Transport for NSW

New Intercity Fleet Maintenance Facility Project

Combined Submissions Report

Artist s impression of the new maintenance facility subject to detailed design.

August 2017

New Intercity Fleet – Maintenance Facility

Combined Submissions Report

Transport for NSW

Project no: NIF MFP Combined Submissions Report
Date: 23 August 2017

Rev	Date	Details
0	24 August 2017	Final

Author, Reviewer and Approver details

Prepared by:	Jarryd Barton	Date: 24 August 2017	Signature:	
Reviewed by:	Alex McDonald	Date: 24 August 2017	Signature:	
Approved by:	Alex McDonald	Date: 24 August 2017	Signature:	

WSP | Parsons Brinckerhoff
Level 27, Ernst & Young Centre
680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101

www.wspgroup.com
www.pbworld.com

TABLE OF CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

Abbreviation	Details
ACHAR	Aboriginal cultural heritage assessment report
AEP	annual exceedance probability
AHIP	Aboriginal Heritage Impact Permit
CCT	correlated colour temperature
CCTV	closed-circuit television
CEMP	construction environmental management plan
Central Coast Council	Central Coast Council refers to the newly created Council consisting of the former Gosford and Wyong Shire Councils following commencement of the NSW council amalgamations on 12 May 2016. Any reference to the Wyong Shire LGA or Wyong Shire Council within this document should be considered to be a reference to the current Central Coast LGA or Central Coast Council.
Combined Submissions Report	This report which considers design changes and responses made during the various public exhibitions.
CNS	*Construction Noise Strategy* (Transport for NSW)
CNVMP	construction noise and vibration management plan
CTMP	construction traffic management plan
CTMP	Construction Traffic Management Plan
EEC	endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	(NSW) *Environmental Planning and Assessment 1979*
EPA	(NSW) Environment Protection Authority
EPBC Act	(Commonwealth) *Environment Protection and Biodiversity Conservation 1999*
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
Infrastructure SEPP	(NSW) *State Environmental Planning Policy (Infrastructure) 2007*
INP	Industrial Noise Policy
kV	kilovolt
L_{Aeq}	equivalent continuous sound level
LALC	Local Aboriginal Land Council

Abbreviation	Details
LEP	local environmental plan
LGA	local government area
LoS	level of service
MCA	multi criteria analysis
MNES	Matter of National Environmental Significance
New Intercity Fleet	The New Intercity Fleet is a new fleet of modern trains set to replace the existing intercity fleet, and is intended to service the Central Coast and Newcastle, the Blue Mountains Line and the South Coast Line
NML	noise management level
NPW Act	*National Parks and Wildlife Act 1974*
OEH	(NSW) Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
PMF	probable maximum flood
Project (the)	Construction and operation of the New Intercity Fleet Maintenance Facility in Kangy Angy (refer to Chapter 4 for a description of the Project).
REF	Review of Environmental Factors
RING	(NSW) Rail Infrastructure Noise Guideline
Roads and Maritime	*Roads and Maritime Services*
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
TSC Act	(NSW) *Threatened Species Conservation 1995*
VMP	vegetation management plan

Executive summary

Overview of the New Intercity Fleet Maintenance Facility Project

The NSW Government is delivering a New Intercity Fleet to replace the trains carrying customers from Sydney to the Central Coast, Newcastle, the Blue Mountains and the Illawarra. A new purpose-built maintenance facility will be built at Kangy Angy to service and maintain the new fleet of trains, subject to planning approval. A contract for the supply and maintenance of the new trains has been awarded, with delivery of the first train expected in 2019.

The proposed New Intercity Fleet Maintenance Facility would include about six kilometres of electrified railway (in total), would be seven tracks wide at its widest point, would cover an area of approximately 500,000 square metres and would be bounded by a perimeter fence. The key features of the proposed maintenance facility would comprise:

- Maintenance facility elements:
  - Fleet maintenance building
  - Four enclosed maintenance roads (tracks for undertaking maintenance on the train sets) and three external standing roads (tracks for holding trains within the maintenance facility) to accommodate the new trains within the site
  - Auxiliary workshops
  - Electronic clean room (to undertake testing and cleaning of electronic train components)
  - Material storage, including flammable liquid storage
  - Wheel lathe
  - Automatic train wash
  - Site access roads.
- Miscellaneous buildings:
  - Administration (including training rooms)
  - Facilities for presentation and train maintenance staff
  - Signalling building
  - Security
  - Mobile train simulator
  - Substation building
  - Power supply (traction power, bulk power, signalling power supply and backup generators).
- Other infrastructure including:
  - New railway track infrastructure on the western side of the existing rail corridor to allow for trains to enter and exit the maintenance facility site from the Main North Line
  - A new rail bridge (consisting of two separate structures) over Chittaway Creek and Turpentine Road
  - A new access roadway and bridge to the maintenance facility site off Enterprise Drive
  - A new flood access road between Orchard Road and the proposed new access roadway
  - A series of drainage detention basins
  - Staff car park
  - Relocation of the existing high voltage power transmission line and combined services route.

Construction work associated with the New Intercity Fleet Maintenance Facility Project is expected to commence in late 2017. Operation of the maintenance facility, including commissioning is scheduled to commence in 2019.

Further detail regarding the design and different elements of the New Intercity Fleet Maintenance Facility Project is provided in Chapter 4 of the *New Intercity Fleet Maintenance Facility Review of Environmental Factors* (Transport for NSW, 2016) ('the REF').

Display of the New Intercity Fleet Project

The REF for the proposed New Intercity Fleet Maintenance Facility Project was displayed for a period of four weeks between 6 June 2016 and 4 July 2016. This was supported by a community engagement program comprising Project notifications and Project updates, eight meetings and briefings for key stakeholders, community information sessions, and door-knocking.

In addition, to meet the Department of Environment and Energy display requirements as part of the Commonwealth controlled action assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the REF, the New Intercity Fleet Maintenance Facility Species Impact Statement (SIS) and other supporting documentation was placed on public display between 21 October 2016 and 21 November 2016. This was supported by additional Project website and email updates as well as a Project information newsletter distributed in October 2016.

Subsequent to the display of the REF, SIS and EPBC documentation an Additional SIS was exhibited in June 2017 that specifically addressed the impact of the New Intercity Fleet Maintenance Facility Project on Mahony's Toadlet (*Uperoleia mahonyi*). Mahony's Toadlet, (which was identified in the previous SIS as an undescribed species of *Uperoleia*) was formally described in November 2016 (Clulow *et al*., 2016) and following this was given a provisional listing as an Endangered species under the *Threatened Species Conservation Act 1995* (TSC Act) on 10 March 2017.

Purpose of this report

This report documents and considers the issues raised in community and stakeholder submissions received during the public display of all public documentation to date, as well as Transport for NSW response to these issues. The Combined Submissions Report also provides:

- An overview of the New Intercity Fleet Maintenance Facility Project
- An outline of consultation activities undertaken prior to, and during, the public display of the REF, the controlled action assessment, the public exhibition of the SIS and Additional SIS, as well as consultation activities proposed during the pre-construction, construction and commissioning phases
- Details regarding proposed design changes and additional investigations that have been undertaken since display of the Project; as well as clarifications on the information provided in the REF (in response to issues raised in submissions)
- Confirmation of the proposed mitigation and management measures for the Project.

Overview of submissions

A total of 210 submissions were received regarding the Project.

A total of 132 submissions were received during the REF display and SIS exhibition period. An additional 62 submissions were received during the display of the EPBC controlled action documentation and a further 16 submissions were received during the exhibition of the Additional SIS.

Overall, five submissions from Government agencies and representatives were received during the three display periods. These included submissions from Roads and Maritime Service, Central Coast Council (two submissions) and the State Member of Parliament for The Entrance (in relation to both the

REF display and controlled action display). Responses to the issues raised in these submissions are presented in Chapter 5 of this Combined Submissions Report.

Issues raised in community submissions (during the three display periods) were grouped together based on their assigned key environmental issues and sub-issue categories, with responses provided to these grouped issues. Each issue is presented as a summary of the specific issues raised by individual submissions meaning that, while the exact wording of a particular submission may not be presented in the summary of the issue, the intent of each individual issue raised has been captured. A response has been provided to each grouped issue summary. A summary of each of the issues and Transport for NSW responses are provided in Chapter 4 of this Combined Submissions Report.

Modifications to the New Intercity Fleet Maintenance Facility Project

Since the display of the REF, seven design changes or Project refinements have been made to the New Intercity Fleet Maintenance Facility Project. The design changes which are proposed were identified as a result of ongoing design development, issues raised by stakeholders and the community during the REF display period, as well as further refinement of the proposed construction methodology options for some elements of the Project. These changes include the following:

- Modification to number, size and location of detention basins
- Identification of the preferred alignment for the Ausgrid 33kV power line (previously identified as two options in Chapter 3 of the REF)
- Refinement of the alignment for the relocation of the existing Sydney Trains 11kV and 66kV power lines
- Nomination of the signalling building location within the Project site
- Modification to the construction methodology for the access road bridge from Enterprise Drive
- Enterprise Drive intersection arrangement
- Further refinement of the earthwork volumes and site fill levels for the Project site.

Overall, the proposed design changes would reduce the overall environmental impact or provide a more beneficial outcome for the Project compared to the design that was presented in the REF. Further detail regarding the proposed design changes is provided in Chapter 6 of this Combined Submissions Report.

Conclusions and next steps

This report has documented the issues identified in the submissions received during the display periods and outlines Transport for NSW responses to these issues. Most community submissions were concerned about options development and site selection, hydrology drainage and flooding, noise and vibration, and biodiversity. Specific key issues of concern included:

- Operational noise impacts
- Impacts to biodiversity and vegetation clearance
- Impacts to the recently discovered Mahony's Toadlet (*Uperoleia mahonyi*)
- Site flooding impacts
- Concern regarding the potential for changes to existing flooding flows
- Opposition to the preferred site.

Next steps

This report has been prepared to support the determination of the Project by Transport for NSW. As part of the determination, the local community will also be notified of Transport for NSW decision to approve the Project by way of a community newsletter and the Transport for NSW website www.transport.nsw.gov.au/Projects. Transport for NSW will also provide a letter to each of the respondents who made a submission during the display periods. This correspondence will include individual submission reference numbers and contact details to obtain further information regarding the progress of the Project.

In the event that Transport for NSW determines to proceed with the approved Project, consultation activities regarding the Project would continue including ongoing updates to the community, businesses and other stakeholders in the lead up to, and during, construction.

1 Introduction

This chapter describes the background and key features of the New Intercity Fleet Maintenance Facility Project. This chapter also outlines the purpose and content of this Combined Submissions Report.

1.1 Background

1.1.1 The New Intercity Fleet Program

The *NSW Long Term Transport Master Plan* (NSW Government 2012a; 'Transport Master Plan') and its supporting document, *Sydney's Rail Future* (NSW Government 2012b), identifies the need to enhance rail passenger services, in particular for longer distance travel outside the metropolitan network. In May 2014, the NSW Government announced its intention to invest in the procurement of the New Intercity Fleet, a fleet of trains that will carry Central Coast, Newcastle, the Blue Mountains and South Coast customers to and from Sydney. The introduction of the New Intercity Fleet will allow for the replacement of the older train fleets used currently to provide intercity services.

In developing the New Intercity Fleet program, the new trains would provide for:

- A more consistent and improved level of customer service for intercity passengers
- The retirement of some of the oldest electric train set types currently in operation
- A reduction in the costs of intercity operations
- Increasing capacity for intercity passengers.

1.1.2 Need for the New Intercity Fleet Maintenance Facility

The need for investment in train maintenance facilities across NSW is ultimately linked to the current fleet size and its composition. The primary need for the proposed New Intercity Fleet Maintenance Facility is a direct result of the current procurement of the New Intercity Fleet trains and the requirement to adequately maintain these trains. However, an opportunity also exists to improve current train operations across the Sydney metropolitan network through the development of the New Intercity Fleet Maintenance Facility at a site in Kangy Angy on the NSW Central Coast. Overall, the key factors driving the need for development of the New Intercity Fleet Maintenance Facility at Kangy Angy include the following:

- *Need for additional maintenance capacity* – driven by an overarching requirement for additional maintenance capacity to cater for the increase in the intercity fleet size and to mitigate the lack of spare capacity at the current maintenance facility sites to accommodate the new trains
- *The need for a dedicated New Intercity Fleet Maintenance Facility* – development of a New Intercity Fleet Maintenance Facility relates to the need for a dedicated maintenance capacity of the New Intercity Fleet, which is driven by:
  - The preference to consolidate maintenance capability for a given fleet in one location
  - Constraints on the design and layout of existing maintenance facilities
- *A preference for an outer metropolitan facility* – it has been identified that the provision of such a facility would have a number of benefits including:
  - Increasing fleet availability across the broader network
  - Avoiding constraints associated with increasing metropolitan train movements and freeing maintenance capacity in Sydney for future growth in the suburban fleet.

Further discussion regarding the need and justification of the New Intercity Fleet Maintenance Facility Project is provided in Chapter 2 of the *New Intercity Fleet Maintenance Facility Project Review of Environmental Factors* (hereafter referred to as the 'REF') (Transport for NSW, 2016a).

1.2 Overview of the New Intercity Fleet Maintenance Facility Project

1.2.1 Key features of the New Intercity Fleet Maintenance Facility Project

The proposed maintenance facility, as described in the REF, would include about six kilometres of electrified railway (in total), would be seven tracks wide at its widest point, would cover an area of approximately 500,000 square metres and would be bounded by a perimeter fence. The key features of the proposed maintenance facility are shown in Figure 1.1 and would comprise:

- Maintenance facility elements:
  - Fleet maintenance building
  - Four enclosed maintenance tracks for undertaking maintenance on the train sets and three external standing racks for holding trains within the maintenance facility to accommodate the new trains within the site
  - Auxiliary workshops
  - Electronic clean room (to undertake testing and cleaning of electronic train components)
  - Material storage, including flammable liquid storage
  - Wheel lathe
  - Automatic train wash
  - Site access roads.
- Miscellaneous buildings:
  - Administration (including training rooms)
  - Facilities for presentation and train maintenance staff
  - Signalling building
  - Security
  - Mobile train simulator
  - Substation building
  - Power supply (traction power, bulk power, signalling power supply and backup generators).
- Other infrastructure including:
  - New railway track infrastructure on the western side of the existing rail corridor to allow for trains to enter and exit the maintenance facility site from the Main North Line
  - A new rail bridge (consisting of two separate structures) over Chittaway Creek and Turpentine Road
  - A new access roadway and bridge to the maintenance facility site off Enterprise Drive
  - A new flood access road between Orchard Road and the proposed new access roadway
  - A series of drainage detention basins
  - Staff car park
  - Relocation of the existing high voltage power transmission line and combined services route.

Construction work associated with the New Intercity Fleet Maintenance Facility Project is expected to commence in late-2017. Operation of the maintenance facility is scheduled to commence in 2019. Further detail regarding the design and different elements of the New Intercity Fleet Maintenance Facility Project is provided in Chapter 4 of the REF.

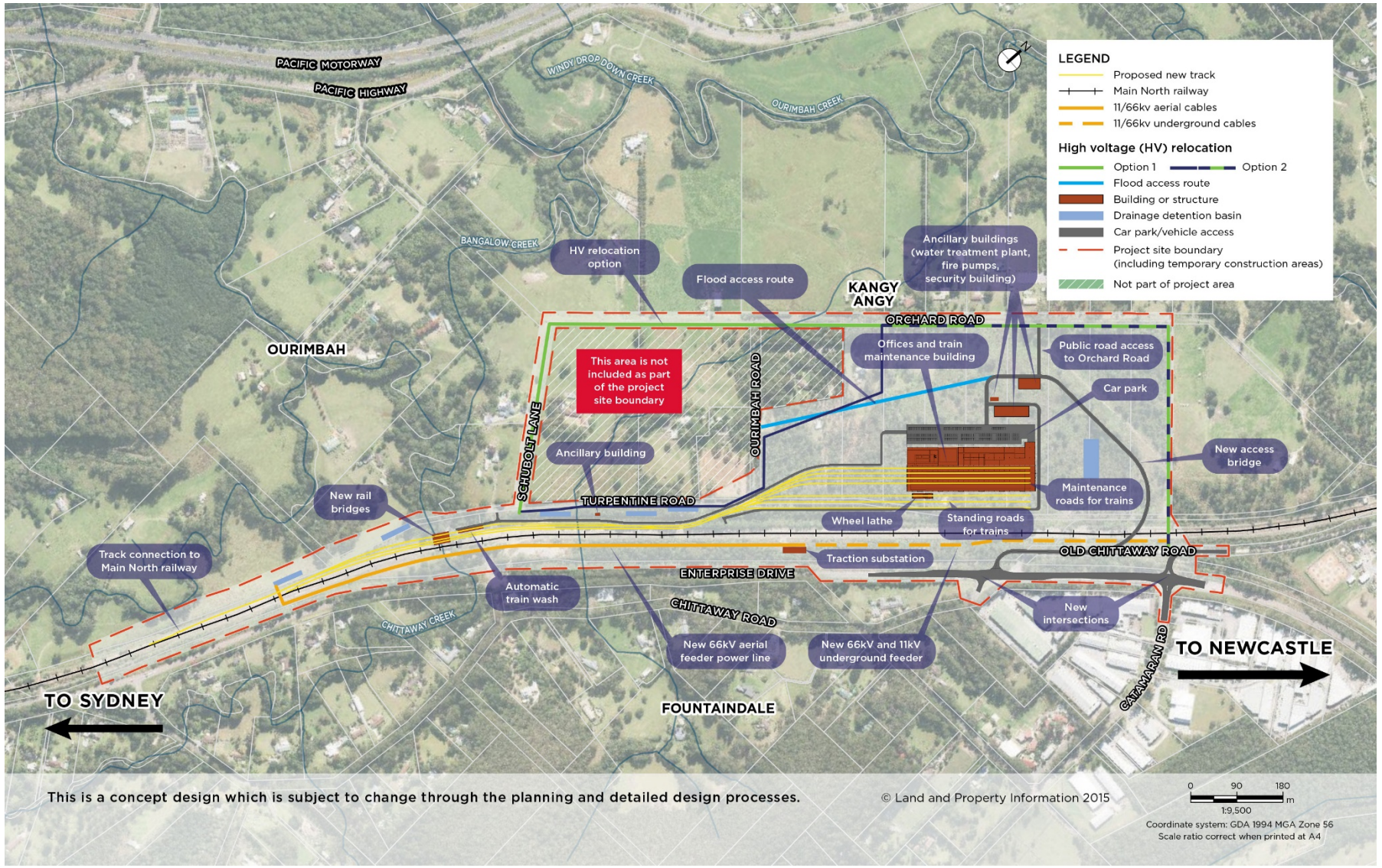


Figure 1.1 Indicative layout of the New Intercity Fleet Maintenance Facility (as described in the REF)

1.3 Summary of environmental assessment

1.3.1 Review of Environmental Factors

A Review of Environmental Factors (REF) has been prepared in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The REF was placed on public display from 6 June 2016 to 4 July 2016.

Potential environmental impacts associated with the New Intercity Maintenance Facility were identified during the development of the REF. The key potential impacts were identified as likely to comprise the following:

- *Biodiversity* – including the loss of existing vegetation, some of which has been identified as threatened species and an Endangered Ecological Community (EEC)
- *Noise and vibration* – including impacts during both construction and operation of the Project
- *Landscape and visual character impacts* – including changes to the rural-residential nature of the existing environment
- *Traffic and transport* – which would primarily occur during the construction of the Project
- *Hydrology, flooding and groundwater* – including the potential for the site to be impacted by the 1:100 year flooding event, in addition to construction impacts associated with high groundwater levels
- *Aboriginal heritage* – including the potential to identify currently undiscovered Aboriginal artefacts within the site.

1.3.2 Species Impact Statement

A Species Impact Statement (SIS) was prepared in accordance with the Chief Executive Requirements, issued by the NSW Office of Environment and Heritage. The SIS was placed on public exhibition from 6 June 2016 to 8 July 2016.

The SIS identified an undescribed frog species which was recorded in the study area as part of an expert report on the likelihood of occurrence of threatened frog species (Biosphere Environmental Consultants Pty Ltd, 2016a). The frog was recorded as Undescribed Red-groined Toadlet (*Uperoleia sp.*). On 4 November 2016, the previously undescribed Red-groined Toadlet was officially named as a new species (*Uperoleia mahonyi* sp. nov. Mahony's Toadlet) and described in the scientific journal Zootaxa (4184 (2): 285-315, dated 4 November 2016) (Clulow *et al*., 2016). On 10 March 2017, the NSW scientific Committee made a determination for the provisional listing, on an emergency basis, of the frog; Mahony's Toadlet, as an Endangered Species in part 1 of Schedule 1 of the TSC Act (NSW Scientific Committee, 2017).

In addition, the study area was assessed as supporting potential habitat for the Wallum Froglet (WSP | Parsons Brinckerhoff, 2016c, Biosphere Environmental Consultants Pty Ltd, 2016a). However, due to the relatively small area of potential habitat and absence of records from the site despite targeted surveys, the Wallum Froglet was not considered an affected species in the SIS.

1.3.3 Environment Protection and Biodiversity Conservation Act 1999 Controlled Action Assessment

In addition to the preparation of the New Intercity Maintenance Facility REF, a referral was also submitted to the Commonwealth Department of the Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the for potential significant impacts to Matters of National Environmental Significance (MNES).

Following review of the referral, the Department of Environment and Energy advised Transport for NSW that it considered the proposed maintenance facility to be a 'controlled action' due to the potential impacts to two species listed under the EPBC Act, being the Critically Endangered Regent Honeyeater and Swift Parrot. As such, approval was also required from the Federal Minister for the Environment and Energy under the

EPBC Act, in addition to the project approval required under Part 5 of the EP&A Act (hereafter referred to as the 'controlled action assessment').

The controlled action was assessed by the 'preliminary documentation' method, in accordance with the requirements of the EPBC Act and *Environment Protection and Biodiversity Conservation Regulation 2000.* The preliminary documentation (which included the REF and SIS) was placed on public display from 21 October 2016 to 21 November 2016.

1.3.4 Additional Species Impact Statement

Subsequent to the display of the REF, SIS and controlled action assessment an Additional SIS was prepared that specifically addressed the Mahony's Toadlet (*Uperoleia mahonyi)*, which was identified in the initial SIS as an undescribed species of *Uperoleia*. This species was formally described in November 2016 (Clulow *et al*., 2016) and was subsequently given a provisional listing as an Endangered species under the *Threatened Species Conservation Act 1995* (TSC Act) on 10 March 2017.

The Additional SIS was placed on public exhibition from 31 May 2017 to 30 June 2017.

1.4 Purpose and content of this Combined Submissions Report

1.4.1 Purpose of this report

This report has been prepared to address the submissions received as part of the display of the REF and as part of the display of the controlled action assessment. This Combined Submissions Report sets out to:

- Summarise issues raised in all submissions received
- Respond to these issues
- Provide any new information concerning the Project (where relevant)
- Identify any changes to the Project and the potential impact of these changes (where relevant)
- Confirm the proposed mitigation and management measures for the Project.

1.4.2 Structure of this report

The structure of this Combined Submissions Report is shown in Table 1.1 below.

Table 1.1 Structure and content of the Combined Submissions Report

Chapter	Description
Chapter 1 – Introduction (this chapter)	Provides background to the New Intercity Fleet Maintenance Facility Project and an overview of the key features of the maintenance facility Project; a summary of the key conclusions of the REF, SIS, EPBC Act Controlled Action Assessment and Additional Species Impact Statement; and an outline of the structure and purpose of this Combined Submissions Report.
Chapter 2 – Community and stakeholder consultation	Provides an overview of consultation activities undertaken before and during, the public display periods. Also includes a summary of ongoing and proposed consultations and communications.
Chapter 3 – Overview of submissions	Provides an overview of the process that was used to analyse the issues raised in submissions, as well as an overview of the key issues raised by the community, and NSW Government agencies and representatives.
Chapter 4 – Response to community and stakeholder submissions	Details the key issues raised in community and stakeholder submissions and Transport for NSW response to these issues.

Chapter	Description
Chapter 5 – Response to NSW Government submissions	Summarises the issues raised in NSW Government submissions and Transport for NSW response to these issues.
Chapter 6 – Design changes to the Project	Details proposed design changes which have been identified as part of the ongoing development of the Project and based on feedback during the REF display period.
Chapter 7 – Additional investigations and clarifications to the REF	Documents additional investigations that have been undertaken since the display of the REF and provides clarifications in response to feedback received from the community and other stakeholders during the display period.
Chapter 7 – Environmental management	Provides a revised set of consolidated environmental management measures for the Project, which have been amended, where required, in response issues raised in submissions received during the public display periods.
Chapter 8 – Conclusion and next steps	Provides a summarised justification and conclusion for the Project.
Chapter 9 – References	Provides a summary of the references used in this report.
Appendix A – Key issue and sub-issue categories	Provides a list of the key issue and sub-issue categories identified from all submissions.
Appendix B – Table of issues per community submission	Provides a breakdown of the list of the key issue and sub-issue categories identified in each individual submission and the location of the responses within the Combined Submissions Report.
Appendix C – Clause 228 considerations	Provides a revised assessment of the Clause 228 considerations, taking into account the proposed design changes.
Appendix D – Flood Study and Flood Impact Assessment Report	Provides a flood assessment to identify potential impacts and risks to the proposed works and surrounding property.
Appendix E – Lighting Impact Assessment	Provides an assessment which addresses the potential light impact from activities, including rail movements, within the proposed New Intercity Fleet Maintenance Facility during the operation of the maintenance facility.
Appendix F – Access Road Impact Piling Construction Noise Assessment	Provides an assessment of the additional noise and vibration impacts from undertaking impact pilling.
Appendix G – Operational noise results table revision	Provides a revised operational noise results table from the table presented in Appendix C of the WSP | Parsons Brinckerhoff noise assessment report for the REF, New Intercity Maintenance Facility Noise and Vibration Assessment (ACG1512210 Dated 16/05/2016).

The Combined Submissions Report is also supported by four additional assessments which have been completed following the display of the REF. These are:

- A *Flood Study and Flood Impact Assessment Report* (AECOM, 2016) (attached as Appendix D of this Submissions Report)
- A *Lighting Impact Assessment* (WSP | Parsons Brinckerhoff, 2016a) (attached as Appendix E of this Submissions Report)
- *Access Road Impact Piling Construction Noise Assessment* (WSP | Parsons Brinckerhoff, 2016b) (attached as Appendix F of this Submissions Report)
- *Operational noise results table* (WSP | Parsons Brinckerhoff, 2016c) (attached as Appendix G of this Submissions Report).

2 Community and Stakeholder Consultation

Transport for NSW has undertaken consultation with the community, state and local government agencies and key stakeholders. Details of these consultation activities are documented below.

2.1 Consultation objectives

Transport for NSW developed a communications and consultation strategy for the New Intercity Fleet Maintenance Facility Project which included details on key activities to be carried out to inform and engage the local community and key stakeholders. In summary, the consultation approach by Transport for NSW for the Project is to:

- Provide accurate, easy to understand, relevant and timely information through a variety of channels, including meetings and briefings with stakeholders
- Establish and maintain clear lines of communication and encourage community participation
- Consult early and often with key stakeholders and the community
- Identify opportunities for community engagement at each stage of the Project lifecycle
- Be transparent and accountable, and report back to the community on engagement activities
- Provide a mechanism for prompt issues resolution
- Identify and consider a diverse range of views and interests presented by the community.

Transport for NSW would ensure that community and stakeholders are informed and proactively consulted throughout the life of the Project including:

- Post determination of the Project
- Throughout construction and operation of the facility.

2.2 Consultation undertaken prior to REF display

Various consultation activities were conducted, through a variety of communication channels, to inform the community and key stakeholders about the Project, to encourage community participation and to gather feedback on the Project. This feedback was considered during the concept design and environmental assessment of the Project. Between September 2015 and the commencement of display for the REF in June 2016, approximately 339 consultation and engagement activities were conducted including:

- Door knocking of 72 businesses and residences to introduce the Project team and to provide contact details for enquires or information requests
- The Project team held 17 on site meetings with residents to gather local knowledge and to listen to issues and concerns
- Responses were provided to 184 enquires via the 1800 Project information line and Project email
- Email notifications to 130 community members and stakeholders registered for Project updates
- Telephone calls and correspondence requesting permission for property access for environmental assessment surveys
- Regular updates to the Project website (www.transport.nsw.gov.au/Projects)
- Meetings and briefings with a range of stakeholders and Government agencies including Central Coast Council, Roads and Maritime Services, Rural Fire Services, NSW Train Link, Ausgrid, Wyong Council, Department of Premier and Cabinet Office, Darkinjung Local Aboriginal Land Council, Guringai Tribal Link Aboriginal Corporation, Office of Environment and Heritage, Department of Environment and Energy, Department of Planning and Environment and local interest groups

- Regular community notifications delivered via letter box drop and available on the Project website including:
  - In September 2015, a community notification was distributed to approximately 300 residents and businesses to announce Kangy Angy as the preferred site for the Project. A map showing the indicative site of the proposed maintenance facility was included as well as next steps and contact details for further information or feedback on the Project.
  - In November 2015, a community notification was distributed to approximately 300 residents and businesses. The notification provided information about site investigations to support the development of the concept design for the Project. The community was advised that planning documents were expected to be placed on public display in 2016 and that community consultation would take place during the display period. Contact details for further information or feedback on the Project were included.
  - A community notification was distributed in December 2015 to approximately 300 residents and businesses. The notification provided information about upcoming geotechnical work required for the development of the concept design. Work activities and hours of work were provided as well as contact details for further information or enquiries.
  - In March 2016, a community notification was distributed to approximately 300 residents and businesses. The notification provided an update on the completion of the geotechnical investigations and outlined ongoing technical works including topographical and field surveys. A diagram in the notification showed the indicative planning approval process and timing and contact details for Project feedback or further information was included.
  - A community notification was distributed in April 2016 to approximately 300 residents and businesses. The notification provided information about a proposed new access arrangement, which was shown in an accompanying map, to provide alternative access for local residents in times of flood. The new arrangement was developed to address community feedback and initial flooding and amenity investigations. Information about the planning approval process and contact details for suggestions and feedback were also provided.

