No night works to occur
Minimise consecutive night time activities in the same locality.	N/A	No night works to occur
Plan for conducting night time activities in ways that eliminate or minimise the need for audible warning alarms.	N/A	No night works to occur

Possible construction noise mitigation measures	***Adopted?***	***Construction noise mitigation measures to be implemented during construction***
Training of site-personnel	Yes	Ecological considerations to be conveyed to on-site staff via toolbox or site induction. No yelling, slamming of car doors or portable radios on site. Avoid dropping materials from a height where practical.

Operation

The following mitigation measures have been identified as part of the operation assessment to reduce impacts to nearby residents:

- Operational noise testing would need to be undertaken to confirm compliance with the adopted project specific noise levels, with commitment for consideration and implementation of additional mitigation measures (where reasonable and feasible) in accordance with the NPI
- Implementation of an Operational Management Plan that includes:
    - Signage to bus drivers and vehicular patrons to minimise noise during sensitive night time periods
    - Posted speed limits within the interchange to minimise high engine revving
- As exceedances of noise criteria at R5 (58 Butler Street) are limited to peak hours only, it is considered that impacts can be managed via operational management measures to limit potential speed-related noise impacts and limit the occurrence of maximum noise level events
- During project delivery of bypass, architectural treatments recommended for dwellings affected by the bypass to be confirmed, particularly R5 as these would be of benefit to the receiver as a result of this proposal.

5.4 Biodiversity

A BAR was prepared by SMEC for the proposal to identify the ecological constraints of the proposal area and to assess the ecological impact of the proposed concept design (Appendix C). It would be used to inform the detailed design for the proposal and to ensure compliance with the:

- NSW *Biodiversity Conservation Act* (BC Act)
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *State Environmental Planning Policy 44 – Koala Habitat Protection* (SEPP 44)
- *State Environmental Planning Policy (Coastal Management) 2018.*

The assessment conducted a review of available background information to gain an understanding of the surrounding environment and potential target species within 5 km of the proposal area. This involved review of the following databases:

- OEH BioNet Atlas, which provides records of threatened flora and fauna and EECs listed under the BC Act
- OEH Vegetation Information System, which provided mapping of the Byron Bay Local Government Area
- *State Environmental Planning Policy (Coastal Management) 2018* maps
- Matters of National Environmental Significance (MNES) using the Protected Matters search tool (PMST), which predicts which threatened flora, threatened and migratory fauna and Threatened Ecological Communities listed under the EPBC Act.

A flora survey and field traverses of the proposal area was conducted in accordance with the BioBanking Assessment Methodology (BBAM 2014) and Draft *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). Three 20 m by 50 m quadrats were undertaken at the proposal area to describe the vegetation at the proposal area. A fauna habitat assessment was undertaken to assess the likelihood of threatened and migratory fauna to utilise the proposal area.

A summary of the findings from the BAR are provided below.

5.4.1 Existing Environment

The study area for the BAR is demonstrated in Figure 5-11. The site is approximately 0.68 ha. in area and is located adjacent to the rail corridor. The proposal area has previously been subjected to a high level of on-going disturbance associated with rail-related activities (e.g. water tower, engine turntable, etc). Following the cessation of transport activities, vegetation at the proposal area has regrown however large canopy gaps remain and a number of weed species have established.

To the north, the proposal area abuts Swamp Sclerophyll Forest (SSF) dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*). To the south is a walking thoroughfare (previous an old pig run) allowing pedestrians to access the town centre commercial precinct from the west. On the south side of this thoroughfare is additional SSF. Both areas of SSF as linear strips between Butler Street and the railway and extend for no more than 100 m.

The location of the three 20m by 50m quadrats used to enable classification of each vegetation zone to the best fit Plant Community Type (PCT) is demonstrated in Figure 5-11

Figure 5-11: Plant Community Types (PCT) and survey locations

Vegetation communities

Based on existing mapping and the results of the field investigations two PCT's are present at the proposal area (Figure 5-11 and Table 5-18):

- PCT1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest
- PCT1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion.

Table 5-18: Vegetation communities at the proposal area

Vegetation communities	*Area (ha)*
PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest	0.24
PCT 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion.	0.22
Cleared (path across existing rail, exotic grassland)	0.22
TOTAL	**0.68**

The majority of the proposal area is covered by highly disturbed PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest. While this PCT is described as a littoral rainforest, the vegetation community at the proposal area does not meet the legal definition *Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions* - Endangered Ecological Community listing.

According to the NSW Scientific Committee's final determination, Littoral Rainforest EEC is dominated by rainforest species with evergreen mesic or coriaceous leaves, while Coast Banksia (*Banksia integrifolia*) is only present as scattered individuals. In contrast, due to previous disturbance, the fragmented canopy at the proposal area is dominated by Coast Banksia. Apart from Broad-leaved Tuckeroo (*Cupaniopsis anacardioides*) and Cheesetree (*Glochidion ferdinandi*), any additional rainforest species are only present as small saplings.

Two small areas in the very north and south of the proposal area were consistent with PCT 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion. These areas have also been previously impacted by disturbance and human use. In the northern section of the proposal area, the canopy is fairly intact and dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*). However, the midstorey has been removed and the dense groundcover is dominated by Molasses Grass (*Melinis minutiflora*). This community is consistent with the definition of *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions EEC* as:

- The canopy is dominated by the indicator species Broad-leaved Paperbark;
- The proposal area occurs on a coastal sandplain; and
- It occurs on a humic soil.

A summary of the vegetation community listings is provided in Table 5-19.

Table 5-19: Summary of vegetation community listing

PCT	*EEC equivalent (BC Act)*
PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest	The extent of this PCT on site does not meet the legal definition of: *Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions - EEC.*
PCT 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion.	Consistent with: *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions EEC*
Cleared (path across existing rail, exotic grassland)	N/A

Threatened flora

A total of 68 flora species were recorded at the proposal area. Of these, 36 (53%) were introduced species. No threatened flora species were detected.

The majority of the proposal area supports highly disturbed native vegetation. Coast Banksia (*Banksia integrifolia*), an important winter nectar-producing tree, was common at the proposal area as it establishes well following disturbance. A small number of Broad-leaved Paperbark, which provides nectar during autumn, are present. One Small-leaved Fig (*Ficus obliqua*) was also present in the north of the proposal area. Based on the soils observed within the proposal area, rainforest flora preferring basalt soils would not be present.

Threatened fauna

During the field investigations, only three bird species were observed at the proposal area; Noisy Miner (*Manorina melanocephala*), Blue-faced Honeyeater (*Entomyzon cyanotis*) and Scaly-breasted Lorikeet (*Trichoglossus chlorolepidotus*). All these species are highly tolerant of modified habitat and a high human presence. While not expected to be a full account of species likely to use the proposal area, they are indicative of the type of species that would occur (i.e. generalist species).

Bird species have the additional advantage of high mobility, which enables them to use the proposal area on a seasonal or intermittent basis. Therefore, they do not need to be permanent residents to use the proposal area.

The likelihood of occurrence assessment concluded that only nine threatened fauna species were likely to use the proposal area. A number of factors are considered in the likelihood assessment; area size, connectedness, soil type, number of plant communities, as well as the occurrence of tree hollows and fallen logs, and degree of disturbance have all been taken account to each this conclusion. All these factors are known to influence habitat occupancy by threatened flora and fauna.

There are several koala records within a 10km radius of the proposal area. Although koalas may move through the proposal area, it is considered very unlikely that they would utilise the area. This is due to a distinct lack of Eucalyptus trees, the proposal area is unsuitable koala habitat, as this is the sole foraging resource for this species. Similarly, species dependent on tree hollows would not breed in the proposal area due to the lack of suitable nesting sites. These species have been assessed as ‘unlikely’ to occur within the proposal area.

The fauna habitat assessment suggested that nine threatened fauna species listed under the BC Act were likely to use the proposal area (Table 5-20).

Table 5-20: Threatened species with a moderate to high likelihood to occur at the proposal area

Common name	*Scientific name*	*BC Act*	*EPBC Act*
Pale-vented Bush-hen	*Amaurornis moluccana*	V	
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	V	
Eastern Freetail-bat	*Mormopterus norfolkensis*	V	
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V	
Little Bentwing-bat	*Miniopterus australis*	V	
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	
Eastern Long-eared Bat	*Nyctophilus bifax*	V	
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V
Eastern Blossom-bat	*Syconycteris australis*	V	

All species are flying mammals that have a high degree of mobility. Three microbat species, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) and the Eastern Freetail-bat (*Mormopterus norfolkensis*) are high flying species that may forage over the proposal area occasionally. Three other microbat species (Greater Broad-nosed Bat *Scoteanax rueppellii*, Little Bentwing-bat *Miniopterus australis*, Eastern Long-eared Bat *Nyctophilus bifax*) may use the proposal area occasionally, despite the open and fragmented canopy and small area of the proposal area. The Grey-headed Flying-fox (*Pteropus poliocephalus*) and Eastern Blossom-bat (*Syconycteris australis*) are nectarivorous and may use the proposal area during the flowering periods of Broad-leaved Paperbark (late summer/early winter) and Coast Banksia (autumn/spring).

It is unclear whether the proposal area would be subject to levels of human activity too high for the Eastern Blossom-bat. However, an intermittent Grey-headed Flying-fox roost is known from about 300 m north-west of the proposal area and the species is known to forage in urban areas. The Grey-headed Flying-fox is the only threatened species under the BC Act that is also listed under the EPBC Act.

No other threatened or migratory fauna are likely to use the proposal area due to factors such as the lack of essential food resources (e.g. fleshy fruit, Eucalypt nectar, Koala food trees), the small area and relative isolation of the proposal area, the proximity to high levels of human activity, the presence of domestic and feral predators (e.g. cats, dogs, foxes) and the lack of shelter sites (e.g. hollow-bearing trees, fallen logs).

5.4.2 Potential Impacts

Potential impacts associated with the proposal have been assessed considering both direct and indirect impacts.

Direct Impacts

The proposal assumes a worst-case scenario, involving the removal of all native vegetation from the proposal area. This would involve clearing 0.46 ha of native vegetation, that is

0.24 ha of disturbed PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest and 0.22 ha of PCT 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion.

The clearing of 0.24 ha of PCT 1536 Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest would involve the removal of predominately Coast Banksia and a small number of Broad-leaved Paperbark, both of which provide seasonal nectar to fauna.

The proposal would also involve the clearing of small areas of PCT 1064 in the north and south of the proposal area. As stated above, PCT 1064 conforms to the definition of the Swamp Sclerophyll Forest EEC. Outside of the proposal area, this community continues to the north and south (Figure 5-11).

Within the immediate locality, there is a total of 0.83 ha of vegetation conforming to PCT 1064. The removal of 0.22 ha only represents 27% of the immediate community that would be affected. The remainder of the PCT within the locality would be retained. It should also be noted, that the removal of 0.22 ha is a worst-case scenario, where possible, native vegetation corresponding to PCT 1064 would be retained.

The removal of 0.46 ha of native vegetation at the proposal area is not expected to increase the impact of edge effects as the existing vegetation within the proposal area is very limited in area and linear in configuration. Edge effects and habitat fragmentation are, therefore, already in operation at the proposal area and impacting upon current biodiversity values. Considering that potential threatened fauna (Table 5-20) that may occur at the proposal area are capable of flight, the proposal is not expected to increase the operation of fragmentation.

The removal of vegetation and its replacement with hardstand and landscaping could potentially alter the drainage and hydrological characteristics within the proposal area. SMEC has investigated the impact of the proposal on existing hydrology and has identified that given the installation of the proposed drainage design, there would not be impacts on downstream conditions or alter groundwater or flooding patterns. This is discussed further in section 5.6.

Indirect Impacts

Indirect impacts associated with the construction and operation of the proposal are associated with noise, light, human activity and potential vibration.

The proposal area is already in an area that is subject to a high human presence and activity during both the day and night, suggesting the proposal is unlikely to have additional noise, light and activity impacts on threatened species during operation.

The majority of construction activities would occur during the day. All threatened species identified as potentially likely to use the proposal area are active at dusk or night. Common species that may utilise the proposal area during the day are generally species that are highly tolerant of modified habitat and a high human presence (e.g. Noisy Miner, Blue-faced Honeyeater, Scaly-breasted/Rainbow Lorikeets).

Erosion and sedimentation may occur during the construction phase of the proposal following vegetation removal. While the sands that underlie the proposal area are not particularly erodible, erosion and sediment control measures would be required.

Fuel spills and oil leaks may result in pollution of surface and groundwater. However, the risks are relatively minor provided construction machinery and buses are well maintained and would be of a similar magnitude to those already occurring due to existing roads and human activity within the wider locality. As a precaution, strategies to deal with any fuel and chemical issues would need to be implemented.

Litter may be produced during the operational stage and may be transported to areas of native vegetation and waterways nearby during windy conditions.

Calculation of Biodiversity Offsets

The loss of EEC vegetation and threatened species habitat resulting from the proposal requires offsetting in accordance with the EMS-09-WI-0177 *Biodiversity Offset Calculator*. The use of the calculator was adopted as the proposal would not have a significant impact on the EEC and supporting habitat, however, loss of vegetation and habitat would still be affected and therefore need to be considered.

As per the dichotomous key in Chapter 6 of the Biodiversity Offsets Calculator, the presence of threatened vegetation (Swamp Sclerophyll Forest) requires Item Two: Threatened Vegetation of the Biodiversity Offset Table to be followed (Table 5-21).

Considering two or more impact questions were answered affirmatively, a moderate impact is assumed. Where suitable revegetation cannot be undertaken, a contribution is made into the Biodiversity Offset Fund (BOF). Given the constraints of the proposal area and availability of a suitable area, it is unlikely revegetation of the community would be undertaken as part of this proposal however this option is still presented in Table 5-21.

The calculations for the offsets were based on the area of Swamp Sclerophyll Forest to be removed as part of the proposal, that is 0.22 ha (or 2,200 square metres). As per the calculator, $30 per square metre is to be contributed to the BOF for every square metre of EEC removed, totalling $66,000.

Table 5-21: Offset options for the proposal

Ecological loss resulting from activity	***Impact Questions***	***Moderate Offset Options***
4. Will the activity impact on a vegetation community that forms part of a vulnerable, endangered, or critically endangered ecological community (ie. threatened vegetation)? a. If yes, go to Item 2: Threatened Vegetation in the biodiversity offset table		
Item 2. Threatened Vegetation Vegetation communities that are listed as critically endangered, endangered, or vulnerable	1. Of the main body of vegetation to be cleared does the threatened vegetation being removed account for 10% or more of the canopy cover? 2. Will any remaining threatened vegetation become isolated from a main vegetation body? 3. Is there potential that the threatened vegetation would be used by one or more threatened fauna species for: 1. Shelter 2. Breeding	1. Where possible: Undertake bush revegetation using locally native species and targeted weed removal of the disturbed area for a minimum of 2 years AND Revegetation to increase the area of threatened vegetation by at least 50%, using relevant species from the threatened vegetation affected, with revegetation located (where possible) to provide a buffer effect AND Contribute $20/m2 of threatened vegetation that will be disturbed to the BOF to rehabilitate land supporting the same threatened vegetation OR 2. If the above is not possible, contribute $30/$m^2$ of threatened vegetation community that will be disturbed to the BOF to rehabilitate land supporting the same threatened vegetation community

5.4.3 Control Measures

To minimise impacts on threatened arising from the proposal, the following recommendations should be adopted at each proposal stage.

Prior to Construction

Prior to the commencement of construction, the following vegetation management measures would be implemented:

- Review the BAR to identify the type and location of vegetation at the proposal area by persons undertaking the clearing
- Incorporate specific vegetation management measures into the site induction, toolbox talk and pre-start meetings
- The site-specific Construction Environment Management Plan (CEMP) must include instructions for dealing with orphaned or injured native animals and include the contact details for the NSW Wildlife Information, Rescue and Education Service Inc (WIRES)
- The CEMP will include a map showing its location the location of the retained tree and its exclusion zone and other required mitigation measures (e.g. erosion and sediment control)
- Conduct a site inspection and mark the extent of clearing and/or trimming. Where possible extent of clearing should be minimised
- Fence trees and vegetation to be retained with clear signage, ensuring exclusion fencing is outside the tree protection zone
- A qualified (demonstrated experience) ecologist or wildlife carer is to be present when clearing trees and vegetation
- Should any priority weeds be encountered, appropriate management and disposal of these weeds must be carried out
- Apply appropriate hygiene protocols to reduce the likelihood of new weed or disease infestations within the proposal area
- Stockpile weeds to prevent them entering waterways and remove from the site to an appropriate facility according to the site-specific CEMP
- Install erosion and sediment controls measures specified in the CEMP
- Locate construction parking, compounds, stockpiles and chemical storage away from vegetated areas (including tree protection zones) and in areas which do not necessitate anymore clearing of vegetation than necessary.

