The background of the entire page is a photograph of a rural landscape. A dirt and grass path, likely a rail trail, runs from the bottom left towards the center of the image. To the left of the path is a field of tall, golden-brown grasses. To the right is a green field with a fence line. In the distance, there are rolling hills under a clear blue sky with a few wispy clouds. A tall utility pole stands on the left side of the path, and another smaller one is visible further down the path.

**City of Newcastle**

Richmond Vale Rail Trail - Shortland to Tarro & Pambalong  
Environmental Impact Statement

October 2019

# Development Application

## Proposal Title

RICHMOND VALE RAIL TRAIL Shared Pathway - Shortland To Pambalong and Hexham To Tarro

## Proponent

### Name

City of Newcastle

### Address

12 Stewart Avenue, Newcastle West NSW 2302

## Location and title description of properties affected by proposal

Location	Lot/DP	Owner
1 Wetlands Place, Shortland NSW 2307	5/233520	Shortland Wetlands Centre Ltd
81 King Street, Shortland NSW 2307	1/805274	Hunter Water Corporation
83 King Street, Shortland NSW 2307	1/611441	Hunter District Water
4A Anderson Drive, Tarro NSW 2322	2/611518	Hunter District Water
4A Anderson Drive, Tarro NSW 2322	1/128309	Hunter Water Corporation
4A Anderson Drive, Tarro NSW 2322	1 & 2/171105	Hunter Water Corporation
292A Minmi Road, Fletcher NSW 2287	147/1143414	Hunter Water Corporation
29 Woodford Street, Minmi NSW 2287	148/840897	Hunter Water Corporation
50A Sparke Street, Hexham NSW 2322	3 & 4/171105	National Parks & Wildlife Service
33 Lenaghans Drive, Minmi NSW 2287	1/1007615	Minister Administering The National Parks & Wildlife Act 1974
12A Railway Street, Hexham NSW 2322	1/90465	National Parks & Wildlife Service/Crown
67C Maitland Road, Hexham NSW 2322	10/1194449	Coal & Allied Operations P/L
52A Lenaghans Drive, Minmi NSW 2287	1/877233	Coal & Allied Operations P/L
52A Lenaghans Drive, Minmi NSW 2287	21/1195619	Coal & Allied Operations P/L

# Executive summary

## The Richmond Vale Rail Trail

### Overview

The proposed Richmond Vale Rail Trail is a 32 kilometre cycling and walking track along the former Richmond Vale railway between Kurri Kurri and Hexham/Shortland.

The Richmond Vale railway is a former rail line that runs from Hexham to Pelaw Main in the Lower Hunter region of NSW. Industrial operation of the railway ceased in 1987 following the closure of the collieries in the region. An opportunity now exists to establish a multi-use recreational trail for non-motorised travel by utilising the disused sections of the former rail line, along with a disused section of the former Chichester to Newcastle rising main corridor between Shortland and Tarro.

A number of branch lines from the main trail alignment are also proposed to provide connections to the suburbs of Tarro, Fletcher and Minmi. The trail would be located within the Newcastle, Cessnock and Lake Macquarie LGAs.

The Council of the City of Newcastle (Council), Cessnock City Council and Lake Macquarie City Council are the proponents of the proposal. Funding contributions have also been made from the National Parks and Wildlife Service (NPWS) and the Donaldson Conservation Trust.

The rail trail would provide a safe cycling and walking experience between Cessnock and Newcastle that does not utilise existing road networks and would attract both local and regional users to enjoy the environmental and heritage attractions along the route. The Richmond Vale Rail Trail provides an opportunity for the communities of the Lower Hunter region to develop the key economic growth areas of tourism and recreation while providing social, health and conservation benefits for users and the region.

### Objectives

The aim of the Richmond Vale Rail Trail is to provide a high quality rail trail facility and link the communities of the Lower Hunter region via a safe, accessible and amenable route. Key objectives of the project are to:

- Support future growth within the Lower Hunter region of NSW.
- Maximise road safety benefits by providing a safe alternative route for non-motorised travel between the communities of the region.
- Provide the local and regional community with better recreational access to the local natural environment.
- Encourage the growth of bicycle-tourism industries within the region.
- Generate opportunities for residents and tourists to enjoy healthier, more active lifestyles.
- Develop a regional tourist facility that facilitates economic development and showcases local environmental areas and heritage/historical features.

## **Need for the Richmond Vale Rail Trail**

The Richmond Vale Rail Trail aims to deliver a continuous off-road shared pathway from Shortland to Kurri Kurri, and once constructed would provide a link between the population centres of Kurri Kurri, Maitland and Newcastle. The shared pathway would provide a link for users between Kurri Kurri, Pelaw Main, Tarro, Minmi and Shortland that would enable cyclists and pedestrians to undertake journeys without having to ride on the Pacific Motorway, Hunter Expressway or New England Highway.

The Richmond Vale Rail Trail is specifically referred to in the *Greater Newcastle Metropolitan Plan 2036* (DP&E, 2018), which identifies a range of strategies to support sustainable growth across the local and regional area including Newcastle, Cessnock and Maitland. The project addresses key actions related to:

- Improved access to open space, recreation areas and waterways.
- Enhanced nature based tourism through protection and promotion of natural assets such as the Hexham Wetlands.

The Richmond Vale Rail Trail provides an active transport and recreational choice for locals and visitors, passing through old railway tunnels and over bridges, amongst wildlife habitats and linking to the Hunter Wetlands Centre. It would also open up the western section of the Hunter Wetlands National Park to the public and provide opportunities in the key growth areas of transport, tourism, recreation, heritage, and economic and social development.

## **The proposal**

### **Overview**

To seek relevant development approvals, the Richmond Vale Rail has been divided into two sections, Shortland to Tarro and Pambalong, and Stockrington to Kurri Kurri. The Shortland to Tarro and Pambalong section (the proposal) is subject to assessment and approval under part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This environmental impact statement (EIS) has been prepared to accompany a development application to Council for that approval. An overview of the proposal is provided in Figure E-1.

The Stockrington to Kurri Kurri section of the rail trail is subject to assessment and approval under Part 5 of the EP&A Act. A separate review of environmental factors (REF) will be prepared for this section of the trail for determination by Cessnock City Council and/or Lake Macquarie City Council.

### **Key features**

The proposal involves the establishment of a pathway between three to four metres wide constructed, for the most part, on an existing cleared water main corridor or the closed and disused rail alignment. The proposal would generally comprise the following:

- Removal of unsuitable subgrades and the construction of pavements using imported gravel, asphalt and concrete.
- Construction of a new seven metre wide, three-span concrete girder bridge across Ironbark Creek within the Hunter Wetlands National Park.
- Construction of a new four metre wide, single-span truss bridge across Fishery Creek within the Hunter Wetlands National Park.
- Replacement of existing dilapidated timber bridges with concrete bridges on six existing bridges along the former railway alignment.

- Construction of 230 metre long and four metre wide fibre reinforced composite (FRC) boardwalk through the Hexham Wetlands (in Hunter Wetlands National Park), along lengths of the alignment where the existing embankment is subject to frequent inundation.
- Construction of 125 metre long and three metre wide FRC boardwalk along an existing pipeline easement to connect the trail into Fletcher.
- Construction of two new parking facilities at various entry points to the proposed shared pathway (one at Shortland, and one at Minmi).
- Once constructed, use of the recreational trail for non-motorised travel between the suburbs of Shortland, Tarro, Fletcher, Minmi and Lenaghan, with the latter connection providing connectivity to Kurri Kurri following completion of the western section of the Richmond Vale Rail Trail (to be assessed and approved separately).

### **Timing**

Construction of the proposal is dependent on grant funding. Should grant funding become available, the proposal is expected to take approximately 12 to 18 months to complete.

### **Objectives of the proposal**

The proposal addresses the objectives of the overall Richmond Vale Rail Trail project, and also specific objectives including to:

- Support growth by connecting local and regional users at key access points including Shortland, Minmi, Tarro and Fletcher.
- Provide commuters and recreational users with a safe alternative route to the road network, including the New England Highway and the M1 Pacific Motorway.
- Provide better recreational access to the Hexham Wetlands and Hunter Wetlands National Park for stakeholders, including birdwatching groups.
- Generate healthier, more active lifestyles and opportunities for public appreciation and enjoyment of the local natural environment, including Pambalong Nature Reserve.

### **Need for the proposal**

The proposal would provide a continuous shared pathway from Shortland in the south/east to Tarro in the north and Minmi in the west. The proposal is a critical component of the Richmond Vale Rail Trail project, which aims to deliver a continuous off-road shared pathway from Shortland to Kurri Kurri. Once constructed, the Richmond Vale Rail Trail would provide a regionally important non-motorised travel link between the centres of Kurri Kurri, Maitland and Newcastle.

The key benefits of the proposal include improved and more sustainable transport choices, increased visitation to the locality and region, additional recreational opportunities and the growth of bicycle-tourism industries. The proposal would improve the safety of pedestrians and cyclists who currently have to continue their journey from one pathway to the next along busy roads. A key safety benefit is removing the need to ride on the New England Highway. The proposal would also provide opportunities for healthier active lifestyles for both residents and tourists and allow users to experience the amenity and heritage significance of the route as it travels through various landscapes and environments.

Council is committed to providing facilities that are accessible to the whole community. The general design objectives for the shared pathway are to provide a safe, enjoyable and aesthetically pleasing journey for the whole community. A number of fatalities have occurred on the New England Highway and other arterial roads and motorways within the locality. The shared pathway would improve safety for all road users.

### **Options considered**

The proposal follows the alignment of the former Richmond Vale railway and Chichester water main. Utilising these existing alignments offers a number of advantages over alternative alignments, including:

- Improved safety by reducing cyclist interactions with road users.
- Minimal land acquisition.
- Minimal earthworks.
- Fewer environmental impacts.
- Improved aesthetic appeal.

For the reasons listed above, alternative alignment options were not pursued. However, a detailed design options assessment was undertaken for the various bridge and treatment options along the proposal alignment.

The preferred option comprises a combination of the preferred options for bridges and pavement treatment, which includes:

- Ironbark Creek 1 (IC1): Construction of a three-span concrete girder bridge over Ironbark Creek. This option is preferred due to its durability and functionality.
- Fisheries Creek 3 (FC4): Construction of a single-span truss bridge over Fishery Creek. This option is preferred due to the durability and lightweight construction, which reduces environmental impact during construction compared with the other options.
- Pavement: Either flexible pavement, comprising granular (gravel) material overlaid with asphalt or other bituminous seals, or concrete, either reinforced with mesh or fibres.

### **Statutory and planning framework**

The proposal would require development on land mapped as coastal wetland under *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP). As designated development, an EIS is required and consent must be sought from Council under Part 4 of the EP&A Act.

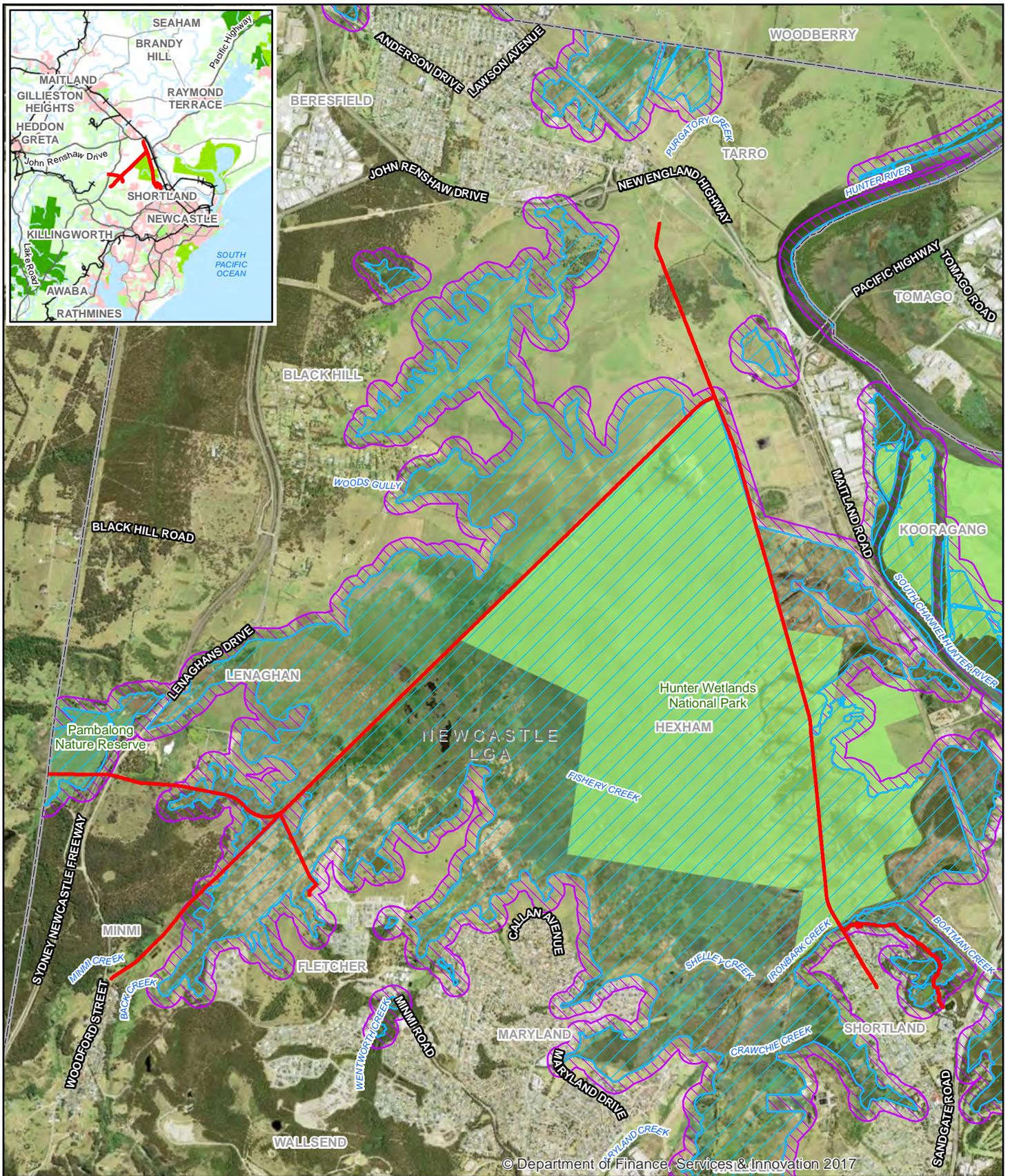
The proposal also fits the definition of regionally significant development under Schedule 7 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD). Therefore the development application would be determined by the Hunter and Central Coast Regional Planning Panel (RPP).

The proposal is considered integrated development in accordance with Division 4.8 of the EP&A Act.

### **Community and stakeholder consultation**

Consultation with potentially affected property owners, residents, relevant government agencies and other stakeholders, and the community, has been undertaken for many years and is ongoing. Information about the proposal is available on the Council website and is updated regularly.

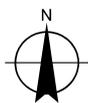
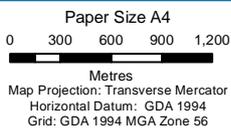
Council would continue to consult with the community and stakeholders throughout the future stages of the proposal.



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**LEGEND**

- Proposed route
- LGA boundary
- National park
- Nature reserve
- Coastal Management SEPP
- Coastal wetlands
- Proximity area for coastal wetlands



Newcastle City Council  
 Richmond Vale Rail Trail  
 Environmental Impact Statement

Job Number 22-18317  
 Revision 0  
 Date 11 Apr 2019

**Proposal overview**

**Figure E-1**

## Summary of the key findings of the EIS

Key benefits of the proposal include:

- Improved facilities linking the local communities of Tarro, Minmi, Fletcher and Shortland via a safe, accessible and amenable route.
- Safe, accessible and amenable commuter and recreational choice for tourists and locals to undertake journeys without having to utilise existing road networks (such as M1 Pacific Motorway and New England Highway).
- Improved access for tourists and locals to enjoy the heritage (such as passing through old railway tunnels) and environmental attractions, including the Hunter Wetlands National Park and Hexham Wetlands, including for bird watchers and other regular users.
- Opportunities for healthier, active lifestyles for both residents and tourists allowing users to experience the amenity of the route as it travels through various landscapes and environments.
- Opportunity for development of key economic growth areas of tourism and recreation, while providing social, health and conservation benefits for users and the region.

These benefits have been quantified and exceed the cost of the proposal by an estimated two and a half times.

The key impacts of the proposal are considered minor in comparison and include:

- Minor amenity impacts during construction due to increased traffic and activity, visual changes, noise and dust.
- Potential water quality impacts due to pollutant runoff, sedimentation, and disturbance of acid sulfate soils.
- Minor change to surface water flows due to increased impermeable surfaces and construction of new bridges and boardwalks.
- Removal of 26.5 hectares of exotic/planted vegetation and 3.3 hectares of native vegetation, including threatened or protected vegetation and potential foraging habitat for threatened and/or migratory fauna species.
- Potential impacts to fauna during proposal operation due to artificial lighting and increased use.
- Potential for injury, mortality and disturbance of native fauna during construction and operation of the proposal.
- Potential introduction and spread of weeds and pathogens.
- Permanent visual changes and impacts to a small number of residents and national park visitors due to increased visitation. Impacts could include noise, inappropriate use and loss of privacy.
- Potential impacts to Aboriginal and non-Aboriginal cultural heritage values.
- Impacts to a small number of landowners due to temporary or long term use or acquisition of property for the proposal.

## Justification and conclusion

The key benefits of the proposal include improved and more sustainable transport choices, increased tourism, better access to recreational opportunities and the growth of bicycle-tourism industries. The proposal would improve the safety of pedestrians and cyclists who currently have to continue their journey from one pathway to the next along busy roads. The proposal also provides opportunities for healthier lifestyles for both residents and tourists and would allow users to better experience certain aspects of the cultural and natural environment of the region.

The potential impacts of the proposal are considered minor when compared to the identified benefits. Mitigation measures are provided in this EIS, which would avoid, reduce or mitigate any impacts. Ongoing consultation during the detailed design, construction and operation stages would ensure that input from affected stakeholders is incorporated where relevant into the proposal.

This EIS has addressed all the requirements of the Secretary's environmental assessment requirements and other relevant legislation. The community and relevant stakeholders have been consulted throughout its preparation.

Biodiversity impacts would be offset, as required, in accordance with the *Biodiversity Conservation Act 2016*.

The proposal as described in the EIS best meets the proposal objectives. On balance the proposal is considered justified.

## Display of the EIS

The EIS will be placed on public display for at least 30 days. You can access the documents in the following ways:

### Internet

The documents will be available as PDF files on the Council website at:

<http://www.newcastle.nsw.gov.au>

### Display

The EIS documents can be viewed at the Customer Enquiry Centre, located on the ground floor of the City Administration Centre:

12 Stewart Ave, Newcastle West, NSW.

Opening hours are 8:30 am to 5:00 pm Monday to Friday, except public holidays.

### How can I make a submission?

To make a submission on the proposal, please send your written comments to:

The General Manager

City of Newcastle

PO Box 489

Newcastle NSW 2300

### Privacy information

All information included in submissions is collected for the sole purpose of assisting in the assessment of this proposal. The information may be used during the assessment process by relevant Council staff and its contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, Council will attempt to keep it confidential. However there may be legislative or legal justification for the release of the information, for example under the *Government Information (Public Access) Act 2009* or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by that respondent but not to any identifying information provided by other respondents if a respondent has indicated that the representation should be kept confidential.

Any respondent may make a correction to the information that they have provided by writing to the same address the submission was sent. The information will be held by the Council.

### **What happens next?**

Following the public display period, Council will collate submissions and prepare a report for the RPP who will determine whether the proposal should proceed as proposed, or whether any alterations to the proposal are necessary. The community will be kept informed regarding this determination.

If the proposal goes ahead and subject to funding, Council would proceed with final design and call for tenders for construction of the proposal.

If you have any queries regarding the proposal, please contact the Council on 02 4974 2000.

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- Appendix E – Geotechnical assessment
- Appendix F – Contaminated site assessment
- Appendix G – Hydrology and hydraulics assessment
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- Appendix I – Biodiversity development assessment report
- Appendix J – Visual impact assessment
- Appendix K – Statement of heritage impact
- Appendix L – Aboriginal archaeological survey report
- Appendix M – Socio-economic impact assessment

# Terms and abbreviations

AADT	Average annual daily traffic
ABS	Australian Bureau of Statistics
AEP	Annual exceedance probability. The probability of a particular rainfall amount for a specified duration being equalled or exceeded in any 1 year period can be expressed as a percentage
AHD	Australian height datum. This is the <a href="#">geodetic datum</a> for <a href="#">altitude</a> measurement in <a href="#">Australia</a> .
AHIMS	Aboriginal Heritage Information Management System. AHIMS contains details of Aboriginal objects, places and other heritage values across NSW.
ALALC	Aboriginal Local Aboriginal Land Council
ARI	Average recurrence interval. The average expressed as an occurrence in a set number of years.
AWS	Automatic weather station
BC Act	<i>Biodiversity Conservation Act 2016</i>
BAM	Biodiversity Assessment Method
BDAR	Biodiversity Development Assessment Report
BoM	Bureau of Meteorology
CEMP	Construction environmental management plan
CLM Act	<i>Contaminated Land Management Act 1997</i> (NSW). A process for investigating and remediating contaminated land.
CO <sub>2</sub> -e	Carbon dioxide equivalent. A measure for describing how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO <sub>2</sub> ) as the reference.
Council	Council of the City of Newcastle
DA	Development application
dB(A)	A-weighted decibels. A-weighting is applied to instrument-measured sound levels in effort to account for the relative <a href="#">loudness</a> perceived by the human ear, as the ear is less sensitive to low audio frequencies
DCP	Development control plan
DEC	NSW Department of Environment and Conservation (former), now DPE
DECC	NSW Department of Environment and Climate Change (former), now DPE
DECCW	NSW Department of Environment, Climate Change and Water (former), now DPE
DotE	Commonwealth Department of the Environment
DotEE	Commonwealth Department of the Environment and Energy
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community, listed under the TSC Act
EIS	Environmental impact statement
ENMM	Environmental Noise Management Manual
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW.
EP&A Regulation	Subordinate legislation to EP&A Act

EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPI	Environmental planning instrument, made under the EP&A Act.
FM Act	<i>Fisheries Management Act 1994</i> (NSW). Act to conserve, develop and share NSW fishery resources for the benefit of present and future generations.
FRC	Fibre reinforced composite
GHD	GHD Pty Limited
GRP	Glass reinforced polyester
Gt	Gigatonnes
Gt CO <sub>2</sub> -e	Gigatonne of carbon dioxide equivalent
HWC	Hunter Water Corporation
ICNG	Interim Construction Noise Guideline
INP	<i>NSW Industrial Noise Policy</i>
ISEPP	<i>State Environmental Planning Policy (infrastructure) 2007</i>
JRPP	Joint regional planning panel
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local government area. The area that is governed by a local council.
mm	Millimetre
Mt CO <sub>2</sub> -e	Megatonnes carbon dioxide equivalent
N/A	Not applicable
NES	National environmental significance
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW). Act to conserve and manage the State's natural and cultural heritage in reserved lands.
NPWS	National Parks and Wildlife Service, now part of OEH within DPE
NSW	New South Wales
NTSCORP Limited	Native title service provider for Aboriginal traditional owners in New South Wales and the Australian Capital Territory
OEH	NSW Office of Environment and Heritage
PMF	Probable maximum flood. The largest flood that could conceivably occur at a particular location
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW). Aims to protect, restore and enhance the environment through a range of objectives.
PPV	Peak particle velocity
Proposal site	The area that would be directly impacted by the proposal
Preferred route	The resolved bypass route that would be progressed to DA and EIS
RBL	Rating background level. Background noise level at a location.
REF	Review of environmental factors
RNP	Road Noise Policy
Roads and Maritime	NSW Roads and Maritime Services
SEARs	Secretary's environmental assessment requirements, issued by DPE for the EIS.
SEPP 14	<i>State Environmental Planning Policy no. 14 – Coastal Wetlands</i> . Aims to ensure that the coastal wetlands are preserved and protected in the environmental and economic interests of the State
SEPP 44	<i>State Environmental Planning Policy no. 44 – Koala Habitat Protection</i> . Aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas.

SEPP 55	<i>State Environmental Planning Policy no. 55 – Remediation of Land.</i> Provides for a statewide planning approach to the remediation of contaminated land.
SEPP 71	<i>State Environmental Planning Policy no. 71 – Coastal Protection.</i> Protects coastal land within NSW, applies to land the whole or any part of which is within the coastal zone.
SEPP SRD	<i>State Environmental Planning Policy (State and Regional Development) 2011.</i> Identifies development that is State significant development (SSD), State significant infrastructure (SSI) and critical SSI and confers functions on joint regional planning panels to determine development applications for such development and development considered regionally significant.
SHI	State Heritage Inventory
SHR	State Heritage Register
SIS	Species impacts statement
SSD	See above for SEPP SRD
SSI	See above for SEPP SRD
Study area	The site and the area that may be indirectly impacted by the proposal.
TEC	Threatened ecological community
The proposal	The activity subject to assessment under the EIS.
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW).</i> Provide for the conservation of threatened species, populations and ecological communities of animals and plants and promotes ecologically sustainable development.
VDV	Vibration dose value
WM Act	<i>Water Management Act 2000 (NSW).</i> Provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations.
WSP	Water sharing plan
°C	Degrees Celsius

# 1. Introduction

*This section provides an introduction and background for the proposal and describes the purpose, structure, scope and limitations for this report.*

## 1.1 Overview

The Richmond Vale Rail Trail is proposed along the former Richmond Vale railway between Kurri Kurri and Shortland, and along the former Chichester to Newcastle water main between Shortland and Tarro, through the Hunter Wetlands National Park. Cessnock, Newcastle and Lake Macquarie Councils are working collaboratively on the Richmond Vale Rail Trail project.

This environmental impact statement (EIS) has been prepared to assess the potential environmental impacts associated with the establishment of the trail within the Newcastle local government area (LGA). The EIS has been prepared in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

A separate review of environmental factors (REF) would be prepared to assess the Richmond Vale Rail Trail within the Cessnock and Lake Macquarie LGAs in accordance with Division 5.1 of the EP&A Act. The trail west of the Pambalong Nature Reserve is not addressed in this EIS.

## 1.2 Proposal background

The Richmond Vale railway is a former rail line that runs from Hexham to Pelaw Main in the Lower Hunter region of NSW. The first section of the railway was opened in 1857 and it originally ran from Hexham to Minmi. In 1905 the line was extended from Minmi to the Richmond Main and Pelaw Main Collieries, near Kurri Kurri. A number of small branch lines were also established from the 1920s to the 1950s to service collieries in the Stockrington area to the east of Pelaw Main. Industrial operation of the railway ceased in 1987 following the closure of the collieries in the region. In 1991, a direct passenger line was re-opened along a section of railway from the former Richmond Main Colliery to the former Pelaw Main Colliery. This passenger line continues to operate as a tourist facility managed by the Richmond Vale Railway Museum. The balance of the line has remained closed since 1987 (Richmond Vale Railway Museum, 2010).

An opportunity now exists to utilise the disused sections of the former rail line, along with a disused section of the former Chichester to Newcastle water main corridor, to establish a multi-use recreational trail for non-motorised travel. Once constructed, the trail would extend for 32 kilometres, from Shortland in the east, to Kurri Kurri in the west. There would also be a number of branch lines from the main trail alignment that would provide connections to the suburbs of Tarro, Fletcher and Minmi. The trail would be located within the Newcastle, Cessnock and Lake Macquarie LGAs.

The rail trail would provide a safe cycling and walking experience between Cessnock and Newcastle that does not utilise existing road networks and would attract both local and regional users to enjoy the environmental and heritage attractions along the route. The Richmond Vale Rail Trail provides an opportunity for the communities of the Lower Hunter region to develop the key economic growth areas of tourism and recreation while providing social, health and conservation benefits for users and the region. These opportunities were identified in a feasibility study undertaken by Mike Halliburton Associates (2014), which recommended the Richmond Vale Rail Trail based on the constructability, value, community benefit and tourism potential of the trail.

GHD Pty Ltd (GHD) has been engaged by Council to prepare the design and EIS/REF for the Richmond Vale Rail Trail. The construction and operation of the trail within the Newcastle LGA is referred to as 'the proposal' in this EIS. Sections of the proposed rail trail situated outside the Newcastle LGA are not addressed in this EIS but are discussed further in Section 1.3.

### **1.3 Relationship to other projects**

#### **1.3.1 Richmond Vale Rail Trail – Stockrington to Kurri Kurri**

The Stockrington to Kurri Kurri section of the proposed Richmond Vale Rail Trail would continue from the western limit of the proposal, at the boundary of the Newcastle LGA in the Pambalong Nature Reserve, for approximately 17 kilometres to Kurri Kurri. The proponents for this section of the rail trail would be Cessnock City Council and Lake Macquarie City Council. A REF and concept design is currently being prepared for the Stockrington to Kurri Kurri section. Once constructed, this section would provide a continuous non-motorised recreational trail between Pambalong Nature Reserve and Kurri Kurri and, along with the Newcastle LGA section, form the entire Richmond Vale Rail Trail.

#### **1.3.2 M1 Pacific Motorway extension to Raymond Terrace**

Roads and Maritime Services (Roads and Maritime) is currently seeking approval for the extension of the M1 Pacific Motorway from Black Hill to the A1 Pacific Highway at Raymond Terrace. The project involves building about 15 kilometres of four lane divided road with:

- Four interchanges located at Black Hill, New England Highway, Tomago and Raymond Terrace.
- A viaduct about 2.6 kilometres long across the Hunter River and floodplain.
- Structures to pass over local roads, the Main North Rail Line, New England Highway and the Chichester Trunk Gravity Water Main.
- Overpass bridges at the existing A1 Pacific Highway at Heatherbrae and Masonite Road near Raymond Terrace.

The Secretary's environmental assessment requirements (SEARs) were issued for the project in November 2015 and a revised concept design was displayed for community comment in August and September 2016.

The project would play a major role within the Lower Hunter road network, providing access to local centres such as Beresfield and Raymond Terrace, as well as major employment and commercial centres in the Hunter Region including Maitland, Port Stephens, Newcastle Airport, the City of Newcastle and the Port of Newcastle. The extension would provide one of the key outstanding motorway stages of the Pacific Motorway/Highway corridor between Sydney and Brisbane. The project would also provide traffic relief to the surrounding road network and improve traffic flows across the Lower Hunter region (Roads and Maritime, 2015).

The conceptual alignment for this project does not intersect the proposal route. However, the project does traverse possible future connections to the Richmond Vale Rail Trail. These future connections would be subject to a separate design, assessment and approvals process if and when they proceed. Council would continue consulting with Roads and Maritime prior to, during and following construction of the proposal to ensure interactions between the proposal, the project and the receiving environment are managed appropriately.

### 1.3.3 Lower Hunter Freight Corridor

The Lower Hunter Freight Corridor will enable a future dedicated freight rail line to be constructed between Fassifern and Hexham; bypassing Newcastle while improving regional and interstate links. Preservation of the Lower Hunter Freight Corridor is an action in the NSW Freight and Ports Strategy, the State Infrastructure Strategy and a 'high priority initiative' in Infrastructure Australia's Infrastructure Priority List. Preliminary investigations are currently underway so the exact location of the corridor is not known. Therefore it is likely that the proposal would be constructed prior to the corridor being identified. The interface between the two projects would need to be considered during future development of the corridor.

## 1.4 Report purpose and structure

The SEARs (No. 976) for the proposal were issued on 23 October 2015, with an extension issued on 14 March 2018. The EIS has been prepared to address the issues raised in the SEARs as summarised in Table 1-1 and Table 1-2. Further consultation was undertaken for the SEARs, due to delays in submitting the EIS, with advice provided on 7 August 2018. The issues raised in this correspondence, and the response in the EIS, are summarised in Table 1-3. The SEARs and government agency requirements for the EIS are provided in full in Appendix A.

**Table 1-1 SEARs issues and response**

SEARs key issues	Where addressed in the EIS
Strategic and statutory context - including: <ul style="list-style-type: none"> <li>A detailed justification for the proposal and suitability of the site for the development;</li> <li>Demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies;</li> <li>A list of any approvals that must be obtained under any other act or law before the development may lawfully be carried out; and</li> <li>The identification of the relevant approval pathway for each section of the trail under the EP&amp;A Act.</li> </ul>	Section 3.3, 3.4 and 9.1 Section 4.2.1 Section 4.5 Section 4.2.2
Waste management – including: <ul style="list-style-type: none"> <li>A description of the type, quantity and classification of waste to be generated at the site;</li> <li>Details of waste handling, management and transport; and</li> <li>Details of waste minimisation measures.</li> </ul>	Section 6.1
Air quality – including: <ul style="list-style-type: none"> <li>A description of all potential sources of air emissions;</li> <li>An air quality impact assessment in accordance with relevant Environment Protection Authority guidelines; and</li> <li>A description and appraisal of air quality impact mitigation and monitoring measures.</li> </ul>	Section 6.2
Noise – including: <ul style="list-style-type: none"> <li>A description of all potential noise sources during construction and operation, including road traffic noise;</li> <li>A noise assessment in accordance with the relevant Environment Protection Authority guidelines; and</li> <li>A description and appraisal of noise mitigation and monitoring measures.</li> </ul>	Section 6.3
Soil and water – including: <ul style="list-style-type: none"> <li>A description of local soils, topography, drainage and landscapes;</li> <li>Consideration of any contaminated soil (including acid sulfate soils) and water on-site, in accordance with relevant guidelines;</li> <li>The details of stormwater, leachate and wastewater management;</li> </ul>	Section 6.4

SEARs key issues	Where addressed in the EIS
<ul style="list-style-type: none"> <li>The details of sediment and erosion controls;</li> <li>An assessment of impacts to surface and groundwater resources, flooding impacts, and impacts to groundwater dependant ecosystems; and</li> <li>A description and appraisal of impact mitigation and monitoring measures.</li> </ul>	
<p>Traffic and transport – including:</p> <ul style="list-style-type: none"> <li>Details of road, cycle and pedestrian transport routes and access arrangements to and from the site during construction and operation;</li> <li>Road traffic predictions for the development during construction; and</li> <li>An assessment of any potential impacts to the Lower Hunter Freight Corridor.</li> </ul>	Section 3.6.11 and 6.6
<p>Biodiversity - including:</p> <ul style="list-style-type: none"> <li>Accurate predictions of any vegetation clearing on site or for any road upgrades;</li> <li>A detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements; and</li> <li>A detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.</li> </ul>	Section 6.7
<p>Visual design – including:</p> <ul style="list-style-type: none"> <li>An impact assessment at private receptors and public vantage points;</li> <li>Details of emergency vehicle access; and</li> <li>Details regarding the safety and security arrangements for the proposal.</li> </ul>	Section 6.8
<p>Infrastructure – including:</p> <ul style="list-style-type: none"> <li>A detailed description of whether the development will impact on any services within the vicinity of the site, and if impacts are predicted, measures must be identified to mitigate and/or manage these impacts; and</li> <li>A detailed description of how access to public utility infrastructure will be maintained during construction and operation.</li> </ul>	Section 3.6.13
<p>Bushfire – including technical information on the fire management and containment measures to be implemented along the trail.</p>	Section 6.9
<p>Heritage and archaeology – including Aboriginal and non-Aboriginal cultural heritage and archaeology.</p>	Section 6.10 and 6.11
<p>The EIS must assess the proposal against relevant environmental planning instruments, including but not limited to:</p> <ul style="list-style-type: none"> <li>State Environmental Planning Policy (Infrastructure) 2007;</li> <li>State Environmental Planning Policy No. 14 – Coastal Wetlands;</li> <li>State Environmental Planning Policy No. 71 – Coastal Protection;</li> <li>Lower Hunter Regional Strategy;</li> <li>Newcastle Local Environmental Plan 2012;</li> <li>Lake Macquarie Local Environment Plan 2014;</li> <li>Cessnock Local Environment Plan 2011; and</li> <li>relevant development control plans and section 94 plans.</li> </ul>	Section 4.2.1

**Table 1-2 Agency requirements for the EIS**

Agency	Date of correspondence	Key issues	Where addressed in the EIS
Roads and Maritime	11/09/2015	Impacts on classified road network and any road underpasses or proposed structures	Section 6.6
		Vehicular access to shared pathway	Section 6.6
		Ongoing maintenance of road underpasses or structures	Section 3.7
		Conflict with M1 Pacific Motorway to Raymond Terrace project	Section 1.3.2
Department of Primary Industries (DPI) – Lands	4/09/2015	Land ownership and management	Section 2.4 and 7.1
		Mechanism for occupying affected Crown land	N/A
		Site maintenance on affected Crown land	N/A
		Ongoing consultation	Section 5.6
Office of Environment and Heritage (OEH)	24/08/2015	Aboriginal cultural heritage	Section 6.11
		Threatened biodiversity and offsetting	Section 6.7
		Impacts to OEH (national parks estate)	
		Flooding, floodplain management and coastal erosions	Section 6.5
DPI - Fisheries	2015	Maps, photographs and descriptions of the proposal, aquatic habitat, aquaculture facilities, and recreational and commercial fishing areas	Section 2 and 3
		Impacts to aquaculture, commercial and recreational fishing	N/A
		Description of the physical and hydrological features of the proposal site	Section 6.5 and Figure 6-3
		Aquatic habitat assessment	Section 6.5
		Aquatic fauna assessment	Section 6.5
		Standard precautions and mitigation measures	Section 6.7.4
		Rehabilitation and compensation measures	Section 6.7.4

Agency	Date of correspondence	Key issues	Where addressed in the EIS
DPI – Water	2015	Annual volumes of surface water and groundwater proposed to be taken by the proposal	N/A
		Assessment of any volumetric water licencing requirements (including those for ongoing water take following completion of construction)	N/A
		The identification of an adequate and secure water supply for the life of the proposal	N/A
		A detailed and consolidated site water balance	N/A
		Assessment of impacts on surface and groundwater sources (both quality and quantity), related infrastructure, adjacent licenced water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts	Section 6.5
		An assessment of impediment to surface or groundwater flow, and potential flood impacts	Section 6.5
		Full technical details and data of all surface and groundwater modelling	N/A
		Proposed surface and groundwater monitoring activities and methodologies	N/A
		Proposed management and disposal of produced or incidental water	Section 6.1
		Details of the final landform of the site, including final void management (where relevant) and rehabilitation measures	Section 3.6.5
		Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts	Section 7.5
		Consideration of relevant policies and guidelines	Section 4
		A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table)	Table 1-1 in Section 1.4
DPI – Resources & Energy	25/08/2015	Impacts of the proposal on significant mineral resources, including: <ul style="list-style-type: none"> <li>Any operating mines, extractive industries or known mineral or petroleum resources</li> <li>Exploration activities</li> <li>Access for future exploration in the area</li> </ul>	N/A
		Consultation with title holders	Section 5
Environment Protection Authority (EPA)	19/08/2015	The EPA does not propose to comment further in relation to the proposal	N/A

**Table 1-3 Additional correspondence with agencies**

Agency	Date	Key issues	Section where addressed in EIS
EPA	26/06/2018	No further comment	N/A
Department of Planning and Environment (DPE) – Resources & Geoscience	29/06/2018	Mineral resources requirements: <ul style="list-style-type: none"> <li>Any operating mines, extractive industries or known mineral or petroleum resources</li> <li>Exploration activities</li> <li>Access for future exploration in the area</li> </ul>	N/A
		Coal mining lease 1618, Coal exploration licence 5337 and 5497	Not within proposal site
Department of Industry (DI) – Crown Land	03/07/2018	Native title considerations	Section 4.4.2 and 6.11
		Contact for recreational trails is Michael Murphy 02 4920 5111.	Noted
DI – Natural Resources Access Regulator	04/07/2018	<ul style="list-style-type: none"> <li>Proposed water balance and water management infrastructure</li> <li>Surface water management and flooding</li> <li>Surface water and ground water impacts</li> <li>Surface water modelling</li> <li>Monitoring</li> <li>Relevant policies and guidelines</li> <li>SEARs</li> <li>Earthworks and ancillary works</li> </ul>	Section 6.5  Section 1.4 Section 3.5 and 3.6
OEH	12/07/2018	<ul style="list-style-type: none"> <li>Aboriginal cultural heritage</li> <li>threatened biodiversity and offsetting</li> <li>impacts to OEH estate</li> <li>soils and water</li> <li>flooding, floodplain management and coastal erosion.</li> </ul>	Section 6.11 Section 6.7 Section 4.3.2 Section 6.4 Section 6.5 and 7.3
Transport for NSW	13/07/2018	<ul style="list-style-type: none"> <li>Road, cycle and pedestrian routes and access</li> <li>School safety zones</li> <li>Access arrangements</li> <li>Impacts on pedestrians and cyclists</li> <li>Impacts on bus services</li> <li>Road safety</li> <li>Lower Hunter Freight Corridor</li> <li>Mitigation measures</li> <li>Construction traffic</li> </ul>	Section 6.6  Section 1.3.3
Roads and Maritime	25/07/2018	Roads and Maritime land impacts	Section 3.5.9

This report includes the following sections:

- Section 1 – Introduction.
- Section 2 – Description of the proposal site and surrounds.
- Section 3 – Description of the proposal.
- Section 4 – Consideration of the legislative and policy requirements relating to the proposal and the site.
- Section 5 – Overview of the consultation completed to date and ongoing consultation to be completed for the proposal.

- Section 6 – Assessment of the key issues potentially impacted by the proposal.
- Section 7 - Assessment of the other environmental issues potentially impacted by the proposal.
- Section 8 – Summary of the environmental management and monitoring recommended for the proposal.
- Section 9 – Conclusion including justification for the proposal and how it addresses the objects of the EP&A Act and the principles of ecologically sustainable development (ESD).
- Section 10 – Certification of the EIS by the author.
- Section 11 – References for the report.
- Appendices – Relevant additional information and specialist reports.

For the purposes of this report, the following definitions are employed:

- The proposed Richmond Vale Rail Trail within the Newcastle LGA is referred to as the 'proposal'.
- The 'site' refers to the area that would be directly impacted by the proposal.
- The 'study area' encompasses the site and the area that may be indirectly impacted by the proposal.
- The 'locality' encompasses the suburbs and localities of Shortland, Hexham, Black Hill, Tarro, Lenaghan, Fletcher and Minmi, which is the area surrounding the site.

## **1.5 Scope and limitations**

This report: has been prepared by GHD for City of Newcastle and may only be used and relied on by City of Newcastle for the purpose agreed between GHD and the City of Newcastle as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than City of Newcastle arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in the relevant sections of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Newcastle and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

All reports have been reviewed and approved by City of Newcastle.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

## 2. Proposal site

*This section describes the proposal site including location, surrounds, land use and ownership.*

### 2.1 Site location

The proposal is located within the Newcastle LGA and commences from the suburb of Shortland, extending north to the suburbs of Hexham and Tarro and west through the suburbs of Fletcher, Lenaghan and Minmi to Pambalong Nature Reserve.

The combined length of the proposal is approximately 18 kilometres, and follows the alignment of the former Hunter Water Corporation (HWC) Chichester rising main and Richmond Vale railway.

From King Street Shortland the proposed alignment descends a steep slope for approximately 600 metres to Ironbark Creek and the Hexham Swamp (Hunter Wetlands National Park). The trail connection into the Hunter Wetlands Centre follows an alignment where grades are sufficient to allow universal access from the Wetlands Centre.

The proposal crosses Ironbark Creek via a new concrete girder bridge and then extends through low-lying land for another 200 metres to cross Fishery Creek via a truss bridge.

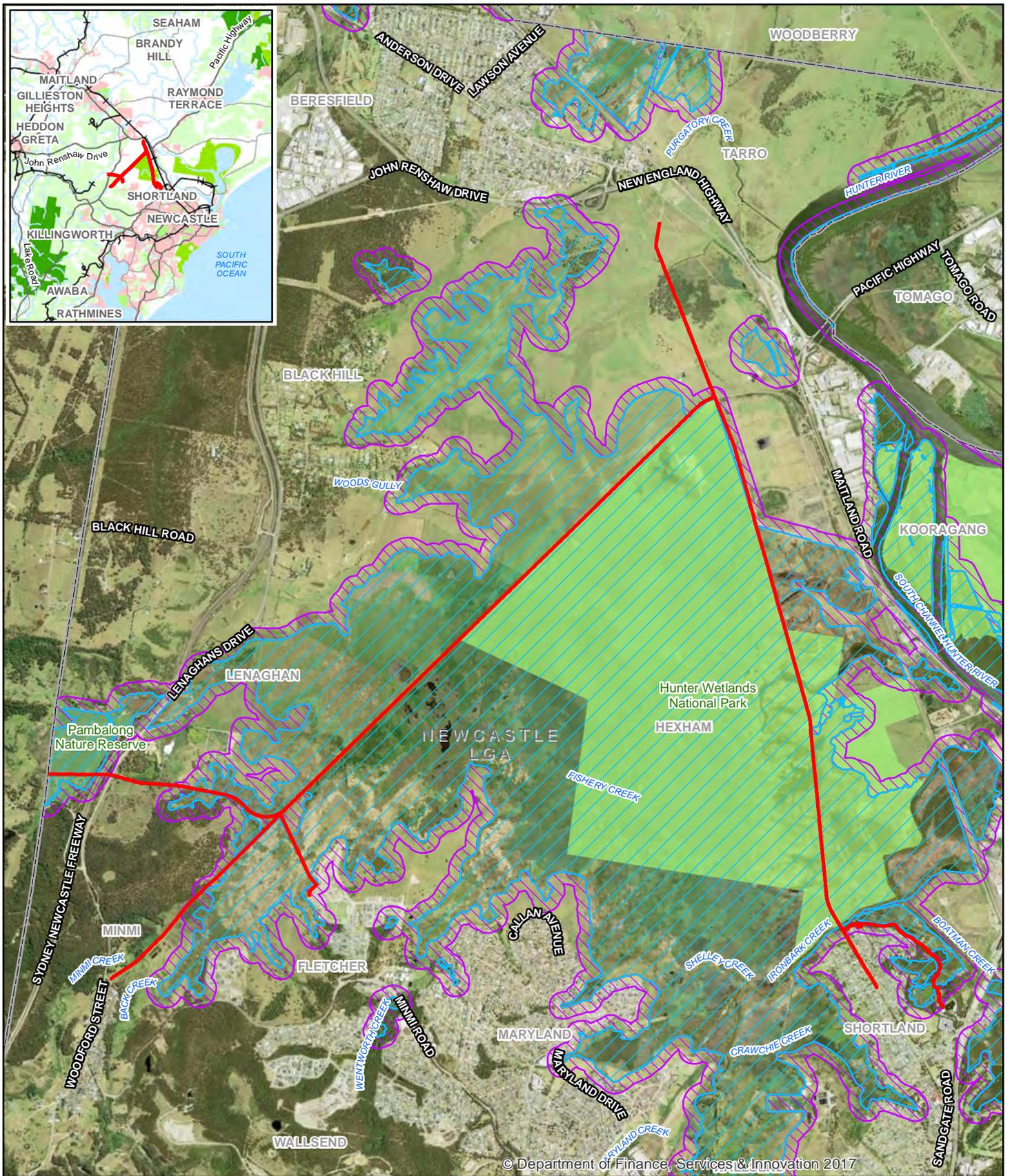
The proposed alignment then follows the HWC water main corridor from Fishery Creek through the Hunter Wetlands National Park for approximately 4.4 kilometres before branching off north towards Tarro and south-west towards Minmi. The northern branch extends for approximately 2.7 kilometres continuing to follow the former water main corridor into Tarro.

The south-western branch continues along the former railway embankment adjacent to the Hunter Wetlands National Park for approximately 5.2 kilometres before branching off again, south-east to Fletcher, south-west to Minmi, and west to the Pambalong Nature Reserve.

The location of the proposal site is shown in Figure 2-1.

With the exception of the first 600 metres of the alignment from Shortland to Ironbark Creek, the balance of the proposal site is generally flat, with longitudinal grades of less than one percent. The majority of the proposal would be constructed on the existing embankments of the former HWC Chichester water main and Richmond Vale railway.

The majority of the proposal is mapped as coastal wetland under *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP) (refer to Figure 2-1). The site also contains areas mapped as proximity area for coastal wetlands under the Coastal Management SEPP (refer to Figure 2-1).



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**LEGEND**

- Proposed route
- LGA boundary
- National park
- Nature reserve
- Coastal Management SEPP
- Coastal wetlands
- Proximity area for coastal wetlands

Paper Size A4  
 0 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56



Newcastle City Council  
 Richmond Vale Rail Trail  
 Environmental Impact Statement

Job Number 22-18317  
 Revision 0  
 Date 11 Apr 2019

Site location and proposal site **Figure 2-1**

G:\2218317\GIS\Maps\Deliverables\EIS\_NewLGA\2218317\_EIS001\_SiteLocation\_0.mxd  
 © 2019. Whilst every care has been taken to prepare this map, GHD, Geoscience Australia, DPE and LPI make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.  
 Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntm@mail@ghd.com W www.ghd.com.au  
 Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006; LPI: DTDB / DCDB, 2012, Aerial 2016, DPE: SEPP's, 2018. Created by: fmackay

## 2.2 Surrounding environment

The proposal is located within the Lower Hunter region of NSW, immediately to the north-west of the city of Newcastle. Newcastle is the second largest city in NSW, and is the major centre for the Lower Hunter region. The city supports a range of regional services focused around transport, education and health. The area surrounding Newcastle supports a diversity of land uses including urban and rural residential, industrial and commercial, transport and communication corridors, recreation, conservation, agriculture, mining, forested land and wetlands.

Immediately to the north of the proposal are the suburbs of Beresfield, Tarro, and Woodberry. The regional centre of Maitland is located 10 kilometres further north. To the east of the proposal lies the industrialised suburbs of Sandgate and Hexham, which extend along the western bank of the Hunter River. To the south and west of the proposal site lie the suburbs of Fletcher, Lenaghan, Maryland, Minmi and Stockrington, and the Pacific Motorway and New England Highway.

The majority of the proposal is located within or immediately adjacent to the Hexham Swamp within the Hunter Wetland National Park, which is located on the floodplain of the Hunter River. The Hexham Swamp covers an area of approximately 2,500 hectares and comprises approximately 45 percent of the remaining freshwater habitat in the Hunter Valley. The swamp is of vital importance as a storage area for floodwaters and is a valuable nutrient sink and nursery for a range of terrestrial, aquatic and marine flora and fauna. The area provides important habitat for at least fifteen internationally protected migratory bird species. (NSW National Parks and Wildlife Service, 2016). A key feature of Hexham Swamp is Ironbark Creek, which is the largest tidal creek draining to the Hunter River within the Newcastle LGA. The creek drains a catchment to the west of the proposal that is bounded by the Sugarloaf Range and covers an area of approximately 12,500 hectares (NSW National Parks and Wildlife Service, 2016).

Key features of the environment surrounding the proposal are shown in Figure 2-1.

## 2.3 Land use

The majority of the proposal site is located within the Hunter Wetland National Park, in the Ironbark Creek catchment. Urban development has taken place within the catchment since 1824. Much of the eastern and south-eastern margins of the catchment, to the south and west of the proposal, have been developed as residential areas. The Hexham Swamp and the associated floodplains of the Hunter River have constrained residential development in the vicinity of the proposal. Dominant land uses within the Hexham Swamp are recreation and conservation (City of Newcastle, 2004). Seasonal grazing is also undertaken in some of the outer areas of the swamp.

Land use on the southern and western periphery of the proposal is dominated by low density residential housing within the suburbs of Shortland, Fletcher, Maryland and Minmi. To the west, the dominant land uses include transportation via the M1 Pacific Motorway, agriculture (grazing), and rural-residential housing. To the north and east, land use is dominated by agriculture (grazing), road transportation via the Pacific and New England Highways, freight rail via operation of the Hunter Valley freight network, heavy industry within the suburbs of Hexham and Beresfield and low-density residential housing within the suburbs of Tarro and Beresfield.

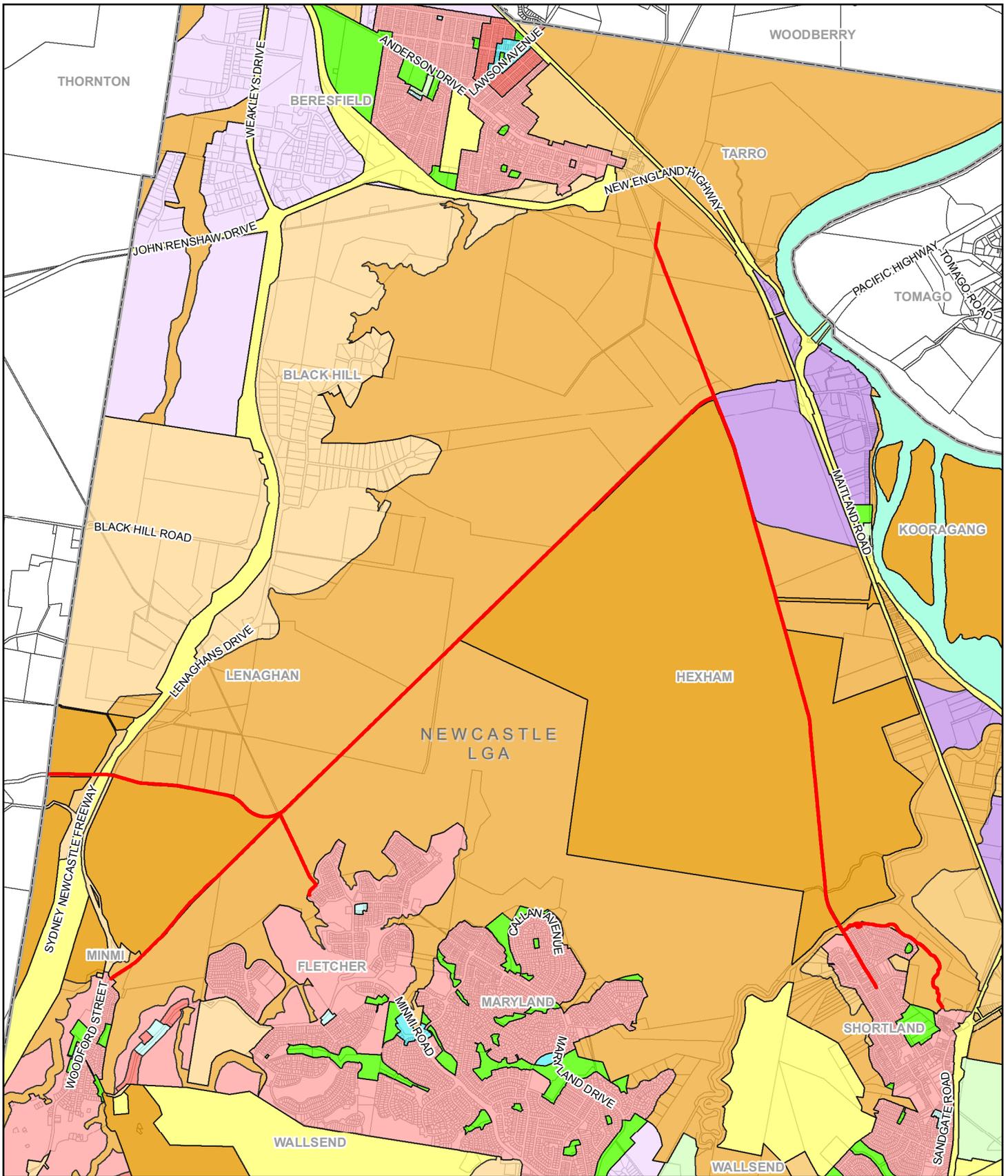
Land use zones, under the *Newcastle Local Environmental Plan 2012* (Newcastle LEP), are shown in Figure 2-2 and include:

- E1 National Parks and Nature Reserves.
- E2 Environmental Conservation.
- R2 Low Density Residential.
- SP2 Infrastructure.

The relevant provisions of the Newcastle LEP are discussed further in section 4.2.1.

## **2.4 Land ownership**

The proposal would be constructed predominantly within the corridors of the former Richmond Vale railway and HWC Chichester water main. However there would be temporary and some permanent impacts on a number of other properties, listed in Appendix B. Land parcels impacted by the proposal are also shown in Figure 2-3. This is discussed further in Sections 3.5.9 and 7.1.