2.3 Consultation during public display of the REF

The REF was placed on public display from 6 June 2016 to 4 July 2016 and written submissions were invited on the Project. The following tools and activities were used to provide the community and stakeholders with a range of methods to find out more information and to comment on the Project.

2.3.1 Project information newsletters

On 25 May 2016 a community notification was distributed to about 2,100 residents, businesses and stakeholders, in the area surrounding the proposed maintenance facility. The community notification provided the following information:

- Details of the proposed New Intercity Fleet Maintenance Facility Project and an overview of the REF assessment
- A map showing the location and key features of the Project
- Key potential Project impacts and proposed high level mitigation measures
- The location and times of the community information sessions and locations of the public displays of the REF documents
- How to make a formal submission and closing date and time of submissions
- Next steps following the public display period
- Contact details for further information.

2.3.2 Public display locations

Hard copies of the REF were made available during the public display period (6 June 2016 to 4 July 2016) at the following locations:

- Central Coast Council, 2 Hely Street Wyong from 8:30am to 5.00pm, Monday to Friday
- Tuggerah Library and Council Services, 50 Wyong Road Tuggerah from 9.00am to 5.30pm, Monday to Friday and 9.00am to 3.00pm Saturday
- Department of Premier and Cabinet, Level 3, 131 Donnison Street, Gosford from 9.00am to 5.00pm, Monday to Friday
- Transport for NSW Level 5, Tower A, Zenith Centre 821 Pacific Highway, Chatswood from 8.30am to 5.00pm, Monday to Friday.

2.3.3 Advertisements

Advertisements were placed in the following local newspapers to notify the community of details of the public display of the REF including, the display locations to view the REF, duration of the public display, upcoming community information sessions and how to obtain further information about the Project:

- Central Coast Express Advocate – 27 May 2016
- Newcastle Herald – 6 June 2016
- Wyong Chronicle – 7 June 2016.

2.3.4 Community information sessions

Two community information sessions were held during the public display of the REF. These sessions provided an opportunity for interested members of the community to find out more about the Project, the REF and how to make a formal submission. Members of the Project team and specialist advisors were available at each session to answer questions from the community. Community information sessions were held at the following locations:

- *Saturday 18 June 2016*
  Central Coast Steiner School, 45 Catamaran Road, Fountaindale from 10.00am to 1.00pm
- *Thursday 23 June 2016*
  Central Coast Steiner School, 45 Catamaran Road, Fountaindale from 4.00pm to 7.00pm.

Posters at the information displayed an overview of the Project and the planning process. Artist impressions showing the potential visual impact of the Project from local vantage points were also on display. Materials available for attendees at the sessions to take away included an executive summary of the REF, fact sheets on noise, flooding, ecology, site selection, tips for making a formal submission and a feedback form to make a submission.

2.3.5 Meetings with residents

The Project team offered meetings to potentially impacted residents during the display period. Questions about the REF documents were discussed at these meetings to help assist community members to better understand the technical, design and submissions process for the Project.

2.3.6 Project information telephone line

The Project information telephone line (1800 684 490) was available for enquiries on the Project throughout the display period. The public were able to make enquiries, speak with the Project team directly, and request further information and/or to provide feedback on any issues related to the Project.

2.3.7 Website and email address

Project information, including ongoing updates, were made available through the Transport for NSW website www.transport.nsw.gov.au/Projects. Enquiries and requests were made and responded to via the Transport for NSW email address (Projects@transport.nsw.gov.au).

2.3.8 Government and stakeholder consultation

Transport for NSW continued to meet and discuss the Project with key Government agencies and stakeholders throughout the display period. These included Central Coast Council, Roads and Maritime Services, the Rural Fire Service, NSW Trains, Ausgrid, the Department of Premier and Cabinet Office, Darkinjung Local Aboriginal Land Council, Guringai Tribal Link Aboriginal Corporation, the Office of Environment and Heritage, the Department of Environment and Energy, the Department of Planning and Environment and local interest groups.

2.3.9 Written submissions

Written submissions on the REF were encouraged throughout the display period. All submissions received during the display period up to 4 July 2016 were considered as formal submissions and have been responded to in this Combined Submissions Report.

Where contact information was provided, all submissions received were acknowledged by email or letter.

2.4 Consultation during public exhibition of Species Impact Statement

2.4.1 Public display locations

As part of the display of the REF, a Species Impact Statement (SIS) was prepared and exhibited concurrently during this period. The SIS was placed on public exhibition from 7 June 2016 until 8 July 2016. The SIS was made available on Transport for NSW website and at the following locations:

- Office of Environment and Heritage, Level 14, 59 Goulburn Street, Sydney
- Transport for NSW Level 5, Tower A, Zenith Centre 821 Pacific Highway, Chatswood
- Department of Planning and Environment, 23–33 Bridge Street, Sydney
- Central Coast Council, 2 Hely Street, Wyong
- Central Coast Council, 49 Mann Street, Wyong
- Nature Conservation Council, Level 14, 338 Pitt Street, Sydney.

The SIS was exhibited a second time from 21 October 2016 until 21 November 2016 and was made available on Transport for NSW website and at the following locations:

- Office of Environment and Heritage, Level 14, 59 Goulburn Street, Sydney
- Transport for NSW Level 5, Tower A, Zenith Centre 821 Pacific Highway, Chatswood
- Department of Planning and Environment, Level 22, 320 Pitt Street, Sydney
- Central Coast Council, 2 Hely Street, Wyong
- Central Coast Council, 49 Mann Street, Wyong
- Tuggerah Library and Council Services, 50 Wyong Road, Tuggerah
- Nature Conservation Council, Level 14, 338 Pitt Street, Sydney.
- Total Environment Centre, Level 1, 99 Devonshire Street, Surry Hills.

Written responses were encouraged throughout the exhibition periods and submissions received were also provided to the NSW Office of Environment and Heritage for their consideration.

2.4.2 Project information telephone line

The Project information telephone line (1800 684 490) was available for enquiries on the Project throughout the exhibition periods. The public were able to make enquiries, speak with the Project team directly, request further information and/or to provide feedback on any issues related to the Project.

2.4.3 Advertisements

Advertisements were placed in the following newspapers to notify the community of details of the SIS exhibition periods and the locations to view the SIS during of the display periods:

- Wyong Regional Chronicle - 7 June 2016
- Sydney Morning Herald – 7 June 2016
- Central Coast Express Advocate – 19 October 2016 and 26 October 2016
- Sydney Morning Herald – 19 October 2016 and 26 October 2016
- Daily Telegraph – 19 October and 26 October 2016.

2.5 Consultation during public display of EPBC controlled action assessment

Following its decision of the Project as being a 'controlled action' under the EPBC Act, the Commonwealth Department of Environment and Energy requested the following 'preliminary documentation' be placed on public display (for no less than 15 business days) as part of the EPBC controlled action assessment process:

- *New Intercity Fleet Maintenance Facility EPBC Act Referral* (Transport for NSW, 2016c)
- *Transport for NSW Additional Information Response* (Transport for NSW, 2016d)
- *New Intercity Fleet Maintenance Facility Species Impact Statement* (Transport for NSW, 2016b)
- *New Intercity Fleet Maintenance Facility SIS and REF Addendum* (Transport for NSW, 2016e).

2.5.1 Public display locations

Hard copies of EPBC documentation were made available during the public display period at the following locations:

- NSW Office of Environment and Heritage – Level 14, 59 Goulburn Street, Sydney
- Transport for NSW – Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood
- NSW Department of Planning and Environment – Level 22, 320 Pitt Street, Sydney
- Central Coast Council – 49 Mann Street, Gosford
- Central Coast Council – 2 Hely Street, Wyong
- Tuggerah Library and Council Services – 50 Wyong Road, Tuggerah
- Nature Conservation Council – Level 14, 338 Pitt Street, Sydney
- Total Environment Centre – Level 1, 99 Devonshire Street, Surry Hills.

2.5.2 Project information telephone line

The Project information telephone line (1800 684 490) was available for enquiries on the Project throughout the display period. The public were able to make enquiries, speak with the Project team directly, request further information and/or to provide feedback on any issues related to the Project.

2.5.3 Project website and email address

Project information, including EPBC documentation, was also made available through the Transport for NSW website www.transport.nsw.gov.au/Projects. Enquiries and requests were made and responded to via the Transport for NSW email address (Projects@transport.nsw.gov.au).

2.5.4 Advertisements

Advertisements were placed in the following newspapers to notify the community of details of the public display of the EPBC documentation, including the display locations to view the documentation and the duration of the public display:

- Central Coast Express Advocate – 19 October 2016
- Sydney Morning Herald – 19 October 2016
- Daily Telegraph – 19 October 2016.

2.5.5 Project information newsletter

On 20 October 2016 a community notification was distributed to approximately 2,100 residents, businesses and stakeholders, in the area surrounding the proposed maintenance facility advising of the display for the EPBC controlled action assessment.

2.5.6 Written submissions

Written submissions for the EPBC controlled action assessment were invited during the display period. All submissions received during the display period up to 21 November 2016 were considered as formal submissions and have been responded to in a standalone submissions report (New Intercity Fleet Maintenance Facility EPBC Submissions Report (Transport for NSW, December 2016)) and also in this Combined Submissions Report.

2.6 Consultation during public exhibition of Additional Species Impact Statement

2.6.1 Public display locations

Subsequent to the provisional listing of Mahony's Toadlet as an Endangered species under the TSC Act, an assessment of significance (7-part test) was undertaken which considered the potential impacts of the project upon Mahony's Toadlet. Based on the conclusion of the 7-part test that the project was likely to have a significant impact upon Mahony's Toadlet, an Additional SIS was prepared, and placed on public exhibition between 31 May 2017 and 30 June 2017. The Additional SIS was made available on the Transport for NSW website and at the following locations:

- NSW Office of Environment and Heritage, Level 14, 59 Goulburn Street, Sydney
- Transport for NSW Level 5, Tower A, Zenith Centre 821 Pacific Highway, Chatswood
- NSW Department of Planning and Environment, Level 22, 320 Pitt Street, Sydney
- Central Coast Council, 2 Hely Street Wyong
- Central Coast Council, 49 Mann Street Gosford
- Tuggerah Library and Council Services, 50 Wyong Road, Tuggerah
- Nature Conservation Council, Level 14, 338 Pitt Street Sydney
- Total Environment Centre, Level 1, 99 Devonshire Street, Surry Hills.

Written responses were invited during the exhibition period, and submissions received were also provided to the NSW Office of Environment and Heritage for consideration.

2.6.2 Project information line

The Project information telephone line (1800 684 490) was available for enquiries on the Project throughout the display period. The public were able to make enquiries, speak with the Project team directly, request further information and/or to provide feedback on any issues related to the Project.

2.6.3 Advertisements

Advertisements were placed in the following newspapers to notify the community of details of the Additional SIS exhibition period and the locations to view the Additional SIS during of the display period:

- Central Coast Express Advocate – 31 May 2017 and 14 June 2017
- Sydney Morning Herald – 31 May 2017 and 21 June 2017
- Daily Telegraph – 31 May 2017 and 14 June 2017.

2.7 Post-determination consultation activities

Should Transport for NSW determine to proceed with the Project, consultation activities regarding the Project would continue, including ongoing updates to the community, businesses and other stakeholders in the lead up to and during construction. The consultation activities would ensure that:

- The community and stakeholders have a high level of awareness of all processes and activities associated with the New Intercity Fleet Maintenance Facility Project
- 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 to the New Intercity Fleet Maintenance Facility Project are provided.

Methods used for engaging and providing Project information to the community and stakeholders would include:

- Project updates on the Transport for NSW website: www.transport.nsw.gov.au/Projects
- A 24 hour construction response line: 1800 775 465
- The Project information line 1800 684 490
- An enquiry email address: Projects@transport.nsw.gov.au
- Delivering notifications of work to nearby residents, businesses and stakeholders
- Door-knocking directly impacted residents and businesses
- Meetings and briefing for stakeholders, businesses and residents as required
- Site signage.

3 Overview of submissions

This chapter provides an overview of the process that was used to analyse the issues raised in submissions. This chapter also identifies the key issues raised in community and government agency (Roads and Maritime Service, Central Coast Council and State Member of Parliament for The Entrance) submissions.

3.1 Analysis process

3.1.1 Receipt of submissions

A total of 210 submissions were received regarding the Project. Following receipt, each submission was assigned an individual submission number. In some instances, one individual submitted several separate submissions at the same time. These have generally been allocated one submission number. These numbers are referred to in Chapters 4 and 5 of this Combined Submissions Report.

3.1.2 Handling of submissions

Community submissions

Community submissions were considered separately to the submissions received from NSW Government agencies and representatives.

The content of each community submission, including community groups such as the Kangy Angy Resident Action Group, the Ourimbah Region Residents Association and the Community Environment Network, were reviewed and categorised according to their key issues (e.g. noise and vibration) and sub-issues raised (e.g. construction noise). A summary of the key issues raised in community submissions is provided in section 3.2 of this Combined Submissions Report. A full list of the key issue and sub-issue categories raised in submissions is provided in Table A.1 of Appendix A.

Government agency submissions

Overall, five submissions from Government agencies and representatives were received during the three submissions periods. These included Roads and Maritime Services, Central Coast Council and two submissions from the State Member of Parliament for The Entrance.

3.1.3 Response to submissions

Community submissions

Issues raised in the submissions were grouped together based on their assigned key and sub-issue categories. Each issue is presented as a summary of the specific issues raised by individual submissions meaning that, while the exact wording of a particular submission may not be presented in the summary of the issue, the intent of each individual issue raised has been captured. Responses to the grouped issues are provided in Chapter 4 of this Combined Submissions Report.

Government agency submissions

Responses to the issues raised by the Roads and Maritime Services, Central Coast Council and the State Member of Parliament for The Entrance are provided in Chapter 5 of this Combined Submissions Report.

3.1.4 Consideration of petitions and form letters

A petition was received as an appendix to the submission received from the Kangy Angy Resident Action Group during the June 2016/July 2016 (REF and SIS) display period. The petition included a total of 1,037 signatures. The main body of the petition raised the following concerns regarding the proposed maintenance facility:

- Construction of the maintenance facility on land currently zoned as environmental conservation (refer to section 4.15.1)
- The need for compulsory acquisition (refer to section 4.15.3)
- Inconsistency of the Project with the surrounding area (refer to section 4.11.2)
- Concerns regarding the following environmental issues:
  - Noise (refer to section 4.8)
  - Lighting (refer to section 4.9.2 and section 7.2)
  - Flooding (refer to section 4.12)
  - Social impacts (refer to section 4.11).
- The petition also requested that the maintenance facility be relocated to a different site (refer to section 4.2).

Issues raised in the petition have been addressed in this Combined Submissions Report in sections outlined above.

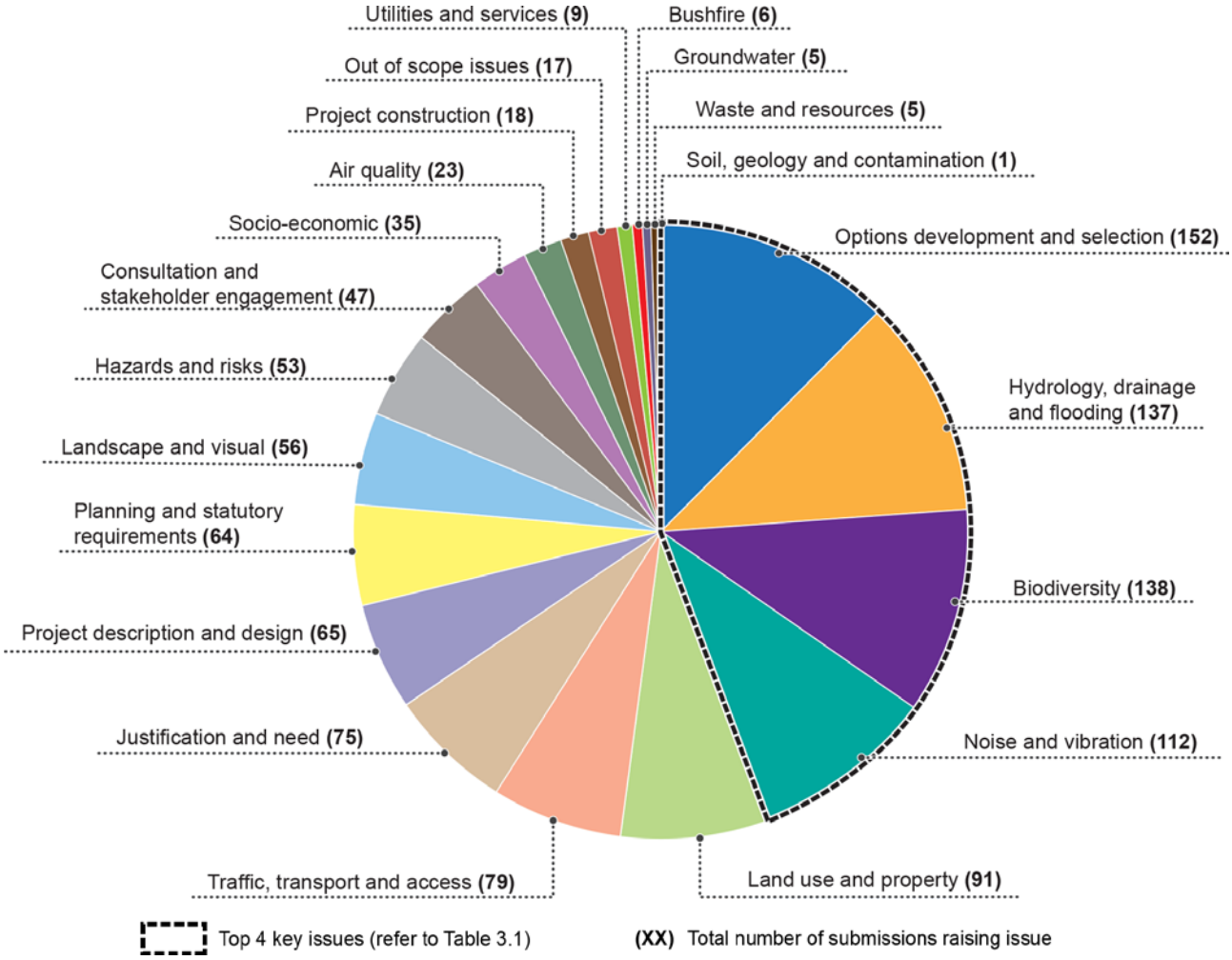
3.2 Summary of issues

Of the 210 submissions received, a total of 208 noted objection to the Project with two submissions stating support for the Project based on the proposed creation of jobs associated with the maintenance facility.

Within the submissions received, a total of 21 separate key issues were identified by respondents. These key issues included the following:

- Justification and need
- Options development and site selection
- Project description and design
- Project construction
- Planning and statutory requirements
- Consultation and stakeholder engagement
- Biodiversity
- Noise and vibration
- Landscape and visual
- Traffic, transport and access
- Socio-economic
- Hydrology, drainage and flooding
- Soils, geology and contamination
- Groundwater
- Land use and property
- Air quality
- Bushfire
- Waste and resources
- Hazards and risks
- Utilities and services
- Issues out of scope (i.e. issues not related to the Project).

A breakdown of the extent to which these issues were raised in each of the submissions is provided in Figure 3.1.



Note: Numbers in brackets represent the number of submissions raising each key issue.

Figure 3.1 Breakdown of key issues raised in submissions

As shown in Figure 3.1, the top four issues in community submissions were:

- Options development and site selection
- Biodiversity
- Hydrology drainage and flooding
- Noise and vibration.

Each of these issues were then broken down into a series of sub-issues to further identify the specific concerns raised. Within the submissions received, a total of 116 separate sub-issue categories were identified by respondents.

A complete breakdown of all key issues and sub-issue categories is provided in Appendix A. Response to these issues are provided in Chapter 4 of this Combined Submissions Report.

Table 3.1 Summary of sub-issues from the top four key issues

Key issue category	Breakdown of sub-issues	Number of submissions raising sub-issue (% of overall submissions)
Options development and site selection (152 submissions)	Opposition to preferred site	84 (40%)
	Community preference for Warnervale site	50 (24%)
	Community preference for Bushells Ridge site	18 (9%)
	Site selection options process	72 (34%)
	Site relocation recommendation	14 (6%)
	Support for the Project	2 (1%)
Biodiversity (138 submissions)	Assessment methodology – Orchid study surveys	10 (3%)
	Assessment methodology – General survey undertaken	14 (7%)
	Adequacy of biodiversity assessment	11 (5%)
	Classification of vegetation	7 (2%)
	Consistency between assessments	7 (2%)
	Impacts to biodiversity – General	66 (31%)
	Impact to newly described frog	50 (24%)
	Impact to threatened species	73 (35%)
	Impact to wildlife corridor	8 (4%)
	Vegetation clearance	22 (10%)
	Offset provisions - General	12 (6%)
	Weeds	3 (1%)
	Cumulative biodiversity impacts	6 (2%)
	Biodiversity management and mitigation measures	5 (2%)
	Subject site definition for the initial SIS	4 (1%)
	Assessment methodology for the initial SIS	7 (2%)
	Adequacy of assessment for the initial SIS	17 (6%)
	Species considered as part of the SIS	1 (1%)
	Adequacy of frog SIS assessment	3 (1%)
	Assessment methodology for new frog species	7 (2%)
	Frog habitat assessment conclusions	1 (1%)
	Impacts to Mahony's Toadlet habitat	11 (5%)
	EPBC referral for Mahony's Toadlet	1 (1%)
	Proposed management measures for Mahony's Toadlet	3 (2%)

Key issue category	Breakdown of sub-issues	Number of submissions raising sub-issue (% of overall submissions)
	Suitability of frog exclusion zones	2 (2%)
	Suitability of relying of existing mapping for frog habitat	1 (1%)
Hydrology drainage and flooding (137 submissions)	Adequacy of hydrology drainage and flooding assessment	25 (12%)
	Change to flooding flow regime	67 (32%)
	Cumulative impacts	1 (1%)
	Site flooding impacts	75 (36%)
	Flood modelling	23 (10%)
	Water quality and pollution to local waterways	31 (15%)
	Management and mitigation measures	18 (9%)
Noise and vibration (112 submissions)	Peer review of noise and vibration assessment	1 (1%)
	Adequacy of noise and vibration assessment	10 (4%)
	Construction noise impacts	31 (14%)
	Construction vibration impacts	2 (1%)
	Operational noise impacts – General	97 (46%)
	Operational noise impacts – Horn testing	35 (17%)
	Operational curfew	11 (5%)
	Operational vibration impacts	20 (9%)
	Impact from track cross-overs	1 (1%)
	Management and mitigation measures	38 (18%)

4 Response to Community and Stakeholder submissions

This chapter details the issues raised in community and stakeholder submissions received during the public display periods for the New Intercity Fleet Maintenance Facility Project. This chapter also provides a response to these issues by Transport for NSW.

A summary of each issue raised is presented and followed by the relevant submission number and response from Transport for NSW.

4.1 Justification and need

4.1.1 Project justification

Summary of issues raised

Submissions raised concern about the justification of the Project and specifically why an inter-city fleet rail servicing Sydney was being built on the Central Coast.

There were also issues raised about the Project meeting the relevant objectives set out in the REF. Specific references were made about the ability of trains to exit or enter from the northern side of the facility, requiring trains arriving from Gosford or leaving towards Gosford to reverse direction to access or leave the site, therefore not providing 'efficient operation'.

Submission number(s)

49, 82, 96, 97, 162, 183.

Response

Discussion regarding the overall need and justification for the New Intercity Fleet Maintenance Facility Project was provided in Chapter 2 of the REF. The primary need for the proposed New Intercity Fleet Maintenance Facility is a direct result of the current procurement of the New Intercity Fleet trains and the requirement to adequately maintain these trains.

As the New Intercity Fleet will operate on three routes including Sydney to the Central Coast/Newcastle (Main North Line and North Shore onto Main North Line); Sydney to Blue Mountains (Western Line); and Sydney to Wollongong/Nowra (South Coast Line) it was identified that the facility should be located centrally to one of these core routes to minimise out-of-sector train movements solely for the purpose of maintenance.

Additionally, to minimise empty train movements, the preference for the new maintenance facility was to locate the facility closer to where trains commence and conclude their journey. The Main North railway is expected to receive a larger proportion of the new fleet and as a result, the Central Coast was considered the preferable region for the proposed maintenance facility.

The timetabling of trains into and out of the maintenance facility gives consideration of train operations on the overall rail network to ensure the efficient operation of the train passenger and freight timetable. Notwithstanding this, it should be noted that the current design of the facility does not preclude any future provision for a connection to the north of the site (which would be subject to a separate business case and planning approval) should this be required in the future.

4.1.2 Cost of the Project – General

Summary of issues raised

Submissions raised concern about the overall cost of the Project. Some submissions commented that the cost of the Project would be expected to be greater than the other short-listed sites (specifically the Warnervale site), given that the ongoing design of the Project has identified additional earthworks, access and other requirements which were not fully known during the site selection assessment process.

Some submissions queried why the details of the budget were not included in the documentation that was on public display, and noted that costs (including for land acquisition) should be released publicly prior to determination.

In addition to overall questions regarding the overall cost of the Project, a series of similar issues were raised as follows:

- The REF did not present any discussion regarding the full costs for the Project
- That the cost for Project elements such as earthworks and sound barriers were not provided
- Requested to know if the costs for the Project would be made public
- Requested that the cost of the land acquisition be provided.

Submission number(s)

2, 7, 14, 17, 21, 23, 25, 32, 34, 40, 43, 48, 51, 52, 53, 59, 66, 67, 75, 82, 88, 89, 98, 109, 119, 121, 129, 130, 134, 138, 139, 143, 145, 146, 148, 149, 153, 155, 162, 163, 165, 172, 175, 181, 183, 186, 188, 191, 193.

Response

Once the procurement process for the Project is complete, the anticipated cost to design and construct the facility would be publicly available. Details regarding the cost of specific elements of the overall Project (such as land acquisition) are confidential, however these costs were included as part of the overall costing for the Project.

4.1.3 Cost for the Project – Access road bridge

Summary of issues raised

Submissions raised concern specifically regarding the potential cost of the access road bridge to the maintenance facility site from Enterprise Drive. A number of the submissions specifically noted that the cost of the bridge had not been included in overall costings when making comparison to other sites. Submissions identified concern that the expected costings for the access bridge could range between approximately $50 million and $100 million.

Submission number(s)

2, 7, 9, 21, 32, 34, 38, 40, 41, 48, 54, 58, 62, 65, 66, 67, 75, 77, 82, 85, 86, 87, 89, 97, 99, 100, 103, 105, 111, 112, 113, 114, 121, 123, 129, 130, 134, 139, 140, 141, 143, 149, 150, 153, 155, 162, 163, 165, 175, 186, 188, 191, 202B.

Response

The site selection process included consideration of cost as part of the multi criteria assessment. This criteria assessment also considered environmental planning and engineering constraints including ecology, heritage, noise, contamination, flooding, planning approvals construction access and enabling works. The cost of a bridge was included as part of the multi criteria assessment. Once the procurement process for the Project is complete, the anticipated cost to design and construct the facility would be publicly available.

4.2 Options development and site selection

4.2.1 Opposition to preferred site

Summary of issues raised

Submissions expressed general opposition to the selection of Kangy Angy as the preferred site and the suitability of this site for the New Intercity Fleet Maintenance Facility. Some submissions noted that the facility should be relocated to an alternative (unspecified) site.

Some submissions suggested that an existing facility (or facilities) be used, rather than the need to construct a new facility. Others noted their opposition to the Kangy Angy site as it was not considered as one of the initial 24 potential sites.

Submission number(s)

1, 3, 4, 6, 13, 20, 27, 29, 30, 31, 32, 33, 35, 38, 40, 41, 44, 45, 47, 49, 52, 54, 55, 58, 59, 60, 61, 62, 63, 69, 70, 71, 72, 73, 74, 78, 79, 88, 93, 100, 103, 111, 112, 113, 114, 115, 119, 123, 127, 137, 138, 141, 142, 145, 146, 147, 148, 149, 151, 152, 153, 154, 155, 157, 159, 163, 164, 165, 169, 170, 172, 179, 187, 188, 191, 193, 194, 196, 199, 200, 202A, 202B, 203, 204, 207, 209.

Response

In order to meet all of the operational requirements of the New Intercity Fleet, a comprehensive site selection and options development process was undertaken for the New Intercity Fleet Maintenance Facility which included consideration of a number of different site location options for the maintenance facility.

As the New Intercity Fleet will operate on three routes including Sydney to the Central Coast/Newcastle (Main North Line and North Shore onto Main North Line); Sydney to Blue Mountains (Western Line); and Sydney to Wollongong/Nowra (South Coast Line), it was identified that the facility should be located centrally to one of these core routes to minimise out-of-sector train movements solely for the purpose of maintenance. Based on this primary requirement Transport for NSW initially identified a total of 24 potential sites across the Main North, Western and South Coast lines as part of the initial site selection process.

In order to minimise empty train movements the preference was to locate the new maintenance facility on the busiest route which is the Main North Line, noting that a substantial proportion of trains start and finish their daily cycle each day between Gosford and Wyong. Therefore, the rationale for the Central Coast as the preferred location is based on the current New Intercity Fleet deployment strategy, which would provide for a larger proportion of New Intercity Fleet trains being deployed on the Central Coast and Newcastle Lines.

As such, of the 24 initial sites identified, the seven sites located along the Main North Line were considered further as part of a strategic site options assessment. Following the strategic site options assessment, three of the seven sites were identified as being suitable for further detailed investigation.

The three short-listed sites were then considered against a more detailed series of environmental and engineering criteria including ecology, heritage, noise, contamination, flooding, planning approval processes, and construction access constraints. Based on the assessment process undertaken for the short-listed sites, a suitable site at Warnervale was identified. However, this site was subsequently identified as having a series of constraints including:

- Impacts on areas of identified wetland identified under Coastal Wetland *State Environmental Planning Policy 14* (Coastal Wetlands) (SEPP 14 wetlands)
- Potential conflict with a proposed new link road between Warnervale and Wyong
- A planned employment precinct for future development by the Central Coast Council and potentially challenging property acquisition constraints.