Construction

During construction, the following vegetation management measures would be implemented:

- Construction works must be stopped if any previously undiscovered threatened species or communities are discovered during works. An assessment of the impact and any required approvals must be obtained. Works must not recommence until Sydney Trains has provided written approval to do so
- Use only defined access tracks and entry/exit points for all vehicle movements

- Use only designated areas for parking, stockpiles, materials and waste storage
- Do not store materials or park equipment/vehicles within tree protection zones
- Where possible revegetate or mulch disturbed areas
- Mulch and reuse cleared vegetation on site for site stabilisation and/or landscaping where appropriate
- Undertake regular inspections of vegetation management measures to ensure they are in place and effective
- Dispose of weeds that have been identified on the proposal area in a manner consistent with TPO Weed Management and Disposal Guide
- Monitor the health of retained vegetation and seek advice from an arborist if vegetation shows signs of stress (discolouration, die back)
- Prepare emergency responses in case of an oil or fuel spill/leak.

After construction

After construction, the following vegetation management measures would be implemented:

- All loss of biodiversity is to be offset according to the offsets calculated using the EMS-09-WI-0177 Biodiversity Offset Calculator (see section 5.4.2 – Calculation of Biodiversity Offsets)
- Any disturbed areas of the site must be revegetated using locally indigenous species in accordance with EMS-09-GD-0074 *Revegetation Guide* and EMS-09-TP-0066 *Revegetation Technical Specification Template*
- Stabilise all disturbed areas, implement landscaping and remove vegetation protection measures
- Plant Coast Banksias (*Banksia integrifolia*) and other winter nectar resources on the proposal area as part of the proposal area landscaping to mitigate the loss of seasonal foraging resources on the proposal area. Where possible, all plants used in landscaping should be sourced from the local area to ensure genetic compatibility and integrity. This recommendation has been supported in the LCVIA where reasonable and feasible to do so
- Ensure that external lighting is not directed towards the Swamp Forest north or south of the proposal area to ensure that additional artificial lighting does not affect the foraging behaviour of threatened and common species or neighbours
- Use porous surfaces, buried leaky tanks or equivalent strategies to minimise hydrological changes
- Ensure a maintenance program is in place for any landscaping or revegetation undertaken as part of the proposal
- Prepare emergency responses in case of an oil or fuel spill/leak
- Provide a sufficient number of well-spaced bins for rubbish.

5.5 Landforms, Geology and Soils

SMEC undertook geotechnical investigations at the proposal area to confirm the existing mapped data and summarise site conditions and geology at the proposal area (SMEC 2018).

Prior to the commencement of the fieldwork, a desktop review of available information relevant to the proposal area was made, including review of geological maps and DBYD plans. Fieldwork was undertaken between 5 March 2018 and 7 March 2018. The geotechnical investigations comprised of:

- Seven vertical boreholes (BH) drilled to depths ranging from 1.0 m to 10.45 m below the existing ground surface. Boreholes BH01 to BH06 were drilled to a minimum depth of 10.0 m, while BH07 was drilled to 1.0 m depth using a large diameter auger, primarily to enable collection of a bulk sample
- Three test pits excavated to depths ranging from 2.0 m to 2.5 m. Dynamic Cone Penetrometer (DCP) testing was carried out adjacent to the test pits to assess the consistency / relative density of the subsoils
- Geotechnical laboratory testing of selected soil samples.

The locations of the geotechnical investigations are provided in Figure 5-12.

Relevant findings of the geotechnical investigations are provided in the following sections.

5.5.1 Existing environment

Landform and topography

The proposal area features several prominent heritage items, notably a dilapidated water tank and remnants of a railway turntable. A 220 mm buried pipe runs east from the tower towards the existing rail line. The railway turntable appears to have been removed from the proposal area, however two concrete plinths remain at the northern and southern ends of the turntable location. Historic survey plans suggest the turntable would have been approximately 15.4 m in diameter whilst in service.

The ground surface within the proposal area slopes gently down to the north and south away from the water tower. Access to most investigation locations was via a locked gate on Butler Street. However, two locations (BH06 and TP03) were positioned within the cul-de-sac.

Geology and soil landscapes

Reference to the NSW Department of Industry Resources & Energy 1:250,000 Tweed Heads Geology Map (Sheet SH 56-3 1st Edition, 1972) indicates that the proposal area is underlain by quaternary alluvium, comprising river gravels, alluvium, sand and clay. The geology mapping also indicates the presence of rocks of the Neranleigh–Fernvale Group (including greywacke, slate, phyllite and quartzite) to the east and south of the proposal area, implying these may underlie the Quaternary sediments.

The Tweed Heads Area 1:25,000 Coastal Quaternary Geology Sheet indicates that the proposal area is also underlain by marine sand and indurated sand from the Pleistocene period, forming part of the Coastal Barrier System. Organic mud and peat are likely in the northern portion of the proposal area, and gravel likely in the south of the proposal area.

Acid Sulfate Soils

Using the OEH for ASS Risk, the proposal area is characterised as low risk for ASS between 1 m and 3 m below ground level (bgl). This is aligned with the Class 3 ASS mapping of the proposal area in the Byron Bay LEP 2014. As discussed previously, according to clause 6.1

of the LEP 2014, development consent is required for the following works within areas mapped as Class 3 soils:

- Class 3: Works more than one metre below the natural ground surface. Works by which the watertable is likely to be lowered more than one metre below the natural ground surface.

The proposal area is considered to be reclaimed swamp land and has been filled with uncontrolled soils, waste and quarried sands. The fill and waste materials uncovered during the investigation were dry, above the intertidal zone, heterogeneous, did not contain organic material and as such was not considered to pose an ASS risk.

Geotechnical investigations

The soil and rock units encountered from the investigation boreholes locations were relatively consistent with the geological maps. The boreholes and test pits generally encountered topsoil overlying sand and indurated sand, with localised incidences of sandy clays and gravels. Bedrock was not encountered within the depth of investigation at any locations.

Topsoil was typically encountered at all borehole and test pit locations, with the exception of BH04 and BH07. It is likely that any topsoil present at these locations was disturbed and displaced during localised clearing and grubbing before drilling.

The topsoil was encountered to depths ranging from 0.1m (TP03) to 1.0m (BH03) and generally comprised Silty Sand and Sand with rootlets and roots throughout.

Inferred marine deposits were encountered in all boreholes and test pits directly below the topsoil until termination depth.

The materials encountered generally comprised:

- Medium dense, grey / pale grey Silty Sand and sand, overlying
- Very dense, dark brown / black Silty Sand (indurated), overlying
- Medium dense to very dense, grey Silty Sand and Gravelly Sand.

A layer of soft to firm, Silty Sandy Clay with organic material was encountered in BH01 and BH02 beneath the very dense, dark brown / black silty sand layer. This is considered to be consistent with the Quaternary geology maps, which indicate organic muds are likely within the northern portion of the proposal area.

Table 5-22: Interpreted Geotechnical Units (SMEC 2018)

Unit	***Name***	***General description***
1	Topsoil	Silty sand and sand, fine to medium grained. Colour varies across the site – grey, dark grey, pale grey, pale brown, dark brown and black. Ranging from loose to medium dense.
2	***Marine Deposits***	
2a	Surface sands	Silty sand and sand, fine to coarse grained, pale grey, grey, off-white, pale brown, dark grey, trace fine sub-rounded gravel. Ranging from very loose to medium dense.
2b	Indurated sands	Silty sand and sand, fine to medium grained, dark brown to black, indurated, trace gravels. Ranging from dense to very dense. Organic / sulphurous odour noted.

2c	Cohesive sands	Silty sandy clay, low to medium plasticity, dark grey and dark brown, trace timber fragments. Consistency ranging from soft to firm.
2d	Sands and gravelly sands	Silty sand, fine to medium grained, grey, brown, with some bands of coarse-grained sand, and Gravelly sand, medium to coarse grained, grey. Ranging from medium dense to very dense.

Groundwater

A search for nearby registered groundwater bores was carried out on the NSW Department of Primary Industries, Office of Water website. The search revealed that eight groundwater bores were located within 500 m of the proposal area, ranging between 3.1 m and 13 m bgl.

Based on the site topography and elevation, regional groundwater is expected to be very shallow with depths from 1 to 2 m bgl and is expected to flow within alluvial sands. Regional groundwater flow direction is likely to flow in an approximate westerly direction towards Cumbebin Swamp.

Groundwater was observed within the soil profile during geotechnical investigations. Steady water influx was noted between 0.9 m and 1.4 m bgl. Although the proposal area is potentially tidally influenced the investigation did not include a measurement of its influence.

Heavy rainfall at the proposal area on the 5th and 6th of March 2018 is likely to have contributed to any perched water at the proposal area. The nearest weather station recording rainfall (Cape Byron, Station ID 60801) recorded 0.4 mm on 5 March, while 53 mm fell on 6 March with much that falling in the early hours of the morning.

Figure 5-12: Location of geotechnical investigations

5.5.2 Potential Impacts

The proposed land use is not expected to interact with groundwater or the natural soils within the groundwater table. There is the potential that minimal construction activities would interact with soils below the water table, these construction methods were not expected to bring potential ASS or water logged soil to the surface.

Based on geotechnical investigations the key constraints associated with ground conditions at the proposal area are related to:

- Possible occurrence of unsuitable material within the prepared subgrade, such as very loose to loose marine deposit surface sands (2a) and soft cohesive soils (2c) clays (to be removed and replaced with engineered fill materials).
- Settlement of the underlying soft cohesive soils
- A high groundwater table, especially after heavy rainfall, which may reduce bearing capacity for certain shallow foundations and pavements.

The main elements of the proposal that would involve earthworks include:

- Shallow footings for all small structures including public amenities building and lay-over buildings
- Piled footings to support the covered canopy areas large enough to accommodate up to three buses/coaches at a time
- Shallow piled footings for the lighting structures.

The proposal would involve excavations and stockpiling of spoil during construction. If not adequately managed, excavation, stockpiling and transportation of spoil could potentially have the following impacts

- Erosion of exposed soil and stockpiled materials
- An increase in sediment loads entering nearby waterways and the wetland.

With the implementation of erosion and sedimentation controls outlined in section 5.5.3, including the preparation of a detailed site-specific erosion and sedimentation management plan, potential construction related erosion and sedimentation impacts would be appropriately managed and are not expected to be significant.

Fill material imported from off-proposal area would be sourced from certified suppliers to avoid the potential for contaminated fill. Surplus or unsuitable material that cannot be used elsewhere on proposal area (for example as part of reinstatement and landscaping) would be classified in accordance with the Waste Classification Guidelines (DECCW 2014) and disposed of appropriately.

Operation

Operation of the proposal is not likely to result in any significant impacts on geology and soils or subsequent water quality. The risk of soil erosion during operation would be minimal as all areas impacted during construction would be sealed or rehabilitated and landscaped to prevent soil erosion.

5.5.3 Proposed Control Measures

The following mitigation measures should be implemented to minimise erosion and sedimentation impacts during construction:

- Disturbed surfaces must be stabilised as soon as possible;
- An Erosion and Sedimentation Control Plan must be prepared by suitable qualified persons as per EMS-09-PR-0012 *Erosion and Sediment Control* and is to be fully implemented and managed through all stages of the project
- Erosion and sediment control measures would be implemented and maintained in accordance with Managing Urban Stormwater, Soils and Construction (Landcom, 2004)
- All erosion and sediment control measures would be checked and maintained on a regular basis and after large rain events so that they work effectively at all times
- Where encountered topsoil should be stripped and screened for foreign objects, and stockpiled separately for possible re-use as landscaping material, subject to contamination assessment
- Embankments should be constructed by overfilling and then trimmed to finished batter, not steeper than 2.5:1 (vertical : horizontal), to achieve compaction to the batter surface
- An experienced Geotechnical Engineer or Engineering Geologist should observe boring of the piles in order to assess the ground conditions and to confirm the suitability of the adopted design parameters
- Excavation below the water table, with or without shoring, should be avoided where reasonable, feasible and safe to do so. Current designs indicate that excavations requiring dewatering would not be required for construction of the proposal. If excavation below the water table is required, then a dewatering system should be designed and installed to reduce the groundwater level below the desired excavation level. Dewatering systems such as a sump or extraction spears may be suitable depending on the amount of dewatering required. Where groundwater extraction is required, further approvals from the NSW Office of Water may be required
- Water (including groundwater) encountered during construction works would need to be tested, classified and managed on-site or disposed of off-site at an appropriately licensed facility
- Control measures should not be removed before the embankment and other exposed surfaces are stabilised
- Weather (wind and rain) forecasts would be used to inform timing of high risk soil and erosion activities
- Where encountered, topsoil would be stockpiled separately for possible reuse for landscaping and rehabilitation.

5.6 Water Quality and Hydrology

SMEC undertook water quantity and water quality assessment as part of the Draft Detailed Design Report (October 2018) to evaluate the maximum peak flow during all storm events, and the water quality reductions for the development site to minimise the potential flood / water pollution impacts at downstream water course. A hydrology and water treatment measure assessment was developed to inform the concept design for this proposed bus interchange development.

The water quantity and quality assessment involved:

- Review existing flood extents and flood levels surrounding the proposal area
- Review the site soil and groundwater contamination assessment report prepared by SMEC (May 2019)
- Develop the design with inputs from detailed site survey for the proposal area
- Develop the design surface levels for drainage structures across the proposal area
- Propose drainage concept design, which is complied with the stormwater design criteria of local council's design specifications
- Propose water quality control concept design, which is complied with the Water Sensitive Urban Design (WSUD) criteria of local council's design policy
- Undertake a hydrology and water quality assessment for the 'as is' and the proposed drainage design scenario to assess the outlet flows for pre-and post-development conditions.

A summary of the findings is provided in the sections below.

5.6.1 Existing environment

Byron Bay is located within the Belongil Creek catchment which covers an area of approximately 3,000 ha. The Belongil Creek flows to the north to north-west of the proposal area and extends from Cumbebin Swamp to the ocean at Belongil.

As discussed in section 5.5.1, the proposal area is considered to be reclaimed swamp land and has been filled with uncontrolled soils, waste and quarried sands. The fill and waste materials uncovered during the investigation were dry, above the intertidal zone, heterogeneous and did not contain organic material.

The Byron Bay township is located near the eastern boundary of the catchment prior to the discharge to the ocean. Byron Bay is a relatively flat and low lying area and is susceptible to flooding from intense rainfall over the town catchment and elevated ocean levels. The creek is extensively modified around the town with a number of man-made channels. Significant storms also create an overland flow within the low lying areas of the town.

An assessment of the 'Belongil Creek Flood Planning Levels' has been prepared previously by BMT WBM (May 2015) which includes the proposal area. The proposal area is not located within the 1 in 100-year flood level.

The northern portion of the proposal area drains naturally towards the north via an overland channel towards Belongil Creek, and the southern portion drains naturally towards the existing council drainage system at the southern boundary of the proposal area (Figure 5-13). The overflow to the north of the proposal area drains to Belongil Creek. To the south the existing overflow channel drains via an existing council system to Clarks Beach. There is no drainage system or infrastructure currently at the proposal area.

Figure 5-13: Existing drainage in proximity to the proposal area

The average elevations at the proposal area are between 1.40 m and 4.72 m Australian Height Datum (AHD) with a ridge line at the water tower crossing the proposal area from west to east.

The proposal area can be delineated into two separate catchments; a Northern Site and Southern Site catchment. The northern portion of the proposal area ('Northern Site') has the maximum fall of 4.2%, and the southern portion ('Southern Site') has the maximum fall of 3.3% (refer to Figure 5-14). The existing site catchments with downstream overland channels are illustrated in Figure 5-14 and Figure 5-15.

The existing catchment areas are tabulated in Table 5-23.

Figure 5-14: Existing catchments at the proposal area (delineated by purple line)

Figure 5-15: Existing overland flow to north (left) and existing overflow to south (right)

Table 5-23: Existing catchment area

Catchment ID	*Area (m2)*	*Impervious %*	*Pervious %*	*Bypass (m^2)*
Northern Site	3453.2	0%	98%	68.2
Southern Site	3319.7	16.21%	83.79%	0

Future bypass

The construction of the future bypass would increase the amount of impervious area adjacent to the proposal area. Additional impervious areas have the potential to increase the peak rate of runoff and runoff volume from the proposal area into the low lying area around Cumbebin Swamp. The bypass would also reduce the amount of land available for flood storage as a result from the placement of fill, alterations to existing elevations and application of road surfaces. The bypass would involve the installation of culverts at Wentworth Street and upgrades to existing structures along Butler Street to ensure maintenance of adequate drainage.

Climate change

In 2015, BMT WBM prepared the 'Belongil Creek Floodplain Risk Management Study and Plan' to assess the existing and future flood risk for the Belongil Creek catchment under three potential scenarios modelling climate change summarised from the 100 year ARI events.

In all three scenarios, the majority of the proposal area is outside the flooding extent.