**LEGEND**

- Proposed route
- LGA boundary
- Cadastre
- B1 Neighbourhood Centre
- B2 Local Centre
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN2 Light Industrial
- IN3 Heavy Industrial
- R2 Low Density Residential
- R3 Medium Density Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- SP2 Infrastructure
- W2 Recreational Waterways

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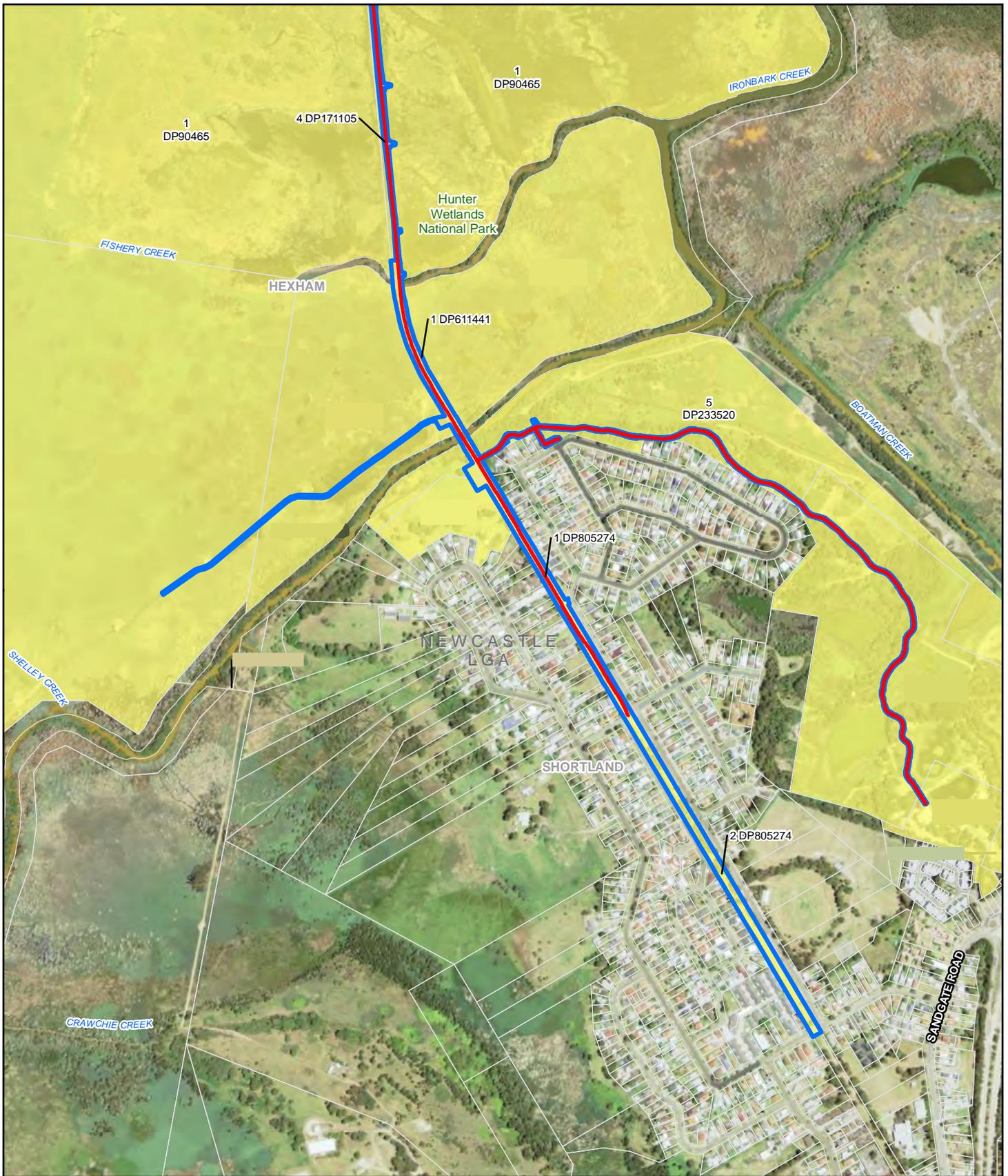


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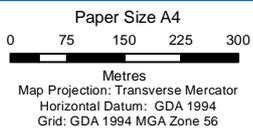
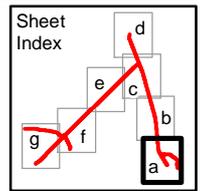
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**Figure 2-2**



**LEGEND**

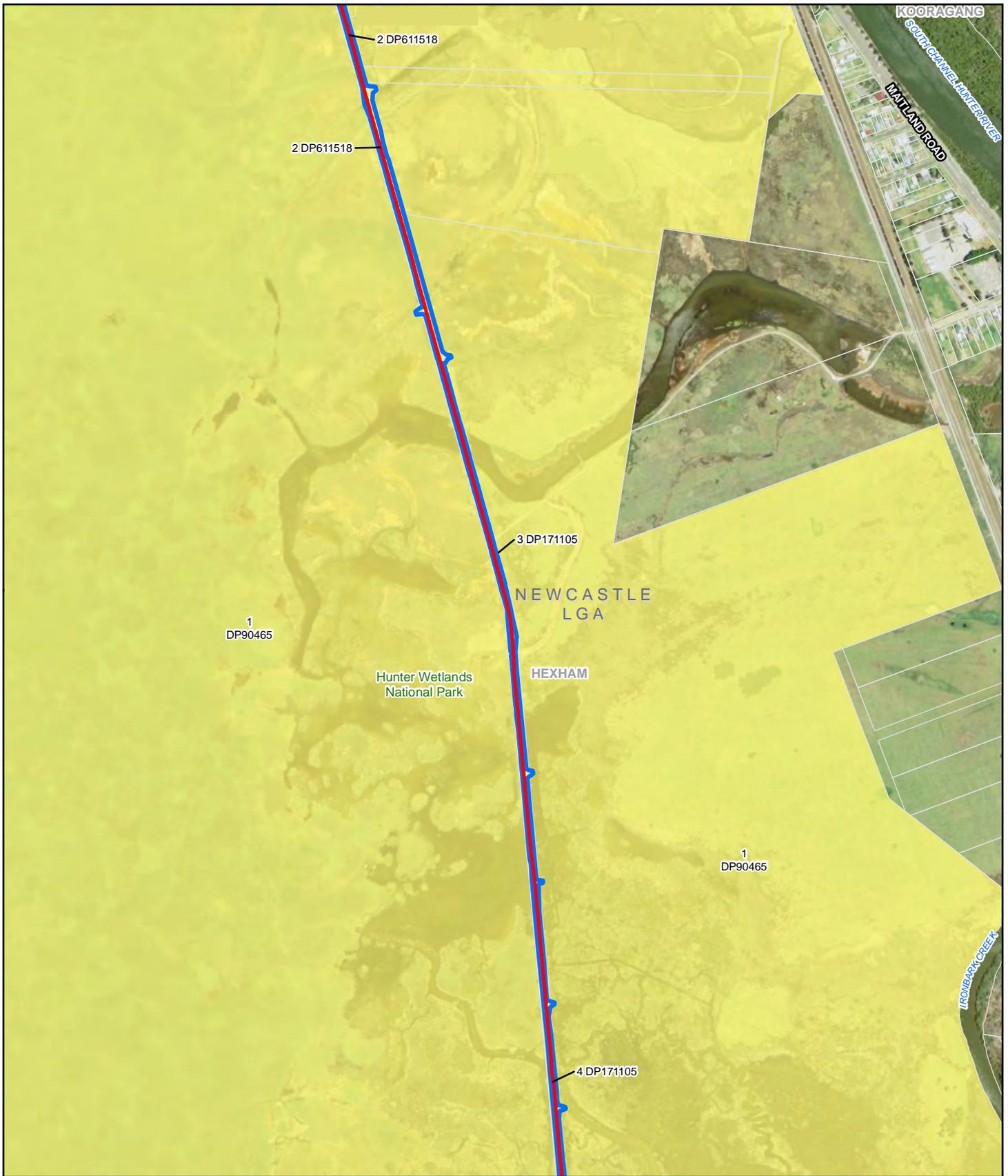
- Proposed route
- Impacted land and/or adjoining properties
- Disturbance boundary
- Cadastre
- LGA boundary



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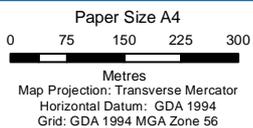
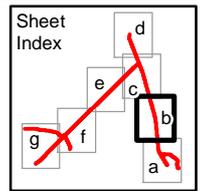
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**Land impacted by the proposal Figure 2-3a**



**LEGEND**

- Proposed route
- Impacted land and/or adjoining properties
- Disturbance boundary
- Cadastre
- LGA boundary



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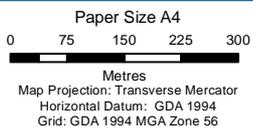
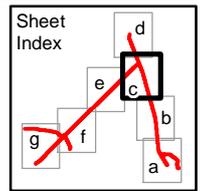
Job Number	22-18317
Revision	0
Date	04 Jul 2019

**Land impacted by the proposal Figure 2-3b**



**LEGEND**

- Proposed route
- Impacted land and/or adjoining properties
- Disturbance boundary
- Cadastre
- LGA boundary



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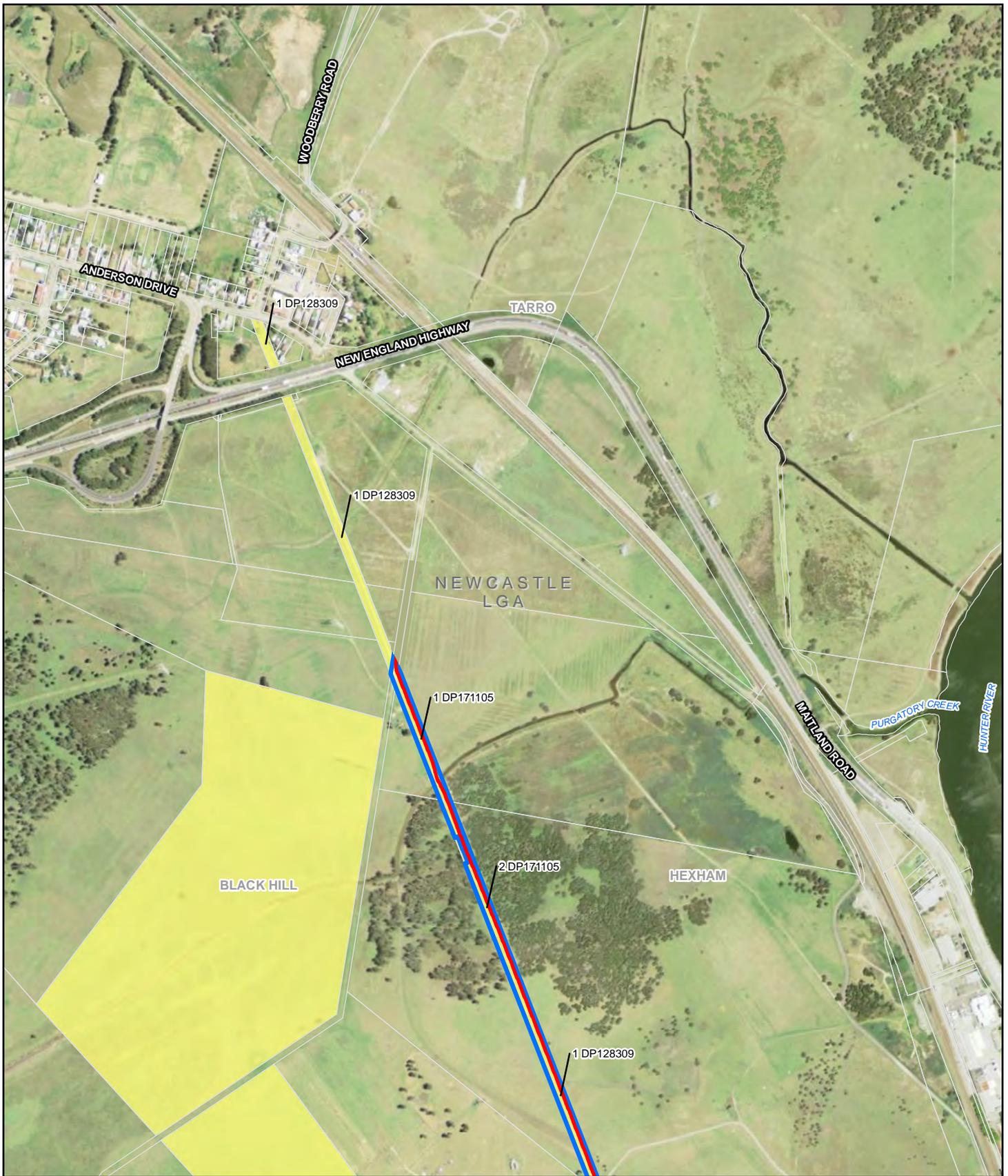
Job Number	22-18317
Revision	0
Date	04 Jul 2019

**Land impacted by the proposal Figure 2-3c**

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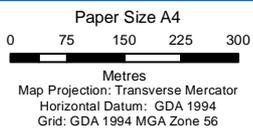
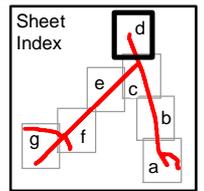
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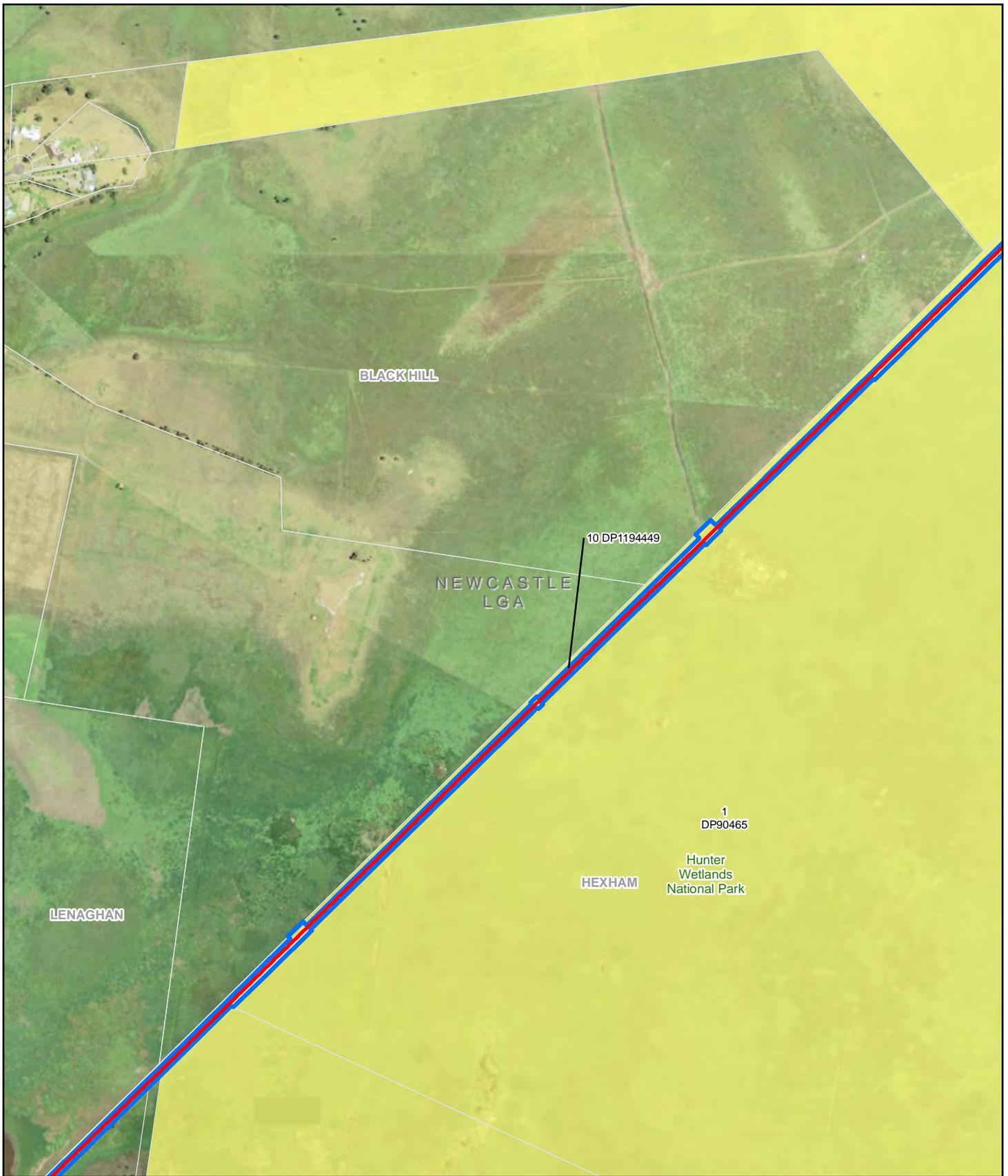
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- Impacted land and/or adjoining properties
- Disturbance boundary
- Cadastre
- LGA boundary



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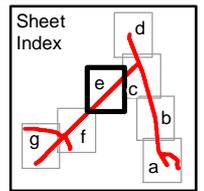
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**Land impacted by the proposal Figure 2-3d**



**LEGEND**

- Proposed route
- Impacted land and/or adjoining properties
- ⊕ Disturbance boundary
- + Cadastre
- LGA boundary



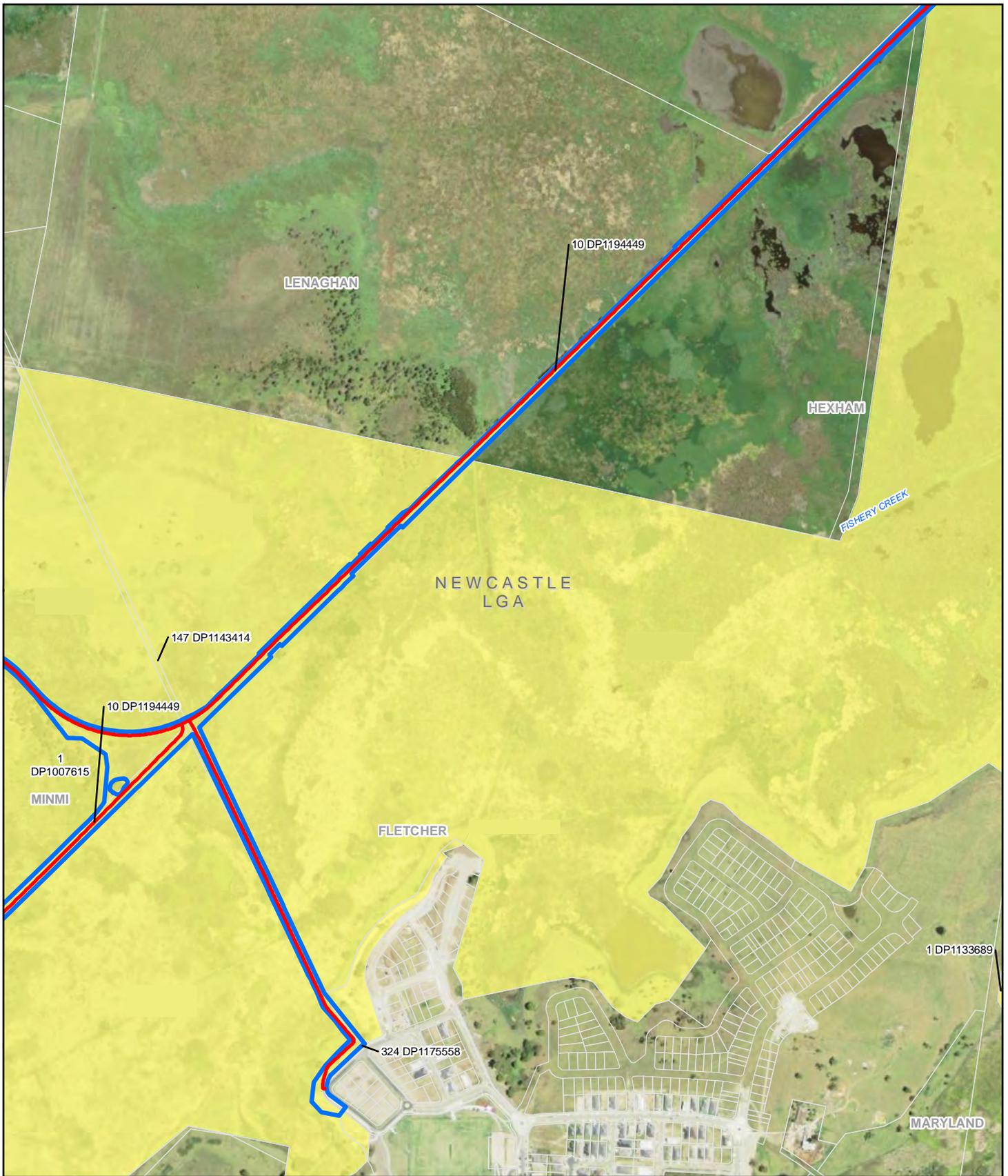
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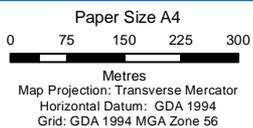
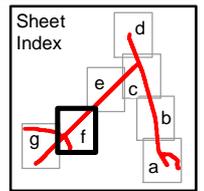
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Revision	0
Date	04 Jul 2019

Land impacted by the proposal **Figure 2-3e**



**LEGEND**

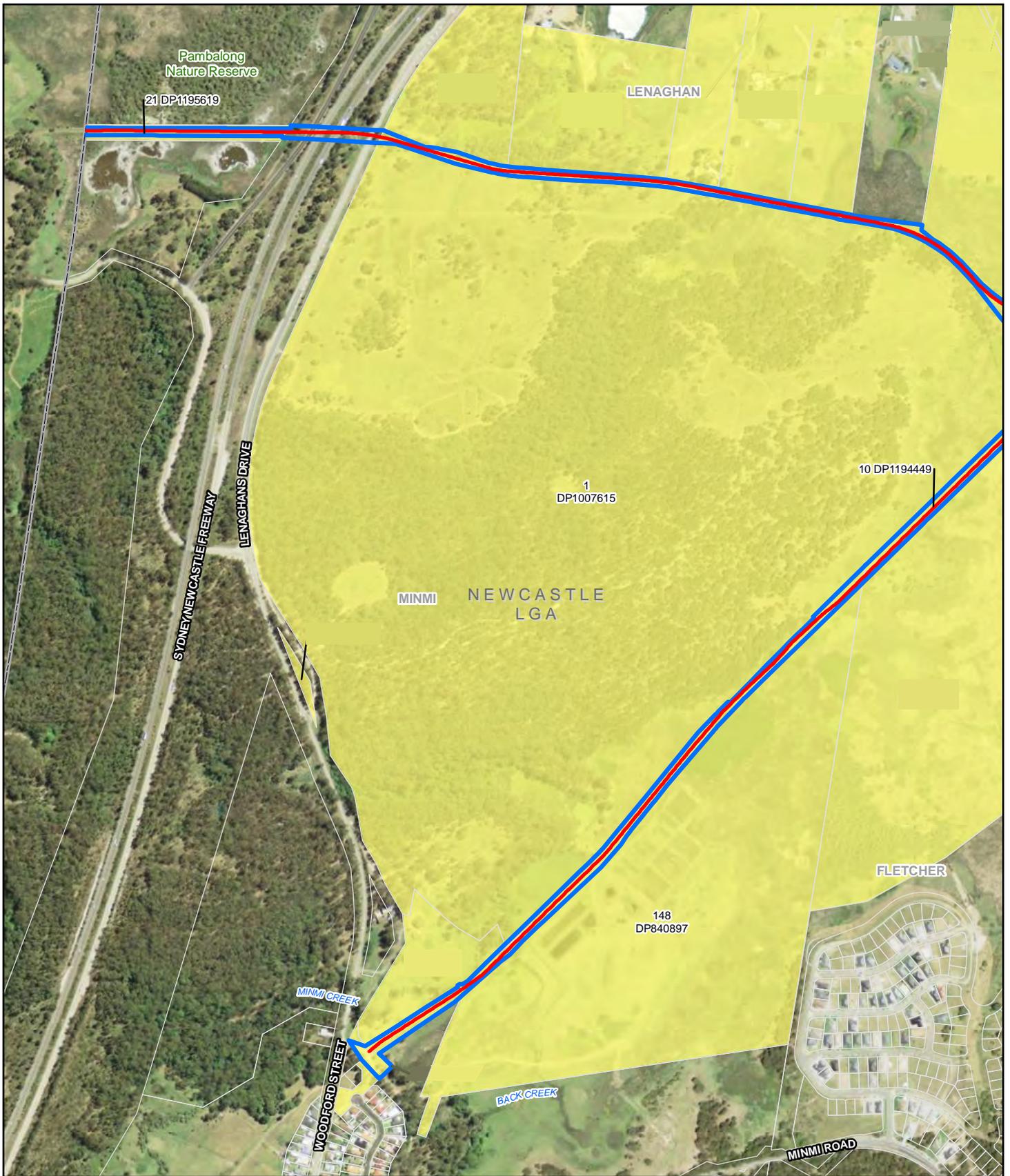
- Proposed route
- Impacted land and/or adjoining properties
- ⊕ Disturbance boundary
- + Cadastre
- LGA boundary



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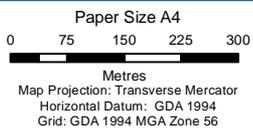
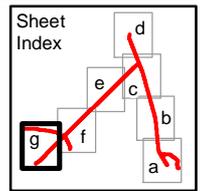
Job Number	22-18317
Revision	0
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Land impacted by the proposal **Figure 2-3f**



**LEGEND**

- Proposed route
- Impacted land and/or adjoining properties
- Disturbance boundary
- Cadastre
- LGA boundary



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**Land impacted by the proposal Figure 2-3g**

## 3. The proposal

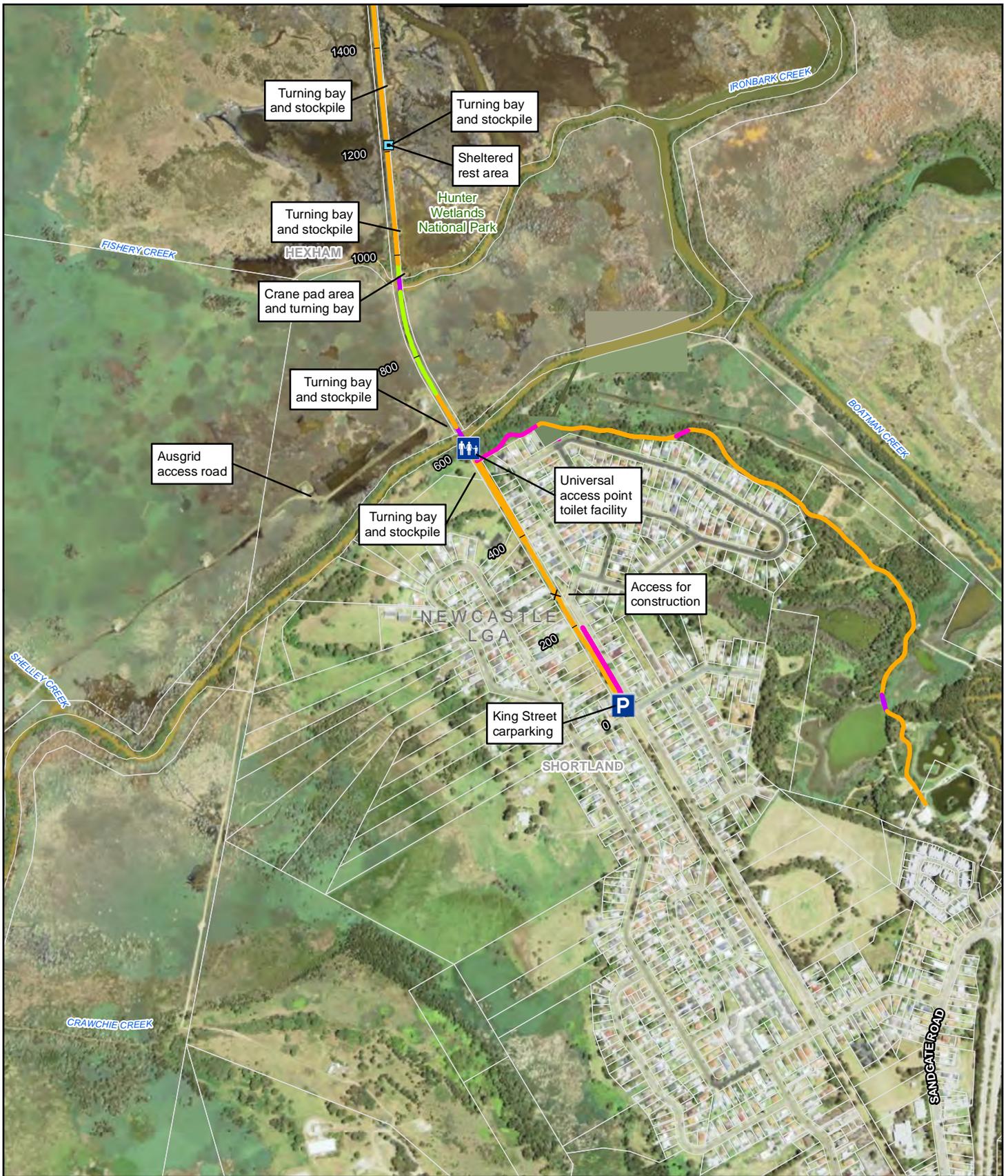
*This section describes the proposal including objectives, need, options considered, key features, construction and operation.*

### 3.1 Proposal overview

The proposal involves the establishment of approximately 18 kilometres of pathway constructed, for the most part, on an existing cleared water main corridor or rail alignment from Shortland to Tarro and to Fletcher, Minmi and Pambalong Nature Reserve. The proposal would generally comprise the following:

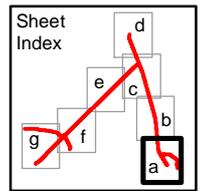
- Removal of unsuitable subgrades and the construction of pavements using imported gravel, asphalt and concrete.
- Construction of a new seven metre wide, three-span concrete girder bridge across Ironbark Creek within the Hunter Wetlands National Park.
- Construction of a new four metre wide, single-span truss bridge across Fishery Creek within the Hunter Wetlands National Park.
- Replacement of existing dilapidated timber bridges with concrete bridges on six existing bridges along the former railway alignment.
- Construction of 230 metre long and four metre wide fibre reinforced composite (FRC) boardwalk through the Hexham Wetlands (in Hunter Wetlands National Park), along lengths of the alignment where the existing embankment is subject to frequent inundation.
- Construction of 125 metre long and three metre wide FRC boardwalk along an existing pipeline easement to connect the trail into Fletcher.
- Construction of two new parking facilities at various entry points to the proposed shared pathway (one at Shortland, and one at Minmi).

The key features of the proposal are shown in Figure 3-1 and described in Section 3.5. Future connections are also identified in Figure 3-1 but are not the subject of this EIS; these would need to be the subject of a further design, assessment and approval process. The concept design plans for the Richmond Vale Rail Trail are provided in Appendix C.



**LEGEND**

- |                          |                              |                  |                   |
|--------------------------|------------------------------|------------------|-------------------|
| Cadastre                 | Toilet facility              | Proposed route   | Concrete pavement |
| LGA boundary             | Sheltered rest area          | Asphalt pavement | Bridge            |
| Proposed carparking area | Proposed rural style fencing | Boardwalk        |                   |



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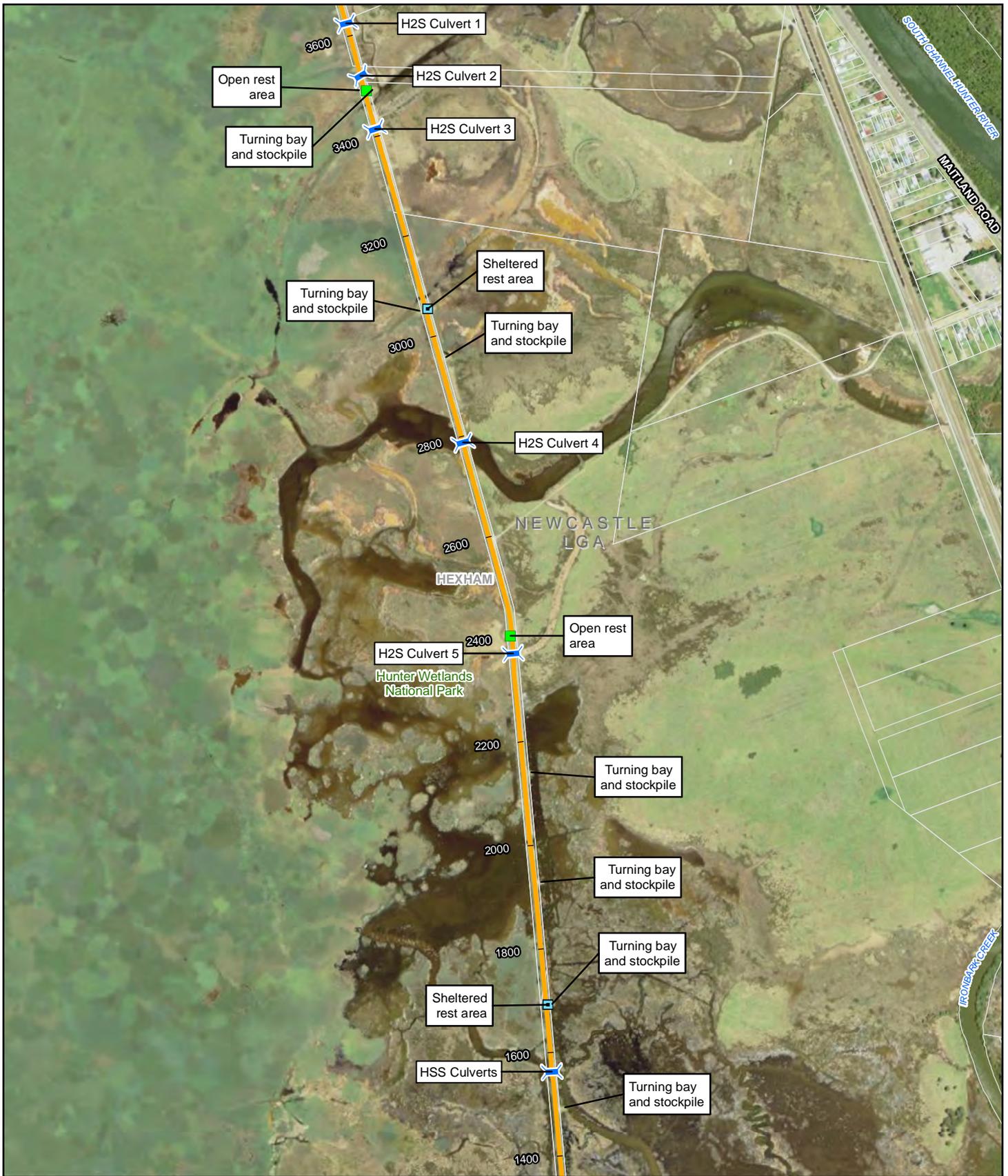


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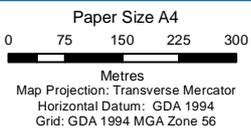
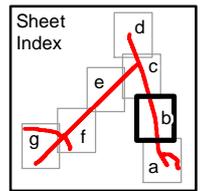
**Proposal overview**

**Figure 3-1a**



**LEGEND**

- Cadastre
- LGA boundary
- Culvert
- Open rest area
- Sheltered rest area
- Proposed route
- Asphalt pavement

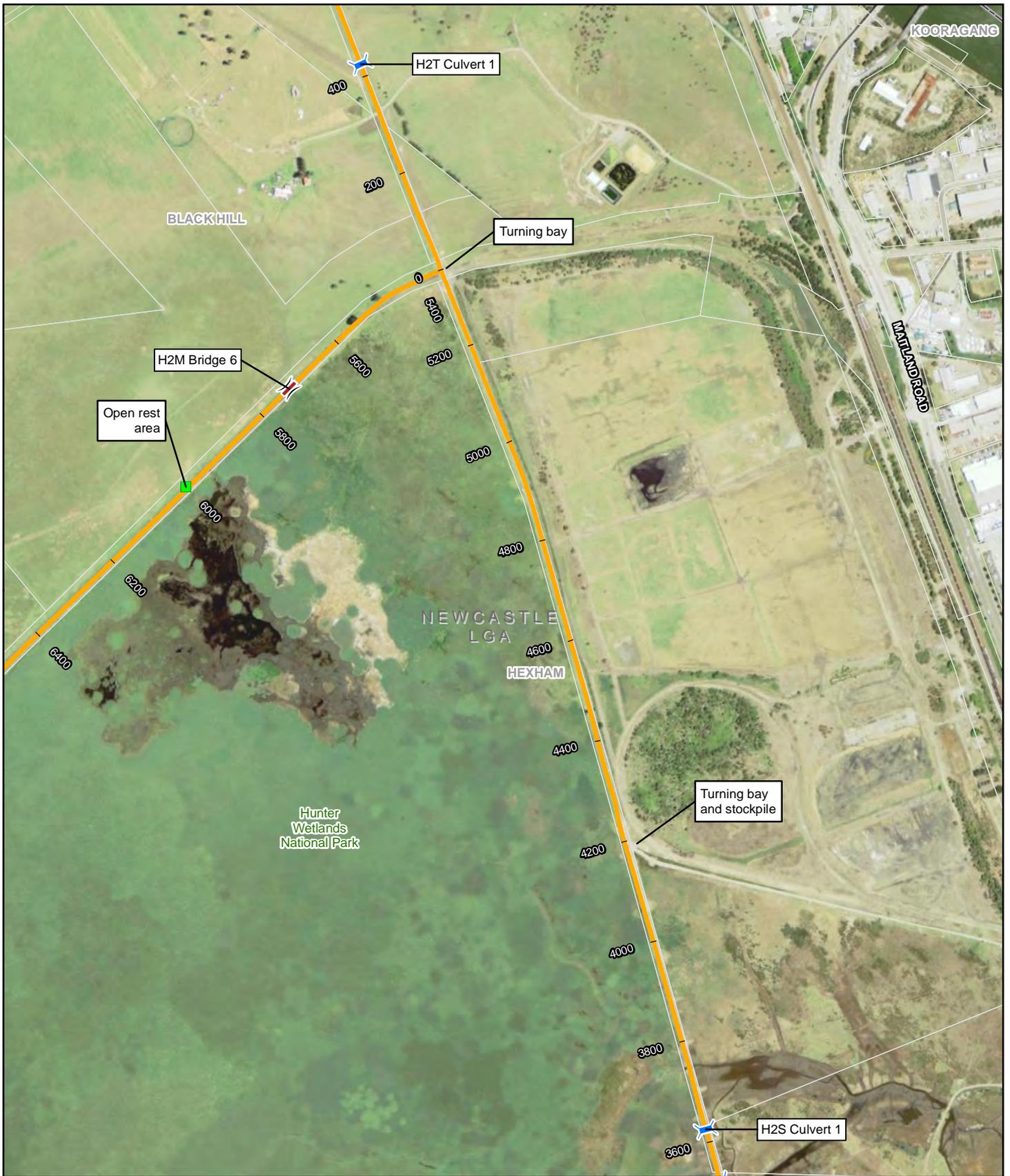


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 Date | 11 Apr 2019

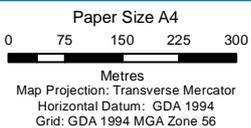
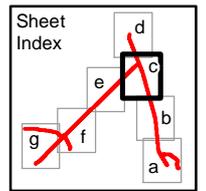
**Proposal overview**

**Figure 3-1b**



**LEGEND**

- Cadastre
- Culvert
- Proposed route
- LGA boundary
- Open rest area
- Asphalt pavement
- Bridge



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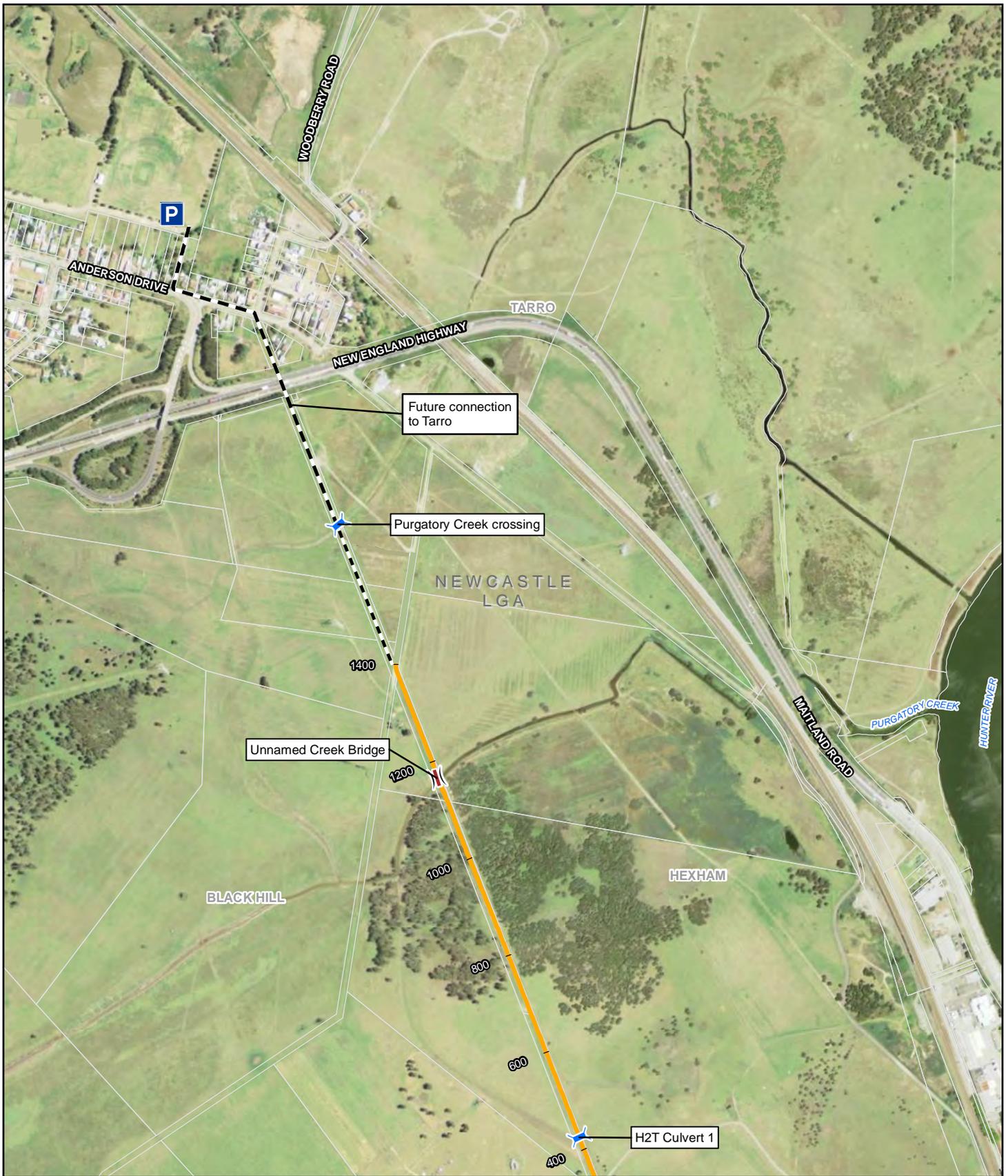
**Proposal overview**

**Figure 3-1c**

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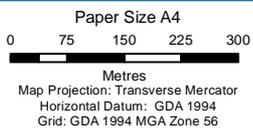
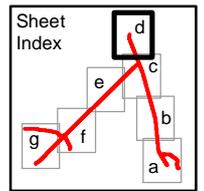
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Data source: LPI: DTDB / DCDB, 2012, Aerial 2016. Created by: fmackay



**LEGEND**

- Cadastre
- LGA boundary
- Proposed carparking area
- Bridge
- Culvert
- Proposed route
- Asphalt pavement
- Bridge
- Future connections

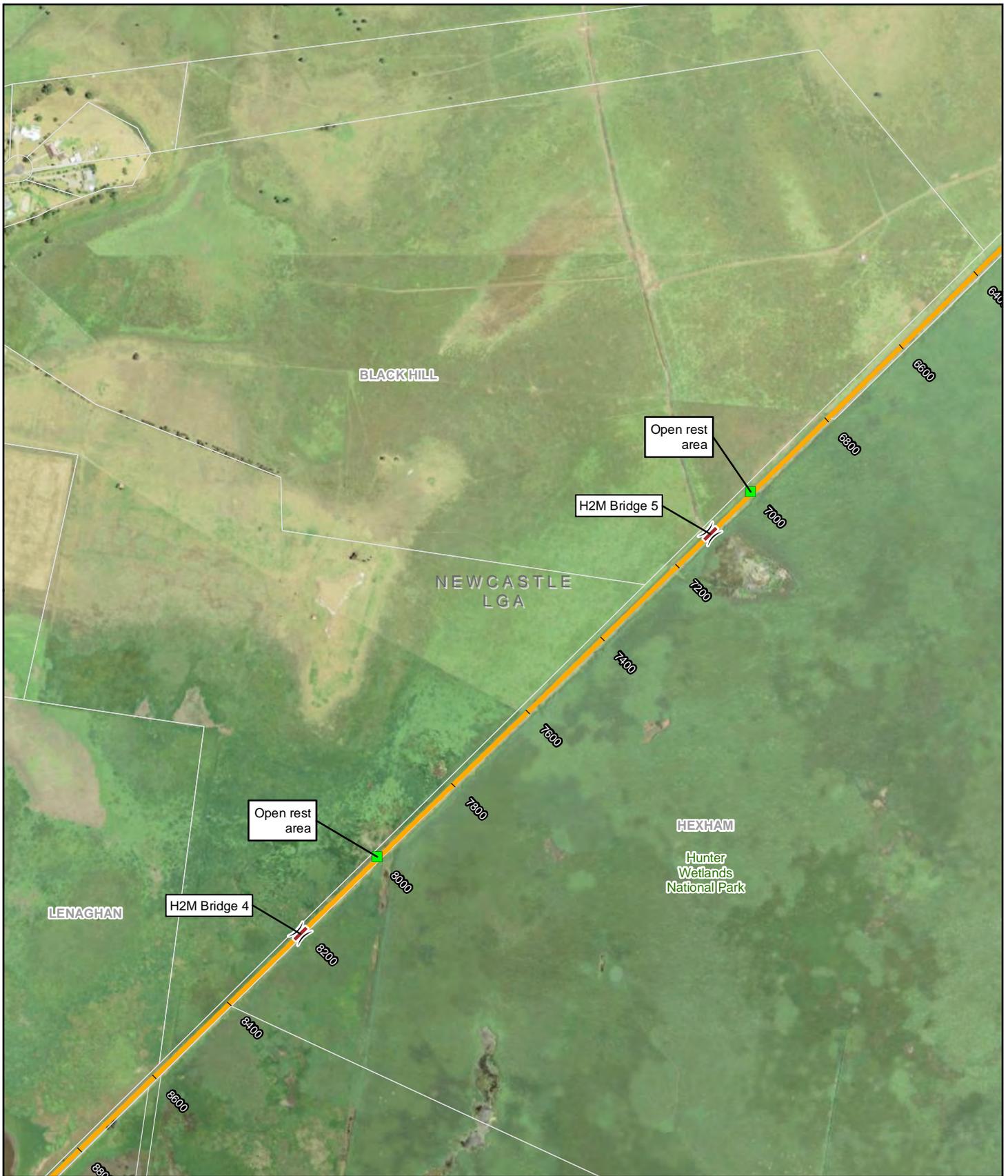


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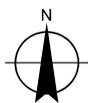
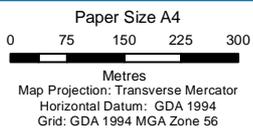
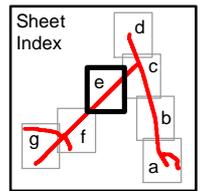
**Proposal overview**

**Figure 3-1d**



**LEGEND**

-  Cadastrate
-  LGA boundary
-  Bridge
-  Open rest area
-  Proposed route
-  Asphalt pavement

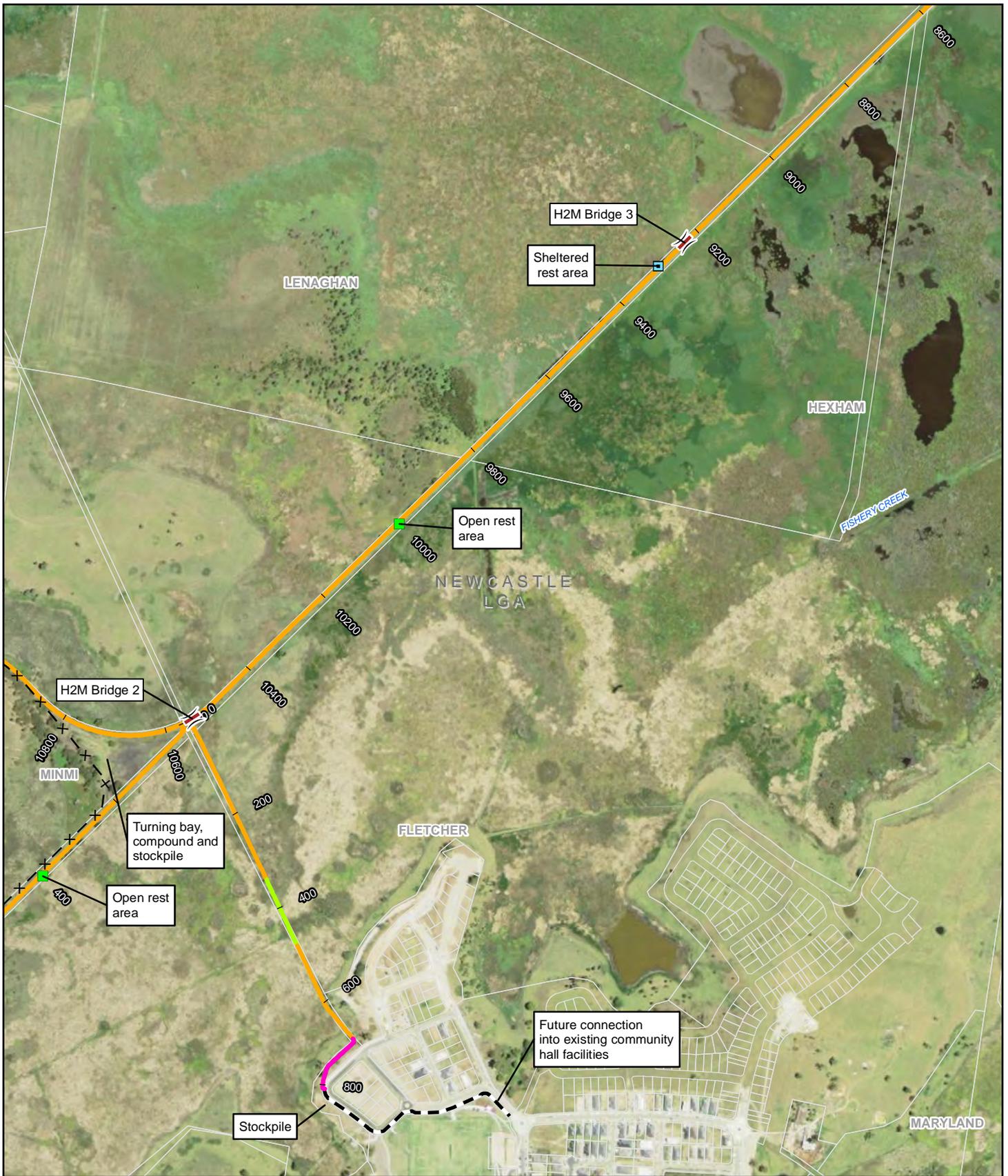


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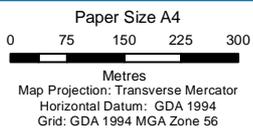
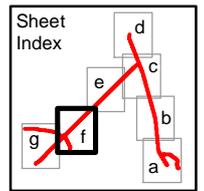
**Proposal overview**

**Figure 3-1e**



**LEGEND**

- Cadastre
- LGA boundary
- Bridge
- Open rest area
- Sheltered rest area
- Proposed rural style fencing
- Proposed route
- Asphalt pavement
- Boardwalk
- Concrete pavement
- Future connections

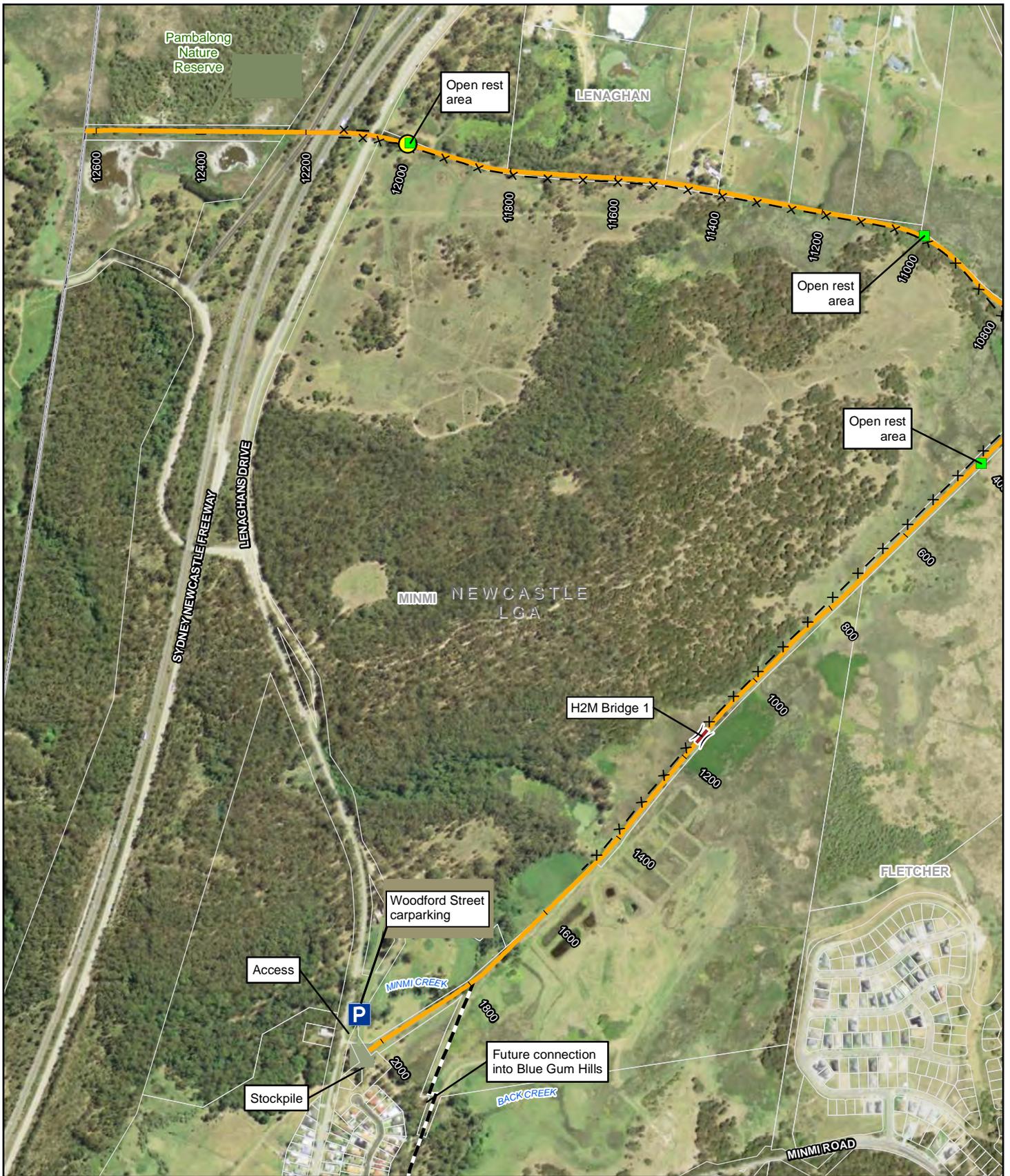


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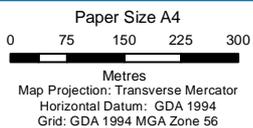
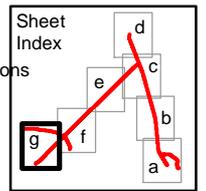
**Proposal overview**

**Figure 3-1f**



**LEGEND**

- |                          |                 |                              |                   |                    |
|--------------------------|-----------------|------------------------------|-------------------|--------------------|
| Cadastre                 | Points of entry | Sheltered rest area          | Proposed route    | Future connections |
| LGA boundary             | Bridge          | Proposed rural style fencing | Asphalt pavement  |                    |
| Proposed carparking area | Open rest area  |                              | Concrete pavement |                    |



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**Proposal overview**

**Figure 3-1g**

### 3.2 Proposal objectives

The aim of the Richmond Vale Rail Trail is to provide improved cycling facilities and link the communities of the Lower Hunter region via a safe, accessible and amenable route. Key objectives of the project are to:

- Support future growth within the Lower Hunter region of NSW.
- Maximise road safety benefits by providing a safe alternative route for non-motorised travel between the communities of the region.
- Provide the local and regional community with better recreational access to the local natural environment.
- Encourage the growth of bicycle-tourism industries within the region.
- Generate opportunities for residents and tourists to enjoy healthier, more active lifestyles.

The proposal is part of the larger regional Richmond Vale Rail Trail project within the Newcastle LGA, while separate design, assessment and approval documentation is being prepared for the sections within Lake Macquarie and Cessnock LGAs.

The proposal addresses the following specific objectives to:

- Support growth by connecting local and regional users at key access points including Shortland, Minmi and Tarro.
- Provide commuters and recreational users with a safe alternative route to the local road network, including the New England Highway and the M1 Pacific Motorway.
- Provide better recreational access to the Hexham Wetlands and Hunter Wetlands National Park for stakeholders, including birdwatching groups.
- Generate healthier, more active lifestyles and opportunities for public appreciation and enjoyment of the local natural environment, including Pambalong Nature Reserve.

### 3.3 Proposal need

The Richmond Vale Rail Trail aims to deliver a continuous off-road shared pathway from Shortland to Kurri Kurri, and once constructed would provide a link between the population centres of Kurri Kurri, Maitland and Newcastle. The shared pathway would provide a link for users between Kurri Kurri, Pelaw Main, Tarro, Minmi and Shortland that would enable cyclists and pedestrians to undertake journeys without having to ride on the Pacific Motorway, Hunter Expressway or New England Highway.

The Richmond Vale Rail Trail is specifically referred to in the *Greater Newcastle Metropolitan Plan 2036* (DP&E, 2018), which identifies a range of strategies to support sustainable growth across the local and regional area including Newcastle, Cessnock and Maitland. The project addresses key actions related to:

- Improved access to open space, recreation areas and waterways.
- Enhanced nature based tourism through protection and promotion of natural assets such as the Hexham Wetlands.

The Richmond Vale Rail Trail provides an active transport and recreational choice for locals and visitors, passing through old railway tunnels and over bridges, amongst wildlife habitats and linking to the Hunter Wetlands Centre. It would also open up the western section of the Hunter Wetlands National Park to the public and provide opportunities in the key growth areas of transport, tourism, recreation, heritage, and economic and social development.

The proposal would provide a continuous shared pathway from Shortland in the south/east to Tarro in the north and Minmi in the west. The proposal is a critical component of the Richmond Vale Rail Trail project, which aims to deliver a continuous off-road shared pathway from Shortland to Kurri Kurri. Once constructed, the Richmond Vale Rail Trail would provide a regionally important non-motorised travel link between the centres of Kurri Kurri, Maitland and Newcastle.

The key benefits of the proposal include improved and more sustainable transport choices, increased visitation to the locality and region, additional recreational opportunities and the growth of bicycle-tourism industries. The proposal would improve the safety of pedestrians and cyclists who currently have to continue their journey from one pathway to the next along busy roads. The proposal would also provide opportunities for healthier active lifestyles for both residents and tourists and allow users to experience the amenity of the route as it travels through various landscapes and environments.

Council is committed to providing facilities that are accessible to the whole community. The general design objectives for the shared pathway are to provide a safe, enjoyable and aesthetically pleasing journey for the whole community. A number of fatalities have occurred on the New England Highway and other arterial roads and motorways within the locality. The shared pathway would improve safety for all road users.

### **3.4 Route selection and alternatives considered**

#### **3.4.1 Options assessment**

A number of alternatives were considered by Council during the concept design development process. An *Options Assessment Report* (GHD Pty Ltd, 2016) was prepared which:

- Outlined a range of options to be considered for the proposal.
- Framed the design criteria for the proposal.
- Provided a basis to enable selection of the preferred alignment and treatments for the proposal.

Following review of the Options Assessment Report, Council convened an internal workshop to evaluate the range of options available. The alignment for the proposal is generally fixed by the existing route of the former Richmond Vale railway and Chichester water main. However the preferred treatment option was chosen based on consideration of safety, environmental, cost and design issues. A summary of the treatment options considered during the review and evaluation process is provided in the following section.

#### **3.4.2 Options considered**

##### **Route options**

The proposal follows the alignment of the former Richmond Vale railway and Chichester water main, which offers a number of advantages over alternative alignments, including:

- Improved safety by reducing cyclist interactions with road users.
- Minimal land acquisition.
- Minimal earthworks.
- Fewer environmental impacts.
- Improved aesthetic appeal.

For the reasons listed above, alternative alignment options were not pursued. However, a detailed design options assessment was undertaken for the various bridge and treatment options along the proposal alignment. The bridge options are described below.

### ***Bridge options***

#### **Ironbark Creek bridge**

A number of options were considered for the bridge crossing at Ironbark Creek. These included:

- IC1 Single span steel girders or truss.
- IC2 40 metre cantilevered cable stayed bridge.
- IC3 Three span concrete girder.

#### **Fishery Creek bridge**

A number of options were considered for the bridge crossing at Fishery Creek. These included:

- FC1 Pontoon bridge.
- FC2 Timber wetland walkway.
- FC3 Single span concrete girder.
- FC4 Single span truss.

### ***Pavement treatment options***

Paving of the trail is proposed because:

- The trail would be more attractive to road and touring cyclists.
- Sealing would improve safety and attractiveness for a range of other users, such as families, walkers, mobility impaired users.
- Use of paving reduces the ongoing maintenance required, which would save costs, improve durability and reduce environmental impacts.

The proposal would be paved using either flexible pavement, comprising granular (gravel) material overlaid with asphalt or other bituminous seals, or concrete, either reinforced with mesh or fibres. The choice of pavement type is based on:

- Cost.
- Ride quality.
- Moisture in subgrade and management of surface water ingress.
- Constructability.

### ***Do nothing option***

The 'do nothing' option would result in the rail trail not being constructed. This would mean that the aim of improving cycling facilities and resultant economic opportunities within the Lower Hunter region would not be achieved. The safety of pedestrians and cyclists who currently use busy roads to continue their journey from one pathway to the next would not be improved. Healthy lifestyle and natural area enjoyment benefits would not be fulfilled. The do nothing option would be a lost opportunity to repurpose an unused existing asset to provide a range of community benefits.

### 3.4.3 Selection of preferred option

The preferred option for the proposal was chosen based on cost, ride quality and user experience, reduced environmental, social and economic impacts, and constructability. The preferred option is based on extensive consultation with relevant stakeholders and the community. The design was refined in response to this input on a number of occasions (see further discussion in Section 3.4.4).

The preferred option comprises a combination of the preferred options for bridges and pavement treatment, which includes:

- Ironbark Creek 1 (IC1): Construction of a three-span concrete girder bridge over Ironbark Creek. This option is preferred due to its durability and functionality.
- Fisheries Creek 4 (FC4): Construction of a single-span glass reinforced polyester (GRP) truss bridge over Fishery Creek. This option is preferred due to the durability and lightweight construction, which reduces environmental impact during construction compared with the other options.
- Pavement: Either flexible pavement, comprising granular (gravel) material overlaid with asphalt or other bituminous seals, or concrete, either reinforced with mesh or fibres.

### 3.4.4 Design refinements

The design for the proposal has been developed in consultation with relevant stakeholders. Input was sought at several stages through the design process and the design was modified accordingly.

Consultation undertaken during the preparation of this EIS also provided input from the community and stakeholders. The consultation undertaken is summarised in Section 5. Design refinements in response to feedback from stakeholders is summarised in Table 3-1.

**Table 3-1 Stakeholder feedback and design response**

Stakeholder	Comments raised	Design response
Bird Observers Club	<ul style="list-style-type: none"> <li>• Importance of Hexham Swamp to avifauna and other biodiversity.</li> <li>• Conflict between cyclists and bird watchers and pedestrians.</li> <li>• Require vehicle access for bird watchers to undertake survey.</li> <li>• Construction requested to be undertaken in April.</li> <li>• Offered to provide input into the education signage.</li> <li>• Speed to be limited to 10 km/h to reduce likely impacts on fauna.</li> </ul>	<ul style="list-style-type: none"> <li>• Pathway has been widened to 4 m to allow more room for bird watchers and cyclists.</li> <li>• 1.5 m wide x 6 m long observation area has been provided on the boardwalk in the national park.</li> <li>• Covered rest areas off the track to provide refuge areas along the trail.</li> <li>• Educational signage has been included in the concept design cost estimate. Detail to be developed during the detailed design stage.</li> <li>• Urban design treatments included in the concept to slow down cyclists. No formal speed limit has been provided but advice will be included on signage.</li> </ul>
Community via information sessions	Intermediate trail head required to provide suitable (distance) pedestrian access to Tunnel 1 and Tunnel 2.	Additional access point provided at George Booth Drive between Tunnel 1 and 2 along an old construction access road for the Hunter Expressway.

Stakeholder	Comments raised	Design response
	Fletcher connection needs to manage on-street parking in quiet streets.	Direct connection to existing facilities at Fletcher Community Centre provided in design. Parking and fencing restrictions to be considered in detailed design.
	Shortland parking affecting residents and current quiet environment	Off-street parking on the HWC easement to be considered in detailed design.
Wetland Centre	Provide wheelchair friendly viewing locations along the boardwalk and trail.	<ul style="list-style-type: none"> <li>Viewing platforms 1.2 m high have been provided on the boardwalk.</li> <li>AS1428 compliant toilet facilities provided.</li> </ul>

### 3.5 Key features of the proposal

#### 3.5.1 Design criteria

Design criteria for the proposal are primarily sourced from Austroads guidelines and relevant Australian standards. The key documents include:

- *Austroads – Guide to Road Design Part 6A: Pedestrian and Cyclist Paths* (Austroads, 2017)
- *AS 1428.1-2009 Design for access and mobility – General requirements for access – New building work* (AS1428.1)
- *AS 1742.9-2000 Manual of uniform traffic control devices – Bicycle facilities* (AS1742.9)
- *NSW Soils and Construction - Managing Urban Stormwater - Volume 1 – the Blue Book - Landcom* (2004).

Table 3-2 and Table 3-3 present the minimum design criteria recommended for the detailed design of the trail and bridges respectively. Specific treatments would be investigated in more detail during the detailed design phase, at which time the design criteria would be confirmed based on the opportunities and constraints of the existing alignment.

**Table 3-2 Trail design criteria**

Design element	Design guide	Adopted parameters
Pathway width	AGRD06A Table 7.4	Desirable minimum width of three metres for shared pathway. The following additional widths are proposed: 6.6 metre width at approach to Ironbark Creek, for safety Four metre width from Shortland to Tarro
Shoulder	AGRD06A Section 7.6.1	0.5 metres
Cross fall	AGRD06A Section 7.6.1	2 – 4% for sealed surfaces
	AS1428.1	Maximum 2.5%
Vertical grade	AGRD06A Section 7.4.2	Maximum 5% for downhill design avoiding curves at base Desirable uphill grades as per Figure 7.1 of AGRDA06A
	AS1428 (guidance only as these reflect building ramps rather than shared paths)	For grade of 1 in 14 – landings required at nine metre centres (1.2 metres long) For grade of 1 in 20 – landings at 15 metre centres For grade less than 1 in 33 – no landing If grade is steeper than 1 in 33 – landings at 25 metre centres

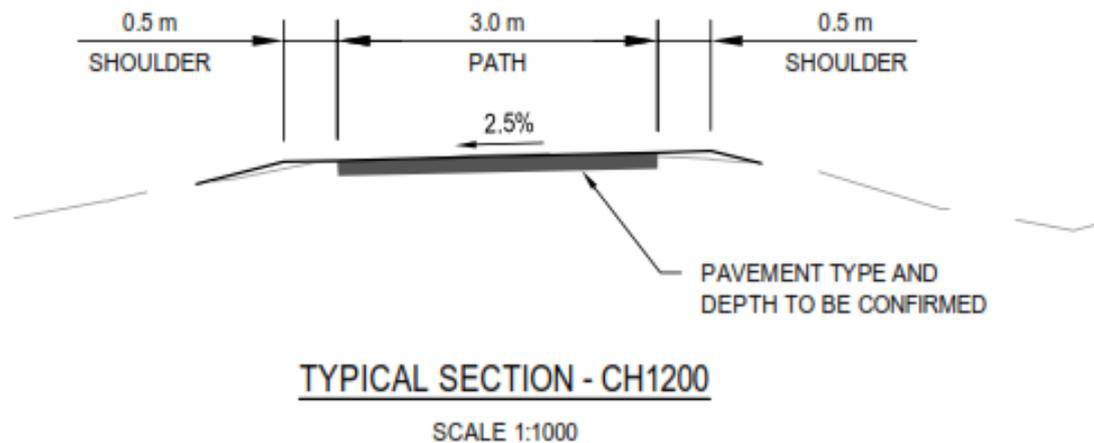
Design element	Design guide	Adopted parameters
Horizontal radius	AGRD06A Table 7.1	Minimum radius of 10 metres (20 km/h) without superelevation Typically 50 metres radius used (40 km/h)
Vertical curve	AGRD06A Figure 7.9	Assuming 20 km/h speed, minimum six metres where less than 11.5% algebraic change in grade
Cut/fill batters	AGRD06A Section 7.4.2	Adopt maximum 1V:4H fill batters to avoid hazardous slope otherwise provide guard rails Adopt 1V:2H cut batter, steeper if required, subject to geotechnical design
Signage	AS1742.9	To be provided in detailed design
Drainage ARI	AGRD06A Section 7.6.2	Five year ARI for major paths adjacent to freeways or arterial roads, two year ARI for paths with a lesser function
Water depth x velocity	AGRD06A Section 7.4.2	Less than 0.35 m <sup>2</sup> /s

**Table 3-3 Bridge and culvert design criteria**

Item	Criteria
Dead and superimposed load criteria	Dead weight of concrete = 25 kN/m <sup>3</sup> Future 50 mm asphalt overlay allowed for as superimposed load. Barriers allowed for as superimposed load. No additional services allowed for.
Traffic load criteria	Ironbark and Fishery creeks Pedestrian and bicycle loads – 5 kPa to Australian Standard AS5100.2 (Bridge design Part 2: Design Loads). Medium weight vehicle loads – 5 kPa and 31kN point load to Australian Standard AS1170.1 for vehicles up to 10 tonne weight. Culverts and small bridges SM1600 traffic loading in accordance with Australian Standard AS5200.2
Flood load criteria	Ironbark and Fishery creeks Flow velocity = 1 m/s. Flow level = R.L. 4.5m AHD for 2,000 year ARI event. Fishery creek boardwalk: Flow velocity = 0.5m/s at RL 4.5m AHD Flow velocity = 1 m/s at deck level Ironbark creek depth of scour = 1.75m from existing bed level. Fishery creek depth of scour = 1.2m form existing bed level Small Bridges and Culverts To be determined in detail design
Other load criteria	Shrinkage, creep, and temperature effects as per AS5100.2. Minimum lateral restraint as per AS5100.2.
Design width	Ironbark Creek – 6.6m clear width Fishery Creek Bridge – 4m clear width Fishery Creek Boardwalk – 4m clear width Small Bridges and culverts – 3m clear width
Design life	Ironbark Creek - 100 years Fishery Creek Bridge – 75 years Fishery Creek Boardwalk – 75 years Culvert and small bridges – 50 years

### 3.5.2 Pavement

The proposal would predominately use flexible pavement with an asphalt seal due to cost, ride quality and ease of construction. Where subgrade is susceptible to moisture, concrete pavements would be used. The pavement type would be confirmed during detailed design but is indicatively shown in Figure 3-1. A typical section of pavement is shown in Figure 3-2.