These constraints resulted in this site being considered to be non-viable for the proposed New Intercity Fleet Maintenance Facility.

An additional site located at Kangy Angy was consequently identified for consideration to address the constraints associated with the Warnervale site. Consideration of the site at Kangy Angy identified that it would result in a similar and/or more beneficial environmental and engineering outcomes to the previously identified Warnervale site. As part of this process, a number of factors were considered which is discussed in section 4.2.5 of this Combined Submissions Report. This included potential costs associated with various Project elements including the cost of potential site access (bridge(s), etc.). Overall, the site at Kangy Angy was considered to be the preferred site option for the proposed New Intercity Fleet Maintenance Facility.

A full discussion which provides greater detail regarding the options development and site selection process for the New Intercity Fleet Maintenance Facility Project was provided in Chapter 3 of the REF.

4.2.2 Community preference for Warnervale site

Summary of issues raised

Submissions objecting to the preferred site at Kangy Angy for the New Intercity Fleet Maintenance Facility identified a preference for the facility to be located on the Warnervale site, one of the previously identified short-listed alternative sites.

Submission number(s)

7, 9, 11, 14, 16, 21, 26, 30, 32, 34, 41, 44, 46, 48, 51, 56, 66, 67, 70, 76, 81, 82, 101, 108, 111, 112, 114, 121, 124, 125, 127, 129, 130, 134, 138, 139, 141, 142, 143, 146, 149, 150, 152, 154, 162, 172, 186, 188, 194, 202A, 202B, 208.

Response

As described in Section 3.1.3 of the REF, although the Warnervale site was identified as the most preferable location for the proposed maintenance facility based on the identified short-listed sites from the site option assessment process, it was still identified as being constrained by environmental issues at both ends of the site.

At the southern end of the site SEPP 14 wetlands were identified, while to the north of the proposed site, existing residential properties and a planned residential subdivision were also identified which would constrain the site. In addition, Roads and Maritime Services had identified that they were investigating a proposed new link road between Warnervale and Wyong. The provision of this road was identified as potentially conflicting with the Warnervale site and would require the facility to be moved, potentially impacting on additional SEPP 14 wetlands.

Based on the constraints identified at the Warnervale site, a *Comparative Site Analysis* (GHD, 2015a) was undertaken to compare the Warnervale site (as the identified preferred site) and an alternative location (the Kangy Angy site) which had been proposed by Wyong Shire Council (now Central Coast Council).
The objective of the study was to undertake the comparison of the two locations to identify the preferred site with regard to engineering and environmental impacts.

As part of the *Comparative Site Analysis* (GHD, 2015a), a multi criteria analysis (MCA) of the Kangy Angy site was done in line with the process used for the *Concept Options Assessment* (GHD, 2014).
The assessment utilised the same staged MCA assessment that was undertaken for the initial options assessment. While it was identified as part of the *Comparative Site Analysis* (GHD, 2015a) that the Warnervale site would have some environmental benefits over the Kangy Angy site, based on consideration of both the environmental and engineering criteria, in conjunction with property ownership constraints and the potential to impact on the proposed Link Road, it was considered that the Kangy Angy site was identified a better overall site for the proposed maintenance facility.

4.2.3 Community preference for Bushells Ridge site

Summary of issues raised

Submissions objecting to the preferred site at Kangy Angy for the New Intercity Fleet Maintenance Facility identified a preference for the development to be located on the Bushells Ridge site, one of the previously identified short-listed alternative sites. A series of these submissions noted that the Darkinjung Local Aboriginal Land Council (LALC) would be receptive to the facility being constructed on their land.

Submission number(s)

2, 19, 21, 26, 28, 30, 36, 42, 60, 82, 93, 111, 121, 129, 139, 149, 162, 200.

Response

In addition to the overall site selection assessment presented in the REF, Section 3.1.5 of the REF provided a more detailed discussion regarding the potential use of the Bushells Ridge site and the key reasons against this location being the preferred site for the maintenance facility. This discussion noted that in April 2015, Transport for NSW undertook additional evaluation of the Bushells Ridge site to further investigate the potential for use of this site as a maintenance facility site (*Bushells Ridge Site Assessment* (GHD, 2015b)). The key reasons for undertaking the additional evaluation were:

- To provide a greater understanding of some of the constraints and potential constructability issues that would affect potential development of the Bushells Ridge site
- To respond to ongoing consultation with affected land owners including Central Coast Council (as the land owner of the Warnervale site) and contact from the land owner of Bushells Ridge, Darkinjung LALC.

Following the additional evaluation of the Bushells Ridge site by Transport for NSW (GHD, 2015b), it was still considered that while the site would provide some environmental benefits in comparison to other identified sites, the Bushells Ridge site would continue to present considerable obstacles and potential for delay to the Project being able to obtain the use of the Bushells Ridge site on Darkinjung Land, which would make it an undesirable option overall. These obstacles include:

- The Darkinjung Land, being subject to the *Aboriginal Land Rights Act 1989* (NSW), cannot be compulsorily acquired by Transport for NSW pursuant to the *Land Acquisition (Just Terms Compensation) Act l991* (NSW)
- Additionally, Transport for NSW understand that there are unresolved native title claims in respect of the Darkinjung Land and due to the provisions of the *Aboriginal Land Rights Act 1989* (NSW), this creates limitations on the Darkinjung LALC's ability to sell or otherwise deal with the Bushells Ridge site
- Approval from the NSW Aboriginal Land Council, in addition to the Darkinjung LALC, would also need to be obtained for the use of the site.

For the Bushells Ridge site, there was a significant risk that that the acquisition process could be delayed, or even not approved. For these reasons, the Bushells Ridge site was not considered viable.

4.2.4 Site selection options process

Summary of issues raised

Submissions objected to the assessment process used to determine the final preferred site (Kangy Angy). Specifically, some submissions noted that the REF failed to provide a robust comparison of the Kangy Angy site when compared to the other sites identified (in particular the Warnervale site as part of the *Comparative Site Analysis* (GHD, 2015a)). Some submissions also referenced the adequacy and objectiveness of the scoring used on the process and that the point scores used for the comparison of Kangy Angy and Warnervale appeared to be subjective without adequate justification. There were also concerns that the options process did not take into account biophysical impacts.

The omission of the enabling work criteria for the Kangy Angy site in the *Comparative Site Analysis* (GHD, 2015a) was also highlighted in some submissions as a concern as it was felt that this should have been included to enable a fair and robust assessment of the two options. Some submissions also raised that consultation should have been undertaken during the site selection process.

Submission number(s)

40, 51, 52, 53, 54, 55, 59, 61, 65, 66, 67, 68, 69, 71, 72, 73, 75, 77, 82, 83, 87, 88, 90, 97, 99. 103, 104, 105, 107, 111, 112, 114, 121, 122, 125, 127, 129, 134, 139, 141, 142, 143, 144, 146, 147, 149, 150, 160, 162, 163, 165, 166, 167, 169, 170, 173, 174, 175, 176, 177, 178, 179, 181, 182, 183, 186, 188, 193, 194, 197, 201, 202A, 202B.

Response

To determine the final preferred site for the maintenance facility, Transport for NSW undertook a series of multi criteria assessments. These multi criteria assessments considered environmental planning and engineering constraints including ecology, heritage, noise, contamination, flooding, planning approvals construction access and enabling works. A summary of these assessments is presented in Section 3.1 of the REF.

Multi criteria assessments are a standard process utilised by government agencies to compare matters such as Project sites. To undertake this type of assessment the Project team developed a set of criteria to consider and compare the various opportunities and risks at each site. As the comparison progressed some of these criteria were adapted to be more specific to the sites being assessed.

As part of the consultation during the early phases of the Project's development, consultation regarding the site selection for the maintenance facility was undertaken with the following stakeholders:

- Sydney Trains
- Darkinjung LALC
- Central Coast Council (formerly Wyong Shire Council).

Consultation with these stakeholders was used to inform the decision regarding the preferred site location for the maintenance facility.

The *Comparative Site Analysis* (GHD, 2015a) compared the Kangy Angy and Warnervale sites. This assessment did not include 'enabling works' as an individual category as was done in the previous site analysis report, because it was considered that both sites required complex enabling works and that the consideration of this individual category would not provide a differentiating factor between the two sites. As a result, enabling works was expanded to include:

- Earthworks
- New bridges (rail)
- Existing bridge modifications
- Major culverts
- Minor culverts
- Site access road
- Existing/proposed road relocations
- Existing utilities
- Existing railway infrastructure.

These categories were considered as part of the option *Comparative Site Analysis* and identified that Kangy Angy was the preferred site based on all of the identified issues. As described above, further details regarding the site selection process was provided in Section 3.1 of the REF.

4.2.5 Site relocation recommendation

Summary of issues raised

Submissions noted that the REF did not adequately acknowledge the recommendations of the Guringai Tribal Link Aboriginal Corporation that the proposed development should be relocated to a different site given the potential environmental impacts associated with the preferred Kangy Angy site.

Other submissions also identified that other alternative or more appropriate sites between Ourimbah and Morisset (not in floodplain land) could be utilised.

Submission number(s)

77, 82, 121, 129, 130, 139, 140, 144, 148, 162, 163, 169, 186, 204, 209.

Response

While the recommendation of the Guringai Tribal Link Aboriginal Corporation was noted as part of their involvement in the development of the *Aboriginal Archaeological Survey Report* (Appendix E of the REF), as discussed in the sections above, a comprehensive site selection process was undertaken taking into consideration a range of factors. Based on this process, the preferred site for the maintenance facility was identified to be at Kangy Angy. While the view of the Guringai Tribal Link Aboriginal Corporation was considered, the overall advantages of the Kangy Angy site were considered to outweigh those of the other considered sites.

4.2.6 Support for the Project

Summary of issues raised

Two submissions noted their support for the Project, identifying the positive local and regional benefits of the Project, including improved access (through the new access road bridge), along with accommodating the growing transport needs of the region and creation of jobs.

Submission number(s)

18,171.

Response

Support for the Project is noted. The Project is expected to have a number of beneficial impacts to the local and wider community and has been designed to adequately maintain the New Intercity Fleet trains.

4.3 Project description and design

4.3.1 Earthworks and fill materials

Summary of issues raised

Submissions noted opposition to the maintenance facility due to the large amount of fill that would be required in order to construct the facility. A number of the submissions noted that the amount of fill required could be significantly larger than described in the REF including ranges between approximately 225,000 cubic metres and 600,000 cubic metres.

Submission number(s)

7, 10, 38, 58, 65, 73, 82, 95, 101, 105, 121, 129, 130, 131, 134, 144, 149, 162, 164, 181, 186, 202B.

Response

An outline of the estimated cut and fill requirements were presented in the REF in Table 4.4. The estimated cut and fill requirements were based on the Project design considered in the REF in addition to information available (such as ground and soil conditions) at the time of preparing the impact assessment.

Following the display of the REF, ongoing design development and the availability of further geotechnical information, refinement of the site level requirements for the Project have been ascertained.

Earthworks would be required for certain Project elements including:

- The new track formations and new maintenance facility buildings to ensure that these areas are outside the required flood design levels
- To support track formation for the existing track (such as modification to existing batters)
- To support embankments and cuttings for the new rail track
- For service roads, access roads, walkways, footpaths, cess drains and retaining walls.

As noted above, the estimated cut and fill requirements presented in the REF were based on the Project design considered at the time of preparing the impact assessment. Based on the ongoing refinement of the design, consideration of additional details regarding the ground conditions, additional modifications to the Project (such as the revised drainage detention basins described in section 6.3 of this Combined Submissions Report), an updated estimate of the amount of earthworks required for the Project has been identified.

Table 4.1 shows the, revised estimated earthwork quantities for the Project. These revised estimates include the earthwork requirements for capping materials, embankments, detention basins and the access road within the proposed site boundaries.

Table 4.1 Estimated earthwork quantities

Cut/fill requirement	Volume (cubic metres)
Cut volume	19,655 m^3
Fill volume	133,770 m^3
Net requirement	114,115 m^3

It should also be noted that the final extent of earthworks would continue to be refined during the detailed design phase of the Project. Further detail regarding the refinement of the earthwork volumes required for the Project is provided in section 6.9 of this Combined Submissions Report.

4.3.2 Future expansion

Summary of issues raised

Submissions expressed opposition to the Project due to the potential for future expansion of the site and that this had not been assessed or considered as part of the current Project. A number of submissions also questioned why the expansion plans were not released to the public and noted that any future plans had not been considered as part of the overall cost of the Project.

Submission number(s)

27, 34, 35, 40, 52, 56, 59, 65, 68, 69, 71, 72, 73, 75, 99, 112, 121, 131, 134, 140, 141, 142, 144, 148, 149, 150, 159, 165, 169, 170, 177, 178, 179, 183, 187, 188.

Response

As discussed in Section 4.2.2 of the REF, the current design for the facility track layout has been designed to not constrain potential future needs of the New Intercity Fleet, if required. However, any future expansion of the capacity of the maintenance facility (or the Main North Line) would be subject to separate costing, environmental assessment, consultation and planning approval processes.

4.3.3 New intersection at Enterprise Drive

Submissions raised concerns about the changes to the intersection of Enterprise Drive and Old Chittaway Road. Specific concerns included:

- Increased traffic at the intersection due to the construction proposed at this intersection
- Increased noise due to the extra vehicles the intersection would generate by maintenance facility employees who would access the site 24/7 as well as the noise generated by traffic slowing down towards the intersection (in particular noise generated by compression braking from trucks)
- Requirement for changes to the speed limit if a roundabout were constructed.

Concern was also expressed regarding the changes to remove right turns from Old Chittaway Road in Enterprise Drive and from Enterprise Drive into Old Chittaway Road.

It was also noted that changes to this intersection may increase traffic past Rudolph Steiner School and through an industrial complex.

One submission also raised concern regarding the level of detail provided for the proposed treatment of this intersection.

Submission number(s)

8, 31, 40, 66, 68, 82, 85, 95, 99, 100, 110, 111, 121, 123, 125, 126, 129, 162, 165, 175, 191.

Response

Based on responses and concerns raised by the community and further consideration of the traffic modelling regarding the proposed arrangement of the intersection at Enterprise Drive and Old Chittaway Road following display of the REF, the arrangement for the intersection has been developed further. The revised arrangement for this intersection is to provide a roundabout at this location. An indicative illustration of this option was presented at the community information sessions held in June 2016.

The roundabout would be located within the same location as the previously proposed intersection and would allow for all traffic movements between Enterprise Drive, Old Chittaway Road and the proposed new access road. This would result in an overall improved outcome for the operation of this intersection in comparison to the previously proposed intersection arrangement as presented in the REF.

Further details about the proposed modification to the Enterprise Drive and Old Chittaway Road intersection is provided in section 6.8 of this Combined Submissions Report.

4.3.4 Detention basins

Summary of issues raised

Submissions noted concern that the location and number of detention basins had not been appropriately considered in the REF with some submissions also noting that they differed between REF and EPBC referral documentation.

One submission enquired about specific details of the basins such as their storage capacity and the timing period over which they would absorb water.

Submission number(s)

34, 82, 95, 114, 121, 129, 130, 141, 144, 162, 183, 186.

Response

At the time the EPBC referral was prepared (February 2016), the number and location of detention basins differed to the number and locations illustrated in the REF (June 2016) as the design of the Project had progressed during this period to provide an improved outcome for the Project.

Section 4.2.6 of the REF provided a description of the proposed detention basins for the Project. This section identified that up to 14 detention basins were proposed to be constructed across the western side of the site to supplement the proposed drainage within the maintenance facility site. Following display of the REF, the design of the on-site stormwater detention system has been refined, including the rationalisation of the number of detention basins to manage surface water flows for the Project site. The refined design provides for a total of three detention basins. Further details, including the revised locations and capacity of these detention basins is provided in section 6.3 of this Combined Submissions Report.

The detention basins have been designed to help attenuate the flows discharging into the main drainage system for occurrence up to a 1:100 AEP event level. As part of the current design for the detention facilities, it has been assumed that the basins would be impermeable to prevent potential interaction with groundwater. Stored water would be pumped to onsite storage areas and then released to the environment in a controlled manner. In addition, one of the detention basins could also be utilised for bushfire management on site.

4.3.5 Flood access road

Summary of issues raised

Five submissions stated that the proposed flood access road would not provide an overall benefit to the local community as Wyong Council previously agreed (March 2016) to upgrade the existing (gravel) access road. It was also noted in some submissions that there a flood evacuation plan was proposed for the facility, but not for local residents.

Submission number(s)

34, 82, 121, 129, 162.

Response

It is considered that the provision of the flood free access road through the Project site would provide a beneficial outcome for local residents during times of flood. A new flood access road would be provided along the western edge of the maintenance facility site between Ourimbah Road and the new maintenance facility access road. This would provide an alternative access route for residents along Turpentine Road, Ourimbah Road and Orchard Road during times of flood (and other emergencies such as a bushfire) which may restrict access to Enterprise Drive from the southern end of Turpentine Road.

As identified in the REF, this access would be available to residents as part of their flood evacuation plan as an egress route during emergency periods (such as flooding or bushfire events).

Transport for NSW cannot comment on the commitments made by the former Wyong Council (now Central Coast Council).

4.3.6 Hours of operation

Summary of issues raised

Two submissions expressed concern regarding the 24-hour, seven day a week nature of the maintenance facility.

Submission number(s)

77, 202B.

Response

It is proposed that the New Intercity Fleet Maintenance Facility would be operational on a 24 hour basis and it is acknowledged that this could result in potential impacts such as noise, vibration and lighting impacts. A range of management and mitigation measures have been proposed to reduce potential impacts during the operation of the Project. A summary of these proposed mitigation measures are outlined in Chapter 8 of this Combined Submissions Report.

It is noted that submissions also raised concern regarding the potential noise and vibration and lighting impact impacts associated with the 24-hour operation of the facility. These concerns have been addressed separately in section 4.8 of this Combined Submissions Report.

4.3.7 Fleet size

Summary of issues raised

One submission expressed concern that the number of trains in the final fleet was not disclosed.

Submission number(s)

103.

Response

Section 1.1 of the REF identifies that the New Intercity Fleet would comprise of approximately 520 cars which would come into service progressively, with the first trains expected to be delivered by 2019, with the remainder of the fleet being delivered through to 2024. These cars would be used to make up combinations of trains of varying lengths depending on operational requirements.

4.3.8 Site area

Summary of issues raised

A number of submissions noted inconsistencies within the REF regarding the overall size of the Project site. In particular, one submission noted that the REF provided three different values (being 37.2 hectares, 42.3 hectares and 50 hectares).

Some submissions also raised queries over the site selection criteria being a site no larger than 10 hectares, when the SIS states that an area of 25.5 hectares would be cleared.

Submission number(s)

105, 147, 170, 178, 181.

Response

It is acknowledged that a number of different areas of the Project site are identified in the REF. However, each of these areas are a component of the overall Project site and are relevant as follows:

- The 50 hectare reference relates to the whole of the Project site area (including the two options which were considered in the REF for the relocation of the Ausgrid 33kV high voltage powerline)
- The 42.3 hectares reference relates to the potential area of total vegetation which may be cleared
- The 37.2 hectares reference relates to the potential area of native vegetation which may be cleared.

Section 3.1.1 of the REF notes the initial site selection criteria included a requirement that the area for the maintenance facility must be larger than 10 hectares (i.e. not less than 10 hectares). The SIS correctly identifies the estimated area for vegetation clearing as 25.5 hectares. The final clearing figure would be determined post detailed design.

4.3.9 Public accessibility to the access bridge

Summary of issues raised

Three submissions noted that the REF does not mention that the new access road bridge would be available for use by local residents.

Submission number(s)

105, 163, 181.

Response

Once the access road bridge has been completed, it would become available for use by the public. This would include during the period of the main construction works for the maintenance facility.

For the operational phase of the maintenance facility, Transport for NSW is continuing to liaise with Central Coast Council to enable dedication of the access road as a public road to allow for alternative access for residents along Orchard Road. These discussions are ongoing.

4.3.10 Impact to Schubolt Lane

Summary of issues raised

Two submissions raised concern regarding the potential impact of the Project along Schubolt Lane, in particular the proposed alignment for the high voltage powerline.

Submission number(s)

112, 188.

Response

As described in Section 4.2.4 of the REF, two options for the relocation of the high voltage powerline which currently runs through the Project site were considered as part of the REF. As described in section 6.4 of this Combined Submissions Report, a preferred alignment for this powerline has been identified which is not along Schubolt Lane.

4.3.11 Proposed maintenance activities

Summary of issues raised

Three submissions raised a concern about the proposed activities to be carried out at the maintenance facility, including whether freight trains would be maintained at the facility in addition to the New Intercity Fleet as a result of the term 'heavy train maintenance'.

One submission also queried what a wheel lathe was and if the train wash would be loud.

Submission number(s)

112, 162, 188.

Response

No maintenance of freight trains is proposed to be carried out at the maintenance facility. As described throughout the REF, the proposed maintenance facility has been designed for the New Intercity Fleet of trains. Section 2.1.2 of the REF identifies the levels of maintenance that are proposed to be undertaken within the facility. These include 'light maintenance' (minor repairs and daily checks, normally undertaken at stabling locations) and 'heavy maintenance' (component change out replacement and refurbishment of major components such as wheel bogies).

A description of the wheel lathe was provided in section 4.2.1 of the REF. The wheel lathe would involve machinery to re-profile and smooth the train wheels and would be housed in a building. The use of the train wash would result in some noise impacts. Both activities were taken into consideration as part of the Noise and Vibration Impact Assessment prepared for the Project.

4.3.12 Relocation of Ausgrid 33kV high voltage powerline

Summary of issues raised

Three submissions raised a concern regarding the proposed relocation of the existing Ausgrid 33 kilovolt (kV) powerline. Particular concern was raised that the relocation would move power lines closer to existing homes and would be expensive to construct.

Submission number(s)

112, 125, 188.

Response

As discussed in Section 3.2.2 of the REF, two options were identified for the realignment of the Ausgrid 33kV powerline. These options were proposed to help eliminate additional interfaces between any electrical enabling works required for the construction of the maintenance facility and any potential future track work modifications of the Main North Line or within the maintenance facility.

Based on further discussions with Ausgrid and ongoing design development, a variation of Option 2 (as presented in the REF) was chosen as the preferred alignment. Where feasible, the preferred alignment has been kept as close to the maintenance facility site as possible, or within established easements to minimise impacts on adjoining properties. Further details regarding the preferred alignment of the Ausgrid 33kV powerline are provided in section 6.4 of this Combined Submissions Report.

Costing for the proposed relocation of the powerline was considered as part of the overall budget for the construction of the maintenance facility.

4.3.13 Maintenance facility access road

Submissions expressed concern regarding the proposed site access road and queried why the existing roads could not be upgraded instead. One submission suggested it would be of little benefit given the council stated they would fix Turpentine Road. One submission raised concern that the access road would impact on public safety and should enter the facility from the west, rather than from Enterprise Drive.

One submission also suggested that the access road should be kept at ground level to minimise noise impacts with an additional submission identifying the issue of light spill from the headlights of cars driving along the access road and asked that the road be moved.

Submission number(s)

117, 125, 167, 175, 183, 187.

Response

The new access road connecting the proposed access road bridge and facility with Orchard Road would be designed to the relevant road standards and consider safety in the design requirements. An access road from the west of the Project site was considered as part of the options development phase of the Project and the assessment was detailed in Section 3.2.1 of the REF. This assessment identified that accessing the site from the west would present a series of substantial challenges including requiring a large amount of fill and earthworks, potential flooding and visual impacts, and substantial land acquisition. Based on these factors, the western access road was not considered to be a viable option.

As discussed in Section 4.2.3 of the REF, the maintenance facility access road would be elevated due to the required clearances between the access road and the overhead wires for the Main North Line railway. Once this clearance has been achieved, the access road would then return to ground level. With regard to potential noise impacts from the access road, Section 7.2.6 of the REF and section 4.8 of this report discuss the mitigation measures that have been proposed to mitigate potential noise impacts associated with the facility.

With respect to potential light spill impacts, opportunities to minimise light spillage would be examined further during detailed design. Further discussion regarding this issue is provided in section 4.9.2 of this Combined Submissions Report.

Transport for NSW cannot comment on any commitments made by the Central Coast Council regarding repairs to existing roads (e.g. Turpentine Road) within the Kangy Angy area.

4.4 Project construction

4.4.1 Construction and traffic haulage routes

Summary of issues raised

Submissions noted concern with the proposed construction haulage routes including the currently nominated routes which pass sensitive receivers such as Ourimbah Public School and Follyfoot Farm Child Care Learning Centre. An alternate route was identified from the north, particularly for heavy vehicles.

A number of the submissions also noted objection to the use of local roads for construction vehicles, including Turpentine Road, Ourimbah Road and Orchard Road.

Submission number(s)

40, 69, 71, 72, 77, 82, 100, 121, 128, 129, 162, 165, 179, 202B.

Response

Figure 4.9 of the REF identified the proposed construction traffic and construction access routes to the Project site. This map identified construction traffic routes from both the north and south of the Project site, including the route proposed by submission respondents. Following display of the REF, and based on responses from the community, the primary access route for construction vehicles (accessing the site via the M1) would be to travel to Wyong Road and to access Enterprise Drive (and the site) from the north. The use of Chittaway Road (and accessing the Project site from the south would typically occur as a secondary access route). The final construction traffic routes (including traffic control procedures) would be determined by the nominated construction contractor (in consultation with Roads and Maritime Services and Central Coast Council) as part of the preparation of the construction traffic management plan (CTMP) prepared as part of the pre-construction planning.

With respect to the use of local roads, Section 4.4.8 of the REF noted that construction vehicle access during the main works contract would primarily occur via the new access road bridge to be constructed during the initial enabling works. As a result, construction vehicles would generally not be required to pass the existing residential properties located along Orchard Road, Ourimbah Road or Turpentine Road. However, as stated in the REF, limited access would still be required along the western side of the site for some vehicle movements (such as concrete trucks and other vehicles during the early works period and vehicles required for the construction of the additional rail bridges over Turpentine Road). These trips however would typically be limited to smaller construction vehicles due to both the current road standard and the low clearance of the existing bridge.

In addition, prior to commencement of construction, a dilapidation assessment of the local road surfaces would be undertaken to identify their current condition. Should damage occur during construction, Transport for NSW would rectify the damage on an as needed basis. A second assessment would also be undertaken following completion of construction and any damage identified would be rectified (where required) by Transport for NSW.

4.4.2 Employee parking

Summary of issues raised

Submissions raised concern about construction workers (and future employees) parking on the nature strips outside the facility during construction (and later operation), and the potential safety impacts of this to local residents who use this area for walking/riding bikes.

Submission number(s)

77, 79, 130, 202B.

Response

During construction, construction worker parking would be restricted to within the maintenance facility construction area. During operation, the maintenance facility would include a dedicated car park with a capacity of approximately 185 parking spaces.

4.4.3 Construction compounds

Summary of issues raised

One submission noted that an eleven metre strip of land from their property would be leased for the construction compounds. The submission requested that the area required be halved.

Submission number(s)

124.

Response

The temporary land within the identified Project site boundary that is required for the construction period was identified as an indicative area based on the construction methodology proposed at the time of preparing the REF. It is expected that these areas would be subject to further refinement during the preparation of the detailed construction methodology. This would be undertaken through consultation between the nominated construction contractor, Transport for NSW and the relevant property owner(s).

Any land utilised for the construction of the Project, under a lease arrangement, would be returned to the owner after being rehabilitated to its original state or a state agreed upon through consultation with the landowner.

4.4.4 Construction program

Summary of issues raised

Three submissions raised a concern regarding the timing for the overall construction program due to the requirement for completion of the access bridge prior to commencement of the main facility.

Submission number(s)

111, 127, 194.

Response

As identified in Section 4.4.1 of the REF, based on the current construction requirements and activities, the construction program for the Project would commence in late 2017 to allow for commencement of operation in 2019. This includes scheduling of the early works associated with the construction of the Project (including utilities diversions, the construction of the new access bridge, general roadworks, and other enabling works) to allow for access during construction to the maintenance facility site.

4.4.5 Number of workers

Summary of issues raised

Two submissions raised a concern about the number of workers on site during construction and operation of the Maintenance Facility.

Submission number(s)

112, 188.

Response

As noted in Section 4.4.2 of the REF, it is anticipated that up to about 200 construction staff (typical working day) and 300 construction staff (during peak times/rail close down periods) would typically be required on-site during construction. The requirement for this number of workers would fluctuate throughout the construction period.

During operation, the number of employees on site at any one time would be substantially reduced, with about 50 to 60 employees on duty at any one time (subject to operational requirements).

4.5 Planning and statutory requirements

4.5.1 Planning approval process

Summary of issues raised

Submissions noted that the preparation of an REF to assess the proposed development was insufficient and did not provide the appropriate level of rigour for the assessment of the Project. In particular it was stated that the REF had not been completed with appropriate consideration of the potential environmental impacts of the maintenance facility. It was stated in each of the submissions that an Environmental Impact Statement (EIS) should have been prepared to assess the Project.

Submissions also raised concerns that detailed design had commenced prior to planning approval, that previous submissions made on the REF had not yet been addressed and the delay of the Combined Submissions Report to 2017 was too long.

Submission number(s)

21, 26, 38, 39, 65, 77, 82, 98, 100, 103, 104, 107, 110, 121, 129, 133, 134, 138, 139, 142, 144, 147, 148, 149, 158, 159, 162, 164, 165, 167, 169, 175, 181, 183, 188, 193, 197, 202B.

Response

The assessment of significance of the potential impacts of the maintenance facility was based on the method outlined in *Is an EIS required? Best practice guidelines* (Planning NSW, 1995). The assessment of the potential environmental impacts associated with the Project concluded that it was unlikely that the proposed maintenance facility would be considered 'likely to significantly affect the environment' for any factors other than impacts to protected species.