5.6.2 Potential impacts

The proposal would require excavation works for the following structural items:

- Shallow footings for all small structures including public amenities building and lay-over buildings
- Piled footings to support the covered canopy areas large enough to accommodate up to three buses/coaches at a time
- Shallow piled footings for the lighting structures
- Installation of drainage trenches and raingardens
- Service trenches including electrical, potable water, waste water and communication connections.

A detailed drainage design and investigation has been undertaken with defined catchment area for each proposed pit based on the design criteria of Northern River-Local Government and Byron Bay Shire Council in conjunction with Australia Rainfall and Runoff (1987).

Construction

Earthworks associated with the proposal would be set back from overland channels and would not impact land immediately adjacent. All works would be managed to ensure that no debris, spoil or materials enter adjacent swamp areas immediately to the north and south of the proposal.

Construction activities may result in increased erosion and sedimentation due to earthworks associated with the interchange, removal of buried rail infrastructure and the installation of new drainage system. While there is the potential for accidental spillage of chemicals, fuels, lubricating and hydraulic oils from mobile construction equipment, the implementation of

erosion and sediment controls would minimise the potential for any spillage to enter adjacent overland channels.

Operation

The hydrology indicates that the discharging flows from the proposed site would be less than the existing conditions in all storm events. Therefore, the proposed development site would not have adverse impacts on the site downstream conditions.

Gross pollutant traps are proposed as a measure to control the peak runoff and to match the existing conditions in all storm events up to and including the 100 year ARI.

Overall, the installation and operation of the proposed drainage would improve the water quality for the proposal area.

The proposal is not expected to have an impact on groundwater or alter flooding patterns.

5.6.3 Control measures

The following mitigation measures should be implemented to minimise potential impacts on water quality and hydrology as a result of the proposal.

- Construction of the proposal would be undertaken so that there would be a minimal amount of excavation of the existing soil to minimise potential impacts on the groundwater level
- Pollution incidents that cause or may cause material harm to the environment to be reported to the NSW EPA
- Chemicals must be appropriately stored and handled in accordance with relevant Material Data Safety Sheets (MSDS)
- All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains
- Spill kits appropriate to products used on site must be readily available
- Plant and equipment must be regularly inspected to check for oil leaks
- Refuelling of vehicles or machinery is to occur within a containment or hardstand area designed to prevent the escape of spilled substances to the surrounding environment
- Wash down of concrete mixers, concreting equipment and trucks must take place in an appropriate area away from drainage lines and stormwater drains
- Wash down areas must be appropriately constructed, and the collected material disposed of off-site
- The CEMP would include a procedure for managing flooding due to natural events. This would include an emergency procedure for ensuring the health and safety of construction workers

5.7 Contaminated land and hazardous materials

SMEC conducted a Preliminary Site Investigation (PSI) at the proposal area (Appendix F). The aim of a PSI is to develop an understanding of the potential contamination status of the proposal area given its historical land use as a rail easement and where necessary provide remediation options and management options. A PSI is the first stage in contamination assessment, which often triggers the need for additional specialist investigations.

Specifically, the PSI included:

- Historical desktop assessment of the proposal area and a review of all available information including aerial photographs, previous reports and anecdotal accounts
- Excavation of eleven test pits and drilling of two boreholes at targeted locations at the proposal area
- Collection of soil samples from the fill and natural soil where encountered
- Drilling and installation of two groundwater wells on the northern and southern boundaries
- Collection of two groundwater samples
- Submission of samples for NATA laboratory analysis for contaminants of concern such as TRH, BTEX, PAH, Heavy metals, OCP, OPP, PCB and Phenols.

The PSI was prepared in accordance with the requirements of the relevant NSW EPA guidelines including but not limited to:

- National Environment Protection (Assessment of Site Contamination) Measure (1999), (Amended 2013)
- NSW EPA (2017) Contaminated Land Management Guidelines for the NSW EPA Site Auditor Scheme (3rd Edition)
- *Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (1998)*

The PSI also includes discussions on laboratory results, interpretation of findings, spatial extent of contamination (if any) and recommendations for proposed remediation (if required).

The investigation area for the PSI was constrained to the proposal area. The investigation area covered an area of approximately 10,396 m^2. The locations of the contamination investigations are shown in Figure 5-16.

Site investigation boundaries are shown extended:

- Vertically: The study boundaries extend vertically to the water table at no deeper than approximately 2.5 m bgl
- Temporal: The contamination investigation was limited to a series of test pits, submission of soil samples for laboratory analysis and one round of groundwater analysis.

The PSI is provided in Appendix F and a summary of the findings are provided below.

5.7.1 Existing Environment

The proposal area is located on reclaimed swamp land which is relatively flat situated at approximately 7 m Australian Height Datum (AHD). The proposal area is oriented in a north-

south direction over a slightly raised ridgeline running east-west with the highest elevation at the water tower in the central portion of the proposal area.

No designated surface drainage lines are GIS mapped or were observed at the proposal area. Low-lying drainage channels were observed to the north and south of the proposal area.

Historical data

A review of eight historical aerial photographs of the proposal area from 1947, 1965, 1971, 1973, 1979, 1987,1997, 2012 and 2019 was carried out. Based on aerial photography, the proposal area was historically used as a rail siding to fill steam trains with water, empty the steam locomotive firebox into an ash pit and stockpiling ash. The following historical timeline has been determined:

- 1890's: the site was constructed for use as a railway siding with associated infrastructure including a water tower, ash pit, coal stage and turntable
- 1947 the site appears cleared with a water tower present. The site appears covered with grass, sand with some trees and shrubs. The main rail line and station platform is present immediately to the east
- Between 1947 and 1965 the rail siding site appears largely unchanged. Residential development has occurred to the east of the train station and west of the water tower site
- Little change between 1965 and 1973, with potential filling and/or stockpiling evident on both sides of the rail siding in 1979
- Between 1979 and 1987 the rail siding appears to have potentially been disused as the unnamed access road appears to have been constructed immediately south of the turntable. Scaring is evident on the investigation area in the immediate area north east of the water tower suggesting potential cutting and/or filling activities. The rail corridor access lane within the southern section of the investigation area has also been constructed and the circular feature has disappeared
- Post 1987 to present day there has been significant vegetation regrowth on the site. The area immediately west of the site and either side of the rail corridor access road have become unsealed vehicle parking areas. The southwestern are of the site has been paved and turned into a carpark. Other than the addition of some residential and dwellings and redevelopment of some commercial areas the wider area has remained relatively unchanged.

EPA Online databases

A search of the NSW EPA Contaminated Land records on 16 May 2019 indicated there are seven contaminated sites notified to the NSW EPA within the Byron Shire Council area. Of these seven, only one site is considered to be located in close proximity to the Proposal site. 'Butler Street Reserve' is located approximately 30m to the north east of the Proposal and is currently listed as 'Under Assessment'. Based on historical activities and investigations conducted at Butler Street Reserve and as outlined in Preliminary Investigation Order 20181009, the EPA reasonably suspects that the specified land is contaminated with methane, carbon dioxide, and metals.

The NSW EPA notices for the site are provided in Table 5-24 below.

Table 5-24: Summary of notices for NSW EPA notified site 'Butler Street Reserve'

Suburb	*Address*	*Site Name*	*Notices relating to site*	*Status*
Byron Bay	Butler Street	Butler Street Reserve	Current Notices: Preliminary Investigation Order (20181009) Amendment or Repeal of Order or Notice (2194406)	Under Assessment Amendment of Order 20181009 was granted by the NSW EPA to extend the timeline for the completion of all works required by the Sampling Analysis and Quality Plan (SAQP) for the site by no later than 31 May 2019.

There are currently no NSW EPA contaminated land notices for the proposal site.

A search of the NSW EPA Protection of the Environment Operations (POEO) database on 16 May 2019 within the Byron Bay Shire Council found that there are no 'issued' environmental EPL for sites within 1km of the Proposal.

Site observations

Site activities for this PSI were undertaken by two experienced Environmental Scientists on 5 and 6 March 2018, and by one Experienced Environmental Scientist on 15 May 2019 (Appendix F).

A summary of relevant observations is included below:

Preliminary Site Investigation (5-6 March 2018)

- At the time of the investigation, the northern and central portions of the site were contained within a fenced section of the rail corridor. The southern portion of the site was publicly accessible
- The northern third and central portion of the site was covered in dense vegetation with trees greater than 5m in height and a thick understorey. The site was cleared around the water tower and buried turn table area. The southern portion of the site comprised an unnamed road and grass road verge
- Some scattered anthropogenic litter that appeared to be a squatter's camp, included a disused tent and camping equipment in the northern portion of the site
- The inferred natural surface water drainage direction was to the north in the northern and central portions of the site, and to the south from the southern side of the Water Tower
- No pooled water was observed on the site
- The vegetation appeared to be healthy showing no signs of stress.

Preliminary Site Investigation (15 May 2019)

- Thick vegetation cover is present across most of the northern and central areas of the site except for the area immediately north of the water tower, the turntable
- The south eastern paved carpark area appears to have been used as a laydown area for other construction works
- Sporadic presence of anthropogenic litter across the site including: glass, brick fragments, plastics, bottles, scrap metal
- Coal ash and ballast was observed on the surface within the former coal stage area and ash pit area
- Ballast was observed in the near surface material throughout the rail corridor in the north eastern area
- An asphalt slab (approx. 4m x 2.5m) was present immediately adjacent to the west of the turntable area
- No pooled water was observed on the site
- The vegetation appeared to be healthy showing no signs of stress.

Groundwater

A search for nearby registered groundwater bores was carried out on the NSW Department of Primary Industries, Office of Water website. The search revealed that eight groundwater bores were located within 500 m of the proposal area. Based on the topography and elevation at the proposal area, regional groundwater is expected to be very shallow with depths from 1 to 2 m bgl and is expected to flow within alluvial sands. Regional groundwater flow direction is likely to flow in an approximate westerly direction towards Cumbebin Swamp.

Groundwater wells GW01 and GW06 were installed at the northern and southern boundaries of the proposal area respectively. Given the low-lying nature of the proposal area and the inferred groundwater flow direction flowing generally to the north and south from the central portion of the proposal area. Based on field observations, water depth across the proposal area was observed to be between 0.9 m and 1.4 m bgl. Steady water influx was noted within test pits and groundwater wells. Although the proposal area is potentially tidally influenced the investigation did not include a measurement of its influence.

Groundwater monitoring wells were purged and sampled on 6 March 2018. As discussed in section 5.5, over 53 mm of rainfall was recorded on the date of investigations. This volume is considered to have had a high impact on groundwater levels with increased rates of infiltration through highly pervious alluvial sands. It is also expected to have an influence on groundwater quality as a result of increased dilution.

Elevated heavy metal concentrations of dissolved zinc and minor exceedances of dissolved copper and dissolved lead reported above site adopted groundwater investigation levels (GILs). These exceedances are considered typical of groundwater in urban environments. The PSI concluded that no further groundwater investigation or remedial action is warranted at the proposal area.

Elevated Total Recoverable Hydrocarbons (TRH) concentrations were above laboratory EQLs were reported in GW01. A comparison of the laboratory supplied chromatogram and TRH reference library showed that the sample chromatogram did not match any common synthetic/industrial petroleum based product and is likely the product of organic processes within the natural estuarine alluvial sands.

Asbestos

No ACM products were readily visible on the surface or within any of the test pit or hand auger excavations carried out during the site investigations on 5-6 March 2018 and 15 May 2019. This does however does not preclude the potential for ACM to be present within fill material located in other areas of the site. No ACM was observed during the concurrent Geotechnical Investigation (SMEC 2018) carried out at the site.

No asbestos was detected in any soil sample analysed by the laboratory. No asbestos fragments were observed during field works, however due to dense grass and vegetation cover, the entire ground surface of the site was not thoroughly inspected.

We note that a full assessment in accordance with WA DoH (2010) guidelines was not carried out to quantify the degree, extent and nature of potential asbestos contamination. This assessment was carried out to determine the presence of asbestos and to assess the requirements for additional investigations.

Soil Contamination

Benzo(a)pyrene TEQ calc (PQL) concentration (3.6mg/kg) above HIL C Recreational criteria (3mg/kg) was reported at one isolated location in surficial soils TP6 at 0.0-0.1m (not at depth). The exceedance is likely attributed to the presence of coal ash and/or fragments of coal in near surface material in the vicinity of the former coal stage.

It's understood that surficial material in the vicinity of TP6 (former coal stage area) is going to be removed from site for offsite disposal. The CSM for the Proposal site indicates that there will be limited access to soils, further reducing the risk of exposure. During construction activities, this area would be defined in a Construction Environmental Management Plan (CEMP) with suitable management measures applied to limit worker's exposure to material potentially impacted by benzo(a)pyrene. Additionally, although the more conservative HIL C for Recreational land use has been adopted for this PSI, the future land use of the site would be considered commercial/industrial and HIL D 'Commercial/Industrial' criteria would be adopted, and as such, Benzo(a)pyrene TEQ calc(PQL) in TP6/0.0-0.1 would not exceed HIL D (40mg/kg).

TRH concentrations (160 mg/kg) marginally above laboratory EQLs (100 mg/kg) were reported in TP03 at 1.6-1.7 m bgl. A comparison of the laboratory supplied chromatogram and TRH reference library showed that the sample chromatogram did not match any common synthetic/industrial petroleum based product and is likely the product of organic processes within the natural estuarine alluvial sands.

All metal concentrations were reported below the HILs.

Areas of Environmental Concern

Based on the results of the above site information, three areas of environmental concern (AEC) have been identified at the proposal area (Table 5-25). A qualitative assessment was undertaken to determine the potential for contamination to be present.

Table 5-25: Areas of environmental concern

AEC	*Location*	*Assessment*
AEC1	Uncontrolled fill	A medium contamination potential is considered for the presence of uncontrolled fill, either buried or at surface in former stockpile locations. The aerial photographs show areas of disturbed soil and stockpiles. There is a potential for ash to be buried on site, but more likely it was transferred to the nearby landfill. There is also a potential for uncontrolled fill imported to the site, potentially used to cover the former rail siding tracks or reshape the surface.
AEC2	Steam train turn table and ash pit	A high contamination potential exists for the presence of contaminated fill material: • Potentially used to backfill the turn table and former ash pit • In the vicinity of the former elevated coal stage area from historical coal storage • In fill material in the north eastern area of the site from historical use as a rail corridor
AEC3	Groundwater	A low to medium contamination potential is considered for the impacts to local groundwater via potential contaminated fill. • Groundwater beneath the site is potentially tidally influenced with standing water level between 0.9 and 1.2 m bgl • Eleven registered groundwater bores were located within 500 m of the site at various hydraulic gradients. No water quality results were captured. Potable groundwater extraction is unlikely to occur due to existing town's main water supply

Figure 5-16: Location of contamination investigations and AECs

5.7.2 Potential Impacts

Construction

Based on the result of the desktop assessment and investigations for the PSI, the following was concluded:

- Three potential areas of environmental concern (AEC) have been identified at the proposal area.
- AEC2 contains backfilled waste material, including discarded rails, concrete blocks, coal ash and coal fragments and ballast in the former train turn table, former ash pit and former coal stage area.
- Based on the results of the desktop assessment, site investigations targeting potential sources of contamination and soil laboratory analytical results. SMEC considers that the site is or can reasonably be made suitable for its intended land use as a bus interchange depot in accordance with *Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (1998*).

Excavated material that is not suitable for on-site reuse or recycling, such as contaminated material should be transported to a site that may legally accept that material for reuse or disposal. Soils disposed offsite would be classified prior removal to ensure the correct legal resource recovery and disposal occur.

Small quantities of fuels or other hazardous substances may be stored at the proposal area during construction to serve construction machinery. As a result, there would be the potential for spills of contaminants, resulting in localised contamination within the proposal area or the contamination of nearby creeks / drainage lines and soils.

Bunding and other appropriate mitigation measures would reduce the risk of accidental spillages and/or discharge during construction. Based on the above, the proposal is expected to have a negligible impact on contamination during construction and no further investigations are deemed necessary.

Operation

During operation of the bus interchange groundwater quality could be potentially affected by the infiltration of pollutants into the soils. If not appropriately managed, these pollutants could reach perched groundwater.