**Figure 3-2 Typical pavement section**

### 3.5.3 Boardwalks

Between Ironbark Creek and Fishery Creek, the former Chichester rising main becomes submerged. The proposal in this section would be constructed of a fibre reinforced composite (FRC) boardwalk. Boardwalk construction would generally comprise the installation of driven FRC piles and precast concrete pad footings, followed by the installation of FRC bearers, joists and timber decking above.

This technique would also be utilised for the trail extension to Fletcher, which traverses low lying land (refer to the concept designs in Appendix C).

### 3.5.4 Bridges

#### *Ironbark Creek bridge*

The proposal involves the construction of a three-span concrete girder bridge with an approximate width of five metres over Ironbark Creek. The concrete piers on the western embankment of the bridge would be constructed using a five tonne hydraulic excavator with an auger or micro-pile attachment. Concrete would be supplied to the western embankment using concrete pump trucks stationed on the eastern embankment.

#### *Fishery Creek bridge*

The bridge over Fishery Creek would be constructed using a 20 metre single span FRC truss supported by concrete abutments. The pile foundations would be constructed via deep micro-piles to avoid heavy machinery.

Six existing small bridges would also be replaced. These would be designed to address drainage requirements and would be a similar size to existing to avoid impacts on flooding and hydrology (further discussion in Section 3.5.6).

Bridge locations are shown in Figure 3-1.

### **3.5.5 Amenities and facilities**

#### ***Car parking and points of entry***

Car parking facilities are proposed to provide the primary point of entry for a large proportion of users who do not want to ride the entire trail but wish to access certain sections. These users would include recreational cyclists, families, mobility impaired users, walkers or those seeking direct access to particular features along the trail.

To cater for and encourage higher participation of recreational users, car parking facilities are proposed at intermediate locations along the trail to enable users to undertake shorter journeys. Parking areas would be provided at Shortland (30 spaces), Tarro (100 spaces) and Minmi (12 spaces) (refer Figure 3-1). All car parks would include appropriate stormwater management to prevent water quality impacts to surrounding receiving environments.

#### ***Toilet and shelter areas***

Public toilet and other facilities (shelters, water, bins, interpretative and instructive signage etc.) would be provided at each of the proposed car parking areas and other relevant locations (refer Figure 3-1). The final layout and inclusions at each car parking area would be determined during detailed design. However, they would be expected to include:

- Parking including accessible spaces and drop off areas.
- Natural drainage management.
- Service/emergency access.
- Lighting.
- Natural or structural shade.
- Toilets.
- Water fountain and taps.
- Seating (benches, seats, informal sitting/leaning elements).
- Bike facilities – parking, maintenance etc.
- Landscaping.

#### ***Stopping and observation points***

In addition to the car parking areas proposed, dedicated stopping/observation areas are planned to highlight the attractions along the trail, which consist of wetlands, tunnels, bridge structures and scenic landscapes. Each stopping/observation point would be complemented by information boards, other signage and street furniture to attract users and encourage them to stop.

Preliminary locations for stopping and observation points are shown in Figure 3-1. These would be confirmed during detailed design.

### **3.5.6 Stormwater management**

#### ***Transverse drainage structures***

The existing transverse drainage structures such as embankment culverts and minor bridges would be retained wherever possible. The sizing of existing culverts is assumed to be adequate as any changes to sizing would affect the flood pattern.

The detailed design would include detailed hydraulic modelling of the proposed trail in order to design crossing structures that, as far as reasonably practical, match the existing hydraulic response. Furthermore, it would identify operational procedures to restrict access to the trail and ensure safety of users during operation. This would include instructional signage for users to follow in the case of flood.

#### ***Pavement drainage***

Significant drainage improvements can be made along the trail to divert surface runoff from entering rail cuttings and prevent the formation and pavements becoming saturated. Top of batter diversion drains are proposed on the uphill side of each cutting and around the tunnel portals to redirect surface runoff away from cuttings. This treatment would prevent the batters from eroding and limit saturation to the rainfall that falls directly on those surfaces.

Grassy or sealed shoulders are proposed along the pathway to reduce hydrocarbons and pavement material leaching to surrounding areas. These would be designed in accordance with relevant standards and guidelines, such as the Blue Book (Landcom 2004).

Culvert and bridge locations are shown in Figure 3-1.

### **3.5.7 Fencing, signage and lighting**

#### ***Fences and barriers***

Fencing for the trail would vary depending on its location and purpose. Existing rural boundary fencing would be utilised where practicable. New fencing would be provided as necessary to delineate access and for safety purposes, in consultation with landowners. Fencing would typically include:

- Galvanised steel tube cycleway fencing on approaches and departures to bridge structures.
- Steel post and cable vehicle control fencing to prevent motorised vehicle access to the trail.
- Rural road boundary fencing at the top of large batters and to divert users to trail access points.
- Security pipe and chain-link boundary fencing to prevent access in the vicinity of Lenaghans Drive and the M1 Pacific Motorway.

In addition to fencing, screen planting with native vegetation would be provided to further enhance security and privacy where necessary. The exact fencing type and gating arrangement would be confirmed with adjacent landowners during the detailed design process. It would consider, as relevant, requirements for security, visual screening and fauna movement. Locations for fencing are shown in Figure 3-1.

Examples of existing and new fencing to be utilised along the proposed trail are shown in Figure 3-3 and Figure 3-4.



**Figure 3-3 Existing rural boundary fencing to be retained where practicable**



**Figure 3-4 Example of post and cable vehicle control fencing**

***Line marking and signage***

A dashed (broken) centre line would be provided along the trail.

Instructional, wayfinding and interpretive signage would be provided along the trail at all parking and access areas and other locations where relevant. Signage would be designed in accordance with AS 1742.9 and installed at regular intervals of approximately 500 metres. Examples of typical signage are shown in Figure 3-5 and Figure 3-6. Where the proposal traverses national park areas, signage would be provided stating that trail bikes/motorised vehicles and dogs (and other domestic animals) are not permitted.



**Figure 3-5 Example instructional signage**



**Figure 3-6 Example wayfinding and interpretive signage**

### **Lighting**

Lighting of the trail would vary depending on the function and location of the area but would be designed and installed in accordance with AS1158.3.1 *Lighting for roads and public spaces – Pedestrian area lighting*. Lighting would be installed as required at points of conflict, such as road crossings, and other areas such as car parks, and through the tunnels, to reduce safety and security risks. Lighting would likely be to the minimum standard required for pedestrian paths and aim to utilise alternative forms of power such as solar, wherever possible. Longitudinal lighting of the trail is not required, but alternative treatments such as pavement delineation through luminescent materials would also be considered. Lighting would be considered in tunnels to manage security and safety issues where relevant. Lighting options to reduce potential impacts of increased artificial lighting on resident fauna would also be incorporated where possible.

### **3.5.8 Urban design**

The proposal design, in particular the amenities and facilities including car park areas, observation points, fences, lighting and signage, would incorporate design elements that aim to deliver an engaging and context responsive solution. Integration of existing natural assets (views, features, topography, habitat) and the provision of well-designed supporting elements (car parks, observation/stopping areas) would offer an enjoyable and memorable experience for the user.

Access and stopping points provide an important opportunity to define the character and quality of the overall trail. The delivery of good quality urban design in these locations can have a positive impact on user experience and attract future patronage. The predominant character for these locations is defined by the route's historical, rural, agricultural and ecological assets. The urban design and landscape treatments for the trail would aim to maintain and enhance this character.

Landscaping would aim to retain all existing trees unless there is a requirement for removal in response to a specific construction or operational need. If planting is required, appropriate local and endemic species would be used and sight lines and security requirements would be considered for plantings in car parks and observation areas.

### **3.5.9 Property acquisition and use**

The proposal would impact on approximately 38.5 hectares of land owned by a range of entities and individuals (see Appendix B). A disturbance boundary was identified to identify temporary property impacts outside the proposal site. The disturbance envisaged might include use of land for access, stockpile or compound sites. These sites are shown in Figure 3-1.

Negotiation with any known impacted landowners has commenced. Any required acquisition or other agreements, both long term or temporary, would be finalised prior to construction commencing in accordance, as relevant, with the relevant requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

### **3.5.10 Capital value**

The estimated cost of the overall Richmond Vale Rail Trail project is approximately \$46,500,000 (excluding GST), while the cost of the proposal is approximately \$18,370,000 (excluding GST), comprising:

- Shortland to Tarro – Approximately \$12,950,000 (excluding GST).
- Hexham to Minmi – Approximately \$5,420,000 (excluding GST).

This estimate is preliminary only and includes construction and land acquisition costs only. Long term maintenance costs, which are expected to be minimal, are not included.

## 3.6 Construction activities

Construction activities are preliminary only and would be reviewed and confirmed by the construction contractor, once appointed.

### 3.6.1 Work sequence

Construction activities would generally include:

- Site establishment – offices, stockpiles sites etc.
- Implement traffic controls.
- Mark out works area.
- Pre-clearance survey, flag trees for removal and fence no go zones.
- Install erosion and sediment controls.
- Services location, protection or relocation if required.
- Tree removal.
- Earthworks – clear and grade, foundations, cut and fill.
- Construct boardwalk, retaining walls, rest areas, pavement, culverts and bridges.
- Site clean-up, revegetation and landscaping.
- Demobilisation.

### 3.6.2 Construction hours, duration and workforce

Construction work would primarily be undertaken during recommended standard construction hours as outlined in the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009), which are:

- Monday to Friday: 7:00 am to 6:00 pm.
- Saturday: 8:00 am to 1:00 pm.
- Sundays and public holidays: no work.

Some night work would be required in the M1 tunnel at Fletcher/Stockrington to reduce impacts to threatened microbats. This is discussed in detail in Section 6.7.

Construction of the proposal, if approved and dependent on grant funding, would commence in 2020 and is expected to take approximately 12 to 18 months to complete.

The construction workforce is expected to comprise up to about 85 workers over the life of the proposal. The workforce numbers would fluctuate depending on the construction stage and location of works.

### 3.6.3 Staging and timing

The proposal would likely be constructed in three stages, as follows:

- Stage 1 - Shortland to Tarro.
- Stage 2 - Hexham to Pambalong Nature Reserve.
- Stage 3 – Fletcher to Minmi Junction.

Timing of construction works would consider peak traffic times, property access, ecological impacts and other relevant issues in consultation with the various stakeholders. Timing and staging would also be dependent on funding and conditions of consent.

Staging of the additional stages of the Richmond Vale Rail Trail project is yet to be confirmed but would consider proposal staging so as to manage impacts. The design and REF are currently being prepared.

### **3.6.4 Construction activities per stage**

#### ***Stage 1- Shortland to Tarro***

##### **Chainage 0 to 600 Shortland to Ironbark Creek**

The first 300 metres of the proposal would be at grade and comprised of pavement constructed within the grassed area of the former Chichester rising main alignment. From chainage 300 to 600, the horizontal grade would be modified by cutting and filling to a maximum depth of 0.5 metres to reduce the steepness of the approach to Ironbark Creek. The area of proposed cut and fill is shown in Figure 3-7. To improve safety along this downhill section of the pathway, two separate pathways for cyclists and pedestrians are proposed. A small toilet block at Ironbark Creek would be constructed as there are few public facilities in the vicinity.



**Figure 3-7 Site of proposed cutting on approach to Ironbark Creek**

A connection to the Hunter Wetlands Centre is proposed to provide access for users with reduced mobility. It would connect into the pathway at Ironbark Creek. This section of the pathway would be 2.5 metres wide with small ramps and retaining walls up to two metres high to ensure that the design conforms to AS1428.

The connection to the Wetlands Centre would allow users to access the existing car parking, café and toilet facilities.

### **Chainage 600 – 650 Ironbark Creek bridge**

A three-span concrete girder bridge with an approximate width of 6.6 metres is proposed over Ironbark Creek. The concrete piers on the western embankment of the bridge would be constructed using a five tonne hydraulic excavator with an auger or micro-pile attachment. Concrete would be supplied to the western embankment using concrete pump trucks stationed on the eastern embankment. The western side of Ironbark Creek is shown in Figure 3-9.



**Figure 3-9 The western bank of Ironbark Creek from the eastern bank**

Tracked excavators and other small off-road machinery would access the western embankment via the existing Ausgrid owned access track (refer to Figure 3-10). The access track is frequently submerged and would require localised repairs along its length where the track is inundated or damaged. To eliminate the need for excavation along the access track and to minimise disturbance of the wetland, repairs would use a 'geocell' cellular confinement system. This would involve the placement of a rubber cellular matrix over the top of the existing track and filling of the matrix with aggregate. This system would confine the aggregate and minimise loss of gravel from the submerged access track. The cellular confinement system (including gravel) would be removed following the completion of construction works.



**Figure 3-10 Existing Ausgrid access to the western bank of Ironbark Creek**

Additional fill would be required to raise the level of the western bridge abutment. This fill would either comprise earthen material or 'geofam' expanded polystyrene (to reduce weight). Access to install the imported fill would be via the newly constructed bridge to avoid damage to the Ausgrid access road.

The eastern piers and abutment would be constructed using similar machinery, equipment and techniques as those used on the western embankment. Access would be gained from King Street, Shortland. The eastern embankment of Ironbark Creek is shown in Figure 3-11.



**Figure 3-11 The eastern bank of Ironbark Creek from the western bank**

A barge would be launched from the eastern embankment to construct the central piers of the bridge. A crane would be used to lift the barge into place. Modification to the embankment may also be required to provide a ramp for the barge. Piling rigs on the barge would be used to drive steel sleeves into the bed of the river to provide permanent formwork for the augured piles, which would be installed into weathered rock. The piers would be cast insitu using access from the barge and pump trucks supplying concrete from the eastern embankment.

Precast concrete girders would be installed between the eastern embankment and central piers and between the central piers and the western embankment. They would be lifted into place using a crane located on the eastern embankment. A crane pad would be constructed at the embankment. Trucks supplying the concrete girders would access the site via King Street, Shortland.

#### **Chainage 650 – 690 Boardwalk between Ironbark Creek and Fishery Creek**

Between Ironbark Creek and Fishery Creek the existing Chichester rising main alignment becomes submerged. The proposal in this section would be constructed of an FRC boardwalk, generally comprising the installation of driven FRC piles, precast concrete pad footings followed by the installation of FRC bearers, joists and timber decking above.

The boardwalk would be constructed progressively using a hydraulic excavator and lightweight four wheel drive vehicles, with access provided from the east over the Ironbark Creek bridge and Ausgrid access track if necessary. The area over which the proposed boardwalk would be installed is shown in Figure 3-12.



**Figure 3-12 Proposed boardwalk section between Ironbark Creek and Fishery Creek**

A temporary haul road would also be installed adjacent to the boardwalk to allow access to the eastern embankment of Fishery Creek. This would be constructed using a geocell cellular confinement system with aggregate fill (as described above for the Ironbark Creek bridge construction). This would allow water to overflow the temporary haul road and avoid the loss of gravel and sediment.

#### **Chainage 960 – 970 Fishery Creek Bridge**

The bridge over Fishery Creek would be constructed using a 20 metre single span truss supported by concrete abutments and deep pile foundations.

Equipment to construct the bridge would be limited to light weight vehicles such as a five tonne hydraulic excavator. The deep foundations would be installed using micro-piles or similar to auger to depths of approximately 20 metres. Drilling fluids, spoil and grout would be banded using sand bags to avoid spillage.

Construction of the bridge would require the clearing of vegetation on each embankment. The western and eastern embankments of Fishery Creek are shown in Figure 3-13.

The piers on the embankments would be cast insitu, with concrete delivered to site from the western side of Fishery Creek. The FRC truss would be delivered on trucks via the existing Aurizon and HWC access road. The trusses would be lifted into place using a crane located on the western embankment.



**Figure 3-13 Western bank of Fishery Creek looking east**

#### **Chainage 950 to 5350 Fishery Creek to Hexham Junction**

From Fishery Creek, the proposal extends north for approximately 4.4 kilometres along the raised embankment of the former Chichester to Newcastle water main to Hexham Junction, at which point the alignment would split, with one section extending further north towards Tarro and another section extending south-west towards Minmi. Between Fishery Creek and Hexham Junction, works would involve limited removal of existing sub-grade material where required and the construction of the pathway pavement using imported gravel, asphalt and concrete.

Access for equipment and materials would be via the Aurizon access road from the New England Highway. The compound and stockpile area along the Hexham Junction to Tarro section of the trail would be used during construction of this section (see below).

#### **Chainage 5350 to 5650 Hexham Junction to Tarro**

From Hexham Junction, the proposal extends generally north for approximately 1.5 kilometres before reaching just south of the New England Highway. This part of the route would be constructed on the existing embankment of the former Newcastle to Chichester water main. An extension from here into Tarro is proposed for the future but would be subject to additional design development, assessment and approval, if progressed.

#### **Stage 2 - Hexham Junction to Pambalong Nature Reserve**

#### **Chainage 5350 to 10550 Hexham Junction to Minmi Junction**

The alignment heads south-west from Hexham Junction for approximately 5.2 kilometres before reaching the Minmi Junction. This section would be constructed on the existing embankment of the former Richmond Vale railway using flexible pavement and/or ridge concrete. To avoid the potential for maintenance issues during operation, existing timber sleepers and rails would be removed prior to pavement construction. A typical section of the existing rail alignment, showing the rails and timber sleepers requiring removal, is shown in Figure 3-14.



**Figure 3-14 Typical section of the trail at Fletcher requiring sleeper and rail removal**

Six small bridges along the alignment would be replaced using precast or insitu concrete decks, with some repair/rectification works to the underlying brick abutments for re-use in replacement bridges. The bridges would be designed and constructed to allow construction equipment to access the site without disturbing the existing waterways. An example of one of the timber bridges requiring replacement of the timber girders is shown in Figure 3-15. Access for equipment and materials would be via either the existing Aurizon access road to the north or from Lenaghans Drive to the south.



**Figure 3-15 Bridge requiring replacement of timber girders**

### **Chainage 10550 to 12620 Minmi Junction to Pambalong Nature Reserve**

The alignment heading west from Minmi Junction extends for approximately 2.1 kilometres to meet the boundary of the Newcastle LGA at Pambalong Nature Reserve. This section would be constructed on the existing embankments and cuttings of the former Richmond Vale railway using flexible pavement and/or ridge concrete. It would pass under the M1 Pacific Motorway via two existing tunnels. Access for equipment and materials during construction would be via Dog Hole Road and Minmi Junction.

No remedial work to the existing tunnels under the M1 Pacific Motorway and Lenaghans Drive would be required, with only concrete pavement and drainage structures proposed to be installed at ground level. The Lenaghans Drive tunnel is shown in Figure 3-16.



**Figure 3-16 Lenaghans Drive tunnel**

### **Stage 3 - Minmi Junction to Minmi and Fletcher**

#### **Chainage 10570 to 2030 Minmi Junction to Minmi**

The Minmi Junction to Minmi section of the trail would be constructed on the existing embankment of the former railway using flexible pavement and/or ridge concrete. Vegetation removal would be limited to ground cover within the pathway corridor. No bulk earthworks would be required in this section. However some rectification and replacement of existing culverts would be required. The existing rail alignment is shown in Figure 3-17.

Access to the site would be via the Minmi end of Lenaghans Drive. The Minmi Junction compound and stockpile area would be utilised for construction of this section.



**Figure 3-17 Existing trail between Minmi Junction and Minmi**

**Chainage 10550 to 800 Minmi Junction to Fletcher**

The Minmi Junction to Fletcher section of the trail would be constructed along the existing HWC easement. Due to the low elevation of the area, the majority (about 125 metres) of this section would be constructed as an FRC boardwalk with 16 metre long box culverts at the two low points of the trail. The balance of the trail in this section would be pavement on ground either on a fill embankment or cutting.

The site compound and stockpiling area for construction of this section would be located at Minmi Junction. Construction access would also be from Minmi Junction.

The proposed shared pathway route from Minmi Junction is shown in Figure 3-18.



**Figure 3-18 Proposed boardwalk section over low-lying ground between Minmi Junction and Fletcher**

### **3.6.5 Site compound and stockpiling area**

A site compound and stockpiling area is proposed within a previously disturbed area at Minmi Junction. The site of the proposed compound and stockpiling area is shown in Figure 3-19 and the location is shown in Figure 3-1.



**Figure 3-19 Proposed stockpiling and site compound area at Minmi Junction**

The site compound would include a portable toilet, secure and bunded storage areas for site materials including fuel and chemicals, a parking area, and a lunchroom and office for on-site personnel. The compound would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions.

The site compound would be erected on-site from week one of the construction program, before the mobilisation of machinery, until the completion of construction activities, which is estimated to be about 12-18 months. Upon completion of the works, the site compound would be demobilised, cleared of all waste and materials and rehabilitated.

### **3.6.6 Plant and equipment**

It is expected that the construction equipment required to construct the proposal would include the following:

- Concrete pump trucks
- Excavators
- Loaders
- Cranes
- Barge (and possibly boats)
- Floating pontoon
- Piling rig (bored)
- Haul trucks
- Asphalt pavers
- Graders
- Rollers
- Light vehicles
- Compressors
- Hand tools (motorised and pneumatic)
- Chain saws and mulchers
- Generators

### **3.6.7 Earthworks**

The proposal would involve earthworks, including filling and minor cutting. A disturbance boundary has been identified for the proposal based on the area required for earthworks and clearing required along the entire trail. The disturbance boundary has been minimised as far as is practicable and is shown in Figure 2-3.

The preliminary construction methodology assumes that some unsuitable soft soil would be removed from the site. The concept design for the proposal has assumed that soft soils would be removed and replaced. Further soft soil analysis and treatment recommendations would be completed during detailed design.

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

### **3.6.8 Vegetation removal**

As stated above, a disturbance boundary has been identified for the proposal based on all areas required during proposal construction including access. Access for construction would be required in various locations adjacent to the proposal route.

In addition, a clearing area has been defined to quantify clearing for the proposal. In some areas, clearing required for the trail would be minimal and the construction footprint would largely correspond to the existing rail embankment. In other areas, such as for construction of the bridges and the boardwalks, a larger construction area would be required. The clearing area has been minimised as far as possible during development of the design.

The construction of the proposal will necessitate the removal of small areas of native vegetation on the edges of the railway and water main corridor. Based on the defined clearing area for the proposal, removal of 3.3 hectares of native vegetation and 26.5 hectares of non-native vegetation would be required for the proposal. This is discussed further in Section 6.7.

### **3.6.9 Source and quantity of materials**

All materials would be sourced from the local area wherever possible. It is not anticipated that any scarce natural resources would be required.

No fill will be required as embankments already exist along the disused railway, and in other areas excavated material from the site will be used where fill is required. The cut to fill balance is expected to be equal.

Other likely materials would include gravels, asphalt, drainage pits, culverts, concrete for paths and kerbs, timber, cored hollow steel piles, landscaping materials, boardwalk material etc.

### **3.6.10 Use and storage of chemicals**

Chemicals anticipated to be used during construction include predominately fuels and oils, degreasers, concrete, bitumen and asphalt, sealers, paints and wash water associated with these products. All chemicals would be stored in bunded containers that would hold at least 110 percent of the chemical container's volume within the proposed compound site.

### **3.6.11 Traffic management and access**

The proposal would result in an increase in truck movements and possible delays to traffic during construction. A traffic management plan would be developed and approved prior to construction commencing. The traffic management plan would detail traffic management and access safeguard measures to ensure safe passage of motorists, pedestrians and cyclists during the construction phase of the proposal.

Construction machinery would access the site at various points along the proposal alignment. Access points for the various sections of the alignment are listed in Table 3-4 and shown in Figure 3-1.

Access for construction would also be required in various locations adjacent to the proposal route. Traffic and transport issues are further discussed in Section 6.6.

**Table 3-4 Construction access points**

Location of works	Access
Shortland to Fishery Creek	King Street and HWC easement
Ironbark Creek and Fishery Creek bridge and boardwalk	Ausgrid access track from Minmi Road, Maryland Drive and Archer Crescent for access to western side King Street and HWC easement for access to eastern side
Fishery Creek to Hexham Junction	Aurizon access road from New England Highway
Hexham Junction to Tarro	Aurizon access road from New England Highway
Hexham Junction to Minmi Junction	Aurizon access road from New England Highway Woodford Street at Minmi Rural Fire Station
Minmi Junction to Fletcher	Woodford Street at Minmi Rural Fire Station

### **3.6.12 Waste generation and management**

Waste streams likely to be generated during construction of the proposal include:

- Excess spoil
- Green waste as a result of vegetation clearing
- Roadside materials (fencing, guide posts, guard rails)
- Packaging and general waste from staff (lunch packaging, portable toilets)
- Chemicals and oils
- Wastewater from wash-down and bunded areas
- Redundant erosion and sediment controls

The potential to reuse materials would be investigated during construction planning. Unsuitable fill material that cannot be used on-site (though not considered likely) would be classified in accordance with the *Waste Classification Guidelines* (Environmental Protection Agency, 2014) and disposed of at an approved materials recycling or waste disposal facility.

Waste generation and management is further discussed in Section 6.1.

### **3.6.13 Public utility adjustments**

Existing utilities and corresponding authorities that have been identified in close proximity to the proposal include:

- Overhead and underground electricity – Ausgrid/ Transgrid
- Water reticulation – HWC
- Sewer reticulation – HWC
- Telecommunications, overhead and underground – Telstra/Optus
- Gas – Jemena

Large segments of the alignment do not interface with existing utilities; therefore significant utility impacts are not envisaged. The location of utilities would be confirmed during the detailed design stage and prior to any construction work commencing. Negotiations with asset owners have commenced (with Jemena, Transgrid and HWC) and would continue where required prior to work commencing.

The proposal may require low voltage electrical connections for lighting along part of the trail alignment. However, the detailed design would seek to maximise the provision of solar-powered lighting units where practicable to minimise the need for connections to the electricity network.

#### **3.6.14 Construction environmental management plan**

A construction environmental management plan (CEMP) would be prepared for the proposal. It would include all of the safeguards and management measures identified during preparation of the EIS, as well as all relevant conditions of approval. The CEMP would be prepared by the contractor and approved by Council prior to works commencing.

### **3.7 Proposal operation**

Once completed, the proposal would provide a continuous shared pathway between Shortland, Tarro, Minmi and Fletcher. It would also provide a key link in the greater Richmond Vale Rail Trail, connecting Shortland in the east to Kurri Kurri in the west.

Ongoing maintenance and management of the proposal would be undertaken by Council in consultation with OEH, as the route traverses the Hunter Wetlands National Park. Appropriate access agreements and approvals would be negotiated with land owners and would include operational requirements, where relevant.

Maintenance and emergency vehicle access would be via the connection points at Shortland, Minmi and Tarro. Infrastructure in the form of gates and bollards would be installed at these connection points to exclude trespass by other vehicles. Once access has been gained from the connection points, maintenance and emergency vehicles movements would be restricted to the trail.

Operational procedures would include measures to restrict access to the trail (such as gates that can be closed during inundated periods) and ensure safety of users during floods, bush fires and other emergencies. While seasonal considerations will be implemented during proposal construction, it is not anticipated that these would apply during operation. However, some consideration may be given to restricting access to the trail (if possible) at night for safety and environmental reasons.

Instructional signage would include safety and emergency procedures for trail users and would include emergency contact details and assembly points.

## 4. Legislative and policy considerations

This section provides a review of all legislation applicable to the proposal and discusses the proposal's consistency with relevant legislation, planning strategies, instruments and development control plans. The relevant approval pathway for the proposal is described and all additional approvals that must be obtained are identified.

### 4.1 Legislation overview

Legislation relevant to the proposal is summarised in Table 4-1 and discussed in further detail in the following sections, as relevant.

**Table 4-1 Legislation overview**

Legislation	Requirements
<b>NSW legislation</b>	
EP&A Act	<p>The proposal site contains an area mapped under the Coastal Management SEPP. Therefore, the proposal is defined as designated development under Section 4.10 of the Act and consent under Part 4 of the Act is required. An EIS is required.</p> <p>The proposal is integrated development pursuant to Section 4.46 of the Act as approval would also be required under the <i>Fisheries Management Act 1994</i> (FM Act).</p>
<i>Roads Act 1993</i>	<p>The proposal would require consent under Section 138 to:</p> <ul style="list-style-type: none"> <li>(a) erect a structure or carry out a work in, on or over a public road, or</li> <li>(b) dig up or disturb the surface of a public road, or</li> <li>(c) remove or interfere with a structure, work or tree on a public road, or</li> <li>(d) pump water into a public road from any land adjoining the road, or</li> <li>(e) connect a road (whether public or private) to a classified road.</li> </ul> <p>None of the above are proposed, therefore approval under the Act is not required.</p>
FM Act	<p>Under Part 7 of the FM Act, a permit is required for dredging and reclamation, obstruction of fish passage, harm to marine vegetation and use of electrical or explosive devices in a waterway.</p> <p>The proposal would require reclamation of water land as defined under the FM Act. Section 200 of the FM Act states that a local government authority must not carry out reclamation work except under the authority of a permit issued by the Minister. Therefore, a permit issued under Part 7 of the FM Act is required for the proposal.</p>
<i>National Parks and Wildlife Act 1974</i> (NPW Act)	<p>The NPW Act aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. If an impact to an Aboriginal heritage object or site is likely from a proposal, a permit must be sought under Section 90.</p> <p>Approval must also be sought for any activity on national park estate under this Act. The proposal would traverse the Hunter Wetlands National Park.</p>
<i>Biodiversity Conservation Act 2016</i> (BC Act)	<p>The BC Act commenced on 25 August 2017. The legislation delivers a strategic approach to conservation in NSW whilst supporting improved farm productivity and sustainable development.</p> <p>The BC Act lists the threatened species, populations or ecological communities to be considered when deciding if a significant impact on threatened biota, or their habitats, is likely as the result of an activity.</p> <p>The proposal would impact on threatened species, populations or ecological communities listed under the Act. Further details are provided in Section 6.7.</p>

Legislation	Requirements
<i>Biosecurity Act 2015</i>	<p>The primary object of this Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.</p> <p>Weeds and pests listed under this Act must be managed in accordance with the Act.</p>
<i>Heritage Act 1977 (Heritage Act)</i>	<p>The Heritage Act aims to ensure that the heritage of NSW is adequately identified and conserved. Under Section 57, a permit must be obtained for works, which have the potential to interfere with a heritage item or place, which is either listed on the State Heritage Register or the subject of an interim heritage order.</p> <p>There are no state listed heritage items impacted by the proposal. Heritage impacts from the proposal are discussed in Section 6.10.</p>
<i>Local Land Services Act 2003 (LLS Act) and Local Land Services Amendment Act 2017</i>	<p>The LLS Act requires the approval of clearing on land in rural areas. Rural land is mapped as either vulnerable, sensitive, unregulated and regulated. There are no areas of mapped land in the Newcastle LGA.</p>
<i>Water Management Act 2000 (WM Act)/ Water Act 1912 (Water Act)</i>	<p>Approval is required under the WM Act or Water Act (unless an exemption applies or water is being taken under a basic water right) to extract or use water from rivers or aquifers.</p> <p>Furthermore, Section 91 of the Act provides that certain types of development and activities carried out in or near a river, lake or estuary are 'controlled activities' and require an activity approval. However, Council is exempt from requiring approval under Section 91 of the WM Act.</p> <p>Dewatering may be required during the construction of bridges and boardwalks within the proposal site. If required, consultation would be undertaken with WaterNSW to determine if a water licence is required.</p>
<i>Protection of the Environment Operations Act 1999 (POEO Act)</i>	<p>Under Section 48 of the Act, an environmental protection licence relating to air, water and noise pollution and waste management is required for scheduled activities as listed under Schedule 1 of the Act. The proposal does not fit the definition of any scheduled activities.</p>
<i>Contaminated Land Management Act 1997 (CLM Act)</i>	<p>Section 59(2) of the CLM Act requires notification of contaminated sites.</p> <p>Section 60 of the CLM Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the EPA.</p> <p>Known contaminated sites and the potential for uncovering unexpected contamination and measures to avoid causing contamination are discussed in Section 6.4.</p>
<i>Local Government Act 1993</i>	<p>The Act sets out the framework for local government including the responsibilities and requirements for making and determining application for development approval, such as sought under this EIS.</p>
<i>Rural Fires Act 1997</i>	<p>The Act regulates bush fire management within the state and development in bush fire prone areas.</p> <p>The majority of the proposal site is mapped as bushfire prone land on the Council bush fire prone land map. However the proposal does not incorporate rural or residential development or a special fire protection purpose; therefore approval under this Act is not required.</p>

Legislation	Requirements
<i>Waste Avoidance and Resource Recovery Act 2000</i>	This Act provides a framework to identify and implement the most efficient use of resources in order to reduce the potential for environmental harm arising from the generation of waste. Under the Act, the construction contractor would be required to conform to the provisions of the Act in relation to waste management by adopting the resource management hierarchy principles (in order of priority) of avoidance, resource recovery and disposal.
<i>Crown Land Management Act 2016</i>	This Act provides for the reservation assessment, management and use of land that is vested in the Crown and managed for the benefit of the people of NSW. The proposal would impact on a small area of Crown land and approval must be sought under this Act.
<i>Aboriginal Land Rights Act 1983</i>	The <i>Aboriginal Land Rights Act 1983</i> establishes Aboriginal Land Councils (at State and Local levels). These bodies have a statutory obligation to protect the culture and heritage of Aboriginal persons in the council's area, and promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area. The process for land claim is defined under the Act. The study area is located within the boundaries of the Awabakal Local Aboriginal Land Council (ALALC) and the Mindaribba Local Aboriginal Land Council (MLALC).
<b>Commonwealth legislation</b>	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Under Section 68(1) of the EPBC Act, 'a person proposing to take an action that the person thinks may be or is a controlled action must refer the proposal to the Minister for the Minister's decision whether or not the action is a controlled action.' The proposal has been referred to the Commonwealth Minister. This is further discussed in Section 4.4.1.
<i>Native Title Act 1993</i>	This Act recognises and protects native title. It provides that native title cannot be extinguished contrary to the Act. The proposal site is not subject to native title claims under this Act. This is further discussed in Section 4.4.2.

## 4.2 NSW Environmental Planning and Assessment Act 1979

The EP&A Act forms the statutory basis for planning and environmental assessment in NSW. The Minister for Planning, statutory authorities and local councils are responsible for implementing the EP&A Act. The EP&A Act includes provisions to ensure that the potential environmental impacts of a development are assessed and considered in the decision making process. Substantial amendments to the EP&A Act came into effect on 1 March 2018.

As outlined in the following sections, the proposal is designated and integrated development (refer to Section 4.2.2) and is subject to assessment and approval under Part 4 of the EP&A Act.

As the capital investment value of the works is greater than five million dollars, Council's functions as a determining authority are delegated to the Hunter and Central Coast RPP (pursuant to *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD)), as discussed below.

## 4.2.1 Environmental planning instruments

Environmental planning instruments (EPIs) are made under Part 3 of the EP&A Act. EPIs relevant to the proposal are discussed in the following subsections.

### *State environmental planning policies*

#### **State Environmental Planning Policy (Infrastructure) 2007**

*State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State through increased regulatory certainty and improved efficiency and flexibility in the location of infrastructure and service facilities while providing adequate stakeholder consultation.

The proposal is defined as a 'road infrastructure facility' under clause 93 of the ISEPP. Clause 94(1) of the ISEPP permits development for the purpose of a road infrastructure facility to be carried out by or on behalf of a public authority without consent on any land except land reserved under the NPW Act unless the development:

- (a) is authorised by or under the National Parks and Wildlife Act 1974, or*
- (b) is, or is the subject of, an existing interest within the meaning of section 39 of that Act, or*
- (c) is on land to which that Act applies over which an easement has been granted and is not contrary to the terms or nature of the easement.*

Part of the site is within land reserved under the NPW Act and permissibility under this Act is discussed in Section 4.3.1.

Notwithstanding the above, clause 8(1) of the ISEPP states that where there is an 'inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency'. The exception is, as stated under clause 8(2), for land to which clauses 10, 11 and 19 of *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP) applies.

The majority of the proposal is located on land that is mapped as coastal wetlands. Therefore, in accordance with clause 8(2) of ISEPP, the Coastal Management SEPP prevails over ISEPP and development consent is required (discussed further below).

#### **State Environmental Planning Policy (Coastal Management) 2018**

The Coastal Management SEPP came into force on 3 April 2018 and SEPP replaces SEPP 14 - Coastal Wetlands, SEPP 26 - Littoral Rainforests and SEPP 71 - Coastal Protection, and amends a number of other SEPPs, LEPs and the Standard Instrument.

The proposal is situated on land within and in proximity to areas mapped as coastal wetland under this policy. Therefore in accordance with Clause 10 and 11 of the Coastal Management SEPP, development consent for the proposal is required. In particular, Clause 10 states that consent for the following is required within the coastal wetland:

- (a) the clearing of native vegetation within the meaning of Part 5A of the Local Land Services Act 2013,*
- (b) the harm of marine vegetation within the meaning of Division 4 of Part 7 of the Fisheries Management Act 1994,*
- (c) the carrying out of any of the following:*
  - (i) earthworks (including the depositing of material on land),*
  - (ii) constructing a levee,*

- (iii) *draining the land,*
- (iv) *environmental protection works,*
- (d) *any other development.*

Clause 11 states that development consent must not be granted in the proximity area for coastal wetlands unless the consent authority is satisfied that the proposal would not significantly impact on:

- (a) *the biophysical, hydrological or ecological integrity of the adjacent coastal wetland ..., or*
- (b) *the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland ...*

The coastal wetland and proximity area mapping is shown in Figure 2-1.

### **State Environmental Planning Policy (State and Regional Development) 2011**

*State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) identifies development that is state significant development (SSD), state significant infrastructure (SSI) and critical SSI and confers functions on joint regional planning panels to determine development applications for such development and development considered regionally significant.

The proposal does not fit the definition of SSD, as listed under Schedule 1 and 2, or SSI, as listed under Schedule 4, or critical SSI, as listed under Schedule 5, of the policy.

Regionally significant development is defined under Schedule 7 of SEPP SRD, and includes:

*Development that has a capital investment value of more than \$5 million if:*

- (a) *a council for the area in which the development is to be carried out is the applicant for development consent, or*
- (b) *the council is the owner of any land on which the development is to be carried out, or*
- (c) *the development is to be carried out by the council, or*
- (d) *the council is a party to any agreement or arrangement relating to the development (other than any agreement or arrangement entered into under the Act or for the purposes of the payment of contributions by a person other than the council).*

As a regionally significant development, and in accordance with Section 4.5 of the EP&A Act, the proposal would be determined by the Hunter and Central Coast RPP.

A development application and this EIS would be lodged to, exhibited and assessed by Council, as required under Section 4.7 of the EP&A Act. The Hunter and Central Coast RPP would determine the application based on Council's assessment.

### **State Environmental Planning Policy (State Significant Precincts) 2005**

*State Environmental Planning Policy (State Significant Precincts) 2005* (SEPP SSP) aims to facilitate the development, redevelopment or protection of land that is of economic, environmental or social significance to the state. State significant precincts are listed in Schedule 3 of the policy. There are no state significant precincts identified within the proposal site. Therefore, this policy does not apply to the proposal.

## State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (SEPP Vegetation) commenced on 25 August 2017. The SEPP applies to certain zones within the Newcastle LGA and regulates clearing that does not require development consent. As consent is required and sought for the clearing proposed in this EIS, SEPP Vegetation is not relevant to this assessment.

## State Environmental Planning Policy No. 44 – Koala Habitat Protection

*State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline by:

- (a) *requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
- (b) *encouraging the identification of areas of core koala habitat, and*
- (c) *encouraging the inclusion of areas of core koala habitat in environment protection zones.*

The policy applies to land within LGAs listed under Schedule 1. Newcastle is listed under Schedule 1 and therefore the policy applies to the proposal.

Part 2 of the SEPP outlines the development control provisions. Clause 7 states:

- (1) *Before a council may grant consent to an application for consent to carry out development on land to which this Part applies, it must satisfy itself whether or not the land is a potential koala habitat.*
- (2) *A council may satisfy itself as to whether or not land is a potential koala habitat only on information obtained by it, or by the applicant, from a person who is qualified and experienced in tree identification.*
- (3) *If the council is satisfied:*
  - (a) *that the land is not a potential koala habitat, it is not prevented, because of this Policy, from granting consent to the development application, or*
  - (b) *that the land is a potential koala habitat, it must comply with clause 8.*

Potential koala habitat is defined under the SEPP as an area of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 percent of the total number of trees in the upper or lower strata of the tree component. Field survey for the EIS found that while parts of the proposal site do constitute potential koala habitat, there was no evidence of a resident koala population found within the proposal area (core koala habitat).

Given that the proposal would result in the removal of very small areas of native vegetation, it is unlikely that this removal would result in significant impacts to the habitat of these threatened arboreal species within the locality (refer to Section 6.7 for more detail).

## State Environmental Planning Policy No 55 – Remediation of Land

*State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) provides for a statewide planning approach to the remediation of contaminated land. In particular, the SEPP aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment:

- (a) *by specifying when consent is required, and when it is not required, for a remediation work, and*

*(b) by specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular, and*

*(c) by requiring that a remediation work meet certain standards and notification requirements.*

Clause 7 of the SEPP requires that 'a consent authority must not consent to the carrying out of any development on land unless:

*(a) it has considered whether the land is contaminated, and*

*(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*

*(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.'*

SEPP 55 applies to the proposal. Potential contamination of the proposal site (and Council's response) is considered in Section 6.4.

### **Newcastle Local Environmental Plan 2012**

The proposal is located within the Newcastle LGA and is subject to the Newcastle LEP. Under the Newcastle LEP the proposal site is zoned:

- E1 National Parks and Nature Reserves.
- E2 Environmental Conservation.
- R2 Low Density Residential.
- SP2 Infrastructure.

The proposal is defined as a 'recreation area' which includes:

*...a place used for outdoor recreation that is normally open to the public, and includes:*

*(a) a children's playground, or*

*(b) an area used for community sporting activities, or*

*(c) a public park, reserve or garden or the like,*

*and any ancillary buildings, but does not include a recreation facility (indoor), recreation facility (major) or recreation facility (outdoor).*

The proposal is considered to meet this definition as it would provide continuous non-motorised recreational access to the Hexham Wetlands, Hunter Wetlands National Park, Pambalong Nature Reserve and surrounding communities and natural environments.

Development for the purpose of a 'recreation area' is permissible with consent in the E2 and R2 zones. Development that is ordinarily incidental or ancillary to a classified road, such as a shared path (i.e. the proposal), is permitted with consent in the SP2 zone.

In the E1 zone, uses authorised under the NPW Act are permitted without consent. Consent requirements of the NPW Act are discussed further in Section 4.3.1.

The objectives of the applicable zones and the consistency of the proposal with these objectives are provided in Table 4-2.

**Table 4-2 Land use zones objectives (Newcastle LEP 2012)**

Zone	Objectives	Consistency against objectives and permissibility
E1 National Parks and Nature Reserves	To enable the management and appropriate use of land that is reserved under the NPW Act or that is acquired under Part 11 of that Act.	The proposal would not significantly adversely impact the management of land reserved under the Act.
	To enable uses authorised under the NPW Act.	The proposal is not an authorised use under the Act. However it is identified in the draft plan of management. Approval from OEH would be required until the plan is adopted.
	To identify land that is to be reserved under the NPW Act and to protect the environmental significance of that land.	The proposal traverses land that is reserved under the Act.
E2 Environmental Conservation	To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.	The proposal would not result in a significant impact on areas of high ecological, scientific, cultural or aesthetic value.
	To prevent development that could destroy, damage or otherwise have an adverse effect on those values.	The proposal would not result in a significant impact on areas of high ecological, scientific, cultural or aesthetic value.
	To provide for the management of the majority of the Hunter River floodplain by restricting the type and intensity of development to that compatible with the anticipated risk to life and property.	The proposal would not cause a significant risk to life and property within or adjacent to the Hunter River floodplain.
	To provide for the conservation, enhancement and protection of the Hexham Wetlands.	The proposal would involve utilisation of a former rail corridor that traverses the Hexham Wetlands and would not significantly adversely impact the wetlands.
R2 Low Density Residential	To provide for the housing needs of the community within a low density residential environment.	The proposal would not impact the ability of Council 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.	The proposal provides for the recreational use of residents.
	To accommodate a diversity of housing forms that respects the amenity, heritage and character of surrounding development and the quality of the environment.	The proposal would not impact on the ability of Council to accommodate a diversity of housing forms that respects the amenity, heritage and character of surrounding development and the quality of the environment.
SP2 Infrastructure	To provide for infrastructure and related uses.	The proposal provides for non-motorised travel, which is an infrastructure related use.
	To prevent development that is not compatible with or that may detract from the provision of infrastructure.	The proposal is compatible with and would not detract from the provision of infrastructure.

The relevant clauses of the Newcastle LEP are addressed below.

### **Clause 5.7 Development below mean high water mark**

Development consent is required to carry out development on any land below the mean high water mark of any body of water subject to tidal influence (including the bed of any such water).

Comment: Part of the proposal is located below the mean high water mark. Therefore, consent under this clause is required for the proposal. Surface and groundwater hydrology is further discussed in Section 6.5.

### **Clause 5.10 Heritage conservation**

*Development consent is required for any of the following:*

*(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):*

*(i) a heritage item,*

*(ii) an Aboriginal object,*

*(iii) a building, work, relic or tree within a heritage conservation area,*

*(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,*

*(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,*

*(d) disturbing or excavating an Aboriginal place of heritage significance,*

*(e) erecting a building on land:*

*(i) on which a heritage item is located or that is within a heritage conservation area, or*

*(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,*

*(f) subdividing land:*

*(i) on which a heritage item is located or that is within a heritage conservation area, or*

*(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.*

Comment: Heritage items listed under Schedule 5 of the Newcastle LEP are shown in Figure 4-1. The proposal would directly impact on the local heritage item of the 'Minmi to Hexham railway'. Therefore consent for the proposal is required under this clause.

The proposal is within proximity of a number of other local heritage items but impacts to these items are not considered likely.

Heritage is discussed in further detail in Section 6.10 and 6.11.

### Clause 6.1 Acid sulfate soils

The proposal site (see Figure 4-1) is mapped as Class 1, Class 2, Class 3 and Class 5 acid sulfate soil under the Newcastle LEP. Development consent is required under Clause 6.1 for works below natural ground surface and for which the water table is likely to be lowered (Class 2) and works more than one metre below the natural ground surface or works by which the water table is likely to be lowered more than one metre below the natural ground surface (Class 3).

Comment: The works required for the proposal would trigger the need for development consent and the preparation of an acid sulfate soils management plan 'unless a preliminary assessment indicated that an acid sulfate soils management plan was not required'. Consent under this clause is required for the proposal.

Soils are discussed in Section 6.4.

### Clause 6.2 Earthworks

(2) *Development consent is required for earthworks unless:*

*(a) the earthworks are exempt development under this Plan or another applicable environmental planning instrument, or*

*(b) the earthworks are ancillary to other development for which development consent has been given.*

(3) *In deciding whether to grant development consent for earthworks (or for development involving ancillary earthworks), the consent authority must consider the following matters:*

*(a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development,*

*(b) the effect of the development on the likely future use or redevelopment of the land,*

*(c) the quality of the fill or the soil to be excavated, or both,*

*(d) the effect of the development on the existing and likely amenity of adjoining properties,*

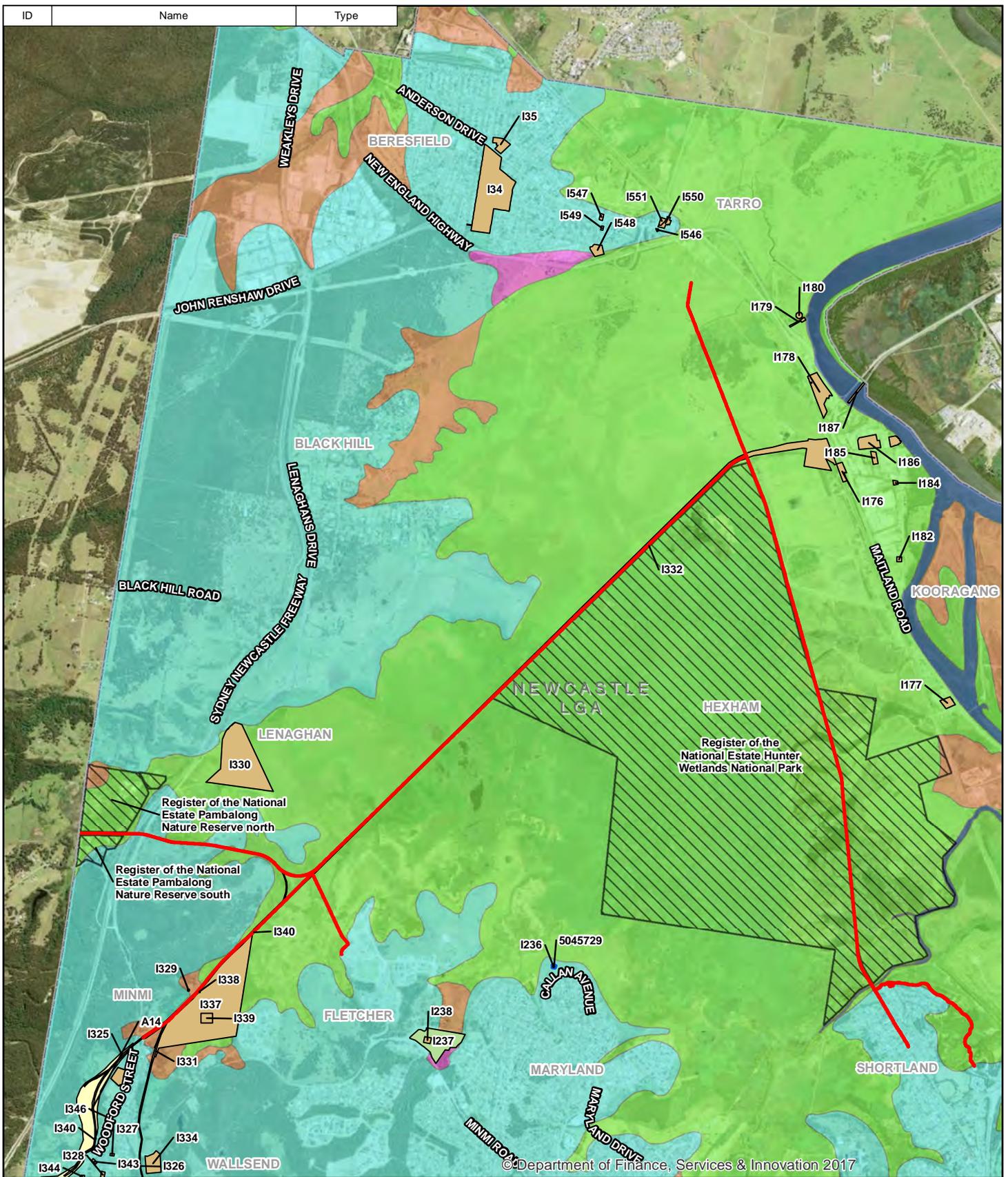
*(e) the source of any fill material and the destination of any excavated material,*

*(f) the likelihood of disturbing relics,*

*(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area,*

*(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.*

Comment: The earthworks proposed for the shared pathway construction are described in Section 3.6.7. The impacts of and management actions for the proposed earthworks are addressed in detail in Section 6.4. The earthworks are ancillary to the proposal for which consent is sought, therefore specific approval under this clause is not required.



**LEGEND**

- |                           |                      |                       |                    |         |
|---------------------------|----------------------|-----------------------|--------------------|---------|
| Proposed route            | Heritage Items (DPE) | Item - Archaeological | Acid sulfate soils | Class 3 |
| LGA boundary              | State Heritage Act   | Item - Landscape      | Class 1            | Class 4 |
| Heritage items (Artefact) | Item - General       |                       | Class 2            | Class 5 |

Paper Size A4  
 0 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56



Newcastle City Council  
 Richmond Vale Rail Trail  
 Environmental Impact Statement

Job Number | 22-18317  
 Revision | 0  
 Date | 11 Apr 2019

**Heritage and acid sulfate soils mapped under Newcastle LEP**

**Figure 4-1**

## Newcastle Development Control Plan 2012

The Newcastle DCP provides details and criteria for assessing development to support local statutory provisions. The primary purpose of the Newcastle DCP is to specify Council's requirements for quality development and sustainable environmental outcomes on land to which the Newcastle LEP applies.

Chapters of the Newcastle DCP that pertain to the proposal are listed below and the relevant provisions of each are addressed in detail in Appendix D:

- Section 3.11 Community Services.
- Section 4.01 Flood Management.
- Section 4.04 Safety and Security.
- Section 4.05 Social Impact.
- Section 5.01 Soil Management.
- Section 5.02 Land Contamination.
- Section 5.03 Tree Management.
- Section 5.04 Aboriginal Heritage.
- Section 5.05 Heritage Items.
- Section 5.06 Archaeological Management.
- Section 6.12 Minmi.
- Section 7.02 Landscape Open Space and Visual Amenity.
- Section 7.03 Traffic, Parking and Access.
- Section 7.06 Stormwater.
- Section 7.08 Waste Management.
- Section 8.00 Public Participation.

### 4.2.2 Development assessment

Part 4 of the EP&A Act outlines the requirements for development that requires consent.

#### *Matters for consideration*

The matters to be considered when determining a development application are outlined in Section 4.15 of the EP&A Act and include:

(a) *the provisions of:*

(i) *any environmental planning instrument, and*

(ii) *any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and*

(iii) *any development control plan, and*

(iiia) *any planning agreement that has been entered into under Section 93F, or any draft planning agreement that a developer has offered to enter into under Section 93F, and*

(iv) *the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and*

*(v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979),*

*that apply to the land to which the development application relates,*

Comment: The relevant EPIs and DCP are addressed in the Section 4.2.1.

There are no planning agreements that pertain to the proposal or the site.

The requirements of the regulations are addressed in the Section 4.2.3.

The *Hunter Estuary Coastal Zone Management Plan 2009* (Hunter CZMP) is addressed in Section 7.2.3.

*(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,*

Comment: Impacts of the proposal are discussed in Section 6 and 7.

*(c) the suitability of the site for the development,*

Comment: The proposal would traverse land zoned as E1 National Parks and Nature Reserves, E2 Environmental Conservation, SP2 Infrastructure, and RS2 Low Density Residential. The proposal is compatible with the land uses permitted within these zones (refer to Section 4.2.1). The site is considered suitable for the proposal. Further discussion around the proposal's suitability is provided throughout the EIS.

*(d) any submissions made in accordance with this Act or the regulations,*

Comment: Submissions regarding the proposal have been considered during EIS preparation and would be further reviewed following public display. This is discussed further in Section 5.

*(e) the public interest.*

Comment: The proposal is considered to be in the public interest as it would provide a safe and accessible recreational and transport facility for cyclists, pedestrians and other non-motorised users.

The proposal route has been finalised following investigations and consultation over many years. It is the route that has, on balance, the least impact on the natural, social and economic environment of the wider region. This is further discussed in Section 9.

### **Designated development**

According to Section 4.10 of the EP&A Act, 'designated development' is defined as 'development that is declared to be designated development by an environmental planning instrument or the regulations'.

As described in 4.2.1, the Coastal Management SEPP applies to the proposal site and the proposal is therefore defined as designated development. Being designated development, the development application for the proposal must be accompanied by an EIS prepared in accordance with the requirements of the EP&A Act (as required by Section 4.12(8) of the Act).

The EIS must also be prepared in accordance with Schedule 2 of the EP&A Regulation. Clause 3 of Schedule 2 states that the EIS must address the general and specific requirements of the Secretary-General of the Department of Planning and Environment. The Secretary-General's requirements for the EIS (the SEARs) are addressed throughout this document as discussed in Section 1.4.

### ***Integrated development***

The proposal is integrated development pursuant to Section 4.46 of the EP&A Act. Approval from DPI – Fisheries under Section 201 of the FM Act is required. This legislation is discussed further in Section 4.

### ***Concurrence***

Section 4.13 of the EP&A Act outlines the requirements for consent authorities to obtain concurrence for certain activities prior to determining to grant development consent. Concurrence for the proposal is required from OEHL in accordance with the BC Act, see Section 4.3.3.

### **4.2.3 Environmental Planning and Assessment Regulation 2000**

The EP&A Regulation gives effect to the EP&A Act. Schedule 1 of the EP&A Regulation (Part 1) outlines the information to be included in a development application as follows:

*(1) A development application must contain the following information:*

*(a) the name and address of the applicant,*

*(b) a description of the development to be carried out,*

*(c) the address, and formal particulars of title, of the land on which the development is to be carried out,*

*(d) an indication as to whether the land is, or is part of, critical habitat,*

*(e) an indication as to whether the development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, unless the development is taken to be development that is not likely to have such an effect because it is biodiversity compliant development,*

*(ea) for biodiversity compliant development, an indication of the reason why the development is biodiversity compliant development,*

*(f) a list of any authorities from which concurrence must be obtained before the development may lawfully be carried out or from which concurrence would have been required but for section 79B (2A) or 89J,*

*(g) a list of any approvals of the kind referred to in section 91 (1) of the Act that must be obtained before the development may lawfully be carried out,*

*(g1) in the case of State significant development, a list of any authorisations that must be provided under section 89K of the Act in relation to the development,*

*(h) the estimated cost of the development,*

*(h1) in the case of State significant development, the capital investment value of the development,*

*(i) evidence that the owner of the land on which the development is to be carried out consents to the application, but only if the application is made by a person other than the owner and the owner's consent is required by this Regulation,*

*(j) a list of the documents accompanying the application.*

All of the above requirements are included in this EIS.

Schedule 2 of the EP&A Regulation describes the requirements for an EIS. In particular, Part 3 of Schedule 2 outlines the required form for an EIS, which includes:

- (a) a summary of the environmental impact statement,*
- (b) a statement of the objectives of the development, activity or infrastructure,*
- (c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,*
- (d) an analysis of the development, activity or infrastructure, including:*
  - (i) a full description of the development, activity or infrastructure, and*
  - (ii) a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and*
  - (iii) the likely impact on the environment of the development, activity or infrastructure, and*
  - (iv) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and*
  - (v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,*
- (e) a compilation (in a single section of the environmental impact statement) of the measures referred to in item (d) (iv),*
- (f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).*

All of the above requirements are included in this EIS.

### **4.3 Relevant NSW legislation**

#### **4.3.1 Fisheries Management Act 1994**

The FM Act aims to conserve, develop and share the fishery resources of the state for the benefit of present and future generations. Under Part 7 of the FM Act, a permit is required for dredging and reclamation, obstruction of fish passage, harm to marine vegetation and use of electrical or explosive devices in a waterway.

Comment: The proposal would require reclamation of water land as defined under the FM Act. Section 200 of the FM Act states that a local government authority must not carry out reclamation work except under the authority of a permit issued by the Minister. A permit would be sought prior to works commencing.

The FM Act also lists threatened aquatic and marine species, populations and communities. Section 220ZZ prescribes the seven-part test of significance that must be taken into account when determining whether an action is likely to significantly affect threatened species, populations or ecological communities, or their habitats. This is further discussed in Section 6.7.

### 4.3.2 National Parks and Wildlife Act 1974

The NPW Act aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NPW Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. The NPW Act is administered by OEH.

It is an offense not to notify the OEH of the location of Aboriginal sites and objects under Section 89A of the NPW Act. If an impact to an Aboriginal heritage object or site is likely from a proposal, a permit must be sought under Section 90 of the NPW Act.

All native fauna and some native flora are protected under the NPW Act.

Comment: The proposal site traverses the Hunter Wetlands National Park, and traverses land owned and managed by Coal & Allied Pty Limited dividing the Southern Swamp from the Main Swamp of the Pambalong Nature Reserve. The Hunter Wetlands National Park and Pambalong Nature Reserve are managed by the National Parks and Wildlife Service (NPWS), which is a division of the OEH. All works on NPWS estate must be authorised under the NPW Act.

Management principles for national parks and nature reserves are detailed in Division 2, clauses 30E and 30J of the NPW Act respectively and are addressed with respect to the proposal in Table 4-3.

**Table 4-3 National park and nature reserve management principles**

Clause	Management principles	Response
<b>30E National Parks</b>		
1	The purpose of reserving land as a national park is to identify, protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor or tourist use and enjoyment so as to enable those areas to be managed in accordance with subsection (2).	The proposal directly addresses this aim the Hunter Wetlands National Park as it provides increased opportunities for public appreciation and inspiration and sustainable visitor or tourist use and enjoyment.
2	A national park is to be managed in accordance with the following principles:	<p>The proposal is in accordance with these principles for the park as follows:</p> <ul style="list-style-type: none"> <li>• The proposal design has been developed to reduce impacts on biodiversity, cultural heritage and ecological integrity</li> <li>• The proposal will enable increased access to the park and provide additional information and educational opportunities</li> <li>• The proposal involves the adaptive reuse of the existing but now unused railway and pipeline corridor</li> <li>• The proposal provides an opportunity for monitoring and research of this type of sustainable, active transport, recreation and tourist</li> </ul>
a	the conservation of biodiversity, the maintenance of ecosystem function, the protection of geological and geomorphological features and natural phenomena and the maintenance of natural landscapes,	
b	the conservation of places, objects, features and landscapes of cultural value,	
c	the protection of the ecological integrity of one or more ecosystems for present and future generations,	
d	the promotion of public appreciation and understanding of the national park's natural and cultural values,	
e	provision for sustainable visitor or tourist use and enjoyment that is compatible with the conservation of the national park's natural and cultural values,	

Clause	Management principles	Response
f	provision for the sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to the conservation of the national park's natural and cultural values,	<ul style="list-style-type: none"> <li>development but also better access for research of the wetland itself, including for bird watching</li> <li>The proposal does not preclude the carrying out of development in any part of a special area.</li> </ul>
fa	provision for the carrying out of development in any part of a special area (within the meaning of the <i>Hunter Water Act 1991</i> ) in the national park that is permitted under section 185A having regard to the conservation of the national park's natural and cultural values,	
g	provision for appropriate research and monitoring.	
<b>30J Nature reserves</b>		
1	The purpose of reserving land as a nature reserve is to identify, protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena so as to enable those areas to be managed in accordance with subsection (2).	The proposal would not interfere with compliance of this aim for the Pambalong Nature Reserve.
2	A nature reserve is to be managed in accordance with the following principles:	<p>The proposal is in accordance with these principles for the reserve as follows:</p> <ul style="list-style-type: none"> <li>The proposal design has been developed to reduce impacts on biodiversity, cultural heritage and ecological integrity</li> <li>The proposal will enable increased access to the park and provide additional information and educational opportunities</li> <li>The proposal provides an opportunity for monitoring and research of this type of sustainable, active transport, recreation and tourist development but also better access for research of the wetland itself, including for bird watching</li> <li>The proposal does not preclude the carrying out of development in any part of a special area.</li> </ul>
a	the conservation of biodiversity, the maintenance of ecosystem function, the protection of geological and geomorphological features and natural phenomena,	
b	the conservation of places, objects, features and landscapes of cultural value,	
c	the promotion of public appreciation, enjoyment and understanding of the nature reserve's natural and cultural values,	
d	provision for appropriate research and monitoring,	
e	provision for the carrying out of development in any part of a special area (within the meaning of the <i>Hunter Water Act 1991</i> ) in the nature reserve that is permitted under section 185A having regard to the conservation of the nature reserve's natural and cultural values.	