Section 112(1C) of the EP&A Act states that an EIS is not required to be prepared for an activity for which a SIS has also been prepared in accordance with the *Threatened Species Conservation Act 1995* (TSC Act) if, other than the potentially significant impact on protected species (which are required to be assessed by a SIS), the activity does not and is not likely to significantly affect the environment. Therefore, in order to meet this requirement, a SIS was prepared as part of the environmental assessment documentation for the Project. The SIS was prepared and displayed concurrently with the REF.

A separate Submissions Report was prepared to specifically address issues raised during the public display of EPBC documentation (listed in section 2.5.1 of this Combined Submissions Report), to allow for the Federal Minister for the Environment to make a determination on the Project under the EPBC Act. This Combined Submissions Report has been prepared to address all of the issues raised during all public display/ exhibition periods and would be made publicly available at the time of determination of the Project. ,Should Transport for NSW determine to proceed with the Project, detailed design of the Project would commence.

4.5.2 Adequacy of documentation

Summary of issues raised

A number of submissions stated that the REF, supporting technical papers and the SIS insufficiently considered potential impacts of the facility on the local community and the natural environment and did not identify all potential impacts of the Project (including cumulative impacts). It was also noted in submissions that the REF did not provide sufficient information regarding the proposed management and mitigation measures which would be implemented to mitigate the identified impacts.

One submission also queried why the REF did not refer to the *Central Coast Regional Strategy* (in particular *Direction 9: Protect and enhance productive agricultural land*).

Submission number(s)

10, 21, 25, 26, 29, 38, 39, 40, 47, 49, 53, 54, 55, 57, 65, 66, 67, 68, 69, 71, 72, 103, 110, 117, 121, 129, 130, 134, 139, 141, 142, 149, 150, 156, 162, 164, 165, 176, 179, 186, 188, 202A, 202B, 203.

Response

The REF, SIS and EPBC documentation was completed by experienced professionals with appropriate qualifications in accordance with all relevant environmental and planning legislation and other relevant procedures and guidelines required by government agencies. It is considered that the information provided in the REF, SIS, EPBC documentation and Additional SIS was sufficient to provide the community with an appropriate level of detail to understand the Project, the potential impacts and the proposed mitigation measures. In addition, a range of technical studies were also undertaken as part of the assessment of the Project. These were contained in Volumes 2 of the REF.

Each of these technical studies provided a detailed of impact assessment of the Project on issues such as biodiversity, noise and vibration, visual and landscape, heritage (both non-Aboriginal and Aboriginal), traffic and transport, socio-economic, surface and ground water and construction air quality. These studies used available information and informed the assessment of the potential impacts of the Project on the existing environment.

Management and mitigation measures were developed as part of the technical studies and were summarised in Section 8.2 of the REF. As part of the review of submissions and design development these management and mitigation have been further refined as outlined in section 8.2 of this report.

The *Central Coast Regional Plan 2036* was published by the NSW Department of Planning and Environment in October 2016 (following display of the REF). The plan will guide the NSW Government's land use planning priorities and decisions over the next 20 years to identify:

- Economic, social and environmental opportunities to build a more prosperous region
- Actions to guide development and land use.

The Project is not considered to be inconsistent with this plan. However it is noted that Direction 9 of this plan comprises a series of actions around the future management of Biophysical Strategic Agricultural Land (BSAL). While the Project site is located on land mapped as BSAL, this only has legal effect under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* where State significant mining or Coal Seam Gas proposals on land that is confirmed as BSAL must go through a Gateway process to obtain approval. There is no equivalent under the Infrastructure SEPP, and so this aspect does not apply to the Project.

4.5.3 Assessment of relevant legislation

Summary of issues raised

Submissions raised concern that the assessment of relevant legislation was inadequate. In particular, the following legislation was identified:

- *Water Management Act 2000* – as the land is adjacent to a defined watercourse
- *State Environmental Planning Policy 71: Coastal Protection* (SEPP 71) – as part of the land is identified in Coastal Protection Land
- *State Environmental Planning Policy 33: Hazardous and Offensive Development* (SEPP 33) – as it was considered that the Project falls within the definition of a potentially hazardous and offensive development.

Some submissions also queried why other environmental impacts or factors (like flooding or costs) had not been assessed under the EPBC Act.

One submission also queried what consent Transport for NSW had to build a rail facility on a wetland with EPBC listed species and considered such an act as breaking Federal law (which would be unconstitutional as Commonwealth laws prevail over State laws). Several respondents also requested that the Federal Minister not issue approval for the Project.

Submission number(s)

38, 56, 82, 121, 129, 162, 164, 167, 170, 178, 182, 183, 193.

Response

It is acknowledged that part of the Project site would be located adjacent to a defined watercourse. Consideration of the *Water Management Act 2000* was provided in Section 5.4.9 of the REF.

It is acknowledged that part of the Project site would be located within the defined coastal protection zone for SEPP 71. Consideration of the provisions of SEPP 71 was provided in Section 5.3.5 of the REF.

Transport for NSW considers that the proposed maintenance facility would not be a 'potentially hazardous and offensive development' within the definition of SEPP 33. The Project would not pose a significant risk in relation to the locality with respect to human health, life or property, or the biophysical environment, nor would it result in significant discharge of pollution such that it would have a significant adverse impact in the locality or on the existing or likely future development on other land in the locality.

The EPBC documentation (listed in Section 2.5.1 of this Combined Submissions Report) was prepared to assess the relevant Matters of National Environmental Significance (MNES) which, for this Project, were related to biodiversity and did not extend to other environmental issues which are instead captured and assessed under NSW legislation (such as flooding).

Transport for NSW has received approval under the EPBC Act and concurrences from the NSW Office of Environment and Heritage (OEH) prior to determining the Project under Part 5 of the EP&A Act.

4.6 Consultation and stakeholder engagement

4.6.1 Request for further and ongoing consultation

Summary of issues raised

Submissions requested that future meetings be coordinated with the two groups representing local residents and landowners being the Kangy Angy Residents Group and the Ourimbah Region Residents Association.

Submission number(s)

82, 121, 129, 133, 162.

Response

As described in Section 6.5 of the REF, should Transport for NSW determine to proceed with the Project, a range of consultation activities would continue to be undertaken in order to provide ongoing communication between the community and the Project team and to continue to seek Project feedback. Activities to inform and engage residents, businesses and other stakeholders in the lead up to and during construction would include:

- Door knocking
- Stakeholder briefings
- Community notifications
- 1800 Project information line

- Email and telephone contact
- Community information sessions
- Project website.

The Project team would continue to be available for meetings with the community to discuss any issues or concerns regarding the Project.

4.6.2 Availability and level of detail at community information sessions

Summary of issues raised

Some submissions raised concerns regarding the level of detail and accuracy of the information presented at the community information sessions and in factsheets, particularly with regard to responses given to community questions about management and mitigation measures. In addition, some submissions noted that community member's questions were left unanswered at the display sessions or that the sessions did not meet the community's expectations.

One submission expressed concern regarding the public availability of information regarding the comparative site assessments and background information regarding the advantages and disadvantages of the short listed site locations.

One submission requested additional printed copies of the REF be provided due to restricted access to digital media.

Submission number(s)

8, 68, 82, 104, 110, 121, 129, 131, 162, 164, 165, 167, 186, 187.

Response

As outlined in section 2.3.4 of this Combined Submission Report, a variety of communication materials were developed for the community information sessions. These materials reflected key points from the REF in an accurate, easy to understand format. The REF and supporting technical papers were also available for public review at the information sessions to provide access to detailed information about the assessments completed and the expected impacts.

One of the aims of the community information sessions was to make key staff (including technical specialists) available to assist in explaining to the community technical details of the proposal or the assessments that were carried out. With respect to the concerns that community member's questions were not answered during the information sessions, Transport for NSW notes that answers were provided to questions when the information requested was known, including information regarding proposed management and mitigation measures.

Where responses to community questions were not able to be provided directly at the community information sessions, members of the community were encouraged to forward their questions to Transport for NSW via the Project email or the 1800 Project information line so that the relevant information could be provided following the information session.

The artist's impressions provided at the community information display sessions were indicative only and were labelled as being based on the concept design and subject to change. These impressions were intended to provide an indication of the key features of the Project and provide a comparison between the existing environment and the potential outcome as a result of the Project. The artist's impressions were developed using existing photographs and architectural models of the proposed facility and are considered to be accurate and representative of the proposed development.

The site selection reports have not been made publicly available due to the sensitive commercial information included in these reports. A detailed summary of the site selection process, based on the information provided within the option assessments reports, was included in Section 3.1 of the REF and a site selection fact sheet summarising the selection process was made available at the information sessions.

With respect to the specific request for provision of additional hard copies of the REF, a number of printed copies were provided to the local community to allow for review of the documentation. In addition, hard copies of the REF were also available for viewing at the community information sessions as well as the public display locations in Wyong, Tuggerah and Gosford. CD copies of the REF were posted by the Project team at the request of residents who were not able to access the internet to view the documents.

4.6.3 Adequacy of consultation undertaken to date

Summary of issues raised

Submissions expressed dissatisfaction with the overall amount and adequacy of community consultation undertaken as part of the initial development and display of the Project. A number of submissions commented that little consultation appeared to have been undertaken (in general) and that numerous residents and stakeholders were not aware of the Project (including the local day care and the Ourimbah University Campus).

One submission also noted concern that there had been limited community consultation by Wyong Shire Council (now Central Coast Council) with local residents regarding the Project.

Submission number(s)

9, 12, 23, 40, 43, 45, 60, 67, 82, 110, 112, 117, 118, 121, 123, 125, 129, 130, 134, 148, 162, 165, 167, 168, 170, 182, 183, 184, 186, 188, 193, 202A.

Response

As described in Section 6.2 of the REF, initial consultation with the community regarding the Project commenced in September 2015. An outline of the key issues which were raised by the community was provided in Table 6.1 of the REF. A range of consultation activities were carried out during the development of the Project design, environmental assessment and public display of the REF, SIS, EPBC documentation and Additional SIS. Details of the consultation activities can be found in section 2.3 of this Combined Submission Report. Activities included:

- Project notifications and Project updates for nearby residents, businesses and stakeholders
- Meetings with property owners
- Discussions regarding permission for property access for environmental assessment surveys
- Door-knocking nearby residents and businesses to outline the Project and discuss potential impacts
- Meetings and briefings with key stakeholders, businesses and residents, including Central Coast Council
- Letters, emails and phone calls about the ongoing development of the Project
- Advertising in local newspapers
- Community information sessions
- Project updates on the Transport for NSW website.

In addition to the consultation undertaken with the community, a range of consultation was carried out with various government authorities and agencies (including Central Coast Council, Department of Premier and Cabinet Office, NSW Office of Environment and Heritage, Commonwealth Department of Environment and Energy and the NSW Department of Planning and Environment) regarding the Project design.

Dissatisfaction regarding a perceived lack of communication from Wyong Council (now Central Coast Council) regarding the Project is considered to be outside the control of Transport for NSW.

4.6.4 Consultation and submissions process

Summary of issues raised

It was requested that submissions made on the Project are taken seriously by Transport for NSW. It was also expressed that the consultation process was inadequate, citing lack of awareness of the Project within the community. Submissions also raised that the consultation techniques of door knocking during the day was not an effective method as most residents were at work during these times.

Two submissions also expressed that the submissions process was unclear and that people were unsure of the required submissions format.

Submission number(s)

8, 35, 68, 77, 82, 90, 99, 121, 129, 130, 159, 162, 186, 188, 202B.

Response

Transport for NSW has considered all submissions made during the public display periods when preparing this Combined Submissions Report.

Awareness of the Project and the REF display period was raised via a range of methods as described in Section 6.2 of the REF. It is noted that while door knocking was typically undertaken during the day, this method was used to discuss the Project with both businesses in the local area (who are only available during the day) and to opportunistically meet available local residents. When residents were not at home a 'sorry we missed you' letter was left which included contact details if they would like a visit from the Project team or for further Project information. Other methods of consultation were utilised including direct phone calls/meetings, Project newsletters and other targeted correspondence. For example, the Project community newsletter distributed in May 2016 (describing the display of the REF) was distributed to about 2,100 residents located within the immediate vicinity and surrounding areas of the Project prior to the display period.

The REF and SIS were publicly displayed for a period of four weeks from June 2016 to July 2016 while the EPBC documentation and SIS was on public display from 21 October 2016 to 21 November 2016. In addition, each of the REF / SIS and Additional SIS display periods were advertised in the Central Coast Express Advocate, the Wyong Chronicle and the Newcastle Herald newspapers while the EPBC documentation display, SIS and Additional SIS periods were advertised in the Central Coast Express Advocate, the Sydney Morning Herald and the Daily Telegraph. The REF, SIS, EPBC and Additional SIS documentation were also available to download electronically from the Transport for NSW website. In addition, hard copies of the REF and SIS were available at four separate locations including Wyong, Tuggerah, Gosford and Chatswood. The EPBC (and SIS) documentation and Additional SIS were available at the eight locations listed in section 2.5 of this Combined Submissions Report.

Two separate information sessions were also provided during the display period to assist the community and stakeholders to understand the Project. These were held at the Central Coast Steiner School in Fountaindale. Each session was three hours in duration. They allowed community members to discuss the Project and ask questions to a range of Project team members. The sessions were attended by about 75 community members (about 40 for first session and about 35 for the second session).

With respect to the submission that raised concern regarding what to write in their submission and the form in which it was required, this was outlined in Section 6.3.8 of the REF which noted that all written submissions regarding the Project would be considered.

In addition, Project feedback forms were available at the community information sessions to provide comments on the Project. At these sessions, Project team members made themselves available to assist with the completion of these forms.

4.6.5 Display period

Summary of issues raised

Three submissions objected to the time available for the public display of the REF (30 days) and requested a three month extension to the submission period time in order to allow for submissions to be received.

Submission number(s)

5, 130, 186.

Response

The REF was publicly displayed for a period of four weeks from 6 June 2016 to 4 July 2016, which is considered to be a suitable period to review and provide comments on the documentation that was made available. Four weeks is a typical display period for a REF.

4.6.6 Website document links

Summary of issues raised

Submissions noted that some of the links to EPBC documents on Transport for NSW's website were not working and also queried why the EPBC documentation was not available on DoEE's website.

Submission number(s)

135, 136.

Response

Transport for NSW promptly addressed the website issues following receipt of this submission so that all Project information remained accessible during the public display period.

The display of documents for the public display of EPBC controlled action is usually hosted by the applicant (being Transport for NSW) and not by the Commonwealth Department of the Environment and Energy.

4.7 Biodiversity

4.7.1 Assessment methodology – Orchid study surveys

Summary of issues raised

A number of submissions raised objection to the adequacy of the survey undertaken regarding orchids as part of the biodiversity assessments (both the *Biodiversity Assessment Report* (Appendix A of the REF) and *Species Impact Statement* (Transport for NSW, 2016b)). Some of the submissions also noted that the period of time over which the surveys were completed was not long enough (therefore missing some potential species that were not present during the survey period) and did not meet required guidelines.

Some respondents also questioned why the Australian Government draft guidelines for threatened orchid species had not been conducted.

Submission number(s)

52, 56, 59, 75, 77, 82, 121, 129, 162, 183.

Response

Table 3.4 of the SIS outlined the likelihood of occurrence for threatened terrestrial ground orchids including *Caladenia porphyrea*, *Caladenia tessellata*, *Corunastylis sp. Charmhaven*, *Corybas dowlingii*, *Cryptostylis hunteriana*, *Diuris bracteata*, *Diuris praecox*, *Genoplesium baueri*, *Genoplesium insigne*, *Rhizanthella slateri* and *Thelymitra sp. adorata.* Based on local records and specific habitat requirements, these species were considered to have a low likelihood of occurrence within the study area.

Surveys for threatened flora species including orchids have been conducted in accordance with the recent NSW Guide to Surveying Threatened Plants (Office of Environment and Heritage 2016). These methods included targeted Random Meanders, in accordance with Cropper (1993), which is a variation of the Transect survey. One species of orchid, *Calandenia tesalata* listed in the Australian Government Draft Guidelines for threatened orchids was considered to have low likelihood of occurring within the site, however was included within the subject species for targeted surveys. Surveys were conducted generally in accordance with the methods, approach and timing for this species, as recommend within the Australian Government Draft Guidelines.

In addition, it was noted in Table 5.1 of the SIS that under the consideration of *Caladenia tessellate*, targeted orchid surveys were conducted over the entire study area as part of the Preliminary Ecological Assessment (EMM 2015). These surveys were undertaken during the recognised flowering period for *Caledenia tessellata* on 10, 16 and 17 September 2015. While these field surveys did not specifically target this species, they were conducted for a number of other threatened orchid species, namely *Corunastlis* sp. Charmhaven, *Genoplesium insigne* (Variable Midge Orchid) and *Thelymitra adorata* (Wyong Sun Orchid) and as such the methodology employed for these targeted surveys would have enabled detection of *Caledenia tessellata* within the study area if the species was present and flowering. No threatened terrestrial ground orchids were recorded during these surveys.

Based on the lack of suitable habitat requirements for threatened terrestrial ground orchids and seasonal targeted surveys completed, the occurrence of threatened orchid species within the study area is considered low and adequately assessed within the SIS.

4.7.2 Assessment methodology – General survey undertaken

Summary of issues raised

Submissions raised objection to the adequacy of the general survey effort undertaken as part of the *Biodiversity Assessment Report* (Appendix A of the REF). The submissions noted that the period of time over which the survey for the flora and fauna species completed was not long enough (therefore missing some potential species that were not present during the survey period) and did not meet required guidelines and standard survey methods. Specific species which were highlighted in the submissions included the Regent Honeyeater, Swift Parrot, Green-thighed Frog and Golden Bell Frog.

Submission number(s)

77, 82, 112, 121, 129, 150, 160, 162, 169, 173, 181, 183, 188, 193, 202B.

Response

The SIS and Additional SIS were prepared in consultation with OEH, including suitable survey methods and expert reports in accordance with guidelines for all subject species. Assessments of significance for all affected species have been undertaken in accordance with Section 5A of the EP&A Act. The SIS and Additional SIS were completed by experienced professionals with ecological expertise in accordance with all relevant environmental legislation, and in particular, the Chief Executive Requirements prepared by the NSW OEH for the SIS and Additional SIS (respectively), identifying all information requirements that the SIS were required to meet.

During field surveys, no sampling technique can totally eliminate the possibility that a species is present within a particular site. For example, some fauna species use habitats on a sporadic or seasonal basis and may not be present on site during the time in which field surveys are undertaken. The conclusions in the REF and biodiversity assessment are based on data acquired from the site and field surveys and are therefore indicative of the environmental condition of the site at the time of preparing the report. This includes the presence of species. A precautionary approach was taken in completing the biodiversity assessment and it was assumed that the species was present if suitable habitat was observed.

Furthermore, where potential habitat for a threatened species is observed within a Project area and the species not recorded during field surveys, the threatened species is assumed to be present based on the availability of habitat.

Targeted seasonal surveys were completed for blossom nomad bird species, including Swift Parrot, Regent Honeyeater and Little Lorikeet on 20 May 2016; targeting patches of Swamp Mahogany blossom. Whilst not detailed in the *Biodiversity Assessment Report*, targeted blossom nomad surveys were completed as part of the SIS process.

Although, the Swift Parrot and Regent Honeyeater were not recorded in the study area during targeted searches, these species were considered 'affected species' under the SIS, due to the presence of potential habitat. Accordingly, the Swift Parrot and Regent Honeyeater were assessed against Project related impacts based on their potential presence within the Project study area.

Additionally, targeted surveys for the blossom nomads (including the Regent Honeyeater and Swift Parrot) were undertaken in accordance with the National Regent Honeyeater and Swift Parrot annual census, and more specifically when the potential feed resources for these species, Swamp Mahogany were in flower on the site.

The SIS acknowledges that surveys were outside of optimal conditions for the Green Thighed frog and as such engaged one of NSW's leading amphibian experts, Dr Arthur White (Biosphere Environmental Consultants) to prepare an expert report on the likelihood of the species (and the Green and Golden Bell frog) being present within the study area. This was undertaken in consultation with OEH and the approved methodology for expert reports for the SIS and NSW Biobanking Methodology.

The expert report identified potential habitat for the Green Thighed frog in a small area along the Chittaway creek, however goes on to state 'The Green-Thighed frog habitat at Kangy Angy is of low quality. Its quality is diminished because of the removal of so much vegetation away from the riparian edges.' The expert report further concludes 'that the likelihood of Green-Thighed frogs being present in the Project area is low'. Based on the small area, poor condition and low likelihood of occurrence provided by the expert, this species was not considered further as an affected species.

The expert report also stated that the only Green and Golden Bell frog habitat found on site consisted of a small depression that could act as a breeding site under optimal conditions. Additionally the report noted that given the scarcity of habitat and that potential breeding site is surrounded by unfavourable habitat there is 'little likelihood that the Green and Golden Bell frogs are present in the Project area'.

4.7.3 Adequacy of assessment

Summary of issues raised

Submissions expressed concern that the *Biodiversity Assessment Report* (Appendix A of the REF) did not adequately assess the impacts associated with the Project. Specifically, the submissions noted that the assessment did not identify certain species and did not assess the impacts of the Project on areas of retained vegetation adjacent to the Project site.

Some submissions also stated that the *Biodiversity Assessment Report* did not assess the significance of the Project with respect to threatened species and EECs in accordance with relevant legislative requirements and guidelines including:

- Section 5A of the EP&A Act
- Office of Environment and Heritage's *Threatened Species Assessment Guidelines* and *NSW Wetlands Policy*
- *Significant Impact Guidelines for Matters of National Environmental Significance* as required under the EPBC Act

Submission number(s)

82, 83, 101,117, 121, 129, 160, 162, 169, 173, 203.

Response

Detailed impact assessments addressing Section 5A of the EP&A Act and OEH guidelines were completed for the Project. These were included in Chapter 8 of the SIS which accompanied the preparation and display of the REF in June/July 2016 and again as part of the public display of EPBC documentation from 21 October to 21 November 2016. Additionally, a specific assessment of the Mahony's Toadlet with respect to Section 5A of the EP&A Act was provided in Chapter 7 of the Additional SIS which was placed on public exhibition in June 2017.

With respect to the Matters of Environmental Significance (MNES) under the EPBC Act, a referral of the Project was submitted to the Department of the Environment and Energy for the Ministers consideration in March 2016. The Department of the Environment and Energy determined that the Project was a controlled action under the EPBC Act. Transport for NSW subsequently prepared documentation to support the assessment of the Project under the EPBC Act which was placed on public display from 21 October 2016 to 21 November 2016. Subsequent to the public display, the Department of the Environment and Energy provided approval on 5 May 2017.

4.7.4 Classification of vegetation

Summary of issues raised

Submissions questioned the classification of two vegetation types identified in the biodiversity assessments prepared as part of the environmental documentation. These included the following:

- The Jackwood-Lilly Pilly Sassafras Rainforest Community identified within the site is considered by the respondent to be commensurate with the River-flat Eucalypt forest on coast floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions.
- The Blackbutt-Turpentine-Sydney Blue Gum mesic Tall Open forest vegetation community is described as containing species characteristic of the Swamp Sclerophyll Forest on Coastal Floodplain EEC. Intergrade areas containing these species should be included and assessed for impacts as areas of Swamp Sclerophyll Forest on Coastal Floodplain.

Submission number(s)

82, 121, 129, 160, 162, 169, 173.

Response

The Jackwood-Lilly Pilly Sassafras Rainforest community is associated with the standardised NSW Vegetation Class – Northern Warm Temperate Rainforests and is aligned to the Rainforest vegetation formation. In contrast, River-flat Eucalypt Forest is typically of open forest structure with a mixed eucalypt canopy and generally forms part of the Forested Wetlands vegetation class.

Detailed threatened ecological community analysis was provided for the Jackwood-Lilly Pilly Sassafras Rainforest community in Section 4.1.2 of the *Biodiversity Assessment Report* (Appendix A of the REF) and Table 6.1 of the SIS. Based on this analysis, this community is not considered to be commensurate with the final determination listing for River-flat Eucalypt Forest.

The Blackbutt-Turpentine-Sydney Blue Gum mesic Tall Open forest vegetation community occurs on slightly higher elevations to Swamp Sclerophyll Forest and is a commonly observed vegetation assemblage that intergrades with lower lying coastal floodplain vegetation throughout the locality. *Eucalyptus pilularis* (Blackbutt) is the dominant tree species and is not a recognised Swamp Sclerophyll Forest diagnostic species. Further detailed analysis of this vegetation community, including its conservation significance, was provided in Section 3.2.3 of the *Biodiversity Assessment Report* (Appendix A of the REF) and section 4.3.1.1 of the SIS. Based on this analysis, this community was not considered to be consistent with the final determination listing for Swamp Sclerophyll Forest.

4.7.5 Consistency between assessments

Summary of issues raised

Submissions raised concern about perceived inconsistencies between the REF and the SIS in relation to the plans, study area, subject site and impacted area.

Submission number(s)

82, 121, 129, 160, 162, 169, 173.

Response

Figure 1.1 of the *Biodiversity Assessment Report* (Appendix A of the REF), Figure 2.2 of the SIS and Figure 7.3 of the REF all consistently depict the vegetation removal and retention within the Project study area. Both the *Biodiversity Assessment Report* and the SIS are considered to provide an accurate and consistent assessment of the Projects' impact on biodiversity across all of the environmental assessment documentation prepared.

4.7.6 Impacts to biodiversity – General

Summary of issues raised

A number of submissions identified concern regarding the general impacts that the Project would have on the ecological nature of the site and the potential impacts that this would have on surrounding areas.

Submission number(s)

3, 4, 14, 16, 21, 24, 25, 27, 30,38, 44, 50, 51, 53, 55, 56, 64, 69, 71, 72, 79, 80, 84, 90, 91, 92, 94, 106, 108, 110, 112, 114, 116, 118, 120, 125, 127, 130, 138, 139, 140, 141, 142, 144, 146, 147, 148, 151, 153, 155, 156, 157, 162, 163, 164, 166, 167, 172, 177, 179, 186, 187, 188, 191, 193, 194, 204, 209.

Response

Transport for NSW is committed to minimising biodiversity impacts as part of the delivery of the Project.

It is acknowledged that the Project would result in some impacts to biodiversity, in particular during the construction phase. In order to identify and assess the potential impact of the Project on existing biodiversity, a *Biodiversity Assessment Report*, SIS and Additional SIS were prepared. These reports provided information about the existing ecological nature of the site and identified the potential impacts that the Project would have on these areas.

Additionally, as part of these reports, a series of management and mitigation measures were identified which would be implemented during the detailed design, construction and operational phases of the Project in order to minimise impacts. These measures include requirements to minimise overall areas of impact during detailed design, development of a vegetation management plan, pre-clearing and construction protocols for the relocation of fauna during construction and a range of other mitigation measures.

In addition, a detailed Biodiversity Offset Strategy for the Project is proposed to be prepared which would be developed in accordance with the NSW Biodiversity Offset Policy and delivered using the BioBanking assessment methodology as part of the detailed design of the Project.

Further discussion regarding the minimisation of impacts to biodiversity across the site, in particular vegetation clearance, is discussed in section 4.7.10 of this Combined Submissions Report.

4.7.7 Impact to newly described frog species

Summary of issues raised

Submissions received in response to REF/SIS display periods

At the time of the public display of the REF/SIS (June/July 2016), Mahony's Toadlet had not been formally identified, and was therefore identified as an "undescribed" species. Submissions expressed concern regarding the potential impacts that the Project would have on the (then) undescribed frog which had been recorded as part of the field investigations undertaken. A number of the submissions stated that due to the recording of the undescribed frog on the site, the REF and SIS could not have fully determined the impacts of the Project and whether the activity would have a significant impact on the species, therefore potentially requiring an EIS. The submissions also noted that additional time should be allocated to allow for a full assessment of the frog species (including an assessment by the NSW Scientific Committee) to be undertaken prior to making a determination regarding the Project.

Submissions received in response to Additional SIS display period

Following the provisional listing of the Mahony's Toadlet in March 2017 and display of the Additional SIS in June 2017, a series of submissions were received which also expressed general concern regarding the potential impacts that the Project would have on the species. Responses to these general concerns are provided below.

In addition, a series of specific concerns regarding specific impacts to this species were also identified. These specific issues are discussed in greater detail in section 4.7.19 to section 4.7.26 of this report.

Submission number(s)

29, 46, 51, 52, 56, 59, 64, 67, 73, 75, 77, 78, 82, 83, 102, 107, 121, 123, 129, 130, 143, 144, 146, 150, 153, 155, 158, 159, 162, 165, 167, 169, 172, 177, 179, 181, 183, 186, 188, 191, 193, 195, 200, 202B, 203, 205, 210.

Response

On 4 November 2016, a scientific paper was published which provided a taxonomic name and classification of the previously unidentified frog species recorded in the SIS. This frog has been classified as *Uperoleia mahonyi* (or Mahony's Toadlet). At the time of preparing the SIS, this species had not been provisionally listed with a threatened status under the *Threatened Species Conservation Act 1995* (TSC Act). Subsequent to the SIS, the species was provisionally listed under the TSC Act on 10 March 2017. Based on this listing, an Additional SIS was prepared and exhibited in June 2017 to consider the potential impacts of the Project on this species.

Biodiversity assessments are variously guided (dependent on the Project status) by local, State and Federal environmental legislative requirements. A consequence of this is that impact assessment of certain species is subject to consideration of Project related impacts to species that that are listed under the TSC Act and/or the EPBC Act at the time that a Project is submitted for approval (such as the 7–part test of significance under the *EP&A Act* of the consideration of the Significant Impact Guidelines 1.1 under and the *EPBC Act*). This includes those species that are listed under preliminary or provisional determinations for listing as a threatened species.

The assessment of the species identified as potentially being impacted by the Project was based on the relevant species identified by current State and Federal legislative requirements. Therefore, it is considered that the REF, SIS and Additional SIS have adequately considered all Project related impacts to threatened species listed under NSW and Commonwealth legislation at the time of preparation of these documents.

As noted above, additional specific issues relating to the Additional SIS are discussed in greater detail in section 4.7.19 to section 4.7.26 of this report.

4.7.8 Impact to threatened species

Summary of issues raised

A number of submissions expressed concern regarding the potential for the Project to impact on threatened and endangered species (including both flora and fauna species) which have been recorded or are considered to potentially be located within the Project site and the removal of their habitat.