5.7.3 Control measures

The following mitigation measures should be implemented to minimise contamination and hazardous materials:

- A CEMP would developed prior to the commencement of site construction activities. The purpose of the CEMP will be to provide a structured approach to the management of environmental impacts during the construction activities.
- As and when required, environmental monitoring procedures may be considered such as visual/olfactory observations (i.e. visual staining or odours from petroleum hydrocarbons).
- It should be noted that if excavated material is proposed to be taken offsite for disposal to a licensed landfill facility, soil will require sampling and testing for waste classification prior to disposal in accordance with the NSW EPA *Waste Classification Guidelines (November 2014).* If contamination is observed/detected, it is also recommended that the underlying soils are assessed through validation sampling

- Given site soils were not assessed against EILs in terms of potential terrestrial ecological receptors, SMEC recommends the use of imported fill as the growing medium in proposed future planting/ landscape areas
- Hazardous materials must be transported, stored and used in accordance with the corresponding Material Safety Data Sheets (MSDS)
- Fuels, lubricants and chemicals must be stored and, where practicable, used within containment/hardstand areas designed to prevent the escape of spilt substances to the surrounding environment, as required by relevant legislation and standards (e.g. AS1940: Australian standard for the storage and handling of flammable and combustible liquids)
- All fuels and other hazardous substances must be stored at designated construction compounds in containers within a bunded enclosure with sufficient capacity to hold 120% of the stored material
- Adequate spill prevention and containment measures (e.g. drip trays) must be used when refuelling equipment at the proposal area
- All storage and handling equipment at the proposal area must be maintained properly
- The amount of hazardous material stored and used at the proposal area must be kept to the minimum practicable
- Construction personnel to be trained in spill containment and response procedures
- Appropriate spill response material to be kept at the proposal area
- Spills or leaks to be reported to the senior officer on site and clean up measures commenced immediately
- Spills to be reported in accordance with legislative and licensing requirements
- If a spill occurs, the material to be contained to the smallest area possible
- Where possible, spilt material and contaminated soils to be treated on site. If this is not possible, the material or soils to be removed off-site for disposal at an appropriately licensed facility
- All spills that cause or may cause material harm to the environment to be reported to the NSW EPA.

5.8 Visual Aesthetics and Urban Design

A Landscape Character and Visual Impact Assessment (LCVIA) was carried out by DesignInc (2019) to assess the impact of the proposed bus interchange on the visual amenity and landscape character surrounding the proposal area and within the larger locality.

Landscape character zones (LCZ) were characterised using photographing, understanding of the locality, mapping and determining the capacity of this zone to visually absorb the proposal. The visual impact assessment considers the degree of visibility of the new proposal from the surrounding streets including Butler Street, Somerset Street and Jonson Street.

The LCVIA identifies and document the visual opportunities and issues within the proposal area and assist in achieving the integration of urban and landscape design for the proposed works.

The LCVIA is based on desktop analysis, a site assessment and visual assessment at various locations. The LCVIA is provided in Appendix G, a summary of the findings and recommended mitigations measures to be investigated at subsequent design stages are provided below.

5.8.1 Existing Environment

As discussed previously, the proposal is located on the east side of Butler Street and west of Byron Bay Town Centre. It is bounded by the disused Railway Station to the east, Butler Street to the west and remnant wetland/bushland to the north and south.

The northern portion of the proposal area is currently disused and secured by a chain mesh fence. Part of the southern section of the area is an unpaved road that is currently being used as an informal carpark. A walking thoroughfare in the southern region of the proposal takes pedestrians from Railway Square, over the level railway crossing, to Butler Street. The pedestrian access way provides a direct link from the main town centre Jonson Street to Burns Street and is mainly used by residents and tourists located to the west.

Numerous tourist accommodations are also located within the immediate area surrounding the proposal area. Residential houses are located immediately to the west of the proposal area on Burns Street (Figure 5-17).

Landscape Character Zones

The LCZs are areas that are relatively consistent in terms of their combination of landform, vegetation and land uses, while containing a degree of variation in visual landscape character.

The LCVIA characterised the surrounding area into seven different LCZ. LCZ locations and their descriptions are provided in Figure 5-18 and Table 5-26.

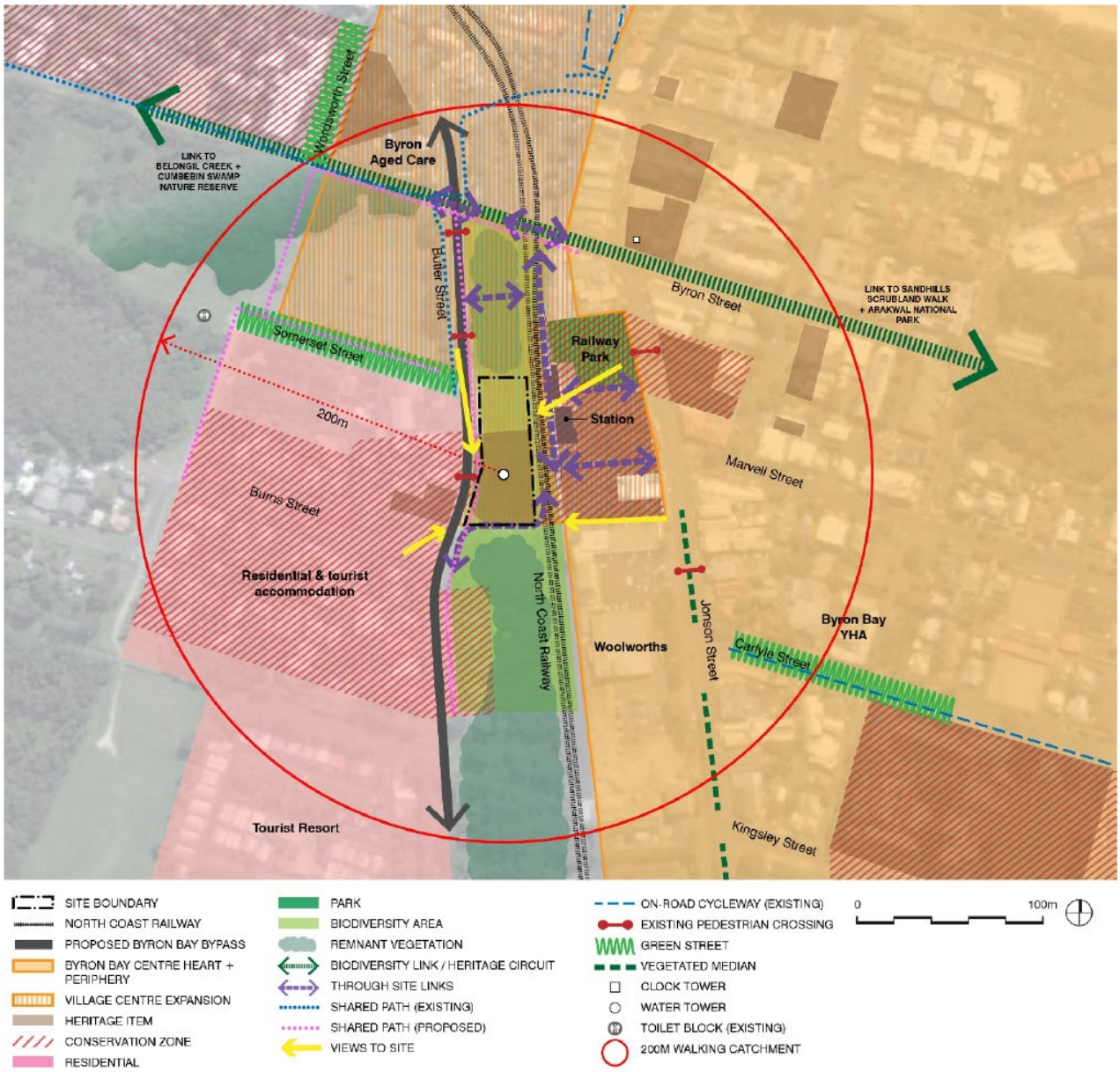

Figure 5-17: Site analysis plan (DesignInc 2019)

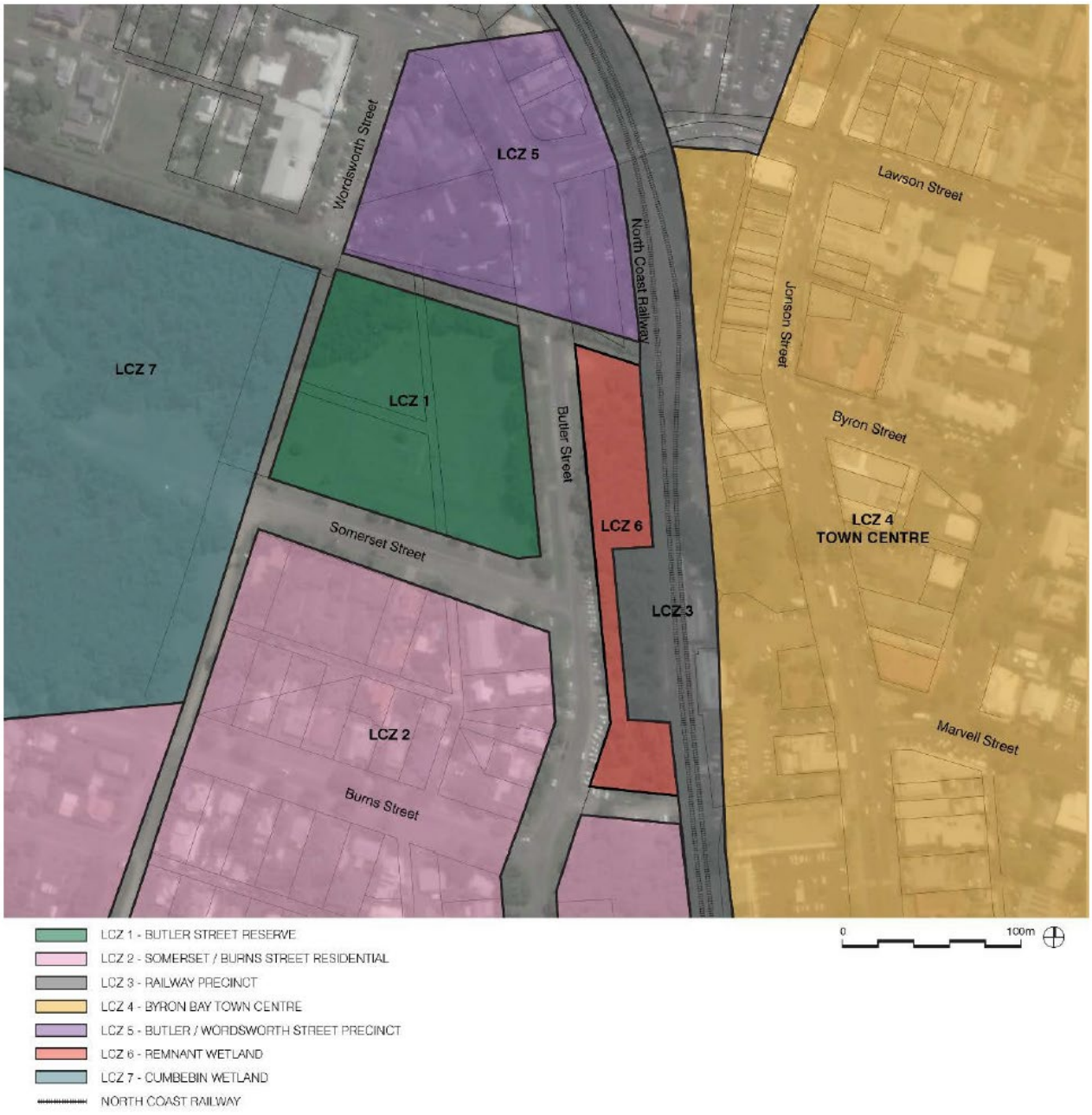

Figure 5-18: Landscape Character Zones (DesignInc 2019)

Table 5-26: LCZ descriptions (DesignInc 2019)

	LCZ 1 Butler Street Reserve	***LCZ 2 Residential***	***LCZ 3 Railway corridor***	***LCZ 4 Byron Bay Town centre***	***LCZ 5 Mixed Use***	***LCZ 6 Wetland east of Butler Street***	***LCZ 7 Cumbebin Wetland***
Landform	Generally flat, low lying, former swamp forest.	Generally flat; low lying, former swamp forest	Generally flat at Railway tracks – at the edges of the corridor the land slopes down to meet the adjacent roads.	Generally flat, rising north of Jonson Street towards the beach front.	Low lying curved flat road – wide carriageway.	Generally flat, low lying swampland.	Undulating – wetland.
Vegetation	Continuous canopy surrounding zone to the west and along Butler Street to the east, very minimal vegetation within the zone – open space grassland in reserve with scattered insignificant tree planting.	Informal street trees	Grass verge, remnant forest at edges	Discontinuous streetscape planting – Araucaria tree planting and planted intersections. Roundabout at Jonson Street and Lawson Street planted with Pandanus.	Informal planting of Araucaria and palm plantings to edges of road in grass verges.	Relatively dense vegetation of melaleuca and some palms.	Dense vegetation with endangered ecological communities present. Remnant and regrowth of wetlands and mangroves. Casuarina, Melaleuca and fig species.
Hydrology	Belongil Creek Tributary located to the north of Reserve; flood zone.	Former swampland flood table. Kerbs and gutters along Somerset Street but others have no kerbs and gutter.	Belongil Creek Tributary underpasses the tracks.	Piped stormwater.	Tributary of Belongil Creek; Former swampland.	Swampland.	Wetland – flood zone.

	LCZ 1 Butler Street Reserve	***LCZ 2 Residential***	***LCZ 3 Railway corridor***	***LCZ 4 Byron Bay Town centre***	***LCZ 5 Mixed Use***	***LCZ 6 Wetland east of Butler Street***	***LCZ 7 Cumbebin Wetland***
Land uses	Public Recreation and Open Space.	Low density residential.	Infrastructure – decommissioned.	Town Centre – Retail outlets and food outlets.	Police Station, Nursing Home, Hospital, Petrol Station and Motel.	None – remnant forest.	Untouched vegetation – wetland.
Built Form	No built form in zone.	Low density residential of 1-2 story dwellings with street front and off-street parking some with Kerbs and gutters.	Railway open space.	1-2 story commercial buildings, street front parking and some centralised street parking	Generally, 1-2 story buildings.	No built form	Public toilets.
Spatial	Generally, a wide-open space with significant tree planting to one side of the Reserve	1-2 story residential development.	Wide open grassland with railway tracks.	Strip shopping – minimal street planting regime – minimal views to the beachfront.	Wide open roads edged by built form.	Remnant swamp wetland forest.	Remnant swamp wetland.

Visual envelope

A map of the visual envelope of the proposal area illustrates the likely visual catchment of the proposal. It generally describes the extend of the views possible from any given place within the proposal area. Based on existing landforms, the visual catchment also takes into account vegetation, land uses and structures.

Figure 5-19 defines the visual catchment of the proposal area that was identified as part of the visual impact assessment and the location of key viewpoints.

The eight viewpoints, location and receivers are specified in Table 5-27.

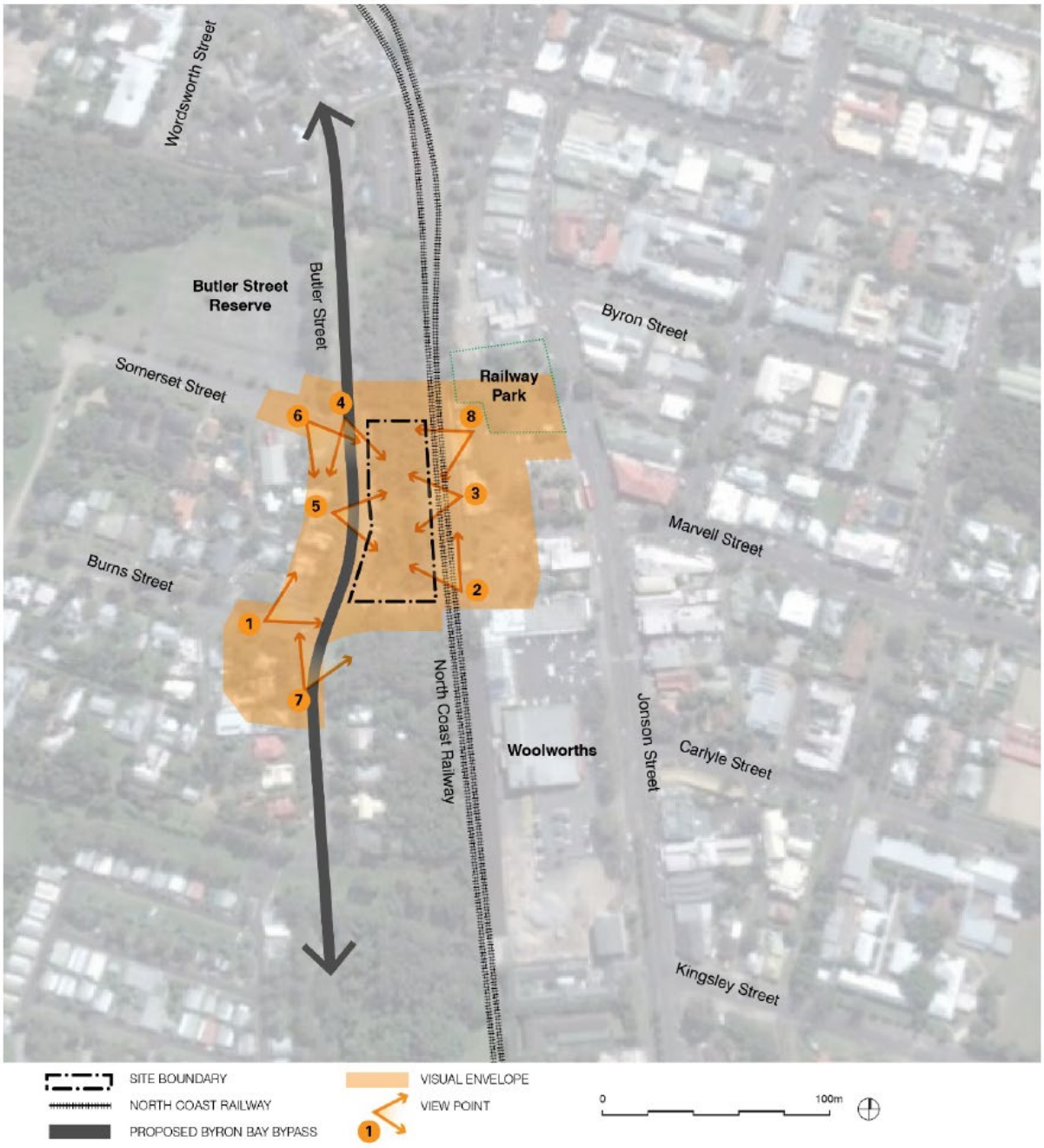

Figure 5-19: Visual envelope and key viewpoints (DesignInc 2019)

Table 5-27: Viewpoint location table (DesignInc 2019)

Viewpoint number	*Location*	*Receptors*
01	Burns Road	Residents and pedestrian/cyclists on Burns Road
02	Pedestrian railway crossing	Pedestrians travelling from Railway Square to Butler Street
03	Existing railway platform	Users of the Railway Square and Bar
04	Northern end of Butler Street	Motorists and pedestrians/cyclists of Byron Bay bypass/Butler Street
05	Butler Street	Residents on Butler Street, pedestrians and cyclists
06	Corner of Somerset Street and Butler Street	Residents and pedestrians/cyclists of Somerset Street
07	Butler Street/ Byron Bay bypass	Users of Butler Street and Byron Bay bypass/Butler Street
08	Railway Square next to the Railway Friendly Bar	Users of the Railway Friendly Bar and railway carpark

5.8.2 Potential impacts

The extent of the proposed works associated with the proposal includes:

- Provision of three dedicated stops for regional coaches within the interchange
- Associated customer facilities such as covered canopies, shelters, waiting areas
- Provision of a disability car parking spot, two taxi ranks and two kiss and rides
- Public amenities
- Accessible paths to key interchange elements
- Landscaped areas within the proposal.