Potential impacts on Aboriginal heritage are discussed in Section 6.11. Potential impacts on native flora and fauna are discussed in Section 6.7.

### 4.3.3 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future. The BC Act lists threatened species, populations and ecological communities as well as critical habitat and key threatening processes that must be considered when assessing the effects of an activity.

The BC Act outlines the factors to be considered when making an assessment. If a significant impact is deemed likely following this assessment, a Species Impact Statement or a Biodiversity Development Assessment Report may be required.

Comment: As local development that requires clearing of native vegetation and is likely to impact on threatened species and communities, the Biodiversity Offset Scheme must be applied to the proposal in accordance with the BC Act. A biodiversity development assessment report (BDAR) has been prepared by an accredited person in relation to proposal. The BDAR sets out the offset obligations for the proposal. Concurrence for the development would be required from OEH under Section 7.12 of the BC Act.

Impacts on threatened species, populations, communities, or their habitats, and required offsets, are addressed further in Section 6.7.

#### **4.3.4 Crown Land Management Act 2016**

The objectives of the *Crown Land Act 1989* are to ensure that Crown land is managed for the benefit of the people of New South Wales and in particular to provide for:

- (a) *a proper assessment of Crown land,*
- (b) *the management of Crown land having regard to the principles of Crown land management contained in this Act,*
- (c) *the proper development and conservation of Crown land having regard to those principles,*
- (d) *the regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with,*
- (e) *the reservation or dedication of Crown land for public purposes and the management and use of the reserved or dedicated land, and*
- (f) *the collection, recording and dissemination of information in relation to Crown land.*

'Crown land shall not be occupied, used, sold, leased, licensed, dedicated or reserved or otherwise dealt with unless the occupation, use, sale, lease, licence, reservation or dedication or other dealing is authorised by this Act.'

Comment: As described in Section 2.4 and 3.5.9 and shown in Figure 2-3, the proposal would impact on several parcels of land, including one parcel of Crown land (Lot 1 DP 90465 ). Landowner's consent to lodge the application would be required for this parcel of land and approval to construct and operate the proposal on this land would be required in accordance with the Act.

## **4.4 Relevant Commonwealth legislation**

### **4.4.1 Environment Protection and Biodiversity Conservation Act 1999**

Under the EPBC Act, a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land.'

Comment: A summary of the search of the Protected Matters Search Tool undertaken on 27 March 2018 for matters of national environmental significance (MNES) and other matters protected by the EPBC Act in the area surrounding the proposal site (i.e. the site plus a ten kilometre buffer) is provided in Table 4-4. Preliminary comment on potential impacts is also provided.

**Table 4-4 EPBC Act protected matters search summary**

Matter	Number	Details	Comment
<b>Matters of National Environmental Significance</b>			
World Heritage properties	None	N/A	There are no World Heritage properties within proximity of the proposal. Referral to the Commonwealth on this matter is not required.
National Heritage Places	None	N/A	There are no National Heritage places within proximity of the proposal. Referral to the Commonwealth on this matter is not required.
Wetland of International Importance	1	Hunter estuary wetlands – Ramsar site	Potential impacts to these wetlands are addressed in Section 6.7. Referral to the Commonwealth on this matter is not required.
Great Barrier Reef Marine Park	None	N/A	N/A
Commonwealth Marine Areas	None	N/A	N/A
Listed Threatened Ecological Communities	4	Central Hunter Valley eucalypt forest and woodland Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community Lowland Rainforest of Subtropical Australia Subtropical and Temperate Coastal Saltmarsh	Potential impacts to these communities are addressed in Section 6.7. Referral to the Commonwealth on this matter is not required.
Listed Threatened Species	75	Refer to report	Potential impacts to relevant threatened species are addressed in Section 6.7. Referral to the Commonwealth on this matter is required.
Listed Migratory Species	64	Refer to report	Potential impacts to relevant threatened species are addressed in Section 6.7. Referral to the Commonwealth on this matter is not required.
<b>Other Matters</b>			
Commonwealth Land	12	Refer to report	The proposal would not impact on any areas of Commonwealth Land. Referral to the Commonwealth on this matter is not required.
Commonwealth Heritage Places	None	N/A	N/A

Matter	Number	Details	Comment
Listed Marine Species	72	Refer to report	The proposal would not impact on marine species as it is not situated in the marine environment. Referral to the Commonwealth on this matter is not required.
Whales and Other Cetaceans	1	<i>Sousa chinensis</i> (Indo-Pacific Humpback Dolphin)	The proposal would not impact on marine species as it is not situated in the marine environment. Referral to the Commonwealth on this matter is not required.
Critical Habitats	None	N/A	N/A
Commonwealth Reserves Terrestrial	None	N/A	N/A
Commonwealth Reserves Marine	None	N/A	N/A

#### 4.4.2 Native Title Act 1993

This *Native Title Act 1993* recognises and protects native title. It provides that native title cannot be extinguished contrary to the Act. Essentially, this Act covers actions affecting native title and the process for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims, the Register of Indigenous Land Use Agreements, and the National Native Title Register.

Comment: The proposal site is not subject to native title claim under this Act. A claim (No. NC2013/006) by the Plains Clans of the Wonnarua People exists west of Richmond Vale Road/ George Booth Drive. This claim is registered but not yet determined and outside the area to which the EIS applies.

## 4.5 Other plans and strategies

### 4.5.1 Lower Hunter Regional Strategy

The Lower Hunter Regional Strategy applies to the five local government areas of Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock, and represents an agreed NSW government position on the future of the Lower Hunter. It is the pre-eminent planning document for the Lower Hunter Region and, although not a planning instrument, has been prepared to complement and inform other relevant state planning instruments.

The primary purpose of the strategy is to ensure that adequate land is available and appropriately located to sustainably accommodate the predicted housing and employment needs of the region's population up to 2031. It plans for the provision of sufficient new urban and employment lands to meet expected strong demands for growth and refocuses development towards strengthening the vibrant centres that support the role of the Newcastle city centre as the regional city.

The strategy works with the NSW government's regional conservation plan to ensure that the future growth of the Lower Hunter makes a positive contribution to the protection of sensitive environments and biodiversity. A number of green corridors have been identified for protection on the Wallarah Peninsula, between the Watagan Ranges and Stockton Beach, and along the Karuah River and Port Stephens foreshores.

The proposal is generally aligned with the key objectives of the strategy. Whilst it is located wholly within an area designated as a green corridor under the strategy, significant impacts to sensitive environments and biodiversity are not expected. The proposal would also improve the connectivity between the regional centres of the Lower Hunter and Newcastle by providing a safe recreational travel corridor for pedestrians, cyclists and other non-motorised users.

#### **4.5.2 Hunter Regional Plan 2036**

The Hunter Regional Plan 2036 is a 20-year blueprint for the future of the Hunter, which aims to create a leading regional economy in Australia, with a vibrant metropolitan city at the heart. The plan has four goals:

- A leading regional economy in Australia - The Plan aims to strengthen the region's economic resilience, protect its well-established economic and employment bases and build on its existing strengths to foster greater market and industry diversification.
- A biodiversity-rich natural environment - Residents and visitors are fortunate to have ready access to many of the region's natural areas and an array of unique experiences. These areas contribute to the region's identity and the health of its communities and are important for recreational and tourism activities and as a focus for investment. They are also a key factor in the decisions people make about where to live.
- Thriving communities - Many communities are set within and around the Hunter's natural features and open space, which are among the region's best assets. The quality of these areas and the ability to access them gives residents an array of unique experiences and the opportunity for a healthy lifestyle.
- Greater housing choice and jobs - An additional 70,000 dwellings will be needed in the region by 2036. Providing the land and the infrastructure to meet this demand is central to the Plan. New housing will be focused in established areas through infill development, and will also continue to be provided through greenfield development.

The proposal is broadly consistent with the plan's goals.

#### **4.5.3 Greater Newcastle Metropolitan Plan 2036**

The Hunter Regional Plan 2036 set the vision for the Hunter to be the leading regional economy in Australia with a vibrant new metropolitan city at its heart. This first-ever Greater Newcastle Metropolitan Plan aims to deliver a collaborative framework to achieve a significant part of the regional plan by identifying the strategies and actions needed to create an integrated metropolitan city as well as and prioritise infrastructure and services needed in catalyst areas.

The vision for Greater Newcastle is to be:

- Australia's newest and emerging economic and lifestyle city, acknowledged globally.
- A dynamic and entrepreneurial city, with a globally competitive economy and the excitement of the inner city and green suburban communities.
- A place that offers great lifestyles minutes from beaches or bushland, the airport or universities, and from the port to the lake.
- A national leader in the new economy, with collaborative governance that makes it a model to others in creating and adapting to change.

The Greater Newcastle Metropolitan Plan aligns with the vision and goals of the Hunter Regional Plan 2036, and delivers on the priority action to prepare a Greater Newcastle Metropolitan Plan.

The proposal is broadly consistent with the Metropolitan Plan's outcomes for Greater Newcastle (particularly Outcome 2 and 4), which are:

1. Create a workforce skilled and ready for the new economy.
2. Enhance environment, amenity and resilience for quality of life.
3. Deliver housing close to jobs and services.
4. Improve connections to jobs, services and recreation.

The Greater Newcastle Metropolitan Plan includes specific reference to the proposal as an important asset presenting recreational opportunities for the community and tourism. Strategy 12 of the Greater Newcastle Metropolitan Plan aims to enhance Greater Newcastle's blue and green grid, which includes the connections and networks linking open spaces and waterways urban parks, bushland, farms, waterways, drinking water catchments, lakes and beaches. The proposal particularly complies with Strategy 12.

#### **4.5.4 Greater Newcastle Future Transport Plan**

The Greater Newcastle Future Transport Plan was developed to guide transport infrastructure planning that fosters sustainable travel behaviour over a 40 year period. The plan outlines specific actions to address the unique transport challenges for the Hunter Region, recognising that the key transport challenges include an ageing population, high levels of private car use, and balancing freight and passenger transport needs.

Of relevance to the proposal, the transport plan outlines the importance of walking and cycling as a mode for travel. The plan identifies that encouraging active transport through the strategic provision of infrastructure will lower dependence on vehicles, which is especially achievable over shorter distances.

The transport plan identifies a number of actions to support walking and cycling including:

- Creating more safe and connected cycling networks and more walkable places through collaboration with local councils.
- Ensuring public transport networks are accessible to walkers from points of interest, such as schools or shopping centres.
- Improving information about cycling and walking routes and facilities.

The transport plan also notes the importance of cycling infrastructure in supporting tourism. As the proposal is expected to facilitate local travel, commuting and tourist use, it reflects the objectives of the active travel actions in the plan.

Supporting economies through connecting areas with growing populations and changes in land use, such as events and tourism, is a key part of the plan's customer outcomes, intended to inform Greater Newcastle transport planning. The proposal serves to connect regional areas, as well as primes the region to continue cycleway networking.

#### **4.6 Summary of approvals required**

The proposal would be determined under Part 4 of the EP&A Act. A development application and this EIS would be submitted to Council.

The proposal is regionally significant development and therefore would be determined by the Hunter and Central Coast RPP. Council would process, exhibit and assess the application prior to referring it to the JPP for determination.

The proposal is integrated development, in accordance with Section 4.46 of the EP&A Act, as Approval under the FM Act is required. Additional approvals, and the relevant authority and required timing, are summarised in Table 4-5.

**Table 4-5 Summary of additional approvals required**

Legislation	Approval required	Administering authority	When approval required
FM Act	Part 7 permit	DPI – Fisheries	Prior to any works commencing
NPW Act	Section 151 Licence	NPWS, OEH	Prior to any works commencing
<i>Crown Land Management Act 2016</i>	Landowner approval to lodge application over Crown land Licence or lease of works on Crown land	DI – Crown Lands	Prior to lodging the application  Prior to any works commencing
BC Act	Concurrence required Credits retired	OEH	Prior to any works commencing
WM Act/ Water Act	Licence	WaterNSW	If dewatering required

## 5. Consultation

*This section describes the consultation undertaken for the proposal including during project feasibility and planning stages, preparation of the EIS, public display of the EIS and ongoing future consultation. Key stakeholders and relevant legislative requirements are also identified.*

### 5.1 Key stakeholders

The SEARs have identified the following key stakeholders for the proposal:

- OEH.
- DPI - Fisheries.
- Roads and Maritime.
- Transport for NSW – Freight and Regional Development.
- EPA.
- Council.
- Lake Macquarie City Council.
- Cessnock City Council.
- The surrounding landowners and occupiers that are likely to be impacted by the proposal.

### 5.2 Relevant legislation, policy and guidelines

The requirements for public participation for designated development are outlined in Clause 77 to 81 and 234 to 235 of the EP&A Regulation. In summary, they require that:

- The consent authority gives written notice of the development application to public authorities that the consent authority feels may have an interest in the determination of the development application.
- Certain information is provided in the written notice of the development application.
- A notice for the development application must be displayed on the land to which the application pertains.
- A notice for the development application must be published in a newspaper on at least two occasions.
- Any submissions made in response to the public exhibition of the development application should be forwarded to the Department.
- Certain information must be contained in the notice of the development application.
- The newspapers in which the notice should appear and the timing of the notice to coincide with the period of the exhibition.
- Copies of the EIS must be made available for public inspection at certain locations.

### 5.3 Consultation strategy

A Consultation Strategy was prepared for the proposal to guide consultation during key phases of the proposal including EIS preparation and public exhibition. The strategy:

- Provides background information about the proposal.
- Identifies the community and key stakeholders with the potential to be affected by the proposal.
- Identifies the potential nature and extent of stakeholder issues/concerns and relevant strategies to manage these proactively.
- Defines key messages, and identifies the communication tools and techniques to disseminate information and provide opportunities for feedback.
- Documents the policies and procedures implemented to record and respond to enquiries, complaints, and issues.
- Identifies and allocates roles and responsibilities.
- Provides an overview of how the effectiveness of the strategy would be evaluated.

### 5.4 Consultation during preparation of the EIS

#### 5.4.1 Key engagement activities

Table 5-1 lists the key engagement activities and tools, outlines their purpose, and describes how each tool/activity has been used to engage the community and stakeholders during EIS preparation.

**Table 5-1 Consultation activities during EIS preparation**

Activity	Stakeholders	Detail
Phone/ face to face interviews	Existing and potential user groups	<p>15 interviews, either face to face or via telephone were held with existing and potential users during November 2016, including:</p> <ul style="list-style-type: none"> <li>• NPWS</li> <li>• Richmond Vale Rail Museum</li> <li>• Newcastle University</li> <li>• Hunter Wetlands Centre</li> <li>• Towns with Heart/Kurri Kurri Visitor Centre</li> <li>• Kurri Kurri Business Chamber</li> <li>• Newcastle Cycleways Movement</li> <li>• Richmond Vale Rail Inc</li> <li>• Kurri Kurri Mongrels</li> <li>• Hunter Bird Observers Group</li> <li>• Kurri Kurri Motorcycle Club</li> <li>• Boomerang Bike Hire</li> </ul> <p>The purpose of the interviews was to discuss the perceived socio-economic impacts (positive and negative), opportunities, and construction impacts of the proposal on potential user groups.</p>
Face to face meetings	Impacted landholders	<p>Six meetings were held with directly impacted landholders.</p> <p>Meetings provided residents with the opportunity to talk directly to the project team and provided an opportunity to discuss the potential impacts of the proposal.</p>

Activity	Stakeholders	Detail
Survey	All	<p>A short survey, consisting of 14 quantitative questions was prepared using SurveyMonkey® to gain a better understanding of the current activities of the local and regional community to understand how the proposal might be used in the future.</p> <p>The survey was available between 3 November and 1 December 2016 and 890 responses were gathered during this period.</p>
Workshop	Council staff from within the regional area and NPWS	<p>A workshop with local government staff was held:</p> <ul style="list-style-type: none"> <li>• Tuesday 1 November 2016, 9:30 am – 12 pm Shortland Wetland Centre.</li> </ul> <p>The workshop provided a project overview and summary of social impact assessment findings to date.</p> <p>Between 20 and 30 representatives attended the workshop from the following organisations:</p> <ul style="list-style-type: none"> <li>• City of Newcastle</li> <li>• Lake Macquarie City Council</li> <li>• Cessnock City Council</li> <li>• Maitland City Council</li> <li>• NPWS.</li> </ul>
Community information sessions	All	<p>Community information sessions were held at the following locations, dates and times:</p> <ul style="list-style-type: none"> <li>• Thursday 3 November 2016, 4:00 pm to 7:00 pm, Fletcher Community Centre</li> <li>• Tuesday 8 November 2016, 4:00 pm to 7:00 pm, Beresfield Public School</li> <li>• Wednesday 9 November 2016, 4:00 pm to 7:00 pm, Kurri Kurri Business Enterprise Centre</li> <li>• Thursday 10 November 2016, 4:00 pm to 7:00 pm, Shortland Wetland Centre.</li> </ul> <p>The community information sessions provided residents and interested community members the opportunity to talk directly to the project team.</p> <p>Attendee numbers ranged from 6 to 43 at each session with 98 community members in total attending the information sessions. 21 completed feedback forms were received.</p>
Community contact and feedback	All	<p>Contact mechanisms were established to enable the community and stakeholders to provide feedback and ask us questions about the proposal via:</p> <ul style="list-style-type: none"> <li>• Project information line: 1800 066 243</li> <li>• email: <a href="mailto:contact@ghd.com">contact@ghd.com</a></li> </ul> <p>All contacts were recorded in a Consultation Manager database set up for the project. 58 phone contacts were made and 67 emails received.</p>
Bulk mail out	Nearby residents	<p>A two page information brochure providing an overview of the proposal and the details of the public consultation process was mailed to over 500 households and properties in the suburbs of Shortland, Tarro, Fletcher, Minmi and Kurri Kurri, in advance of the drop in sessions.</p>

Activity	Stakeholders	Detail
Advertisement	All	<p>Advertisements were placed in:</p> <ul style="list-style-type: none"> <li>• Newcastle Weekly on 27 October 2016</li> <li>• Cessnock Advertiser on 26 October 2016</li> <li>• Newcastle Herald Weekender on 29 October 2016</li> <li>• Lower Hunter Star on 29 October 2016.</li> </ul> <p>The purpose of advertisements was to provide information about the display locations and information sessions.</p>
Symposium with Newcastle University	University	Council presented an overview of the proposal to the University at a Symposium.
Council website	All	<p>Details of the proposal are provided on the Council website.</p> <p><a href="http://www.newcastle.nsw.gov.au/Council/News/Projects-Works/Richmond-Vale-Rail-Trail">http://www.newcastle.nsw.gov.au/Council/News/Projects-Works/Richmond-Vale-Rail-Trail</a></p>

#### 5.4.2 Summary of issues raised by the community

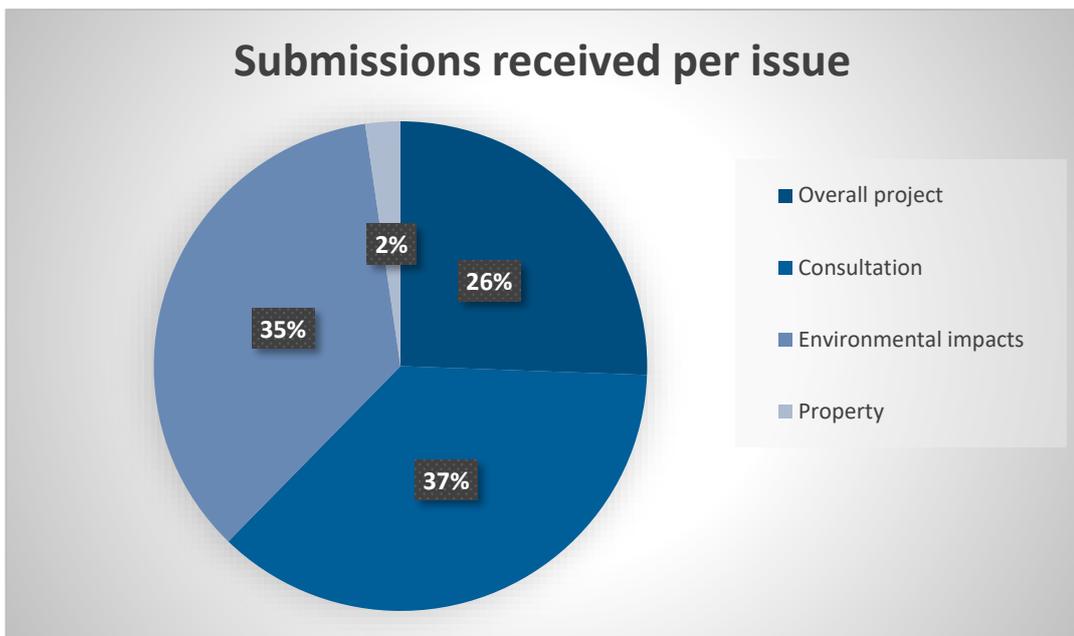
A summary of the key issues raised during consultation activities undertaken during EIS preparation, and a reference to where they are addressed in the EIS, is provided in Table 5-2, with further discussion of consultation undertaken and feedback provided in the socio-economic impact assessment in Appendix M.

The numbers of responses per issue is presented graphically in Figure 5-1, which demonstrates that the major issues raised by the community were around the potential for environmental or social impacts from the proposal and the need for ongoing consultation that reaches a broad spectrum of the community and potential users. Also of relevance, nearly 20 percent of submissions expressed support for the proposal.

**Table 5-2 Issues summary**

Issue category	Key issues raised	No. of submissions	Where addressed in EIS
Overall project	Support for the proposal	52	N/A
	Comments on the scope/route of the proposal	6	Section 3.4
	Queries re proposal timing	16	Section 3.6.3
	Queries re approvals process	4	Section 4.5
Consultation	Request for additional information	37	Section 5.6
	Suggestions for further consultation	38	Section 5.6
	Comments regarding consultation activities	34	Section 5.6
	Complaints about lack of/access to consultation	3	Section 5.5 and 5.6
Environmental impacts	Flora and fauna impacts	12	Section 6.7
	Heritage (Aboriginal and non-Aboriginal) impacts	8	Section 6.10 and 6.11
	Socio-economic impacts	37	Section 7.2
	Health and safety issues	26	Section 3.4, 3.5, 6.5, 6.6, 6.9, 7.4 and 7.5
	Waste and contamination	4	Section 6.1
	Soil and water	1	Section 6.4
	Traffic and transport	11	Section 6.6

Issue category	Key issues raised	No. of submissions	Where addressed in EIS
	Visual amenity	2	Section 6.8
	Amenity	6	Section 7.2
	Noise and vibration	1	Section 6.3
Property	General impacts	4	Section 6 and 7
	Damage to property	1	Section 6.3
	Need for acquisition	2	Section 3.5.9 and 7.2



**Figure 5-1 Submissions received per issue**

### 5.4.3 Feedback from other stakeholders

The following agencies were specifically consulted for their requirements for the EIS (see Section 1.4 and Appendix A):

- Roads and Maritime
- DI – Crown Lands
- OEH
- DPI – Fisheries
- WaterNSW
- DPE – Resources and Energy
- EPA

Their detailed requirements have been incorporated into the EIS as summarised in Section 1.4.

## 5.5 Public exhibition of the EIS

The requirements for public exhibition of the EIS are outlined in Part 6 Division 5 of the EP&A Regulation, which state:

*As soon as practicable after a development application is made for consent to carry out designated development, the consent authority must:*

*(a) place the application and any accompanying information on public exhibition for a period of not less than 30 days (the submission period) commencing on the day after which notice of the application is first published as referred to in paragraph (d), and*

*(b) give written notice of the application in accordance with the regulations:*

*(i) to such persons as appear to it to own or occupy the land adjoining the land to which the development application relates, and*

*(ii) if practicable, to such other persons as appear to it to own or occupy land the use or enjoyment of which, in its opinion, may be detrimentally affected if the designated development is carried out, and*

*(iii) to such other persons as are required to be notified by the regulations, and*

*(c) cause notice of the application to be exhibited in accordance with the regulations on the land to which the application relates, and*

*(d) cause notice of the application to be published in accordance with the regulations in a newspaper circulating in the locality.*

A media release and website information would announce the exhibition of the EIS. Adjoining and affected landowners and other stakeholders would be notified by mail.

During exhibition written submissions would be accepted by mail, delivered to Council in person or email. The EIS would be available at the following locations:

- Customer Enquiry Centre, located on the ground floor of the City Administration Centre:
  - 282 King St, Newcastle, NSW (hard copy).
- Council website (<http://www.newcastle.nsw.gov.au/>) (digital copy).

All written feedback received during the public exhibition period would be treated as a formal submission and would be recorded on the consultation database. Submissions would not be responded to individually.

Following the EIS exhibition period, a submissions report would be prepared to:

- Summarise issues raised in submissions and respond to the issues raised.
- Provide any new information about the proposal in addition to that included in the EIS.
- Identify any changes to the proposal and the potential impact of those changes.

Council and the JRPP would consider the issues raised and the content of the submissions report prior to determining the proposal.

## 5.6 Future consultation

Should the proposal be approved, consultation with the community and key stakeholders would be ongoing in the lead up to, and during the construction phase of the proposal. The consultation activities would ensure that:

- The community and stakeholders have a high level of awareness of all processes and activities associated with the proposal.

- Accurate and accessible information is made available.
- A timely response is given to issues and concerns raised by the community.
- Feedback from the community is encouraged.
- Opportunities for input are provided.
- Any special needs, such as access, are considered on a case-by-case basis in the development of the construction program and staging of the works.
- Proposed mitigation measures are discussed and agreed with affected landowners/residents.

The Council phone line and email address would continue to be available during construction. Targeted consultation methods, such as letters, notifications, signage and verbal communications, would continue to occur as required. The Council website would also include updates on the progress of the proposal.

## 6. Key issues

*This section provides an assessment of the key issues identified in the SEARs for the proposal. The existing environment, potential impacts from the proposal and recommended mitigation measures are described.*

### 6.1 Resource consumption and waste generation

#### 6.1.1 Existing environment

Council is committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures in accordance with the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. The resource management hierarchy principles in order of priority, as outlined in the Act, are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal

By adopting the above principles, Council encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development.

#### 6.1.2 Potential impacts

##### *Construction*

##### **Resource use**

Construction of the proposal would require the use of a number of resources, including:

- Resources associated with the operation of construction machinery and motor vehicles (this includes the use of diesel and petrol)
- Material required for the trail surface and pavements (asphalt, spray seal, sand, concrete, aggregate)
- Fill required to meet design levels
- Materials required for signage, lighting and fencing
- Materials required for drainage, conduits, services and pits
- Construction water (for concrete mixing and dust suppression)

The materials required for construction of the proposal are not currently limited in availability. However, materials such as metal and fuel are non-renewable and would be used conservatively. Excess spoil, not suitable for reuse (although not currently anticipated), would be disposed of in accordance with legal requirements as required. Other waste would be reused or recycled wherever practical.

## Waste generation

The proposal has the potential to generate waste from the following activities:

- Vegetation to be removed as part of the proposal
- Earthworks for trail and bridge construction
- Trail construction
- General site activities by workers

Waste streams likely to be generated during construction of the proposal include:

- Excess spoil. This is not considered likely as all excavated material (amounts would be minimal), unless contaminated, would be reused on-site as fill
- Green waste as a result of vegetation clearing
- Fencing, guide posts, guard rails
- Packaging and general waste from staff (lunch packaging, portable toilets)
- Chemicals and oils
- Waste water from wash-down and bunded areas
- Redundant erosion and sediment controls

The potential to reuse materials would be investigated during construction planning. Unsuitable fill material that cannot be used on-site (though not considered likely) would be classified in accordance with the *Waste Classification Guidelines* (Environmental Protection Agency, 2014) and disposed of at an approved materials recycling or waste disposal facility.

## Operation

The proposal would create small amounts of waste as a result of maintenance and management activities during operation. Quantities are not expected to be significant and waste would be managed in accordance with Council's current waste management procedures. Waste receptacles would be provided at car parks and signage would encourage all users to take waste with them from the trail.

Similarly small quantities of resources would be utilised during operation. This would include, for example, herbicides, fencing materials, paints, fuels, cleaning equipment and chemicals etc.

Public amenities would be provided at the Shortland and Minmi connection points, which would be connected via the rising main to the existing HWC sewer network.

### 6.1.3 Mitigation measures

#### Construction

- The following resource management hierarchy principles would be followed:
  - Avoid unnecessary resource consumption as a priority
  - Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)
  - Disposal would be undertaken as a last resort (in accordance with the *Waste Avoidance and Resource Recovery Act 2001*)

- A site waste minimisation and management plan would be prepared to include the following measures as a minimum. The plan would be included in the CEMP and prepared in accordance with relevant EPA guidelines. The plan would be prepared and approved by Council prior to construction commencing.
- Procurement would endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.
- Excess excavated material would be reused appropriately for fill or disposed of at an appropriate facility. Excess material requiring waste disposal would first be assessed against the *Waste Classification Guidelines* (Environmental Protection Agency, 2014).
- Additional fill material would be sourced from appropriate local sources.
- Cleared weed-free vegetation would be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible. Weed vegetation would be disposed of appropriately off-site in accordance with its classification status under the *Noxious Weeds Act 1993*, where relevant.
- Garbage receptacles would be provided at the site compound and recycling of materials encouraged. There would be no disposal or re-use of construction waste on to other land.
- Waste would not be burnt on-site.
- Waste material, other than vegetation and tree mulch, would be removed from site once the works have been completed.
- Portable toilets would be provided for construction workers and would be managed by the service provider to ensure the appropriate disposal of sewage.
- Site inductions would ensure staff are aware of waste disposal protocols and attendance would be recorded by the site supervisor.
- All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
- Any hazardous waste material stockpiles would be fenced and sign posted for public safety.
- Dedicated concrete washout facilities would be provided during construction so that runoff from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility.
- Waste would be disposed of appropriately with supporting waste classification documentation, if required.

### **Operation**

- Regular maintenance of the pathway, as part of Council's ongoing regime for the non-motorised travel network under their control, would identify and control waste.
- Waste management and resource use would be in accordance with Council's existing operational procedures.
- Waste receptacles would be provided at car parks and signage would encourage all users to take waste with them from the trail.

## 6.2 Air quality

### 6.2.1 Existing environment

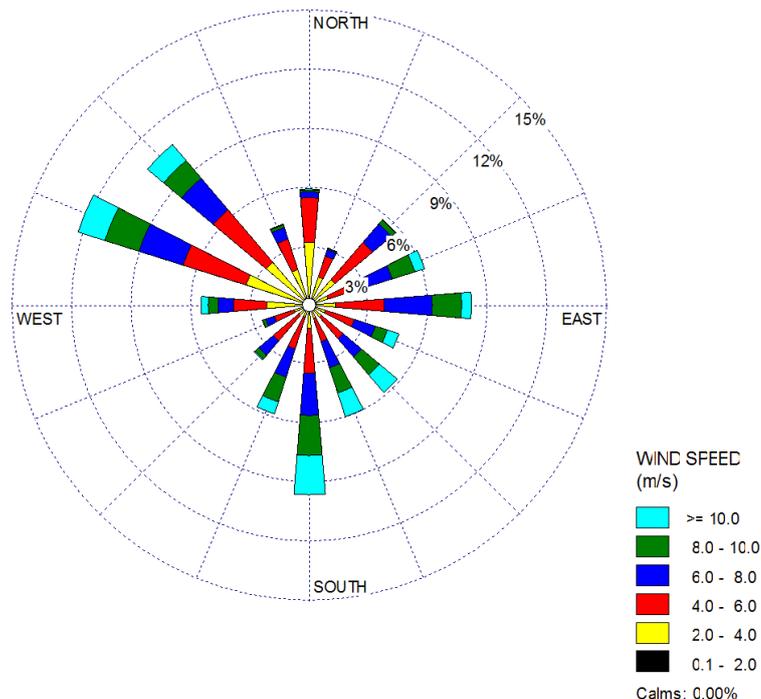
As outlined in the *State of the Environment Report* (City of Newcastle, 2011), air quality in the Newcastle LGA meets the standard set in the *National Environment Protection Measure* (NEPM) for *Ambient Air Quality* (1998). The report also identifies that industrial, domestic and transportation sources are all significant contributors to adverse air quality in Newcastle and the surrounding areas. The primary source of air emissions within the study area is expected to be vehicles, generating particulate matter and products of combustions (exhaust emissions).

The relative exposure of sensitive receptors (e.g. residences) to air emissions from a source will generally vary significantly at a given range from the source and is dependent on the wind direction and strength. Strong winds are important during the construction phase where dust from unconsolidated and stockpiled sources can be easily dispersed in certain conditions.

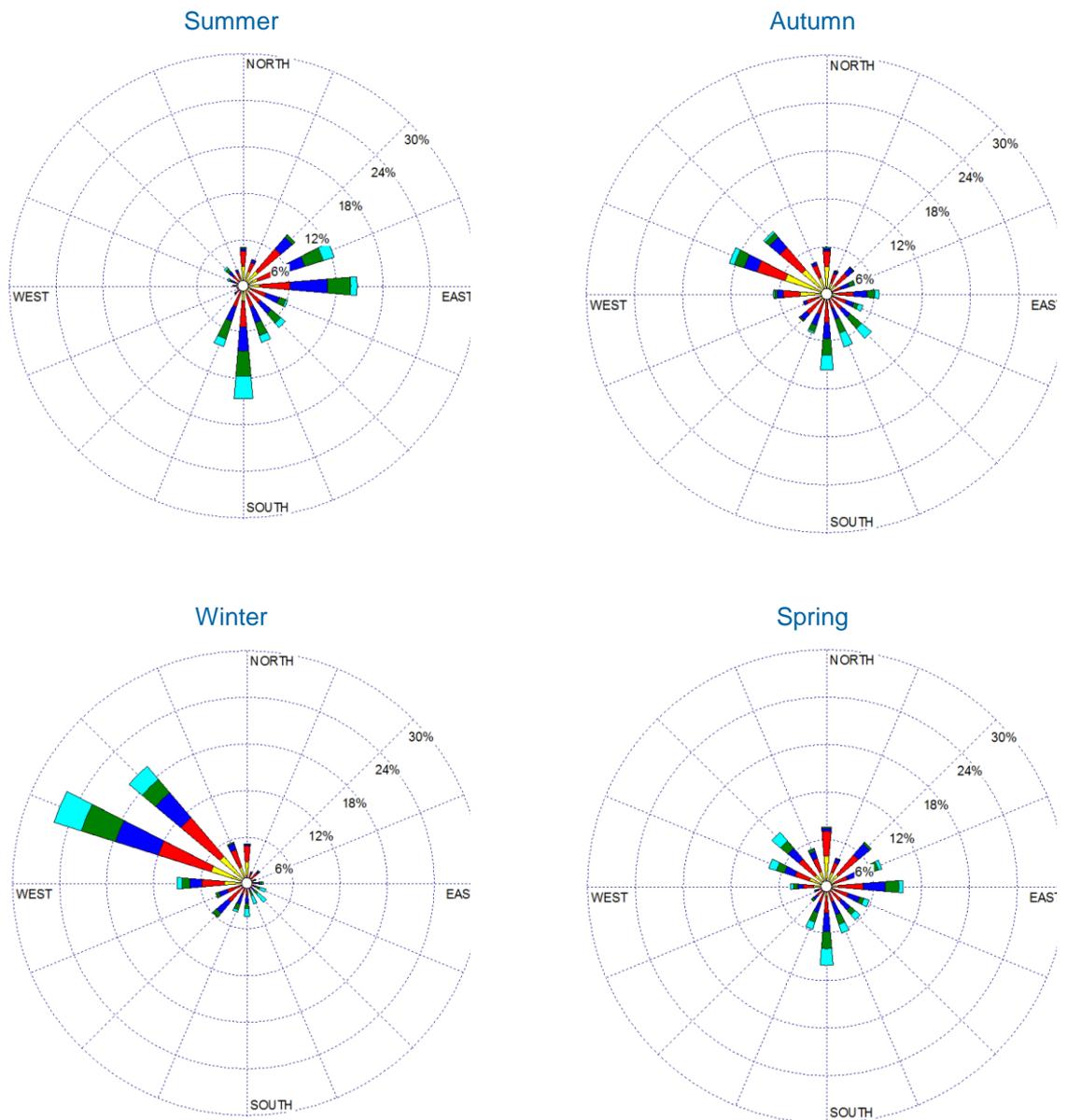
The proposal site is located approximately 13 kilometres north-west of the nearest Bureau of Meteorology (BoM) automatic weather station (AWS) at Nobbys Head. Wind data from this station is considered to be the best available for the site. However, it is acknowledged that due to its coastal exposure, wind speeds recorded at this AWS are likely to be higher than those experienced at the proposal site, particularly winds with an easterly component.

Prevalent winds are generally from the north-west and south, and less frequently from the east and south-east. The incidence of north-easterly and south-westerly winds is lowest. Strong (>6 m/s) winds are most likely from the south, south-east and north-west. Light (0.5-3 m/s) winds are generally from the north, north-west and west. On a seasonal basis, winds are predominantly from the south and north-east during summer and from the north-west during winter. Spring and autumn conditions are a mixture of summer and winter, with the predominant wind from the south and north-west.

The annual average wind rose for a five-year period (2007 - 2012) at Nobbys Head is shown in Figure 6-1. Seasonal wind roses covering the same period are shown in Figure 6-2.



**Figure 6-1 Annual wind rose for Nobbys Head, 2007 - 2012 (average wind speed 6.0 m/s)**



**Figure 6-2 Seasonal wind roses for Nobbys Head, 2007-2012**

## 6.2.2 Potential impacts

### *Construction*

Construction of the proposal may have short-term localised impacts on air quality, primarily due to dust generation. There would also be small amount of emissions from plant, machinery and vehicles. The individual processes that generate significant amounts of dust (PM<sub>10</sub> and TSP) are identified to be:

- Mechanical disturbance: dust emissions brought about by civil works with the operation of construction and maintenance vehicles and equipment (e.g. material handling and wheel-induced emissions).
- Wind erosion: dust emissions from exposed, disturbed soil surfaces under high wind speeds during construction.

Dust emission sources would include:

- Material handling during earthworks
- Loading and dumping of material
- Levelling, grading and compacting of disturbed soil surfaces
- Wind erosion of exposed unstable soil surfaces and localised stockpiles

The potential for exposure to dust emissions is dependent on the intensity of construction work (i.e. the amount of dust generated and material transfer volumes occurring), duration and frequency of the operations in any given locality and the relative location of nearby sensitive receptors.

Analysis of the annual wind rose (Figure 6-1) indicates prevailing winds are from the south and north-west. This highlights the potential for adverse dust impacts at sensitive receptors to the north and south-east of construction work. Residential receivers are generally located to the south of the proposal, with the exception of those located in the suburb of Tarro, which is located to the north of the proposal.

Sensitive receptors closest to the construction work area have the highest potential for adverse air quality impacts. However, since the proposal is linear in nature, construction work fronts would be transient and unlikely to affect an individual receptor for an extended period of time. Measures to avoid or reduce air quality impacts are provided in Section 6.2.3.

### **Operation**

Air quality impacts associated with the operation of the proposal are anticipated to be negligible.

## **6.2.3 Mitigation measures**

### **Construction**

- All plant and machinery would be fitted with emission control devices complying with relevant Australian Standards.
- Machinery would be turned off when not in use and not left to idle for prolonged periods.
- Construction plant and equipment would be maintained in good working condition.
- Vehicle movements would be limited to designated entries and exits, haulage routes and parking areas.
- Limit the areas of clearing to only those that are required to reduce fugitive dust emissions.
- Stockpiles would be stabilised to minimise wind erosion and the generation of dust (e.g. hydromulch, matting).
- Dust generation would be monitored visually, and where required, dust control measures such as water spraying would be implemented to control the generation of dust. If air quality monitoring is considered warranted, it would be undertaken in accordance with *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (Department of Environment and Conservation, 2005).
- Materials transported to and from the site would be covered to reduce dust generation in transit.
- No burning of any materials would occur.

- Access points would be inspected to determine whether sediment is being transferred to the surrounding road network. If required, sediment would be promptly removed from roads to minimise dust generation.
- Shade cloth would be fastened to site fencing at construction compounds to minimise dust transported from the site during construction.
- Daily inspections and regular surveillance would be undertaken to identify any vehicle, plant or equipment that is causing visible emissions. If any defective vehicles, plant or equipment are identified, operation of this machinery would cease and service/ maintenance would be undertaken.
- Any exposed surfaces would be stabilised, and final landscaping implemented, as soon as practicable following completion of construction.
- Any dust complaints would be investigated as soon as possible and measures taken to manage any impacts identified.

### **Operation**

No specific mitigation measures are required during operation.

## **6.3 Noise and vibration**

### **6.3.1 Methodology**

#### **Background noise**

The *NSW Industrial Noise Policy* (INP) (Environment Protection Agency, 2000) provides a procedure for determining background levels prior to establishing noise criteria. The INP states that the minimum day time background level for the purpose of setting criteria is 30 dB(A). This study has assumed a background level of 30 dB(A) for the purpose of establishing noise criteria.

#### **Construction noise criteria**

Construction noise has been assessed with consideration to the *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009). The ICNG defines noise sensitive receivers as the following:

- Residences
- Classrooms
- Hospitals
- Places of worship
- Passive recreation areas such as outdoor areas used for teaching
- Active recreation areas such as parks and sports grounds
- Commercial premises and industrial premises

With reference to the above, sensitive receivers for the proposal would include residences and passive recreation areas. Of these two land uses, residences are considered to be the more sensitive receiver type, and are therefore the focus of this assessment.

The ICNG provides two methods for assessing construction noise based on the duration of predicted noise impacts to sensitive receivers: a qualitative assessment for when construction noise is predicted to impact a noise sensitive receiver for less than three weeks in total, and a quantitative noise assessment for when construction noise is predicted to impact a noise sensitive receiver for more than three weeks in total.

The proposal would be constructed progressively along a linear alignment with the majority of construction activities not anticipated to cause noise impacts to any receivers for a period of greater than three weeks. The proposal would include some localised construction activities that would likely extend for greater than three weeks, such as the construction of bridges and the establishment and use of site compounds. However these sites are sufficiently distant from residences so that significant noise impacts are not considered likely.

The construction noise criteria for the proposal is presented in Table 6-1 and Table 6-2.

**Table 6-1 ICNG construction noise criteria at residential receivers, dB(A)**

Time period	Management level LAeq(15 min)
Recommended standard hours: <ul style="list-style-type: none"> <li>Monday to Friday: 7.00 am to 6.00 pm</li> <li>Saturday: 8.00 am to 1.00 pm</li> <li>No work on Sundays or public holidays</li> </ul>	Noise affected level: RBL(period) + 10 Highly noise affected level: 75
Outside recommended standard hours	Noise affected level: RBL(period) + 5

**Table 6-2 Project specific construction noise criteria for residential receivers**

Time period	Management level LAeq(15 min)
Recommended standard hours: <ul style="list-style-type: none"> <li>Monday to Friday: 7.00 am to 6.00 pm</li> <li>Saturday: 8.00 am to 1.00 pm</li> <li>No work on Sundays or public holidays</li> </ul>	Noise affected level <sup>1</sup> : 40 Highly noise affected level: 75
Outside recommended standard hours	Noise affected level <sup>1</sup> : 35
Note <sup>1</sup> : The INP notes that 'where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A)'. This assessment has adopted a rating background level of 30 dB(A).	

### Construction vibration criteria

#### Human vibration criteria

*Assessing vibration: A technical guideline* (Department of Environment and Conservation, 2006) (AVTG) outlines methods for assessing potential impacts and ways to manage vibration from construction activities. AVTG is based on guidelines contained in BS 6472-1992 *Evaluation of human exposure to vibration in buildings* (1–80 Hz).

Typically, construction works generate ground vibration of an intermittent nature. Under BS 6472–1992, intermittent vibration is assessed using the vibration dose value (VDV). Acceptable VDV, as outlined in AVTG, are presented in Table 6-3.

**Table 6-3 Acceptable vibration dose values for intermittent vibration (m/s<sup>1.75</sup>)**

Location	Day <sup>1</sup>		Night <sup>1</sup>	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas <sup>2</sup>	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

<sup>1</sup> Daytime is 7:00 to 22:00 and night-time is 22:00 to 7:00.

<sup>2</sup> Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be need to assess intermittent values against the continuous or impulsive criteria for critical areas.

Whilst the assessment of human response to vibration in BS 6472-1992 is based on VDV and weighted acceleration, for construction related vibration, it is considered more appropriate to provide guidance in terms of peak particle velocity (PPV), since this parameter is more likely to be routinely measured.

Humans are capable of detecting vibration at levels well below those that risk causing damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in BS 5228-2:2009 *Code of practice for noise and vibration on construction and open sites – Part 2: Vibration* and are summarised in Table 6-4.

**Table 6-4 Guidance on the effects of vibration levels**

Approximate vibration level	Degree of perception
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30 mm/s	Vibration might be just perceptible in residential environments.
1.00 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10.00 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

### Structural damage criteria

Currently, there is no Australian Standard that sets the criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained from reference to German Standard *DIN 4150-3: 1999-02 Structural Vibration – Part 3: Effects of vibration on structures*. Short-term vibration guideline values are presented in Table 6-5.

**Table 6-5 Guideline values for short term vibration on structures (DIN 4150-3)**

Line	Type of structure	Guideline values for velocity, $v_i(t)$ <sup>1</sup> [mm/s]		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz <sup>2</sup>
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy.	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (such as heritage listed buildings under preservation order).	3	3 to 8	8 to 10

<sup>1</sup> The term  $v_i$  refers to vibration levels in any of the x, y or z axes.

<sup>2</sup> At frequencies above 100 Hz the values given in this column may be used as minimum values.

For standard buildings, a common vibration target adopted for structural vibration is 5 mm/s PPV where specific source vibration frequencies are not available.

Energy from construction equipment is transmitted into the ground and transformed into vibration, which attenuates with distance. The magnitude and attenuation of ground vibration is dependent on the following:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive, reciprocating, rolling or rotating equipment)
- The frequency content
- The impact medium stiffness
- The type of wave (surface or body)
- The ground type and topography

Due to the above factors, there is inherent variability in ground vibration predictions without site-specific measurement data. The *Environmental Noise Management Manual* (Roads and Traffic Authority, 2001) provides typical construction equipment ground vibration levels at 10 metres. The rate of vibration attenuation can be calculated from the following regression analysis formula:

$$V = kD^{-n} \text{ where } V = \text{PPV}$$

D = Distance n = attenuation exponent

This assessment conservatively adopts an n value of 0.8 for predicting construction vibration at distances further than 10 metres from the source.

### **Operational noise criteria**

The INP provides industrial noise criteria to aid in the assessment of industrial noise sources scheduled under the *Protection of the Environment Operations Act 1997*. The policy sets two separate noise criteria to meet environmental noise objectives; one to account for intrusiveness and the other to protect the amenity of particular land uses.

Intrusiveness is assessed by determining the background noise level, where the equivalent continuous noise level from operations should not be more than five decibels (dB) above the measured background level. The amenity criterion is based on noise criteria specific to the land use and associated activities. The project specific level is the more stringent of the intrusive and amenity criteria.

The intrusive, amenity and project specific levels are shown in Table 6-6. The INP rural residence category has been adopted as the controlling amenity criteria.

**Table 6-6 Project specific operational noise criteria , dB(A)**

	Criterion, dB(A)
Adopted rating background level, $L_{A90}(\text{Period})$	30
Intrusiveness criteria, $L_{Aeq}(15\text{min})$	35
Amenity criteria (Residence - rural), $L_{Aeq}(\text{period})$	50
<b>Project specific criterion, <math>L_{Aeq}(15\text{min})</math></b>	<b>35</b>

### Traffic noise criteria

The NSW Road Noise Policy (RNP) (Department of Environment, Climate Change and Water, 2011) provides road noise criteria for residential receivers subject to noise from public roads. The relevant criteria is for noise generated by land use developments at existing residences affected by additional traffic on existing local roads, and is reproduced in Table 6-7. Road noise from vehicles travelling on private roads is assessed as cumulative site noise and compared to either the ICNG or the INP.

**Table 6-7 Road traffic noise assessment criteria for residential land uses**

Road category	Type of proposal/land use	Assessment criteria, dB(A)	
		Day (7:00 am – 10:00 pm)	Night (10:00 pm – 7:00 am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1 \text{ hour})}$ 55 (external)	$L_{Aeq, (1 \text{ hour})}$ 50 (external)

### 6.3.1 Existing environment

The majority of the proposal runs through national park with few residential receivers. Apart from a few public access points to the proposal, residential receivers are typically greater than five hundred metres away. The ambient acoustic environment along the proposal alignment is influenced by road traffic where the proposal intersects major public roads, but is dominated by natural sources such as animals and wind through foliage.

## **6.3.2 Impact assessment**

### ***Construction***

Assessment of potential construction noise and vibration impacts is based on the construction methodology outlined in Section 3.6. Sound pressure levels at various distances have been predicted for an assumed equipment list based on similar projects, and are presented in Table 6-8. The noise levels presented in Table 6-8 are a conservative estimate based on distance loss alone. The effects of topography, ground cover and molecular absorption have not been considered.

Table 6-8 indicates that the highly noise affected noise management level would be exceeded within 20 metres of certain activities during construction of the pathway, Ironbark Creek bridge and the car parking areas. The noise affected noise management level (40 dB(A)) would be exceeded within 500 metres of residences during most activities. However as construction would proceed relatively quickly along the alignment and noise would not be generated at any one location for long periods, a significant impact is not expected.

Predicted vibration levels from the highest vibration generating equipment on site are presented in Table 6-9. The structural damage criteria of 5 mm/s would be exceeded at residences up to 25 metres from vibration generating activities.

### ***Operation***

The proposal is not expected to generate significant noise or vibration during operation. Proposed instructional signage would inform users of the need to consider noise impacts for residences when using the trail.

**Table 6-8 Construction equipment and predicted noise level at distance, dB(A)**

Construction activity	Construction equipment	Adopted SWL, dB(A)	Noise data reference	Predicted sound pressure level (dBA) at distance, dB(A)						
				20 m	50 m	100 m	200 m	350 m	500 m	1000 m
Construction of shared pathway	Asphalt truck and sprayer	103	RMS CNVG	69	61	55	49	44	41	35
	Chainsaw	114	RMS CNVG	<b>80</b>	72	66	60	55	52	46
	Compressors and hand tools	105	AS2436-2010	71	63	57	51	46	43	37
	Concrete truck	108	AS2436-2010	74	66	60	54	49	46	40
	Dog and trailer	101	GHD database	67	59	53	47	42	39	33
	Excavator 52 kW	105	BS 5228-1:2009	71	63	57	51	46	43	37
	Generator	99	AS2436-2010	65	57	51	45	40	37	31
	Grader	110	AS2436-2019	<b>76</b>	68	62	56	51	48	42
	Light vehicles	100	AS2436-2010	66	58	52	46	41	38	32
	Smooth drum roller	107	RMS CNVG	73	65	59	53	48	45	39
Construct bridge at Ironbark Creek	Concrete truck	108	AS2436-2010	74	66	60	54	49	46	40
	Dog and trailer	101	GHD database	67	59	53	47	42	39	33
	Excavator 52 kW	105	BS 5228-1:2009	71	63	57	51	46	43	37
	Franna crane 20 t	98	RMS CNVG	64	56	50	44	39	36	30
	Light vehicles	100	AS2436-2010	66	58	52	46	41	38	32
	Piling rig (bored)	111	AS2436-2010	<b>77</b>	69	63	57	52	49	43
Construct bridge at Fisheries Creek	Concrete truck	108	AS2436-2010	74	66	60	54	49	46	40
	Dog and trailer	101	GHD database	67	59	53	47	42	39	33
	Excavator 52 kW	105	BS 5228-1:2009	71	63	57	51	46	43	37
	Franna crane 20 t	98	AS2436-2010	64	56	50	44	39	36	30
	Light vehicles	100	AS2436-2010	66	58	52	46	41	38	32
Construction of compound	Dog and trailer	101	GHD database	67	59	53	47	42	39	33
	Excavator 52 kW	105	BS 5228-1:2009	71	63	57	51	46	43	37
	Franna crane 20 t	98	RMS CNVG	64	56	50	44	39	36	30
	Front end loader (52 kW)	108	BS 5228-1:2009	74	66	60	54	49	46	40
	Generator	99	AS2436-2010	65	57	51	45	40	37	31
	Grader	110	AS2436-2010	76	68	62	56	51	48	42

Construction activity	Construction equipment	Adopted SWL, dB(A)	Noise data reference	Predicted sound pressure level (dBA) at distance, dB(A)						
				20 m	50 m	100 m	200 m	350 m	500 m	1000 m
Construction of car parks and other facilities	Light vehicles	100	AS2436-2010	66	58	52	46	41	38	32
	Smooth drum roller	107	RMS CNVG	73	65	59	53	48	45	39
	Water cart	107	RMS CNVG	73	65	59	53	48	45	39
	Asphalt truck and sprayer	103	RMS CNVG	69	61	55	49	44	41	35
	Concrete truck	108	AS2436-2010	74	66	60	54	49	46	40
	Excavator 52 kW	105	BS 5228-1:2009	71	63	57	51	46	43	37
	Grader	110	AS2436-2010	<b>76</b>	68	62	56	51	48	42
	Light vehicles	100	AS2436-2010	66	58	52	46	41	38	32
	Pavement laying machine	114	RMS CNVG	<b>80</b>	72	66	60	55	52	46
Smooth drum roller	107	RMS CNVG	73	65	59	53	48	45	39	

Note: 'RMS CNVG' refers to the Construction Noise and Vibration Guideline (Roads and Maritime, 2016).

Note: Red bold indicates exceedance of highly noise affected management level of 75 dB(A)

**Table 6-9 Vibration levels - construction equipment**

Item	Reference PPV (mm/s)	Source	PPV (mm/s) at distance (m)										
			10 m	12 m	15 m	20 m	25 m	30 m	50 m	100 m	150 m	200 m	250 m
Piling (bored)	12 mm/s at 10 m	ENMM	<b>12.0</b>	<b>10.4</b>	<b>8.7</b>	<b>6.9</b>	<b>5.8</b>	5.0	3.3	1.9	1.4	1.1	0.9
7 tonne compactor	7 mm/s at 10	ENMM	<b>7.0</b>	<b>6.0</b>	<b>5.1</b>	4.0	3.4	2.9	1.9	1.1	0.8	0.6	0.5
Roller	6 mm/s at 10m	ENMM	<b>6.0</b>	<b>5.2</b>	4.3	3.4	2.9	2.5	1.7	1.0	0.7	0.5	0.5

Note: Red bold indicates levels that exceed the 5 mm/s limit for residential dwellings.

Note: *The Environmental Noise Management Manual* (ENMM) (Roads and Traffic Authority, 2001) provides a range of vibration predicted at 10 metres for piling of 12 mm/s - 30 mm/s. The upper range represents impact piling, therefore the lower range has been assumed for bored piling.

### 6.3.3 Mitigation measures

#### Construction

A noise and vibration management plan, prepared and approved by Council prior to construction commencing, would include, as a minimum, the following measures

- All employees, contractors and subcontractors are to receive an environmental induction, which would include:
  - All relevant project specific and standard noise and vibration mitigation measures
  - Relevant licence and approval conditions
  - Permissible hours of work
  - Location of nearest sensitive receivers
  - Construction employee parking areas
  - Designated loading/unloading areas and procedures
  - Site opening/closing times (including deliveries)
  - Environmental incident procedures
- No swearing or unnecessary shouting or loud stereos/radios would be allowed on site. Dropping of materials from height, throwing of metal items and slamming of doors would be avoided.
- Contact would be established with local residents and the construction program and progress communicated on a regular basis, particularly when noisy or vibration-generating activities are planned. Affected receivers would be notified of the intended work, its duration and times of occurrence. Specific notifications would be provided to receivers where the highly noise affected of 75 dB(A) is expected to be exceeded.
- A contact number would be provided for complaints. All complaints would be logged and responded to.
- Noise monitoring would be undertaken upon receipt of a new complaint at the complainant's location and cover the time of day when the impacts were reported to occur. Attended noise monitoring is recommended. If noise levels exceed the 75 dB(A) highly noise affected management level, construction activities would be reviewed to identify reasonable and feasible mitigation strategies to reduce noise. Noise monitoring would be undertaken by a qualified professional in accordance with the ICNG.
- Vibration monitoring would be undertaken where construction activities generating vibration are to be undertaken within 25 metres of structures. If the structural damage criteria of 5 mm/s is exceeded, alternative construction plant or methods are required. Vibration monitoring would be undertaken by a qualified professional in accordance with the ICNG.
- Pre-work inspections are recommended for all structures within 25 metres of vibration generating activities.
- All work would be undertaken within standard construction hours, unless out of hours work has been approved.
- Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.

- High noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq (15 min) during standard construction hours.
- High noise and vibration generating equipment to be avoided wherever possible. Monitoring off site of high vibration and noise generating equipment is recommended prior to any works adjacent to receiver properties to establish noise baselines.
- Broadband reverse warnings should be used in preference over 'beeper' style warnings.
- Simultaneous operation of noisy plant within discernible range of a sensitive receiver would be avoided.
- The offset distance between noisy or vibration generating plant and adjacent sensitive receivers is to be maximised. Noise-emitting plant to be directed away from sensitive receivers.
- Plant used intermittently would be throttled down or shut down in between uses.
- Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the site.
- Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers.
- Site access points and roads would be selected as far as possible away from sensitive receivers.
- Dedicated loading/unloading areas would be shielded if close to sensitive receivers.
- Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.

### **Operation**

No specific noise and vibration mitigation measures are required during operation.

## **6.4 Soil and water quality**

The following sections have been summarised from specialist geotechnical and contamination reports prepared by GHD, which are included in full in Appendix E and Appendix F.

### **6.4.1 Existing environment**

#### **Geology**

The *1:100,000 Newcastle Geological Map* (Gorbert & Chestnut, 1975) indicates that south of Ironbark Creek in the vicinity of Shortland the proposed route is underlain by the Tomago Coal Measures. From the crossing of Ironbark Creek to just south of Tarro the proposed route is underlain by Quaternary sediments including silt, clay and estuarine sediments. The proposed route is also underlain by these Quaternary sediments between Shortland and the proposed connections with Fletcher and Minmi. West of the proposed connection with Fletcher, the proposed route is generally underlain by the Permian Newcastle Coal Measures including coal, tuff, conglomerate, sandstone and shale.

## Topography

The proposal site is characterised by a vast, low lying plain which is subdivided into the three major landscape types:

- Saline/brackish swamp, adjacent to the Hunter River
- Freshwater marsh
- Relic beach located on the margins of the swamp to the north and west

The margins of the swamp comprise open valleys of low relief with alluvial plains and terraces.

Elevations of the surrounding terrain range from 20 - 50 metres Australian height datum (AHD) with gradual inclines and declines in topography.

## Soils

### Overview

The *1:100,000 Soil Landscapes of Newcastle* (Matthei, 1995) shows that the proposal lies within numerous soil landscapes including Beresfield, Hexham Swamp, Bobs Farm and Millers Forest. Human activity has also caused mapped 'Disturbed Terrain'.

### Acid sulfate soils

The following acid sulfate soil risks are mapped for the proposal site on the *1:25,000 Acid Sulfate Soil Risk Map for Newcastle* (Department of Land and Water Conservation 1997):

- EK1 estuarine back swamp soils of elevation 1-2 metres - high probability of occurrence of acid sulfate soils throughout the soil profile within one metre of the ground surface. Severe environmental risk is possible if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.
- Ap1 Alluvial plain soils of elevation 1-2 metres - high probability of occurrence of acid sulfate soils exists throughout the profile within one metre of the ground surface. Potential for severe environmental risk if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.
- Em Estuarine bottom sediments - High probability of occurrence of acid sulfate soils below water level. Severe environmental risk is a possibility if acid sulfate soil materials are disturbed by activities such as dredging.

In addition, as discussed in Section 4.2.1 and shown in Figure 4-1, the proposal site is mapped as Class 1, Class 2, Class 3 and Class 5 acid sulfate soil under the Newcastle LEP.

Development consent is required under Clause 6.1 for any works (Class 1), works below natural ground surface and for which the water table is likely to be lowered (Class 2) and more than one metre below the natural ground surface or works by which the water table is likely to be lowered more than one metre below the natural ground surface (Class 3).

## Contaminated land

A search of the contaminated land record for regulatory notices issued under the CLM Act found the following sites:

- One notice at Woodland Farm, Tarro for asbestos contamination in fill
- One current notice at the Forgacs Site on Sparke Street, Hexham
- One notice at the Trojay Pty Ltd site at 64 Old Maitland Road, Hexham for asbestos contamination in fill
- Four current notices at the former Astra St Landfill site at 1, 2 & 28 Astra Street, Shortland

In addition, the following sites have been voluntarily notified to the EPA under Section 60 of the CLM Act:

- QR National – 179 Maitland Road, Hexham – regulation not required
- Cummins Newcastle – 21 Galleghan Street, Hexham – under assessment
- Caltex Bogas Warehouse – 239 Old Maitland Road, Hexham – under assessment
- Industrial Galvanisers – 312 Pacific Highway, Hexham – currently regulated under the POEO Act
- Caltex Service Station – 300 Old Maitland Road, Hexham – under assessment
- BP Service Station – corner of Pacific Highway and Old Maitland Road, Hexham – under assessment
- Tuxford Park Landfill – 10 King Street, Shortland – regulation not required.
- BP Service Station – 298 Sandgate Road, Shortland – regulation not required
- Former Lorna Street Landfill – 475 Sandgate Road, Shortland – regulation not required
- Koppers Timber Treatment Site - 56-58 Glen Street, Beresfield
- BP Beresfield Truck Stop Service Station – Cnr Kinta Drive and John Renshaw Drive – under assessment

Environmental protection licences issued under the POEO Act include:

- Richmond Vale – Orica Australia Pty Ltd licenced for explosive production
- Stockrington - Buttai Gravel Pty Ltd licensed as a gravel quarry
- Minmi - Former Minmi sewage treatment plant
- Hexham – Aurizon Operations Limited, Brancourts Manufacturing, Hexham Bowling Club, Community Association in DP 270447, CPB Contractors Pty Ltd (rail corridor), CREI Industrial Nominees No. 2 Pty Ltd, Cummins South Pacific, Industrial Galvanisers, McDonalds Australia, One Steel Recycling Plant, Sanchez Group Property Pty Ltd and Slattery Auctions Australia Pty Ltd all licensed as industry
- Shortland – BHP Billiton Innovation Pty Ltd, HWC (sewage treatment works) and the Hunter Valley Private Hospital all licensed as industry

Based on either the minimum distance to the proposal or the nature of the activities undertaken at the sites, the potential for contamination from any of the above sites on the proposal is considered low.