Specific species identified in submissions included Swamp Mahogany – Cabbage Palm Swamp Forest, *Melaleuca biconvex*, the Regent Honeyeater, the Swift Parrot, the Wyong Sun Orchid, the Powerful Owl, the Wallum Froglet and the Mahony's Toadlet.

Submission number(s)

37, 39, 40, 65, 67, 69, 71, 72, 76, 77, 78, 81, 85, 86, 87, 101, 103, 108, 114, 116, 121, 123, 127, 134, 137, 139, 140, 141, 142, 143, 144, 146, 147, 148, 149, 150, 153, 154, 155, 156, 157, 159, 160, 163, 164, 165, 166, 167, 168, 169, 170, 172, 173, 175, 177, 178, 179, 183, 186, 188, 191, 193, 194, 195, 196, 200, 202A, 202B, 205.

Response

As part of preliminary ecological investigations it was identified that the Project was likely to lead to a significant impact on the threatened flora species *Melaleuca biconvexa* and the threatened ecological community listed as Swamp Sclerophyll Forest on Coastal Floodplain. Given this, a detailed SIS was prepared for the Project.

The SIS was prepared in accordance with the OEH Chief Executive Requirements and included consideration of all potential threatened species that were assessed as likely to utilise the study area. The SIS included the preparation of assessments of significance for 13 different flora and fauna species listed under the TSC Act, including for the Regent Honey-eater, Swift Parrot and Powerful Owl (the Wyong Sun Orchid and Wallum Froglet did not require such assessments as they were considered to have a low/moderate likelihood of occurrence). The Additional SIS which was displayed in June 2017 also considered the potential impacts associated specifically with the Mahony's Toadlet which was provisionally listed as a threatened species under the TSC Act in March 2017.

With the exception of the potential impacts to Swamp Sclerophyll Forest, these assessments concluded that, with the implementation of the various management and mitigation measures proposed, the impact of the Project on threatened species would be unlikely to result in a significant impact to the identified threatened species or ecological communities.

With respect to the Swamp Sclerophyll Forest impacts, in order to minimise these potential impacts, the Project is committed to the delivery of a comprehensive biodiversity offset package that would include in perpetuity conservation and management of Swamp Sclerophyll Forest, with the objective of having these offsets being sourced from the local occurrence (refer to section 4.7.11 of this Combined Submissions Report for further details).

Notwithstanding the conclusions of the assessments and proposed biodiversity offsets for the impacts to Swamp Sclerophyll Forest, ongoing detailed design of the Project would seek to further refine the Project design and overall footprint in order to reduce the overall potential for impacts to threatened species within the Project site.

4.7.9 Impact to wildlife corridor

Summary of issues raised

Submissions raised concern about the potential impacts on the existing 'wildlife corridor' which crosses the Project site.

Submission number(s)

112, 114, 125, 141, 146, 156, 188, 196.

Response

As described in the Biodiversity Assessment Report, the SIS and the Additional SIS, the Project would occur within a discontinuous regional wildlife corridor. As much of the study area and associated lands is characterised by floodplain topography perched above Bangalow Creek and Ourimbah Creek, land immediately adjacent is currently already fragmented due to historical clearing for rural residential land holdings. This has created a mosaic of smaller, fragmented patches of habitat on flat alluvial valleys leading to forested foothills and ranges.

Although the Project site is surrounded by cleared and managed rural residential tenures, construction and operation of the Project was noted as resulting in adding incrementally to the fragmentation of habitat in an approximate north–south alignment from the coastal range south of the existing rail corridor to riparian habitat associated with Ourimbah Creek in the north. The assessment also noted that the existing rail corridor may already act as a barrier in the landscape to less mobile species of animals, in which case the Project would only add incrementally to the width of an existing barrier.

Additionally, while the removal of the proposed areas of vegetation was noted as increasing some fragmentation in the local area, it was also assessed to be unlikely to exacerbate fragmentation at the regional scale.

4.7.10 Vegetation clearance

Summary of issues raised

Submissions raised concern regarding the overall amount of vegetation required to be removed to allow for the development of the Project. In particular, concern was expressed for the removal of large areas of *Melaleuca Biconvexa* trees and sections of Swamp Sclerophyll Forest.

Submission number(s)

26, 32, 48, 51, 55, 73, 107, 108, 113, 116, 125, 140, 142, 143, 144B, 146, 160, 163, 182, 195, 201.

Response

As part of preliminary ecological investigations undertaken in 2015, it was identified that the Project was likely to lead to a significant impact on the threatened flora species *Melaleuca biconvexa* and the threatened ecological community listed as Swamp Sclerophyll Forest on Coastal Floodplain. However, the Project is committed to minimising the potential impacts of the Project on vegetation during detailed design. As noted in management and mitigation measure A.1 in the REF, opportunities to further reduce the clearing of native vegetation would be investigated during detailed design.

This would include options such as:

- Potential reduction of the construction impact footprint through refinement of the construction methodology
- Potential relocation of Project elements away from substantial vegetation patches
- Identification of alternative construction methodologies which do not require the removal of vegetation.

As described in section 4.7.11 above, the Project is committed to the delivery of a comprehensive biodiversity offset package that would include, in perpetuity conservation and management, in excess of 50,000 *Melaleuca biconvexa* species credits and 170 hectares of Swamp Sclerophyll Forest habitat, with the objective of having these offsets sourced from the local population.

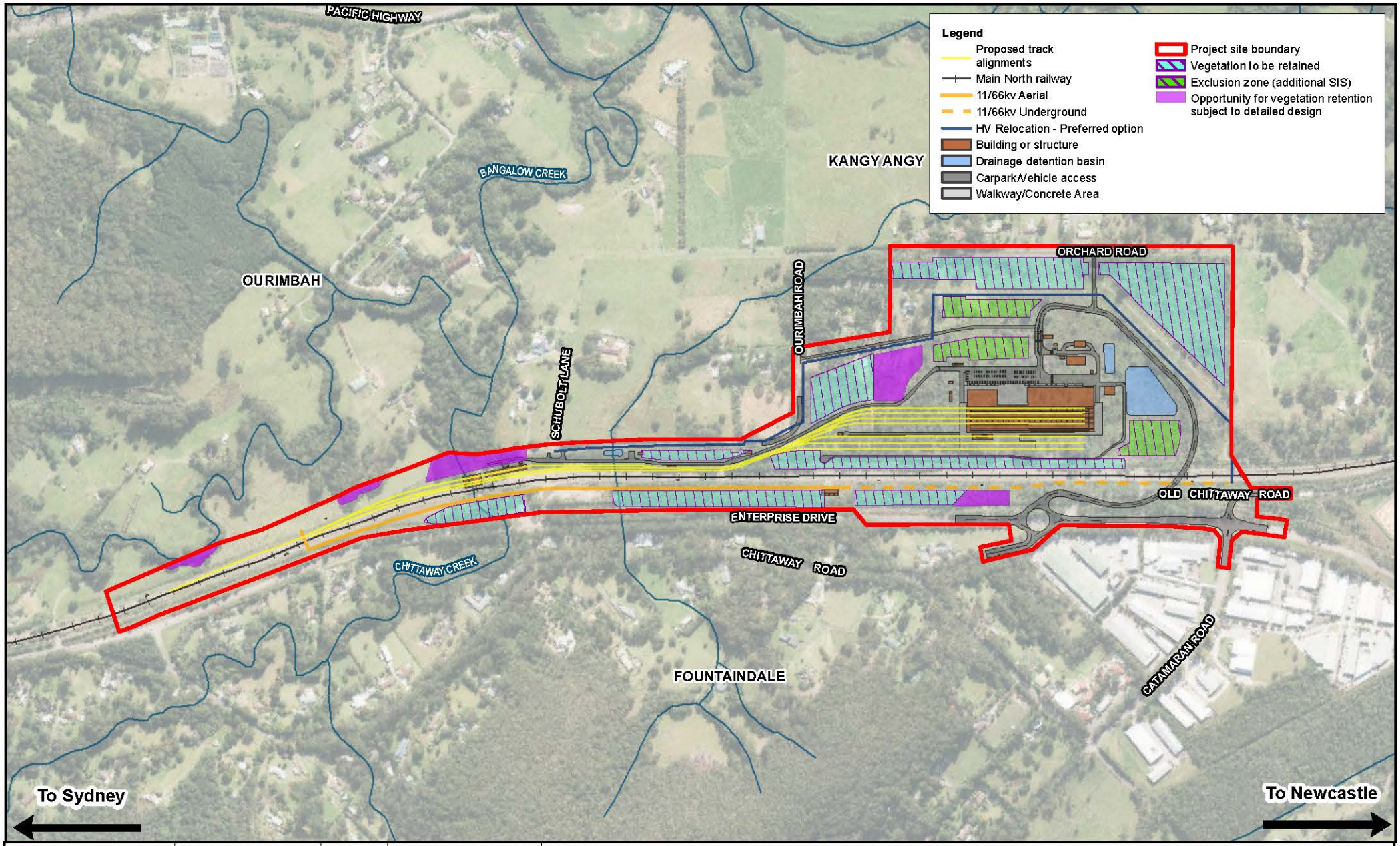
In addition, following the display of the REF and SIS, further refinement of the vegetation proposed to be retained was undertaken (including throughout the preparation of the Additional SIS) to identify additional areas of vegetation which were not required to be removed as part of the Project.

The revised areas of vegetation to be retained are shown in Figure 4.1 and the change in area is summarised in Table 4.2.

Table 4.2 Summary of proposed vegetation to be retained as part of the Project

Vegetation type	Area identified for vegetation retention (approx.)	Additional area identified for vegetation retention (subject to detailed design) (approx.)	Total
Vegetation to be retained (as per REF)	8.84 hectares	1.49 hectares	10.33 hectares
Vegetation to be retained (current)	13.90 hectares	0.95 hectares	14.85 hectares

As can be seen from Table 4.2 above, refinement of the Project following public display of the REF and Additional SIS has identified an additional 4.52 hectares of vegetation which is proposed to be retained (subject to detailed design of the Maintenance Facility) across the Project site. Ongoing detailed design of the Project would also seek to further refine the Project design and overall footprint in order to reduce the overall potential for impacts to vegetation within the Project site.



Map: 2202522A_GIS_F086_A5	Author: mitchellem
Date: 23/08/2017	Approved by: JB

Data source: -© Land and Property Information 2015

0 100 200 m

1:9,500

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

Note: Design is indicative only. Subject to detailed design

WSP | PARSONS BRINCKERHOFF

New Intercity Fleet Maintenance Facility Project
Figure 4.1
Areas of vegetation proposed to be retained

4.7.11 Offset provisions – General

Summary of issues raised

Submissions questioned the offset measures identified as part of the overall suite of management and mitigation measures for the Project. Some submissions noted that the publicly available documentation did not demonstrate that the offset requirements could be achieved within the region and that these potential offset sites should be made publicly available.

Submission number(s)

9, 17, 58, 67, 83, 95, 107, 144, 160, 183, 205.

Response

The accepted approach to environmental assessment requires that, in the first instance, environmental impacts are avoided or minimised as far as possible and subsequently reduced to acceptable levels through appropriate mitigation techniques. Where measures to avoid and mitigate impacts are not feasible or cost effective, offset strategies can be used to compensate the residual impacts of the development on biodiversity.

Transport for NSW has followed the 'avoid, minimise and mitigate' approach by firstly avoiding impacts to around 10 hectares of native vegetation and 1,030 *Melaleuca biconvexa* plant stems within the study area through modifications to the preliminary design of the proposed maintenance facility.

Section 7.1.2 of the SIS provided a detailed description regarding the proposed Biodiversity Offset Strategy for the Project which would be fully developed in accordance with the *NSW Biodiversity Offset Policy,* and delivered using BioBanking assessment methodology. This included identification of the estimated Project offset requirements, potential offset options and the security of these offset options. The development of this strategy would be ongoing during the development approval phase and would be done in consultation with the NSW Office of Environment and Heritage and the Commonwealth Department of the Environment and Energy.

While specific offset sites for *Melaleuca biconvexa* were not identified in the SIS, Transport for NSW is committed to the delivery of a comprehensive biodiversity offset package that would include, in perpetuity conservation and management, in excess of 50,000 *Melaleuca biconvexa* species credits and 170 hectares of Swamp Sclerophyll Forest habitat, with the objective of having these offsets sourced from the local population.

In addition, section 6.3 of the Additional SIS outlines potential offset options to mitigate identified impacts to the Mahony's Toadlet and Wallum Froglet as a result of the Project. These measures include:

- Onsite exclusion zones (offset areas)
- Purchase of credits
- Consideration of other options (such as contributions to land management for conservation).

4.7.12 Weeds

Summary of issues raised

Three submissions raised concern regarding the potential for the introduction of weeds into the Project site and surrounding areas as a result of the Project.

Submission number(s)

101, 108, 117.

Response

Specific mitigation measures to control potential weeds were identified in the REF (management and mitigation measures K.4 and K.5) which stated that management techniques for the management of weeds may include immediate weed removal and disposal without stockpiling, disposal of weed-contaminated soils at appropriate weed disposal facilities and to ensure that all equipment is cleaned prior to and on completion of works to ensure weeds are not introduced or spread to other locations. In addition, noxious weeds would be managed in accordance with the *Noxious Weeds Act 1993*. These measures would be included as part of the overall Construction Environmental Management Plan (CEMP) for the Project as part of a site specific Vegetation Management Plan.

4.7.13 Cumulative biodiversity impacts

Summary of issues raised

Six submissions raised concern regarding the potential cumulative impacts associated with the proposed removal of *Melaleuca biconvex* as part of both the New Intercity Fleet Maintenance Facility Project, the proposed Pacific Highway upgrade Project at Lisarow and one other Roads and Maritime Services Project currently in the planning approval stage. The submissions expressed concern that the combined removal of this species between the three Projects would result in a significant impact to the local population.

Submission number(s)

40, 114, 141, 156, 165, 183.

Response

Section 5.2.3.3 of the SIS provides an analysis of known cumulative impacts on other populations of *Melaleuca biconvexa* in the locality. Specifically, this section of the REF states that the Lisarow – Ourimbah Street and Parsons Road upgrade is currently still in the planning approval phase. This Project has been identified to potentially directly impact on 2.13 hectares of *Melaleuca biconvexa* that is estimated to contain approximately 2,396 stems (Jacobs, 2015). This Project is located within the same locality as the New Intercity Fleet Maintenance Facility although its occurrence is within a separate disjunct population (Lisarow–Narara population). The New Intercity Fleet Maintenance Facility would not result in cumulative impacts to the local population of *Melaleuca biconvexa* that is subject to proposed impacts under the Lisarow – Ourimbah Street and Parsons Road upgrade.

As a result, impacts on *Melaleuca biconvexa* resulting from the Pacific Highway upgrade Project at Lisarow are not anticipated to exacerbate impacts on the local population that is subject to the New Intercity Fleet Maintenance Facility Project.

4.7.14 Management and mitigation measures

Summary of issues raised

Submissions identified potential management and mitigation measures in their submissions. In particular, one submission noted that a rejuvenation area or 'green belt' should be implemented on the western side of the flood access road for visual buffering and to limit any expansion to the west in the future.

One submission also questioned whether the proposed mitigation to capture and relocate animals prior to and during construction would be effective.

Submission number(s)

17, 46, 107, 112, 117, 188.

Response

With regards to the proposal to provide a 'green belt' on the western side of the flood access road for visual buffering, as shown in Figure 7.3 of the REF, a majority of the vegetation to the west of the proposed flood access road is proposed to be retained as part of the Project. Where possible detailed design of the maintenance facility would also seek to reduce the overall footprint of the Project (operational and construction areas) to further reduce vegetation impacts. During detailed design, provision of a vegetated earth mound would also be considered with the aim of improving visual (and noise) screening of the maintenance facility from properties along Orchard Road (refer to management and mitigation measure D.2).

In addition, as part of the detailed design phase of the Project, an Urban Design Plan would be developed to identify potential visual and landscaping mitigation measures to reduce the potential impacts associated with the Project.

The capture and relocation of fauna species prior to and during construction is a standard requirement that forms part of the conditions of approval where native vegetation clearing is to be conducted. Clearing and fauna handling protocols would form part of the CEMP that would be prepared prior to the commencement of construction activities.

4.7.15 Subject site definition for the initial SIS

Summary of issues raised

Four submissions stated that the SIS subject site area has not been correctly defined as areas likely to be affected by impacts such as noise, light and/or biodiversity fragmentation (areas enclosed within the outer perimeter of the Project area) had been excluded from the site. Additionally, the submission noted that areas which are not proposed to be directly impacted have not been included within the study area and have not been surveyed.

Submission number(s)

83, 173, 183, 188.

Response

The subject site and study area is consistent with the definition outlined in the OEH Chief Executive Requirements. The impact assessments undertaken as part of the *Biodiversity Assessment Report* and SIS considered both direct and indirect impacts in terms of the local population and within the Project locality.

4.7.16 Assessment methodology for the initial SIS

Summary of issues raised

A number of issues were raised regarding the assessment methodology in the SIS, in particular regarding the surveying of specific species within the site. These issues included elements such as:

- Seasonality of the surveys
- Location(s) the surveys were undertaken
- Survey techniques utilised for the surveys
- Survey effort undertaken for specific species
- Assessment of potential impacts in accordance with relevant guidelines.

Submission number(s)

83, 160, 173, 181, 183.

Response

Specific issues (and Transport for NSW's response to these issues) are provided in Table 4.3.

Table 4.3 Items raised regarding the SIS methodology

Issue	Transport for NSW response
The SIS has not undertaken surveys for the Green-Thighed Frog and the Golden Bell Frog within the required season in accordance with the OEH Chief Executive Requirements. Areas of both breeding habitat and shelter habitat should subject to seasonal surveys.	The SIS acknowledges that surveys were outside of optimal conditions for the Green Thighed Frog and Green and Golden Bell Frog and as such engaged one of NSW leading amphibian experts, Dr Arthur White (Biosphere Environmental Consultants) to prepare a report on the likelihood of the species' being present within the study area. This was undertaken in consultation with OEH and the approved methodology for expert reports for the SIS and NSW Biobanking Methodology.
The survey locations are confined to the southern sections of the development area and have not adequately covered central and northern areas of proposed development which may contain populations of threatened species not inhabiting the areas which have been surveyed.	Section 4.2.1 of the SIS noted that prior to designing the survey effort, a site inspection was undertaken to identify the vegetation communities and their associated habitat types. The initial site inspection allowed for the stratification of the study area into vegetation communities and corresponding habitat types that informed the survey effort that would be required in order to comply with the Chief Executive Requirements and relevant survey guidelines. The subsequent survey effort was therefore directed to those areas of highest habitat quality or where specific threatened fauna species habitat attributes occurred, and therefore where the greatest likelihood of recording threatened fauna species existed. Areas of highest habitat quality selected were characterised by the highest diversity of flora species and vegetation community strata. Results of bird surveys across the site, which are considered to be a good surrogate for determining fauna habitat quality, strongly indicated that the areas selected for formal trapping surveys were the most likely places for threatened fauna species to occur.
Threatened flora species were only targeted during random meandering surveys and opportunistic observations. Belt transects across the site should have been completed to ensure that potential occurrences of threatened flora species were not missed.	Based on the identification of targeted subject species and habitat stratification, the adopted flora survey methods are deemed appropriate for the positive species identification. Parallel (or Belt) transects were undertaken as part of targeted *Melaleuca biconvexa* surveys. Further details regarding the flora survey methodology and effort was outlined is section 4.2.1.1 of the SIS.
Only 1/3 of the required effort for Large Forest Owl surveys has been undertaken in accordance with the OEH Chief Executive Requirements.	Surveys of the Large Forest Owls were undertaken across four separate nights in accordance with standard methods and guidelines (Debus 1995; Kavanagh & Debus 1994) and Threatened Species Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation 2004b). The Large Forest Owls were included in the species considered to be affected by the Project given the likelihood of occurrence or use of the site for foraging habitat. Large Forest Owl assessments were not based upon the results of field surveys alone, due to the possibility of false negative survey results (refer to Section 4.1 of the SIS). The assessment discussions for Powerful Owl (Section 8.10 of the SIS) and Sooty Owl (Section 8.11 of the SIS), suggest that field surveys are only one component in determining the potential for a species to occur. The occurrence of local records and onsite habitats were taken as an 'assumed study area occurrence' for some locally occurring Large Forest Owls, which reduces a reliance on field survey effort alone.

Issue	Transport for NSW response
Owl surveys were not undertaken during the breeding period for the target Large Forest Owls.	Hollow-bearing tree occurrences across the study area were used as the initial determining factor for potential Large Forest Owl breeding habitat occurring in the study area. The absence of suitable breeding hollows in the study area indicated that the site could not support the breeding cycle of Large Forest Owls. Therefore, it was considered unlikely that surveys during the breeding season would add to what could easily be concluded through habitat assessment (i.e. that the occurrence of local records suggests that the study area may represent part of the home range of local individuals for foraging and roosting purposes, but could not support the breeding cycle of these species).
No cage or Elliott B size trapping was undertaken in accordance with the OEH Chief Executive Requirements and Survey Guideline requirements for medium sized mammals. At least 100 trap nights are required for each stratification area.	Elliott B traps were employed for arboreal mammal surveys (refer to section 4.2.1.2 of the SIS). Methods of Terrestrial trapping within the site were tailored to the subject species considered potential to use the site and in consultation with OEH. Medium to large mammals were targeted using remote motion sensing infra-red cameras and hair tubes across 15 nights. These infra-red cameras are widely accepted as an appropriate alternative method for targeting trap shy species of terrestrial fauna.
No bird surveys have been undertaken during the winter season when Swamp Mahogany trees are in bloom to allow optimal detection of the Regent Honeyeater and Swift Parrot.	Bird surveys were undertaken on 20 May 2016. Whilst this was ten days prior to the winter period, Swamp Mahogany blossom was present in the study area during the survey and nectarivorous bird activity was high. Some areas of Swamp Mahogany on site were holding fruit and were not likely to flower during 2016. Regent Honeyeater and Swift Parrot occurrences are spasmodic across their range and therefore impact assessments were not based on survey results and considered records.
Only one camera trap was used to survey the whole site.	Table 4.4 of the SIS identifies 75 trap nights for camera traps, and 'Remote Cameras' and section 4.2.1.2 notes that six remote cameras were employed during field surveys.
No nest box surveys for Yellow-bellied Gliders were undertaken.	Field surveys confirmed that there were no Yellow-bellied Gliders using the study area. This is a very vocal species, which responds quickly to call playback broadcasts and there was no sign of their using the site during surveys. The lack of suitable hollows in the study area also suggested their unlikely occurrence. Surveys conducted in good habitat for Yellow-bellied Gliders throughout the same period found them to be abundant and easily encountered under the same seasonal conditions when present.
Details of the undescribed frog should be forwarded to the NSW Museum in accordance with the Chief Executive Requirements and NSW Scientific Committee for consideration for provisional listing on an emergency basis.	Refer to response in section 4.7.8.
Potential impacts to undescribed *Uperoleia* species should not be approved until the conservation status of this species is assessed and the extent of impacts across the Project area are properly determined.	Refer to response in section 4.7.8.
The effort expended during nest box surveys is considered deficient and unlikely to detect the target species. The surveys should be undertaken over a longer time period and should utilise more boxes to account for the home range of the target species, Eastern Pygmy Possum and Squirrel Glider.	Due to the lack of records in the study area locality, the lack of preferred habitat in the study area, the lack of hollow resources, the lack of evidence during survey despite a number of survey techniques and an abundance of similar habitat locally, these species were not deemed to be an affected species and unlikely to be recorded.

Issue	Transport for NSW response
Nest box surveys did not cover the preferred rainforest habitat of the Eastern Pygmy Possum.	Rainforest habitats are not the preferred habitat of the Eastern Pygmy Possum and habitats containing sclerophyllous and proteaceous plant species were determined to be the most likely areas for occurrence.
The spotlighting surveys undertaken were not adequate as they only covered the edge areas of the site and accordingly are considered as not likely to have detected the target species. Spotlight surveys should be undertaken across the whole site.	Spotlighting surveys were conducted throughout habitats containing canopy strata and not grassland dominated habitats to target those threatened species most likely to be detected by spotlighting methodologies (e.g. Large Forest Owls, Grey-headed Flying-foxes and threatened arboreal mammals). Other more elusive terrestrial mammals were targeted by other survey methodologies.
Surveys for arboreal or terrestrial mammal species did not cover rainforest habitats as identified in Table 4.4 of the SIS. Surveys for these species should be stratified across the entire site.	Rainforest habitats were represented by small areas within the study area and were considered unlikely to be important for the arboreal and terrestrial threatened mammal species most likely to occur in the study area. Survey efforts were therefore concentrated in the areas of greatest potential for local threatened mammals.
The assessments of significance completed for the affected species have not adequately addressed the DECC (2007) Threatened Species Assessment Guidelines.	Impact assessment at the State level was conducted by the test of significance as is required by the EP&A Act, while taking into consideration those amendments outlined in the *Threatened Species Conservation Amendment Act 2002*, which affect those species contained in the TSC Act and the *Fisheries Management Act 1994*.
The assessments of significance for habitats do not adequately consider the importance or extent of impacts to specific habitat components or types within the locality.	The SIS assessed impacts in regard to the amount of habitat for each species occurring within the study area against the amount of similar habitats occurring in the locality.
Impacts to *Melaleuca biconvexa* have not been properly classified in the assessment of significance provided, as a significant effect is likely to occur to this species due to the extent and importance of the 3,984 *Melaleuca biconvexa* plant stems and 25.5 hectares of habitat proposed for removal. This is supported by the Preliminary Ecological Assessment prepared for the site by EMM (2015).	An SIS was prepared for *Melaleuca biconvexa* based on the assessment of significance conducted as part of the Preliminary Ecological Assessment (EMM 2015). The SIS provides detailed local population analysis (refer to section 5.2) and revised assessment of significance (refer to section 8.2) based on this additional analysis.
The number of hours and the time of year the information was gathered at this important site is inadequate to allow for all possible fauna and flora to be observed. The REF with reference to the SIS, Appendix C pages 352-353 indicated that only 2 nights in May 2016 had field studies conducted to look for only 2 specific species the Green-Thighed Frog and the Green and Golden Bell Frog. This goes to show how hastily and incomplete the SIS is.	It was recognised that optimum survey periods for both the Green and Golden Bell Frog and Green-Thighed Frog would not be possible during the period when other fauna surveys were conducted, so expert opinion from Dr Arthur White (expert report included in the SIS) was sought regarding the likelihood of these species to occur within the study area. The SIS was completed by experienced professionals with ecological expertise in accordance with all relevant environmental, legislation and, in particular, the Chief Executive Requirements which were prepared by the NSW OEH, identifying all information requirements that the SIS were required to meet. As part of their assessment of the SIS, OEH undertook a review of the document to ensure the report meet all the Chief Executive Requirements.

Issue	Transport for NSW response
Why have the assessments of significance completed for the affected species not been adequately addressed the DEC (2007) *Threatened Species Assessment Guidelines*? How does Transport for NSW plan to resolve this issue?	The SIS has been prepared in consultation with OEH, including suitable survey methods and expert reports in accordance with guidelines for all subject species. Assessments of significance for all affected species have been undertaken in accordance with Section 5A of the EP&A Act. Section 5A of the EP&A Act requires that a seven part test is undertaken to assess the likelihood of significant impact upon Threatened Species, populations or ecological communities listed under the TSC Act. In addition, threatened biodiversity listed under the EPBC Act require assessment in accordance with the *Matters of National Environmental, Significant Impact* Guidelines (Department of the Environment 2013).
Why has Transport for NSW not adequately considered the importance or extent of impact to specific habitat component or types within the locality for threatened fauna species? According to their study, they have identified that the proposal will only affect 0.6 per cent of the habitat for the threatened fauna species. Consider that at least 8.6 per cent of Swamp Sclerophyll Forest habitat in the locality will be removed by the proposal. Is it considered that this would be likely to significantly affect several nomadic type threatened species fauna such as the Grey-headed flying fox, Swift Parrot and Regent Honey-eater, all listed under the EPBC Act?	The impact assessments have provided robust assessment of the project impacts on the habitat component within the locality for all threatened fauna species. The SIS has correctly assessed the impacts as 0.6 per cent of the potential habitat within the locality for Regent Honeyeater and Swift Parrot. It should be noted that this assessment identifies more than just the Swamp Sclerophyll Forest as potential habitat for these species. The figure of 8.6 per cent is also specifically related to the percentage of the Project impacts on the 'local occurrence' of the TSC Act listed Swamp Sclerophyll Forest. This figure differs from the percentage of the project impacts in the 'locality' (five kilometre radius) which is about four per cent.

4.7.17 Adequacy of assessment for the initial SIS

Summary of issues raised

A number of submissions stated that the SIS did not provide a sufficient level of survey or assessment to determine the impacts associated with the Project. Comments were made with respect to the duration of surveys and/or the timing of surveys and whether the SIS considered habitat for the newly identified frog.

Additionally submissions stated that the SIS did not appear to include any surveys of animals that are currently present in the area. One submission noted that several species identified in the SIS were excluded from the list of affected species despite the presence of suitable habitat and the potential to occur.

Submissions did not agree with the findings of the SIS that the Project was unlikely to have a significant impact to EPBC listed species (which may have been underestimated due to inadequate survey).

Submission number(s)

83, 95, 112, 114, 141, 150, 156, 160, 165, 167, 168, 173, 181, 182, 183, 188.

Response

The SIS was completed by experienced professionals with ecological expertise in accordance with all relevant environmental, legislation and, in particular, the OEH Chief Executive Requirements which identifies all requirements and information that the SIS is required to address.

As part of the SIS, subject species were determined based on an initial assessment and in accordance with the Chief Executive Requirements issued by OEH. A comprehensive list of identified subject species that became the focus for targeted surveys (refer to Chapter 3 and Table 3.5 and Table 3.6 of the SIS). Following this, a list of potentially affected species were identified based on field survey results and habitat assessment (refer to Table 5.1 and Table 6.1 of the SIS).

Results of flora and fauna surveys were outlined in section 4.3 of the SIS with species inventories provided in Appendix A and B of the SIS.