Construction

Activities associated with the construction would be visible to residents along Butler Street. These include stockpiles, earthworks, presence of machinery and plant at the proposal area. The construction of the proposal would also potentially block east-west vistas however these vistas are currently blocked due to the presence of dense vegetation at the proposal area.

The site compound is approximately 100 m from the nearest residential receiver along Butler Street. The site compound is nestled within the existing car park to the south between commercial receivers to the east and dense vegetation to the west, this would obscure line of sight to most residents along Butler Street. Temporary screening (such as noise blankets) would be erected along the western boundary of the proposal area between the work site and residential receivers on Butler Street.

Operation

The proposal provides two entries into the proposed interchange to separate buses and cars. Buses would enter and exit the proposed interchange via a roundabout at the intersection of

Somerset Street and Butler Street (to be constructed as part of the bypass). Cars would enter off Butler Street where there is a single disabled car space, two taxi stands and two kiss and ride spots.

The proposal would provide a shared path alongside Butler Street before crossing over to the western side to help minimise the pedestrian and vehicle conflict at the entry/exit points of the proposed interchange.

The pedestrian link over the railway would be widened to allow for a generous entry into the proposed interchange enabling pedestrians to better move through the space. The existing railway tracks would be embedded into the pavement so they are still visible (and still useable should they need to be) but would be flush with the pavement so not to create a trip hazard.

The proposed amenity building would have a direct visual connection in terms of architecture to that of the proposed canopies.

The landscape design integrates the proposal into the surrounding parkland setting. The proposed new public space would allow for the infiltration of people through the space, whilst allowing for the gathering of people that arrive at the proposed interchange. This is in alignment of the TAP objectives driving the proposal. A fragmented pavement edge leading into the main public space would blend the landscape together with the pedestrian zone and soften the edges to the remnant wetland beyond.

The remains of the existing steam turntable would be part demolished and re-interpreted through the landscape in the central roundabout. Plants with contrasts of both texture and colour would be chosen to represent the shape, scale and layout of the turntable.

A buffer zone of planting in the form of a raingarden would separate Butler Street from the internal roadway of the interchange. The main public square would be planted with trees, predominately comprised of native or indigenous species, that have an underground strata vault system which allows for an increased soil volume to enable adequate tree root growth and would prevent the pavement from lifting. This strata vault system would also ensure the longevity of the trees.

Artist impressions of the proposal are provided in Figure 5-20 to Figure 5-23

Figure 5-20: Artist Impression of the proposed bus shelter from within the interchange (indicative vegetation only) (DesignInc 2019)

Figure 5-21: Artist Impression of the bus shelter from the taxi/kiss and ride drop off area (indicative vegetation only) (DesignInc 2019)

Figure 5-22: Artist Impression of the Bus Interchange and Public Square from Butler Street (indicative vegetation only) (DesignInc 2019)

Figure 5-23: Artist Impression of the Bus Interchange and public square facing north from pedestrian access way (indicative vegetation only) (DesignInc 2019)

Landscape character impact assessment

The LCZ impacts vary from low to high, primarily due to the proximity of residential housing to the proposed interchange, the sensitivity of the adjacent swamp forest and the degree of change of use from a disused railway corridor to a more intense bus interchange with new canopies and amenities building. The impact of the proposal on each LCZ is described in Table 5-28.

Table 5-28: Landscape Character Impact

Zone	*Overall impact*	*Explanation*
LCZ 1	Low	There would be no change in use of Butler Street Reserve. No new works are proposed inside this zone.
LCZ 2	High	Impact is high due to the sensitive residential use and the large degree of change.
LCZ 3	High-moderate	New urban and landscape design works in this zone. The water tower is visible from inside the railway corridor and the existing railway platforms. The water tower would be more prominent due to the clearing of the overgrown vegetation. Heritage zone with heritage buildings.
LCZ 4	Low	Improved connection from Jonson Street to Butler Street through pedestrian railway link. The proposal would remove buses from the town centre. Bus shelter and amenities would be marginally visible from the town centre.
LCZ 5	Low	Minimal change to zone. Potential for increased patronage of Byron Street shared path the boundary of Zone 5 and Zone 1, which links to Jonson Street.
LCZ 6	Negligible	This landscape character zone has high sensitivity. However, the strategic design of the proposal indicates that the proposed works do not directly impact the site.
LCZ 7	Negligible	No visual change to the wetland itself as it is located distant to the proposal area.

Visual impact assessment

The visual impact assessment described the visual sensitivity, magnitude and overall visual impact of the proposal on the key viewpoints identified in Figure 5-19. A summary of the impact assessment is provided in Table 5-29 using a qualitative ranking scale of 'high-moderate-low'. This scale has been used for the purpose of describing the qualitative visual impact of the proposed works and is not reflective of the overall environmental impact assessment of the proposal.

The visual impact is higher in areas that are located close to the proposed bus interchange and in more sensitive residential areas. The urban and landscape design proposed for the proposal coupled with the retention of existing mature trees have reduced the visual impact during the concept design process.

Three viewpoints have been qualitatively described as having a high to moderate–high rating as these viewpoints are closest to the proposal area and adjacent to residents. The remaining five viewpoints have been assessed as having a moderate to moderate-low visual impact and are either further away from the development or less visually sensitive.

As noted in Table 5-29, the visual impact at VP3 (existing railway platform) is considered to be 'high'. The existing vegetation would be removed to build the proposal which will open views to and across the site. The interchange would be highly visible from the disused railway platform, which is accessible from the railway carpark. The proposed bus canopy would be visible as well as the windbreak with the steam train motif. Glimpses of the Water Tower will be visible through the canopy and between the trees in the median, although the bus canopy structure has been designed to align with the tree canopy. In addition, the

proposed operation of the interchange would require lighting for safety and surveillance and is likely to increase light spill.

Based on the LCVIA, the visual impact of the proposal on the town centre would be negligible due to the distance of the proposal and the screening effect of the existing wetland along the railway.

Table 5-29: Overall visual impact for each key viewpoint

Viewpoint	*Overall visual impact*	*Explanation*
VP1	High–Moderate	At this location the proposal would be visible to some residents on the west side of Butler Street. The inclusion of tree planting in the public domain would screen the proposed interchange and help mitigate the impact to some extent. Additional lower level planting to the edge of the bus roadway is incorporated to soften the edges of the road and plaza. Further mitigations to reduce visual impacts could include control of lighting to minimise light spill and graffiti deterrent strategies.
VP2	Moderate	At this location the proposal is partially visible to users of the Railway Carpark and pedestrians/cyclists. Trees and landscape in at the proposal area would reduce the visual impact and improve the current dilapidated nature of this view. The additional landscaping proposed would also help to visually soften the amount of paved space. Further mitigations to reduce visual impacts could include control of lighting to minimise light spill and graffiti deterrent strategies.
VP3	High	At this location, the proposal would be highly visible and the degree of change is high as it changes from an empty site to an activated and utilised site. Light Spill will be increased as new lighting is proposed to the proposal area and the lighting is designed to Asset Standards Authority (ASA) standards, fittings have been chosen to provide directional lighting to help reduce unnecessary light spill..
VP4	Moderate–Low	At this location, the view of the proposal would be screened by vegetation, similarly to its current conditions. Casual surveillance will be enhanced by the removal of the dense low branching vegetation providing better safety and security. The new planting proposed along the edge of Butler Street is in a swale and is of varying scales ensuring casual surveillance is still retained or enhanced.
VP5	Moderate–High	The overall impact from this viewpoint is due to the proximity to residential housing. Tree planting would be incorporated into the design to mitigate the visual

Viewpoint	*Overall visual impact*	*Explanation*
		impact the proposed interchange on the residents located on Butler Street. The tree planting also helps to mitigate the increased bighting in the proposal area, which is lit to ASA standards.
VP6	Moderate	The view of the proposed interchange at this location would be screened by vegetation. Casual surveillance opportunities would be increased through creating a more visually permeable area providing better safety and security.
VP7	Moderate	The overall visual impact for this viewpoint is due to the distance of the proposed interchange from the viewer and the screening provided by the existing trees and proposed new landscaping. The degree of change is moderate when compared to the existing view. Light spill would be increased due to the nature of the new plaza and to ensure the safety of its users.
VP8	Moderate–Low	The overall visual impact for this viewpoint is due to the low sensitivity with viewers being predominately users of the carpark or Railway Friendly Bar patrons. The amount of the proposal visible would also be minimal. Light spill at this location would increase due to the ASA standard requirements that is being designed to.

In general, the increase in scale, form and change in character of the proposal area to an interchange, utilised daily by visitors and locals, provides an increased magnitude of effect. The visual impact is higher in areas that are located in more sensitive residential areas. The urban and landscape design proposed for the project coupled with the retention of the existing heritage Water Tower have reduced the potential visual impact during the concept design process.

Further mitigations to be investigated during detailed design include maximising landscaping, architectural paint finishes and colours, containment of light spill, minimisation of signage clutter and anti–graffiti vandalism strategies are provided in section 5.8.3.

5.8.3 Control Measures

The following mitigation measures should be considered during detailed design, construction or operation to minimise visual impacts of the proposal on sensitive receivers: These mitigation measures have been developed during the LCVIA in to address issues of visual amenity, light spillage, graffiti and vandalism, dumped rubbish and litter, noise mitigation, and signage and advertising (Appendix G).

- Maximise planting along the edge of Butler Street to screen the proposed interchange
- Minimise visibility of the amenities building from Butler Street through tree planting and building design. Select materials that blend into the surrounding landscape and help the building recede into the background

- Lighting for the project should be designed in accordance with AS 4282 *Control of the Obtrusive Effects of Outdoor Lighting*. Lighting to minimise light spill into adjoining areas.
- Maximise planting surrounding the proposed interchange to further screen lighting
- Provide directional lighting that has been is angled downwards and includes glare shields
- Ensure provision of CCTV and sufficient lighting to deter vandalism
- Consider surface finishes that discourage graffiti such as textures or patterns or anti-graffiti coatings to remove graffiti quickly and easily
- Consider screening of walls with planting to restrict access to walls
- Consider incorporation of public art on walls (i.e. painting, printing or mosaic tiles)
- Ensure management of the proposal area to ensure prompt removal of rubbish and surveillance
- Provide sufficient bins at the proposed interchange and within the public domain areas
- Preferentially consider at receptor treatments rather than structures such as noise walls. If noise walls are required, ensure screening of walls with landscape planting
- Minimise use of signage and advertising to mitigate landscape and visual impacts associated with land use change
- Avoid lighting of signage so not to increase the amount of light into the proposal area
- Any disturbed areas of the site must be revegetated using locally indigenous species in accordance with EMS-09-GD-0074 *Revegetation Guide* and EMS-09-TP-0066 *Revegetation Technical Specification Template.*
- All conditions outlined in the s60 approval would be applied to the proposal, particularly those relating to landscape design and visual amenity.

5.9 Traffic and access

A Bus Bay Capacity Assessment (BBCA) Technical Note was prepared by DCI & Associates Pty Ltd (2018) to review the existing scheduled timetable at the bus stop and to conduct a high-level capacity assessment to identify the number of bays required for the proposal. The BBCA also involved a review of the existing concept design relating to operations, pedestrians and safety.

The BBCA identified the number of trips servicing the Jonson Street bus facility each weekday, by hour across the day, according to their status of a commencing trip (bus starts at Byron Bay), a passing trip (bus services Byron Bay mid-trip), or a terminating trip (bus finishes service at Byron Bay).

The BBCA is provided in Appendix H and a summary of the findings are provided below.

5.9.1 Existing environment

Access and surrounding land use

The proposal area is located to the west of the Byron town centre adjacent to the disused rail corridor. Currently, the northern portion of the proposal area is only accessible by Sydney

Trains personnel and is secured by a chain link fence. The southern section of the proposal area includes an informal pedestrian thoroughfare and informal car parking.

There is a walking thoroughfare that takes pedestrians from the town centre, over the level railway crossing, to Butler Street. This provides a direct link from the main town centre Jonson Street to Burns Street. Informal car parking is available along the western boundary of the proposal area on Butler Street, and to the south. Formalised parking is available to the south east for Woolworths carpark and Railway Friendly Bar.

As discussed previously, the surrounding land use includes residential properties to the south west and west, commercial premises to the east and dense vegetation adjacent to the northern and southern boundary of the proposal area.

Additional car parking is also available at Butler Street Reserve, to the north-west of the proposal area.

Road network

Butler Street is a two way – two lane local road that provides access to a primarily residential area, west of the railway line. The sign post speed limit is 50 km/h. There are two T-intersections on Butler Street; at Somerset Street and Burns Street.

Butler Street forms the northern alignment for the approved Butler Street bypass, with the southern section of the bypass to be an extension of the street parallel with the railway line in an undeveloped road reserve. The Environmental Impact Statement (EIS) for the construction of the bypass estimated the bypass was expected to redirect between 3,200 and 4,400 vehicles per day away from Jonson Street (and the town centre).

The expected future traffic volumes are demonstrated in Table 5-30. Future traffic volumes were prepared on the based on 2018 as the opening year with an assumed two per cent linear growth rate. Notably, the bypass open year is scheduled for 2020[1].

Table 5-30: Future traffic volumes compared to existing (GHD 2016)

Street	*Existing traffic volumes (vehicles per day)*	*Future traffic volumes (vehicles per day)*
Shirley Street, north of roundabout	21,000	22,680
Lawson Street, east of level crossing	19,500	16,740
Butler Street north, near roundabout	1,500	5,940
Butler Street south / Browning Street	-	4,320
Jonson Street, south of Lawson Street	9,000	5,400
Browning Street east	8,000	8,640

Public transport

Bus services

There are no existing bus stops near the proposal area. The nearest bus stop is located on Jonson Street, 100 m to the east. The BBCA conducted a review of the current timetable utilising the existing Jonson Street bus stop (Appendix H).

[1] https://www.byron.nsw.gov.au/Services/Major-construction-projects/Byron-Bay-Bypass

To identify the number of weekday trips servicing the bus facility, the existing Friday timetable was assessed for the school period as this provides a higher volume of bus trips compared to the operational timetable on Monday to Thursday or during school holidays. This allows the bus facility to be assessed against the day when the highest volume of buses are scheduled.

Based on the current scheduled timetable, 121 buses are servicing the facility each weekday including 45 trips commencing, 29 trips passing through and 47 trips terminating at Byron Bay. The bus facility experiences the greatest number of buses using the stop between 5:00pm and 6:00pm with ten buses scheduled.

On Saturday, 60 buses are servicing the facility each Saturday with 16 trips commencing and terminating, and 28 trips passing through. The bus facility experiences the greatest number of buses using the stop between 8:00pm and 9:00pm, with nine buses scheduled.