A number of previous contamination investigations have been completed in the vicinity of the proposal site. Potential areas of environmental concern were identified including:

- Imported fill for construction of the former HWC water main access track containing coal washery reject and building rubble
- Past weed and pest control
- Former HWC water main with leaching of lead from pipe collars
- Spill over/blow over from the former Tuxford Park landfill at Shortland

However the potential for significant contamination of the soils proposed to be disturbed as part of construction of the proposal is considered to be low.

### ***Mine subsidence***

The proposal site is not mapped within a known mine subsidence district.

## **6.4.2 Potential impacts**

### ***Construction***

### ***Contamination***

The contaminated sites assessment (see Appendix F) for the proposal has found there is the potential for diffuse or isolated chemical contamination associated with:

- Historical use of the proposal route as a railway corridor with potential impacts from fuel, oil and grease residues along the former tracks, sleepers and surrounding areas (diffuse – along the length of the former railway).
- Historical construction of the railway including use of coal rejects, building rubble and rock fill (diffuse – along the length of the former railway).
- Historical use of herbicides or pesticides to maintain the former Chichester rising main, the former railway, adjacent roads and nearby agricultural land (diffuse – along the length of the former railway).
- Roads adjacent to the proposal route with accumulation and runoff containing fuel and oil residues potentially directed to road verges and drainage lines (isolated to areas adjacent to roads).
- Dilapidated timber bridge structures and coatings including potential use of lead based paint, pesticides and timber treatment chemicals.
- Potential for poor demolition practices, burial of wastes and illegal dumping along the proposal route including the potential for asbestos containing material (isolated to areas where dumping or building rubble were observed).
- Historical and current industrial/commercial practices within proximity of the proposal including Orica Technical Centre, Buttai Gravel Pit, former Minmi sewage treatment plant, Aurizon Operations, Shortland sewage treatment plant and Tuxford Park landfill (isolated to areas where these industries are close to the proposal).
- Potential for lead contamination to surface soils in areas surrounding the former/current water main due to the use of lead collars and solder (isolated to areas where the water main is in close proximity).

The overall risk of significant contamination being encountered during proposal works that disturb the ground surface is considered to be low. The risks from disturbance of potentially contaminated soils during proposal construction can be managed by implementation of the measures described in Section 6.4.3.

Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the management measures provided in Section 6.4.3.

### **Acid sulfate soils**

The proposal route traverses areas mapped as high probability for the occurrence of acid sulfate soils. Consent is required for works below the natural ground surface in some areas and one metre below ground level in other areas (see Figure 4-1).

The disturbance of acid sulfate soils can form sulphuric acid when soils react with oxygen in the air. Sulphuric acid can leach into surrounding environments, causing soils to become very acid and toxic and impacting waterways and soil health resulting in environmental and agricultural degradation.

Measures to avoid or minimise these potential impacts are provided in Section 6.4.3.

### **Water quality**

Construction activities have the potential to impact on water quality within local receiving waters. The main potential impacts relate to soil disturbance, which represents a risk to surface water quality, and runoff during construction. During construction, there is potential for a range of pollutants to enter waterways, particularly during high rainfall events. These include:

- Sediment laden water and soil nutrients (including construction wastewater) resulting from earthworks including:
  - Removal of vegetation currently stabilising soils and increasing the risk of erosion and sedimentation through the exposure of soils to weathering processes
  - Construction of including construction of piers and approach works
  - Construction of stormwater management infrastructure
  - Reinstatement of work areas following completion of construction
- Dust deposition during construction activities
- Construction waste
- Fuels spilled during refuelling of plant and equipment
- Hydraulic and lubricating oil leaking from plant and equipment
- Water from washing down of plant and equipment
- Concrete slurries or concrete wash, which could alter the pH of water if spilled into waterways
- Water containing biological contaminants such as nutrients and bacteria from site toilets and taps associated with site compounds
- Tannin runoff from cleared and mulched vegetation stockpiled on-site for use where possible on-site

The impact of construction activities on the quality of runoff discharging to the receiving drainage lines would be minimised by implementing an effective construction soil and water management plan.

Impacts on water quality during construction can be minimised effectively through implementation of the mitigation measures detailed in Section 6.4.3.

### **Operation**

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

There is a risk of fuel or chemical spill during routine maintenance activities and increased litter from user of the trail, which could impact on water quality in the nearby wetland.

## **6.4.3 Mitigation measures**

### **Construction**

#### **Soils**

- A detailed geotechnical investigation will be undertaken prior to detailed design to confirm geotechnical requirements (such as the presence of soft soils). The investigations would include further soil sampling and analysis to confirm the potential for acid sulfate soils and soil contamination.
- An acid sulfate soil management plan would be prepared as part of the CEMP in accordance with the Acid Sulfate Soil Laboratory Methods and Manual (ASSMAC, 1998). The plan would include as a minimum:
  - Where works are to be undertaken in Class 1 areas (Figure 4-1), material below the existing ground level (Class 2 mapping, Figure 4-1) or one metre below the existing ground level (Class 3 mapping, Figure 4-1), is to be disturbed by construction, fine grained agricultural lime (agLime) would be mixed through the disturbed soil in order to neutralise the actual and potential acidity present. A proposed application rate of four kilograms per cubic metre ( $\text{kg/m}^3$ ) is recommended for disturbed sands and clays up to a depth of 3.5 metres below surface level. This rate would be confirmed in the plan.
  - Lime should be thoroughly mixed through all excavated and stockpiled material during the excavation and/or backfill process.
  - Erosion and sediment control measures must be implemented at all times to ensure potential runoff and acidic leachate is contained and appropriately managed prior to controlled release.
  - Effective treatment of disturbed material should be confirmed by quantitative verification testing undertaken at a rate of no less than one test per 250 cubic metres of treated material, and at least one test per material type. Samples must be representative of the treated soil volume and span the depth as well as the horizontal area of the treated soil. Successfully treated material must have a pH less than 6.5 and a total acid generating potential below 0.03 percent equivalent sulphur. Photographic records of excavation, lime treatment and backfill should also be taken and kept for validation purposes.
  - Construction dewatering must be limited to no greater than three consecutive days at any one location. Where prolonged dewatering is required, additional controls to manage in situ groundwater conditions would be implemented.

- A soil and water management plan would be prepared as part of the CEMP in accordance with the requirements of The NSW Soils and Construction – Managing Urban Stormwater Volume 1 ‘the Blue Book’ (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change, 2008). The plan would include as a minimum:
  - Erosion and sediment controls would be implemented in accordance with the soil and water management plan before any construction starts and inspected regularly, particularly after a rainfall event. Maintenance work would be undertaken as needed.
  - Site stabilisation of disturbed areas would be undertaken progressively as stages are completed. Controls would not be removed until areas are stabilised.
  - All stockpiles would be located away from drainage lines and areas subject to flooding. Appropriate erosion and sediment controls would be established and maintained for stockpiles.
  - Controls would be implemented at work site exit points to minimise the tracking of soil and particulates onto pavement surfaces.
  - Any material transported onto pavement surfaces would be swept and removed at the end of each working day.
  - A dewatering procedure to identify controls and management measures for dewatering including testing, containment and disposal.
- A contaminated soils management plan would be prepared as part of the CEMP in accordance with the requirements of relevant guidelines made under the CLM Act. The plan would include as a minimum:
  - Provision for further detailed assessment where appropriate to confirm the conclusions of this preliminary assessment and to determine whether any specific remediation or management of areas is required. Any future contamination reports would be prepared or reviewed and approved by an appropriately qualified and certified Environmental Consultant accredited under a scheme recognised by the NSW EPA and Council. Further assessment would be based on the following:
    - potential areas and types of contamination identified in this assessment
    - the potential for exposure to workers and to end-users based respectively on the nature of the proposed construction works and the final design of the proposal.
  - Appropriate management controls to minimise the potential for exposure of contamination to workers and recreational users within the proposal site both during and post construction.
  - Description of appropriate excavation, validation, management and/or disposal requirements for potentially contaminated materials, if identified by further assessment or encountered during the construction of the proposal site.
  - Sampling and analysis requirements for assessment of potentially contaminated soils for re-use or for waste classification prior to offsite disposal.
  - Contingency plans including unexpected finds protocols for potentially contaminated soils (if encountered) including landfill or anthropogenic waste and potential asbestos containing material.

### Water quality

- A fully equipped emergency spill kit would be kept on-site at all times.
- All fuels, chemicals, and liquids would be stored at least 50 metres away from the wetland and drainage lines.

- Refuelling of plant and equipment is to occur in impervious bunded areas located a minimum of 50 metres from the wetland and drainage lines.
- Compounds and storage locations would be located as far as practicable outside areas subject to flooding.
- Vehicle wash downs and/or concrete truck washouts would be undertaken within a designated bunded area on an impervious surface or undertaken off-site.
- A facility for collecting, treating and disposing of concrete wastes generated during construction would be installed on-site.
- Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) would be undertaken on a regular basis to identify potential spills or the effects of sediment-laden runoff. If visual inspection identifies concerns, water quality monitoring should be considered. Data would be assessed against the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 2000).
- Vehicles and plant would be properly maintained and regularly inspected for fluid leaks.
- Low lying areas of construction formations that collect stormwater would be dewatered (if required) in accordance with the soil and water management plan (as part of the CEMP).

### **Operation**

No specific mitigation measures are required during proposal operation.

## **6.5 Surface and groundwater hydrology**

The following sections have been summarised from the specialist hydrology assessment prepared by GHD, which is included in full in Appendix G.

### **6.5.1 Existing environment**

#### **Hydrology**

The proposal is located on the Hunter River floodplain. The Southern Channel of the Hunter River is approximately 2.5 kilometres to the east. The proposal crosses a number of creeks and drainage channels including Ironbark Creek, Fishery Creek, Purgatory Creek, Minmi Creek, Wallis Creek and Surveyors Creek.

The Hexham Swamp covers a large portion of the proposal site. It is mapped as a coastal wetland under the Coastal Management SEPP and coincides with part of the area gazetted as the Hunter Wetlands National Park.

Alluvial aquifers consist of deposits of unconsolidated silts, sand and minor fine gravels of mixed colluvial-alluvial origin and are present in many of the valleys of creeks and gullies within the vicinity of the proposal. These do not have significant groundwater storage capacity.

The hydrological features of the study area are shown in Figure 6-3.

#### **Flooding**

The proposal site is mapped as high and medium flood risk on Council's flood maps (see Figure 6-3). Due to its coastal location, the proposal site would be subject to flooding during high rainfall events, elevated ocean levels and a combination of both.

The *Lower Hunter River Flood Study Update* (DHI 2008) provides an estimate of the maximum levels within the Hexham Swamp. Flooding occurs in this area in response to Hunter River flooding, with Table 6-10 providing a summary of the predicted flood level from a number of design storm events.

**Table 6-10 Flood levels in Hexham Swamp**

Annual exceedance probability (AEP; %)	Maximum modelled flood level (mAHD)
0.5	4
1	3.8
2	2.7
5	2.3
10	1.9

***Water sharing plans***

The proposal site is subject to the water sharing plan (WSP) for the Hunter Unregulated and Alluvial Water Sources. This WSP commenced in August 2009 and regulates extraction and interception of surface water and alluvium from unregulated rivers in the vicinity of the proposal.

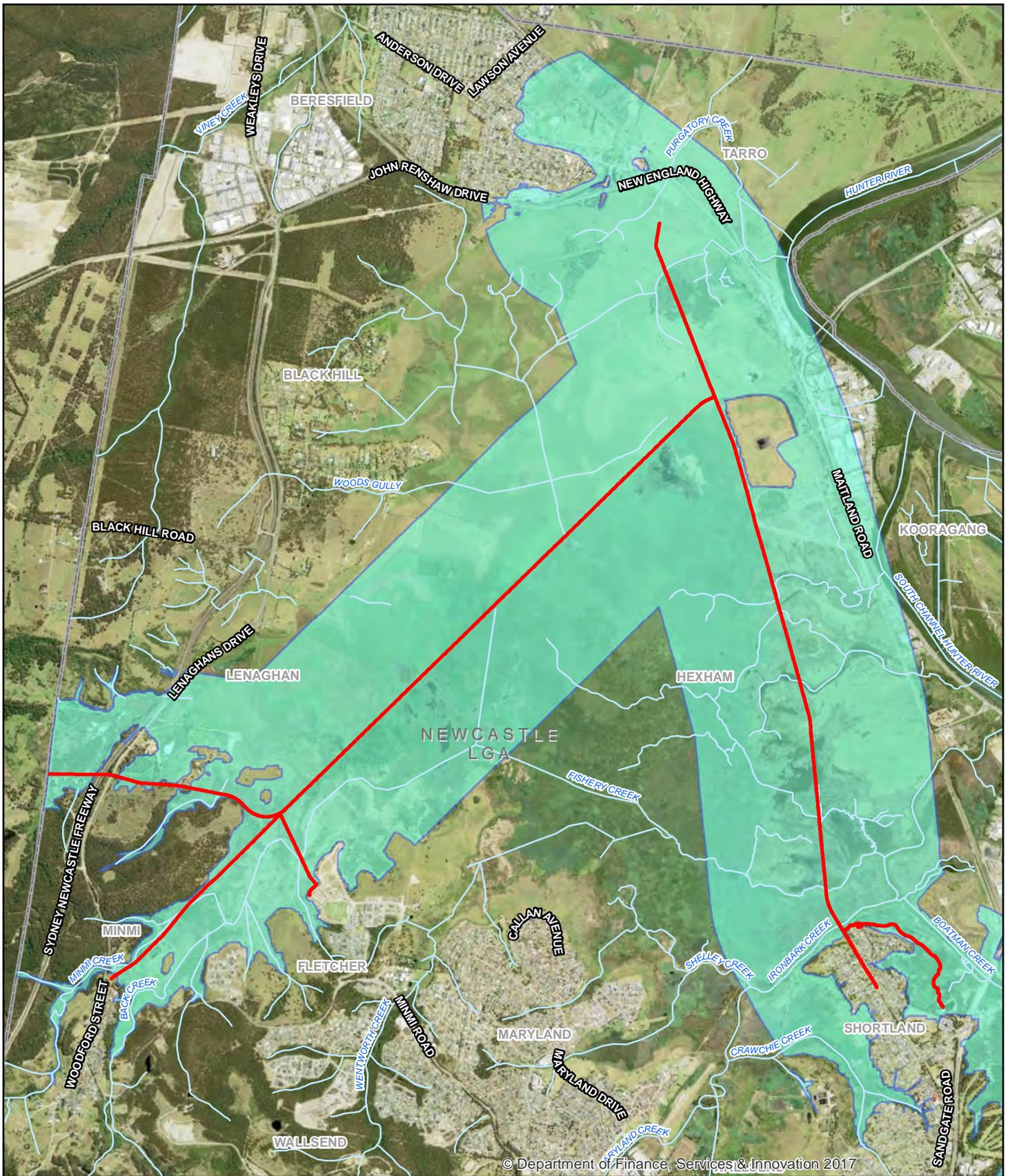
The proposal site is subject to the WSP for the North Coast Fractured and Porous Rock Groundwater Sources. This WSP commenced in July 2016 and regulates extraction and interception of groundwater from the fractured and porous rock aquifer in the vicinity of the proposal.

***Registered groundwater users***

A total of 13 registered bores are located within approximately two kilometres of the proposal site (<http://allwaterdata.water.nsw.gov.au/water.stm>). The majority of the bores are registered as monitoring or test bores. The remainder of the bores are registered for stock or domestic use. The depth to groundwater ranges between 2.8 - 72 metres below ground level. Regional groundwater would generally be expected to flow in an easterly and south-easterly direction towards the Hunter River.

***Groundwater dependent ecosystems***

High priority groundwater dependent ecosystems (GDEs) listed in the WSP for the North Coast Fractured and Porous Rock Groundwater Sources and the WSP for the Hunter Unregulated and Alluvial Water Sources include the wetlands associated with the Hexham Swamp.



**LEGEND**

- Proposed route
- Flood prone land
- Watercourse
- LGA boundary

Paper Size A4  
 0 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56



Newcastle City Council  
 Richmond Vale Rail Trail  
 Environmental Impact Statement  
**Hydrology and flood risk  
 of the study area**

Job Number | 22-18317  
 Revision | 0  
 Date | 11 Apr 2019

**Figure 6-3**

## **6.5.2 Impact assessment**

### **Construction**

Earthworks for the proposal would be limited to minor cut and fill along the proposal route of generally 0.2 metres depth or less. There would be limited regrading of existing embankments and cuttings. Accordingly there is little likelihood of significant impact to surface water during construction.

The excavation associated with construction of the Ironbark Creek and Fishery Creek crossings could intercept groundwater. If groundwater is intercepted, dewatering of excavations would be required. Any potential impact on groundwater level would be limited to the vicinity of the excavation and would have negligible impact on the seepage or flow of groundwater to the Hexham Swamp or high priority groundwater dependent ecosystems. Following construction any excavations associated with creek crossings would be backfilled. No other excavations are expected to intercept groundwater.

Construction activities would include the installation or modification of existing watercourse crossing structures. This will require works within existing ephemeral drainage lines, which may require temporary diversions, erosion and sediment controls would be installed to minimise potential impacts on pathways and flow volumes downstream. The construction of the watercourse crossing structures should be undertaken outside of periods of extended wet weather in order to minimise the requirement to divert flows around the works site. If flows are to be diverted, they are to be intercepted, diverted and discharged as near as practical to the existing flow path(s). These measures will minimise the potential changes to flow pathways and flow volumes in the downstream environment.

Flooding during construction would impact on proposed works. Safety procedures would be in place to avoid impacts on workers and measures would be implemented to ensure that no equipment or materials are stored or left within areas of flood. This includes ensuring, where practicable, stockpiles are located outside of high risk flood areas (i.e. away from existing drainage lines) in order to minimise the potential alteration of flood levels, pathways and velocities during construction.

### **Operation**

There is not expected to be any ongoing interception of groundwater during proposal operation. The proposal design would ensure that surface water flow is maintained following construction of the trail.

A hydrological assessment of the proposal was conducted during preparation of the design. The assessment found that the proposal would be flood free during flood events up to and including the 10% AEP event (refer Table 6-10). In addition, compared to the significant flood storage within the Hexham Swamp, the proposal would not have a significant impact to flooding.

Flooding of the trail during operation could present a risk to human health and safety. Operational procedures would be developed to restrict access to the trail and ensure safety of users during periods of floods, while instructional signage would include historical flood levels and safety procedures for trail users to follow in the case of flood. This would include emergency contact details and assembly points.

### **6.5.3 Mitigation measures**

#### ***Detailed design***

- The detailed design process should include detailed hydraulic modelling of the proposed trail in order to design crossing structures (such as culverts, bridges, fences etc.) that, as far as reasonably practical, match the existing hydraulic response. This will minimise the potential indirect impacts on the wetland.

#### ***Construction***

- Construction of the proposal would be undertaken so that there would be a minimum amount of excavation of the existing soil to minimise potential impacts on the groundwater level.
- The period of excavation would be minimised to further reduce the potential for groundwater impacts.
- The soil and water management plan (see Section 6.4.3) would include a strategy for monitoring and, if required, treating any extracted groundwater prior to discharge back onto the ground surface to minimise any short term impacts.
- If dewatering is required, the need for a water licence would need to be confirmed with WaterNSW.
- The soil and water management plan would include procedures to ensure that machinery, stockpiles, equipment, fuels and chemicals, and other facilities are not stored or left within areas subject to flooding.
- An emergency response plan would be prepared to 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.

#### ***Operation***

To protect trail users during periods of flood:

- Operational procedures would include measures to restrict access to the trail (such as gates that can be closed during inundated periods) and ensure safety of users during proposal operation.
- Instructional signage would include safety procedures for trail users to follow in the case of flood. This would include emergency contact details and assembly points.

## 6.6 Traffic, transport and access

The following sections have been summarised from the specialist traffic report prepared by GHD, which is included in full in Appendix H.

### 6.6.1 Existing environment

#### Roads

While much of the proposal site is remote from the road network, the route intersects various roads including:

- King Street and Sandgate Road, Shortland
- Kural Crescent and Mitti Street, Fletcher
- Woodford Street and Lenaghans Drive, Minmi

These roads are described below and shown in Figure 2-1 and Figure 3-1.

#### King Street and Sandgate Road, Shortland

King Street is a local residential collector street that runs parallel to the beginning of the trail. Access to the arterial road network is via Marton Street, another residential collector road, to Sandgate Road. The intersection of Marton Street and Sandgate Road is give-way controlled.

Sandgate Road is a sub-arterial road connecting the Pacific Highway/Maitland Road via a grade-separated interchange to the Newcastle Inner City Bypass. It has a single lane in each direction, and a 50 kilometres per hour (km/h) speed limit.

#### Kural Crescent and Mitti Street, Fletcher

Relevant local roads within Fletcher include Kural Crescent and Mitti Street, while connections to the wider road network include via Kurraka Drive or Tibin Drive/Awabakal Drive to Minmi Road. Local and collector roads in Fletcher have a 50 km/h speed limit. Minmi Road has a 60 km/h speed limit, with signalised intersections and roundabouts providing connections into residential subdivisions.

#### Woodford Street and Lenaghans Drive, Minmi

The proposal would connect to an access road just off Woodford Street, Minmi, opposite the Minmi Rural Fire Station. Through Minmi, Woodford Street has a posted speed limit of 50 km/h, with a single lane of traffic in each direction.

North of Minmi, Woodford Street becomes Lenaghans Drive, a sub-arterial road running parallel to the Pacific Motorway, with a single lane in each direction and an 80 km/h speed limit.

#### Arterial road network

The arterial road network in the vicinity of the proposal includes the New England Highway (A1), John Renshaw Drive (B6), Pacific Motorway (M1), Newcastle Link Road (A15) and Hunter Expressway (M15).

John Renshaw Drive connects Tarro and Kurri Kurri and has a posted speed limit of 100 km/h. The westbound annual average daily traffic (AADT) of John Renshaw Drive in 2010 was 16,093 west of Tarro. Eastbound volumes were not available.

The Pacific Motorway commences at John Renshaw Drive, Tarro and heads south, with major interchanges at the Hunter Expressway and George Booth Drive, before continuing towards the Central Coast and Sydney. Traffic volumes from 2016 indicate a two-way AADT of 32,314 south of Tarro. The Pacific Motorway has a posted speed limit of 110 km/h.

Roads and Maritime are currently planning the extension of the M1 to Raymond Terrace. The current proposal includes the Pacific Motorway (M1) diverting from its current route south of John Renshaw Drive, and heading east to Tarro. The new route would include an interchange with the New England Highway at Tarro before heading east over the New England Highway, Main Northern Rail Line and the Hunter River. The new route would meet the existing Pacific Highway alignment at Tomago, with a diversion to the east of the Heatherbrae industrial area. Future extension of the trail would intersect with the M1 extension at Tarro, where it would need to pass over or under the new route as well as the existing New England Highway. This section of the route would be determined in close consultation with Roads and Maritime.

Newcastle Link Road is a major arterial road connecting Newcastle and the Hunter Expressway, with a posted speed limit of 90 km/h. Traffic volumes from 2010 showed an AADT of 27,098.

Hunter Expressway connects to Newcastle Link Road and runs past Kurri Kurri heading north with a posted speed limit of 110 km/h. Traffic volumes from 2016 showed an AADT of 26,772 south of the John Renshaw Drive interchange.

### **Crash history**

The crash history from 2011-2015 was sourced from the NSW Centre for Road Safety for the road network surrounding the proposal and includes:

- There were two crashes recorded in King Street, Shortland, both resulting in moderate injury. Both crashes involved a vehicle out of control, one leaving the road to the left and hitting an object.
- There were three crashes at Tarro recorded at the top of the eastbound off-ramp from the New England Highway, including two single-vehicle run-off-road crashes. There were a further three crashes in Anderson Drive, near the New England Highway interchange.
- There were no crashes recorded in the vicinity of the proposal at Minmi.
- There were no crashes recorded in the vicinity of the proposal at Fletcher.

### **Rail**

The existing Hunter Valley Rail Line is located about 1.5 kilometres to the east of the proposal site. The closest train station to the proposal is at Tarro and is located at the end of Woodberry Road. The rail service is run by NSW Trains between Scone, Dungog or Telarah, and the Newcastle Interchange. Trains run approximately hourly every day.

The proposed Lower Hunter Freight Corridor would connect the Main North Railway Line at Fassifern with the Hunter Valley Rail Line at Hexham. Transport for NSW are currently investigating options for the route.

### **Buses**

Bus services at Shortland are operated by Newcastle Transport. One route travels via Griffiths Road/Donald Street, linking Shortland with Newcastle West. Services are approximately every 60 minutes on weekdays and Saturdays, and Sundays.

Bus services at Tarro are operated by Hunter Valley Buses. Route 181 loops through Tarro via Christie Road, Burgess Parade, Southern Avenue, Eastern Avenue and Anderson Drive, and operates approximately hourly on weekdays and Saturdays, with less frequent services on Sundays.

Bus services at Fletcher are operated by Hunter Valley Buses. Route 260 travels via Kurraka Drive, Tibin Drive and Awabakal Drive during weekday peak periods only. Otherwise services travel via Minmi Road.

Bus services at Minmi are operated by Hunter Valley Buses and stop at Woodford Street near Minmi Road. Only some services on Route 260 continue to the Minmi terminus, with most services terminating at Fletcher.

### **Cycling**

There are many local bike tracks in the areas surrounding the proposal ranging from off road gravel tracks to sealed bike/pedestrian tracks that follow local road alignments.

The *Newcastle Cycling Strategy and Action Plan* (The City of Newcastle, 2012) outlines a vision for cycling activity in Newcastle, including improvements to cycling infrastructure. The strategy outlines a number of proposed routes that align with parts of this current proposal, or would connect to it, including:

- R8 – Birmingham Gardens to Tarro via Hexham Swamp
- R9 – Minmi to Hexham
- L1 – Lenaghans Drive to Maryland
- R11 – Minmi to Beresfield
- L33 – Minmi to Maryland Drive West
- R2 – Newcastle to Maitland

## **6.6.2 Potential impacts**

### **Construction**

#### **Access**

Construction access is discussed in Section 3.6.11. It is not expected that any of the proposed access points would result in significant impacts to the point of access or the surrounding road network.

The proposal site would intersect with property accesses and driveways where it runs along road corridors. Potential impacts could include temporary loss or delay to property access while works are in that location. These delays and associated inconveniences to property owners would be temporary only and construction activities would be planned to consider pedestrian and vehicle movements in consultation with residents and business owners, to ensure impacts are minimised.

#### **Construction vehicle movements**

The construction of the proposal would involve increased vehicle movements in and around the construction site and compound areas. Construction vehicle movements would comprise:

- Heavy vehicles (construction plant and machinery, material and equipment delivery)
- Worker vehicles (cars/light vehicles which would arrive and leave at the start and end of each day)

Construction vehicle numbers are estimated to be between 20 and 30 each day.

Construction is expected to occur over the standard working hours of 7:00 am to 6:00 pm Monday to Friday, and 8:00 am to 1:00 pm Saturday. The volume of traffic associated with construction would vary from location to location, and across the duration of the works.

The delivery of some equipment and machinery may be considered oversized deliveries. These deliveries would be undertaken in accordance with the requirements of Council and/or Roads and Maritime, so as not to cause undue interruption or compromise the safety of the road network or road users.

Increased vehicle movements may increase the potential for incidents and accidents but the overall number of construction vehicles is minor in relation to existing traffic volumes. Construction vehicles would predominantly access the site during work hours on week days which would minimise impacts on weekend traffic.

### Workforce parking

Designated worker parking would be provided within the site compounds and, where appropriate, dedicated access points to minimise inconvenience to residents and local businesses during the construction period.

### Operation

#### Traffic

The majority of users of the proposal are likely to be recreational users, as opposed to commuters. As such, while the proposal may result in a minor reduction in commuters using the local road network, traffic movements to and from the rail trail during the network peak periods would be minimal. The peak traffic activity associated with the proposal is expected on weekends, and during holiday periods, when background traffic volumes are generally lower and there is spare capacity on the road network. Accordingly, significant traffic impacts during proposal operation are not anticipated.

Routine maintenance of the proposal would not generate significant traffic numbers.

#### Parking and access

Proposed parking provision is anticipated to be sufficient for the usage envisaged as there would be several locations available to access the trail. However, Council would monitor use over time to keep track of parking availability.

Maintenance and emergency vehicle access would be via the connection points and Shortland, Minmi and Tarro, infrastructure in the form of gates and bollards would be installed at these connection points to exclude trespass by other vehicles. Once access been gained from the connectionpoints,maintenance and emergency vehicles movements would be restricted to the trail.

The expected traffic activity at each trail head is reflected in the number of parking spaces provided. Parking supply at each location is summarised in Table 6-11.

**Table 6-11 Proposed parking supply**

Location	Approximate parking supply
Shortland (King Street)	9
Hunter Wetland Centre	40 (shared with Wetland Centre)
Fletcher	0
Minmi	11

## Loss of rail facilities

Community input during the preparation of the EIS raised the loss of opportunity to reinstate a rail service to the rail line if the proposal is constructed. Given the long closed and derelict nature of the majority of the line, including the bridges, this is not considered feasible. On balance, considering the cost of restoration of the rail line and the benefits of its use as a rail trail for recreational and commuter users, the proposal is considered the best and highest use for the land.

### 6.6.3 Mitigation measures

#### *Detailed design*

- Upgrades to intersections would be investigated during detailed design at intersections including:
  - Woodford Street opposite Minmi Rural Fire Station. Consideration should include the need for localised widening to provide a BAR treatment could be investigated as part of the civil works at this location.
  - George Booth Drive access to Blue Gum Creek. Consideration should include reconfiguration of this intersection to allow right turns off George Booth Drive.

#### *Construction*

- Construction traffic management plans (CTMPs) would be prepared and approved by Council prior to works commencing. The CTMPs would include specific temporary traffic management measures to support construction activities at some locations:
  - King Street, Shortland
  - Ausgrid Access Road, Maryland
  - Woodford Street, Minmi
  - Kural Crescent, Fletcher
- Worker parking would be constrained to within the compound site as far as is practicable.
- Carpooling and other methods would be investigated to limit the number of vehicles coming to site, as far as practicable.
- The queuing and idling of construction vehicles in residential streets would be minimised to reduce nuisance.
- An emergency response plan would be developed for construction traffic incidents and/ or accidents. During site inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents.
- The community and local residents would be notified in advance of vehicle movements and anticipated effects on the local road network relating to site works. This would aim to reduce delays and access impacts for residents, public transport, pedestrians and cyclists.
- Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners.

## Operation

- Council would monitor the use of car parks over time to determine if parking provided is sufficient.
- In order to manage the potential conflict between light and heavy vehicle traffic at the Private Quarry Access Road, the following measures are recommended:
  - Provision of truck warning signage on the access road
  - Management of roadside vegetation to maintain forward sight lines for traffic moving along the access road.
- Signage would be installed at all locations where the proposal interacts at grade with a road or other road safety issue (such as a school zone), providing a clear delineation between the proposal and the road. Trail users would be warned of the approaching road, via 'Road Ahead' signage. Road and other users would be warned of the approaching trail using appropriate signage in accordance with Australian Standards (see Section 3.5.7).

## 6.7 Biodiversity

The following sections have been summarised from the specialist biodiversity assessment prepared by GHD, which is included in full in Appendix I.

### 6.7.1 Methodology

#### Overview

A BDAR has been prepared in accordance with the Biodiversity Assessment Method (BAM) to assess the likely impacts of the of the proposal on biodiversity values, in particular threatened species and communities listed under the BC Act and FM Act, and relevant MNES listed under the EPBC Act.

The BAM was established by the *Biodiversity Assessment Method Order 2017* made under the provisions of Part 6, Division 2 of the BC Act. The preparation of a BDAR in accordance with the BAM is required as the proposal exceeds the Biodiversity Offset Scheme (BOS) threshold set out in Clause 7.1(1)(b) of the *Biodiversity Conservation Regulation 2017*, as it is located on land included on the Biodiversity Values Map published under Clause 7.3 of the regulations.

The biodiversity assessment for the proposal was undertaken in two broad stages. The original assessment commenced in 2016 using transitional arrangements provided under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*. This stage of assessment predates the application of the BAM. The second stage of the assessment (undertaken since 25 February 2018) was completed in accordance with the BAM after the transitional arrangements ended and former planning provisions no longer applied.

The following section provides a summary of the methodology used to prepare the BDAR. Further details on the methodology are provide in the BDAR in Appendix I.

#### Desktop assessment

A desktop assessment was undertaken to identify threatened flora and fauna species, populations and ecological communities (threatened biota) listed under the BC Act and FM Act, and MNES listed under the EPBC Act, expected to occur in the locality based on previous records, known distribution ranges and habitats present. These searches were also used to obtain the necessary site data to perform BAM calculations.

The desktop assessment included a review of both licensed and publicly available databases for a 10 kilometre radius around the proposal site in order to assess the suitability of the habitat within the study area and the broader locality for threatened species and ecological communities. Following collation and review of database records and threatened species and community profiles, a 'likelihood of occurrence' assessment was prepared for threatened biota and migratory species with reference to the broad vegetation types and habitats contained within the proposal site.

A detailed description of the desktop assessment and results can be found in the BDAR in Appendix I.

### **Field survey (2016/ 2017)**

Baseline field surveys were initially conducted in 2016-2017 across the entire route for Richmond Vale Rail Trail. Site investigations were undertaken by two ecologists across five days in September and October 2016, during which vegetation ground-truthing surveys, systematic floristic plot sampling, habitat assessment, diurnal bird surveys, and opportunistic threatened flora and fauna searches were completed.

Additional microbat surveys were conducted in January 2017 to the west of the study area at Tunnel 1 and 2 in Stockrington. A summary of the baseline field survey effort is provided in Table 6-12. A detailed description of the baseline survey methodology is provided in the BDAR in Appendix I.

**Table 6-12 Baseline survey effort (2016 - 2017)**

Survey dates	Survey method and effort
21-23 September 2016	Habitat assessment Vegetation ground-truthing Targeted threatened flora searches Dawn bird surveys (x 2 mornings)
30 September – 2 October 2016	Acoustic microbat surveys at the tunnels (west of the study area) (one unit deployed overnight at each tunnel)
13 – 14 October 2016	BioBanking plot transect surveys (nine plots, four within the proposal site)
23 November 2016	Koala Spot Assessment Technique surveys
12, 30 January 2017	Dusk bat observation surveys at the tunnels (west of the proposal site).

The results of the baseline surveys in 2016-2017 indicated that the key biodiversity values for the study area were habitats for threatened and migratory wetland birds, and habitats for cave-roosting microchiropteran bats. The biodiversity values of the study area are strongly influenced by the wetland and estuarine habitats present, and the presence of the underpass tunnels within proximity of the vegetated slopes of the Sugarloaf Range to the west.

### **Field survey (2019)**

Field survey recommenced in early 2019 and was undertaken within the threatened species assessment framework as prescribed in the BAM (OEH, 2017). The field survey was restricted to the sections of the trail between Shortland to Tarro and Pambalong, and focussed on further refining the vegetation mapping to identify plant community types (PCTs) and vegetation zones, collecting vegetation integrity plot data, and undertaking targeted threatened species surveys for the assessment of species credit entities.

Staged surveys of the study area were conducted in accordance with the BAM and with reference to appropriate threatened species survey guidelines for targeted species (OEH, 2016; DEC, 2004). Site surveys included:

- Site stratification and refinement of vegetation mapping.
- Sampling of vegetation integrity plot/transects.
- Habitat assessments.
- Targeted surveys for threatened flora and fauna.

The survey effort is summarised in Table 6-13. A detailed description of site survey methodologies is provide in the BDAR in Appendix I.

**Table 6-13 Field survey effort (2019)**

Survey date	Techniques
24 January 2019	Ground-truth vegetation mapping Vegetation zone mapping Habitat assessments
8 February 2019	Vegetation integrity plots Targeted flora survey
3 – 8 March 2019	Arboreal mammal trapping (Elliot A) Dirunal bird surveys Anabat survey Nocturnal microbat survey Active search of bat roosts Stagwatching potential owl tree Spotlighting Green and Golden Bell Frog call playback Habitat assessments
11 March 2019	Anabat survey
18 April 2019	Vegetation integrity plots Targeted flora survey

#### **Targeted threatened fauna surveys**

Under Section 6.2 of the BAM, targeted, seasonal surveys are required for candidate threatened species entities (i.e. species credit species) and specific habitat resources such as nesting or roosting habitat for dual credit species. Targeted fauna survey techniques and effort conducted in the study area are summarised in Table 6-14.

A full list of candidate threatened entities (species credit species) is provided in the BDAR in Appendix I.

Targeted survey for Green and Golden Bell Frog (*Litoria auria*) was not undertaken for the 2019 field survey due to a lack of adequate rainfall within the planned field season. Given that additional targeted surveys for this species were not completed, this species is assumed to be present at the site.

**Table 6-14 Targeted fauna survey techniques and effort**

Survey technique	Target species	Methods	Survey effort
Opportunistic fauna surveys	All species credit entities	Opportunistic and incidental observations of fauna species were recorded at all times during the field survey.	N/A
Active searches for microbat roosts	Microchiropteran species credit entities	Conducted in compliance with the 'Species credit' threatened bats and their habitats'- NSW survey guidelines for the Biodiversity Assessment Method (OEH, 2018).	3 x 2 hr surveys (4,5,7/03/2019) Total=6 hrs
Nocturnal microbat survey	Microchiropteran species credit entities	Bat surveys were conducted to assess the likely presence of and potential impacts on cave-roosting microbat species. These surveys involved inspection of potential roost sites for the presence of maternal roosts (OEH, 2018).	2 person hrs across three nights (3, 4, 7/03/2019) Total= 6 hrs
Ultrasonic call recording	Microchiropteran species credit entities	Conducted in compliance with the 'Species credit' threatened bats and their habitats'- NSW survey guidelines for the Biodiversity Assessment Method (OEH, 2018).	4 x Anabats positioned in different locations over four nights (12 hours each/per night from 5-7/03/2019, and 11/03/2019) Total= 192 hrs
Spotlighting	Barking Owl Masked Owl Powerful Owl Sooty Owl Squirrel Glider Common Planigale Eastern Pygmy Possum Grey-headed Flying-fox Brush-tailed Phascogale	Surveys conducted in accordance with methods described in the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC, 2004).	2 x 2 hr spotlight surveys (4/03/2019) Total= 4 hrs
Call playback	Green and Golden Bell Frog	Conducted in accordance to the 'Threatened species survey and assessment guidelines: field survey methods for fauna- Amphibians' (DEC, 2009). Note: call playback was conducted outside of suitable survey period so presence should be assumed (see section 6.5.1.1 of BAM).	Total= 4 person hours across one evening (6/03/2019)

Survey technique	Target species	Methods	Survey effort
Diurnal bird surveys	Wetland bird species credit entities Little Eagle Square-tailed Kite Swift Parrot	Bird surveys were performed opportunistically during daylight hours within the proposal area. All vegetation types were examined to compile a list of native birds present. Species were identified by sight and call. Incidental observations made outside the targeted survey period were also recorded.	4 x 2 person hour assessments (5-8/03/2019) Total= 8 hrs
Habitat assessments	All species credit entities	Refer to Section 3.3.1 in Appendix I, subsection Fauna habitat assessment.	4 x 2 person hour assessments (5-8/03/2019) Total= 8 hrs
Arboreal Elliot trapping	Squirrel Glider Eastern Pygmy Possum Brush-tailed Phascogale	Surveys conducted in accordance with Table 5.8 of Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC, 2004)	25 Elliot A traps over 4 nights (3-8/03/2019) Total=100 trap nights

For some species credit entities, OEH have identified 'important habitat' within which these species must be assumed to be present. For these species, targeted seasonal surveys are not required (Section 6.4.1.25 of the BAM). OEH confirmed that the following candidate threatened species have important habitat mapping that intersects with the proposal site:

- Curlew Sandpiper (*Calidris ferruginea*).
- Black-tailed Godwit (*Limosa limosa*).
- Terek Sandpiper (*Xenus cinereus*).

These candidate threatened species were assumed to be present and no targeted survey was required.

The following non-threatened species also have mapped areas of important habitat that intersects with the proposal site:

- Bar-tailed Godwit (*Limosa lapponica baueri*).
- Eastern Curlew (*Numenius madagascariensis*).
- Red Knot (*Calidris canutus*).

These species are not listed under the BC Act and so are not assessable under the BAM as candidate threatened species. However, these species are listed under the EPBC Act and are assessed as MNES (see Section 6.7.3).

#### **Aquatic habitat assessment**

A rapid aquatic habitat assessment was undertaken along Ironbark Creek and Fishery Creek.

An assessment of potential habitat for threatened aquatic species was based on these habitat assessments and published habitat preferences of threatened biota. Key fish habitat maps for the area (DPI, Key Fish Habitat Maps, 2007) were reviewed and key fish habitat was identified according to the classifications detailed in the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) (refer to Appendix I for further detail).

#### **Geographical Information System (GIS) analysis**

GIS analysis is an integral part of the BAM. GIS was used to:

- Plot the proposal site over high resolution aerial photography to map vegetation zones, survey effort, habitat resources and biodiversity values across the site.
- Calculate the extent of native vegetation to be impacted.
- Identify patch sizes relevant to the proposal site.
- Confirm the relevant Interim Biogeographic Regionalisation for Australia (IBRA) bioregion, IBRA subregion and Mitchell Landscape for the site.
- Plot a 500 metre buffer area surrounding the site in which site context components were calculated.

A detailed description of the GIS analyses used to prepare the BDAR can be found in Appendix I.

### **BAM calculations**

The proposal was assessed according to the methodology presented in the BAM (OEH, 2017), the BAM Operational Manual Stage 1 (OEH, 2018) and the Biodiversity Assessment Methods Calculator Users Guide (OEH, 2017). The credit calculator is a software application that is used to apply the BAM. Data is entered into the credit calculator based on information collected in the desktop assessment, site surveys and GIS analysis.

The BAM credit calculations were performed by Cecilia Phu (accredited assessor) using credit calculator version 1.2.6.00. Data entered into the BAM calculator and the biodiversity credit report is included in the BDAR in Appendix I.

## **6.7.2 Existing environment**

### **Landscape features**

The BAM requires the assessment of landscape features to help describe the biodiversity values of the proposal site, and to assess the impacts of the proposal. Landscape features relevant to the BAM calculations are summarised in Table 6-15. Further details on the landscape features of the site can be found in the BDAR in Appendix I.

**Table 6-15 Landscape features of the proposal site**

Landscape features	Proposal site
Method applied for site context components	Linear-based (500 m buffered assessment area)
IBRA bioregion	Sydney Basin
IBRA subregion	Hunter
BioNet NSW landscapes (former Mitchell landscapes)	Lower Hunter Channels and Floodplains (majority of proposal site) Gosford - Cooranbong Coastal Slopes (Shortland and Minmi ends) Watagan Ranges (near Pambalong Nature Reserve)
Rivers, streams and estuaries	The following rivers, streams and estuaries have been mapped within or downstream of the proposal site and buffered assessment area: Hunter River Ironbark Creek Fishery Creek Purgatory Creek Minmi Creek Un-named first and second order streams
Wetlands	The following Nationally Important Wetlands have been mapped within the proposal site and buffered assessment area: Shortland Wetlands Centre Hexham Swamp RAMSAR wetland: Site 24 - Hunter Estuary Wetlands Coastal Wetlands defined under the Coastal Management SEPP are also mapped within the proposal site and buffered assessment area.

Landscape features	Proposal site
Connectivity of different areas of habitat	The proposal site includes key fauna corridors mapped under the Key Habitats and Corridors (KHC) Project (DECCW, 2011). Wetland and dry sclerophyll forest habitats within the proposal site are part of larger patches of forests and wetland vegetation within the buffered assessment area and wider locality. A network of roads and dual carriageway lanes in turn intersects these patches. Notwithstanding, the wetland and swamp vegetation types are still hydrologically connected to other significant areas of wetland habitat.
Areas of geological significance and soil hazard	There are no areas of geological significance within the proposal site. Acid sulfate soil risk mapping indicates that there is a high probability of occurrence of acid sulfate soils across the majority of the proposal site. The acid sulfate soil risk is high, and is associated with estuarine and alluvial processes on backswamps, plains and bottom sediments. Estimated depth to acid sulfate soils include 1-2 metres and 2-4 metres.
Areas of outstanding biodiversity values	There are no areas of outstanding biodiversity value mapped within the proposal site.

### Vegetation

The native vegetation extent within the study area was mapped in accordance with Section 5.1 of the BAM (OEH, 2017) and includes all areas of native vegetation, including areas where woody cover may have been removed and only native groundcover remains.

The majority of the proposal site has been historically cleared for the former HWC Chichester rising main and Richmond Vale railway and is dominated by exotic grasslands. The extent of native vegetation mapped within the proposal site is approximately 3.3 hectares and represents the fringes of remnant native woodland patches and wetland vegetation extending offsite into the study area. Much of this vegetation is affected by weeds including *Rubus fruticosus* (Blackberry), *Lonicera japonica* (Japanese Honeysuckle), *Juncus acutus* (Sharp Rush) and exotic grasses.

There is approximately 26.5 hectares of non-native vegetation in the study area, the majority of which is exotic grasslands. Other areas of non-native vegetation include planted vegetation in the Hunter Wetland Centre and patches of groundcover vegetation almost entirely dominated by the introduced *Juncus acutus* (Sharp Rush), which was recorded in estuarine and brackish environments associated with the lower reaches of Ironbark and Fishery creeks at the Shortland end of the proposal site.

## Plant community types and vegetation zones

There are 11 PCTs mapped within the study area. Of these, 10 PCTs occur within the proposal site. A number of the PCTs conform to threatened ecological communities (TECs) listed under the BC Act and EPBC Act.

Two PCTs comprising mangrove and saltmarsh vegetation, are defined as key fish habitat, and are protected marine vegetation under the FM Act.

The vegetation types (including PCTs, derived grassland and non-native or non-indigenous vegetation) mapped within the study area are summarised in Table 6-16. A detailed description for each PCT can be found in the BDAR in Appendix I.

The vegetation zones identified within the proposal site and the vegetation integrity score components as required by Table 25 of the BAM (OEH, 2017a) are detailed in Table 6-17.

PCTs and vegetation zones in the study area are shown in Table 6-16.

**Table 6-16 PCTs within the study area**

PCT	BC Act status	EPBC Act status	FM Act status	Extent in proposal site (ha)	Extent in study area (ha)
PCT 1528 - Jackwood - Lilly Pilly - Sassafras riparian warm temperate rainforest of the Central Coast.	EEC	CEEC	-	0.18	1.11
PCT 1568 - Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Not listed	Not listed	-	0.22	1.33
PCT 1590- Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Not listed	Not listed	-	0.04	1.67
PCT 1598- Forest Red Gum grassy open forest on floodplains of the lower Hunter	EEC	Not listed	-	0.76	3.47
PCT 1619- Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Not listed	Not listed	-	0.00	0.09
PCT 1718- Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	EEC	Not listed	-	0.41	4.83
PCT 1727 - Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast	EEC	EEC	-	0.60	9.86
PCT 1747- Grey Mangrove low closed forest	Not listed	Not listed	Protected marine vegetation (Key Fish Habitat)	0.24	8.50
PCT 1746- Saltmarsh Estuarine Complex	EEC	VEC	Protected marine vegetation (Key Fish Habitat)	0.02	0.62
PCT 1737- Typha Rushland	EEC	Not listed	-	0.85	45.34
PCT 1808- Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline	EEC	Not listed	-	0.01	29.21
Planted vegetation	n/a	n/a	n/a	0.12	1.79
Exotic grassland	n/a	n/a	n/a	26.33	68.59
<i>Juncus acutus</i> reedland	n/a	n/a	n/a	0.00	0.90
<b>TOTAL AREA (hectares)</b>				<b>29.8</b>	<b>177.3</b>

EEC = endangered ecological community, VEC = vulnerable ecological community, CEEC = critically endangered ecological community

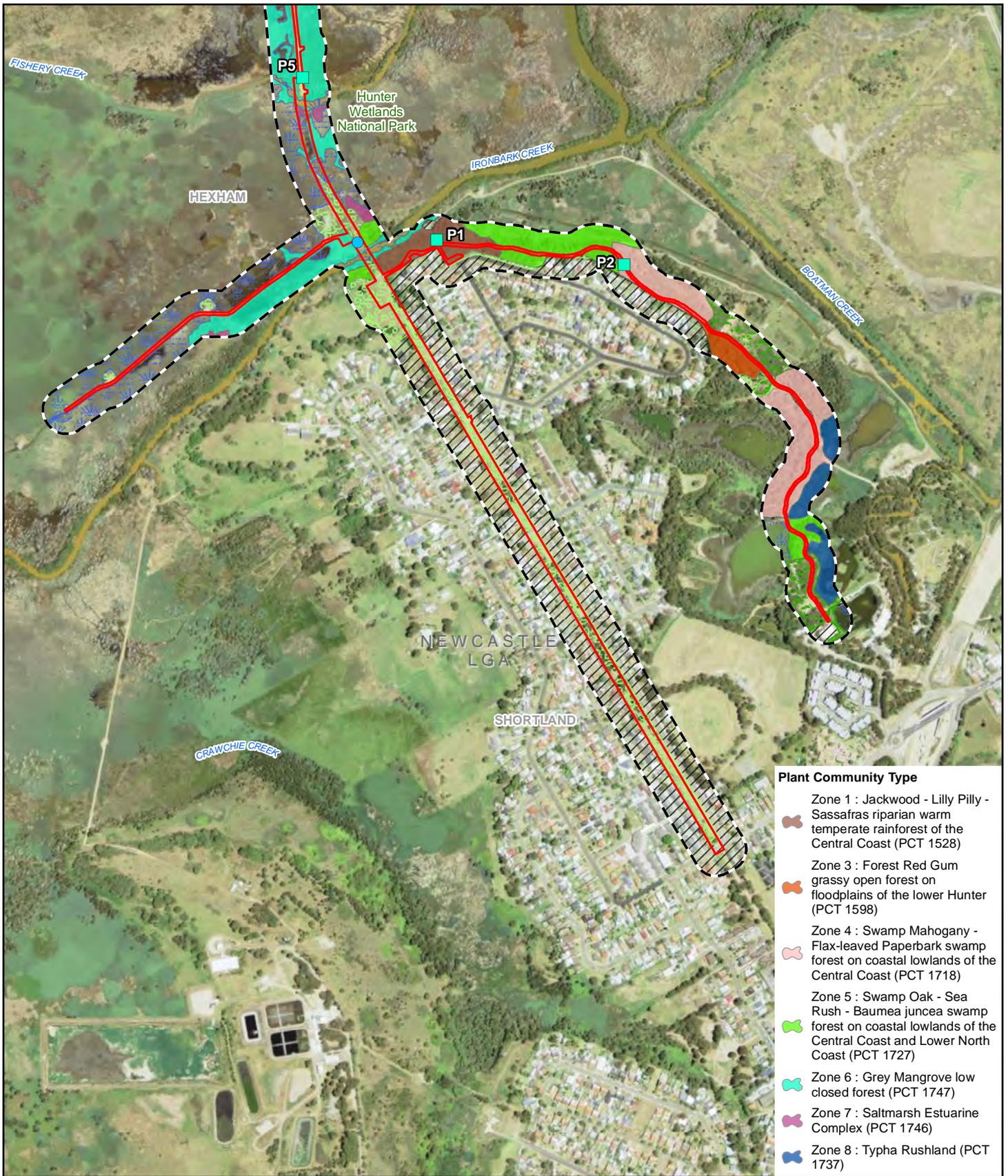
**Table 6-17 Vegetation zones within the proposal site**

Vegetation zone	PCT	Condition	Area (ha)	Patch size (ha)	Composition score	Structural score	Functional score	Vegetation integrity score
1	PCT 1528 - Jackwood - Lilly Pilly - Sassafras riparian warm temperate rainforest of the Central Coast.	intact	0.18	> 101	66	50.2	100	69.2
2	PCT 1568 - Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	intact	0.22	> 101	29.7	41.3	68.4	43.8
# see table note	PCT 1590- Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	intact	0.04	> 101	n/a	n/a	n/a	n/a
3	PCT 1598- Forest Red Gum grassy open forest on floodplains of the lower Hunter	intact	0.76	> 101	76.7	21.8	94.6	54.1
4	PCT 1718- Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	intact	0.41	> 101	41.1	24.4	65.5	40.3
5	PCT 1727 - Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast	intact	0.60	> 101	34.4	18.4	45	30.5
6	PCT 1747- Grey Mangrove low closed forest	intact	0.24	> 101	68.9	98.5	-	82.4
^see table note	PCT 1746- Saltmarsh Estuarine Complex	intact	0.02	> 101	n/a	n/a	n/a	n/a
7	PCT 1737- Typha Rushland	intact	0.85	> 101	69.9	91.2	-	79.8
*see table note	PCT 1808- Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline	intact	0.01	> 101	n/a	n/a	n/a	n/a

# PCT 1590 is present within the proposal site as two small patches; has been combined with the nearest PCT (i.e. PCT 1598) to form one vegetation zone due to its size.

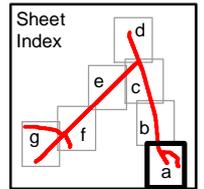
^ PCT 1746 has been combined with the nearest PCT (i.e. PCT 1747) to form one vegetation zone due to its size.

\* PCT 1808 has been combined with the nearest PCT (i.e. PCT 1737) to form one vegetation zone due to its size.

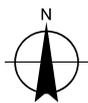


- Plant Community Type**
- Zone 1 : Jackwood - Lilly Pilly - Sassafras riparian warm temperate rainforest of the Central Coast (PCT 1528)
  - Zone 3 : Forest Red Gum grassy open forest on floodplains of the lower Hunter (PCT 1598)
  - Zone 4 : Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast (PCT 1718)
  - Zone 5 : Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
  - Zone 6 : Grey Mangrove low closed forest (PCT 1747)
  - Zone 7 : Saltmarsh Estuarine Complex (PCT 1746)
  - Zone 8 : Typha Rushland (PCT 1737)

- LEGEND**
- Disturbance boundary
  - Proposal area
  - BAM plot surveys (2019)
  - Exotic grassland
  - Plantings
  - Cleared
  - Water
  - Threatened biota and habitat
  - (Spotted Harrier)



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 Grid: GDA 1994 MGA Zone 56



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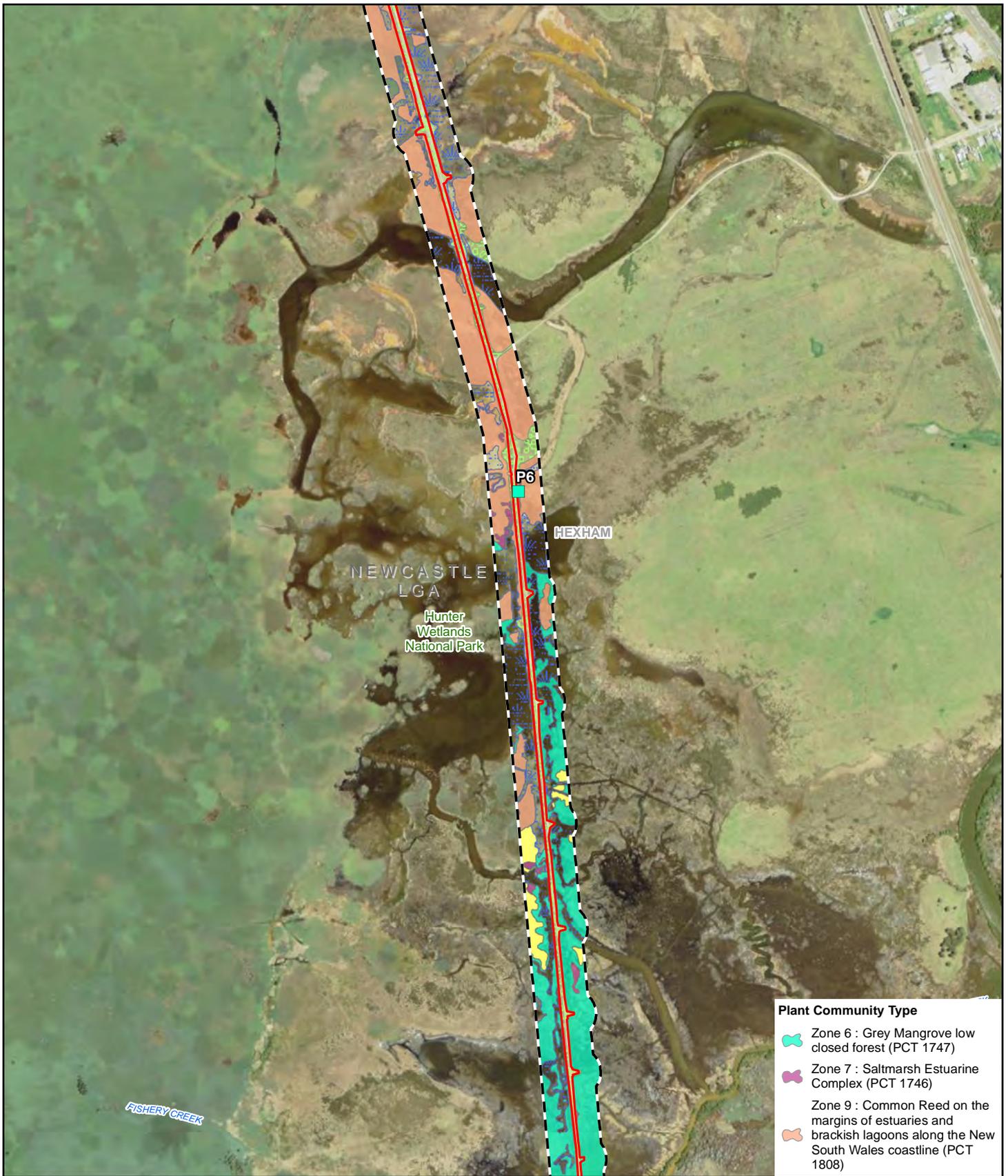
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**Vegetation communities and threatened species recorded within the study area**

**Figure 6-4a**

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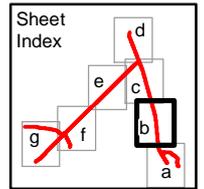
Data source: LPI: DTDB / DCDB, 2017, Aerial Imagery, 2012. Created by: fmackay, tmorton



**Plant Community Type**

- Zone 6 : Grey Mangrove low closed forest (PCT 1747)
- Zone 7 : Saltmarsh Estuarine Complex (PCT 1746)
- Zone 9 : Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (PCT 1808)

- LEGEND**
- Disturbance boundary
  - Proposal area
  - BAM plot surveys (2019)
  - Juncus acutus reedland
  - Exotic grassland
  - Water



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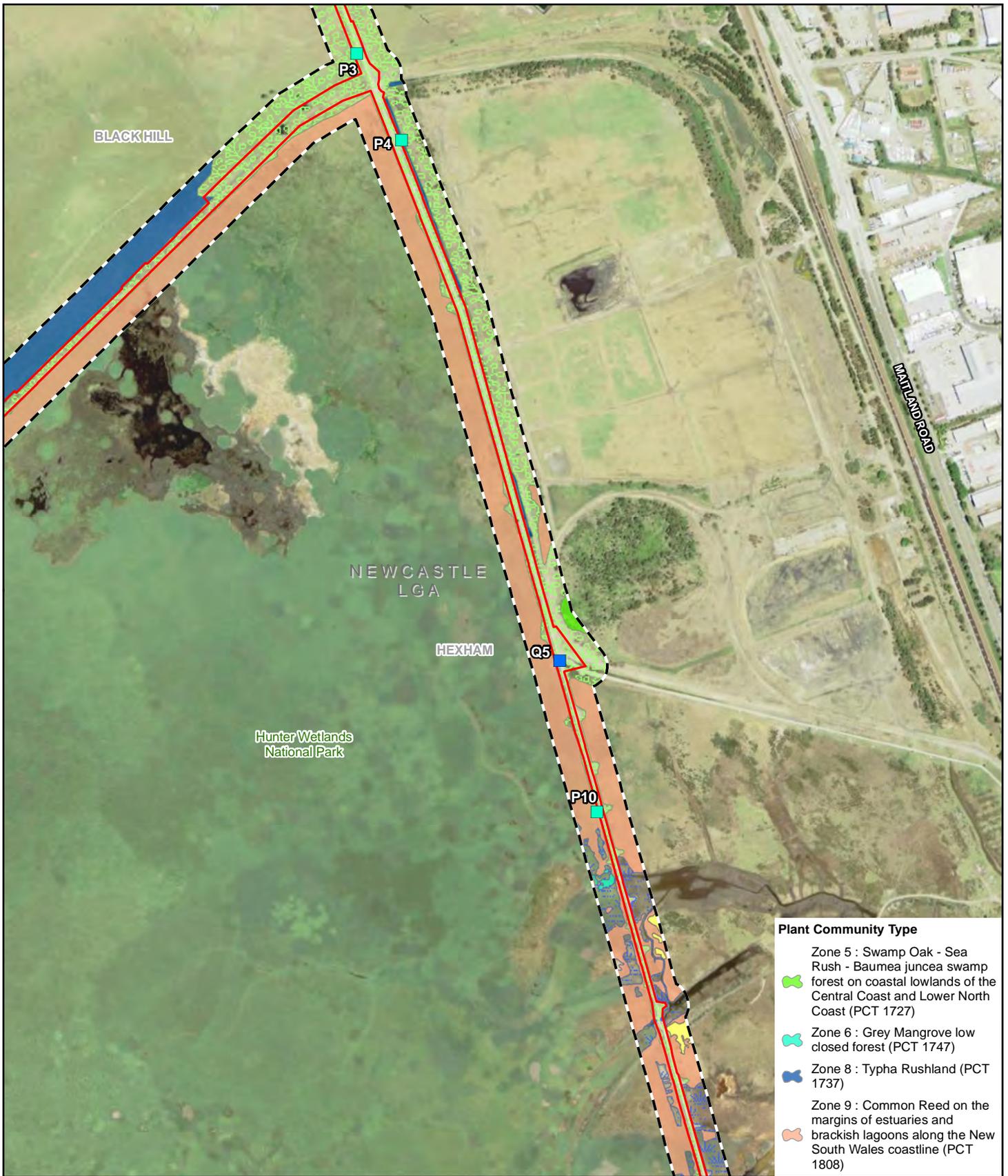
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**Vegetation communities and threatened species recorded within the study area**

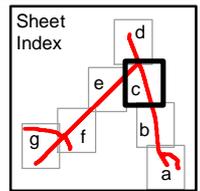
**Figure 6-4b**

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- Plant Community Type**
- Zone 5 : Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
  - Zone 6 : Grey Mangrove low closed forest (PCT 1747)
  - Zone 8 : Typha Rushland (PCT 1737)
  - Zone 9 : Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (PCT 1808)

- LEGEND**
- Disturbance boundary
  - Proposal area
  - BBAM plot surveys (2016)
  - BAM plot surveys (2019)
  - Juncus acutus reedland
  - Exotic grassland
  - Water