It is considered that the information provided in the REF and SIS was sufficient to provide the community with an appropriate level of detail to understand the Project and the potential impacts.

4.7.18 Species considered as part of the SIS

Summary of issues raised

One submission noted that several species identified in the SIS were excluded from the list of affected species despite the presence of suitable habitat and the potential to occur.

Submission number(s)

83.

Response

As part of the SIS, subject species were determined based on an initial assessment and in accordance with the Chief Executive Requirements issued by OEH. A comprehensive list of subject species were then identified that became the focus for targeted surveys (refer to section 3 and Table 3.5 and Table 3.6 of the SIS). Following this, a list of affected species were identified based on field survey results and habitat assessment (refer to Table 5.1 and Table 6.1 of the SIS).

4.7.19 Assessment methodology for new frog species

Summary of issues raised

A number of submissions raised concern regarding the adequacy of the assessment methodology undertaken for the Additional SIS for the Mahony's Toadlet. A range of concerns were identified regarding the assessment method for the Additional SIS including:

- Not adequately surveying adjoining sites
- Timing of the survey and the specific time of the year when the subject species was most likely to be detected
- That the requirements of the Chief Executive Officer of the Office of Environment and Heritage had not been placed on exhibition
- Suggestion that the initial surveys were not conducted in the right conditions, with the right survey design or were not intensive enough to detect such threatened species.
- A lack of detail about the survey methods including:
  - what surveys were carried out
  - what part of the subject site was surveyed
  - when the surveys were carried out
  - results of the surveys such as the results of the pitfall trapping and how the acoustic call recorders were analysed
- Suitability of taking weather data from the Gosford BOM station to reflect conditions at the subject site during the survey period
- The timing of surveys and adequacy of reference sites used for comparative assessment.

Submission number(s)

197, 199, 202B, 203, 204, 205, 209, 210.

Response

Assessment methodology

Sections 4.1 and 4.2 of the Additional SIS outline the requirements for survey effort as contained in the relevant guidelines. These requirements were exceeded for the survey effort undertaken to inform the Additional SIS.

The survey methodology used to complete the targeted frog surveys were undertaken in accordance with all relevant survey methodology guidelines for each identified subject species.

Minimum survey effort is defined in *Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation, 2004) and *Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians* (Department of Environment and Climate Change, 2009). Suggested minimum survey effort for amphibians typically include:

- Systematic day habitat search for one hour per habitat stratification unit
- Night habitat search of damp and watery sites for 30 minutes on two separate nights per stratification unit
- Nocturnal call playback completed at least one location on each of two separate nights
- Minimum of one 200 metre transect per water body or inundated area, repeated on a minimum of two separate nights (Department of Environment and Conservation, 2004) (Department of Environment and Climate Change, 2009).

A total effort of 38 survey days targeting Mahony's Toadlet and Wallum Froglet, encompassing a variety of survey methodologies and climatic conditions, were undertaken to inform the Additional SIS. The survey effort significantly exceeded the suggested industry minimum standard of two days/nights. Surveys were conducted in accordance with the Chief Executive Requirements for the Additional SIS and in consideration of the following survey methodology guidelines:

- *Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation, 2004)
- *Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians* (Department of Environment and Climate Change, 2009)
- *Threatened Species Assessment Guidelines: The Assessment of Significance* (Department of Environment and Climate Change, 2007c)
- *Survey guidelines for Australia's threatened frogs* (Department of the Environment Water Heritage and the Arts, 2010).

Survey methods

Section 4.2.1.2 of the Additional SIS provides descriptions of methodologies used to map and quantify frog habitat and complete targeted sampling of frog populations in the study area. Survey methodologies described, included:

- Mahony's Toadlet habitat mapping
  - Vegetation mapping
  - Surficial (surface) sand mapping
  - Semi-permanent and ephemeral water body mapping

- Targeted Mahony's Toadlet surveys:
  - Reference populations
  - Nocturnal searches (including spotlighting)
  - Auditory survey (including call playback)
  - Pitfall trapping
  - Bioacoustic recording.

Figure 4.1 (Geotechnical surficial sand mapping) and Figure 4.2 (Mahony's Toadlet and Wallum Froglet survey effort in the study area) of the Additional SIS clearly showed where sampling and targeted survey methodologies were completed in the study area. In addition, Section 4.2.2 and Table 4.2 of the Additional SIS provided a breakdown of survey methodologies completed during preparation of the Additional SIS, the survey effort imparted, and the date the survey effort was completed.

Results acquired from the various sampling methodologies, inclusive of pitfall trapping, were discussed in Section 4 of the Additional SIS. A compilation of species observed or trapped during these surveys was provided in Table 4.7 of the Additional SIS.

Timing

Optimal timing for amphibian surveys and trapping is known to be during their breeding period. Survey was timed as far as practicable to coincide with Mahony's Toadlet activity described in (Clulow *et al*., 2016), with breeding activity identified as spring (October and November) and autumn (March to May). Surveys encompassed a range of seasons, climatic contexts and hydrological (rainfall) periods, through November 2016 to April 2017 (refer Section 4, Table 4.1 and Table 4.2 of the SIS).

Adequacy of use reference sites

Section 4.2.1.2 of the Additional SIS detailed the use and visitation of Mahony's Toadlet reference populations at Pelican Point Road, Norah Head and the type locality at Oyster Cove. The action of visiting reference populations at different stages of the survey period demonstrated due diligence in survey methodologies and their efficacy for a recently described species with limited information available. In addition, surveys were completed over a several seasonal, climatic contexts and hydrological (rainfall) periods, during periods when the species has been reported (Clulow *et al.*, 2016) to be active.

Weather station

For simplicity and readability, the Bureau of Meteorology Gosford AWS weather station (061425) was referenced for its complete rainfall and temperature dataset during the survey periods. During surveys, rainfall data was largely gauged from the Bureau of Meteorology Wyong (Kangy Angy (Ourimbah Creek)) weather station (061384), which occurs approximately two kilometres from the study area. However, rainfall data from this weather station ceased on 28 February 2017. Therefore, to avoid confusion and potential ambiguity, one complete dataset (Gosford AWS weather station) was selected for display in Table 4.1 of the Additional SIS. Furthermore, during some survey efforts, site specific temperature readings were ascertained via use of a hand-held Kestrel weather meter.

Surveying adjoining site

Most survey effort was completed in the study area to adequately describe known and potential habitat and sample the known population of Mahony's Toadlet, which was likely to be significantly impacted by the Project. Most land surrounding the study area occurs as cleared and highly managed private rural residential land holdings. Due to site accessibility (private ownership status), surveys largely concentrated on the study area. In addition, locality area searches for Mahony's Toadlet were completed at 10 publicly accessible remnant patches of vegetation using criteria nominated in the desk-based assessment of the Additional SIS.

Initial frog surveys (presumably the original SIS and referring to Wallum Froglet)

Wallum Froglet survey effort typically includes a combination of call surveys and nocturnal searches in suitable weather conditions around swamps, dams and flooded roadside ditches. Suitable survey periods are considered to occur from November to May, with breeding occurring in autumn and late winter, and possibly spring and late summer. However, weather conditions are likely to be more important than the time of year, with males calling anytime of the year, especially after heavy rain, and can sometimes be heard during the day after rain.

Targeted surveys completed as part of the initial SIS were completed in mid to late-March 2016, during and following rainfall events and incorporated a combination of aural recognition of calls, call playback and spotlight transects. Approximately 88.4 mm of rainfall fell the week preceding the surveys, with an additional 53.2 mm recorded during the survey period. Targeted surveys for Wallum Froglet (during the initial SIS) are considered to have met survey guidelines during suitable weather conditions to have had a reasonable expectation of recording the species.

Chief Executive Requirements

The SIS and Additional SIS were prepared in accordance with the Chief Executive Requirements; however there is no legal obligation for the requirements to be publicly exhibited with the SIS and Additional SIS.

4.7.20 Adequacy of Additional SIS frog assessment

Summary of issues raised

Three submissions raised concern regarding the adequacy of the overall assessment undertaken as part of the Additional SIS for the Mahony's Toadlet. Additionally, some of the submissions disputed that the Precautionary Principle had been applied as part of the preparation of the Additional SIS.

One submission also requested that Transport for NSW obtain an independent expert assessment of the Additional SIS. One submission also noted that the Additional SIS did not provided an adequate assessment of Key Threatening Processes including:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
- Clearing of native vegetation
- Removal of dead wood and dead trees
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis.

Additionally, one submission raised concern that the Additional SIS did not include details of the experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement.

Submission number(s)

199, 205, 210.

Response

Adequacy of assessment

Sections 4.1 and 4.2 of the Additional SIS outline the requirements for survey effort as contained in the relevant guidelines. These requirements were exceeded for the survey effort undertaken to inform the Additional SIS. Prescriptive survey methods for study area surveys and local area surveys are described in Section 4.2.1.2 and Section 4.2.1.3 of the Additional SIS respectively. Table 4.2 of Section 4.2.2 (documenting survey effort) provides a breakdown of targeted fauna survey effort. Of the 38 survey days, a small amount of survey was conducted in daylight hours, in association with:

- → Amphibian activity that continued beyond nocturnal hours
- → Clearing of pit fall traps within 2 hours of sunrise.

Most targeted amphibian surveys, including those for Mahony's Toadlet, were undertaken within nocturnal hours during the autumn period when Mahony's Toadlet was reported to most likely be active. Careful reference was made to ensure local temperature values (using a hand-held Kestrel weather meter) exceeded the minimum values where Mahony's Toadlet reported as active within the Clulow *et al.* (2016) paper.

Precautionary principle

The ecological assessment undertaken for Mahony's Toadlet has appropriately applied the precautionary principle. In Section 7 of the Additional SIS, the assessment of significance of likely effect of the proposed action on Mahony's Toadlet concluded that the Project would impact the only currently known habitat for this species in the locality. As little is known about this relatively new frog species and its dependence on potential habitats in the locality and study area, a precautionary approach was applied and the Project was considered likely to have a significant impact upon Mahony's Toadlet. This is the same conclusion arrived at in submission number 210. It is noted that the Precautionary Principle, where triggered, does not necessarily prohibit the carrying out of development until scientific certainty is attained.

Key threatening processes

Threats and key threatening processes are considered in Section 5 (specifically Section 5.1, 5.2.1.5 and 5.2.2.5) and Section 7 of the Additional SIS. Particular reference is made to key threats nominated by the OEH and *National Recovery Plan for the Wallum Sedgefrog and other Wallum-dependent Frog Species*. Due to a general paucity (rarity) of information regarding Mahony's Toadlet and its likely dependence on habitats in the study area, the Additional SIS concluded that the Project is likely to have a significant impact on Mahony's Toadlet.

Additional SIS contributor's experience

Table 8.1 of the Additional SIS outlined the qualification and roles of the contributors to who prepared this document. Please refer to the following Table 4.4 for a revised Table 8.1, detailing the name, qualification, experience and role of the contributors who prepared the Additional SIS.

Table 4.4 Contributors and their qualifications

Name	Qualification	Experience	Role
Alex Cockerill	BSc (Hons)	Alex has more than 17 years' experience in botanical and terrestrial ecological research, ecological impact assessment and conservation landscape management.	Lead Ecologist – Project manager, field survey and technical review, BBAM credit calculations

Name	Qualification	Experience	Role
Allan Richardson	BEnvSc (Hons)	Allan has 13 years' professional ecological experience within a diversity of ecological disciplines. His work experiences range across NSW from the coast and. Allan's professional experience is based on a life-long interest in natural history spanning more than 37 years. Allan is familiar with all Australian vertebrate fauna groups, with specialist experience regarding Australia's avi-fauna and amphibians.	Senior Ecologist – Field survey and reporting
Nathan Cooper	BEnvSc, Grad Dip Ornith	Nathan is a terrestrial ecologist who has worked in the environmental consultancy field for approximately 13 years specialising in vertebrate fauna of eastern Australia	Senior Ecologist – Field survey and reporting
Clementine Watson	BEnvSc	Clementine is Environmental Science and Ecology graduate with 3 experience in environmental conservation and management with government, research institutes and community organisations. Clementine has experience in undertaking detailed fauna surveys, targeted flora surveys and habitat assessments	Graduate Ecologist – Field survey and reporting
Rob Harrison	MEnvMgt, BEcoAg	11 years ecological consulting who specialises in fauna ecology.	Principal Ecologist – Reporting
Mark Stables	BSc (Hons)	Mark is a highly experienced Principal Ecologist with 15 years' experience in biodiversity impact assessment with emphasis in ecological surveys, ecological reporting, review and analysis on the Central Coast of NSW	Principal Ecologist – Field survey and technical review
Rob Suansri	BSc, BEc	Experienced GIS operator	Mapping and data management – GIS operator
Emily Mitchell	BDevStud	Experienced GIS operator	Mapping and data management – GIS operator
Arthur White	PhD	Dr Arthur White has had over 40 years of experience in consultancy, specialising in frog ecology and taxonomy, and has been involved with providing expert advice and developing Amphibian Management plans to industry for over 20 years.	Expert Amphibian Report supporting the initial SIS. Provide advice on additional SIS amphibian field survey methods, timing of survey, amphibian habitat on site and within locality. Provide input into the additional SIS proposed onsite conservation planning for amphibians.

4.7.21 EPBC referral for Mahony's Toadlet

Summary of issues raised

One submission noted that, due to its provisionally listed status under the *Threatened Species Conservation Act 1995* (NSW), that the Mahony's Toadlet should therefore require referral under the EPBC Act

Submission number(s)

203.

Response

Mahony's Toadlet is not listed under the EPBC Act. Given this, there is no legislative mechanism for the consideration of this species under this Act. Given this, Mahony's Toadlet is not a matter of national environmental significance (MNES) nor regulated by the EPBC Act. As a result, there is no basis upon which to refer the action to the Commonwealth for consideration of the impact on the species under the Act.

4.7.22 Impacts to Mahony's Toadlet habitat

Summary of issues raised

A number of submissions to the Additional SIS identified an overall concern that the Project would result in unacceptable impacts to the identified habitat for the Mahony's Toadlet and the Wallum Froglet. It was considered that retained habitat patches would not be considered suitable due to impacts associated with habitat fragmentation, reduction in patch size, alteration of natural flow of the wetland habitats present and increased exposure to predators.

A number of submissions also disputed the impacts to the identified habitat areas as a result of the Project would be unlikely to result in adverse effect on the lifecycle of the species such that a viable local population of the species would be placed at risk of extinction.

Submission number(s)

195, 197, 198, 202A, 203, 204, 205, 206, 207, 209, 210.

Response

Section 7.1 of the Additional SIS arrived at the conclusion that the Project would be unlikely to result in adverse effects on the lifecycle of the species based on:

- Transport for NSW has considered several facility layouts to reduce impacts to Mahony's Toadlet and Wallum Froglet habitat areas, however are limited by competing engineering, construction and operational requirements of the facility. Nevertheless, this options process considered the retention of habitat and the provision of connectivity of these habitats in the study area; with additional exclusion zones afforded in the study area (refer to Figure 2.2 of the Additional SIS).
- The layout of the exclusion zones attempts to maintain connectivity and movement for these species and prevent the isolation of retained exclusion zones. In addition, exclusion zones provide opportunities for further connectivity to potential habitats outside the study area, and encompass a range of size classes, from 0.6 hectares to 2.8 hectares in size.
- An Amphibian Conservation Management Plan (for Mahony's Toadlet and Wallum Froglet) would be developed, in consultation with an industry recognised amphibian expert, to provide effective management of exclusion areas occurring in the study area.
- By the time the scientific paper describing Mahony's Toadlet was published, the species habitat preference and range had expanded as a result of the Kangy Angy record. Habitat, such as which occurs at Kangy Angy is not described in the Clulow *et al.* (2016) paper, and it occurs outside of the area deemed by that paper to encompass its likely distribution. Although little is known about this relatively new frog species and its dependence on potential habitats in the locality and study area, there is potential for the species to persist in areas containing "potential" habitat between the Kangy Angy site and the Wyrrabalong National Park locations.

Regardless of the outcome of whether the Project would likely have an adverse effect on the life cycle of the Mahony's Toadlet such that a viable local population of the species is likely to be placed at risk of extinction, the Precautionary Principle has been considered and applied to the Project was considered likely to have a significant impact upon Mahony's Toadlet in the locality.

4.7.23 Suitability of identified frog exclusion zones

Summary of issues raised

Two submissions noted that, based on the mapping provided in the Additional SIS, the identified exclusion zones did not include habitat in the areas in which Mahony's Toadlet had been identified as being recorded. It was noted in the submissions that these exclusion zones would therefore be inadequate to maintain the local population in the long-term.

It was also stated in one submission that the figures included in the Additional SIS did not show both the exclusion zones and the proposed facility, access roads, construction zones or parking areas.

Submission number(s)

196, 203.

Response

Mahony's Toadlet was recorded in the study area in a buried situation. Due to the buried situation and the relatively dry nature of the record location, it is considered most likely that this was a site used by the frog for aestivation (a period of inactivity). Mahony's Toadlet requires water to breed, with such areas mapped in the Additional SIS as semi-permanent water habitat and ephemeral water habitat. It is likely that the individual recorded in the study area would utilise such areas (mapped in the study area) when preferred conditions for breeding are available.

Proposed frog exclusion zones would be conserved as part of a Conservation Management Plan (CMP) that would be prepared to specifically address retained habitat for Mahony's Toadlet and Wallum Froglet in the study area.

The CMP would also be developed to specify effective management and mitigation of potential impacts to Mahony's Toadlet and Wallum Froglet during the construction and operational phases of the Project.

Exclusion zones in the study area include Mahony's Toadlet breeding habitat (semi-permanent water), potential breeding habitat (ephemeral water) and drier perched habitat (30 percent of this species habitat occurring within the study is to be retained).

To reduce the level of potential fragmentation, specific exclusion zones are proposed in strategic locations within the study area. The intention of the exclusion zones is to maintain a level of connectivity and movement opportunities for Mahony's Toadlet and Wallum Froglet within and around the proposed infrastructure, as shown on Figure 5.1 of the Additional SIS.

All exclusion zones were clearly identified Figures 2.2, 4.1, 4.2, 4.4, 4.6, 5.1 & 5.2 of the Additional SIS. It is assumed that all intervening areas are subject to infrastructure development (either temporary for construction of the Project, or permanent for operation of the facility).

4.7.24 Suitability of relying of existing mapping for frog habitat

Summary of issues raised

One submission raised concern regarding the use of existing vegetation mapping to infer the amount of suitable habitat within the Project site. The submission argued that using vegetation and sediment mapping to infer that there is suitable habitat in other areas does not reliably translate to the species necessarily occurring in those areas. The submission noted that it was therefore not appropriate to conclude that the species was likely to occur in the broader region, based on presence of potentially suitable habitat.

Submission number(s)

210.

Response

It is not considered that the Additional SIS concludes that Mahony's Toadlet has a wider population than currently known. This is evident in the final paragraph of "Discussion of Local Populations" in Section 5.2.1.8, which notes, *'The results of these surveys indicate Mahony's Toadlet numbers within the study are limited. Due to a lack of records in the locality it is impossible to determine conclusively if Mahony's Toadlet exists outside the currently known location within the study area.'*

The use of vegetation and sediment mapping is the exact method that the Clulow *et al.* (2016) paper uses to describe their known range and distribution of Mahony's Toadlet. Therefore, in the process of determining the possible habitat footprint of a species beyond what is currently known, the range of possible preferred habitats must be stratified and separated from unlikely habitats in a similar manner. As the Clulow *et al.* (2016) paper clearly states that this species is confined to quaternary marine deposits, and a specific range of suitable habitat types, it is only logical that an approach which uses such sediment and vegetation mapping information as a starting point for identifying other "potential" areas for Mahony's Toadlet to occur would be employed.

The Additional SIS does not conclude that the species range has been extended into all areas of suitable habitat and sediment types or it might have concluded that it occurs in coastal areas of southern NSW. However, there is a relatively large area containing 'potential' habitat between the Kangy Angy site and Wyrrabalong National Park locations, where there is potential for the frog to persist. Given the difficulty of finding individuals at the Kangy Angy site, such potential occurrences may not be easily confirmed or eliminated from being possible.

4.7.25 Frog habitat assessment conclusions

Summary of issues raised

The submission questioned the overall conclusions made regarding the suitability of the habitat for the Mahony's Toadlet. In particular, the respondent questioned the conclusion which inferred onsite habitats are marginal compared to the habitats described at the type localities.

The respondent also questioned the conclusion that the absence of additional records of the species may also indicate the habitat within the subject is of lower significance to other potential more intact habitats arguing that this would indicate that the habitat would therefore be of greater importance for the species.

Submission number(s)

210.

Response

The Additional SIS concludes that the Kangy Angy site is unique for Mahony's Toadlet in regard to its spatial and topographical location, as well its underlying substrates. This conclusion was reached in comparison to the 'type localities' defined in the Clulow *et al.* (2016) description of the species and its habitat. Habitat such as occurs at Kangy Angy is not described in the Clulow *et al.* (2016) paper, in fact it occurs outside of the area deemed by that paper to encompass its likely distribution.

The Additional SIS also mentions possibilities for the status of the species beyond what the Clulow *et al.* (2016) paper encompasses (Section 5.2.1.7). It suggests that the new habitat information represented by the Kangy Angy site may indicate that the species' habitat footprint is likely to be larger than previously thought, but that such possibilities could only be verified by additional survey. The Additional SIS also offers a contrary position to be possible. The Additional SIS does not state that the Kangy Angy site 'is' marginal

habitat, but that habitat at Kangy Angy "may be inferred" as marginal as it occurs outside of the habitat parameters mapped as being important to the species as described by Clulow *et al.* (2016).

That the site and its unique habitats was not encompassed in descriptions of the species' requirements and range in the published paper suggests that authors of the Clulow *et al.* (2016) paper held a similar position at the time of its publication. Therefore, to suggest the possibility of a record being marginal, where a species' record occurs outside of its formally described habitat parameters and expert defined distribution range, which is limited to a single individual in an area that is much harder to locate than those at the type localities is not unreasonable, it merely acknowledges that the record occurs beyond the limits recently described in the Clulow *et al.* (2016) paper, and that may be of significance one way or another.

If the statement was presented in the Additional SIS supporting an argument of a reduced significance of the Kangy Angy records, then the ecological assessments undertaken for Mahony's Toadlet through a precautionary approach would not have concluded, in Section 7.1 of the Additional SIS, that the Project is likely to have a significant impact upon Mahony's Toadlet.

4.7.26 Proposed management measures for Mahony's Toadlet

Summary of issues raised

Three submissions objected to the nominated management measures proposed to mitigate potential impacts with particular respect to the Mahony's Toadlet, identifying that the nominated measures to use ecosystem credits were inadequate. Specifically, it was noted in one submission that ecosystem credits would not likely protect or offset the impact to the species and that species credits would be a more effective offset measure.

Submission number(s)

199, 203, 210.

Response

Due to the provisional listing of Mahony's Toadlet under the TSC Act, there is no provision for this species within the Biobanking Credit Calculator Version 4.1 for determining offsets. Considering this, a habitat surrogate offset, using ecosystem credits, was presented.

In the Additional SIS, it is proposed that offsets for Mahony's Toadlet are restricted to ecosystem credits directly associated with the areas of potential Mahony's Toadlet habitat in the locality and/or ecosystem credits for Plant Community Types (PCT) matching those described in the literature (Clulow *et al*., 2016) (NSW Scientific Committee, 2017) and the associated geomorphological characteristics (Clulow *et al*., 2016).

If updates to the Biobanking Credit Calculator include Mahony's Toadlet, prior to the final Biodiversity Offset Strategy being approved, then final offset requirement for this species would address this requirement

4.8 Noise and vibration

4.8.1 Peer review of noise and vibration assessment

As part of the submission from a group representing local residents and landowners, a peer review of the *Noise and Vibration Impact* Assessment (Appendix B of the REF) was undertaken by PKA Consulting. In order to fully address the items raised in this peer review, these comments have been addressed separately in Table 4.4 below.

It should be noted that the information presented by PKA Consulting in the submission has been replicated in Table 4.4 below. Transport for NSW responses to these comments has been included as an additional column.

Table 4.5 Summary of sub-issues from the topics three key issues in community submissions

Item	Technical Paper section	Technical Paper comment	PKA comment	Transport for NSW response
1	6.1.2	Currently at concept phase, some details and specifications of activities and equipment are not known yet therefore noise emissions cannot be fully quantified.	Once noise levels of those activities are known, if the noise levels will affect / increase the levels in the scenario, the calculations and modelling should be repeated.	Transport for NSW concurs with this approach. This was included as one of the mitigation measures included in the REF (refer to management and mitigation measures including B.1 and B.2).
2	6.1.2	Shunt vehicle noise not included. Vehicles are expected to be electric.	If shunt vehicle is mechanical (not electric), the vehicle noise should be included in the noise modelling.	Transport for NSW concurs with this remark and notes that any changes to plant or equipment would be reassessed in accordance with management and mitigation measure B.1 (refer to section 8.2.2 of this Combined Submissions Report).
3	6.1.2 (and Table 6.1)	Door tests, PA system noise not included in the assessment.	Noise from door tests and PA systems once obtained, to be included in modelling scenarios and assessments.	Transport for NSW concurs with this remark and when further details are known of the noise from these sources, they would be reassessed in accordance with management and mitigation measure B.2 (refer to section 8.2.2 of this Combined Submissions Report).
4	6.1.2 (and Table 6.1)	Wheel squeal notes.	Wheel squeal has the potential to be high frequency tonal noise at 70km stretch, therefore the noise including modifying factors of INP should be used in the assessment.	The potential for wheel squeal is addressed in Section 6.1.2 of the *Noise and Vibration Impact Assessment*. However as this phenomenon is not typically associated with normal operations, it is has not been included in the predictions. If wheel squeal occurred during operations, mitigation measures would be investigated.
5	6.2 and 8.4 (construction noise)	Receivers were modelled to be at 1.5m above ground level.	Some receivers are two storey dwellings, for which the bedroom will likely be 4.5m above ground. This will likely have a large effect on noise level increases which will require an updated model, results and recommendations.	In the case of the closest receivers on large properties, receivers were placed 30 metres from the dwelling in accordance with the Industrial Noise Policy (INP). Indicative calculations show that the difference in shielding for receiver heights 1.8 metres to 4.5 metres when 30 metres from the house is expected to be 2–3dBA. The receivers in question are on Ourimbah Road are already identified for potential at-property acoustic treatment which would be considered following further detailed assessment.
6	6.2 – Noise modelling methodology	Calibration of noise model is not mentioned in the report.	The predications were not calibrated to known noise levels from example existing facilities to see if assumptions were correct.	The sound power levels used for the assessment were sourced from similar facility assessments of similar activities and equipment, and Transport for NSW asset standards.

Item	Technical Paper section	Technical Paper comment	PKA comment	Transport for NSW response
7	6.2	Soft ground assumption.	Allowances must be made more specific for each calculation scenario rather than assumptions. Calculated noise will be higher where this assumption is not correct.	The model assumed majority hard ground (Factor 0.25) inside in the facility and rail corridor with generally soft ground (Factor 0.75) outside of the facility.
8	6.2	Train speed assumptions.	Require verification during detailed design and acoustic requirements adjusted accordingly.	Transport for NSW concurs with this approach. This was included as one of the mitigation measures included in the REF (refer to management and mitigation measures including B.1 and B.2).
9	6.2	Based on a review of potential noise sources, adjustments for modifying factors of INP are not applicable.	The modifying factor correction was applied to some sources such as the substation but not all sources. The horns, wheel squeal, train cleaning etc. may require correction which will increase noise impacts.	Based on other studies for similar rail facilities, these factors are not usually applied. In this case, if they were applied to the horns they are not considered to add significantly to the overall sound power level of the scenario. In addition, the following points are made: → Wheel squeal was discussed in Section 6.1.2 of the *Noise and Vibration Impact Assessment* and is not considered to be applicable. If wheel squeal occurred during operations, mitigation measures would be investigated. → As stated in Section 6.1.2 of the *Noise and Vibration Impact Assessment*, some of the potential noise sources including train system preparation testing were not able to be quantified during this concept stage of the Project. An assumption was made that external train cleaning by pressure washer would only take place during the day. → Where further details of these other noise sources are known, the eligibility for the application of modifying factors would be included as part of any further assessment. → In terms of the sleep disturbance assessment, Section 4.3 of the INP requires a modifying factor to be added to the 15 minute level and not a maximum noise level, so modifying factors would not apply to the sleep disturbance assessment.
10	6.4 (and Appendix C)	Predicted noise levels for all scenarios are presented in Appendix C.	Noise levels for Scenario 8 are not shown in Table 13.1 of Appendix C.	Scenario 8 should appear in Table 13.1 in Appendix C. This has been addressed in section 7.4.3 of this Combined Submissions Report.
11	6.5.1	External cleaning takes place during the day only.	External cleaning is part of maintenance and also takes place in the evening and night (between 6.30pm and 1.30am). What will be the impact of this?	As part of the assessment it was assumed that external cleaning with a pressure washer would not occur during the evening and night. This was a recommendation stated in Section 6.6.8 of the *Noise and Vibration Impact Assessment* and would be addressed/ validated as part of the operational noise management plan.