On Sunday, 30 buses are servicing the facility each Sunday with 5 trips commencing, 21 trips passing, and 4 trips terminating at the bus facility. The bus facility experiences the greatest number of buses using the stop at the same time period as weekday's being between 5:00pm to 6:00pm with five buses scheduled.

A summary of the findings in the BBCA are provided in Table 5-31.

Table 5-31: Summary of bus trips serving Jonson Street bus stop (DCI 2018)

Day	*Commencing trip*	*Passing trip*	*Terminating trip*	*Total*
Weekday	45	29	47	121
Saturday	16	28	16	60
Sunday	5	21	4	30
Weekly	66	78	67	211

A solar train was officially launched by Byron Bay Railroad Company Ltd on 16 December 2017. Nine services are operating from Byron Beach to North Beach (10-minute commute) each day commencing at 10 am until 5.25 pm[2]. The re-activation of a small extent of the disused rail corridor, 3 km, is not expected to alter the need for improved public transport within the locality. The solar train is unable to take trips longer than 3 km without regular recharging stations along the route, which is currently unavailable.

Van services

Van services include airport shuttle buses, and other larger those associated with transporting guests to various hostels and recreational companies (Appendix H). The number of services operating at Byron Bay using a van remains fairly consistent across the week. Overall 89 trips are operated by van each weekday, 83 each Saturday and 84 each Sunday. Table 2-4 identifies the number of trips servicing the bus facility by van each weekday, by hour across the day, according to their status. Based on the current timetable, 34 trips commence and terminate with an additional 28 trips passing through the facility. The highest number of vans accessing the bus facility during the same time period is between 1:00pm and 2:00pm with 11 vans servicing the facility.

Based on the current scheduled timetable, 32 trips commence from Byron Bay with an additional 20 trips passing through and 31 trips terminating. The bus facility experiences the

[2] http://byronbaytrain.com.au/

greatest number of vans using the stop between 1:00pm and 2:00pm, and again between 4:00pm and 5:00pm with ten vans scheduled.

The Sunday time period with the greatest number of vans servicing the facility at one time period is the same as Saturdays being between 1:00pm and 2:00pm, and again between 4:00pm and 5:00pm with ten vans scheduled.

Table 5-32: Summary of van trips servicing Jonson Street bus stop (DCI 2018)

Day	*Commencing trip*	*Passing trip*	*Terminating trip*	*Total*
Weekday	34	21	34	89
Saturday	32	20	31	83
Sunday	31	21	32	84
Weekly	97	62	97	256

5.9.2 Potential Impacts

Construction

Traffic impacts during construction are likely to be limited to the delivery of plant, materials and personnel to the proposal area. However, it is anticipated that the proposal would be constructed at a similar time to the bypass in order to align the commencement of operations of both projects.

The simultaneous construction of both projects may cause some delays along Butler Street and contribute to cumulative traffic and access impacts on the existing road network and adjacent residents along Butler Street, Burns Street and Somerset Street. The estimated peak hourly construction vehicle movements for the bypass are outlined in Table 5-33. While estimates of cumulative construction vehicle impacts is not yet available, it is assumed that the number of vehicles associated with the proposal would be substantially less than the bypass.

Table 5-33: Estimated peak hour construction vehicle movements bypass (source: GHD, 2016)

Type	*Via Butler Street*
Heavy vehicles	8
Light vehicles	15

At various times throughout construction, access to the informal path to the south linking pedestrians from Butler Street to the town centre would be temporarily unavailable and informal parking to the south and along the western boundary removed however all attempts will be made to minimise this occurrence.

Construction would involve the removal of car parking spaces along the pedestrian thoroughfare, along the western boundary adjacent to Butler Street and within the existing car park to the south near Woolworths. Approximately 70 informal car parking spaces along Butler Street would be lost during construction, as these form the western boundary of the proposal construction area. These parking spaces would not be reinstated.

Car parking facilities at Butler Street Reserve would remain available during the construction phase of the proposal. The reserve has approximately 250 informal car parking spaces

available. During several site inspections, it was noted that the existing car park facilities at the reserve are not heavily utilised during weekdays (1-3 cars parked within the reserve at any one time).

Clearly identified alternative routes for pedestrian traffic and alternative car parking would be designated should any temporary diversions be required. Activities would be staged so that much of the works likely to impact on pedestrian and motorists' movements would be undertaken outside of peak periods.

During construction, bus services would continue to utilise Jonson Street bus stop.

The overall disruption to local traffic is likely to be minor considering the proposal area is outside of the congested town centre and is currently predominately utilised by local traffic, as indicated by existing the road two-way road configuration, 50km/hr speed limit and limited commercial land use along Butler Street near the proposal. An exception to this would be increased non-local traffic associated with the Byron Bay Farmer's Markets on Thursday mornings. The community would be informed of any potential traffic and access impacts to minimise inconvenience.

Operation

The proposal area would be accessed by buses via a roundabout at the intersection of Somerset Street and Butler Street (to be constructed as part of the bypass). Cars would enter the proposal area via an entry off Butler Street where there is a single disabled car space, two taxi stands and two kiss and ride spots. The provision of the taxi zone and kiss and ride zone would enable customers to transfer between different modes of transport easily.

The proposal has been designed to accommodate the existing bus services that service the Jonson Street bus stop. The BBCA identified that three bus bays are required to accommodate existing operations and support bus operations. The provision of three bus bays would allow for several buses to arrive at the same time without having to wait for another bus to leave before entering the facility, ultimately improving travel time and reducing the potential for delay. This would also increase the capacity of the proposed interchange facility and extend the life to incorporate future growth in services and demand.

The BBCA identified that based on the existing timetable of van services, there is a need for four dedicated van bays in order to cater for existing operations and not delay services waiting for a parking space. However, as there is only once instance during weekday services when four vans are scheduled to operate at the facility at the same time, providing a fourth bay would result in an inefficient use of resources as the bay would be empty the majority of the time. The conflicts between the services at 1:00pm can be managed by encouraging the local hostel services to use the general parking, drop-off (kiss and ride) or taxi areas if the dedicated facility and designated van bays are occupied. Providing vans with this option could minimise conflict and reduce the required space for vans from four to three.

Following construction, formal car parking displaced for the site compound would be reinstated however informal parking along the western boundary and along the pedestrian thoroughfare would not be reinstated. There are currently about 70 informal parking spaces along the western boundary of the proposal area at Butler Street and the pedestrian thoroughfare which connects Butler Street to the Woolworth Parking lot. This informal access street also forms the southern boundary of the proposal area. These informal parking spaces would be removed at the commencement of construction and not reinstated. It is not anticipated that removing these spaces would adversely impact the local community, as ample car parking facilities are available at the Butler Street Reserve, which is currently underutilised.

The thoroughfare would be formalised as part of the proposal to maintain existing access between Butler Street and the town centre.

The operation of the proposal may result in delays for residents accessing properties along Butler Street, Burns Street and Somerset Street. Local Butler Street road users may decide to keep away the areas near the interchange and seek alternative routes to avoid encountering buses and vans, pedestrians and drop-off vehicles frequenting the proposal. Traffic volumes on connected local roads may experience minor increases because of this. However, traffic impacts of the operational stage of the proposal are not expected to be significant, especially when considered in the context of the bypass. The operation of the bypass is anticipated to redistribute traffic flows in and the around Byron Bay town centre and would therefore likely have implications for property access on Butler Street (GHD, 2016).

The proposal would provide a bus interchange which would provide public services to the local community and visitors whilst removing bus services from the congested town centre. The operation of the proposal would facilitate safe and efficient movement of bus and van vehicles, kiss and drop vehicles and streamline pedestrian movements. The existing bus stop at Jonson Street would be decommissioned as future services would be re-routed to avoid the town centre.

Directional signage, would be implemented throughout the town centre to enable people to find their way to the proposed interchange. It is anticipated that a temporary Variable Message Sign (VMS) board would be situated at the railway forecourt to reflect the change for approximately 3 months.

On balance, the benefits of the proposal are considered to outweigh the minor adverse impacts and risks associated with the proposal. The operation of the proposal would improve traffic and access in the town centre by removing coach and bus services and overall reducing vehicular congestion along Jonson Street.

5.9.3 Control Measures

The following mitigation measures should be implemented to minimise traffic and access impacts during construction:

- New bus routes would be provided to the local traffic committee, stakeholders and Council for agreement prior to the commencement of services
- A Traffic Management Plan (TMP) would be prepared prior to the commencement of works. The TMP would include detail of all traffic alterations or temporary disruptions required, including parking. Council should be consulted on the content of this plan prior to the commencement of works
- Where possible, works would be undertaken in non-peak hours in order to minimise disruption to motorists using local roads, particularly when transporting materials to the proposal area
- The community will be notified of the proposal prior to the commencement of works
- Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners
- Construction vehicles, materials and equipment must be positioned to minimise impacts to public access and parking.

Bus bays:

- Implement three bus bays to support existing operations:

- Three bus bays would support the current instances where multiple buses are utilising the facility at the same time
- A lead stop or linear bus stop arrangement would reduce space requirements for buses to stop. Having independent bus bays requires additional space so all buses can enter and exit the bays. Implementing a lead stop arrangement means buses pull up directly behind the bus in front without stopping at a dedicated flag
- At times throughout the day when less buses are scheduled the redundant bays can be used as layover space for long distance coaches or urban services to have meals or breaking prior to becoming in-service.

Van and shuttle services:

- Implement three bays for vans and shuttle services:
  - Non-scheduled or specialised vans, such as hotel/hostel and tour services, should be encouraged to use existing general parking spaces or kiss and ride as these vans tend to be the size of a standard van and may not require a dedicated bay
  - Bays for vans should be line-marked to ensure services are not utilising more space than required
  - These bays could be modified in the future to provide additional bus bays for servicing passengers or for layover.

5.10 Demand on Resources

5.11 Cumulative Environmental Impacts

In accordance with clause 82 of the EP&A Regulation, any cumulative environmental effects of the project associated with other existing and likely future activities must be taken into account in determining the potential impacts of the project on the environment.

A number of projects are occurring within the vicinity of the proposal area. Immediately adjacent to the proposal area would be the construction of the Butler Street bypass expected to commence August 2019. Construction of the bypass is expected to take 18 months.

Other projects in the vicinity of the proposal, include:

- Lawson Street South (southern gravel section) and Rail Hotel carpark upgrade
- Byron Street renewal – pavement and drainage works
- Rail corridor upgrade for markets and community space
- Butler Street wetland rehabilitation project

The construction of the bypass and other projects would contribute to an increase in activity within the area during construction with the movement of personnel, vehicles and other machinery. The proposal and listed projects would involve upgrades to the locality that would allow for greater accessibility and provide improved interchange facilities, safety improvements, signage improvements and maintenance improvements.

The proposal does not involve extensive construction activities and would be undertaken over a relatively short timeframe. Cumulative impacts as a result of the proposal are expected to be minimal and manageable with the mitigation measures identified in this report.

The aim of the upgrades is to deliver accessible, modern, secure and integrated transfer infrastructure while also providing easier travel connections and access to the different transport services. On balance, the proposal would improve the experience for public transport customers and work towards fulfilling initiatives identified within the Masterplan.

6 Consideration of State and Commonwealth Environmental Factors

6.1 Clause 228 Factors

Table 6-1: Clause 228 Factors

Clause 228 Factors		*Impact*
(a)	**Any environmental impact on a community?** The proposal would involve disruptions to pedestrian utilising the informal access way in the southern portion of the proposal area that connects Butler Street to the town centre. About 70 informal parking spaces would be lost once construction of the proposal commenced. These parking spaces would be reinstated. During construction, the walking thoroughfare between Butler Street and Woolworths would remain accessible to pedestrians. There may be occasional changes to the path alignment during different stages of the work, however all attempts will be made to minimise this occurrence. The operation of the proposal would also increase availability of public transport to and from Byron Bay and reduced travel times and congestion within the town centre.	Short term: Negative Long term: Positive
(b)	**Any transformation of a locality?** The proposal would result in a change to the visual landscape in the locality of the proposal, transforming the existing parcel of land to an interchange. During construction a site compound would be established in the existing car park to the south. The removal of regrowth vegetation within the proposal area would reinstate views across the proposal area from either side, reinstating a key visual linkage for the town. The reactivation of the area as an active public transport centre is consistent with the heritage values of Byron Bay Railway Station and would reinvigorate the vicinity as an important locality within the town.	Short term: Negative Long term: Positive
(c)	**Any environmental impact on the ecosystems of the locality?** The proposal would involve the removal of 0.46 ha of native vegetation. Mitigation measures to minimise impacts on threatened species, fauna and vegetation communities have been provided in section 5.4.3. The BAR concluded that the proposal would not have a significant impact on EEC or threatened species with the implementation of mitigation measures.	Short term: Minor negative Long term: Negligible

Clause 228 Factors		*Impact*
(d)	**Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?** The majority of the proposal area is not currently being utilised by the public. Pedestrian flows in the southern portion of the proposal area would be disrupted during construction, however this would be minimised. The operation of the proposal would open up the space for public access and utilisation. The proposal would transform the proposal area into a public transport interchange facility which would also provide a social and community benefit.	Short term: Minor negative Long term: Positive
(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 reactivation of the area as an active public transport centre is consistent with the heritage values of Byron Bay Railway Station and would reinvigorate the vicinity as an important locality within the town. The creation of a new level of public activity in its vicinity of the heritage-listed water tower may also lead to opportunities for its adaptive reuse or, at least, a more active interpretation of its history and significance.	Long term: Positive
(f)	**Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?** The proposal would involve the removal of habitat that may be utilised by protected fauna. The BAR concluded that the proposal would not have a significant impact the habitat of protected fauna with the implementation of mitigation measures.	Short term: Minor negative Long term: Negligible
(g)	**Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?** As above.	Short term: Minor negative Long term: Negligible
(h)	**Any long term effects on the environment?** The proposal would have a long term positive impact by providing the community with improved public transport facilities with greater accessibility, and reducing vehicular congestion along Jonson Street.	Long term: Positive
(i)	**Any degradation of the quality of the environment?** The proposal would involve the removal of 0.46 ha of native vegetation. Mitigation measures to minimise	Short term: Negative Long term: Positive

Clause 228 Factors		*Impact*
	impacts on threatened species, fauna and vegetation communities have been provided in section 5.4.3. The proposal area has previously been subjected to a high level of on-going disturbance associated with rail-related activities (e.g. water tower, engine turntable, etc). The proposal would not subject the area to further degradation and would seek to improve the quality of the existing environment by removing weeds, reinstating native plantings and removing graffiti/rubbish.	
(j)	**Any risk to the safety of the environment?** There may be general risks associated with construction, which would be addressed by the contractor and Site Manager. Pedestrians and motorists would be managed accordingly. The proposal seeks to improve stability concerns regarding the water tower.	Short term: Minor negative Long term: Positive
(k)	**Any reduction in the range of beneficial uses of the environment?** The majority of the proposal area is not currently accessible to the public. Construction would attempt to minimise disruptions pedestrian traffic from Butler Street to the town centre. Operation of the proposal would provide a beneficial use to the community as an accessible, modern, secure and integrated interchange facility.	Short term: Minor negative Long term: Positive
(l)	**Any pollution of the environment?** There is potential for pollution sources to enter the environment as a result of the proposal including sediment entering watercourses, oils, fuels and other chemicals, engine emissions, noise, rubbish and other wastes, visual pollution and many other potential impacts. Recommended mitigation measures to minimise pollution risks to environment are provided throughout the REF. The proposal seeks to improve the quality of the existing environment by removing weeds, reinstating native plantings and removing graffiti/rubbish.	Short term: Minor negative Long term: Positive
(m)	**Any environmental problems associated with the disposal of waste?** All wastes must be classified in accordance to the Waste Classification Guidelines (DECC 2014) prior to disposal and transported to a licensed waste disposal facility.	Nil.
(n)	**Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?**	Nil.

Clause 228 Factors		*Impact*
	The proposal would not require resources or materials that are in short supply.	
(o)	**Any cumulative environmental effect with other existing or likely future activities?** Several projects would be undertaken within the vicinity of the proposal area. The construction of the bypass and various projects would contribute to an increase in activity within the area during construction with the movement of personnel, vehicles and other machinery. During operation, the projects would work together to allow for greater accessibility between the proposed interchange and the town centre.	Short term: Minor negative. Long term: Positive
(p)	**Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?** The proposal would not impact on coastal processes or coastal hazards.	Nil.

6.2 Matters of National Environmental Significance Factors

Under the EPBC Act, environmental assessments are undertaken to enable environment and heritage protection and biodiversity conservation. It is mandated that a proponent must not undertake an action that will have or is likely to have a significant impact on any of the MNES listed in below without approval from the Australian Government Minister for the Environment and Energy. Table 6-2 addresses the MNES for the project.