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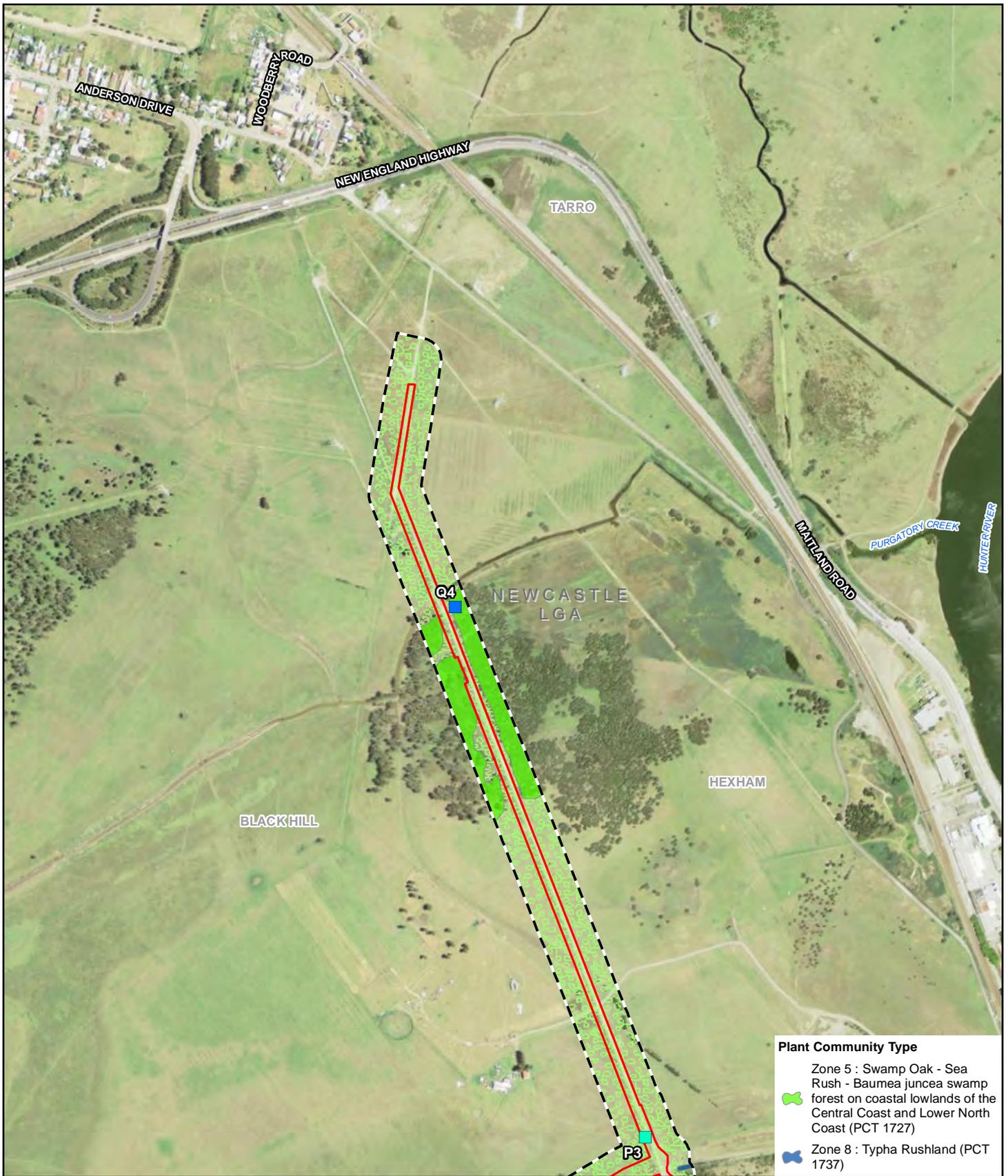


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**Vegetation communities and threatened species recorded within the study area**

**Figure 6-4c**



**Plant Community Type**

- Zone 5 : Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
- Zone 8 : Typha Rushland (PCT 1737)

**LEGEND**

- Disturbance boundary
- Exotic grassland
- Proposal area
- BBAM plot surveys (2016)
- BAM plot surveys (2019)

**Sheet Index**

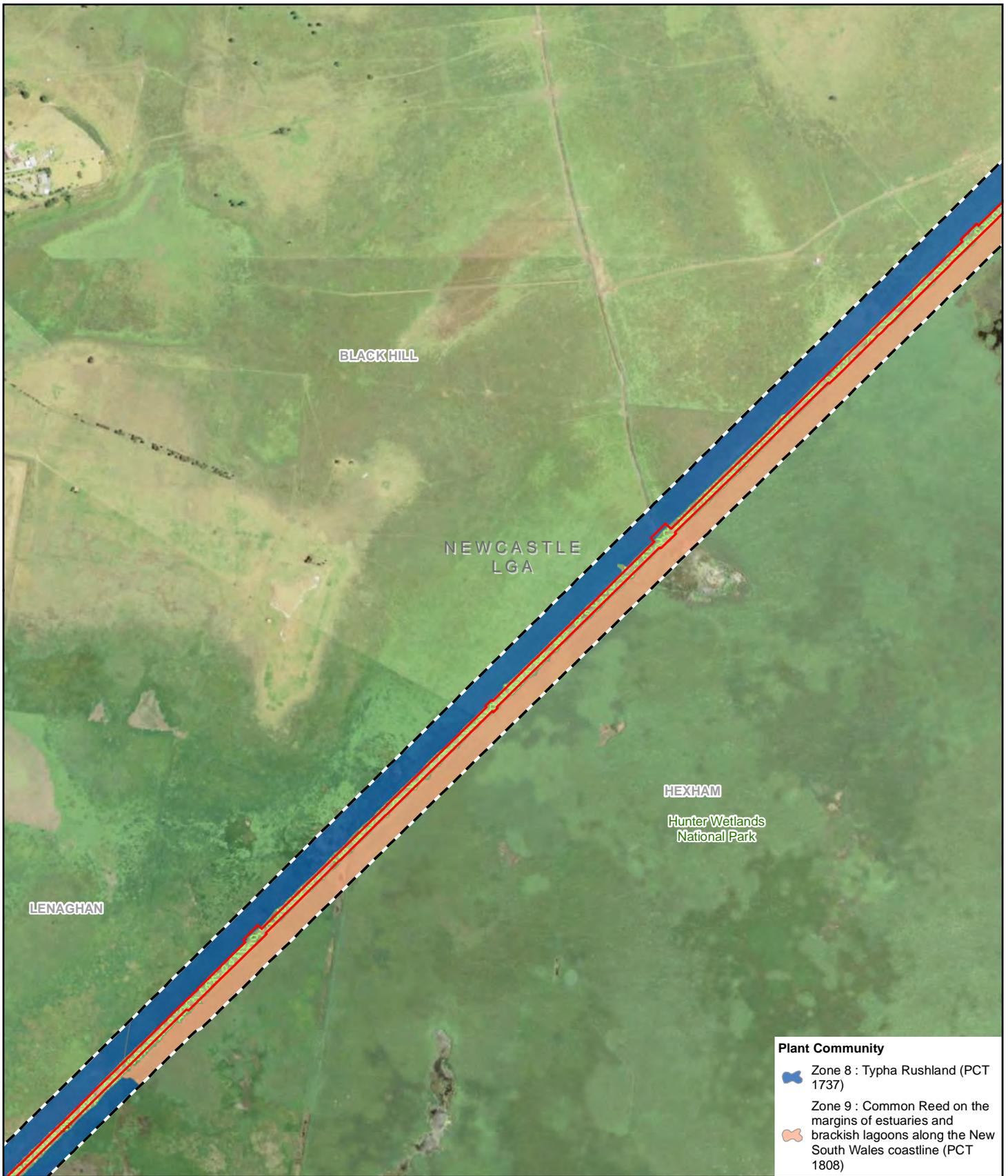
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**Vegetation communities and threatened species recorded within the study area** Figure 6-4d

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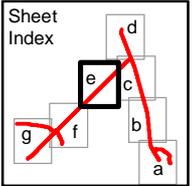


**Plant Community**

- Zone 8 : Typha Rushland (PCT 1737)
- Zone 9 : Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (PCT 1808)

**LEGEND**

- Disturbance boundary
- Proposal area
- Exotic grassland



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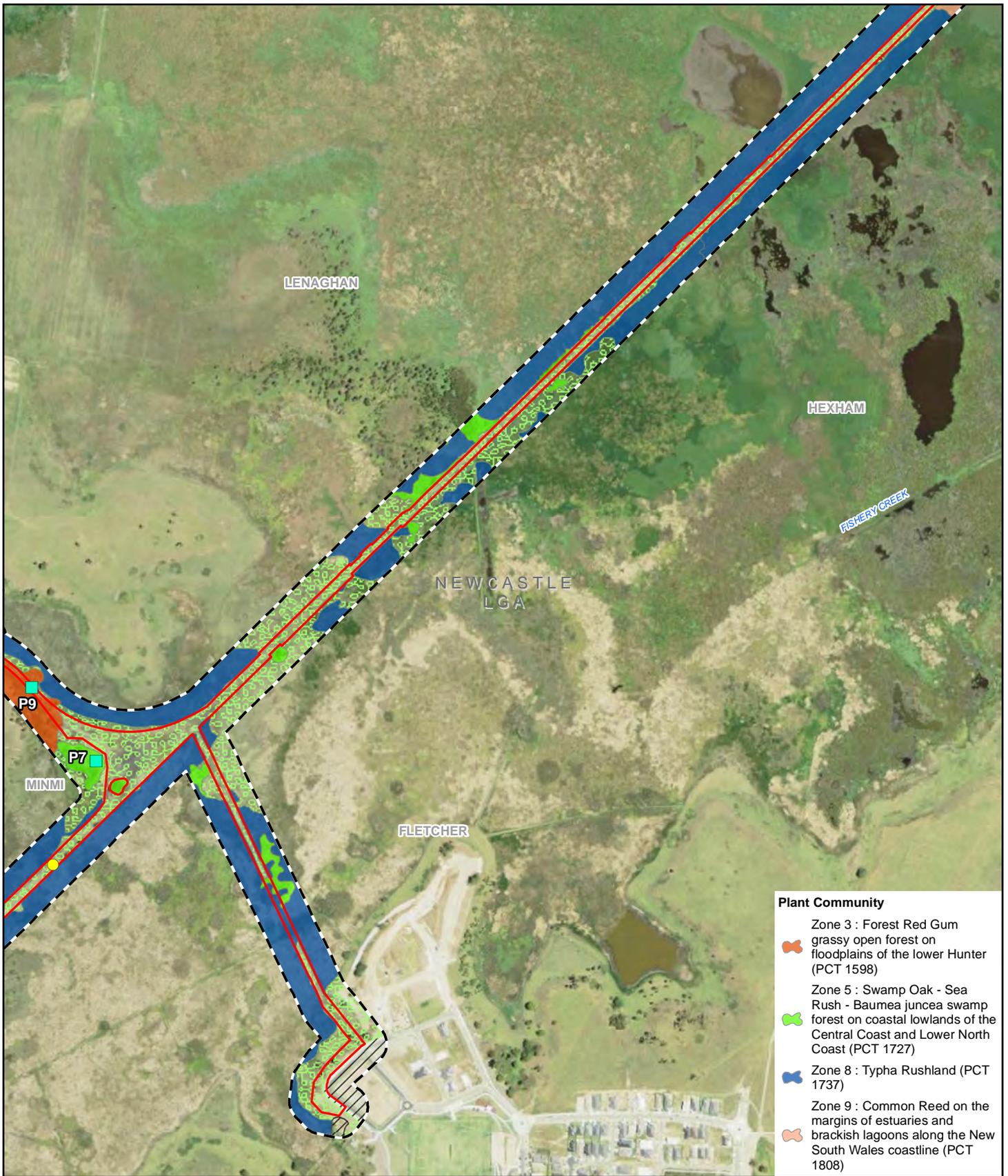


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**Vegetation communities and threatened species recorded within the study area**

**Figure 6-4e**

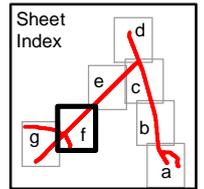


**Plant Community**

- Zone 3 : Forest Red Gum grassy open forest on floodplains of the lower Hunter (PCT 1598)
- Zone 5 : Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
- Zone 8 : Typha Rushland (PCT 1737)
- Zone 9 : Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coastline (PCT 1808)

**LEGEND**

- Disturbance boundary
- Proposal area
- BAM plot surveys (2019)
- Exotic grassland
- Cleared
- Threatened biota and habitat (Little Eagle)



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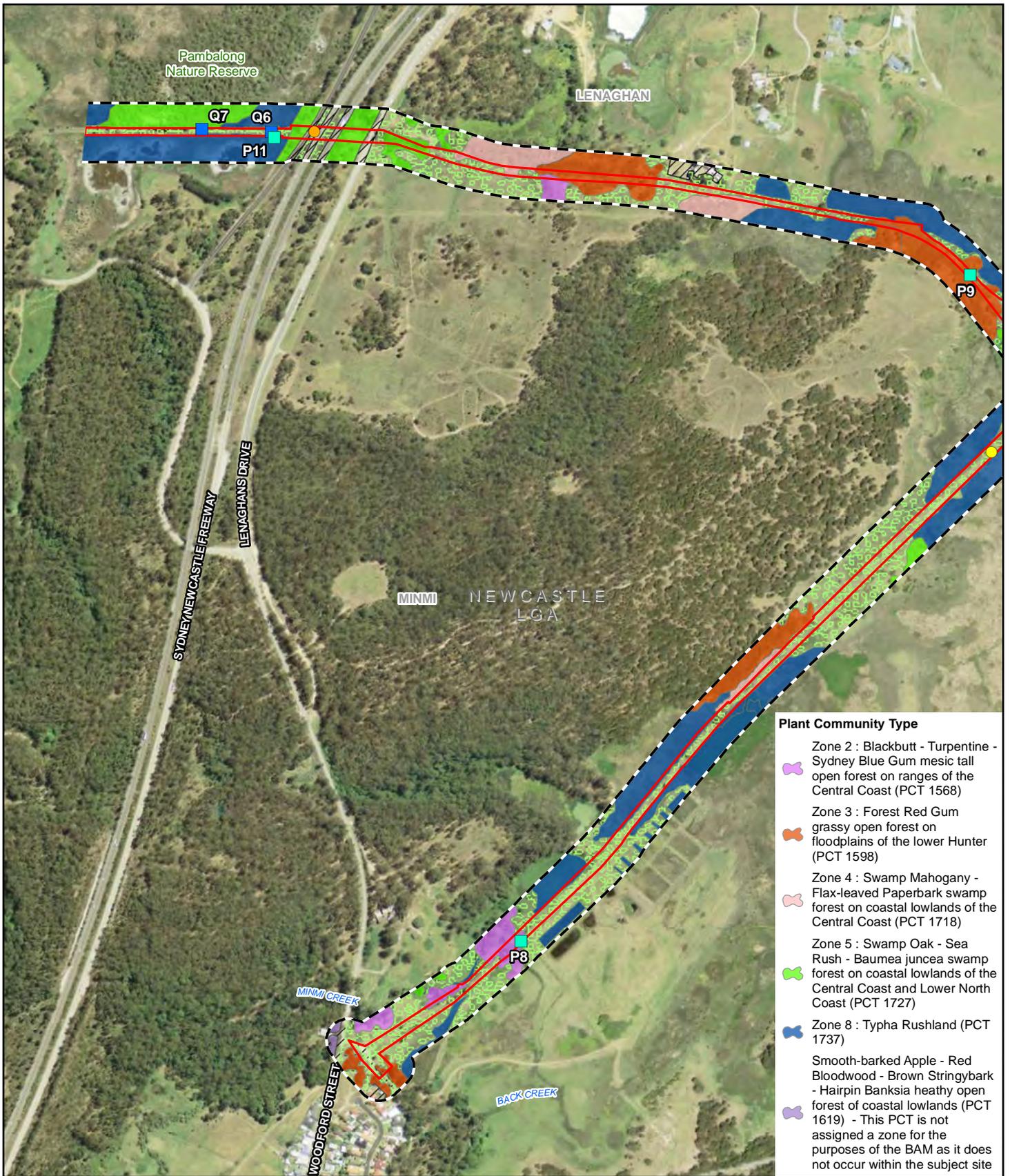
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**Vegetation communities and threatened species recorded within the study area**

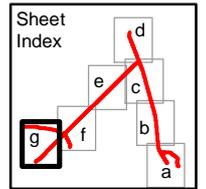
**Figure 6-4f**

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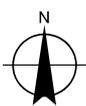


- Plant Community Type**
- Zone 2 : Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast (PCT 1568)
  - Zone 3 : Forest Red Gum grassy open forest on floodplains of the lower Hunter (PCT 1598)
  - Zone 4 : Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast (PCT 1718)
  - Zone 5 : Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
  - Zone 8 : Typha Rushland (PCT 1737)
- Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands (PCT 1619) - This PCT is not assigned a zone for the BAM as it does not occur within the subject site

- LEGEND**
- Disturbance boundary
  - Proposal area
  - BBAM plot surveys (2016)
  - BAM plot surveys (2019)
  - Exotic grassland
  - Cleared
  - Water
  - Threatened biota and habitat**
  - (Black-necked Stork)
  - (Little Eagle)



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**Vegetation communities and threatened species recorded within the study area**

**Figure 6-4g**

## Flora species

A total of 160 species from 65 families were identified within the study area, including 114 native species and 46 exotic species (see Appendix I for full species list).

No threatened flora species were identified within the study area during targeted field survey. The flora habitats within the proposal site represent highly disturbed edge vegetation and soil profiles along the pipeline and rail trail embankment are likely to have been historically disturbed.

Four priority weeds, *Lantana camara* (Lantana), *Senecio madagascariensis* (Fireweed), *Rubus fruticosus* sp. *aggregate* (Blackberry) and *Alternanthera philoxeroides* (Alligator Weed) listed under the *Biosecurity Act 2015* for the Hunter region were recorded within the study area during the field survey. These are also Weeds of National Significance declared under the National Weed Strategy.

Twenty exotic species classified as high threat weeds for the purposes of the BAM were also recorded in the study area (listed in Appendix I).

## Groundwater dependent ecosystems

A search of the Bureau of Meteorology Atlas of groundwater dependent ecosystems (GDEs) was used to determine any dependence (or interaction) on groundwater for the vegetation communities within the proposal site. The wetland areas within the study area are classified as a known aquatic GDE from regional studies. The associated wetland vegetation, comprising *Typha* rushlands, Swamp Oak and Grey Mangrove swamp forests, are classified as high potential GDEs from regional studies.

The assessment of these wetland communities in the BDAR represents an assessment of the GDEs within the proposal site.

## Fauna

### Fauna habitat

The dominant habitat types of the study area include:

- Forested habitats.
- Wetland habitats.
- Planted vegetation.
- Exotic grassland.
- Cleared land (including roads and gravel tracks).
- Artificial structures (bridges, buildings and tunnels).

A detailed description of these habitat types and associated fauna species is included in the BDAR in Appendix I.

### Terrestrial fauna

A total of 112 species from 57 families were identified within the study area, including 108 native species and four introduced species (see Appendix I). This comprised four frog species, 82 bird species, 24 mammal species and two reptile species.

Twelve fauna species recorded within the study area are listed as threatened under the BC Act. Of these, one is also listed as threatened under the EPBC Act. An additional four species recorded within the study area are listed migratory species under the EPBC Act. These species are listed in Table 6-18.

**Table 6-18 Threatened and migratory fauna species recorded within the study area**

Scientific name	Common name	BC Act	EPBC Act
<b>Birds</b>			
<i>Apus pacificus</i>	Forked-tailed Swift		Mi
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		Mi
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V	
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	
<i>Epthianura albifrons</i>	White-fronted Chat	V	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	
<i>Hieraaetus morphnoides</i>	Little Eagle	V	
<i>Hydroprogne caspia</i>	Caspian Tern		Mi
<i>Ninox connivens</i>	Barking Owl	V	
<i>Tringa nebularia</i>	Common Greenshank		Mi
<b>Mammals - bats</b>			
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V
<i>Miniopterus australis</i>	Little Bentwing-bat	V	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	
<i>Myotis macropus</i>	Southern Myotis	V	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	

E=endangered, V = vulnerable, Mi = migratory

A number of species listed under the EPBC Act were considered as moderately to highly likely to occur within the study area but were not recorded during field surveys. A large proportion of these migratory species are wetland specialists, which reflects the recognised wetland habitat values of the Hunter Wetlands National Park and the Hunter Estuary Wetlands Ramsar site. The areas of suitable wetland habitat for most migratory bird species likely to occur in the study area are located in the estuarine and brackish habitats at the Shortland end of the study area, and within the Hunter Wetlands Centre.

These species are listed in Table 6-19 and considered in further detail in the BDAR in Appendix I.

**Table 6-19 Threatened and migratory species known or likely to occur in the proposal site**

Scientific Name	Common Name	EPBC Act
<i>Litoria aurea</i>	Green and Golden Bell Frog	V
<i>Botaurus poiciloptilus</i>	Australasian Bittern*	E
<i>Calidris canutus</i>	Red Knot, Knot	E, MW
<i>Calidris ferruginea</i>	Curlew Sandpiper**	CE, MW
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit	V, MW
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, MW
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	MW
<i>Gallinago hardwickii</i>	Latham's Snipe	MW
<i>Tringa nebularia</i>	Common Greenshank	MW
<i>Tringa stagnatilis</i>	Marsh Sandpiper	MW
<i>Plegadis falcinellus</i>	Glossy Ibis	MW

MW = migratory wetland, V = vulnerable, E = endangered, CE = critically endangered

### Koala habitat

The Koala habitat within the study area is not considered to be core habitat as defined in SEPP 44, or critical koala habitat for the purposes of the EPBC Act (see Appendix I for further details).

### Aquatic habitat

The aquatic habitats within the study area are represented by water bodies with fringing *Typha orientalis* (Broad-leaved Cumbungi) and *Phragmites australis* (Common Reed) within the broader wetland landscape of the Hunter Wetlands National Park and Pambalong Nature Reserve. Waterways associated with Fishery Creek, Ironbark Creek, Minmi Creek and Purgatory Creek also represent aquatic habitat for fish and aquatic invertebrates.

Most of the creeks and tributaries are not permanently flowing and will only contain standing water from time to time as influenced by freshwater overland flows. Ironbark and Fishery creeks are permanently flowing and are saline-influenced, supporting saltmarsh and mangrove vegetation.

Ironbark Creek and Fishery Creek are classified as Class 1 major key fish habitat for fish passage, as they are major creeks comprising a permanently flowing or flooded waterway (DPI, 2013). The remaining creeks in the study area are classified as Class 2 moderate key fish habitat (Class 2).

Saltmarsh patches under five square metres in area and mangroves are categorised as Type 2 moderately sensitive key fish habitat. Saltmarsh patches that are greater than five square metres in area are categorised as Type 1 highly sensitive key fish habitat. The study area supports Type 1 and Type 2 saltmarsh patches, with all areas of mangroves comprising Type 2 fish habitat.

Saltmarsh and mangroves also constitute marine vegetation, which provide important habitat for the recruitment, shelter and feeding of a wide range of marine and estuarine dependent fish species, and protected under the FM Act.

Indicative distributions for threatened fish modelled by DPI (2007) identify that two threatened species, the endangered Purple Spotted Gudgeon (*Mogurnda adspersa*) and the Black Rockcod (*Ephinephelus daemeli*) may occur in the study area. However, based on the habitat associations and known distributions of these species, both are considered unlikely to occur (see Appendix I for further details).

### Microbat habitat

A concrete tunnel forming the M1 underpass provides roosting habitat for a number of microchiropteran bat species. It is considered to be a substantial roost site due to the high number of roost locations within the tunnel and the high number of animals likely to be roosting there.

## 6.7.3 Potential impacts

### Key biodiversity values

Due to the proposal's location within a nationally important wetland, and its proximity to the Sugarloaf Range, the key biodiversity values that are likely to be impacted by the proposal are identified in the BDAR as:

- Migratory and threatened wetland and shorebird species.
- Cave-roosting microchiropteran bat species (at the M1 tunnel, on the western end of the proposal site at the Stockrington connection).

- Green and Golden Bell Frog.
- Threatened swamp and wetland ecological communities.
- Sensitive aquatic habitats, including key fish habitat (protected marine vegetation).

A summary of potential impacts to these biodiversity values is provided below. Further details can be found in the BDAR in Appendix I.

## **Construction**

### **Vegetation clearing**

The proposal would require permanent removal of vegetation, including 3.3 hectares of native vegetation and 26.5 hectares of exotic/planted vegetation. This estimated vegetation loss assumes that all clearing and works associated with the proposal would be contained within the proposal site. The vegetation to be removed consists of:

- 2.8 hectares of TECs listed under the BC Act, of which 0.2 hectares is also listed under the EPBC Act.
- 0.3 hectares of protected marine vegetation under the FM Act in the form of mangrove and saltmarsh vegetation.
- 3.3 hectares of native vegetation comprising foraging and roosting habitat for threatened and/or migratory fauna species.
- 26.5 hectares of non-native vegetation comprising foraging and roosting habitat for some threatened and migratory fauna species.

Most of the vegetation proposed to be removed is considered native regrowth (where original remnant forest was historically cleared for the railway and water main) and disturbed fringes of existing native wetland vegetation along the existing railway and water main embankment. Vegetation clearing within the Hunter Wetlands Centre at the Shortland end of the proposal site is likely to comprise clearing of individual trees and pruning where required to allow access of plant and other construction equipment.

### **Loss of habitat**

Despite the disturbed and modified nature of the fauna habitat to be removed, the types of habitat resources that would be disturbed include the following:

- Myrtaceous tree species that provide blossom, nectar, and fruiting forage for arboreal fauna and woodland bird species. These resources are restricted to remnant trees and regrowth forest at the western boundary of the wetlands and managed vegetation within the Hunter Wetlands Centre. The potential hollow resources provided by such trees are minimal to absent within the proposal site.
- A low density of fallen logs and woody debris, which would provide marginal shelter and foraging habitat for native insects, common reptiles and amphibians.
- Exotic grassland habitat on the embankments along the pipeline and rail trail that provide roosting habitat for wetland birds.
- Wetland vegetation on the margins of larger areas of mangrove forest, saltmarsh and brackish lagoons that provide foraging habitat for wetland and migratory birds, and the Green and Golden Bell Frog.

## Impacts on aquatic habitats and protected marine vegetation

The main impacts on aquatic habitats and protected marine vegetation is associated with the construction of the bridges at Fishery Creek and Ironbark Creek. The proposal would result in the direct disturbance of approximately 0.9 hectares of saltmarsh and mangrove habitats that are classified as protected marine vegetation under the FM Act. This area of removal constitutes approximately 10 percent of the occurrence of this vegetation within the study area and substantially less within the locality. Due to the small area of mangrove and saltmarsh vegetation predicted to be disturbed along existing tracks, and considering the larger areas of habitat that will be retained and undisturbed in the locality, the proposal is not likely to significantly reduce the extent of marine vegetation in the locality.

Potential shading of adjacent mangrove and saltmarsh vegetation from physical structures such as bridges can impact mangroves and saltmarsh, resulting in dieback or longer-term habitat loss. Shading impacts at the Ironbark and Fishery Creek crossings are likely to be minimal because the bridges are oriented north-south and adjacent mangrove and saltmarsh vegetation on the foreshore will continue to receive light for part of the day. At Fishery Creek, the proposed bridge decking will also be graded, so adjacent vegetation will also receive dappled light through the decking.

The new bridges would be aligned with the stream contours (i.e. will be perpendicular to the banks), thus limiting the area of impact as much as possible. Impacts on riparian vegetation and in-stream flora would be limited to the area immediately adjacent to proposed bridges.

The use of elevated boardwalks and culverts at low points where the existing rail and water main embankment experience inundation is a low-impact option over other alternatives, and is also intended to minimise impacts to aquatic vegetation.

## Fragmentation and barrier effects

The construction of the proposal will be undertaken in an existing cleared corridor. Vegetation removal at the edges of the existing corridor is unlikely to widen the existing cleared corridor such that it will represent a hostile barrier for native flora and fauna species. The relatively narrow width of the proposal, and its placement within an existing cleared corridor, is not likely to fragment extant forest and wetland vegetation within the study area, nor will it impede movement of the highly mobile fauna species that are known to utilise the study area. Fence infrastructure will be fauna friendly and will not impede movements of native fauna, including wetland birds or amphibians.

## Injury and mortality

The proposal may cause displacement or mortality of fauna that are present at the time of vegetation clearing and construction activities. The majority of native bird species and non-arboreal mammal species occurring within the study area are likely to use these habitats as part of a wider network of habitat across the landscape. These species would likely disperse to avoid vegetation clearing and construction activities given their mobile nature, and most individuals directly affected by the proposal are likely to be displaced into surrounding habitat rather than killed (if appropriate mitigation measures are implemented).

Less mobile terrestrial fauna, such as frogs and reptiles present within groundcover, nesting birds and their nestlings/eggs, nocturnal species sheltering in hollows during daylight hours, and species in periods of torpor such as microbats, are at most risk of mortality as a result of these activities.

Impacts to nocturnal species (such as microbats and arboreal mammals) from diurnal displacement due to habitat clearing or disturbance include (but are not limited to) vulnerability to predation during daylight hours, increases in energy costs and potential increased competition for resources.

### **Soil and water pollution**

The proposal has the potential to impact on water quality within adjacent and downstream wetland habitats during construction. Contamination associated with machinery and construction materials, and erosion/sedimentation associated with ground disturbance activities, could have adverse impacts on surrounding sensitive wetland habitats, waterways and downstream aquatic environments, without appropriate pollution controls. Sediment-laden runoff to waterways can alter water quality and adversely affect aquatic life as well as wetland habitats for wetland species. Sedimentation and turbidity impacts can also arise from changes in flow velocity of waterways due to placement of instream structures, such as the proposed bridges across Ironbark Creek and Fishery Creek.

Disturbance of acid sulfate soils could potentially impact on aquatic habitats. The disturbance of acid sulfate soils can form sulphuric acid when soils react with oxygen. Sulphuric acid can leach into surrounding environments, causing soils to become acidic and toxic, impacting waterway and soil health resulting in environmental and agricultural degradation. The construction of the proposal will largely take place on previously disturbed land (i.e. embankments associated with the rail and water main) where soils have historically been disturbed and oxidisation is likely to have already taken place. Furthermore, earthworks for the proposal would be limited to minor cut and fill along the proposal route to a depth of 0.2 metres or less.

Potential water quality impacts and risks from acid sulfate soils would be managed as part of the CEMP.

### **Potential to modify hydrological regimes**

The use of boardwalks and culverts is proposed to maintain the current hydrological regime of the wetlands and to further minimise impacts to aquatic vegetation. One section of the study area, near Fletcher (i.e. the Fletcher connection) is a greenfield undeveloped site. The construction of a boardwalk and box culverts is proposed at this location to minimise any changes to the current hydrology of the wetland by allowing drainage lines to continue to flow under the pathway. There may be temporary disturbances within these drainage lines during construction, but temporary diversions would be installed to maintain flows. Any flows requiring diversion would be intercepted, diverted and discharged as near as practical to the existing flow path(s). These measures would minimise potential changes to flow pathways and flow volumes in the downstream environment.

Increases in surface water flows may occur as a result of the introduction of hard surfaces due to the proposed pavement. This has potential to change local flow pathways, and increase flow volumes and velocities adjacent to the proposal. Vegetated shoulders are proposed along the proposal length, which would attenuate flows and filter surface run-off into the surrounding wetland.

### **Noise and vibration**

Impacts from noise and vibration are expected during construction as a result of vegetation clearing, vehicle movement and operation of plant. Raised levels of noise and vibration may deter native fauna from using the study area during construction or cause animals to temporarily abandon the study area in search of quieter areas.

Bat species using the tunnel for roosting and wetland bird species are likely to be more sensitive to noise impacts compared to other native fauna, particularly during breeding or torpor periods. Furthermore, construction noise may be concentrated or amplified in the enclosed M1 tunnel, compared with construction noise in the wetland (where noises are expected to be attenuated over distance in the open environment). Noise impacts have potential to be substantial, however would likely be short term (e.g. 1-2 months) in any location, depending on the timing and method of construction. Mitigation measures including the timing and staging of construction (e.g. during the non-breeding period of bats) and use of noise barriers will be key to minimising the potential impacts of noise and vibration to roosting bats.

### **Introduction of pathogens**

Construction activities have the potential to introduce or spread pathogens such as Phytophthora (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*) and Chytrid fungus (*Batrachochytrium dendrobatidis*) throughout the proposal site. Diseases and pathogens can be introduced or spread to the site via soil or organic material attached to machinery, vehicles, equipment and workers. The spread of diseases and pathogens is not restricted to the construction phase of the proposal; they may also be introduced by visitors/users once construction is completed and the pathway is open to the public.

Phytophthora and Myrtle Rust can result in the dieback or modification of native vegetation and damage to fauna habitats. Chytrid fungus affects both tadpoles and adult frogs and can lead to the extinction of local populations once introduced into an area. The minimisation and control of Chytrid fungus is a particularly important consideration for the proposal due to the presence of Green and Golden Bell Frog (*Litoria aurea*) within the study area (the Sandgate/Hexham Swamp Key Population), and the proximity of the proposal site to the Kooragang/Ash Island Key Population of Green and Golden Bell Frog.

### **Operation**

#### **Weed invasion and edge effects**

Removal of vegetation causes a number of new environmental conditions to develop along the edges of cleared environments, in particular in environments where the removal of the woody strata promotes the invasion of exotic species due to increased light and physical space. The proposal may cause the dispersal of weed propagules (seeds, stems and flowers) into adjacent areas of native vegetation via plant and machinery, erosion (wind and water) and worker/ visitor shoes and clothing, during both the construction and operation phase. Some sections of the proposal already support substantial infestations of various exotic species. However, there is a possibility that additional, more invasive or otherwise damaging environmental weeds may be introduced to the retained vegetation, or that existing infestations may be further spread into areas that are currently free from infestation. Depending upon the weeds introduced to the site, this could result in a decline in the condition of adjacent native vegetation and associated native fauna habitats.

#### **Artificial lighting**

Permanent lighting along the proposed pathway has potential to result in light impacts on native fauna. Permanent lighting can discourage native species from using habitat where diffuse light penetrates into adjoining areas of vegetation. The foraging and nesting regimes of some nocturnal native mammals and birds can therefore be disrupted by lighting. In addition, the eyesight of nocturnal species (such as owls and possums) is hindered by bright lights, and when affected, they can become more susceptible to predation. The key potential impact from permanent lighting of sections of the proposal would be on cave-roosting bats roosting in the M1 tunnel.

The key impacts regarding the installation of artificial lighting to microbats is the potential for delayed roost emergence and roost abandonment. Roost abandonment may in turn lead to increased predation particularly if viable alternative roosting options are not available in the local area. This is of particular consequence for the threatened Southern Myotis that may roost in the tunnel year round and other species (e.g. Little Bent-wing Bat, *Miniopterus australis*) that may occasionally use the tunnel for roosting.

Installation of 'shields' or false ceilings around roost sites would reduce the potential for delayed roost emergence and roost abandonment in the M1 tunnel, maintaining the suitability of these roosts for microbats. There are number of design and management strategies to mitigate the effects of artificial lighting on roosting bats during the operation of the proposal. Potential measures that would be further investigated during detailed design of the proposal include part-night lighting (i.e. switching off lighting in the middle of the night), dimming of lights to reduce the intensity and spread of illumination, directed lighting and use of light shields to reduce light spill, creation of light exclusion zones (through strategic placement of lamps), use of light types (long wavelength 'warm white' lights rather than short wavelength 'blue' lights), and motion-sensitive lighting.

### **Pedestrian activity**

Research indicates that human disturbance to wetland birds can cause a range of behavioural and/or physiological responses that may result in permanent or temporary impacts including displacement from preferred habitat, exposure of eggs or chicks, disruption of behavioural displays, disruption to foraging behaviour and increased energetic expenditure associated with responses. By increasing and improving access through wetland areas, it is reasonable to assume that increased pedestrian and bicycle traffic will increase disturbances to wetland bird species that may utilise the adjacent habitat. Some species may habituate to this disturbance, for example the Hunter Wetlands Centre is known to support a wide diversity and abundance of waterbirds will receiving regular visitation that has the potential to disturb roosting and foraging birds. However, not every species is likely to habituate and some level of disturbance from increased human presence is likely. It is difficult to quantify the impact that increased human activity associated with the proposal will have on wetland birds, and whether such impacts are likely to result in impacts at a population level. However, given the broad extents of suitable habitat available to wetland bird species beyond 100 metres from the trail, as well as in the Hunter Estuary at large, pedestrian disturbance is considered unlikely to result in a significant impact to wetland bird species that would result in population level declines.

Increased numbers of pedestrians (foot traffic) and cyclists through the M1 tunnel, particularly during daylight hours, may negatively affect roosting microbats. Increases in human activity near roosting microbat species can lead to roost abandonment, and use of energy from winter fat storage during periods of torpor. Placement of barriers such as shields/false ceilings over the roost sites will minimise the potential impacts of increased pedestrian usage on roosting bats within the tunnel.

### **Prescribed impacts**

Prescribed biodiversity impacts of relevance to the proposal have been considered along with other residual impacts with reference to Section 9.2 of the BAM, as follows:

- 'Impacts on habitat of threatened species or ecological communities associated with human made structures' through consideration of potential indirect impacts of noise and other disturbance on potential microbat roost sites in the M1 tunnel.

- 'Impacts on habitat associated with areas of non-native vegetation' through consideration of impacts associated with roosting and/or breeding activities by wetland birds on the embankments within the proposal site and potential injury or mortality of fauna during construction.

Measures to minimise these prescribed impacts are described in Section 6.7.4 and in further detail in the BDAR in Appendix I.

### **Potential serious and irreversible impacts (SAIL)**

There are two potential SAIL entities identified in *Guidance to Assist a Decision-Maker To Determine a Serious and Irreversible Impact* (OEH, 2017) that are relevant to the proposal:

- Large-eared Pied Bat (*Chalinolobus dwyeri*).
- Curlew Sandpiper (*Calidris ferruginea*).

Of these, only the Curlew Sandpiper was considered to be an SAIL entity for the purposes of the BDAR. The assessment of the SAIL entity, Curlew Sandpiper, in the BDAR found that the proposal was unlikely to have a serious and irreversible impact on this species. A detailed assessment of SAIL entities can be found in the BDAR in Appendix I.

### **Consideration of MNES**

Assessments of significance were prepared for the following MNES, with reference to the relevant significant impact criteria from the *EPBC Act significant impact guidelines 1.1* (DotE, 2013).

### **Threatened ecological communities**

- Lowland Rainforest of Subtropical Australia (critically endangered)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community (endangered)

### **Critically endangered and endangered species**

- Eastern Curlew (critically endangered, migratory)
- Curlew Sandpiper (critically endangered, migratory)
- Red Knot (endangered, migratory)
- Australasian Bittern (endangered)

### **Vulnerable threatened species**

- Large-eared Pied Bat
- Green and Golden Bell Frog
- Bar-tailed Godwit

### **Migratory birds (wetland specialists)**

- Latham's Snipe
- Marsh Sandpiper
- Sharp-tailed Sandpiper
- Common Greenshank
- Glossy Ibis

- \*Eastern Curlew (critically endangered )
- \*Curlew Sandpiper (critically endangered )
- \*Red Knot (endangered )
- \*Bar-tailed Godwit (vulnerable)

(\*) these species were assessed as threatened species.

#### **Wetlands of international importance**

- Hunter Estuary Wetlands Ramsar Site

The assessments concluded that no significant impacts were likely to any MNES as a result of the proposal. Detailed discussion on the outcomes of these assessments is provided in the BDAR in Appendix I.

#### **6.7.4 Mitigation measures**

Mitigation measures for the potential impacts described in section 6.7.3 are outlined below, and further detailed in Appendix I.

#### **Avoidance of impacts**

The proposal design has been developed with due consideration of environmental constraints and has sought to avoid impacts on native vegetation and sensitive environments through route selection and iteration of various design elements, including:

- Locating the alignment of the proposal on land that has been previously cleared in association with the now decommissioned Richmond Vale railway and Hunter Water pipeline.
- Avoiding areas of high biodiversity values (by locating the proposal predominantly on previously cleared land).
- Proposing use of elevated boardwalks in sensitive areas such as wetlands instead of 'fill' construction methods.
- Aligning new bridges at Fishery Creek and Ironbark Creek with the stream contours (i.e. will be perpendicular to the banks), thus limiting the area of impact as much as possible.
- Limiting impacts on riparian vegetation and in-stream flora to the area immediately adjacent to proposed bridges.
- Minimising vegetation clearing as far as practical during design development, particularly with consideration of minimising clearing of native vegetation and habitat for sensitive fauna species.
- Site access, compounds and stockpile sites would be located in existing cleared areas.
- Vegetated buffers along the proposal length to assist with maintaining water quality.

#### **Detailed design**

Additional measures to avoid and minimise impacts would be considered during the detailed design as follows:

### Artificial lighting

- Incorporate design features to minimise light spill onto the roof of the M1 tunnel where there are substantial numbers of bat roosts, such as constructing 'shields' or false ceilings around roost sites to maintain darkness within roosts. Creation of these light exclusion zones will reduce the potential for delayed roost emergence and roost abandonment. These shields/false ceilings will also provide a barrier between roosting bats and pedestrians using the tunnel during daylight hours.
- Use variable lighting regimes along the alignment and in the M1 tunnel to reduce the potential for light spill impacting foraging habitat, and minimise the chance of roost abandonment. This could involve switching off or dimming lights for part of the night, or use of sensor lights along the alignment and in the M1 tunnel that switch on upon approach and turn off after people pass.
- Limit light spill into areas of adjoining sensitive habitat along the alignment, as far as practicable, to minimise the impacts of lighting to foraging habitat along the alignment. This could include the use of low intensity lamps to reduce the spread of illumination, directed lighting or light shields to create dark refuges between lamps.
- Use of certain light types such as long wavelength 'warm white' lights rather than short wavelength 'blue' lights.

### Bridge design

- Locate bridge abutments, piers and temporary works to further avoid mangroves and saltmarsh vegetation (for example, exploiting natural gaps in mangrove and saltmarsh vegetation).
- Consider choice of bridge height, orientation and construction materials to minimise shading of marine vegetation such as mangroves and saltmarshes.
- Ensure instream structures minimise impacts to river flow and fish passage.

### Construction planning

- Limit vegetation clearing in riparian areas.

### Landscaping

- Use landscaping along the proposal route in the Hunter Wetlands National Park to create a visual disincentive for trail users to cross into areas of habitat for wetland birds.
- Landscaping would use only suitable endemic species (such as low shrubs and native grasses).

### Fencing

- Use fencing structures along the proposal in the Hunter Wetland National Park to protect wildlife (including wetland birds) from dogs and pedestrians.
- Use fauna-friendly fencing to reduce impacts on habitat connectivity and native fauna movements. Fencing should comprise five rows of galvanised steel plain wire with no mesh. Barbed wire may be used on the first, fourth and fifth wires if exclusion of stock is also required.

## Construction

The CEMP would include a detailed flora and fauna management sub-plan which would incorporate a wetland bird management plan, a microbat management plan and a Green and Golden Bell Frog management plan. The plans would include specific management measures for the construction periods as well as ongoing management and monitoring after construction is completed. These plans would be prepared in consultation with appropriate experts and relevant government agencies.

The flora and fauna management plan and its sub-plans would include the following (as a minimum):

### General

- Clearing areas would be delineated with a high visibility barrier to prevent accidental clearing or disturbance of adjacent vegetation or aquatic habitat.
- Adjoining sensitive areas would also be delineated (using different colours or material to enable clear differentiation) to prevent impacts during construction.
- Trees within the works area that are to be retained would be clearly marked with falling tape or similar.
- No stockpiling of materials would be undertaken adjacent to or within the dripline of native vegetation.
- Stockpiles, compounds and material storage would only be established within existing cleared areas.
- Noxious and environmental weeds encountered during construction would be removed, with weed material stockpiled separately to all other vegetation, removed from site and disposed of at an appropriately licenced disposal facility. When transporting weed waste from the site to the waste facility, trucks must be covered to avoid the spread of weed-contaminated material.
- No access or parking of vehicles or machinery in areas of native vegetation.
- Construction lighting, if required, would avoid or minimise light spill into areas of adjoining sensitive habitat.
- Thorough pre-clearing surveys would be undertaken of all habitats prior to clearing and all clearing of hollow-bearing trees and logs would be supervised by an ecologist to minimise fauna injury or mortality.
- Fauna handling and release protocols would be implemented during any clearing works.
- Cleared areas would be remediated as soon as practicable following completion of works including soil stabilisation and planting of native endemic species characteristic of the vegetation types identified within the study area.

### Protection of waterways

- Erosion and sediment control measures would be implemented during construction to minimise pollution and sediment impacts on waterways and downstream aquatic environments, including estuarine communities. This could include measures such as the use of silt curtains during substrate disturbance activities (e.g. pile driving) to minimise the potential for migration of turbid plumes outside of the immediate construction footprint. See Section 6.4.3.
- Appropriate measures would be implemented to manage fuels, chemicals, and liquids required during construction. See Section 6.4.3.

- Riparian and instream habitat impacts would be minimised, for example by using barge access rather than shore-based access during bridge construction.

### Managing vehicle movements

- Restrict vehicle movements to operational (daylight) hours.
- Implement and enforce appropriate speed limits for vehicles traversing the site.
- Establish 'no-go' areas, which are demarcated with high visibility barrier tape, to prevent accidental impacts by vehicles to vegetation and other biota adjacent to the disturbance footprint.

### Timing of construction works

- Works that occur within the M1 tunnel would be undertaken only from late March to May, which is outside the breeding period of the threatened microbats found within the tunnel, to avoid placing any undue stress on any pregnant or lactating females. Construction should completely stop works after May when microbats enter torpor and unnecessary energy expenditure during this time (such as finding alternative roost sites as a result of disturbance from construction) could reduce their likelihood of survival.
- Works within the M1 tunnel to occur at night following the emergence period and prior to the re-emergence period ( 45 minutes after sunset and at least 45 minutes before sunrise), when bats are likely to be foraging rather than occupying roosts within the tunnel.
- Works within areas of potential shorebird habitat (chainages 5200 to 600 and the extension to Hunter Wetlands Centre) to occur between the end of April and beginning of September when the majority of migratory shorebirds utilising these habitats are in the northern hemisphere.
- Clearing and grubbing works within areas mapped as potential Green and Golden Bell Frog habitat would be undertaken between September to April when frogs are most active and can move away from potential disturbances. If this is not possible, additional targeted pre-clearance surveys would need to be implemented.

### Green and Golden Bell Frog

- A suitably qualified ecologist would undertake pre-construction surveys for Green and Golden Bell Frog (between September and January) to determine whether individuals are present within the study area and an estimate of population size to assist in defining procedures to be detailed in the Green and Golden Bell Frog management plan.
- The Green and Golden Bell Frog management plan would include specific induction material regarding hygiene management, exclusion fencing, pre-clearance surveys, handling and relocation procedures, reporting procedures and impact mitigation measures.
- Temporary frog fencing would be installed during the construction phase (following the pre-clearing survey) to exclude Green and Golden Bell Frogs from construction areas (whether they are recorded during pre-construction survey or not). Fencing should be placed within areas mapped as habitat for Green and Golden Bell Frog, plus 200 metres either side, and would remain in place until the completion of all construction activities including installation of fencing and revegetation. Frog fences would be monitored by an ecologist during construction, at a frequency determined by the results of the pre-construction surveys.
- Hygiene protocols would be implemented to prevent the introduction and spread of Chytrid Fungus. Strict protocols would be applied (regardless of whether Green and Golden Bell Frog is recorded during pre-construction surveys).

## Microbats

- Works through the M1 tunnel would be staged as follows:
  - Suspend a material barrier to delineate one third or half of the tunnel length. No work would be conducted inside the barrier to minimise disturbance to roosting bats. The barrier should use appropriate material so as to inhibit noise impacts through the tunnel.
  - When work is completed outside of the barrier, it would be relocated to enable work in the other half/ third of the tunnel.
  - Access must be one way to ensure disturbance within the tunnel is limited to the section. The other end of the tunnel would be blocked to prevent access.
- A suitably qualified ecologist would undertake pre-construction surveys of the M1 tunnel to confirm the presence of known microbat roost sites and identify any new roost sites, species present and activity levels.
- False ceilings/shields would be permanently installed around bat roosts to reduce impacts from light disturbance and construction activity within the M1 tunnel. These would remain in place following construction to also reduce the ongoing impacts of lighting in the tunnel and increased pedestrian activity.
- The microbat management plan would include specific induction material regarding pre-construction/pre-clearance survey details, reporting procedures, impact mitigation measures and construction procedures.

## Wetland birds

- Engagement of a suitably qualified ecologist prior to any clearing works to undertake pre-construction surveys of wetland birds to determine usage of threatened species and inform procedures within the wetland bird management plan.
- A wetland bird management plan that would detail at a minimum environment induction training, impact mitigation measures and reporting procedures.

## Operation

- Appropriate signage would be installed which states that dogs should be kept on a lead at all times while using the trail, to protect wetland birds. No dogs are permitted in the national park.
- Interpretive signage educating users on the importance of the surrounding wetlands and the species and ecological communities that occur there, as well as the importance of habitat within the M1 tunnel for roosting bats.
- Ongoing management of retained native vegetation to reduce impacts of human activities and weed infestation.
- Ongoing maintenance of fencing to ensure its effectiveness at restricting access to important wetland habitat.

## Offsetting

### Offsetting under the BC Act

Impacts associated with the proposal that require offsetting include the removal of 3.3 hectares of native vegetation, and associated habitat for threatened biota. The BDAR has identified the following offsetting requirements to address residual impacts on threatened species and communities listed under the BC Act:

- 92 ecosystem credits to address loss of 3.3 hectares of native vegetation representing TECs and/or threatened species habitat for a number of predicted threatened species (refer to Table 6-20).
- 293 species credits to address impacts on six candidate threatened species (refer to Table 6-21), including:
  - Curlew Sandpiper.
  - Large-eared Pied Bat.
  - Black-tailed Godwit.
  - Green and Golden Bell Frog.
  - Southern Myotis.

In accordance with the offset rules established by the *Biodiversity Conservation Regulation 2017* there are various means by which offset obligations can be met including:

- Retiring the appropriate credits from an established stewardship site.
- Monetary payment directly into the Biodiversity Conservation Fund (BCF).
- Funding an approved biodiversity action as a last resort, subject to consultation with approval authorities, if all other options are determined to be unsuitable.

Further details of these options is provided in the BDAR in Appendix I.

### Offsetting under the EPBC Act

The predicted loss of native vegetation is unlikely to cause a significant impact on TECs listed under the EPBC Act. With the implementation of appropriate mitigation measures, the proposal is not likely to have significant impacts on migratory wetland birds, threatened microbats and sensitive aquatic environments, including internationally important wetlands. Offsetting is not required.

### Offsetting of impacts on key fish habitats and protected marine vegetation

Consultation with the Minister for Primary Industries would be required for the proposal in relation to potential impacts on protected marine vegetation (mangroves and saltmarsh) and key fish habitat and the identification of an appropriate offset for such impacts. Permits would be required in relation to the bridge crossings at Fishery and Ironbark creeks.

### ***Referral under the EPBC Act***

The proposal is located within an area known to support the Green and Golden Bell Frog Sandgate/Hexham Swamp key population. Based on consideration of the significant impact criteria for vulnerable species, the proposal is unlikely to have a significant impact on the Green and Golden Bell Frog. However, the proposal is likely to meet Threshold 1 and/or Threshold 2 set out in the species-specific significant impact guidelines (EPBC Act Policy Statement 3.19) as works will occur, 'within 200 metres of habitat... either where the Green and Golden Bell Frog has been recorded since 1995 or habitat that has been assessed as being suitable according to these guidelines'. The EPBC Act Policy Statement 3.19 states 'a referral under the EPBC Act should be considered' if an action meets one or more of the policy thresholds. Accordingly Council will refer the proposal to the Commonwealth Minister for the Environment.

**Table 6-20 Ecosystem credits required to offset impacts of the proposal**

Vegetation Zone	Plant community type	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Ecosystem credits required
1	Jackwood - Lilly Pilly - Sassafras riparian warm temperate rainforest of the Central Coast (PCT 1528)	0.18	69.2	0	6
2	Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast (PCT 1568)	0.22	43.8	0	4
3	Forest Red Gum grassy open forest on floodplains of the lower Hunter (PCT 1598)	0.80	54.1	0	22
4	Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast (PCT 1718)	0.41	40.3	0	8
5	Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)	0.60	30.5	0	9
6	Grey Mangrove low closed forest (PCT 1747)	0.26	82.4	0	9
7	Typha Rushland (PCT 1737)	0.86	79.8	0	34
<b>Total ecosystem credits required</b>					<b>92</b>

**Table 6-21 Species credits required to offset impacts of the proposal**

Species	Common name	Area (ha)	Species credits required
<i>Calidris ferruginea</i> (breeding)	Curlew Sandpiper (breeding)	0.9	56
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	1.6	54
<i>Limosa limosa</i> (breeding)	Black-tailed Godwit (breeding)	0.9	37
<i>Litoria aurea</i>	Green and Golden Bell Frog	3.3	95
<i>Myotis macropus</i>	Southern Myotis	0.7	14
<i>Xenus cinereus</i> (breeding)	Terek Sandpiper (breeding)	0.9	37
<b>Total species credits required</b>			<b>293</b>

## 6.8 Visual amenity

The following sections have been summarised from the specialist visual report prepared by Peter Andrews and Associates, which is included in full in Appendix J.

### 6.8.1 Methodology

The visual impact assessment has been prepared as follows:

- A desktop review was undertaken of the trail to identify key areas that could view the proposal. These key areas have been identified as zones.
- Site investigations of the zones were undertaken on 2 to 5 December 2016 to determine visual impacts from the proposal. Site investigations were undertaken from public areas as access was not possible from private dwellings.
- Preparation of site contextual analysis including landscape character for each of the zones.
- Identification of the potential future visual impacts from the proposal (the trail and ancillary facilities such as car parks and amenities) for each of the zones from the surrounding area. It was not possible to review every view of the proposal due to the length of the trail, inaccessible land and private property. However, assumptions and mitigation measures are proposed for the trail within these areas.
- Determination of appropriate mitigation measures for any visual impact.

The potential visual impact of the proposal has been assessed in relation to the key viewpoints identified in each zone. The levels of potential visual impact has been assessed through consideration of the combination of magnitude of visual change in the landscape and its proximity to the viewer and the sensitivity in relation to the quality of the view and how sensitive it is to the proposed change.

The magnitude of visual change is strongly influenced by the level of visibility of the new works resulting from the combination of scale, extent, distance and duration of the views. Visual sensitivity depends on the nature of the existing environment and on the likely response from people viewing the scene. The combination of sensitivity and magnitude provides an impact rating for the proposal on the key view points. The definitions of magnitude, sensitivity and impact ratings are provided in Table 6-22 and Figure 6-5.

**Table 6-22 Magnitude and sensitivity of visibility**

Rank	Description
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that are consistent with the existing visual character.
Low	Minor loss of/or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that are consistent with the existing visual character.
Moderate	Partial loss of/or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic.
High	Substantial to total loss of key elements/features/characteristics of the baseline visual character and/or introduction of elements considered to be totally uncharacteristic.

		Magnitude of impacts			
		Large	Moderate	Small	Negligible
Sensitivity of feature	High	High	High-moderate	Moderate	Negligible
	Medium	High-moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

**Figure 6-5 Impact matrix**

### 6.8.2 Existing environment

The proposal site has been separated into five visual zones, zones 5 to 10. A description of the key landscape characteristics of each zone is provided in Table 6-23 to

Table 6-27 below. The visual zones are shown in Figure 6-6.

**Table 6-23 Description of visual zone 5**

Characteristic	Description
Landform	The trail is on fairly level ground as it passes from the east of the M1 Pacific Motorway to the west of the Motorway. It utilises a tunnel under the Motorway. Land to the east of the M1 Pacific Motorway and north of the trail is elevated from the trail. The trail to the west of the M1 Pacific Motorway passes through land owned and managed by Coal & Allied Pty Limited dividing the Southern Swamp from the Main Swamp of the Pambalong Nature Reserve and is slightly elevated within the surrounding wetland.
Land use/built environment	There are several rural properties on land east of the M1 Pacific Motorway and north of the trail. The Pambalong Nature Reserve is located to the west of the M1 Pacific Motorway.
Vegetation	Vegetation incorporates mature trees on both sides of the M1 Pacific Motorway as well as wetlands and associated vegetation.
Landscape features	Pambalong Nature Reserve.
Infrastructure	The M1 Pacific Motorway, Lenaghans Drive, Dog Hole Road and electrical easements. The existing tunnel under the M1 Pacific Motorway.
Major economic components	Pambalong Nature Reserve and rural industries.
Spatial quality	The trail along both sides of the M1 Pacific Motorway are semi-enclosed as various mature vegetation aligns the trail or is in close proximity.

**Table 6-24 Description of visual zone 6**

Characteristic	Description
Landform	The trail is undulating and raised through to Minmi.
Land use/built environment	The surrounding area includes the Hexham Swamp and land identified as nature reserves and environmental conservation. Land to the south of the trail includes the village of Minmi.
Vegetation	Mature vegetation and grasses along the trail.
Landscape features	Wetlands.

Characteristic	Description
Infrastructure	Access from Lenaghans Drive. Minmi Fire Station opposite on Lenaghans Drive.
Major economic components	Local village of Minmi.
Spatial quality	The trail is fairly open with the swamp located to the east of the trail. Land is heavily vegetated to the north and west of the trail.

**Table 6-25 Description of visual zone 7**

Characteristic	Description
Landform	The trail will use the existing HWC easement that runs through the Hexham Swamp. This land is flat through the Hexham Swamp. Fletcher residential area is elevated above the swamp.
Land use/built environment	Hexham Swamp.
Vegetation	Swamp grasses through the Hexham Swamp. Trees, shrubs and grasses on the periphery of the Fletcher residential area.
Landscape features	Hexham Swamp.
Infrastructure	The road and footpath network in the new residential area of Fletcher. Drainage swales along the road network comprising rocks and grasses.
Major economic components	Fletcher community and sporting facilities.
Spatial quality	The zone is open and visible from the dwellings in Fletcher.

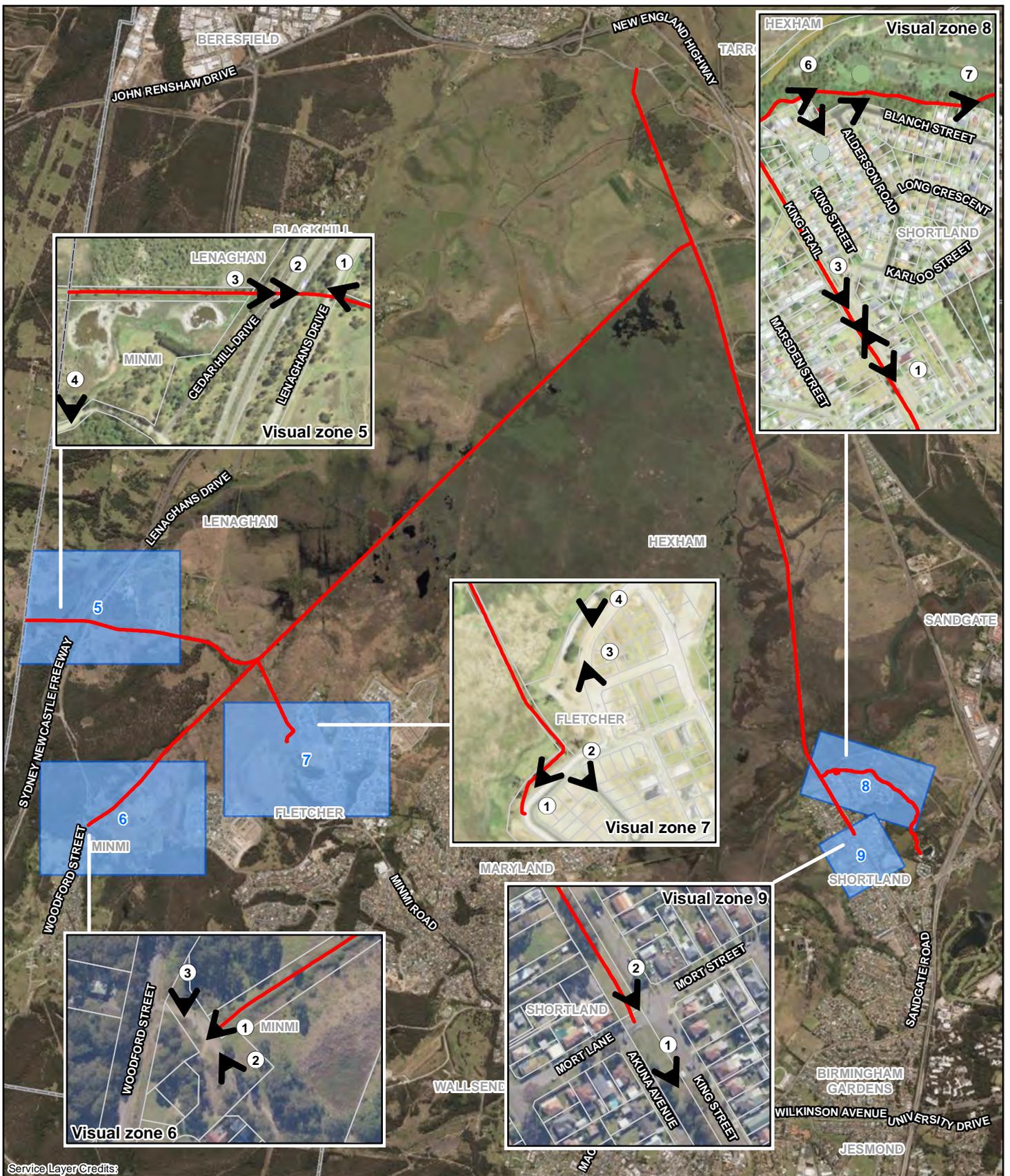
**Table 6-26 Description of visual zone 8**

Characteristic	Description
Landform	The trail corridor is raised above King Street and generally level with the adjoining dwellings. The trail corridor is then lower within the Hexham Swamp.
Land use/built environment	Residential dwellings adjoin the trail and the proposed car park. In most cases, the dwellings do not face onto the corridor. Instead the rear yards adjoin the corridor and rear fences have been erected. Land to the north west includes the Hunter Wetlands National Park and environmental conservation lands. The trail ends at the Hunter Wetlands Centre.
Vegetation	The trail corridor within the urban context consists of a turfed corridor with planted mature trees. The car park area is heavily vegetated with mature vegetation. The trail through Hexham is an existing path and consists of wetland vegetation.
Landscape features	The Hunter Wetlands National Park, Fishery Creek and Ironbark Creek.
Infrastructure	Urban street network with and without kerb and guttering and overhead power lines.
Major economic components	The suburb of Shortland. Hunter Wetlands Centre.
Spatial quality	The corridor is partly enclosed within the area with rear fences on both sides on the approach to King Street. The trail corridor is generally open with minimal mature vegetation along King Street. The corridor is enclosed by vegetation and rear fences as it makes its way to the Hunter Wetlands Centre.

**Table 6-27 Description of visual zone 9**

Characteristic	Description
Landform	The trail is generally flat with a slight slope down to the road network.
Land use/ built environment	Residential dwellings adjoining the trail.
Vegetation	The trail corridor consists of a turf and planted mature trees.
Landscape features	A wide open space area.
Infrastructure	Urban street network with and without kerb and guttering and overhead power lines.
Major economic components	The suburb of Shortland.
Spatial quality	The trail corridor is generally open with minimal mature vegetation.

A number of view points were identified in each visual zone. These are shown in Figure 6-6.

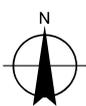


Service Layer Credits:

**LEGEND**

- Proposed route
- View point
- LGA boundary
- Visual zone

Paper Size A4  
 0 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56



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Visual zones and view points

Figure 6-6

### 6.8.3 Potential impacts

#### *Impacts in each visual zone*

The impacts predicted at each view point in each visual zone are summarised in Table 6-28 to Table 6-32. Sensitivity, magnitude and impacts are determined with reference to Table 6-22 and Figure 6-5.