Item	Technical Paper section	Technical Paper comment	PKA comment	Transport for NSW response
12	6.51 and 6.6.10	South of Enterprise Drive - the noise source from trains entering and exiting the main line will be similar in nature to the existing train noise therefore considered unlikely to cause additional impact.	Existing rail movements cause a noise impact. The additional noise although similar will increase the L_{eq} (equivalent level) and will result in a higher noise impact.	At the time the noise assessment was prepared, there was expected to be one or two additional rail movements per day associated with the facility. This number is small compared with the overall number of rail movements (approximately one to two passenger train movements per half an hour) and is unlikely to increase L_{eq} 15hr and 9hr noise levels. Furthermore, the controlling INP criterion for this Project is assessed over a 15 minute period and the number of trains per 15 minute period is not expected to increase.
13	6.5.2 and 6.6.10	South of Enterprise Drive - the noise source from trains entering and exiting the main line will be similar in nature to the existing train noise therefore considered unlikely to cause additional impact.	Existing rail movements cause a noise impact. The additional noise although similar, will increase the number of L_1 exceedances and will have noticeable effects on health or wellbeing.	At the time the noise assessment was prepared, there was expected to be one or two additional rail movements associated with the facility. Therefore the noise from trains on the lines entering the facility would be similar in nature and there was assumed to be one or two more a day. An assessment of the potential impacts arising from trains travelling on the main line and crossing new turnouts is being prepared to identify any additional impacts associated with the main line as a result of community feedback. A summary of the additional assessment can be found in section 7.3 of this Combined Submissions Report.
14	6.5.2	Noise mitigation recommended above 65db(A). Note: 65dB(A) refers to an $L_{A1,1min}$ for the assessment of sleep disturbance.	RNP is in the range of 60–65db(A) as the goal is not well defined. Measures should be considered from 60db(A) rather than 65db(A).	The limit was set at 65dBA as this represented the limit at which sleep disturbance is not unlikely. The guidance from the RNP suggests that below 60 to 65dBA sleep disturbance is not likely. Roads and Maritime Services use a noise level of 65dBA to identify a maximum noise level with the potential to cause sleep disturbance. As the guidance from the Road Noise Policy was developed based on road traffic noise, the use of 65dBA as a screening criteria is considered appropriate in this case.
15	6.6.3	Rw26 requirements from the shed.	All doors and windows to be acoustically rated as well. Is there internal absorption treatment proposed to reduce reverberation time and therefore noise build up?	The *Noise and Vibration Impact Assessment* specifies the maintenance building would achieve the sound insulation rating, this would include windows, doors and any other apertures for ventilation. Specific construction materials for the maintenance building would be addressed as part of detailed design and could include reverberation control, where required.
16	6.6.3	Alcuobond panelling	This will offer poor sound insulation against low frequency noise sources.	Specific materials would be developed and specified as part of the detailed design process.

Item	Technical Paper section	Technical Paper comment	PKA comment	Transport for NSW response
17	6.6.3	Roller door	Unlikely to be able to achieve Rw26 from a fast acting roller door.	Specific materials and operational processes would be developed as part of the detailed design process.
18	6.6.4	Testing of horns.	The recommended strategies should be developed now as they are of critical importance to the minimisation of noise impacts to the residential areas.	The potential impacts from the use of horns are to be considered in the operational noise management plan in consideration of the potential environmental noise impacts. Management and mitigation measure AC.1 identifies that the Operational Noise and Vibration Review would be developed to meet the environmental noise objectives for the Project and would include consideration of alternative methodologies for horns, warning signals and horn testing at the facility. This would include the recommendation that horns are not to be used at the maintenance facility and that a ground based warning system is used instead of yard horns.
19	6.6.6	5m acoustic barriers are considered next to the standing tracks and at full height of the train wash to block the line of sight from source to receiver.	Are 5m barriers high enough for two storey receivers? A 5m barrier will likely only block line of sight which typically gives 5db(A) attenuation whilst some exceedances are more than 5db(A). When barriers are used in the model, is a 0.75 ground absorption coefficient still taken into account?	The *Noise and Vibration Impact Assessment* identified options for noise barriers and other mitigation to be considered as part of detailed design. The barrier was limited at a height of five metres with the aim of minimising potential visual amenity impacts. However it is noted that all barrier heights in conjunction with other mitigation measures such as property treatment should be considered as part of further detailed design. As the facility is in concept design stage, the implementation of any mitigation measure is subject to further consideration by Transport for NSW as identified in management and mitigation measure B.5. The ground absorption in the facility and rail corridor was modelled as hard ground as 0.25.
20	6.6.8	12 cubic metre mass of barrier. Note: this comment relates to the surface density of the proposed barrier material and is related to the sound transmission through the barrier.	Mass is likely to be insufficient to control component of noise *through* the barrier, especially with noise sources close to ground level.	The minimum barrier requirement of 12 kilograms per square metre represents the typical standard adopted for transport infrastructure noise mitigation in Australia. Specific barrier materials would be developed during detailed design as described in management and mitigation measure B.5.

Item	Technical Paper section	Technical Paper comment	PKA comment	Transport for NSW response
21	Figure 6.1	Barrier layout	More details and locations for barriers should be given. The barrier described to the east of the maintenance shed is not shown.	The *Noise and Vibration Impact Assessment* presented options for noise barriers and other mitigation to be considered as part of the detailed design process. As the facility is in concept design stage, the implementation of any mitigation measures is subject to further consideration by Transport for NSW as stated in Section 6.6 of the *Noise and Vibration Impact Assessment*. These measures would be considered further during detailed design as outlined in management and mitigation measure B.5.
22	6.2	Calibration of the noise model is not mentioned in the report.	The predictions were not calibrated to known noise levels from example existing facilities to see if assumptions were correct.	Refer to response for Item 6 above (repeated item).
23	Section 10.1 and Table 10.3	Out of hours work recommendations	For outside recommended standard hours, details shown in Table 5.3 (how to apply) should also be considered.	The application of the additional mitigation measures is provided in Transport for NSW *Construction Noise Strategy*.
24	All sections	Nowhere in the report is the accumulated noise of different scenarios mentioned or considered.	The accumulated noise from simultaneous scenarios should be considered. This may increase the noise exceedances or impacts.	The operational situations have been assembled such that simultaneous operations have been considered (for example trains preparing to leave and trains moving at the same time, or two trains arriving and standing). As the controlling criteria are assessed over a 15 minute period, the *Noise and Vibration Impact Assessment* intends to conservatively address the potential impact over a 15 minute period.

4.8.2 Adequacy of assessment

Summary of issues raised

Submissions noted that they considered the noise and vibration assessment provided in the REF and associated *Noise and Vibration Impact* Assessment (Appendix B of the REF) was inadequate and that it did not address all potential impacts (including cumulative) or were concerned around the number of assumptions.

Additionally, one submission noted that further assessment should be undertaken to determine if the Project can comply with *Industrial Noise Policy* (INP) criteria prior to approval, rather than during detailed design.

Submission number(s)

38, 82, 95, 110, 117, 121, 129, 150, 162, 164, 183.

Response

The *Noise and Vibration Impact Assessment* (Appendix B of the REF) was developed to address, highlight and assess potential noise issues associated with the Project. At the time of the preparation of the report, all of the details of the noise sources, activities and operations were not known. However in order to address this, gaps in the data were highlighted in the report and have been flagged for further assessment when details are known.

The INP is not intended to present noise criteria that are absolute noise limits; rather it is designed to provide a method of establishing trigger levels above which mitigation should be considered and a range of guidance to deal with situations where the criteria are exceeded. The *Noise and Vibration Impact Assessment* provided a range of recommendations where additional assessment should be carried out and the outcomes of this assessment to be addressed accordingly. These were included as management and mitigation measures B.1 to B.6 in the REF (refer to section 8.2.1 of this Combined Submissions Report).

In addition to the management and mitigation measures identified in the REF, the predicted noise levels and determination of required noise mitigation would be reviewed and verified as part of an Operational Noise and Vibration Review in the next stage of the Project (measure AC.1). This review would determine the final design of management and mitigation measures.

4.8.3 Construction noise impacts

Summary of issues raised

Submissions expressed concern regarding the potential noise impacts that would be generated by the construction of the Project. Specific concerns identified included the potential for excessive noise from heavy trucks and equipment during construction and disturbances to residents, the Follyfoot Farm Child Care Learning Centre and farm animals on surrounding properties.

Questions regarding the extent of expected construction hours (i.e. standard construction hours or out-of-hours work requirements) were also raised in some submissions.

Submission number(s)

14, 17, 27, 30, 32, 46, 63, 76, 77, 80, 95, 130, 131, 134, 138, 148, 150, 151, 154, 162, 165, 170, 172, 175, 177, 179, 182, 183, 186, 187, 202B.

Response

It is acknowledged that the *Noise and Vibration Impact Assessment* indicated that construction noise levels above the noise management levels would be experienced by a number of the surrounding receivers including the Follyfoot Farm Child Care Learning Centre and the Central Coast Steiner School. In order to minimise these potential impacts, a series of noise management measures, including the preparation of the construction noise and vibration management plan (CNVMP) were recommended for both the construction and operational phases of the Project (refer to management and mitigation measures B.1 to B.6, L1 to L.5 and AC.1 to AC.3 in section 8.2 of this Combined Submissions Report).

With respect to the extent of construction hours, these were described in Section 4.4.3 of the REF. As some of the works are required in the rail corridor, some work may be required outside of standard hours during rail shut down periods. The potential noise and vibration impacts for out of hours works was also addressed as part of the *Noise and Vibration Impact Assessment* (refer to Section 8.4 of Appendix B of the REF).

The Construction Noise and Vibration Management Plan would include details to instruct the construction contractors in methods and protocols to reduce and manage construction noise impacts from their activities. This would include trucks on public roads accessing the site and any works carried out outside of standard hours during the night. Construction works outside of standard hours would also be required to be approved by Transport for NSW in accordance with the relevant protocols or by the NSW EPA (should an Environmental Protection Licence be required).

4.8.4 Construction vibration impacts

Summary of issues raised

Submissions expressed concern regarding the potential vibration impacts that would be generated by the construction of the Project and the potential impacts to property.

Submission number(s)

27, 148, 186.

Response

Section 7.2.4 of the REF identified the potential vibration impact associated with the construction of the Project. This discussion noted that the vibration levels and associated safe working distances indicate that cosmetic damage is not considered be a substantial risk due to construction at the nearest sensitive receivers. Vibration may be perceptible at the nearest houses; however it is unlikely to be a risk for the majority of receivers.

Nevertheless, prior to the commencement of construction, property conditions surveys would be undertaken at properties designated by the relevant risk assessments.

4.8.5 Operational noise impacts – General

Summary of issues raised

Submissions raised concerns regarding the general noise impacts which are predicted to result from the operation of the maintenance facility. These included noise impacts associated with the 24-hour site operation, including train washing, maintenance to the wheels (wheel lathe) and other aspects of the facility which would be most prevalent during night time periods. A number of the submissions noted concerns that this would result in impacts to sleep and general amenity for the surrounding area.

Some submissions also raised concerns regarding the noise impacts generated by additional traffic during shift changes during night or early morning periods. Specific concerns included noise increase from increases in road traffic as well as other elements such as compression braking associated with trucks approaching the new intersection along Enterprise Drive at this times.

Submission number(s)

1, 3, 4, 6, 12, 13, 15, 16, 17, 19, 22, 25, 26, 27, 30, 31, 32, 33, 35, 36, 38, 45, 47, 51, 53, 54, 55, 58, 60, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72, 74, 76, 77, 79, 80, 81, 85, 86, 87, 90, 92, 93, 94, 95, 96, 97, 99, 101, 102, 103, 104, 108, 110, 112, 116, 117, 118, 119, 120, 121, 122, 123, 125, 127, 130, 131, 134, 138, 142, 146, 148, 149, 151, 153, 154, 155, 164, 165, 167, 170, 172, 177, 179, 182, 186, 187, 188, 191, 194, 198, 202B.

Response

The operational noise and vibration impacts of the Project were assessed in the REF in accordance with the EPA's *Industrial Noise Policy* ((EPA, 2000).

The *Noise and Vibration Impact Assessment* considered a range of operational scenarios which were developed in consultation with Transport for NSW. The assessment of these scenarios presented the range of predicted impacts associated with the operation of the maintenance facility. The assessment indicated that even after the implementation of mitigation measures, residual impacts may be experienced at some of the closest receivers to the facility. These receivers were recommended for consideration of 'at-property treatment' (refer to management and mitigation measure B.6).

In addition to the management and mitigation measures identified in the REF, the predicted noise levels and determination of required noise mitigation would be reviewed and verified as part of an Operational Noise and Vibration Review in the next stage of the Project. This review would determine the final design of management and mitigation measures, and identify any residual exceedances of the operational goals.

With respect to the concerns raised regarding potential road noise impacts, the Project also assessed the potential for noise impacts from operational road traffic associated with heavy vehicles movements and shift changeovers in Chapter 11 of the *Noise and Vibration Impact Assessment*. This assessment identified that off-site road traffic noise impacts would comply with the NSW *Road Noise Policy* (DECCW, 2011) guideline limits and as such specific noise mitigation was not considered to be required. However, the operational noise management plan for the facility would include provisions for managing heavy vehicles and shift change over times to further minimise potential noise impacts.

4.8.6 Operational noise impacts – Horn testing

Summary of issues raised

Submissions raised concern regarding the impacts of horn testing as part of the operation of the maintenance facility. Additionally, a number of the submissions questioned how the impacts of this noise would be mitigated, and whether testing would be undertaken throughout the 24 hour operational period of the facility (i.e. testing during night time or early morning periods).

Submission number(s)

24, 38, 47, 51, 54, 55, 68, 69, 71, 72, 77, 81, 85, 86, 90, 91, 93, 94, 97, 99, 100, 103, 118, 125, 130, 131, 146, 153, 155, 164, 177, 179, 183, 186, 187, 191, 202B.

Response

As outlined in Section 7.2.6 of the REF, alternative methodologies for horn testing would be considered further during the development of the Operational Noise and Vibration Review (refer to management and mitigation measure AC.1 in the REF). This consideration would include the environmental noise objectives for the Project and the safety of any staff within the facility. However, the use of horns within the Project site would not be restricted where there is an immediate potential hazard or safety risk to maintenance facility employees.

Further community consultation would be undertaken as part of the Operational Noise and Vibration Review assessment.

Once the maintenance facility has commenced operation, noise monitoring would be carried out to confirm compliance with the applicable noise goals. This would include identification of 'average' noise level (L_{eq}) and maximum noise level (L_{max}) impacts including day, evening and night time periods.

4.8.7 Operational curfew

Summary of issues raised

Submissions noted that the facility should have a curfew, or restricted hours for certain activities such as the use of horns, shunting and wheel lathing, to minimise noise impacts during operation.

Submission number(s)

17, 45, 47, 77, 87, 90, 99, 100, 101, 117, 202B.

Response

The facility would operate 24 hours 7 days a week. Operational processes may include specifying times for certain activities and this would be considered further in the Operational Noise and Vibration Review. Further community consultation would be undertaken as part of the Operational Noise and Vibration Review.

4.8.8 Operational vibration impacts

Summary of issues raised

Submissions raised concern about the potential increase in vibration on their residence and surrounding properties (including schools) and resulting health impacts from lack of sleep based on the increase in train movements, increased heavy vehicle traffic and increased vehicle traffic during operation of the maintenance facility.

Another submission enquired how any structural or aesthetic repairs would be addressed should they be required due to vibration impacts associated with the Project.

Submission number(s)

26, 27, 31, 33, 54, 67, 68, 71, 72, 77, 81, 101, 130, 142, 148, 153, 155, 179, 186, 187, 191, 194, 202B.

Response

Operational vibration impacts of the Project were addressed in Section 7.2.5 of the REF. This section noted that it is expected that the rail vehicles would comply with applicable vibration standards. As such, substantial operational vibration impacts were not expected. Similarly, it is considered that heavy vehicle movements would not cause perceptible vibration at the nearest sensitive receivers.

With respect to potential concerns regarding the need to repair damaged caused by operation of the Project, this would be addressed in the Operational Noise and Vibration Review for the Project. This would include taking baseline surveys of properties where potential impacts may occur. Where impacts are identified as a result of the operation of the maintenance facility, these would be repaired by Transport for NSW at no cost to the property owner.

4.8.9 Impact from track cross-overs

Summary of issues raised

One submission raised concern regarding the noise impacts from the proposed track cross-overs.

Submission number(s)

118.

Response

Further assessment regarding the potential noise impacts associated with the track cross-overs from the Main North Line into the maintenance facility has been undertaken following the display of the REF. A summary of this assessment is provided in section 7.3 of this Combined Submissions Report.

4.8.10 Management and mitigation measures

Summary of issues raised

Submissions noted uncertainty about the details regarding proposed management and mitigation measures (such as the location of the proposed noise walls) and that the measures proposed were not clearly defined. Some of the submissions also noted that many acoustic predictions and noise mitigation options were proposed to be delayed for future assessment (i.e. to be further considered during detailed design).

A series of requests for specific mitigation treatments were also made in some submissions including:

- Provision of double glazing on all windows
- Provision of sound insulation in walls and ceilings of surrounding residences
- No use of any type of loud speaker system inside or outside the facility during operation
- Identification of additional noise walls or mounds
- Provision of a suitable level of sound proofing to the interior of the facility
- Construction trucks fitted with noise reducing backing signals.

Questions regarding the ongoing monitoring of noise levels during the operation of the maintenance facility and enforcement of noise goals were also raised in three submissions.

Submission number(s)

17, 22, 25, 31, 45, 47, 55, 57, 58, 67, 69, 71, 72, 77, 82, 85, 86, 95, 99, 101, 108, 121, 125, 129, 130, 131, 153, 155, 162, 175, 177, 179, 183, 185, 186, 191, 194, 202B.

Response

The operational noise assessment identified a range of mitigation options (refer to management and mitigation measures B.1 to B.6 in the REF). These options are intended for further consideration by Transport for NSW during detailed design when further reasonable and feasible measures are considered for implementation. The options presented included:

- Architectural treatment for the facilities buildings
- Noise barriers
- Restrictions on activities and noise sources
- Treatment and selection of noise sources
- At-property treatments.

These mitigation measures were identified to address potential residual noise and vibration impacts associated with the Project. In addition, the maintenance facility would be subject to an Operational Noise and Vibration Review. The plan would include processes, protocols and measures to control activities and sources that generate noise. Operational noise monitoring would be carried out to confirm compliance with applicable noise goals.

4.9 Landscape and visual

4.9.1 Visual impacts during operation

Summary of issues raised

Submissions expressed concern about the visual impacts of the maintenance facility including the overall size and industrial appearance of the facility. Concern was also raised about the new vehicular access bridge and the removal of the existing visual buffer provided by the tree lines adjacent to the roads surrounding the facility.

Submission number(s)

12, 17, 25, 45, 85, 86, 101, 108, 110, 113, 118, 122, 123, 125, 153, 155, 191.

Response

As identified in Section 7.3.4 of the REF, the *Landscape and Visual Impact Assessment* (Appendix C of the REF) concluded that moderate or high visual impacts associated with the Project would be expected to be limited to those properties which are in close proximity to the Project site, including two dwellings along Ourimbah Road and Orchard Road. These dwellings were identified to likely have filtered views of the most prominent elements of the Project including the main facility building, light poles, fences and potentially, moving trains within the Project site.

In addition, the assessment noted that, as the Project site is proposed to be surrounded by dense and tall tree planting (including a large amount of retained vegetation along the boundaries of the Project site, this would assist in screening or blocking many views of the Project from surrounding roads and dwellings. Illustrations of where the vegetation retention would provide substantial screening of the Project site were shown in artist's impressions displayed at two community information sessions held in June 2016.

Where possible, Transport for NSW would seek to retain and enhance as much of the existing vegetation within the site to provide a visual buffer between the Project and adjoining properties to limit visual impacts. While the assessment noted that some dwellings may have some views of the facility, with the implementation of a sufficient buffer of screen planting, the overall impact would be reduced.

In addition, during the detailed design of the Project, additional opportunities to increase the visual screening for adjacent properties would be considered, including the potential for additional planted earth mounds within the Project site, in order to provide both a visual and noise buffer to adjacent residences.

4.9.2 Lighting impacts and light spill

Summary of issues raised

A number of submissions identified concern regarding the lighting and potential light spill impacts from the operational facility including potential impacts on the existing night time environment and surrounding residential properties. Specific reference to the lighting of the access bridge was also raised in some submissions.

Submission number(s)

16, 17, 25, 26, 27, 31, 32, 37, 45, 51, 54, 62, 66, 68, 74, 77, 79, 99, 103, 110, 112, 118, 120, 123, 125, 130, 142, 143, 146, 148, 172, 182, 186, 187, 188, 202B.

Response

As described in Section 4.2.6 of the REF, lighting of the indoor and outdoor areas of the facility would be required as part of the facility for general maintenance activities, navigation and security purposes. Due to the 24-hour operation of the facility, it is acknowledged that lighting would be required to be on for all or most of the night and may result in some increased lighting impacts to surrounding areas. As a result, the REF noted that any lighting within the site would be required to be installed in a manner which minimises light spill to areas beyond the maintenance facility site boundary (management and mitigation measure M.3 in the REF).

Following the display of the REF and in response to community concerns, a *Lighting Impact Assessment* (WSP | Parsons Brinckerhoff, 2016) was undertaken to further identify and assess the potential impacts of the maintenance facility with respect to lighting and light spill impacts. This assessment has identified an additional series of management and mitigation measures including the following:

- Ensure the lighting design is in accordance with relevant Australian Standards which provides recommended maximum values of light technical parameters for the control of obtrusive light. Ensure light spill and light pollution externally are avoided in accordance with this Standard.
- Appoint a qualified lighting designer who demonstrates a detailed understanding of lighting design and experience in the application of light within the interior architectural and exterior landscape environment.
- Restrict lighting to the minimum required for operations, safety and security requirements.
- Use directional lighting techniques to direct light away from sensitive viewpoints.
- Indirect glare from reflective surfaces must be avoided.
- Lower luminaire mounting heights (for example ground level or low level garden path-type lighting) should be provided along pedestrian paths within the car park (where possible and sufficient to meet required guidelines and standards).
- Lighting controls should be separated by tasks and task zones to allow for flexible control of light levels.
- Shielding of the perimeter should be provided through the use of planting or structural elements to prevent direct views of lit surfaces wherever practical.

The *Lighting Impact Assessment* is attached to this Combined Submissions Report as Appendix E and further details regarding the assessment and additional management and mitigation measures is summarised in section 7.2 of this Combined Submissions Report.

4.9.3 Privacy

Summary of issues raised

Two submissions raised concern about reductions to privacy as a result of the Project.

Submission number(s)

80, 151.

Response

Maintaining privacy of residences adjacent to the Project is an important consideration for the Project's urban design. In order to maximise the existing privacy for surrounding properties from the maintenance facility, it is proposed that, wherever possible, existing vegetation along the boundary of the site be maintained in order to provide a visual screen between the maintenance facility and adjacent properties. Where vegetation is required to be removed for construction, it is proposed that, where possible, this vegetation is reinstated following completion of construction. These requirements are described in greater detail in management and mitigation measure M.1 (refer to section 8.2.2 of this Combined Submissions Report).

In addition, as described in management and mitigation measure M.1, as part of the consideration of the detailed design of the maintenance facility, consideration of additional measures to reduce potential visual privacy impacts, such as overlooking of adjacent properties from the new access road, would be undertaken.

4.9.4 Accuracy of photomontage

Summary of issues raised

One submission stated that the artist impressions gave a misleading view as there were no trains or overhead lines shown.

Submission number(s)

118.

Response

The artist's impressions provided at the community information display sessions were indicative only and were labelled as being based on the concept design and subject to change. These impressions were intended to provide an indication of the key features of the Project and provide a comparison between the existing environment and the potential outcome as a result of the Project. The artist's impressions were developed using existing photographs and architectural models of the proposed facility and are considered to be accurate and representative of the proposed development.

For images where trains and overhead lines were not shown, this was generally a factor of the views that were provided whereby the viewpoints would be screened by vegetation (either vegetation proposed to be retained or reinstated as part of the Project). Where relevant, trains and overhead wires were shown in the artists impressions displayed (refer to one of the artists impressions presented in Figure 4.2 below).

Figure 4.2 Artist impression highlighting the overall maintenance facility, including trains entering the main maintenance building and powerlines (foreground of the figure)

4.9.5 Management and mitigation measures

Summary of issues raised

Concerns were raised about the management and mitigation measures proposed for nearby homes to reduce visual impacts. A number of submissions noted they did not want to be able to see the facility or overpass from their houses. Some submissions requested that Transport for NSW increase the proposed noise walls in order to assist with mitigating the visual impacts of the Project. Other requests raised in submissions included the retention of vegetation or landscaping with appropriate native plants early in the Project timeline.

Submission number(s)

17, 31, 45, 69, 71, 72, 77, 99, 101, 124, 127, 174, 175, 177, 179, 194, 202B.

Response

Minimising the visual impact of the Project from surrounding residences is an important consideration for the Project's urban design.

As described in Section 7.3.5 of the REF, a range of management and mitigation measures have been proposed to assist with minimising the potential impacts of the Project within the context of the existing environment (refer to section 8.2.2 of this Combined Submissions Report for all proposed mitigation measures).

One of the key management measures which have been proposed for the Project is, wherever possible, maintaining existing vegetation along the boundary of the site in order to provide a visual screen between the maintenance facility and adjacent properties. Where vegetation is required to be removed for construction, it is proposed that, wherever possible, this vegetation would be reinstated following completion of construction. These requirements are described in greater detail in management and mitigation measure M.1 (refer to section 8.2.2 of this Combined Submissions Report).

Where it is proposed to provide additional landscaping, this would be undertaken as early within the construction program as possible in order to assist with ongoing screening of construction works (and subsequent operation of the facility).

Management and mitigation measure M.4 (refer to section 8.2.2 of this Combined Submissions Report) states that tree planting outside the works boundary would also be considered to assist in visually screening the facility. Offset planting for the removed vegetation would be required and would be undertaken with specialist ecological advice. Selection of sympathetic colours, the final materials and finishes for the maintenance facility would be determined during detailed design in accordance with existing management and mitigation measure M.2 (refer to section 8.2.2 of this Combined Submissions Report).

4.10 Traffic, transport and access

4.10.1 Assessment methodology

Summary of issues raised

The adequacy of the assessment methodology for the *Traffic and Transport Impact Assessment* (Appendix F of the REF) was raised in some submissions. Specific issues include:

- A number of local roads which will be impacted by the construction and operation of this facility were omitted from the traffic and transport report, including Station Road East and Manns Road
- No traffic modelling of the Catamaran Road and Enterprise Drive intersection was provided.

Submission number(s)

40, 82, 121, 129, 162, 165.

Response

The *Traffic and transport Impact Assessment* (Appendix F of the REF) was developed to address; highlight and assess potential traffic and transport impacts associated with the Project. As part of the assessment, the key roads with the potential to be impacted by the construction and operation of the Project were considered. As all construction and operational employee traffic were anticipated to access the Project site via Enterprise Drive and the local roads to the west of this road, increases in traffic impact to local roads to the east of Enterprise Drive were considered to be minimal.

It was not considered that traffic modelling of the Catamaran Road and Enterprise Drive intersection was required as this intersection was not expected to result in any changes to existing traffic volumes as a result of the Project (other than some additional through traffic). During construction and operation of the Project, this intersection was expected to operate at the same level of service as existing operations. Therefore, it was considered that additional modelling of this intersection is not required.

4.10.2 Construction traffic impacts

Summary of issues raised

Submissions expressed concern that there would be increased traffic through the area during the construction phase. Traffic related concerns included increased delays and congestion, pollution from vehicles and increases in traffic related noise. There was specific concern about delays on Enterprise Drive and increased heavy vehicles in a semi-rural area.

It was also noted that the REF failed to take into account the impact on associated roads like the M1 from the increased truck movements during construction.

Submission number(s)

21, 27, 30, 40, 47, 53, 54, 69, 71, 72, 77, 82, 85, 86, 87, 90, 99, 100, 112, 117, 118, 121, 123, 126, 129, 130, 134, 139, 148, 162, 165, 170, 177, 179, 182, 183, 188, 191, 202B.

Response

As part of the REF, a range of management and mitigation measures were identified to be implemented during construction in order to minimise potential impacts. Specifically, these included development of a construction traffic management plan as part of the pre-construction planning for the Project. This plan would be developed to address construction traffic and transport management, maintenance of local access, and would also be used to develop site-specific traffic management measures once the construction methods and haulage routes are finalised. These are outlined as management and mitigation measures P.1 to P14 in section 8.2.2 of this Combined Submissions Report.

Impacts relating to potential noise and pollution impacts associated with construction traffic are addressed in section 4.8.3 and section 4.16.2 of this Combined Submissions Report respectively. It is expected that the construction of the Project would result in a negligible impact to the existing capacity of the M1 motorway.

4.10.3 Impacts to local access and local roads

Summary of issues raised

Submissions expressed concern about potential access restrictions for residents and commuters during the construction of the facility. Specific reference was made to the potential impacts to Station Road East and Manns Road which noted would result in increased traffic due to the proposed changes to the existing right turn at Old Chittaway Road.

The corresponding impacts on the increase in traffic past the Central Coast Steiner School and through the industrial area was also noted as part of this concern.

Submission number(s)

7, 9, 82, 104, 121, 129, 131, 134, 151, 153, 155, 162, 165, 167, 175, 177, 179, 186, 187, 191.

Response

The design of the Enterprise Drive and Old Chittaway Road intersection arrangement has been reconsidered as part of the ongoing design of the Project following display of the REF. A description of this refinement is provided in section 4.2.3 and section 6.8 of this Combined Submissions Report. This design refinement would allow for all traffic movements at this location to continue without the need to restrict any turning movements. As such, it is not expected that the traffic along Manns Road and Station Road East would substantially increase as a result of the Project.

4.10.4 Operational traffic impacts

Summary of issues raised

A number of submissions objected to the Project based on the resulting increased traffic impacts. Specific issues raised include:

- Generation of additional traffic (in particular along Enterprise Drive) by maintenance facility employees both during peak and non-peak periods which would worsen existing traffic conditions in the area
- Increase in heavy vehicles which were expected to constantly service the maintenance facility
- A request that all employees and visitors access the maintenance facility do so via the new access road bridge, rather than using existing local roads (Turpentine Road, Ourimbah Road and Orchard Road)
- Increased noise impact associated with the increase in vehicle traffic travelling to and from the maintenance facility.

Submission number(s)

3, 4, 7, 12, 16, 25, 27, 32, 35, 36, 37, 40, 45, 47, 53, 54, 57, 58, 62, 64, 67, 69, 71, 72, 74, 76, 77, 80, 81, 87, 90, 91, 93, 94, 95, 99, 100, 101, 108, 110, 112, 117, 120, 123, 126, 127, 130, 131, 148, 154, 165, 170, 177, 179, 182, 188, 194, 202B.