Table 6-2: MNES

MNES	*Impact*
Any significant environmental impact on a World Heritage property?	Nil.
Any significant environmental impact on National heritage places?	Nil.
Any significant environmental impact on RAMSAR wetlands?	Nil.
Any significant environmental impact on Commonwealth listed threatened species or ecological communities?	Nil.
Any significant environmental impact on Commonwealth listed migratory species?	Nil.
Does any part of the project involve nuclear action?	Nil.
Any significant environmental impact on a Commonwealth marine area?	Nil.
Any impact on Commonwealth land?	Nil.

There are no MNES that would be affected as a result of this project. No Commonwealth land would be affected, either directly or indirectly, as a result of this project.

7 Environmental Management Measures

7.1 Summary of Control Measures

The following control measures have either been identified through the assessment undertaken through this REF or are standard best practice environmental management controls. They will be incorporated into the detailed design phase of the project and during construction and operation of the project, should it proceed. These control measures would minimise any potential adverse environmental impacts arising from the project. The controls measures are summarised in Table 7-1.

Table 7-1: Summary of Site Specific Control Measures

Aspect	*Potential Impact*	*Control measures*
Landforms, Geology and Soils	☒ Soil Erosion / Stability ☐ Site Rehabilitation ☐ Acid Sulphate Soils	• Disturbed surfaces must be stabilised as soon as possible • An Erosion and Sedimentation Control Plan must be prepared by suitable qualified persons as per EMS-09-PR-0012 *Erosion and Sediment Control* and is to be fully implemented and managed through all stages of the project • Erosion and sediment control measures would be implemented and maintained in accordance with *Managing Urban Stormwater, Soils and Construction* (Landcom 2004) • All erosion and sediment control measures would be checked and maintained on a regular basis and after large rain events so that they work effectively at all times • Where encountered, topsoil should be stripped and screened for foreign objects, and stockpiled separately for possible re-use as landscaping material, subject to contamination assessment • Embankments would be constructed by overfilling and then trimmed to finished batter, not steeper than 2.5: 1 (vertical: horizontal) to achieve compaction to the batter surface • An experienced Geotechnical Engineer or Engineering Geologist would observe boring of the piles in order to assess the ground conditions and to confirm the suitability of the adopted design parameters • Excavation below the water table, with or without shoring, would be avoided where reasonable, feasible and safe to do so. Current designs indicate that excavations requiring dewatering would

Aspect	*Potential Impact*	*Control measures*
		not be required for construction of the proposal. If excavation below the water table is required, then a dewatering system should be designed and installed to reduce the groundwater level below the desired excavation level. Dewatering systems such as a sump or extraction spears may be suitable depending on the amount of dewatering required. Where groundwater extraction is required, further approvals from the NSW Office of Water may be required • Water (including groundwater) encountered during construction works would need to be tested, classified and managed on-site or disposed of off-site at an appropriately licensed facility • Control measures should not be removed before the embankment and other exposed surfaces are stabilised • Weather (wind and rain) forecasts would be used to inform timing of high risk soil and erosion activities • Where encountered, topsoil would be stockpiled separately for possible reuse for landscaping and rehabilitation.
Water Quality and Hydrology	☒ Pollution ☒ Sedimentation ☒ Oil Spills	• Construction of the proposal would be undertaken so that there would be a minimal amount of excavation of the existing soil to minimise potential impacts on the groundwater level • Pollution incidents that cause or may cause material harm to the environment to be reported to the NSW EPA • Chemicals must be appropriately stored and handled in accordance with relevant Material Data Safety Sheets (MSDS) • All required chemicals and fuels must be located within a bunded enclosure located away from drainage lines and stormwater drains • Spill kits appropriate to products used on site must be readily available • Plant and equipment must be regularly inspected to check for oil leaks • Refuelling of vehicles or machinery is to occur within a containment or hardstand area designed to prevent the escape of spilled substances to the surrounding environment

Aspect	*Potential Impact*	*Control measures*
		• Wash down of concrete mixers, concreting equipment and trucks must take place in an appropriate area away from drainage lines and stormwater drains • Wash down areas must be appropriately constructed, and the collected material disposed of off-site • The CEMP would include a procedure for managing flooding due to natural events. This would include an emergency procedure for ensuring the health and safety of construction workers.
Air Quality	☒ Dust ☒ Odour & Fumes ☐ Greenhouse Gases	• The techniques adopted for stripping out and / or demolition must minimise the release of dust into the environment • At the conclusion of the demolition works, the project site must be examined visually for any evidence of paint chips or debris resulting from the demolition activities. All debris must be removed • Emission of dust from unsealed roads and other exposed surfaces such as unprotected earth or soil stockpiles must be controlled by use of surface sealants and/or water spray carts or other appropriate cover material • Disturbed areas must be rehabilitated upon completion of demolition works by provision of protective ground cover such as mulches, vegetation, organic binders or dust retardants • Stockpiles must be appropriately maintained and contained which could include covering or regular watering to minimise dust • Traffic movements on any disturbed areas must be limited • Work must be minimised during high wind periods • Trucks or train carriages transporting spoil and other waste materials from the site must be covered • Plant and equipment must be operated in a proper and efficient manner and switched off when not in use • Plant and equipment must be maintained in accordance with manufacturer's specifications to ensure that it is in a proper and efficient condition

Aspect	*Potential Impact*	*Control measures*
		• Plant and equipment must be regularly inspected to ascertain that fitted emission controls are operating efficiently.
Biodiversity	☒ Trimming and removal of trees ☐ Noxious weeds ☒ Native vegetation ☒ Habitat ☐ Threatened species ☐ Sensitive areas	**Prior to Construction** Prior to the commencement of construction, the following vegetation management measures would be implemented: • Review the BAR to identify the type and location of vegetation at the proposal area by persons undertaking the clearing • Incorporate specific vegetation management measures into the site induction, toolbox talk and pre-start meetings • The site-specific Construction Environment Management Plan (CEMP) must include instructions for dealing with orphaned or injured native animals and include the contact details for the NSW Wildlife Information, Rescue and Education Service Inc (WIRES) • The CEMP will include a map showing its location the location of the retained tree and its exclusion zone and other required mitigation measures (e.g. erosion and sediment control) • Conduct a site inspection and mark the extent of clearing and/or trimming. Where possible extent of clearing should be minimised • Fence trees and vegetation to be retained with clear signage, ensuring exclusion fencing is outside the tree protection zone • A qualified (demonstrated experience) ecologist or wildlife carer is to be present when clearing trees and vegetation • Should any priority weeds be encountered, appropriate management and disposal of these weeds must be carried out • Apply appropriate hygiene protocols to reduce the likelihood of new weed or disease infestations within the proposal area

Aspect	Potential Impact	Control measures
		• Stockpile weeds to prevent them entering waterways and remove from the site to an appropriate facility according to the site-specific CEMP • Install erosion and sediment controls measures specified in the CEMP • Locate construction parking, compounds, stockpiles and chemical storage away from vegetated areas (including tree protection zones) and in areas which do not necessitate anymore clearing of vegetation than necessary. **Construction** During construction, the following vegetation management measures would be implemented: • Construction works must be stopped if any previously undiscovered threatened species or communities are discovered during works. An assessment of the impact and any required approvals must be obtained. Works must not recommence until Sydney Trains has provided written approval to do so • Use only defined access tracks and entry/exit points for all vehicle movements • Use only designated areas for parking, stockpiles, materials and waste storage • Do not store materials or park equipment/vehicles within tree protection zones • Where possible revegetate or mulch disturbed areas • Mulch and reuse cleared vegetation on site for site stabilisation and/or landscaping where appropriate • Undertake regular inspections of vegetation management measures to ensure they are in place and effective • Dispose of weeds that have been identified on the proposal area in a manner consistent with TPO Weed Management and Disposal Guide • Monitor the health of retained vegetation and seek advice from an arborist if vegetation shows signs of stress (discolouration, die back)

Aspect	Potential Impact	Control measures
		• Prepare emergency responses in case of an oil or fuel spill/leak. **After construction** After construction, the following vegetation management measures would be implemented: • All loss of biodiversity is to be offset according to the offsets calculated using the EMS-09-WI-0177 *Biodiversity Offset Calculator* (see section 5.4.2 – Calculation of Biodiversity Offsets) • Any disturbed areas of the site must be revegetated using locally indigenous species in accordance with EMS-09-GD-0074 *Revegetation Guide* and EMS-09-TP-0066 *Revegetation Technical Specification Template* • Stabilise all disturbed areas, implement landscaping and remove vegetation protection measures • Plant Coast Banksias (*Banksia integrifolia*) and other winter nectar resources on the proposal area as part of the proposal area landscaping to mitigate the loss of seasonal foraging resources on the proposal area. Where possible, all plants used in landscaping should be sourced from the local area to ensure genetic compatibility and integrity. This recommendation has been supported in the LCVIA where reasonable and reasonable to do so • Ensure that external lighting is not directed towards the Swamp Forest north or south of the proposal area to ensure that additional artificial lighting does not affect the foraging behaviour of threatened and common species or neighbours • Use porous surfaces, buried leaky tanks or equivalent strategies to minimise hydrological changes • Ensure a maintenance program is in place for any landscaping or revegetation undertaken as part of the proposal • Prepare emergency responses in case of an oil or fuel spill/leak • Provide a sufficient number of well-spaced bins for rubbish.

Aspect	***Potential Impact***	***Control measures***
Noise and Vibration	☒ Noise ☐ Vibration ☒ Adjoining landowners	**Construction** • The proposed works (including deliveries) would be undertaken within standard working hours, i.e. Monday to Friday 7am to 6pm; Saturday 8am to 1pm; and no work on Sundays or public holidays • Temporary screening (such as noise blankets) to be erected along the western boundary of the proposal area between the work site and residential receivers on Butler Street • During the proposed works a 2-day respite every 14 days would be implemented • During the proposed works a 1-hour off to 3-hours on would be implemented during noisy works, such as road and pavement installation • Sydney Trains would notify adjacent residents of works at least five days in advance of work commencing • Plant not in use will be throttled or shut down when not in use • Where possible, the nominated Contractor would endeavour to use smaller or quieter will be used • The use of plant and equipment would be staged to avoid the simultaneous operation of two or more noisy plant items in close vicinity and adjacent to residential receivers where possible • Construction personnel would minimise the use of chains on delivery vehicles where practicable • Ecological considerations to be conveyed to on-site staff via toolbox or site induction • No yelling, slamming of car doors or portable radios on site • Avoid dropping materials from a height where practical • Any proposed out of hours works must be assessed using EMS-09-PR-0048 *Construction and Maintenance Noise and Vibration Management* or equivalent assessment process. **Operation**

Aspect	*Potential Impact*	*Control measures*

		• Operational noise testing would need to be undertaken to confirm compliance with the adopted project specific noise levels, with commitment for consideration and implementation of additional mitigation measures (where reasonable and feasible) in accordance with the NPI
		• Requirement for the implementation of an Operational Management Plan that includes:
		  ○ Signage to bus drivers and vehicular patrons to minimise noise during sensitive night time periods
		  ○ Posted speed limits within the interchange to minimise high engine revving
		• As exceedances of noise criteria at R5 (58 Butler Street) are limited to peak hours only, it is considered that impacts can be managed via operational management measures to limit potential speed-related noise impacts and limit the occurrence of maximum noise level events
		• During project delivery of bypass, architectural treatments recommended for dwellings affected by the bypass to be confirmed, particularly R5 as these would be of benefit to the receiver as a result of this proposal.

Heritage	☒ Aboriginal Heritage ☒ Non Aboriginal Heritage ☐ Conservation area ☐ Archaeological potential	**Aboriginal heritage** • Should an unexpected historic relic or Aboriginal object be identified during construction, work in the immediate vicinity of the find is to stop and the area must be fenced off with suitable markers (star pickets, flagging or barrier mesh). The Sydney Trains Project Manager and Environment Division are to be notified. Engage an archaeologist to determine the significance of the find, and if required, determine the notification, consultation, and approval requirements. Works must not recommence until Sydney Trains has provided written approval to do so. A process of consultation with representatives of the Aboriginal community would also be required • If any Aboriginal objects are later identified within the proposed activity area, the Aboriginal Heritage Due Diligence report (Appendix D) cannot however be used to support an application for an Aboriginal Heritage Impact Permit (AHIP). Such an application would require more detailed investigation involving a formal process of Aboriginal community consultation and the preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR)

Aspect	Potential Impact	Control measures
		• Per the conditions outlined in the s60 approval, should any Aboriginal objects be uncovered by the work which is not covered by a valid AHIP, excavation or disturbance of the area is to stop immediately and the Office of Environment & Heritage is to be informed in accordance with the *National Parks and Wildlife Act 1974* (as amended). Works affecting Aboriginal objects on the site must not continue until the Office of Environment and Heritage has been informed and the appropriate approvals are in place. Aboriginal objects must be managed in accordance with the *National Parks and Wildlife Act 1974*. • If human skeletal material less than 100 years old is discovered, the *Coroners Act 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of OEH and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*. **Non-Aboriginal heritage** • Undertaken works in accordance with the SOHI and ALL conditions outlined in the NSW Heritage Council s60 approval (Appendix A). • If unexpected archaeological deposits or relics not identified and considered in the supporting documents (SOHI and s60), work must cease in the affected area(s) and the Heritage Council of NSW must be notified. Additional assessment and approval may be required prior to the works continuing in the affected area(s) based on the nature of the discovery. The Sydney Trains Project Manager and Environment Division are to be notified. • Final works design will include provision to undertake remedial stabilisation works to the brickwork and ironwork of the water tower prior to other works • The water tower will need to be adequately protected during construction works

Aspect	***Potential Impact***	***Control measures***
		• Excavation works at the proposal area will be undertaken in the presence of an archaeologist to observe and record the remnants of the turntable and possible remnants of the ash pit and footings of the coal stage • The proposal and associated landscaping will include interpretation information regarding the water tower, the railway station and the history of the Byron Bay region.
Waste Management	☒ Spoil ☒ Litter ☐ Chemicals ☐ Hazardous, Liquid or Special Waste ☐ Solid waste	• Resource management options for the project must be considered against a hierarchy of the following order embodied in the *Waste Avoidance and Resource Recovery Act 2001* • Avoid unnecessary resource consumption • Recover resources (including reuse, reprocessing, recycling and energy recovery) • Dispose (as a last resort) • All wastes must be classified in accordance to the *Waste Classification Guidelines* (DECC, 2009) prior to disposal and transported to a licensed waste disposal facility • Excavated material must be temporarily stored in a bunded area or with appropriate environmental controls in place to prevent run-off of contaminants entering the stormwater system • Should volumes of excavated material exceed the capacity for stockpiling prior to off-site disposal, excavation works must cease until existing stockpiled material has been disposed of offsite or an additional appropriate stockpiling area is identified elsewhere on the site • Any spoil or waste material tracked onto paved areas such as roads and car parks must be immediately swept up. No water is to be used to wash any such material tracked onto roads into stormwater drains • Any concrete aggregate from concrete washdown areas must be disposed off-site either to a recycling facility or a licensed waste disposal facility • An adequate numbers of bins must be placed at the site for workers and all litter will be placed in these bins. Work areas of the project site would be kept clean and free of litter, including cigarette butts, at all times

Aspect	***Potential Impact***	***Control measures***
		• The only fill material that may be imported to the site is Virgin Excavated Natural Material (VENM) within the meaning of the POEO Act and/or any other waste-derived material the subject of a resource recovery exemption under clause 51A of the *POEO (Waste) Regulation 2005* that is permitted to be used as fill material. Any fill material received at the site must be accompanied by documentation proving its waste classification or the material's compliance with the exemption conditions • All waste must be removed from the site on completion of the works • Upon completion of waste disposal, all original weighbridge / disposal receipts issued by the receiving waste facility must be retained in a waste register as evidence of proper disposal.
Contaminated Land and Hazardous Materials	☐ Soil Contamination ☒ Hazardous spills	• A Construction Environmental Management Plan (CEMP) would developed prior to the commencement of site construction activities. The purpose of the CEMP will be to provide a structured approach to the management of environmental impacts during the construction activities • As and when required, environmental monitoring procedures may be considered such as visual/olfactory observations (i.e. visual staining or odours from petroleum hydrocarbons) and/or vapour monitoring within worker breathing zone using photo-ionisation detector at suitable frequency. • It should be noted that if excavated material is proposed to be taken offsite for disposal to a licensed landfill facility, soil will require sampling and testing for waste classification prior to disposal in accordance with the NSW EPA Waste Classification Guidelines (November 2014). If contamination is observed/detected, it is also recommended that the underlying soils are assessed through validation sampling • Given site soils were not assessed against EILs in terms of potential terrestrial ecological receptors, SMEC recommends the use of imported fill as the growing medium in proposed future planting/ landscape areas • Hazardous materials must be transported, stored and used in accordance with the corresponding Material Safety Data Sheets (MSDS)

Aspect	***Potential Impact***	***Control measures***
		• Fuels, lubricants and chemicals must be stored and, where practicable, used within containment/hardstand areas designed to prevent the escape of spilt substances to the surrounding environment, as required by relevant legislation and standards (e.g. AS1940: Australian standard for the storage and handling of flammable and combustible liquids) • All fuels and other hazardous substances must be stored at designated construction compounds in containers within a bunded enclosure with sufficient capacity to hold 120% of the stored material • Adequate spill prevention and containment measures (e.g. drip trays) must be used when refuelling equipment at the proposal area • All storage and handling equipment at the proposal area must be maintained properly • The amount of hazardous material stored and used at the proposal area must be kept to the minimum practicable • Construction personnel to be trained in spill containment and response procedures • Appropriate spill response material to be kept at the proposal area • Spills or leaks to be reported to the senior officer on site and clean up measures commenced immediately • Spills to be reported in accordance with legislative and licensing requirements • If a spill occurs, the material to be contained to the smallest area possible • Where possible, spilt material and contaminated soils to be treated on site. If this is not possible, the material or soils to be removed off-site for disposal at an appropriately licensed facility • All spills that cause or may cause material harm to the environment to be reported to the NSW EPA.