**Table 6-28 Impacts at each view point in visual zone 5**

	View point 1	View point 2	View point 3	View point 4
Description	View to the east along the trail from Lenaghans Drive.	View to the west along the trail from Lenaghans Drive to the tunnel under the M1 Pacific Motorway.	View of the trail in the Pambalong Nature Reserve from Cedar Hill Drive.	View of the trail in the Pambalong Nature Reserve from Dog Hole Road.
Visual sensitivity	Low to moderate	Negligible	Low to moderate	Low
Magnitude of visual effect	Low to moderate	Negligible	Low to moderate	Negligible
Impact	Low (near Lenaghans Drive) to moderate (near the existing dwellings).	Negligible	Low to moderate	Negligible

**Table 6-29 Impacts at each view point in visual zone 6**

	View point 1	View point 2	View point 3
Description	View of trail north of Minmi.	View of access area south of the trail.	View of proposed car park area west of the trail.
Visual sensitivity	Low	Negligible	Moderate
Magnitude of visual effect	Low	Negligible	Moderate
Impact	Low	Negligible	Moderate

**Table 6-30 Impacts at each view point in visual zone 7**

	View point 1	View point 2	View point 3	View point 4
Description	View from the existing footpath on Kural Crescent to the trail.	View along Mitti Street looking north west towards the trail.	View from Panorama Close to the south and Hexham Swamp.	View from Panorama Close looking west to Hexham Swamp.
Visual sensitivity	Low	Negligible	Moderate	Moderate
Magnitude of visual effect	Low	Negligible	Moderate	Moderate
Impact	Low	Negligible	Moderate	Moderate

**Table 6-31 Impacts at each view point in visual zone 8**

	View point 1	View point 2	View point 3	View point 6
Description	View of the trail to the north west from King Street.	View of the trail further to the north west from King Street.	A view of the trail further to the north west between the dwellings.	View from the existing pathway in the wetlands.
Visual sensitivity	Negligible	Low	Negligible	Low
Magnitude of visual effect	Negligible	Low	Negligible	Low
Impact	Negligible	Low	Negligible	Low

**Table 6-32 Impacts at each view point in visual zone 9**

	View point 1	View point 2
Description	View from King Street to the proposed car park location.	View of the trail from King Street.
Visual sensitivity	Low	Low
Magnitude of visual effect	Low	Low
Impact	Low	Low

**Summary of impacts**

Potential impacts in each zone are summarised in Table 6-33 and discussed below.

**Table 6-33 Summary of proposal visual impacts**

Zone	View	Visual Impact
Zone 5 - Pambalong Nature Reserve	1	Low to moderate
	2	Negligible
	3	Low to moderate
	4	Negligible
Zone 6 - Minmi Connection	1	Low
	2	Negligible
	3	Moderate
Zone 7 - Fletcher Connection	1	Low
	2	Negligible
	3	Moderate
	4	Moderate
Zone 8 - Hexham to Hunter Wetlands	1	Negligible
	2	Low
	3	Negligible
	6	Low
Zone 9 - Shortland	1	Low
	2	Low

## Zone 5

- The trail through this zone is generally not visible from the surrounding road network. As it passes through rural lands, the number of dwellings, and therefore potential views, is also less.
- Vegetation removal would have a minor impact on visual amenity and landscape character of the zone.
- Appropriate treatment of the trail (i.e. materials and finishes) would minimise the visual impact.

## Zone 6 and 7

- The pipeline is not a significant component of the visual landscape.
- The wetland provides visual amenity for the dwellings in Fletcher.
- The trail through the wetlands will have a visual impact.
- Appropriate treatment of the trail (i.e. materials and finishes ) would minimise the visual impact and be appropriate to a wetland setting.
- The siting and treatment of the car park would minimise the visual impact.

## Zone 8 and 9

- Generally the dwellings face away from the trail with rear boundaries along the corridor.
- There is a large amount of vegetation between the dwellings and the wetlands.
- The wetlands are broad open space areas with limited formal access and proximal views. Long distance views are available from several surrounding higher areas, which would be impacted by the proposal.
- The trail through the wetlands would provide a significant visual experience for the user. Negative impacts could be minimised through use of complementary materials and finishes.
- Visual impact would be higher for the car parks, due to vegetation removal. Appropriate siting and design of the car parks can minimise this impact.

### 6.8.4 Mitigation measures

#### *Detailed design*

The detailed design for the proposal should consider:

#### **Existing structures/landforms**

- Existing structures, such as the timber bridges, culverts, etc should be retained wherever possible as these will provide additional visual interest to the users of the trail. Whilst it is acknowledged that some of the structures would not be able to be upgraded and used, they should be retained as visual elements if possible.
- The existing raised landform of the trail should be maintained where possible.

#### **Spatial quality**

- Vegetation removal should be limited. Where vegetation removal is required, additional vegetation should be planted to improve the area.

- The landscape treatments should consider the spatial quality of the existing landscape character and its setting. Retain the openness or enclosed spaces where relevant.

### Materials and finishes

- Appropriate materials and finishes for the trail needs to consider the environment that it is passing through, e.g. the wetlands, urban and rural areas and the number of users.
- The trail should continue along the existing raised trail as this ensures that users will keep to the trail.
- The trail should be easily defined for the user so that the user keeps to the trail reducing impacts on adjoining vegetation.

### Signage

- Appropriate signage is to be located to assist in way finding and to ensure public and private areas are recognisable for the users.
- Signage should incorporate a theme for the trail, which would also assist in way finding and keeping users on the trail.
- Signage should be developed around the heritage and the locality to inform and educate the users.

### Bridges and structures

- The new bridges should not replicate the existing bridges but should be sympathetic and a simple design.
- Materials such as steel and timber should be used in preference to monolithic concrete construction.
- Road crossings should be low key within the rural areas but will need to consider road safety.
- Make use of any existing structures/points of interest along the trail.

### Car parks

- Treatment should be low key and appropriate to the area, i.e. gravel base in the rural areas and concrete in the urban areas if appropriate.
- If facilities, e.g. amenities are to be incorporated along the trail, these should be incorporated into the car park areas where possible.
- Facilities should be low key and use suitable materials that are appropriate to the area.
- Review location of car parks to minimise the loss of vegetation and conflicts of interest.
- Existing car parks should be utilised where possible.
- Car parks should be appropriately located to minimise conflicts with dwellings and other land uses.

## Construction

- Construction/stockpile sites should be located in cleared areas.
- All parking and site equipment associated with construction should be located in cleared areas and appropriately screened if required.
- All construction equipment, materials etc. are to be removed from site on completion of the works.
- Rehabilitation of the construction sites should be undertaken upon completion of the works, if required.

## Operation

No specific mitigation measures are required during proposal operation.

## 6.9 Bush fire

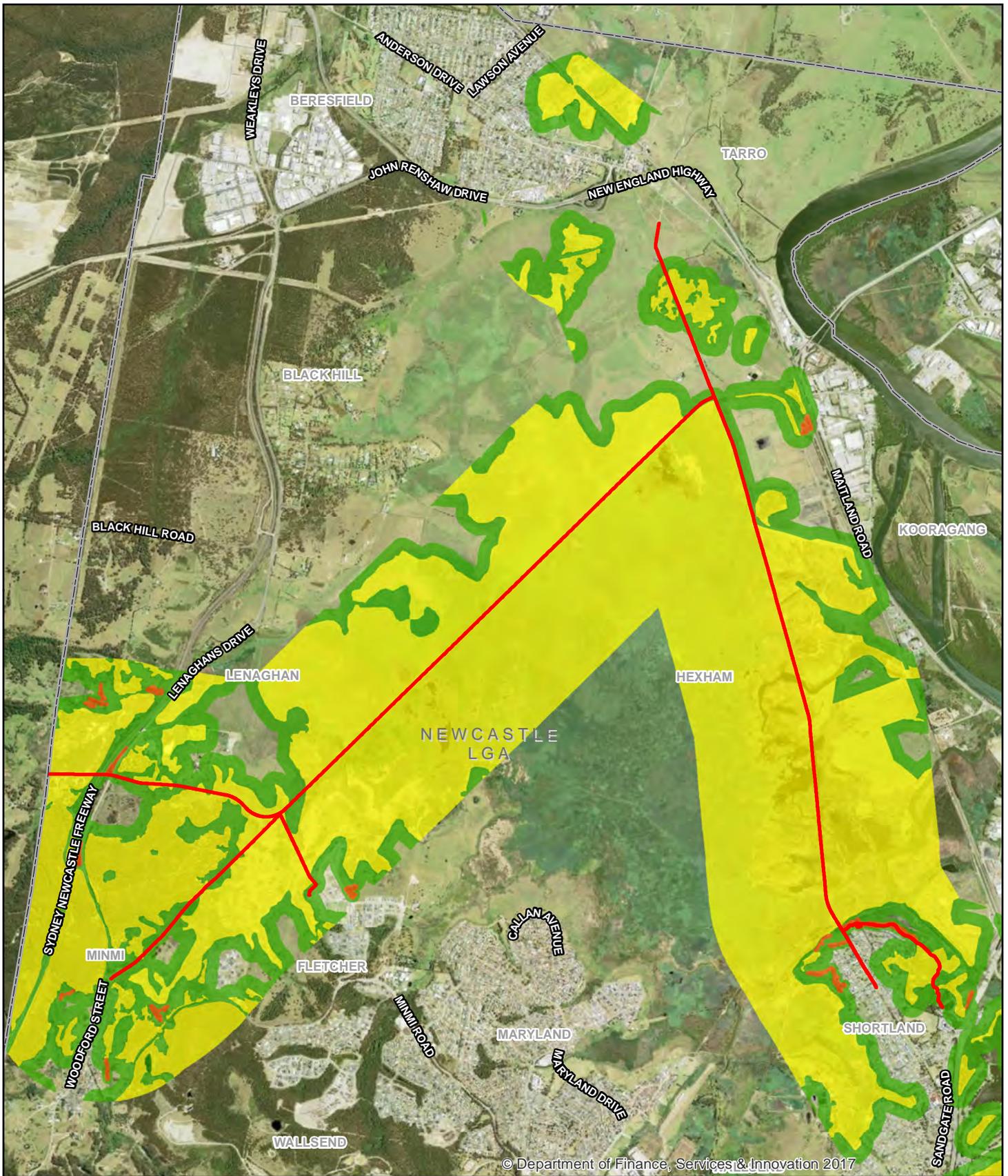
### 6.9.1 Existing environment

The proposal site is predominately mapped as bush fire prone land – vegetation category 1 under the Newcastle LGA – Bush Fire Prone Land Map (Rural Fire Service, 2009). The mapping is shown in Figure 6-7. Development consent cannot be granted for the proposal unless the consent authority is satisfied the proposal conforms to the specifications and requirements of Planning for Bush Fire Protection (PFBFP) (Rural Fire Service, 2006) that are relevant to the development.

The PFBFP only applies to residential/rural residential development and special fire protection purposes. A special fire protection purpose, as stated under the *Rural Fires Act 1997*, is defined as:

- A school
- A child care centre
- A hospital (including a hospital for the mentally ill or mentally disordered)
- A hotel, motel or other tourist accommodation
- A building wholly or principally used as a home or other establishment for mentally incapacitated persons
- Housing for older people or people with disabilities within the meaning of *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004*
- A group home within the meaning of *State Environmental Planning Policy (Affordable Rental Housing) 2009*
- A retirement village
- Any other purpose prescribed by the regulations

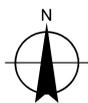
In light of the above, consent is not required for the proposal under Section 79BA of the EP&A Act, or as subdivision is not required, Section 100B of the *Rural Fires Act 1997*.



**LEGEND**

- Proposed route
- LGA boundary
- Vegetation Category 1
- Vegetation Category 2
- Bush fire prone land
- Vegetation Buffer

Paper Size A4  
 0 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56



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**Bush fire prone land**

**Figure 6-7**

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 © 2019. Whilst every care has been taken to prepare this map, GHD, NCC and LPI make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

## 6.9.2 Potential impacts

The proposal is situated within a landscape that is subject to bush fire threat. The detailed design would be prepared, as relevant, in accordance with *AS 3959 – 1999 Construction of Buildings in Bush Fire-prone Areas*.

## 6.9.3 Mitigation measures

### *Detailed design*

- The detailed design would include all relevant requirements of *AS 3959 – 1999 Construction of Buildings in Bush Fire-prone Areas*.

### *Construction*

- A bush fire management plan (BFMP) would be prepared for the proposal in consultation with the National Parks and Wildlife Service (NPWS) and other relevant stakeholders for implementation during construction and operation. The BFMP would consider potential impacts to infrastructure, users and the surrounding landscape, and include an emergency response plan with procedures to ensure the safety of workers and trail users in the case of bush fire.

### *Operation*

- Operational procedures would include measures to restrict access to the trail and ensure safety of users.
- Instructional signage would include safety procedures for trail users to follow in the case of bush fire. This would include emergency contact details and assembly points.

## 6.10 Non-Aboriginal heritage

The following sections have been summarised from the specialist non-Aboriginal heritage report prepared by Artefact, which is included in full in Appendix K.

### 6.10.1 Methodology

A Statement of Heritage Impact (SoHI) was prepared for the proposal. The SoHI was prepared in accordance with the document *Statement of Heritage Impact (2002)* contained within the *NSW Heritage Manual*, and *Assessing Significance for Historical Archaeological Sites and Relics (2009)*, both prepared by the NSW Heritage Office. It includes:

- A historical background of the proposal and associated elements.
- An analysis of existing items associated with and including the proposal such as remains of collieries, tunnels, bridges, cuttings and embankments.
- Significance assessments for listed and unlisted heritage listed items in and near the study area.
- Assessment of potential impacts to listed and unlisted heritage items from the proposal.
- A preliminary non-Aboriginal archaeological assessment of the study area.

An inspection of the proposal route was conducted by two archaeologists on 12-16 September 2016 and on 10 May 2017.

## 6.10.2 Existing environment

### *Historical context*

The study area is home to the Awabakal and Mindaribba tribes, and extends from the Hunter River in the north, Lake Macquarie in the south and as far west as the Sugarloaf ranges. The name Awaba means 'flat or plain surface' in the local dialect and the Awabakal are known as the 'people of the flat surface'.

The European exploration of much of the Hunter Region including Newcastle, Lake Macquarie and Cessnock began in the late 18th century and was related to some of the first coal discoveries in NSW.

Land in the Shortland portion was originally granted to pastoralist John Whitehall Stevens in the early 1840s. A subdivision map shows the property had recently been surveyed and plotted for the 'Village of Stevensville' in c.1859. Lots varied from large agricultural and pastoral holdings to small residential lots. A portion of land reserved for a wharf occupies the area along the banks of Ironbark Creek where a three-span concrete girder bridge is proposed to be constructed as part of the proposal. A later map dated 1946 shows the area had been renamed Shortland - as it is known today.

The first land grants within Hexham Swamp were given to Alexander Walker Scott, William Charles Wentworth, William Sparke, John Sparke, H. C. Cooper, G. Miller and T Walker in the late 1830s. The men are likely to have used their land for grazing purposes and there is no evidence to suggest they resided within these particular holdings. Urban settlement in the area altered the landscape of Hexham Swamp over time. This was mainly associated with the diversion of waterways, obstruction of natural drainage lines and the restriction of water from entering and existing the swamplands. The swamp was separated from the Hunter River in 1972 via the construction of floodgates.

Minmi was first settled in 1830, and used as a cattle station. Free settler John Eales, a grazier and pioneer pastoralist, was one of the earliest landowners in the area, acquiring a grant in the 1840s. Coal was identified in the Minmi area by Harry Styles in 1836 and on Eales' estate in the 1840s. Although the Australian Agricultural Company (AACo.) had already amassed a monopoly over coal mining and export in the area, Eales began mining and exporting coal in defiance. Eales established the Minmi to Hexham Railway in 1855-6. Minmi did not flourish until the mid-to-late 19th century, when James and Alexander Brown designated it a mining town for their workers.

James and Alexander Brown were prominent figures in the Newcastle coal industry and played a significant role in its growth and success from the 1840s onwards. James (b.1816) and Alexander (b.1827) were born in Lanarkshire, Scotland, and immigrated to Sydney in 1842 as free settlers and established themselves in Newcastle. James leased an 80-acre property from the Crown and later the AAcO. at Four Mile Creek, near East Maitland. The land contained a large coal outcrop which he and his brothers John and Alexander mined and sold at local markets in Maitland and Morpeth. James' venture was successful and he soon won a tender to supply the Hunter River Steam Navigation Company with 4000 tons of coal per annum. When the AAcO. became aware of the brother's activities, a court case ensued. The case was lost and the brothers were evicted from the property. The matter was finally brought before Parliament and won on the grounds that the Crown had established a monopoly on coal resources in the region. As a result, the Crown was forced to surrender its control over the colony's coal trade, opening the market to competition and lowering coal prices in the region. The brothers acquired the Minmi Colliery in 1859, which included its own private railway to Hexham.

During the 1870s, John Brown, James' eldest son, began managing the Minmi colliery. John Brown established a Model Farm near the Minmi Township at some time in the late 19th or early 20th century. The farm occupied a 600-acre property to the west of Hexham Swamp, near the town of Minmi. The farm was used to raise and breed dairy cows, horses and prize-winning poultry. A large stone homestead sat at the top of a hill that overlooked the township and various outbuildings, including dairy cool rooms occupied the property. After Brown's death in 1930, the farm was sold and came into the ownership of the Nealon brothers. The property was purchased by HWC at some time in the mid-20th century and converted into the Minmi Wastewater Treatment Plant site. All structures associated with the farm were demolished at that time.

The Richmond Vale rail line was established in two sections, The Minmi to Hexham Railway, which was completed in 1856, and the remainder of the line (to the west of Minmi) which was completed in 1905. As discussed above, the Minmi to Hexham Railway was established in 1856 by John Eales. Prior to its construction, coal was transported from Eales' Minmi Colliery via carts hauled by bullock teams. In 1897, J & A Brown purchased the Richmond Vale Estate where they planned to establish the Richmond Vale Colliery and headquarters for the business. In 1900, James Brown applied for an Act of Parliament to allow for the construction of a railway line from the Richmond Vale Estate to the existing Minmi and Hexham Railway. Construction commenced in 1904 and was completed in 1905. Following the completion of the Richmond Vale Railway, the Minmi to Hexham portion of the line was duplicated in 1909 – 1910.

### ***Heritage items***

#### **Minmi to Hexham Railway**

The Minmi to Hexham Railway is listed on the Newcastle LEP (Item No. 1332) as having local significance. The Minmi to Hexham Railway consists of specially built sand embankments that cross Hexham Swamp, from Hexham to Minmi. These embankments are still visible within the landscape today, although much of the railway infrastructure, including rails and sleepers are no longer extant. The State Heritage Inventory (SHI) states that the Minmi to Hexham Railway is of State heritage significance, however it is not listed on the State Heritage Register (SHR). The significance assessment for the proposal found that the item has local significance only (refer Appendix K).

#### **John Brown's Model Farm**

The heritage listed item 'John Brown's Model Farm' (Newcastle LEP, Item No. 1337) is also listed on the HWC Section 170 Register as 'Archaeological Remains (Former Minmi Wastewater Treatment Plant Site)' (S170 item no. 3630123). They are listed as locally significant. It encompasses land originally occupied by a hobby farm owned by John Brown (as described above), established in the late 1800s. Many of the original landscape features and domestic, agricultural and dairying structures associated with John Brown's Model Farm were removed in the mid-twentieth century. However, archaeological remains of these structures may survive below ground level. The significance assessment for the proposal found that the item has local significance (refer Appendix K).

### **Former railway cuttings**

This item (Newcastle LEP, Item No. I340) is located within the heritage listed curtilage of John Brown's Model Farm and Archaeological Remains (Former Minmi Wastewater Treatment Plant Site), described above. The item consists of the remains of railway cuttings and embankments created to accommodate a portion of Richmond Vale Railway, which ran through the northern boundary of the property and serviced the farm. The remains of former railway cuttings and embankments are still identifiable within the landscape and appear to be in good condition. The significance assessment for the proposal found that the item has local significance (refer Appendix K).

### **Remains of railway siding**

This item (Newcastle LEP, Item No. I338) consists of the remains of a railway siding and water tower associated with John Brown's Model Farm. The railway siding is comprised of a brick dwarf wall. Both items are likely to have been constructed in the early 20th century. The remains of the railway siding are in good condition and intact but the remains of the water tower could not be found during the site inspection. The significance assessment for the proposal found that the item has local significance (refer Appendix K).

### **Former railway cuttings**

This item (Newcastle LEP, Item No. I331) is located within the heritage listed curtilage of John Brown's Model Farm and Archaeological Remains (Former Minmi Wastewater Treatment Plant Site), described above. The cuttings are still clearly visible within the landscape. The significance assessment for the proposal found that the item has local significance (refer Appendix K).

The heritage items listed under the Newcastle LEP within the study are shown in Figure 4-1.

### ***Archaeological potential***

Non-Aboriginal archaeological potential is defined as the potential of a site to contain historical archaeological relics, as classified under the NSW Heritage Act 1977. Non-Aboriginal archaeological potential is assessed by identifying former land uses and associated features through historical research, and evaluating whether subsequent actions (either natural or human) may have impacted on evidence for these former land uses.

Based on the history of the site and likely levels of disturbance that have occurred throughout the study area, potential archaeological remains are likely to represent the Richmond Vale Railway and associated industries. However, there is always some probability that unexpected historical archaeological remains may be encountered during works.

Unexpected historical remains could include:

- 1850s remains of the original Minmi to Hexham Railway
- Archaeological remains relating to John Brown's former farm
- Former cottages and cabins related to the railway

### 6.10.3 Potential impacts

The potential impacts of the proposal to the heritage items and archaeological potential of the study area is summarised in Table 6-34.

**Table 6-34 Potential impacts to non-Aboriginal heritage**

Item	Potential impact
Minmi to Hexham Railway	Cumulative impacts from the preferred route would result in moderate heritage impacts to physical fabric and moderate visual heritage impacts.
Former railway cuttings (John Brown's Farm)	Negligible physical and visual heritage impacts.
John Brown's Model Farm and Archaeological Remains	Nil potential for impacting significant archaeological remains.
Remains of railway siding	Negligible physical and visual heritage impacts.
Archaeological potential – Hexham to Minmi Railway	The proposal will include the construction of a three metre wide path along the existing Richmond Vale Railway corridor. This will involve grading along some portions of the existing alignment. This has the potential to impact archaeological remains associated with the listed item.

### 6.10.4 Mitigation measures

#### *Detailed design*

- Consideration should be given to preserve as much original heritage fabric as practical, including timber bridges and residual rail infrastructure located along the route of the former Richmond Vale Railway (Minmi to Hexham Railway). This would include preserving and re-pointing brickwork associated with tunnels and culverts along the corridor.
- The selection of new materials and finishes in the detailed design should be as sympathetic as possible to the existing character of the railway, with the aim of minimising visual impacts
- The detailed design should include heritage interpretation and signage to be installed in conjunction with shared pathway amenities. Liaison with local historical societies, including the University of Newcastle's Coal River Working Party and the Richmond Vale Railway Society and Museum is recommended for designing interpretation and signage content.
- Detailed assessment, including assessment of the significance and location of any potential remains (such as worker's camps), would be undertaken during detailed design. The detailed archaeological assessment would assess the impact of any proposed excavation works and provide recommendations for appropriate management of the archaeological resource. Dependant on the assessed level of impact, this may necessitate application for an excavation permit under Section 140 or exception notification under Section 139(4) of the *Heritage Act 1977*.

#### *Construction*

- Prior to construction commencing, all heritage significant elements of the former Richmond Vale Railway that would be impacted should be archival recorded. This would involve accurate surveying and planning, as per guidelines set out by the NSW Heritage Office (1998 and 2006).

- A heritage management plan would be prepared and implemented during construction, in accordance with relevant permits where relevant, and would include:
  - A requirement for a heritage induction for all workers.
  - Information on the heritage significant elements of the former Richmond Vale Railway and other heritage listed items in and near the study area for the information of workers.
- Details of how heritage significant elements and items should be protected from inadvertent and indirect impacts by construction crews during works, including protective barriers, fencing or padding placed on or around significant fabric.
- An unexpected finds procedure in the event unknown heritage items are uncovered during works.
- Appropriate cleaning methodology in areas where cleaning significant fabric may be required (e.g. within tunnel lining), hand cleaning should be carried out wherever safe and practicable to do so. Blasting with a high-pressure hose should be avoided where possible to avoid inadvertent impact or damage to mortar and bricks within the tunnel each tunnel, or causing damage to cuttings.

### **Operation**

No specific mitigation measures are required during proposal operation.

## **6.11 Aboriginal heritage**

The following sections have been summarised from the specialist Aboriginal heritage report prepared by Artefact, which is included in full in Appendix L.

### **6.11.1 Methodology**

The assessment was prepared in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) and the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (2010) and includes:

- An overview of the Aboriginal history of the study area
- The results of a site survey
- Identification of Aboriginal sites and areas of archaeological potential within the study area
- Assessment of the significance of identified Aboriginal sites
- Conclusions and recommendations for the project in regards to Aboriginal heritage.

Archaeological survey of the study area was conducted between 12 and 16 September 2016. The proposal alignment was surveyed on foot. The survey was undertaken by Duncan Jones, Adele Zubrzycka (Heritage Consultants, Artefact Heritage), Peter Townsend (Awabakal Local Aboriginal Land Council; ALALC), Jason Brown (Mindaribba Local Aboriginal Land Council; MLALC) and Peter Leven (Awabakal and Guringai People Native Title claimant). An additional pedestrian survey of the Hunter Wetlands Centre was conducted on 10 May 2017 by Duncan Jones and Adele Zubrzycka.

## **6.11.2 Existing environment**

### *Historical context*

The study area is located partly within the Awabakal language group area. The Awabakal language group extends from the Hunter River in the north, down to the south of Lake Macquarie and west as far out as the Sugarloaf Range. The name Awaba means 'flat or plain surface' in the local dialect, and the Awabakal are known as the 'people of the flat surface'.

Much of the information on the Awabakal language group comes from the works of Reverend Lancelot Edward Threlkeld. Threlkeld operated an Aboriginal mission north of Lake Macquarie for 15 years and documented traditional and early Aboriginal history in the area after 1825. Threlkeld worked for many years with a prominent Awabakal man, Biraban (meaning eagle-hawk), who had learnt to speak English while he was raised in the military barracks of Sydney. Together they painstakingly recorded and translated the Awabakal language into English. It is from Threlkeld's writings that many early accounts of the Awabakal people were recorded. At the same time, the convict artist Joseph Lycett painted representations of the Aboriginal people who lived in the Newcastle area in the early 1800s, and recorded some details of their life and community in his paintings.

Aboriginal people who lived in the vicinity of the study area occupied both the coastal margin, coastal hinterland and inner mountain ranges. Threlkeld mentioned the way in which Aboriginal people would move seasonally from the coast to the mountains. Areas of primary significance for Aboriginal people in the lower Hunter Valley included the highly food abundant Hexham Swamp, and the higher mountain crests of Mount Sugarloaf, Black Hill and the Watagans.

Hexham Swamp is a saltwater and brackish wetland, which was host to large quantities of animal and plant resources which were exploited by Aboriginal people. Surrounding the wetland are numerous low hills which project into the swamp on all sides. From these raised terraces on the edge of the swamp, Aboriginal people were able to foray into the wetland to collect food and plant materials at ease.

In recognition of its cultural value, the Hexham Swamp was officially given its Aboriginal name Burraghinhbihing by the NSW Geographical Names Board in June 2016. The naming process was an initiative of Council's Guraki Aboriginal Advisory Committee. Burraghinhbihing is one of eight landforms in the Newcastle LGA that have been given Aboriginal names.

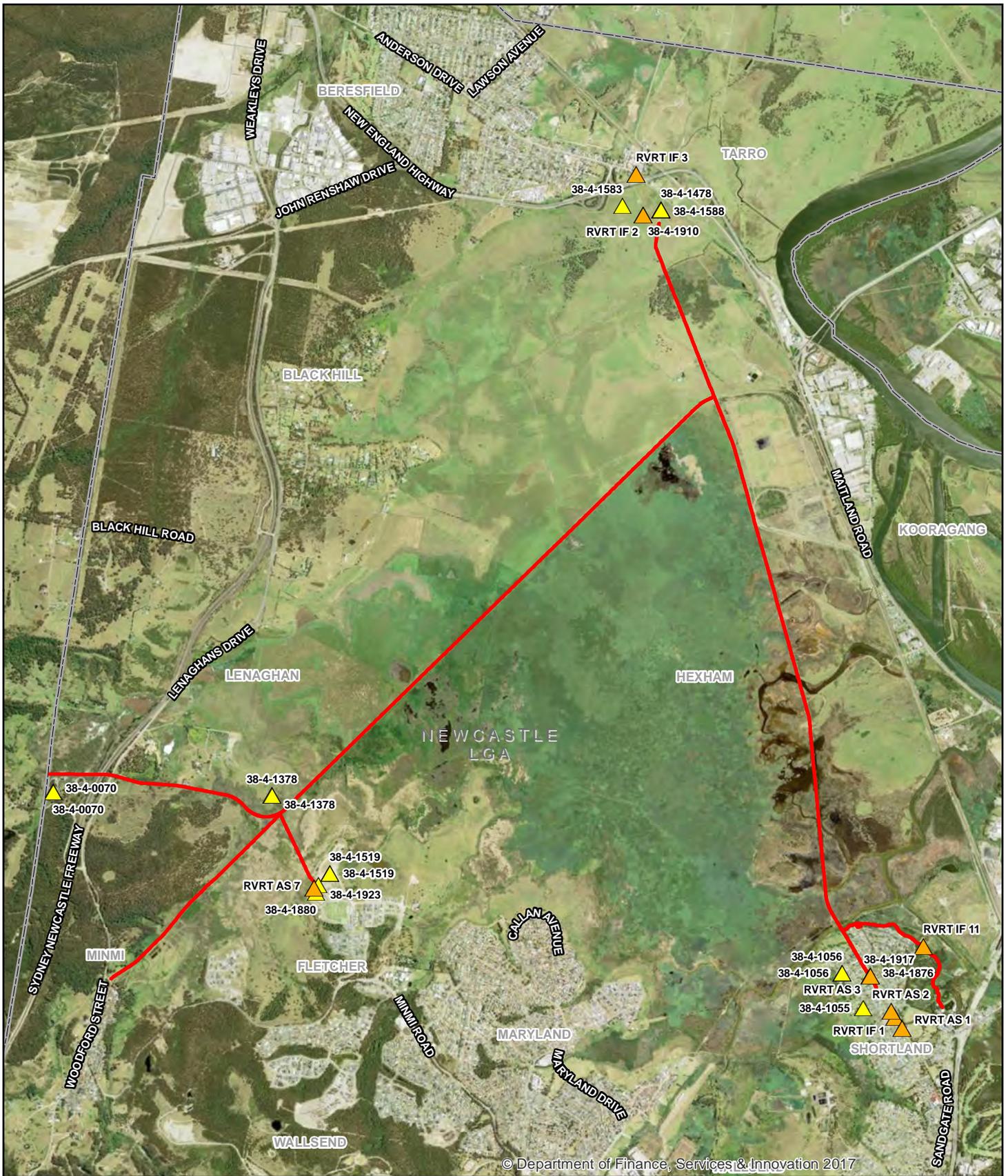
### *Recorded Aboriginal sites*

Table 6-35 lists the Aboriginal sites registered in the Aboriginal heritage information management system (AHIMS) that are within 200 metres of the proposal. The sites are shown in Figure 6-8.

**Table 6-35 AHIMS registered sites within or in 200 metres of the proposal**

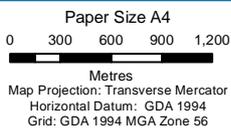
Site name	AHIMS No.	Location	Description
CTGM 1/A	38-4-1056	Within 200 metres	Located approximately 175 metres east of the current study area. The site consists of an isolated brown silcrete flake, located in a gravel exposure on an unsealed portion of a vehicle track that runs adjacent to the pipeline. The site is located at the northern spur crest overlooking the flats and wetlands of Ironbark Creek and Hexham Swamp. The site has been extensively disturbed through the construction of the existing pipeline, vehicle track, vegetation removal, gravel deposition and erosion. There is minimal potential for an in-situ sub-surface deposit. The site has been designated culturally important by ALALC.
CTGM 1/B	38-4-1055	Within 200 metres	Located approximately 170 metres west of the current study area, and 350 metres southeast of CTGM 1/a, within the existing CTGM pipeline easement at Shortland, Newcastle. The site is located within an area that has been completely cleared of native vegetation. The local rock type is Tomago Coal Measures. The site consists of an isolated brown tuff flake located towards the northern end of a gentle spur crest overlooking the flats and wetlands of Ironbark Creek and Hexham Swamp. The site has been extensively disturbed through the construction of the existing pipeline, road construction, drainage control, vegetation removal, gravel deposition and erosion. The site has been designated culturally important by ALALC.
Hexham Swamp (HS) 1	34-4-1588	Within 200 metres	Located approximately 75 metres north east of the current study area, 330 metres east of AHIMS # 38-4-1583 and was originally recorded in 2011. The site was investigated for the Hexham Relief Roads Project. The site has been subject to damage related to the construction of gravel embankments to create access roads. The site consists of substantial evidence of Aboriginal heritage, the extent of which was not able to be fully recorded during survey. Many artefacts had been damaged by vehicles or machinery. Several types of stone were noted, predominantly chert/MTC. AMBS (2012) determined there was evidence of substantial Aboriginal heritage material below the surface in this area on the margins of the swamp, and other areas in a similar landform should be considered archaeologically sensitive.

Site name	AHIMS No.	Location	Description
			The site was re-recorded in 2012 by AMBS. It was noted that although there is an Aboriginal silcrete quarry nearby the area, none of the artefacts were made of silcrete. No artefactual material was identified on adjacent access tracks. AMBS determined the artefactual material is confined to the one track and that the artefacts have been brought to the area during the construction of the track, and is not indicative of the local Aboriginal archaeology. The artefactual material located spread over a low-lying alluvial plain in 2011 and appears to be the result of vehicles crossing the disused track, and unlikely to be associated with the site HS1. The site is considered not to have archaeological sensitivity or be associated with a PAD. This was confirmed by AMBS' October 2012 test excavations.
Hexham Swamp 1 (HS1)	38-4-1478	Within 200 metres	Located approximately 75 metres north east of the current study area, 330 metres east of AHIMS # 38-4-1583 and was originally recorded in 2011. Information on the AHIMS site card states that the site has been subject to damage related to the construction of gravel embankments to create access roads. The site consists of substantial evidence of Aboriginal heritage, the extent of which was not able to be fully recorded during survey. Many artefacts had been damaged by vehicles or machinery. Several types of stone were noted, predominantly chert/MTC.
Hexham Swamp 2A (HS2A)	38-4-1583	Within proposal site	Located approximately 160 metres south of the New England Highway, approximately 160-180 metres from Purgatory Creek. Test excavation works were carried out as part of the Hexham Relief Roads Project. The site consists of three artefacts, including an IMT backed blade, a chert retouched flake and a Fine Grained Siliceous flake. The artefacts were recovered from two test pits in a disturbed context, and are likely to represent a background archaeological signal in the local area. The site was designated as having low archaeological sensitivity.
Lenaghans AS2	38-4-1378	Within 200 metres	Located approximately 160 metres north of the current study area. The artefact scatter was originally identified by an ALALC representative in a cleared, pastoral area on lower/midslopes. The site contains at least two artefacts, one silcrete and one chert flake.
Sanctuary Estate Stage4b Fletcher NSW	38-4-1519	Within 200 metres	Information on this site is limited however it is located in an area of likely high archaeological sensitivity.
Minmi Road	38-4-0070	Within 200 metres	Located approximately 200 metres north of Stockrington Road and 150 metres west of Mimi Road in an alluvial area. The site consists of a scatter of sparse artefacts along the shoulder of the ridge. Extensive vegetation clearance has been undertaken for pastoral purposes.



**LEGEND**

- Proposed route
- ▲ Aboriginal sites (Artefact)
- LGA boundary
- ▲ Aboriginal sites (AHIMS)



Newcastle City Council  
Richmond Vale Rail Trail  
Environmental Impact Statement

Job Number	22-18317
Revision	0
Date	11 Apr 2019

Aboriginal sites in and within  
200 metres of the proposal site **Figure 6-8**

## Survey results

As stated, site survey was conducted in September 2016 and May 2017. A number of previously unrecorded sites were recorded during the site survey. These are summarised in Table 6-36. All new sites have been reported to the AHIMS and are shown in Figure 6-8. More detail on the site finds is provided in the specialist report in Appendix L.

**Table 6-36 Unrecorded Aboriginal sites noted during site survey**

Site name	Description
Richmond Vale Rail Trail Artefact Scatter 1 (RVRT AS1)	The site was identified on the edge of the Shortland hill crest, immediately to the west of the utility service corridor adjacent to King Street. The ground was exposed from surface disturbance caused by vehicle driving and parking on the road verge. The site is located directly opposite Tuxford Park in Shortland, which is located further down the slope of the Shortland hillcrest, bordering Hexham Swamp. Six Aboriginal artefacts were identified, including a red-white indurated mudstone/tuff (IMT) core. The remainder of the artefacts recovered were red-white IMT and grey and red silcrete stone tools (flake fragments).
Richmond Vale Rail Trail Isolated Find 1 (RVRT IF1)	The site was identified in an exposure near the base of a tree, directly west of the King Street road verge and parallel ground disturbance caused by the adjacent service utility corridors. The site was located in ground which did not appear to have been heavily disturbed. The site consisted of a single quartzite flake.
Richmond Vale Rail Trail Artefact Scatter 2 (RVRT AS2)	The site was identified in surface exposures around the base of several trees, directly to the west of the King Street service utility corridor. A total of 13 artefacts were identified, consisting of red banded silcrete and grey IMT. Recovered artefacts were flake fragments less than 30 mm in size.
Richmond Vale Rail Trail Artefact Scatter 3 (RVRT AS3)	The site consisted of five artefacts identified in an exposure on the road verge of King Street, to the west of the area of identified service utility corridors and to the east of the excised cutting where the former HWC pipeline was located. The soil exposure showed a high quantity of natural angular gravels. Two artefacts, one of grey IMT and one of red silcrete, were identified in the exposure.
Richmond Vale Rail Trail Isolated Find 2 (RVRT IF2)	The site consisted of a grey and red chert flake fragment identified on a vehicle access track, immediately to north of the unnamed Aurizon facility access road. Shell material was identified in association with the identified artefact. This access track had been graded with fresh sand and gravels, and was located above a newly installed stormwater culvert. The artefactual material has been introduced to the area.
Richmond Vale Rail Trail Isolated Find 3 (RVRT IF3)	The site consisted of a single red course-grained silcrete whole flake. The site was identified immediately adjacent to the concrete kerb at the eastern end of Anderson Drive. While the artefact was located on this immediate road verge with some evidence of introduced gravels, exposures indicated that the natural Beresfield topsoil was still largely intact.
Richmond Vale Rail Trail Isolated Find 11 (RVRT IF11)	Isolated artefact identified on edge of regraded pedestrian pathway, in area of reclaimed vegetation and clear ground disturbance. Likely imported to its present location from nearby soil materials.

Site name	Description
Richmond Vale Rail Trail Artefact Scatter 7 (RVRT AS7)	<p>The site consists of an open and level area of ground at the end of the spur crest, on the outer edge of the Fletcher hill crest. The site extent is defined as an area between the newly constructed garden beds adjacent to Kural Crescent and the break in slope of the hill crest. The north-western portion of the site extends slightly further down the hill-slope due to the milder gradient in this area. There are significant ground exposures on the northern side of the site due to erosion and slippage on the break in slope of the hill crest.</p> <p>13 stone artefacts were identified in the site, in several areas where erosion had caused ground exposures. These artefacts consisted of a mix of grey-white IMT and red silcrete, including core fragments, whole flakes and cortical fragments. Eroded exposures in these areas showed that the ground was natural Beresfield residual soil and did not represent imported material brought in during the construction of the estate.</p>

### ***Archaeological potential***

A number of natural landforms within the study area have been identified as areas of archaeological potential, including:

- Spur crests and ridgelines of hills that border Hexham Swamp
- Margins of water courses which are above the flood zone

Despite the high archaeological sensitivity of these natural landforms throughout the study area, the level of ground disturbance caused by construction of the former Richmond Vale Railway, and the confinement of most of the study area to that area of disturbance, means that the level of archaeological potential across the whole of the study area is considered to be low.

As such, Aboriginal archaeological potential has been identified in only relatively undisturbed areas, or in areas of only shallow ground disturbance. These areas are located away from this original rail alignment. Intact Aboriginal sites have been located only in these areas where natural ground surfaces were identified. Areas of archaeological potential include:

- RVRT Archaeological Complex (AC) 1. RVRT AC1 is comprised of RVRT AS1, RVRT IF1, RVRT AS2, and RVRT AS3
- RVRT AS7.

### ***Archaeological sensitivity***

Two areas of possible archaeological sensitivity were identified immediately adjacent to the alignment of the former railway line along the spur crests that adjoin the upper margins of Hexham Swamp. These spur crests were identified as sensitive areas due to the location of this landform near the swamp edge, and the correlation of these landforms with other nearby spur crests in which AHIMS listed sites had been registered.

The areas of archaeological sensitivity were only opportunistically examined due to low vegetation coverage and relatively easy access to the surrounding landform in this area. It is likely that other areas of archaeological sensitivity exist directly adjacent to the study area in similar landform contexts. However as the proposal footprint is confined in the most part to the existing railway corridor, these areas would be avoided.

## **Significance assessment**

The significance of areas of archaeological potential has been assessed in Appendix L and the results are as follows:

### **Richmond Vale Rail Trail Archaeological Complex 1 (RVRT AC1)**

A number of sites located in the only shallow-disturbed ground were identified along the road verge of King Street in Shortland. These sites were located on a high hill crest, located less than 150 metres away from Hexham Swamp. Despite the moderate level of disturbance from the construction of King Street and the former HWC pipeline, a six to eight metre wide portion of the ground surface appeared to be relatively undisturbed between these service and infrastructure corridors.

Spur crests that fringe Hexham Swamp are known to have yielded relatively high densities of Aboriginal artefactual material. Archaeological investigations from new housing estates have yielded relatively high volumes, although the majority of recent investigations have focused on the surface collection of artefacts. The moderately deep (up to 30 centimetres) soil profile in the area of the Shortland ridge crest could indicate intact and stratified archaeological deposits in this area, related to occupation areas associated with resource gathering in Hexham Swamp.

The sites that comprise the RVRT AC1 are determined to be of moderate archaeological significance.

### **Richmond Vale Rail Trail Artefact Scatter 7 (RVRT AS7)**

The RVRT AS 7 was identified based on the presence of surface artefacts on the intact landform located directly on the edge of a spur crest in the suburb of Fletcher. A small number of exposures revealed surface artefacts in moderate densities. The area between the break of slope and the newly installed pedestrian pathway showed relatively minor ground disturbance. Any occupation area located along this ridge line would have been within easy access of resources from an upper freshwater portion of Hexham Swamp.

An AHIMS listed site is located less than 100 metres to the east of the RVRT AS7 (Sanctuary – Estate Stage 4B Fletcher, AHIMS# 38-4-1519). Due to the recent construction of the housing development in this area, and the listing of this site, it is possible that the newly identified RVRT AS 7 may be part of the originally recorded extent of AHIMS# 38-4-1519.

This site is considered to be of moderate archaeological significance.

### **All other sites**

The remainder of the sites located within the study area were considered to be of nil or low archaeological significance. Sites which were classified as nil significance included the site that has demonstrably been destroyed (AHIMS Site HS2A).

Sites classified as having low archaeological significance were those that were located in highly disturbed contexts, or that were shown to be artificially imported to their present location. Due to the displaced and disturbed contexts of these sites, it was determined that archaeological excavation for further sub-surface deposits would fail to yield artefacts in controlled archaeological contexts.

### 6.11.3 Potential impacts

The proposal has the potential to impact on two sites of moderate archaeological potential, as discussed above:

- RVRT AC1 (which includes the following sites RVRT AS1, RVRT IF4, RVRT AS2, RVRT AS5)
- RVRT AS7

However, due to the low impact and narrow footprint of the proposal it is possible that impacts can be avoided at these sites. This would be investigated further during detailed design.

### 6.11.4 Mitigation measures

#### *Detailed design*

- The footprint of the proposal and the construction methodology would be developed so as to minimise impacts in the vicinity of RVRT AC1 and RVRT AS7.
- The detailed design should include heritage interpretation and signage to be installed in conjunction with shared pathway amenities. Liaison with Aboriginal stakeholders is recommended for designing interpretation and signage content.
- If impacts cannot be avoided, an Aboriginal heritage impact permit (AHIP) under Section 90 of the NPW Act would be required prior to construction commencing. This AHIP application would be submitted with an Aboriginal Cultural Heritage Assessment Report (ACHAR) which would be completed in accordance with the *Guide to Investigation, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (Office of Environment and Heritage, 2011). Full consultation with Aboriginal stakeholders, in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (OEH 2010), would be required. Archaeological test excavation of the identified sites would also be required. Existing AHIPs that may overlap the site should also be confirmed.

#### *Construction*

- A heritage management plan would be prepared and implemented during construction, and would include:
  - A requirement for a specific heritage induction for all workers
  - Information on the aboriginal heritage of the study area for the information of workers
  - Details of how aboriginal heritage sites and items should be protected from inadvertent and indirect impacts by construction crews during works
  - An unexpected finds procedure in the event unknown heritage items are uncovered during works

#### *Operation*

No specific mitigation measures are required during proposal operation.

## 7. Other environmental issues

*This section provides an assessment of environmental issues potentially impacted as a result of the proposal. The existing environment, potential impacts from the proposal and recommended mitigation measures are described.*

### 7.1 Land use

#### 7.1.1 Existing environment

The majority of the proposal site is located within the Hexham Swamp, in the Ironbark Creek catchment. The Hexham Swamp and the associated floodplains of the Hunter River have constrained residential development in the vicinity of the proposal site. Dominant land uses within the Hexham Swamp are recreation and conservation (City of Newcastle, 2004). Seasonal grazing is also undertaken in some of the outer areas of the swamp.

Land use on the southern and western periphery of the proposal site is dominated by low density residential housing within the suburbs of Shortland, Fletcher and Minmi. To the west, the dominant land uses include transportation along the M1 Pacific Motorway, agriculture (grazing), and rural-residential housing. To the north and east land use is dominated by agriculture (grazing), road transportation along the Pacific and New England Highways, freight rail via operation of the Hunter Valley Freight Network, heavy industry within the suburbs of Hexham and Beresfield and low-density residential housing within the suburbs of Tarro and Beresfield.

Land within the proposal site is owned by a range of entities and individuals. Coal and Allied Operations Pty Ltd (Rio Tinto) own most parcels that make up the former rail corridor. The HWC own land within the former water main corridor. Other parcels are in State Government, Council and private ownership (further discussed in Section 2.4 and 3.5.9).

Review of the Division of Resources and Energy's (DRE's) MinView map view indicates that there are no coal title applications, current coal titles, mineral title applications, current mineral titles, petroleum title applications or current petroleum titles within the proposal area. However, it is noted that there are current coal titles (i.e. exploration and mining leases) within proximity to the proposal site west and north of Pambalong Nature Reserve.

#### 7.1.2 Potential impacts

##### *Construction*

The proposal is not expected to create any significant land use changes in the area. The majority of the proposed works would be within the corridors of the former Richmond Vale railway and HWC Chichester water main.

Some property acquisition may be required but the land acquired would not significantly affect the ongoing future use of the remainder of the lot (Section 3.5.9).

##### *Operation*

Land use impacts are unlikely during proposal operation; however, there is potential for social impacts for some residents in close proximity to the trail. This is further discussed in Section 7.2.

#### 7.1.3 Mitigation measures

No specific mitigation measures would be required during construction or operation of the proposal.

## 7.2 Socio-economic

The following sections have been summarised from the specialist socio-economic assessment prepared by GHD, which is included in full in Appendix M. Descriptions in this section are based on 2016 census data (Australian Bureau of Statistics, 2016) and a local and regional area defined in the socio-economic impact assessment as follows:

- The local area includes the thirteen state suburbs that intersect the proposal and may be directly impacted.
- The regional area is considered as the wider area of influence and includes the Newcastle, Cessnock, Lake Macquarie and Maitland LGAs.

### 7.2.1 Existing environment

#### *Population characteristics*

In 2016, 30,951 people lived in the local area, representing roughly 6.4 percent of the regional area's population of around 486,000. Compared to the regional area, the local area is characterised by:

- A younger average age of 37 compared to the regional area, which is 39 years.
- The proportion of the population under 18 years is greater in the local area compared to regional area (24.4 percent and 22.3 percent respectively).

Indigenous people make up up 5.7 percent of the total population of the local area. This is slightly higher than the regional area (4.4 percent), with higher representation in Kurri Kurri, Pelaw Main and Hexham (7.6, 7.6 and 8.5 percent) and the lowest representation in Minmi (3.8 percent).

Larger households in separate houses dominant in the local area, with 82.9 percent of properties being separate dwellings with an average household size of 2.7 persons. This is higher than the regional area (74.1 percent and 2.5 persons respectively). Nearly 73 percent of people own their property, either outright or with a mortgage compared to the regional area (70.3 percent).

About 73 percent of households are families in the local area, which is 2.9 percent higher than the regional area (70.6 percent).

As noted in *Towards a Healthy Hunter* (Hunter Medicare Local, 2014), the region has high rates of behavioural health risk factors. These risk factors may contribute to the region's higher rates of hospitalisation for health behaviour related conditions, which exceed the state average.

*The Hunter Regional Plan 2036* (NSW Government, 2016) estimates the Hunter Region will grow from 732,400 in 2016 to 862,250 in 2036, an increase of 17.8 percent. Much of this growth is predicted to occur within close proximity to the proposal; within the Blue Gum Hills Precinct (including Fletcher, Minmi and Maryland, extending south towards Glendale and connecting to the urban renewal corridor of Glendale to Cardiff), areas to the east of Kurri Kurri, and just to the northwest of Tarro and Beresfield near Thornton in the Maitland LGA.

#### *Local economy*

Nearly 60 percent of people aged 15 years and over are actively participating in the labour force in the local area, compared to 58.6 percent of the regional area. Most people are employed full time in the local area, whereas there is a higher number of part time employees in the regional area. The unemployment rate is consistent across the local area (7.7 percent) and the regional area (7.3 percent).

Those attending university or other tertiary institutes in the local area, either full time or part time, are predominately located in the suburb of Shortland (43.8 percent), whereas suburbs including Hexham, Mulbring, Stanford Merthyr and Pelaw Main all have less than 15 percent of students in the population. Similarly, the majority of people attending further education reside within the Newcastle LGA (34.5 percent) in the regional area, compared to Lake Macquarie (20.7 percent), Maitland (19.5 percent) and Cessnock (13.4 percent).

The average weekly household income in the local area was marginally higher (\$1,376) than in the regional area (\$1,331). However there was a significant range across the suburbs within the local area with Tarro, Hexham, Kurri Kurri and Pelaw Main having averages less than \$1,000 per week, and other suburbs more than \$1,000 per week. Fletcher had the highest average weekly household income at \$2,296.

### **Social infrastructure and businesses**

The proposal site is located approximately 10.5 kilometres north-west of the Newcastle city centre. There are a number of community facilities and businesses servicing the local area in proximity to the proposal.

Tourism numbers in the Hunter region have varied over the last eight years, initially declining from a 2011 high before gradually increasing every year from 2015. The Hunter region currently hosts in excess of 10 million visitors per year (Destination NSW, 2016). Domestic day trippers represent around two thirds of all visitors, and their numbers increased by 11.4 percent between 2010 and 2018.

### **Travel and transport**

Heavy rail train stations are located at Hexham, Tarro and Beresfield in the local area. The next closest train stations are located within surrounding suburbs including Warabrook, (located at the University of Newcastle), Sandgate and Maitland.

There are several bus services operating within the local area. However, there are no existing bus routes that travel through the entire proposal, with an average of three or four buses and/or train journeys required to travel from Shortland to Kurri Kurri.

Connections to onward active travel networks are currently limited, however regional visions for cycle networks in the longer term include onward connections to the University of Newcastle from Shortland, through Minmi to Blue Gum Hills, from Kurri Kurri to Cessnock and on to the vineyards, and also from Kurri Kurri to Maitland. There is currently a short shared walking and cycling path at Log of Knowledge Park in Kurri Kurri. Residential developments in the Fletcher and Minmi areas are currently integrating active travel networks into their master planning.

### **Community values**

The *Newcastle 2030: Newcastle Community Strategic Plan* (The City of Newcastle, 2018) expresses the shared community vision for a smart, liveable and sustainable city and a ten-year strategic plan. The Community Strategic Plan outlines:

- The community's shared vision for a smart, liveable and sustainable city
- Seven strategic directions for Newcastle
- 23 objectives to be achieved over the next 10 years
- Strategies and partnerships to fulfil these objectives

The vision and strategic plan were developed through an extensive collaborative engagement process based on social justice principles to invite as many people as possible to be part of the ongoing conversation.

Some of the key strategic directions and objectives for Newcastle, as outlined in the Plan include:

- Creating and developing transport networks that are well connected and convenient. Walking, cycling and public transport are required to be viable options for the majority of trips.
- Cycling will play an increasingly important role in helping meet the goals of sustainable connected and active communities which also requires the necessities of end of trip facilities such as lockers, showers and bike racks throughout the city.
- Continued upgrade, extension and promotion of cycling and pedestrian networks
- Newcastle should be a city of great public places and neighbourhoods promoting people's health, happiness and wellbeing.
- Promoting active and health communities with physical mental and spiritual wellbeing.

### **7.2.2 Potential impacts**

Extensive community and stakeholder consultation has been completed for the proposal (refer Section 5 and Appendix M). All feedback collected to date regarding the proposal has been collated and reviewed during design development and preparation of the EIS. Feedback will also be considered during public display of the EIS, determination of the application and detailed design (if the proposal should proceed).

This community involvement has provided representative insight into the social values of the key stakeholders, potential future users of the proposal, and likely social and economic impacts.

Economic impacts (benefits and costs) have been further defined using detailed quantitative economic assessment. The methodology for and findings of the economic assessment are described in detail in the socio-economic impact assessment in Appendix M.

#### **Construction**

##### **Access and connectivity**

During construction, access to the proposal would be restricted, affecting any current recreational users of the alignment (such as birdwatchers, walkers and cyclists). Construction vehicle access would be via a number of access points spread along the proposed alignment, resulting in a dispersed distribution of construction traffic.

Construction traffic management plans would be developed for the proposal and identify transport routes which avoid or minimise traffic near sensitive social infrastructure (such as schools and the Fletcher Community Centre). It is expected that the traffic network would readily support the temporary increase in traffic during construction.

##### **Amenity and aesthetics**

Properties and land uses within study area are likely to experience temporary amenity impacts resulting from construction of the proposal, including:

- Increase in noise, vibration and dust from construction activities (refer to Sections 6.2 and 6.3)
- Visual changes (refer to Section 6.8)
- Minor increase in construction traffic (refer to Section 6.6).

The linear nature of the proposal means that, in most locations works, would be completed within a period of less than three weeks, and any noise and vibration impacts associated with these works would thus be short lived. Appropriate mitigation developed through engagement with affected property owners is expected to adequately manage these impacts.

### **Privacy and safety**

Loss of privacy may occur at several properties in Shortland due to the presence of construction workers. However, these impacts would occur for short durations only as works continue along the proposed alignment. Fencing may be required at some properties to prevent trespassing and to control the movement of stock during construction and operation.

Management of recreational use of the route during construction would be enforced to ensure the safety of any permitted or unauthorised users.

### **Property and land use**

Temporary use of private or government owned land during construction would be undertaken in accordance with required agreements, which would be negotiated by Council prior to works commencing. Any reparation works required as part of negotiated agreements would be completed as soon as practicable after construction is finalised.

### **Economic impacts**

It is anticipated that a workforce of approximately 85 construction and site management personnel would be required during construction, which is anticipated to be undertaken over a 12 to 18 month period. This would deliver short-term employment benefits for local labour. In addition, local and/or regional businesses are likely to experience a small increase in trade through sourcing of construction materials and services, and workforce expenditure in the local area.

### **Operation**

#### **Access and connectivity**

Consistent with the *Greater Newcastle Metropolitan Plan 2036*, the proposal would enhance access to recreational facilities and connect various locations, supporting thriving communities. The proposal would provide improved accessibility for residents and visitors within Newcastle and between Newcastle and the Maitland, Cessnock and Lake Macquarie LGAs, connecting not only recreational and natural areas, but also education, health and employment facilities.

The key accessibility benefits for the proposal include:

- Equity and diversity of access
- Enhanced access to natural areas
- Active travel links and infrastructure for communities along the route
- Increased commuting options

### **Privacy and safety**

The proposal passes primarily through rural and natural areas. However there is potential for users to impact on resident privacy at some locations along the route, primarily at Shortland where the proposal route is in close proximity to residential areas. During larger events, these impacts are likely to be more pronounced due to a higher volume of users.

The presence of trail users during proposal operation would generate a degree of safety through passive surveillance and assist in preventing unauthorised motor vehicle use and illegal dumping that currently occurs along the route. This would be enhanced by lighting in selected areas.

Car parking and rest areas may be used for social gatherings that could cause nuisance for residences, particularly at night. Adequate waste facilities would be provided to avoid rubbish being left by users.

### **Cultural heritage**

The proposal would permanently impact on the intrinsic heritage value of the former Richmond Vale railway and potentially impact on other areas of Aboriginal and non-Aboriginal heritage value. This would be further investigated and approval sought during detailed design and is discussed in further detail in Section 6.10 and 6.11. Heritage considerations would be included in the detailed design of the proposal (in consultation with relevant stakeholders) and would include (but not be limited to):

- Preservation and protection of heritage items, objects and sites where appropriate
- Adaptive reuse of heritage material in the proposal design
- Interpretative and educational signage about heritage issue and sites

### **Property and land use**

No permanent private property impacts are anticipated due to the proposal. This would be confirmed during detailed design.

Agreements for acquisition or permanent use of Crown or other government owned land would be negotiated with relevant agencies prior to work commencing. Preliminary and ongoing discussions have already commenced. No significant impacts have been identified to date.

### **Economic impacts**

It is estimated that the Richmond Vale Rail Trail will cost in the order of \$46 million and will result in benefits to the value of \$77 million. This means that the benefits of the project to the region outweigh the costs by a factor of 2.4 and the value to the region would be approximately \$45 million. The detailed costs benefit analysis is provided in Appendix M.

The key benefits that have added an economic value to the proposal include:

- Improvement in cyclist safety
- Health benefits
- Congestion cost savings
- Vehicle operating cost savings
- Public transport fare cost savings
- Air pollution
- Greenhouse gas emission
- Noise
- Water pollution
- Journey ambience
- Regional spend per trip

Secondary benefits of the proposal that were not fully costed but would provide an economic benefit include increased tourist visitation and local business stimulus.

### **7.2.3 Mitigation measures**

#### ***Detailed design***

- Rest areas and trail interpretation locations and content be developed in consultation with local and regional bird observers.
- Detailed design would consider lighting of the route (particularly in tunnels and in heavily forested areas) to enhance safety.
- Heritage considerations outlined in the ongoing heritage assessments and investigations would be reflected in the detailed design.
- Provision of adequate waste facilities should be included to avoid nuisance to other users (e.g., through creation of broken glass and scattered waste) if areas used for social gatherings in the evenings.
- Property acquisition or temporary use would be negotiated by Council with affected landowners where relevant in order to reach fair compensation and access arrangements.
- Consideration of permitting the use of motorised cycles/scooter/chairs (adequate to carry birdwatching equipment) and hiring facilities for these at some access points.
- Provide emergency access at suitable locations along the trail.
- Use vandal resistant materials and include appropriate signage to outline expectations of users and other safety information.
- Consider safety requirements at road intersections and other crossings.

#### ***Construction***

- Fencing or screening of private properties proximal to the route would be implemented to minimise this overlooking and privacy impact.
- Communication with residents, businesses and organisations located close to the proposal would be carried out in advance of construction to ascertain any specific times/events that should be considered in construction programming (e.g. school or cultural events).
- Residents living near the proposal and the local community would be provided with timely and relevant information to enable them to understand the likely nature, extent and duration of vibration, dust and noise impacts and access changes.
- Communication methods would be chosen to ensure any vulnerable community members are appropriately engaged during the consultation period.
- Communications would include roadside signage, letterbox dropped newsletters, newspaper advertisements, web based information, a complaints line, and advice to specific service providers such as community transport and seniors organisations.
- All works would be undertaken during standard construction hours.

#### ***Operation***

- Council would continue to engage with affected stakeholders during proposal operation to enable identification and management of any issues.

## 7.3 Coastal processes and hazards

### 7.3.1 Existing environment

Publicly available tidal information for a period of 5 days in May 2017 was obtained for the Hunter River from Manly Hydraulics Laboratory gauging at Hexham Bridge. The observed tidal range for this period was:

- Maximum tide height – +1.015 mAHD
- Minimum tide height - -0.472 mAHD
- Mean tide height – +0.2715 mAHD (half way between minimum and maximum tide recorded over the five day period)

Three low points across the alignment are generally influenced by the high and flood tides. These areas correspond to the three low points along the alignment. The high tide influences the lowest section of the alignment by between 0.5 to 1.0 metre of water depth.

Connectivity of waterways from the Hunter River upstream may influence the expression of tidal water within the swamp where the track is proposed; however, as a minimum, tidal conditions are expected to be a maintained feature of subsoil moisture (in turn a key factor in sustaining vegetation within the swamp).

### 7.3.2 Potential impacts

The site is located about twelve kilometres upriver from the mouth of the Hunter River, meaning that hazards associated with natural coastal processes, such as beach erosion and recession, are not expected to extend sufficiently upriver to affect the project.

As noted in Section 6.5, the low-lying nature of the site means that flood levels are influenced by both rainfall and the sea levels. With sea level rise due to climate change, the lower portions of the site are likely to be flooded more frequently.

### 7.3.3 Mitigation measures

#### *Detailed design*

- Long term tidal information should be obtained during detailed design to confirm the annual variance in tide height (e.g. consideration of spring and astronomical high tide).
- The detailed design process should include detailed hydraulic modelling that considers the potential influence of sea level rise (and changes to rainfall intensity) because of future climate change, in order to understand better the potential reduction in the flood immunity of the trail. The modelling could also be used to identify potential future design modifications that could be implemented, if required, to preserve the proposed flood immunity of the trail under future climate conditions.

#### *Construction*

- An emergency response plan would be prepared to include a procedure for managing flooding due to tide events. This would include an emergency procedure for ensuring the health and safety of construction workers.

## **Operation**

To protect trail users during periods of flood:

- Operational procedures would include measures to restrict access to the trail (such as gates that can be closed during inundated periods) and ensure safety of users during proposal operation.
- Instructional signage would include safety procedures for trail users to follow in the case of flood. This would include emergency contact details and assembly points.