Aspect	***Potential Impact***	***Control measures***
Visual Aesthetics and Urban Design	☒ Visual ☒ Views and vistas ☐ Overshadowing ☒ Light spill	• Maximise planting along the edge of Butler Street to screen the proposed interchange • Minimise visibility of the amenities building from Butler Street through tree planting and building design. Select materials that blend into the surrounding landscape and help the building recede into the background • Lighting for the project will be designed in accordance with *AS 4282 Control of the Obtrusive Effects of Outdoor Lighting*. Lighting to minimise light spill into adjoining areas. Maximise planting surrounding the proposed interchange to further screen lighting. • Maximise planting surrounding the proposal area to further screen lighting • Provide directional lighting that has been is angled downwards and includes glare shields • Ensure provision of CCTV and sufficient lighting to deter vandalism • Consider surface finishes that discourage graffiti such as textures or patterns or anti-graffiti coatings to remove graffiti quickly and easily • Consider screening of walls with planting to restrict access to walls • Consider incorporation of public art on walls (i.e. painting, printing or mosaic tiles) • Ensure management of the proposal area to ensure prompt removal of rubbish and surveillance • Provide sufficient bins at the proposed interchange and within the public domain areas • Preferentially consider at receptor treatments rather than structures such as noise walls. If noise walls are required, ensure screening of walls with landscape planting • Minimise use of signage and advertising to mitigate landscape and visual impacts associated with land use change • Avoid lighting of signage so not to increase the amount of light in the proposal area • Any disturbed areas of the site must be revegetated using locally indigenous species in accordance with EMS-09-GD-0074 *Revegetation Guide* and EMS-09-TP-0066 *Revegetation Technical Specification Template*.

Aspect	*Potential Impact*	*Control measures*
		• All conditions outlined in the s60 approval would be applied to the project, particularly those relating to landscape design and visual amenity.
Socio-Economic Effects	☐ Land Use ☐ Property Effects ☐ Economic Effects ☐ Other community impacts	Nil.
Transport	☒ Traffic and access ☐ Transport	• New bus routes would be provided to the local traffic committee, stakeholders and Council for agreement prior to the commencement of services • A Traffic Management Plan (TMP) would be prepared prior to the commencement of works. The TMP would include detail of all traffic alterations or temporary disruptions required, including parking. Council should be consulted on the content of this plan prior to the commencement of works • Where possible, works would be undertaken in non-peak hours in order to minimise disruption to motorists using local roads, particularly when transporting materials to the proposal area • The community will be notified of the proposal prior to the commencement of works • Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners • Construction vehicles, materials and equipment must be positioned to minimise impacts to public access and parking. **Bus bays:** • Implement three bus bays to support existing operations: ○ Three bus bays would support the current instances where multiple buses are utilising the facility at the same time

Aspect	***Potential Impact***	***Control measures***
		○ A lead stop or linear bus stop arrangement would reduce space requirements for buses to stop. Having independent bus bays requires additional space so all buses can enter and exit the bays. Implementing a lead stop arrangement means buses pull up directly behind the bus in front without stopping at a dedicated flag ○ At times throughout the day when less buses are scheduled the redundant bays can be used as layover space for long distance coaches or urban services to have meals or breaking prior to becoming in-service. **Van and shuttle services:** • Implement three bays for vans and shuttle services: ○ Non-scheduled or specialised vans, such as hotel/hostel and tour services, would be encouraged to use existing general parking spaces or kiss and ride as these vans tend to be the size of a standard van and may not require a dedicated bay ○ Bays for vans would be line-marked to ensure services are not utilising more space than required ○ The detailed design of the van and shuttle bays would be such as to allow future modification to provide additional bus bays for servicing passengers or for layover.

7.2 Implementation Process

The environmental management measures contained in this REF (as outlined in section 7) would be implemented to ensure that the environment is adequately protected and that adverse impacts are avoided or otherwise substantially ameliorated.

The construction contractor would be required to prepare a specific Construction Environmental Management Plan (CEMP) incorporating the mitigation measures specified in this REF. A copy of this REF and the CEMP is to be retained on the work site and produced upon request. The CEMP is to be reviewed by a Sydney Trains Environmental Professional, where required and endorsed by the Project Manager prior to works commencing on site. The CEMP is to include the following:

- Identification of the environmental issues and risks of the project
- Details of environmental controls to be implemented including location and timing
- Details of statutory requirements including those of any approvals and licences (see Table 7-2 below)
- Assignment of responsibility for implementation and monitoring of environmental controls
- Reporting, incident notification and emergency procedures
- Contact details for all site personnel and agency contact
- Corrective action requirements and their verification.

The details of permits, licenses and approvals, including but not limited to those identified in section 3.7 can be summarised in Table 7-2 where relevant.

Details of the other permits and approvals must also be provided in the CEMP.

Table 7-2: Summary of permits and other approvals required for the proposal

Aspect	*Legislation*	*Section/Clause*	*Approval authority*	*Comment*
Other approvals	*Heritage Act 1977*	Section 60	Heritage Branch, OEH	S60 approval received for the proposal, see Appendix A. The proposed works occur within the curtilage of an area listed on the NSW State Heritage Register.
		Section 139(2)	Heritage Branch, OEH	Not required, however should a relic be discovered or exposed, an Excavation Permit must be obtained before any further work is undertaken.

8 Finalisation

8.1 Justification and conclusion

The proposal, a new bus interchange at Byron Bay is part of an initiative by TfNSW to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most. This efficient proposal would encourage people to use public transport, meet the demand of the patronage growth and make it easier for customers, especially those with a disability, the elderly and parents with prams, to use public transport.

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:

- Provision of dedicated stops for regional coaches within the interchange
- Associated customer facilities such as shelters, waiting areas etc
- Provision of drop off/pick up area for taxis and kiss and rid
- Accessible paths to key interchange elements
- The reactivation of the area as an active public transport centre is consistent with the heritage values of Byron Bay Railway Station and would reinvigorate the vicinity as an important locality within the town
- The creation of a new level of public activity in the vicinity of the water tower may also lead to opportunities for its adaptive reuse or, at least, a more active interpretation of its history and significance.

It is envisaged that the bus interchange would help to relieve some of the traffic congestion from tourist, interstate and intercity coaches currently travelling through the town centre along Jonson Street which has been identified as a strategy in the Byron Bay Town Centre Masterplan.

The key likely impacts associated with the proposal include:

- Removal of 0.46 ha of native vegetation
- The proposal area is within the state-listed heritage curtilage for the *Byron Bay Railway Station and yard group* which is also listed on the John Holland Rail CNR section 170 Heritage and Conservation Register
- The proposal area contains a locally-listed heritage item, '*Former railway water tower*' (Byron LEP 2014 #1064) that requires stabilisation work prior to construction and protection during construction and operation of the interchange
- Potential noise disturbance to nearby sensitive receivers during construction and operation
- Potential risk to workers, commuters and adjacent residents from potential contamination associated with the historical use of infrastructure associated with railyard activities.

This REF has considered and assessed these impacts in accordance with the relevant legislation. Mitigation measures have been proposed to reduce the potential impacts upon environmental factors within the proposal area.

Overall, the benefits derived from proceeding with the proposal are considered to outweigh the potential impacts and the proposal is therefore considered to be justified.

8.2 REF Determination

8.2.1 Author Declaration

I declare that:

- This REF has been prepared in accordance with the following plans and supporting information:
    - Statement of Heritage Impact prepared by Extent Heritage (2018a)
    - Operational Noise Assessment prepared by Pacific Environment (2018)
    - Biodiversity Assessment Report prepared by SMEC (2019)
    - Aboriginal Heritage Due Diligence Assessment prepared by Extent Heritage (2018c)
    - Preliminary Site Investigation prepared by SMEC (2019)
    - Landscape Character and Visual Impact Assesssment prepared by DesignInc (2019)
    - Bus Bay Capacity Assessment prepared by DCI (2018)
    - Draft Detailed Design Report prepared by SMEC (2018)
- This REF addresses the requirements of section 5.5 of the EP&A Act.
- An examination and assessment of the activity has been undertaken to take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity, as addressed in this REF.
- The likely significance of the environmental impacts of the activity has been assessed in accordance with clause 228 of the EP&A Regulation.
- An assessment of the impacts of the activity on critical habitat and on threatened species, populations or ecological communities or their habitats, for both terrestrial and aquatic species has been undertaken. The activity described in the REF will not significantly affect threatened species, populations or ecological communities or their habitats. Therefore, no Species Impact Statement is required.
- The assessment has addressed the potential impacts of the activity on MNES under the EPBC Act and any impacts on Commonwealth land. The assessment concluded that the proposal would not, and is not likely to, have a significant impact on MNES under the EPBC Act and would not have a significant impact on the environment of Commonwealth land, provided the recommended management measures are implemented. Therefore there is no need for a referral to be made to the Commonwealth Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.
- The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister of Planning under Division 5.1 of the EP&A Act.
- This REF provides a true and fair review of the activity in relation to the likely impacts of the proposed activity on the environment, and details the control measures to be implemented to minimise the potential impact on the environment.

- I have complied with the Sydney Trains EMS-03-WI-0124 *Part 5 Review of Environmental Factors Process*.

Author:		
Name:	Kristen Bigland	
Position:	Experienced Scientist	
Signature		**Date: 17 May 2019**

8.2.2 Assessor Declaration

I declare that:

- I have independently reviewed this REF.
- It is my judgement that the declaration made by the Author is correct and not false or misleading in a material respect.
- I have complied with the Sydney Trains EMS-03-WI-0124 *Part 5 Review of Environmental Factors Process.* The assessment was prepared in accordance with the requirements of Division 5.1 of the EP&A Act.
- It is recommended that the project proceed subject to the implementation of all mitigation measures identified in this REF and compliance with all other relevant statutory approvals, licences, permits and authorisations.

Assessor:		
Name:		
Position:		
Signature		**Date:**

8.2.3 Certifier Declaration

I declare that:

- The description of the project in this REF thoroughly and accurately represents the proposed activities associated with the project.
- The REF provides a true and fair review of the activity in relation to the likely impacts of the proposed works on the environment, and details the control measures to be implemented to minimise the potential impact on the environment.
- I have reviewed the Assessment and Evaluation requirements of the EMS-03-WI-0124 *Part 5 Review of Environmental Factors Process* and am satisfied these have been adequately completed.
- I accept the REF on behalf of Sydney Trains (check subject to any review process)
- A copy of this REF will be retained onsite and produced upon request.
- All mitigation measures described in this REF will be implemented.

- A Construction Environmental Management Plan (CEMP) shall be prepared to implement the mitigation measures identified in the REF (section 7.1) and address the following matters:
    - All potential impacts assessed in this REF

- The CEMP must be endorsed/approved by the Project Manager (or delegate) prior to any works commencing on site.
- Copies of the plans must be retained onsite and produced upon request:
- The following management plans will be developed and in place before work commences and will be implemented throughout the construction phase.
    - An Erosion and Sediment Control Plan (ESCP);
    - An Environmental Controls Map with erosion controls, access points, important contacts, sensitive receivers, location of amenities and any vegetation clearing or trimming; and
    - Any other management plan required by this REF.
- Personnel will be briefed during site induction on the location of sensitive areas and control measures identified in the CEMP, ESCP and Environmental Controls Map.
- Control measures will be regularly monitored and maintained to ensure effectiveness.
- Any additional approvals, licences or permits required under relevant environmental legislation will be obtained and the conditions therein diligently implemented.
- I have complied with the Sydney Trains EMS-03-WI-0124 *Part 5 Review of Environmental Factors Process.*
- I acknowledge that I will be held accountable for implementing all of the activities listed under the Certifier Declaration.

Certified by:		
Name:		
Position:		
Signature		**Date:**

8.2.4 Determiner's Declaration

I declare that:

- Having considered the scope of the project, the impacts and controls identified in the REF, in accordance with section 5.5 and section 5.7 of the *Environmental Planning and Assessment Act 1979,* I approve the undertaking of the project as described by the REF <with the following conditions: insert or provide additional conditions as recommended by Assessor and / or Certifier …>.
- This project determination will remain current for <max five years> until <insert lapse date> at which time it shall lapse if works have not been physically commenced

- I have complied with the EMS-03-WI-0124 *Part 5 Review of Environmental Factors Process*. The assessment was prepared in accordance with the requirements of Division 5.1 of the EP&A Act

Determiner's Declaration and Approval:		
Name:		
Position:		
Signature		**Date:**

9 References

BMT WBM (2011) Belongil Creek Floodplain Risk Management Study and Plan Discussion Paper 7: Climate Change and Flood Planning Levels Assessment

BMT WBM (2015) Belongil Creek Flood Planning Levels

Byron Bay Council (2016) Byron Bay Town Centre Master Plan

Byron Bay Council (2012) Byron Bay Shire Council Community Strategic Plan 2022

DECC (2009) Interim Construction Noise Guidelines.

Department of Environment and Conservation (2004) Draft - Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities.

Department of Industry Resources & Energy (1972) 1:250,000 Tweed Heads Geology Map.

Department of Primary Industries Office of Water (2017) Continuous water monitoring network.

Department of Primary Industries Office of Water (2017) NSW Aquifer Interference Policy.

DesignInc (2019) Byron Bay Interchange – Water Tower Site, Visual Impact Assessment

EPA (1999) Guidelines on Solid Waste Landfills. NSW Environment Protection Authority.

EPA (2000) NSW Industrial Noise Policy. NSW Environment Protection Authority.

EPA (2014) Waste Classification Guidelines. NSW Environment Protection Authority.

EPA (1997) Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites

EPA (2017) Contaminated Land Records.

EPA (2017) Contaminated Land Management Guidelines for the NSW EPA Site Auditor Scheme (3rd Edition)

EPA (2017) Noise Policy for Industry

Extent Heritage (2018a) Final – Statement of Heritage Impact Byron Bay Bus Interchange Redevelopment

Extent Heritage (2018b) Draft – Byron Bay Railway Station Conservation Management Plan

Extent Heritage (2018c) Final - Aboriginal Heritage Due Diligence Assessment

GHD (2016) Byron Bay Bypass Environmental Impact Statement

GHD (2016) Byron Bypass Noise and Vibration Impact Assessment

International Organisation for Standardization (ISO) (1996), *ISO 9613 Acoustics – Attenuation of sound during propagation outdoors*Landcom (2004) Managing Urban Stormwater, Soils and Construction. 4th edition. NSW Government.

Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (1998)

National Environment Protection (Assessment of Site Contamination) Measure (1999), (Amended 2013)

Office of Environment and Heritage (2009) 1:100,000 Lismore-Ballina Soil Landscape Map (Sheet 9540-9640, Second edition).

Office of Environment & Heritage (2014) BioBanking Assessment Methodology.

Office of Environment & Heritage (2017) Acid Sulfate Soil Risk.

Renzo Tonin and Associates (2017) Byron Bay Bypass – Expert Report

SMEC (2017) Byron Bay Transport Interchange: Detailed Site Investigation, prepared for Sydney Trains

SMEC (2018) Rural and Regional Interchanges: Byron Bay Water Tower, Geotechnical Report, prepared for Sydney Trains

SMEC (2019) Rural and Regional Interchanges: Byron Bay Water Tower, Biodiversity Assessment Report, prepared for Sydney Trains

SMEC (2019a), Rural and Regional Interchanges: Byron Bay Water Tower, Preliminary Site Investigation, prepared for Sydney Trains

Appendices

Appendix A – Statement of Heritage Impact (Extent 2018) and s60

Appendix B – Operational Noise Assessment (Pacific Environment 2018)

Appendix C – Biodiversity Assessment Report (SMEC 2019)

Appendix D– Aboriginal Heritage Due Diligence Assessment (Extent 2018)

Appendix E – AHIMS and NTT Extract

Appendix F – Preliminary Site Investigation (SMEC 2019)

Appendix G– Landscape Character and Visual Impact Assessment (DesignInc 2019)

Appendix H– Bus Bay Capacity Assessment (DCI 2018)

Appendix I – Council correspondence regarding land use

Appendix J – ISEPP Correspondence

Appendix K - Proposal layout (DesignInc 2019)