## **7.4 Greenhouse gas emissions and climate change**

### **7.4.1 Existing environment**

#### **Rainfall**

Rainfall statistics for Nobby Head AWS (no. 61055) between 1862 and 2016 (Australian Government Bureau of Meteorology, 2016) are as follows:

- Mean annual rainfall of 1123.1 millimetres (mm)
- Highest mean monthly rainfall occurring in March with 118.8 mm
- Lowest mean monthly rainfall occurring in November with 71.0 mm

#### **Temperature**

The average minimum temperature at the Nobby Head AWS is approximately 5.1 degrees Celsius (°C) in July and 16.3°C in January. The lowest minimum temperature ranges between 1.8°C in June and 12°C in January. The highest minimum temperature recorded is between 7.5°C in August and 19.5°C in February (Australian Government Bureau of Meteorology, 2016).

The average maximum temperature at the Nobby Head AWS is approximately 12.7°C in June and 34.8°C in January. The lowest maximum temperature ranges between 18.2°C in June and 26.8°C in January. The highest maximum temperature ranges between 26.1°C in June and 42.5°C in January (Australian Government Bureau of Meteorology, 2016).

#### **Greenhouse gas emissions**

The Commonwealth Department of the Environment estimates annual greenhouse gas emissions for Australia to fulfil the reporting requirements of the United Nations Framework Convention on Climate Change and the Kyoto Protocol. The latest breakdown of Australia's national and state and territory greenhouse gas emissions was published in two separate reports in May 2016 on the Commonwealth Department of Environment website (DotE, 2016a; DotE, 2016b). National emission estimates are current to 2015 and state and territory emission estimates are current to 2014.

Australia's total greenhouse gas emissions for 2015 were estimated as 529.2 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub>-e). NSW total greenhouse gas emissions for 2014 were estimated at 130.2 Mt CO<sub>2</sub>-e. The major emission sources for NSW were fuel combustion for stationary energy purposes and fuel combustion for transport purposes. In 2013, global greenhouse gas emissions for Annex 1 Parties to the United Nations Framework Convention on Climate Change were 19 gigatons of carbon dioxide equivalent (Gt CO<sub>2</sub>-e) (<http://unfccc.int/resource/docs/2014/sbi/eng/20.pdf>).

The Newcastle 2020 Carbon and Water Management Action Plan (The City of Newcastle, 2011), has two strategic objectives that are relevant to the management of greenhouse gas emissions:

- Minimise carbon emissions – both within Council's operations and across the Newcastle community-to levels required to avoid dangerous climate change
- Position Newcastle as an innovation centre and a global showcase for carbon and water management

### **Predicted climate change**

The key impacts of climate change are warming temperatures and increases in the number, duration and severity of eastern weather events including heatwaves, storms and rainfall.

The *NSW Climate Impact Profile* (Department of Environment, Climate Change and Water, 2010) provides regional climate projections for NSW in 2050 based on preliminary analyses of global modelling data. The projections have been developed for a range of NSW regions, including the Hunter region, within which the proposal site is located. A summary of the predicted climate change impacts for the Hunter region is provided Table 7-1.

**Table 7-1 Climate change predictions for the Hunter region 2050**

Period	Minimum temperatures	Maximum temperatures	Precipitation	Runoff depths	Magnitude of high flows
Spring	2.0–3.0°C warmer	1.5–2.0°C warmer	5-20% increase	-9% to +6%	Slight decrease
Summer	2.0–3.0°C warmer	1.0–1.5°C warmer	10-50% increase	+6% to +18%	Substantial increase
Autumn	2.0–3.0°C warmer	1.5–2.0°C warmer	5-10% increase	-6% to +17%	Moderate increase
Winter	2.0–3.0°C warmer	2.0–3.0°C warmer	5-10% decrease	-15% to +9%	Slight decrease

## **7.4.2 Potential impacts**

### **Construction**

The key gas emission sources during proposal construction are the use of fuels for plant, equipment and vehicles, electricity consumption and removal of vegetation. However these would be insignificant when compared with Australia's and NSW's total greenhouse gas emissions. Nevertheless measures to reduce greenhouse gas emission are provided in Section 7.4.3.

The predicted increases in rainfall, temperature and extreme weather events are not likely to significantly impact on the proposal during construction. Proposal design would consider material and design features that can accommodate climate change effects. Consideration of the health and safety of construction workers would be incorporated into work method statements.

### **Operation**

Due to the relatively small scale of the proposal when considered across the landscape of the proposal site, it is not considered likely that the proposal would contribute significantly to greenhouse gas emissions and exacerbate climate change impacts during operation. Consideration of the health and safety of users of the trail would be incorporated into operational procedures.

### **7.4.3 Mitigation measures**

#### **Construction**

- Design and material selection would consider temperature, for example use of non-conductive materials, and incorporate shade provision in open space.
- Pathway grades (longitudinal and cross-section) would account for increased drainage requirements.
- Design and material selection would consider rainfall and flooding.
- Signage would be used to provide flood warnings if necessary.
- An emergency response plan would be prepared that would contain procedures to ensure the safety of workers in the case of extreme weather events or flooding.
- Fuel use would be reduced whenever possible. This could include:
  - Turning vehicles, machinery and equipment off when not in use.
  - Planning movements of personnel, equipment and materials to minimise trips.
  - Ordering equipment and material to minimise trips to site.
- Modern vehicles, equipment and machinery only would be used. These are more fuel efficient and have better emission controls than older models.
- All vehicles, machinery and equipment would be adequately maintained.
- Use of biodiesel (and other alternative fuel sources) for proposal vehicles, equipment and machinery would be investigated during the construction planning phase.

#### **Operation**

No specific mitigation measures are required during operation. Instructional signage and operational procedures would ensure that the trail is not used during extreme weather events, when flooded or flooding.

## **7.5 Cumulative impacts**

### **7.5.1 Construction**

Potential cumulative impacts could occur as a result of construction of the proposal occurring simultaneously with the construction of other projects in the locality. Potential short term and local amenity impacts may also arise if other major projects, such as large subdivision developments or road projects, occur simultaneously with the proposal.

Cumulative impacts would be minimised through the application of individual proposal specific environmental safeguards and management measures. Consultation with relevant stakeholders, such as landowners, development proponents (if relevant), the Australian Rail Track Corporation, Roads and Maritime, and other stakeholders, would be undertaken during construction planning to ensure that potential cumulative impacts are minimised. Any additional mitigation measures from that consultation would be included in the CEMP for the proposal.

## **7.5.2 Operation**

The long term effect of the proposal would be a positive cumulative impact on non-motorised travel times, road safety and efficiency. The proposal would potentially reduce the number of non-motorised commuters (e.g. cyclists) on busy public roads such as the M1 Pacific Motorway and the New England Highway, improving safety for both cyclists and motorists. It would also contribute to the health and wellbeing of the residents of the Lower Hunter region by offering an additional recreational facility to encourage exercise through outdoor pursuits.

## **7.5.3 Mitigation measures**

### **Construction**

- Construction planning would consider avoiding known heavy tourism periods, such as school holidays.
- Ongoing coordination and consultation would be undertaken with stakeholders (including internally in Council) to ensure cumulative noise and traffic impacts are appropriately assessed, avoided where possible and managed.
- The CEMP would be revised to consider potential cumulative impacts from surrounding development activities if and as they become known.
- The traffic management plan would consider other traffic generating developments and activities where relevant.
- An out of hours work procedure would be prepared as part of the noise and vibration management plan for the proposal. The plan would consider the cumulative impact from other construction activities occurring in the vicinity of the proposal.

### **Operation**

No specific mitigation measures required.

## 8. Environmental management and monitoring

*This section describes the environmental management procedures recommended for the proposal and provides a summary of all proposed mitigation described in Section 6 and 7.*

### 8.1 Summary of key impacts

The key impacts of the proposal include:

- Minor amenity impacts during construction due to increased traffic and activity, visual changes, noise and dust.
- Potential water quality impacts due to pollutant runoff, sedimentation, and disturbance of acid sulfate soils.
- Minor change to surface water flows due to increased impermeable surfaces and construction of new bridges and boardwalks.
- Removal of 3.3 hectares of native vegetation comprising threatened or protected vegetation as well as foraging and roosting habitat for threatened and/or migratory fauna species.
- Removal of 26.5 hectares of non-native vegetation comprising foraging and roosting habitat for some threatened and migratory fauna species.
- Potential for injury, mortality and disturbance of native fauna during construction and operation of the proposal.
- Potential introduction and spread of weeds and pathogens.
- Impacts to fauna during proposal operation due to artificial lighting and increased use.
- Permanent visual changes and impacts to a small number of residents and national park visitors due to increased visitation. Impacts could include noise, inappropriate use and loss of privacy.
- Potential impacts to Aboriginal and non-Aboriginal cultural heritage values.
- Impacts to a small number of landowners due to temporary or long term use or acquisition of property for the proposal.

Measures to avoid or mitigate the above impacts, where relevant, are summarised in Section 8.3.

### 8.2 Environmental management

The environmental management safeguards and mitigation measures described in this EIS would be contained within a CEMP, which would be prepared by the contractor and approved by Council prior to construction commencing. All site personnel, contractors and Council staff would be responsible to ensure that environmental protection measures are implemented and that the environment is protected to the highest standard during works. Constant monitoring and improvement of the protection and mitigation measures would ensure that impacts on the environment are minimised.

The construction contractor would nominate an appropriately qualified person to assume day to day operational responsibility for ensuring that the protection and mitigation measures contained within the CEMP are implemented, for monitoring the effectiveness of these measures, for investigating possible improvements to these measures, and for preparing and supplying the supplementary plans that would be required to accompany the CEMP.

Supplementary plans would include:

- Site waste minimisation and management plan
- Noise and vibration management plan
- Soil and water management plan
- Traffic management plan
- Flora and fauna management plan incorporating wetland bird management plan, microbat management plan and Green and Golden Bell Frog management plan
- Emergency response plan
- Cultural heritage management plan

The proposal site induction would refer to the CEMP and include relevant staff responsibilities and environmental management measures. All personnel would be required to attend the environmental site induction. Copies of the CEMP would be kept on-site for ready access by all proposal workers.

An operational management plan or procedures would also be developed for the proposal by Council to manage ongoing maintenance and day-to-day management of the proposal following construction. This would be prepared in consultation with relevant stakeholders such as landowners and managers.

### **8.3 Summary of mitigation measures**

Table 8-1 provides a summary of the mitigation measures prescribed for the proposal in Sections 6 and 7. These measures, at a minimum, would be incorporated into the CEMP and operational procedures for the proposal.

**Table 8-1 Summary of mitigation measures**

No.	Issue	Mitigation measure	Timing	Responsibility
<b>1</b>	<b>Resource use &amp; waste</b>			
1.1	Resource use & waste	The following resource management hierarchy principles would be followed: <ul style="list-style-type: none"> <li>• Avoid unnecessary resource consumption as a priority</li> <li>• Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)</li> <li>• Disposal would be undertaken as a last resort (in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i>).</li> </ul>	Construction	All
1.2	Waste	A site waste minimisation and management plan would be prepared to include the following measures as a minimum. The plan would be included in the CEMP and prepared in accordance with relevant EPA guidelines. The plan would be prepared and approved by Council prior to construction commencing	Construction	Contractor
1.3	Resource use	Procurement would endeavour to use materials and products with a recycled content where that material or product is cost and performance effective	Construction	Contractor
1.4	Waste	Excess excavated material would be reused appropriately for fill or disposed of at an appropriate facility. Excess material requiring waste disposal would first be assessed against the <i>Waste Classification Guidelines</i> (Environmental Protection Agency, 2014)	Construction	Contractor
1.5	Resource use	Additional fill material would be sourced from appropriate local sources	Construction	Contractor
1.6	Resource use	Cleared weed-free vegetation would be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible. Weed vegetation would be disposed of appropriately off-site in accordance with its classification status under the <i>Noxious Weeds Act 1993</i> , where relevant	Construction	Contractor
1.7	Waste	Garbage receptacles would be provided at the site compound and recycling of materials encouraged. There would be no disposal or re-use of construction waste on to other land	Construction	Contractor
1.8	Waste	Waste would not be burnt on-site	Construction	Contractor
1.9	Waste	Waste material, other than vegetation and tree mulch, would be removed from site once the works have been completed	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
1.10	Waste	Portable toilets would be provided for construction workers and would be managed by the service provider to ensure the appropriate disposal of sewage	Construction	Contractor
1.11	Waste	Site inductions would ensure staff are aware of waste disposal protocols and attendance would be recorded by the site supervisor	Construction	Contractor
1.12	Waste	All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day	Construction	Contractor
1.13	Waste	Any hazardous waste material stockpiles would be fenced and sign posted for public safety	Construction	Contractor
1.14	Waste	Dedicated concrete washout facilities would be provided during construction so that runoff from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility	Construction	Contractor
1.15	Waste	Waste would be disposed of appropriately with supporting waste classification documentation, if required.	Construction	Contractor
1.16	Waste	Regular maintenance of the pathway, as part of Council's ongoing regime for the non-motorised travel network under their control, would identify and control waste.	Operation	Council
1.17	Waste	Waste management and resource use would be in accordance with Council's existing operational procedures.	Operation	Council
1.18	Waste	Waste receptacles would be provided at car parks and signage would encourage all users to take waste with them from the trail.	Operation	Council
<b>2</b>	<b>Air quality</b>			
2.1	Emissions	All plant and machinery would be fitted with emission control devices complying with relevant Australian Standards.	Construction	Contractor
2.2	Emissions	Machinery would be turned off when not in use and not left to idle for prolonged periods.	Construction	Contractor
2.3	Emissions	Construction plant and equipment would be maintained in good working condition.	Construction	Contractor
2.4	Dust	Vehicle movements would be limited to designated entries and exits, haulage routes and parking areas.	Construction	Contractor
2.5	Dust	Limit the areas of clearing to only those that are required to reduce fugitive dust emissions.	Construction	Contractor
2.6	Dust	Stockpiles would be stabilised to minimise wind erosion and the generation of dust (e.g. hydromulch, matting).	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
2.7	Dust	Dust generation would be monitored visually, and where required, dust control measures such as water spraying would be implemented to control the generation of dust. If air quality monitoring is considered warranted, it would be undertaken in accordance with <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (Department of Environment and Conservation, 2005).	Construction	Contractor
2.8	Dust	Materials transported to and from the site would be covered to reduce dust generation in transit.	Construction	Contractor
2.9	Emissions	No burning of any materials would occur.	Construction	Contractor
2.10	Dust	Access points would be inspected to determine whether sediment is being transferred to the surrounding road network. If required, sediment would be promptly removed from roads to minimise dust generation.	Construction	Contractor
2.11	Dust	Shade cloth would be fastened to site fencing at construction compounds to minimise dust transported from the site during construction.	Construction	Contractor
2.12	Emissions	Daily inspections and regular surveillance would be undertaken to identify any vehicle, plant or equipment that is causing visible emissions. If any defective vehicles, plant or equipment are identified, operation of this machinery would cease and service/ maintenance would be undertaken.	Construction	Contractor
2.13	Dust	Any exposed surfaces would be stabilised, and final landscaping implemented, as soon as practicable following completion of construction.	Construction	Contractor
2.14	Complaints	Any dust complaints would be investigated as soon as possible and measures taken to manage any impacts identified.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
<b>3</b>	<b>Noise &amp; vibration</b>			
3.1	Induction	<p>All employees, contractors and subcontractors are to receive an environmental induction, which would include:</p> <ul style="list-style-type: none"> <li>• All relevant project specific and standard noise and vibration mitigation measures</li> <li>• Relevant licence and approval conditions</li> <li>• Permissible hours of work</li> <li>• Location of nearest sensitive receivers</li> <li>• Construction employee parking areas</li> <li>• Designated loading/unloading areas and procedures</li> <li>• Site opening/closing times (including deliveries)</li> <li>• Environmental incident procedures</li> </ul>	Construction	Contractor
3.2	Noise	No swearing or unnecessary shouting or loud stereos/radios would be allowed on site. Dropping of materials from height, throwing of metal items and slamming of doors would be avoided	Construction	Contractor
3.3	Notification	Contact would be established with local residents and the construction program and progress communicated on a regular basis, particularly when noisy or vibration-generating activities are planned. Affected receivers would be notified of the intended work, its duration and times of occurrence. Specific notifications would be provided to receivers where the highly noise affected of 75 dB(A) is expected to be exceeded	Construction	Contractor
3.4	Complaints	A contact number would be provided for complaints. All complaints would be logged and responded to	Construction	Contractor
3.5	Complaints	Noise monitoring would be undertaken upon receipt of a new complaint at the complainant's location and cover the time of day when the impacts were reported to occur. Attended noise monitoring is recommended. If noise levels exceed the 75 dB(A) highly noise affected management level, construction activities would be reviewed to identify reasonable and feasible mitigation strategies to reduce noise. Noise monitoring would be undertaken by a qualified professional in accordance with the ICNG	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
3.6	Vibration	Vibration monitoring would be undertaken where construction activities generating vibration are to be undertaken within 25 metres of structures. If the structural damage criteria of 5 mm/s is exceeded, alternative construction plant or methods are required. Vibration monitoring would be undertaken by a qualified professional in accordance with the ICNG	Construction	Contractor
3.7	Vibration	Pre-work inspections are recommended for all structures within 25 metres of vibration generating activities	Construction	Contractor
3.8	Construction hours	All work would be undertaken within standard construction hours, unless out of hours work has been approved	Construction	Contractor
3.9	Construction hours	Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods	Construction	Contractor
3.10	Respite	High noise and vibration generating activities may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. High noise refers to construction noise impacts which exceed the highly affected noise management level of 75 dB(A) LAeq (15 min) during standard construction hours	Construction	Contractor
3.11	Equipment	High noise and vibration generating equipment to be avoided wherever possible. Monitoring off site of high vibration and noise generating equipment is recommended prior to any works adjacent to receiver properties to establish noise baselines	Construction	Contractor
3.12	Reversing beepers	Broadband reverse warnings should be used in preference over 'beeper' style warnings	Construction	Contractor
3.13	Plant operation	Simultaneous operation of noisy plant within discernible range of a sensitive receiver would be avoided	Construction	Contractor
3.14	Plant operation	The offset distance between noisy or vibration generating plant and adjacent sensitive receivers is to be maximised. Noise-emitting plant to be directed away from sensitive receivers	Construction	Contractor
3.15	Plant operation	Plant used intermittently would be throttled down or shut down in between uses	Construction	Contractor
3.16	Vehicles	Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the site	Construction	Contractor
3.17	Deliveries	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
3.18	Vehicles	Site access points and roads would be selected as far as possible away from sensitive receivers	Construction	Contractor
3.19	Vehicles	Dedicated loading/unloading areas would be shielded if close to sensitive receivers	Construction	Contractor
3.20	Vehicles	Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.	Construction	Contractor
<b>4</b>	<b>Soils &amp; water quality</b>			
4.1	Geotechnical investigation	A detailed geotechnical investigation will be undertaken prior to detailed design to confirm geotechnical requirements (such as the presence of soft soils). The investigations would include further soil sampling and analysis to confirm the potential for acid sulfate soils and soil contamination	Construction	Council
4.2	Acid sulfate soil management plan	<p>An acid sulfate soil management plan would be prepared as part of the CEMP in accordance with the Acid Sulfate Soil Laboratory Methods and Manual (ASSMAC, 1998). The plan would include as a minimum:</p> <ul style="list-style-type: none"> <li>• Where works are to be undertaken in Class 1 areas (Figure 4-1), material below the existing ground level (Class 2 mapping, Figure 4-1) or one metre below the existing ground level (Class 3 mapping, Figure 4-1), is to be disturbed by construction, fine grained agricultural lime (agLime) would be mixed through the disturbed soil in order to neutralise the actual and potential acidity present. A proposed application rate of four kilograms per cubic metre (kg/m<sup>3</sup>) is recommended for disturbed sands and clays up to a depth of 3.5 metres below surface level. This rate would be confirmed in the plan</li> <li>• Lime should be thoroughly mixed through all excavated and stockpiled material during the excavation and/or backfill process</li> <li>• Erosion and sediment control measures must be implemented at all times to ensure potential runoff and acidic leachate is contained and appropriately managed prior to controlled release</li> <li>• Effective treatment of disturbed material should be confirmed by quantitative verification testing undertaken at a rate of no less than one test per 250 cubic metres of treated material, and at least one test per material type. Samples must be representative of the treated soil volume and span the depth as well as the horizontal area of the treated soil. Successfully treated material must have a pH less than 6.5 and a total acid generating potential below 0.03 percent equivalent sulphur.</li> </ul>	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
		<p>Photographic records of excavation, lime treatment and backfill should also be taken and kept for validation purposes</p> <ul style="list-style-type: none"> <li>• Construction dewatering must be limited to no greater than three consecutive days at any one location. Where prolonged dewatering is required, additional controls to manage in situ groundwater conditions would be implemented.</li> </ul>		
4.3	Soil and water management plan	<p>A soil and water management plan would be prepared as part of the CEMP in accordance with the requirements of The NSW Soils and Construction – Managing Urban Stormwater Volume 1 ‘the Blue Book’ (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change, 2008). The plan would include as a minimum:</p> <ul style="list-style-type: none"> <li>• Erosion and sediment controls would be implemented in accordance with the soil and water management plan before any construction starts and inspected regularly, particularly after a rainfall event. Maintenance work would be undertaken as needed</li> <li>• Site stabilisation of disturbed areas would be undertaken progressively as stages are completed. Controls would not be removed until areas are stabilised</li> <li>• All stockpiles would be located away from drainage lines and areas subject to flooding. Appropriate erosion and sediment controls would be established and maintained for stockpiles</li> <li>• Controls would be implemented at work site exit points to minimise the tracking of soil and particulates onto pavement surfaces</li> <li>• Any material transported onto pavement surfaces would be swept and removed at the end of each working day</li> <li>• A dewatering procedure to identify controls and management measures for dewatering including testing, containment and disposal.</li> </ul>	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
4.4	Contaminated soils management plan	<p>A contaminated soils management plan would be prepared as part of the CEMP in accordance with the requirements of relevant guidelines made under the CLM Act. The plan would include as a minimum:</p> <ul style="list-style-type: none"> <li>• Provision for further detailed assessment where appropriate to confirm the conclusions of this preliminary assessment and to determine whether any specific remediation or management of areas is required. Any future contamination reports would be prepared or reviewed and approved by an appropriately qualified and certified Environmental Consultant accredited under a scheme recognised by the NSW EPA and Council. Further assessment would be based on the following: <ul style="list-style-type: none"> <li>– potential areas and types of contamination identified in this assessment</li> <li>– the potential for exposure to workers and to end-users based respectively on the nature of the proposed construction works and the final design of the proposal.</li> </ul> </li> <li>• Appropriate management controls to minimise the potential for exposure of contamination to workers and recreational users within the proposal site both during and post construction.</li> <li>• Description of appropriate excavation, validation, management and/or disposal requirements for potentially contaminated materials, if identified by further assessment or encountered during the construction of the proposal site.</li> <li>• Sampling and analysis requirements for assessment of potentially contaminated soils for re-use or for waste classification prior to offsite disposal.</li> <li>• Contingency plans including unexpected finds protocols for potentially contaminated soils (if encountered) including landfill or anthropogenic waste and potential asbestos containing material.</li> </ul>	Construction	Contractor
4.5	Spills	A fully equipped emergency spill kit would be kept on-site at all times	Construction	Contractor
4.6	Spills	All fuels, chemicals, and liquids would be stored at least 50 metres away from the wetland and drainage lines	Construction	Contractor
4.7	Spills	Refuelling of plant and equipment is to occur in impervious bunded areas located a minimum of 50 metres from the wetland and drainage lines	Construction	Contractor
4.8	Spills	Compounds and storage locations would be located as far as practicable outside areas subject to flooding	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
4.9	Concrete	Vehicle wash downs and/or concrete truck washouts would be undertaken within a designated bunded area on an impervious surface or undertaken off-site	Construction	Contractor
4.10	Concrete	A facility for collecting, treating and disposing of concrete wastes generated during construction would be installed on-site	Construction	Contractor
4.11	Water quality	Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) would be undertaken on a regular basis to identify potential spills or the effects of sediment-laden runoff. If visual inspection identifies concerns, water quality monitoring should be considered. Data would be assessed against the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 2000)	Construction	Contractor
4.12	Spills	Vehicles and plant would be properly maintained and regularly inspected for fluid leaks	Construction	Contractor
4.13	Dewatering	Low lying areas of construction formations that collect stormwater would be dewatered (if required) in accordance with the soil and water management plan (as part of the CEMP).	Construction	Contractor
<b>5</b>	<b>Surface &amp; groundwater</b>			
5.1	Hydraulic modelling	The detailed design process should include detailed hydraulic modelling of the proposed trail in order to design crossing structures (such as culverts, bridges, fences etc.) that, as far as reasonably practical, match the existing hydraulic response. This will minimise the potential indirect impacts on the wetland.	Detailed design	Council
5.2	Groundwater	Construction of the proposal would be undertaken so that there would be a minimum amount of excavation of the existing soil to minimise potential impacts on the groundwater level	Construction	Contractor
5.3	Groundwater	The period of excavation would be minimised to further reduce the potential for groundwater impacts	Construction	Contractor
5.4	Groundwater	The soil and water management plan (see Section 6.4.3) would include a strategy for monitoring and, if required, treating any extracted groundwater prior to discharge back onto the ground surface to minimise any short term impacts	Construction	Contractor
5.5	Water licence	If dewatering is required, the need for a water licence would need to be confirmed with WaterNSW	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
5.6	Flooding	The soil and water management plan would include procedures to ensure that machinery, stockpiles, equipment, fuels and chemicals, and other facilities are not stored or left within areas subject to flooding	Construction	Contractor
5.7	Flooding	An emergency response plan would be prepared to 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.	Construction	Contractor
5.8	Flooding	Operational procedures would include measures to restrict access to the trail (such as gates that can be closed during inundated periods) and ensure safety of users during proposal operation	Operation	Council
5.9	Flooding	Instructional signage would include safety procedures for trail users to follow in the case of flood. This would include emergency contact details and assembly points.	Operation	Council
<b>6</b>	<b>Traffic, transport &amp; access</b>			
6.1	Intersection upgrades	Upgrades to intersections would be investigated during detailed design at intersections including: <ul style="list-style-type: none"> <li>Woodford Street opposite Minmi Rural Fire Station. Consideration should include the need for localised widening to provide a BAR treatment could be investigated as part of the civil works at this location</li> <li>George Booth Drive access to Blue Gum Creek. Consideration should include reconfiguration of this intersection to allow right turns off George Booth Drive.</li> </ul>	Detailed Design	Council
6.2	Construction traffic management plans	Construction traffic management plans (CTMPs) would be prepared and approved by Council prior to works commencing. The CTMPs would include specific temporary traffic management measures to support construction activities at some locations: <ul style="list-style-type: none"> <li>King Street, Shortland</li> <li>Ausgrid Access Road, Maryland</li> <li>Woodford Street, Minmi</li> <li>Kural Crescent, Fletcher</li> </ul>	Construction	Contractor
6.3	Worker parking	Worker parking would be constrained to within the compound site as far as is practicable.	Construction	Contractor
6.4	Construction vehicles	Carpooling and other methods would be investigated to limit the number of vehicles coming to site, as far as practicable.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
6.5	Construction vehicles	The queuing and idling of construction vehicles in residential streets would be minimised to reduce nuisance.		Contractor
6.6	Construction vehicles	An emergency response plan would be developed for construction traffic incidents and/ or accidents. During site inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents.	Construction	Contractor
6.7	Construction vehicles	The community and local residents would be notified in advance of vehicle movements and anticipated effects on the local road network relating to site works. This would aim to reduce delays and access impacts for residents, public transport, pedestrians and cyclists.	Construction	Contractor
6.8	Property access	Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners.	Construction	Contractor
6.9	Parking	Council would monitor the use of car parks over time to determine if parking provided is sufficient.	Operation	Council
6.10	Traffic	In order to manage the potential conflict between light and heavy vehicle traffic at the Private Quarry Access Road, the following measures are recommended: <ul style="list-style-type: none"> <li>• Provision of truck warning signage on the access road</li> <li>• Management of roadside vegetation to maintain forward sight lines for traffic moving along the access road.</li> </ul>	Operation	Council
6.11	Signage	Signage would be installed at all locations where the proposal interacts at grade with a road or other road safety issue (such as a school zone), providing a clear delineation between the proposal and the road. Trail users would be warned of the approaching road, via 'Road Ahead' signage. Road and other users would be warned of the approaching trail using appropriate signage in accordance with Australian Standards (see Section 3.5.7).	Operation	Council
<b>7</b>	<b>Biodiversity</b>			
7.1	Artificial lighting	Incorporate design features to minimise light spill onto the roof of the M1 tunnel where there are substantial numbers of bat roosts, such as constructing 'shields' or false ceilings around roost sites to maintain darkness within roosts. Creation of these light exclusion zones will reduce the potential for delayed roost emergence and roost abandonment. These shields/false ceilings will also provide a barrier between roosting bats and pedestrians using the tunnel during daylight hours.	Detailed design	Council

No.	Issue	Mitigation measure	Timing	Responsibility
7.2	Artificial lighting	Use variable lighting regimes along the alignment and in the M1 tunnel to reduce the potential for light spill impacting foraging habitat, and minimise the chance of roost abandonment. This could involve switching off or dimming lights for part of the night, or use of sensor lights along the alignment and in the M1 tunnel that switch on upon approach and turn off after people pass.	Detailed design	Council
7.3	Artificial lighting	Limit light spill into areas of adjoining sensitive habitat along the alignment, as far as practicable, to minimise the impacts of lighting to foraging habitat along the alignment. This could include the use of low intensity lamps to reduce the spread of illumination, directed lighting or light shields to create dark refuges between lamps.	Detailed design	Council
7.4	Artificial lighting	Use of certain light types such as long wavelength 'warm white' lights rather than short wavelength 'blue' lights.	Detailed design	Council
7.5	Bridge design	Locate bridge abutments, piers and temporary works to further avoid mangroves and saltmarsh vegetation (for example, exploiting natural gaps in mangrove and saltmarsh vegetation).	Detailed design	Council
7.6	Bridge design	Consider choice of bridge height, orientation and construction materials to minimise shading of marine vegetation such as mangroves and saltmarshes.	Detailed design	Council
7.7	Bridge design	Ensure instream structures minimise impacts to river flow and fish passage.	Detailed design	Council
7.8	Construction Planning	Limit vegetation clearing in riparian areas.	Detailed design	Council
7.9	Landscaping	Use landscaping along the proposal route in the Hunter Wetlands National Park to create a visual disincentive for trail users to cross into areas of habitat for wetland birds.	Detailed design	Council
7.10	Landscaping	Landscaping would use only suitable endemic species (such as low shrubs and native grasses).	Detailed design	Council
7.11	Fencing	Use fencing structures along the proposal in the Hunter Wetland National Park to protect wildlife (including wetland birds) from dogs and pedestrians.	Detailed design	Council
7.12	Fencing	Use fauna-friendly fencing to reduce impacts on habitat connectivity and native fauna movements. Fencing should comprise five rows of galvanised steel plain wire with no mesh. Barbed wire may be used on the first, fourth and fifth wires if exclusion of stock is also required.	Detailed design	Council
7.13	Vegetation clearing	Clearing areas would be delineated with a high visibility barrier to prevent accidental clearing or disturbance of adjacent vegetation or aquatic habitat.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
7.14	Vegetation clearing	Adjoining sensitive areas would also be delineated (using different colours or material to enable clear differentiation) to prevent impacts during construction.	Construction	Contractor
7.15	Vegetation clearing	Trees within the works area that are to be retained would be clearly marked with falling tape or similar.	Construction	Contractor
7.16	Stockpiles	No stockpiling of materials would be undertaken adjacent to or within the dripline of native vegetation.	Construction	Contractor
7.17	Stockpiles, compounds	Stockpiles, compounds and material storage would only be established within existing cleared areas.	Construction	Contractor
7.18	Weeds	Noxious and environmental weeds encountered during construction would be removed, with weed material stockpiled separately to all other vegetation, removed from site and disposed of at an appropriately licenced disposal facility. When transporting weed waste from the site to the waste facility, trucks must be covered to avoid the spread of weed-contaminated material.	Construction	Contractor
7.19	Parking	No access or parking of vehicles or machinery in areas of native vegetation.	Construction	Contractor
7.20	Construction lighting	Construction lighting, if required, would avoid or minimise light spill into areas of adjoining sensitive habitat.	Construction	Contractor
7.21	Pre-clearing survey	Thorough pre-clearing surveys would be undertaken of all habitats prior to clearing and all clearing of hollow-bearing trees and logs would be supervised by an ecologist to minimise fauna injury or mortality.	Construction	Contractor
7.22	Fauna handling	Fauna handling and release protocols would be implemented during any clearing works.	Construction	Contractor
7.23	Rehabilitation	Cleared areas would be remediated as soon as practicable following completion of works including soil stabilisation and planting of native endemic species characteristic of the vegetation types identified within the study area.	Construction	Contractor
7.24	Erosion and sediment control	Erosion and sediment control measures would be implemented during construction to minimise pollution and sediment impacts on waterways and downstream aquatic environments, including estuarine communities. This could include measures such as the use of silt curtains during substrate disturbance activities (e.g. pile driving) to minimise the potential for migration of turbid plumes outside of the immediate construction footprint. See Section 6.4.3.	Construction	Contractor
7.25	Spills	Appropriate measures would be implemented to manage fuels, chemicals, and liquids required during construction. See Section 6.4.3.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
7.26	Protection of waterways	Riparian and instream habitat impacts would be minimised, for example by using barge access rather than shore-based access during bridge construction.	Construction	Contractor
7.27	Vehicle movements	Restrict vehicle movements to operational (daylight) hours.	Construction	Contractor
7.28	Vehicle movements	Implement and enforce appropriate speed limits for vehicles traversing the site.	Construction	Contractor
7.29	Vehicle movements	Establish 'no-go' areas, which are demarcated with high visibility barrier tape, to prevent accidental impacts by vehicles to vegetation and other biota adjacent to the disturbance footprint.	Construction	Contractor
7.30	Timing of works	Works that occur within the M1 tunnel would be undertaken only from late March to May, which is outside the breeding period of the threatened microbats found within the tunnel, to avoid placing any undue stress on any pregnant or lactating females. Construction should completely stop works after May when microbats enter torpor and unnecessary energy expenditure during this time (such as finding alternative roost sites as a result of disturbance from construction) could reduce their likelihood of survival.	Construction	Contractor
7.31	Timing of works	Works within the M1 tunnel to occur at night following the emergence period and prior to the re-emergence period ( 45 minutes after sunset and at least 45 minutes before sunrise), when bats are likely to be foraging rather than occupying roosts within the tunnel.	Construction	Contractor
7.32	Timing of works	Works within areas of potential shorebird habitat (chainages 5200 to 600 and the extension to Hunter Wetlands Centre) to occur between the end of April and beginning of September when the majority of migratory shorebirds utilising these habitats are in the northern hemisphere.	Construction	Contractor
7.33	Timing of works	Clearing and grubbing works within areas mapped as potential Green and Golden Bell Frog habitat would be undertaken between September to April when frogs are most active and can move away from potential disturbances. If this is not possible, additional targeted pre-clearance surveys would need to be implemented.	Construction	Contractor
7.34	Pre-clearing survey	A suitably qualified ecologist would undertake pre-construction surveys for Green and Golden Bell Frog (between September and January) to determine whether individuals are present within the study area and an estimate of population size to assist in defining procedures to be detailed in the Green and Golden Bell Frog management plan.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
7.35	Green and Golden Bell Frog management plan	The Green and Golden Bell Frog management plan would include specific induction material regarding hygiene management, exclusion fencing, pre-clearance surveys, handling and relocation procedures, reporting procedures and impact mitigation measures.	Construction	Contractor
7.36	Frog fencing	Temporary frog fencing would be installed during the construction phase (following the pre-clearing survey) to exclude Green and Golden Bell Frogs from construction areas (whether they are recorded during pre-construction survey or not). Fencing should be placed within areas mapped as habitat for Green and Golden Bell Frog, plus 200 metres either side, and would remain in place until the completion of all construction activities including installation of fencing and revegetation. Frog fences would be monitored by an ecologist during construction, at a frequency determined by the results of the pre-construction surveys.	Construction	Contractor
7.37	Hygiene	Hygiene protocols would be implemented to prevent the introduction and spread of Chytrid Fungus. Strict protocols would be applied (regardless of whether Green and Golden Bell Frog is recorded during pre-construction surveys).	Construction	Contractor
7.38	Microbats	Works through the M1 tunnel would be staged as follows: <ul style="list-style-type: none"> <li>• Suspend a material barrier to delineate one third or half of the tunnel length. No work would be conducted inside the barrier to minimise disturbance to roosting bats. The barrier should use appropriate material so as to inhibit noise impacts through the tunnel.</li> <li>• When work is completed outside of the barrier, it would be relocated to enable work in the other half/ third of the tunnel.</li> <li>• Access must be one way to ensure disturbance within the tunnel is limited to the section. The other end of the tunnel would be blocked to prevent access.</li> </ul>	Construction	Contractor
7.39	Pre-clearing survey	A suitably qualified ecologist would undertake pre-construction surveys of the M1 tunnel to confirm the presence of known microbat roost sites and identify any new roost sites, species present and activity levels.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
7.40	Shields	False ceilings/shields would be permanently installed around bat roosts to reduce impacts from light disturbance and construction activity within the M1 tunnel. These would remain in place following construction to also reduce the ongoing impacts of lighting in the tunnel and increased pedestrian activity.	Construction	Contractor
7.41	Microbats	The microbat management plan would include specific induction material regarding pre-construction/pre-clearance survey details, reporting procedures, impact mitigation measures and construction procedures.	Construction	Contractor
7.42	Pre-clearing survey	Engagement of a suitably qualified ecologist prior to any clearing works to undertake pre-construction surveys of wetland birds to determine usage of threatened species and inform procedures within the wetland bird management plan.	Construction	Contractor
7.43	Wetland bird management plan	A wetland bird management plan that would detail at a minimum environment induction training, impact mitigation measures and reporting procedures.	Construction	Contractor
7.44	Signage	Interpretive signage educating users on the importance of the surrounding wetlands and the species and ecological communities that occur there, as well as the importance of habitat within the M1 tunnel for roosting bats.	Operation	Contractor
7.45	Signage	Appropriate signage would be installed which states that dogs should be kept on a lead at all times while using the trail, to protect wetland birds. No dogs are permitted in the national park.	Operation	Contractor
7.46	Vegetation management	Ongoing management of retained native vegetation to reduce impacts of human activities and weed infestation.	Operation	Council
7.47	Fencing	Ongoing maintenance of fencing to ensure its effectiveness at restricting access to important wetland habitat.	Operation	Council

No.	Issue	Mitigation measure	Timing	Responsibility
7.48	Offsetting under the BC Act	<p>Impacts associated with the proposal that require offsetting include the removal of 3.3 hectares of native vegetation, and associated habitat for threatened biota. The BDAR has identified the following offsetting requirements to address residual impacts on threatened species and communities listed under the BC Act:</p> <ul style="list-style-type: none"> <li>• 92 ecosystem credits to address loss of 3.3 hectares of native vegetation representing TECs and/or threatened species habitat for a number of predicted threatened species (refer to Table 6-20).</li> <li>• 293 species credits to address impacts on six candidate threatened species (refer to Table 6-21), including: <ul style="list-style-type: none"> <li>– Curlew Sandpiper.</li> <li>– Large-eared Pied Bat.</li> <li>– Black-tailed Godwit.</li> <li>– Green and Golden Bell Frog.</li> <li>– Southern Myotis.</li> </ul> </li> </ul>	Pre-construction	Council
7.51	Offsetting of impacts on key fish habitats and protected marine vegetation	<p>Consultation with the Minister for Primary Industries would be required for the proposal in relation to potential impacts on protected marine vegetation (mangroves and saltmarsh) and key fish habitat and the identification of an appropriate offset for such impacts. Permits would be required in relation to the bridge crossings at Fishery and Ironbark creeks.</p>	Pre-construction	Council
7.52	Referral under the EPBC Act	<p>The proposal is located within an area known to support the Green and Golden Bell Frog Sandgate/Hexham Swamp key population. Based on consideration of the significant impact criteria for vulnerable species, the proposal is unlikely to have a significant impact on the Green and Golden Bell Frog. However, the proposal is likely to meet Threshold 1 and/or Threshold 2 set out in the species-specific significant impact guidelines (EPBC Act Policy Statement 3.19) as works will occur, 'within 200 metres of habitat... either where the Green and Golden Bell Frog has been recorded since 1995 or habitat that has been assessed as being suitable according to these guidelines'. The EPBC Act Policy Statement 3.19 states 'a referral under the EPBC Act should be considered' if an action meets one or more of the policy thresholds. Accordingly Council will refer the proposal to the Commonwealth Minister for the Environment.</p>	Pre-construction	Council

No.	Issue	Mitigation measure	Timing	Responsibility
<b>8</b>	<b>Visual amenity</b>			
8.1	Existing structures/landforms	Existing structures, such as the timber bridges, culverts, etc should be retained wherever possible as these will provide additional visual interest to the users of the trail. Whilst it is acknowledged that some of the structures would not be able to be upgraded and used, they should be retained as visual elements if possible.	Detailed design	Council
8.2	Existing structures/landforms	The existing raised landform of the trail should be maintained where possible.	Detailed design	Council
8.3	Spatial quality	Vegetation removal should be limited. Where vegetation removal is required, additional vegetation should be planted to improve the area.	Detailed design	Council
8.4	Spatial quality	The landscape treatments should consider the spatial quality of the existing landscape character and its setting. Retain the openness or enclosed spaces where relevant.	Detailed design	Council
8.5	Materials and finishes	Appropriate materials and finishes for the trail needs to consider the environment that it is passing through, e.g. the wetlands, urban and rural areas and the number of users.	Detailed design	Council
8.6	Materials and finishes	The trail should continue along the existing raised trail as this ensures that users will keep to the trail.	Detailed design	Council
8.7	Materials and finishes	The trail should be easily defined for the user so that the user keeps to the trail reducing impacts on adjoining vegetation.	Detailed design	Council
8.8	Signage	Appropriate signage is to be located to assist in way finding and to ensure public and private areas are recognisable for the users.	Detailed design	Council
8.9	Signage	Signage should incorporate a theme for the trail, which would also assist in way finding and keeping users on the trail.	Detailed design	Council
8.10	Signage	Signage should be developed around the heritage and the locality to inform and educate the users.	Detailed design	Council
8.11	Bridges and structures	The new bridges should not replicate the existing bridges but should be sympathetic and a simple design.	Detailed design	Council
8.12	Bridges and structures	Materials such as steel and timber should be used in preference to monolithic concrete construction.	Detailed design	Council
8.13	Bridges and structures	Road crossings should be low key within the rural areas but will need to consider road safety.	Detailed design	Council
8.14	Bridges and structures	Make use of any existing structures/points of interest along the trail.	Detailed design	Council

No.	Issue	Mitigation measure	Timing	Responsibility
8.15	Car parks	Treatment should be low key and appropriate to the area, i.e. gravel base in the rural areas and concrete in the urban areas if appropriate.	Detailed design	Council
8.16	Car parks	If facilities, e.g. amenities are to be incorporated along the trail, these should be incorporated into the car park areas where possible.	Detailed design	Council
8.17	Car parks	Facilities should be low key and use suitable materials that are appropriate to the area.	Detailed design	Council
8.18	Car parks	Review location of car parks to minimise the loss of vegetation and conflicts of interest.	Detailed design	Council
8.19	Car parks	Existing car parks should be utilised where possible.	Detailed design	Council
8.20	Car parks	Car parks should be appropriately located to minimise conflicts with dwellings and other land uses.	Detailed design	Council
8.21	Stockpiles/ compounds	Construction/stockpile sites should be located in cleared areas.	Construction	Contractor
8.22	Vehicles and equipment	All parking and site equipment associated with construction should be located in cleared areas and appropriately screened if required.	Construction	Contractor
8.23	Demobilisation	All construction equipment, materials etc. are to be removed from site on completion of the works.	Construction	Contractor
8.24	Demobilisation	Rehabilitation of the construction sites should be undertaken upon completion of the works, if required.	Construction	Contractor
<b>9</b>	<b>Bush fire</b>			
9.1	Australian Standard	The detailed design would include all relevant requirements of AS 3959 – 1999 Construction of Buildings in Bush Fire-prone Areas.	Detailed design	Council
9.2	Management plan	A bush fire management plan (BFMP) would be prepared for the proposal in consultation with the National Parks and Wildlife Service (NPWS) and other relevant stakeholders for implementation during construction and operation. The BFMP would consider potential impacts to infrastructure, users and the surrounding landscape, and include an emergency response plan with procedures to ensure the safety of workers and trail users in the case of bush fire.	Construction	Council
9.3	Safety	Operational procedures would include measures to restrict access to the trail and ensure safety of users.	Operation	Council
9.4	Signage	Instructional signage would include safety procedures for trail users to follow in the case of bush fire. This would include emergency contact details and assembly points.	Operation	Council

No.	Issue	Mitigation measure	Timing	Responsibility
<b>10</b>	<b>Non-Aboriginal heritage</b>			
10.1	Heritage fabric	Consideration should be given to preserve as much original heritage fabric as practical, including timber bridges and residual rail infrastructure located along the route of the former Richmond Vale Railway (Minmi to Hexham Railway). This would include preserving and re-pointing brickwork associated with tunnels and culverts along the corridor.	Detailed design	Council
10.2	Materials and finishes	The selection of new materials and finishes in the detailed design should be as sympathetic as possible to the existing character of the railway, with the aim of minimising visual impacts.	Detailed design	Council
10.3	Interpretation and signage	The detailed design should include heritage interpretation and signage to be installed in conjunction with shared pathway amenities. Liaison with local historical societies, including the University of Newcastle's Coal River Working Party and the Richmond Vale Railway Society and Museum is recommended for designing interpretation and signage content.	Detailed design	Council
10.4	Detailed archaeological assessment	Detailed assessment, including assessment of the significance and location of any potential remains (such as worker's camps), would be undertaken during detailed design. The detailed archaeological assessment would assess the impact of any proposed excavation works and provide recommendations for appropriate management of the archaeological resource. Dependant on the assessed level of impact, this may necessitate application for an excavation permit under Section 140 or exception notification under Section 139(4) of the <i>Heritage Act 1977</i> .	Detailed design	Council
10.5	Archival recording	Prior to construction commencing, all heritage significant elements of the former Richmond Vale Railway that would be impacted should be archival recorded. This would involve accurate surveying and planning, as per guidelines set out by the NSW Heritage Office (1998 and 2006)	Pre-construction	Council

No.	Issue	Mitigation measure	Timing	Responsibility
10.6	Heritage management plan	<p>A heritage management plan would be prepared and implemented during construction, in accordance with relevant permits where relevant, and would include:</p> <ul style="list-style-type: none"> <li>• A requirement for a heritage induction for all workers</li> <li>• Information on the heritage significant elements of the former Richmond Vale Railway and other heritage listed items in and near the study area for the information of workers.</li> <li>• Details of how heritage significant elements and items should be protected from inadvertent and indirect impacts by construction crews during works, including protective barriers, fencing or padding placed on or around significant fabric.</li> <li>• An unexpected finds procedure in the event unknown heritage items are uncovered during works.</li> <li>• Appropriate cleaning methodology in areas where cleaning significant fabric may be required (e.g. within tunnel lining), hand cleaning should be carried out wherever safe and practicable to do so. Blasting with a high-pressure hose should be avoided where possible to avoid inadvertent impact or damage to mortar and bricks within the tunnel each tunnel, or causing damage to cuttings.</li> </ul>	Construction	Contractor
<b>11</b>	<b>Aboriginal heritage</b>			
11.1	Construction footprint	The footprint of the proposal and the construction methodology would be developed so as to minimise impacts in the vicinity of RVRT AC1 and RVRT AS7	Detailed design	Council
11.2	Interpretation and signage	The detailed design should include heritage interpretation and signage to be installed in conjunction with shared pathway amenities. Liaison with Aboriginal stakeholders is recommended for designing interpretation and signage content	Detailed design	Council

No.	Issue	Mitigation measure	Timing	Responsibility
11.3	AHIP	If impacts cannot be avoided, an Aboriginal heritage impact permit (AHIP) under Section 90 of the NPW Act would be required prior to construction commencing. This AHIP application would be submitted with an Aboriginal Cultural Heritage Assessment Report (ACHAR) which would be completed in accordance with the Guide to Investigation, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (Office of Environment and Heritage, 2011). Full consultation with Aboriginal stakeholders, in accordance with Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH 2010), would be required. Archaeological test excavation of the identified sites would also be required. Existing AHIPs that may overlap the site should also be confirmed.	Detailed design	Council
11.4	Heritage management plan	A heritage management plan would be prepared and implemented during construction, and would include: <ul style="list-style-type: none"> <li>• A requirement for a specific heritage induction for all workers</li> <li>• Information on the aboriginal heritage of the study area for the information of workers</li> <li>• Details of how aboriginal heritage sites and items should be protected from inadvertent and indirect impacts by construction crews during works</li> <li>• An unexpected finds procedure in the event unknown heritage items are uncovered during works.</li> </ul>	Construction	Contractor
<b>12</b>	<b>Socio-economic</b>			
12.1	Interpretation	Rest areas and trail interpretation locations and content be developed in consultation with local and regional bird observers.	Detailed design	Council
12.2	Lighting	Detailed design would consider lighting of the route (particularly in tunnels and in heavily forested areas) to enhance safety.	Detailed design	Council
12.3	Heritage	Heritage considerations outlined in the ongoing heritage assessments and investigations would be reflected in the detailed design.	Detailed design	Council
12.4	Waste facilities	Provision of adequate waste facilities should be included to avoid nuisance to other users (e.g., through creation of broken glass and scattered waste) if areas used for social gatherings in the evenings.	Detailed design	Council
12.5	Property acquisition/use	Property acquisition or temporary use would be negotiated by Council with affected landowners where relevant in order to reach fair compensation and access arrangements.	Detailed design	Council

No.	Issue	Mitigation measure	Timing	Responsibility
12.6	Mobility scooters	Consideration of permitting the use of motorised cycles/scooter/chairs (adequate to carry birdwatching equipment) and hiring facilities for these at some access points.	Detailed design	Council
12.7	Emergency access	Provide emergency access at suitable locations along the trail.	Detailed design	Council
12.8	Vandalism	Use vandal resistant materials and include appropriate signage to outline expectations of users and other safety information.	Detailed design	Council
12.9	Safety	Consider safety requirements at road intersections and other crossings.	Detailed design	Council
12.10	Fencing	Fencing or screening of private properties proximal to the route would be implemented to minimise this overlooking and privacy impact.	Construction	Contractor
12.11	Notification	Communication with residents, businesses and organisations located close to the proposal would be carried out in advance of construction to ascertain any specific times/events that should be considered in construction programming (e.g. school or cultural events).	Construction	Contractor
12.12	Notification	Residents living near the proposal and the local community would be provided with timely and relevant information to enable them to understand the likely nature, extent and duration of vibration, dust and noise impacts and access changes.	Construction	Contractor
12.13	Notification	Communication methods would be chosen to ensure any vulnerable community members are appropriately engaged during the consultation period.	Construction	Contractor
12.14	Notification	Communications would include roadside signage, letterbox dropped newsletters, newspaper advertisements, web based information, a complaints line, and advice to specific service providers such as community transport and seniors organisations.	Construction	Contractor
12.15	Work hours	All works would be undertaken during standard construction hours.	Construction	Contractor
12.16	Stakeholder engagement	Council would continue to engage with affected stakeholders during proposal operation to enable identification and management of any issues.	Operation	Council

No.	Issue	Mitigation measure	Timing	Responsibility
<b>13</b>	<b>Coastal processes &amp; hazards</b>			
13.1	Tide modelling	Long term tidal information should be obtained during detailed design to confirm the annual variance in tide height (e.g. consideration of spring and astronomical high tide).	Detailed design	Council
13.2	Hydraulic modelling	The detailed design process should include detailed hydraulic modelling that considers the potential influence of sea level rise (and changes to rainfall intensity) because of future climate change, in order to understand better the potential reduction in the flood immunity of the trail. The modelling could also be used to identify potential future design modifications that could be implemented, if required, to preserve the proposed flood immunity of the trail under future climate conditions.	Detailed design	Council
13.3	Emergency response	An emergency response plan would be prepared to include a procedure for managing flooding due to tide events. This would include an emergency procedure for ensuring the health and safety of construction workers.	Construction	Contractor
13.4	Flooding	To protect trail users during periods of flood: <ul style="list-style-type: none"> <li>Operational procedures would include measures to restrict access to the trail (such as gates that can be closed during inundated periods) and ensure safety of users during proposal operation.</li> <li>Instructional signage would include safety procedures for trail users to follow in the case of flood. This would include emergency contact details and assembly points.</li> </ul>	Operation	Council
<b>14</b>	<b>Greenhouse gases &amp; climate change</b>			
14.1	Material selection	Design and material selection would consider temperature, for example use of non-conductive materials, and incorporate shade provision in open space.	Detailed design	Council
14.2	Pathway grades	Pathway grades (longitudinal and cross-section) would account for increased drainage requirements.	Detailed design	Council
14.3	Material selection	Design and material selection would consider rainfall and flooding.	Detailed design	Council
14.4	Signage	Signage would be used to provide flood warnings if necessary.	Detailed design	Council
14.5	Emergency response	An emergency response plan would be prepared that would contain procedures to ensure the safety of workers in the case of extreme weather events or flooding.	Construction	Contractor

No.	Issue	Mitigation measure	Timing	Responsibility
14.6	Fuel use	Fuel use would be reduced whenever possible. This could include: <ul style="list-style-type: none"> <li>• Turning vehicles, machinery and equipment off when not in use.</li> <li>• Planning movements of personnel, equipment and materials to minimise trips.</li> <li>• Ordering equipment and material to minimise trips to site.</li> </ul>	Construction	Contractor
14.7	Vehicles, machinery and equipment	Modern vehicles, equipment and machinery only would be used. These are more fuel efficient and have better emission controls than older models.	Construction	Contractor
14.8	Vehicles, machinery and equipment	All vehicles, machinery and equipment would be adequately maintained.	Construction	Contractor
14.9	Fuel use	Use of biodiesel (and other alternative fuel sources) for proposal vehicles, equipment and machinery would be investigated during the construction planning phase.	Construction	Contractor
<b>15</b>	<b>Cumulative impacts</b>			
15.1	Planning	Construction planning would consider avoiding known heavy tourism periods, such as school holidays.	Construction	Contractor
15.2	Stakeholder consultation	Ongoing coordination and consultation would be undertaken with stakeholders (including internally in Council) to ensure cumulative noise and traffic impacts are appropriately assessed, avoided where possible and managed.	Construction	Contractor
15.3	Other developments	The CEMP would be revised to consider potential cumulative impacts from surrounding development activities if and as they become known.	Construction	Contractor
15.4	Traffic	The traffic management plan would consider other traffic generating developments and activities where relevant.	Construction	Contractor
15.5	Noise and vibration	An out of hours work procedure would be prepared as part of the noise and vibration management plan for the proposal. The plan would consider the cumulative impact from other construction activities occurring in the vicinity of the proposal.	Construction	Contractor

## 9. Conclusion

*This section provides the overall justification for the proposal, an assessment of the proposal against the objectives of the EP&A Act and the principles of ecologically sustainable development and a summary of the findings of this EIS.*

### 9.1 Proposal justification

The Richmond Vale Rail Trail aims to deliver a continuous off-road shared pathway from Shortland to Kurri Kurri, and once constructed would provide a link between the population centres of Kurri Kurri, Maitland and Newcastle. The shared pathway would provide a link for users between Kurri Kurri, Pelaw Main, Tarro, Minmi and Shortland that would enable cyclists and pedestrians to undertake journeys without having to ride on the Pacific Motorway, Hunter Expressway or New England Highway.

The Richmond Vale Rail Trail is specifically referred to in the *Greater Newcastle Metropolitan Plan 2036* (DP&E, 2018), which identifies a range of strategies to support sustainable growth across the local and regional area including Newcastle, Cessnock and Maitland. The project addresses key actions related to:

- Improved access to open space, recreation areas and waterways.
- Enhanced nature based tourism through protection and promotion of natural assets such as the Hexham Wetlands.

The Richmond Vale Rail Trail provides an active transport and recreational choice for locals and visitors, passing through old railway tunnels and over bridges, amongst wildlife habitats and linking to the Hunter Wetlands Centre. It would also open up the western section of the Hunter Wetlands National Park to the public and provide opportunities in the key growth areas of transport, tourism, recreation, heritage, and economic and social development.

The proposal is a critical component of the Richmond Vale Rail Trail, which would provide a continuous shared pathway from Shortland in the east to Tarro in the north and Minmi in the west. Key benefits of the proposal include:

- Improved facilities linking the local communities of Tarro, Minmi and Shortland via a safe, accessible and amenable route.
- Safe, accessible and amenable commuter and recreational choice for tourists and locals to undertake journeys without having to utilise existing road networks (such as M1 Pacific Motorway and New England Highway).
- Improved access for tourists and locals to enjoy the heritage (such as passing through old railway tunnels) and environmental attractions, including the Hunter Wetlands National Park and Hexham Wetlands, including for bird watchers and other regular users.
- Opportunities for healthier, active lifestyles for both residents and tourists allowing users to experience the amenity of the route as it travels through various landscapes and environments.
- Opportunity for development of key economic growth areas of tourism and recreation, while providing social, health and conservation benefits for users and the region.

The potential impacts of the proposal are considered minor when compared to the identified benefits. Mitigation measures are provided in this EIS, which would avoid, reduce or mitigate any impacts. Council is committed to providing facilities that are accessible to the whole community. The general design objectives for the shared pathway are to provide a safe, enjoyable and aesthetically pleasing journey for the whole community. Ongoing consultation during the detailed design, construction and operation stages would ensure that input from affected stakeholders is incorporated where relevant into the proposal.

## 9.2 Objects of the EP&A Act

Table 9-1 provides a summary of the proposal against the objects of the EP&A Act.

**Table 9-1 Objects of the EP&A Act**

Object	Comment
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	The proposal would improve the safety of pedestrians and cyclists, provide opportunities for healthier lifestyles and allow users to experience the cultural and natural environment of the region. A number of management measures would be implemented to minimise any environmental, social or economic impacts associated with the proposal.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Ecologically sustainable development is specifically addressed in Section 9.3.
(c) to promote the orderly and economic use and development of land,	The proposal would create a non-motorised recreational and active transport pathway for use by members of the public. It would be a community facility accessible to the whole community.
(d) to promote the delivery and maintenance of affordable housing,	Not relevant to the proposal.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	Measures would be implemented to protect and conserve the environment and native animals and plants. The potential impacts on vegetation, threatened species, population and ecological communities are discussed in Section 6.7.
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	Potential impacts to heritage are assessed in Section 6.10 and 6.11. Measures would be implemented to sustainably manage known and unknown heritage resources.
(g) to promote good design and amenity of the built environment,	The proposal design considers all relevant design and construction standards as well as user and adjoining landowner amenity.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	Not relevant to the proposal.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	Not relevant to the proposal.

Object	Comment
(j) to provide increased opportunity for community participation in environmental planning and assessment.	Consultation with the community and relevant government agencies was undertaken during the development of the proposal. Details of this consultation can be found in Section 5. Consultation would be ongoing during detailed design, construction and operation.

### 9.3 Ecologically sustainable development

The principles of ecologically sustainable development are defined under section 6 (2) of the *Protection of the Environment Administration Act 1991* as:

*(a) the precautionary principle, namely, that 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. In the application of the precautionary principle, public and private decisions should be guided by:*

*(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*

*(ii) an assessment of the risk-weighted consequences of various options,*

*(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*

*(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*

*(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:*

*(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

*(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

*(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

These principles are addressed in turn, as they pertain to the proposal, in the following sections.

#### 9.3.1 The precautionary principle

This principle states 'if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.

Evaluation and assessment of alternative options has aimed to reduce the risk of serious and irreversible impacts on the environment. Stakeholder consultation considered issues raised by stakeholders and a range of specialist studies were undertaken for key issues to provide accurate and impartial information to assist in the design development process.

The concept design has sought to minimise impacts on the amenity of the study area while maintaining engineering feasibility and safety for all users. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the proposal. No safeguards have been postponed as a result of lack of scientific certainty.

A CEMP would be prepared before construction starts. This requirement would ensure the proposal achieves a high-level of environmental performance. No management measures or mechanisms would be postponed as a result of a lack of information.

### **9.3.2 Intergenerational equity**

This principle states, 'the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations'.

The proposal would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations by improving road safety, providing safe and healthy opportunities for recreation and encouraging access and appreciation of the natural and cultural environment.

### **9.3.3 Conservation of biological diversity and ecological integrity**

This principle states the 'diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival'.

The proposal is bound by large areas of significant native flora and fauna habitat. Specific design efforts have been taken to minimise impacts upon locally significant habitats. The majority of the proposal would be constructed within previously disturbed areas of exotic grassland associated within the former Richmond Vale railway and Newcastle to Chichester water main. The proposal would not have a significant impact on biological diversity and ecological integrity. Appropriate site-specific safeguards are provided in Section 6.7 and Appendix I.

### **9.3.4 Improved valuation, pricing and incentive mechanisms**

This principle requires 'costs to the environment should be factored into the economic costs of a proposal'.

The EIS has examined the environmental consequences of the proposal and identified management measures to manage the potential for adverse impacts. The requirement to implement these management measures would result in an economic cost to Council. The implementation of management measures would increase both the capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

The concept design has been developed with an objective of minimising potential impacts on the surrounding environment.

## 9.4 Summary

This EIS has addressed all the requirements of the SEARs (see Table 1-1, Table 1-2 and Table 1-3) and other relevant legislation. The community and relevant stakeholders have been consulted throughout its preparation.

A number of potential environmental impacts from the proposal have been avoided or reduced during the options assessment process and through development of the concept design. The proposal as described in the EIS best meets the proposal objectives but would still result in some impacts on public amenity due to noise, traffic and visual impacts. Management measures as detailed in this EIS would ameliorate or minimise these expected impacts. On balance the proposal is considered justified.

The EIS has found that:

- Development consent is required for the proposal under Part 4 of the EP&A Act.
- The proposal would be determined by the Hunter and Central Coast RPP and concurrence is required by the OEH.
- Biodiversity impacts have been assessed and would be offset, as required, in accordance with the BC Act.
- The proposed works would not significantly impact on any matters of NES (or other matters), as listed under the EPBC Act.
- The proposal is located within an area known to support the Green and Golden Bell Frog Sandgate/Hexham Swamp key population. Based on consideration of the significant impact criteria for vulnerable species, the proposal is unlikely to have a significant impact on the Green and Golden Bell Frog. However, a referral to the Commonwealth under the EPBC Act is recommended if a proposed action is likely to trigger any one of the three thresholds defined for the species in the Green and Golden Bell Frog significant impact guidelines. Given that the proposal triggers one of the thresholds, Council will refer the proposal to the Commonwealth for their decision as to whether the proposal is a controlled action under the EPBC Act.

Approval for the proposal is required in accordance with:

- Clause 10 and 11 of the Coastal Management SEPP
- Clause 5.7 and 6.1 of the Newcastle LEP
- Clause 7 of SEPP 55
- Section 201 of the FM Act
- Section 151 of the NPW Act
- Section 7.12 of the BC Act
- Part 5 of *Crown Lands Management Act 2016*.

# 10. Certification

*This section provides the certification of the EIS by the author and the proponent.*

This EIS provides a true and fair review of the proposal in relation to its potential effects on the environment as required under all relevant legislation.



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GHD Pty Ltd Level 2, GHD Tower, 24 Honeysuckle Drive, Newcastle, NSW 2300

Date: 4 October 2019

I have examined this EIS and the certification by Lisa King and GHD Pty Ltd and accept the EIS on behalf of Council.

Name:

Title:

City of Newcastle

Date:

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# Appendices

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