Response

An assessment of the potential operational traffic movements associated with the maintenance facility was presented in Section 7.6.3 of the REF. This assessment noted that the key traffic impacts associated with the facility would be the arrival and departure of approximately 50 to 60 light vehicles at the shift changeover points. Additionally, the movements of shift workers to and from site was not anticipated to coincide with standard peak traffic times as shift changeover points would fall outside these hours. Therefore, the impact of these movements is considered to be minimal.

Light vehicle traffic due to office-based staff would account for approximately 20 additional vehicles per day with their movements likely to coincide with peak traffic periods however given the small number of vehicles anticipated impacts are expected to be minimal.

The REF noted that up to approximately 10 heavy vehicles would access the facility per day for maintenance, service and delivery which is considered to be a minimal impact.

It is expected that all employees and visitors would access the maintenance facility via the new access road as this would represent the shortest (and therefore most efficient) access route to the facility.

Potential noise impacts associated with the operation of the facility, is addressed previously in section 4.8.5 of this Combined Submissions Report.

4.10.5 Speed limits

Summary of issues raised

Six submissions raised concern regarding the potential speed limit impacts along Enterprise Drive. In particular, the submissions noted that due to the increased traffic, expected increase in heavy vehicles and change to the intersection arrangement at Enterprise Drive and Chittaway Road, that the speed limit along Enterprise Drive should be reduced.

Submission number(s)

87, 95, 99, 100, 118, 123.

Response

Concerns regarding the existing speed limits along Enterprise Drive are noted. As part of the reconfiguration of the intersection of Enterprise Drive, Old Chittaway Road and the new access road and the intersection of Enterprise Drive, Catamaran Road and the relocation of Old Chittaway Road (west of Enterprise Drive), a review of the existing speed limits along Enterprise Drive would be assessed as part of a Road Safety Audit undertaken during detailed design.

If it is determined that the existing speed limits are inappropriate for the proposed intersection arrangements, approval for amendment to these speed limits would be sought through consultation with the appropriate roads authority.

4.10.6 Management and mitigation measures

Summary of issues raised

Two submissions noted that additional signage in the streets surrounding the maintenance facility should be installed identifying these streets as restricted 'Local traffic only' zones.

Submission number(s)

17, 45.

Response

Additional traffic signage, including 'Local traffic only' signs, would be considered during detailed design in consultation with Central Coast Council.

4.11 Socio-economic

4.11.1 Assessment methodology

Summary of issues raised

A series of submissions expressed concern that the *Socio-economic Impact Assessment* (Appendix G of the REF) used out of date statistics for the assessment and also expressed disappointment at the use of the available statistics to misrepresent the existing demographics of the local community.

Submission number(s)

40, 82, 121, 129, 162, 165, 183.

Response

All of the technical studies prepared as part of the REF, including the *Socio-economic Impact Assessment*, used up to date information which was available at the time of preparation of these studies.

With respect to the concerns regarding the use of the available statistics to misrepresent the existing demographics, this comment is noted by Transport for NSW. This representation was only intended as an interpretation of the available demographics data that was available from the Australian Bureau of Statistics for the Kangy Angy and Fountaindale suburb profiles. The information presented was intended to provide an averaged assessment of the available data.

4.11.2 Amenity impacts

Summary of issues raised

Submissions raised concern about potential impacts to the existing amenity and rural character of the local area or expressed opposition to the introduction of an industrial facility in the area which would impact on the existing amenity and quality of life for surrounding residences.

Submission number(s)

6, 7, 16, 21, 40, 57, 66, 77, 94, 96, 112, 121, 125, 134, 139, 148, 165, 170, 174, 183, 188, 190, 202B, 208.

Response

Amenity impacts of the Project during construction and operation were considered throughout the REF (in particular in Chapter 7) in relation to issues such as noise impacts (Section 7.2), visual impacts (Section 7.3), socio-economic impacts (Section 7.7), general land use amenity impacts (Section 7.8) and air quality (Section 7.13). A range of mitigation measures were proposed to manage and mitigate all of the anticipated impacts associated with these environmental issues. The final list of proposed management and mitigation measures is provided in section 8.2 of this Combined Submissions Report.

Further responses to potential amenity impacts associated with the Project are also provided in section 4.8, 4.9, 4.15 and 4.16 of this Combined Submissions Report.

4.11.3 Impacts to local businesses and schools

Summary of issues raised

Submissions raised concerns about the potential impact of the Project on the local schools (Follyfoot Farm Child Care Learning Centre, Central Coast Steiner School and Berkley Vale High School) and businesses in the area surrounding the Project area.

Two submissions also questioned the potential for the Project to provide employment to people in the Central Coast, and what measures would be put in place to ensure that this occurred.

Submission number(s)

12, 15, 74, 77, 81, 96, 101, 116, 130, 165, 202B.

Response

The potential impact of the Project on local businesses and schools and childcare centres was considered throughout the REF, in particular with respect to key potential impact issues including noise and vibration, traffic and transport and socio-economic (Section 7.2, Section 7.6 and Section 7.7 of the REF respectively). These assessments concluded that, with the implementation of the identified management and mitigation measures, the impacts to local businesses and the nearby schools and childcare centres would be able to be suitably managed.

The issue of encouraging local employment was addressed in the REF management and mitigation measure Q.3 (refer to Section 8.2.2 of the REF). This mitigation measure noted that, where possible, Transport for NSW would ensure that employment opportunities for the local and regional population are maximised. In addition, it was also identified as part of this management and mitigation measure that, where possible, Transport for NSW would look to target sectors where unemployment is greatest, and maximise opportunities, through training opportunities, for youths and indigenous members of the community.

4.12 Hydrology, drainage and flooding

4.12.1 Adequacy of assessment

Summary of issues raised

A number of submissions expressed concern that the *Surface Water Impact Assessment* (Appendix H of the REF) undertaken for the REF was inadequate and did not address all of the potential impacts of the Project, including:

- The impact of various components of the Project such as the train washing facility, the access road bridge, the widening of the rail bridge at the Turpentine Road underpass
- The impact of blocked bridges, culverts and drains during major flooding events outside of the Project site
- The perceived reduction in overall area of the flood plain and the potential impact on Bangalow Creek and Chittaway Creek.

Some of the submissions also expressed concern that modelling of the one percent annual exceedance probability (AEP) (or 1:100 year) event level (with an allowance of 10 percent made for potential future climate change impacts) was not sufficient, or that detailed assessment should be undertaken prior to planning approval.

Submission number(s)

34, 67, 82, 95, 97, 99, 100, 121, 129, 130, 131, 141, 143, 149, 159, 162, 174, 175, 177, 179, 186, 187, 202B, 204, 209.

Response

The level of assessment undertaken is considered appropriate given the level of design detail on which the REF was prepared. The REF was completed by experienced and suitably qualified professionals in accordance with all relevant environmental and planning legislation, relevant guidelines by government agencies and was based on available information at the time of preparation of the assessment.

The design criteria identified for the Project to meet was a 1:100 flood event plus 10 percent for climate change. As such, the design for the facility, and the associated assessment of potential impacts, was assessed against this design criteria. Further discussion regarding the flood modelling for the Project is provided in section 4.12.5 of this Combined Submissions Report.

The hydrology and flooding impact assessment presented in the REF and the *Surface Water Impact Assessment* technical paper (Appendix H of the REF) did consider the potential for flooding impacts on all proposed Project elements including potential local drainage; stormwater impacts; and water quality impacts during construction, in addition to potential regional flooding impacts; local drainage; stormwater impacts; and water quality impacts during operation.

As further discussed in section 4.12.5 of this Combined Submissions Report, a detailed *Flood Study and Flood Impact Assessment* (AECOM, 2016) of the Project site has been undertaken since the display of the REF to provide greater certainty of the impact of the Project on the regional flood and local drainage processes. A summary of this assessment is provided in section 7.1 of this Combined Submissions Report and is attached as Appendix D.

4.12.2 Change to flooding flow regime

Summary of issues raised

Submissions expressed concern regarding the potential changes to flood flow regimes in the area as a result of the construction and operation of the Project. A number of submissions specifically noted concern about the potential changes to flood water flow paths (due to the importation of fill material) and the resultant diversion of surface water run-off which would result in increased flooding impacts to adjacent properties. Residential properties and the University site at Ourimbah were identified as specific concerns in the future. Additional concerns were also raised that any diversion of flood waters away from the Project site would impact on the local waterway system including Ourimbah Creek, Bangalow Creek and Chittaway Creek which flow directly into Tuggerah Lake.

One submission also questioned what assessment had been undertaken to identify likely impacts of the flood waters displaced by fill imported to the site into other adjacent areas, and where this had been addressed in the REF.

Submission number(s)

1, 3, 4, 7, 9, 10, 14, 21, 30, 31, 32, 53, 55, 57, 66, 68, 69, 70, 71, 72, 73, 74, 75, 77, 80, 81, 82, 85, 86, 99, 100, 103, 108, 110, 111, 112, 114, 117, 118, 120, 121, 122, 123, 124, 125, 129, 130, 131, 138, 139, 141, 142, 150, 151, 153, 155, 157, 162, 163, 164, 177, 179, 183, 186, 188, 191, 199, 202B.

Response

As described in Section 7.9.3 of the REF, the current design for the proposed New Intercity Fleet Maintenance Facility would be broadly unaffected by the flood waters during the 1:100 AEP event level. However, the REF also did identify that widening of the embankment where the rail crosses an unnamed intermittent waterway may potentially impact the existing flood plain and local drainage processes. These impacts were however noted to likely be minor and the impacts were to be further investigated during the detailed design process. The proposed detention basins would also be designed to manage drainage flows across the site, further minimising potential impacts.

As described in section 4.12.1 above, following display of the REF, a detailed *Flood Study and Flood Impact Assessment* (AECOM, 2016) of the Project site was undertaken to provide more certainty regarding the impact of the Project on the regional flood and local drainage processes. This assessment included specific reference to potential flooding impacts to surrounding areas (refer to section 5.2 of Appendix D of this Combined Submissions Report).

With respect to the potential for changes to the flooding impacts outside of the Project site, the detailed *Flood Study and Flood Impact Assessment* identified that overall there would be no increase in impact to the flood risk for surrounding properties as a result of the Project. During the design stage of the Project, understanding the behaviour of the drainage system and how it compares to the existing overall catchment response would be further investigated and refined. Further discussion of the potential impacts of flooding is provided in section 7.1.2 of this Combined Submissions Report.

4.12.3 Cumulative impacts

Summary of issues raised

One submission raised concern regarding the potential cumulative flooding impacts that the Project would have in conjunction with two other Projects that have been proposed by the former Wyong Shire Council within the vicinity of the Project. It was noted in the submission that the impact of each development had only been assessed in isolation and that the cumulative impacts that the combined developments would have on surface water run-off into Ourimbah Creek were unknown.

Submission number(s)

29.

Response

During the design stage of the Project, the understanding of the behaviour of the drainage system and how it compares to the existing overall catchment response, including potential cumulative impacts associated with other local Projects, would be further investigated and refined.

4.12.4 Site flooding impacts

Summary of issues raised

A number of submissions objected to the Project noting that it is unsuitable to propose that the facility be located in an area that has been documented as being prone to flooding. Some submissions also raised flooding of the site as a concern and noted that potential flooding impacts associated with the site would add significant costs to the Project.

Some submissions also noted that the flood-prone nature of the site would be likely to delay construction of the facility, and that during operation, flooding would have the potential to cut off access to the site for up to four to eight days at a time

Submission number(s)

6, 7, 9, 16, 24, 25, 26, 27, 28, 29, 32, 34, 38, 40, 42, 44, 48, 49, 52, 53, 54, 56, 57, 59, 60, 62, 63, 64, 65, 70, 73, 75, 76, 77, 80, 87, 88, 90, 93, 94, 95, 103, 104, 110, 111, 112, 114, 117, 118, 119, 121, 122, 123, 125, 127, 130, 132, 134, 138, 139, 141, 142, 143, 147, 148, 149, 151, 154, 164, 165, 167, 169, 170, 172, 180, 181B, 183, 188, 193, 194, 202B, 208.

Response

The concerns raised in the submissions regarding the potential flood-prone nature of the Project site are acknowledged. As discussed in Section 7.9.3 of the REF, the maintenance facility would be developed so as to be located outside the identified 1:100 AEP event level.

Other design elements that have been incorporated in the facility design to minimise the impacts of flooding on the site and neighbouring sites include:

- The access road would be designed so as to be immune from the 1:100 AEP event level
- Detention basins have also been proposed as part of the maintenance facility, designed to attenuate flows up to the 1:100 AEP event level
- The track connection from the Main North Line to the Project site would be at the same elevation as the existing so that the 1:100 AEP event level flood immunity is preserved. The new bridge structures at this location over Turpentine Road would be designed to have no impact on existing flood levels
- Where possible, all Project components would be designed to be above the 1:100 AEP event level.

Further investigation regarding the potential site flooding impacts on the New Intercity Fleet Maintenance Facility has been undertaken following the display of the REF. This impact assessment has been summarised in section 7.2 of this Combined Submissions Report and is provided as Appendix D.

4.12.5 Flood modelling

Summary of issues raised

Submissions raised concern that the flood modelling in the report was not extensive enough for the Project. Submissions stated that the REF did not consider:

- Extreme events such as the 0.5 percent AEP (1:200 year) flood event and the Probable Maximum Flood (PMF)
- The impact of blocked bridges, culverts and drains during major flooding events
- Possible blockages at Lees Bridge and the Turpentine Road/Chittaway Creek rail bridge.

A number of submissions also requested that additional flooding modelling and flooding impact assessment be completed for the Project. Of these, a number also specifically requested that the site be re-evaluated with reference to the flood mapping from the 1992 flood event.

Submission number(s)

17, 29, 34, 45, 52, 53, 54, 59, 69, 71, 72, 73, 82, 90, 104, 121, 129, 130, 150, 162, 167, 179, 183, 186, 188.

Response

The level of assessment undertaken is considered appropriate given the level of design detail on which the REF was prepared. The REF was completed by experienced professionals in accordance with all relevant environmental and planning legislation, relevant guidelines by government agencies and was based on available information at the time of preparation of the assessment. The design criteria identified for the Project to meet was a 1:100 AEP event level, for which the facility has been designed to, and to which the Project would be assessed.

With respect to the request for additional flood modelling to be undertaken, following display of the REF, an additional *Flood Study and Flood Impact Assessment* (AECOM, 2016) was prepared for the Project. This assessment was undertaken to provide more certainty regarding the impact of the Project on the regional flood and local drainage processes to identify any additional required mitigation and management measures.

This impact assessment has been summarised in section 7.2 of this Combined Submissions Report and is provided as Appendix D.

4.12.6 Water quality and pollution to local waterways

Summary of issues raised

A number of submissions expressed concern about potential impacts to water quality and pollution in local waterways, particularly Ourimbah, Chittaway and Bangalow Creeks and the Tuggerah Lake system. These submissions were also concerned about the release and/or leakage of contaminated wastes and chemicals into the local water systems. It was also noted that the Tuggerah Lake system is currently subject to substantial weed and water quality issues which would be exacerbated by the Project.

It was also recommended that the waterways should be monitored.

Submission number(s)

29, 40, 42, 77, 82, 85, 86, 91, 104, 108, 110, 112, 114, 117, 121, 125, 129, 138, 139, 141, 148, 153, 155, 165, 162, 165, 167, 177, 179, 182, 183, 188, 191, 194, 198, 202B.

Response

Section 7.9.4 of the REF identified a range of management and mitigation measures which would be implemented to minimise potential contamination and pollution impacts from discharge and run-off from the Project site. Water quality impacts would also be managed in accordance with a site Erosion and Sediment Control Plan (management and mitigation measure U.1 in the REF). In addition, a range of measures would be put in place during construction and operation to minimise pollutants entering the water system including:

- Scour protection would be provided at both ends of culvert extensions to reduce erosion and water quality impacts (management and mitigation measure E.6 in the REF)
- The proposed detention basins would be designed so as to reduce sediment loads and pollutants entering streams. These detention basins would be installed as early as possible during the construction phase of the Project (management and mitigation measure E.7 in the REF)
- Stormwater from higher risk pollution generating activities such as workshop facilities should be treated with oil interceptors or other treatment measures discharged to sewers, where feasible (management and mitigation measure E.8 in the REF).

4.12.7 Management and mitigation measures

Summary of issues raised

Submissions questioned the proposed management and mitigation measures for the management of potential hydrology, drainage and flooding impacts. Some of these submissions were also concerned that not all possible management and mitigation measures were addressed in the REF. A range of additional mitigation measures were also required to be considered as part of the ongoing design of the facility. These included:

- Installation of kerb and gutters along each side of Orchard Road
- Bunding of stormwater in the Project car park
- A plan to allow safe access and egress from the Central Coast Highway during flood periods
- Measures to stop erosion on local properties due to flooding.

One submission also queried the Work, Health and Safety requirements around potential flooding and if medics were required to be on site.

Submission number(s)

17, 34, 45, 58, 70, 77, 82, 101, 105, 111, 117, 121, 129, 156, 162, 183, 202B, 203.

Response

As part of the REF, a range of management and mitigation measures were identified to minimise potential impacts during both detailed design and construction with respect to potential hydrology and flooding impacts associated with the Project. These were outlined in section 7.9.4 of the REF and summarised as management and mitigation measures E.1 to E.8 (detailed design) and S.1 to S.7 (construction).

With respect to the suggestion to provide safe access and egress from the Central Coast Highway during flood periods, the proposed flood access road outlined in the REF is considered to be sufficient to meet this need and would provide direct access to Enterprise Drive during flood events. In the event of an emergency, the relevant emergency services would be contacted.

An Erosion and Sedimentation Control Plan (ESCP) would be developed, implemented and maintained for areas within the site in accordance with *Managing Urban Stormwater, Soils and Construction Guidelines* (Landcom, 2004). As the Project would not increase the flood risk to surrounding properties, no alteration of existing erosion hazards is expected. The implementation of erosion control measures on private property is therefore considered to be outside the scope of the Project.

Further consideration of any additional mitigation measures, such as those suggested by respondents, would be completed as part of the detailed design of the facility.

4.13 Soils, geology and contamination

4.13.1 Mitigation and management measures

Summary of issues raised

Two submissions enquired which independent body would be responsible for monitoring the proposed management and mitigation measures relating to containment of potential contamination to local waterways from cleaning chemicals and heavy metals which may be generated as part of the operation of the Project.

Submission number(s)

104, 167.

Response

Transport for NSW would be responsible for implementing and monitoring proposed management and mitigation measures. As described in Section 7.11.5 of the REF, an Erosion and Sedimentation Control Plan would be developed and maintained for the site in accordance with *Managing Urban Stormwater, Soils and Construction Guidelines* (Landcom, 2004). This plan would include details of management and mitigation measures for contaminated soils, monitoring of waterways and auditing schedules.

In addition, management and mitigation measures AH.1 to AH.3 (refer to section 8.2.3 of this Combined Submissions Report) which identify the controls which have been proposed for management of potential spills and hazardous materials during operation of the maintenance facility.

4.14 Groundwater

4.14.1 Impact to existing bores

Summary of issues raised

Five submissions raised concern regarding the potential impacts to bore water and ground water as a result of the Project. It was noted in the submissions that some properties in the area rely on bore water and expressed concern about potential contamination of this water source.

Submission number(s)

21, 32, 101, 138, 139.

Response

The potential impacts to registered groundwater bores was discussed in Section 7.10.2 of the REF. This assessment concluded that the potential impacts to registered groundwater bores during the construction and operational phases of the Project are considered to be negligible. Additionally, the REF stated that further consideration and assessment of the potential impacts to registered bores would be undertaken during detailed design, following the calculation or modelling of groundwater inflow rates, dewatering volumes and drawdown (refer to management and mitigation measures F.1 to F4 in section 8.2.1 of this Combined Submissions Report).

With respect to the potential for contamination to groundwater, management and mitigation measure AE.1 identified that a hazardous material procedure, including procedures for managing spills and refuelling, would be developed and implemented during operation of the Project to minimise groundwater contamination from chemical spills and leaks.

4.15 Land use and property

4.15.1 Land zoning

Summary of issues raised

A number of submissions objected to the Project based on the current zoning of the site with a majority of the land currently being zoned as either E2 Environmental Conservation or E3 Environmental Management under the *Wyong Local Environmental Plan 2013*. Concern was also raised in some submissions that the facility would represent an inappropriate use of the objectives and intention of these zones. Some submissions also raised objection that the zoning could be changed for the purposes of the Project without consultation or an EIS process.

Submission number(s)

14, 24 28, 30, 31, 37, 38, 40, 41, 42, 44, 45, 46, 47, 56, 58, 65, 67, 73, 77, 82, 85, 86, 103, 105, 110, 114, 121, 127, 129, 130, 134, 141, 144, 149, 150, 153, 155, 162, 164, 165, 167, 183, 186, 191, 193, 194, 202B.

Response

As described in Section 5.3 of the REF, the provisions of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) means that local environmental plans (LEPs), and hence the zonings that they identify, do not apply to the extent that they impose controls which are inconsistent with the Infrastructure SEPP. Specifically, clause 79 of the Infrastructure SEPP outlines that railway facilities (inclusive of 'maintenance, repair and stabling facilities for rolling stock') are permissible without the need for development consent on any land.

Notwithstanding the above provisions of the Infrastructure SEPP, during the preparation of the REF, the aims and objectives of the Wyong LEP 2013 (current LEP affecting the site), and the relevant land use zonings were still considered. The consideration of all the zonings affected by the Project was described in Table 5.1 of the REF.

While it is acknowledged that the Project would result in a change to the overall environment and the identified intentions of the E2 Environmental Conservation and E3 Environmental Management zone objectives, the ongoing design of the Project has included consideration of these objectives in order to minimise potential impacts. In particular, throughout the ongoing design of the maintenance facility, the need to retain and conserve as much of the existing vegetation on the site has been considered, including the retention of as much vegetation as possible, in particular along the boundaries of the site.

4.15.2 Land and property value impacts

Summary of issues raised

A number of submissions expressed concern that the construction and operation of the Project would result in detrimental impacts to the value of their properties and the properties in the surrounding area.

Submission number(s)

15, 16, 17, 24, 26, 27, 30, 35, 37, 45, 47, 49, 50, 53, 54, 58, 62, 65, 69, 71, 72, 77, 81, 82, 90, 91, 92, 94, 97, 99, 108, 112, 118, 119, 121, 125, 127, 129, 130, 142, 148, 149, 153, 155, 162, 170, 175, 177, 179, 182, 185, 186, 188, 191, 194, 201, 202B, 208.

Response

Movements in the value of a property are difficult to predict as they are subject to many variables including specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market. Land values have a tendency to move in response to positive and negative influences in a given area. As such they can be seen as a barometer of the net effectiveness of various changes.

While it is acknowledged that the Project would result in some change to the local character of the area, ongoing detailed design of the facility would assist in ensuring that the design of the facility is as sensitive as possible to the amenity of the surrounding landscape. This would include retention of existing vegetation and enhancement of new vegetative screening of the facility from surrounding residents which would assist with minimising potential adverse impacts on property values. The implementation of the range of additional management and mitigation measures (as identified throughout the REF) as part of the construction and operation of the Project are considered to be sufficient to minimise any potential impacts associated with the Project, including any potential impact to the land values of surrounding properties.

In addition, under the *NSW Land Acquisition (Just Terms Compensation) Act 1991*, Transport for NSW is not required to compensate property owners for the potential loss of property value, and are only required to compensate property owners at market value for all property acquired as part of the Project (refer to section 4.15.3 below).

4.15.3 Land acquisition

Summary of issues raised

Submissions objected to the need for compulsory acquisition as part of the Project. Some submissions noted that the REF did not make any reference to the need to acquire properties to accommodate the Project.

One respondent also requested that their property be acquired as part of the Project; while another requested that less land be acquired than what is currently proposed. Another submission also queried why the sale contract value for Central Coast Council land had not yet been disclosed to the public.

Submission number(s)

27, 30, 39, 73, 81, 88, 93, 97, 102, 133, 148, 157, 166, 167, 174, 182, 183, 193.

Response

The general extent of land acquisition required as a result of the Project was described in Section 4.3 of the REF. While it is acknowledged that some level of private property acquisition would be required to accommodate the Project, Transport for NSW would seek to refine the amount of land required as part of detailed design. Transport for NSW is currently in the process of negotiating with existing private property owners and Central Coast Council for the acquisition of their respective land holdings in accordance with the (NSW) *Land Acquisition (Just Terms Compensation) Act 1991*. The compensation requirements of this Act would apply to all property proposed to be acquired as part of the Project.

Only properties that are directly required for the construction and operation of the Project have been identified for acquisition. Under the *NSW Land Acquisition (Just Terms Compensation) Act 1991*, Transport for NSW is only required to compensate property owners at market value for all property directly affected by the Project. This refers to property that is either temporarily or permanently required for the Project. There is no legal requirement for compensation for indirect impacts (such as amenity impacts) on adjacent properties.

Costs associated with property acquisition are commercial in confidence.

4.16 Air quality

4.16.1 Assessment methodology

Summary of issues raised

Six submissions expressed concern that there was no specific air quality testing undertaken at the Project site or surrounding residences.

Submission number(s)

40, 82, 121, 129, 162, 165.

Response

A *Construction Air Quality Impact Assessment* for the Project was provided a part of the REF (provided as Appendix J). This assessment included consideration of air quality impacts associated with the generation of dust and emissions from the operation of on-site machinery, excavation works, materials handling and material storage.

While this assessment was limited to a desktop study and did not include specific air quality testing at the Project site, the assessment did take into account available data for the existing environment including local climate, wind speed and direction data from the Bureau of Meteorology in addition to local air quality data from the OEH including PM_{10}, $PM_{2.5}$ and total suspended particle concentrations which were available from local monitoring stations. The use of available information was consistent with the preparation of construction air quality assessments for similar Projects and provided an adequate level of information to identify the potential impacts and determine appropriate management and mitigation measures.

4.16.2 Construction air quality impacts

Summary of issues raised

A series of submissions expressed concern about potential air pollution impacts during construction. In particular, raising the issue of dust and the potential that air quality changes would affect the health of their animals.

Submission number(s)

7, 30, 40, 76, 79, 112, 125, 134, 143, 154, 165, 172, 175, 182, 183, 187, 188.

Response

While it is acknowledged that there would be a temporary increase in dust from earthworks and particulate emissions from the movement and use of on-site machinery and traffic during construction, these issues are typical of infrastructure Projects and should be able to be successfully managed using standard environmental management measures.

One of the key measures would be the development of a Dust Management Plan (management and mitigation measure W.1 – refer to section 8.2.2 of this Combined Submissions Report). This plan would identify the range of construction activities with potential to impact air quality and detail specific management and mitigation measures which would be applied to minimise these impacts. The management and mitigation measures identified would also take into consideration measures to minimise potential health impacts to the local community as a result of construction and operation of the Project.

During construction, most recommended management measures are routinely employed as standard practice on construction sites. At the Project site, particular attention would be paid to controlling dust generated by earthworks and movement of vehicles to, from and within the Project site.

4.16.3 Operational air quality impacts

Summary of issues raised

Submissions expressed concern regarding potential air quality impacts such as pollution and dust from the facility during operation. One submission also noted that they felt the facility doors should be closed at all times to manage air pollution.

Submission number(s)

53, 76, 82, 101, 103, 112, 121, 125, 129, 134, 154, 162, 165, 172, 182.

Response

As described in Section 7.13.3 of the REF, the proposed maintenance facility is expected to generate limited operational air quality impacts. The New Intercity Fleet would consist of electrified trains and equipment would typically be electricity or battery powered where practicable. A small amount of gaseous emissions (including some minimal potential for dust) would however have the potential to occur as a result of the use of some site equipment or from the additional vehicle travel required for employees.

Section 7.13.4 of the REF outlines a series of management and mitigation measures that would be included in the Dust Management Plan and implemented for the Project site during operation to minimise potential air quality impacts.

Closure of the maintenance facility doors was considered as part of the noise and vibration impacts in the REF. This assessment noted that the maintenance shed doors would remain closed when activities are occurring inside the sheds, where reasonable and feasible. This would also apply to the closure of the doors to mitigate any potential air quality impacts.

4.16.4 Errors and omissions

Summary of issues raised

Three submissions identified an error in the REF regarding the statement that the Project would have potential air quality impacts during operation.

Submission number(s)

40, 162, 165.

Response

While all efforts were made during the preparation of the REF to provide accurate and consistent information throughout the report and technical papers, some inconsistencies or omissions have been raised throughout the submissions process. Any inconsistencies and errors which have been identified are considered to be minor in nature and Transport for NSW does not consider that they significantly impede the ability to assess the impacts of the Project.

With specific reference to the inconsistency regarding operational air quality impacts, as described in Section 7.13.3 of the REF, the proposed maintenance facility would have very little operational impact on air quality. The operation of the main elements of the New Intercity Fleet Maintenance Facility would have almost no operating air quality impacts as the new fleet would consist of electrified trains and would therefore result in minimal generation of air quality impacts.

4.17 Bushfire

4.17.1 Adequacy of assessment

Summary of issues raised

Seven submissions noted that under the *Planning for Bushfire Protection Guidelines* (NSW Rural Fire Service, 2006), developments which may start bushfires should not be permitted in bushfire prone areas. It was also noted that the REF did not contain a Bushfire Assessment Report given its identification as being within a bushfire risk zone.

Submission number(s)

38, 82, 121, 129, 162, 164, 183.

Response

The document entitled *Planning for Bushfire Protection guidelines* (NSW Rural Fire Service, 2006) was reviewed in relation to the Project and the relevant management and mitigation measures have been identified. As noted in Section 7.15.1 of the REF, the Project site has been identified Bush Fire Prone Land. Section 7.15.4 of the REF identifies the appropriate bushfire management and mitigation measures. These measures have been developed based on a review of the document entitled *Planning for Bushfire Protection* (NSW Rural Fire Service, 2006). A Bushfire Management Plan would be incorporated into the overall CEMP.

In addition, a *Bushfire Protection Assessment Report* (Australian Bushfire Protection Planners Pty Limited, 2016) was prepared as part of the development of the concept design for the Project. The *Bushfire Protection Assessment Report* provided an assessment of the bushfire protection measures required to address the objectives of *Planning for Bushfire Protection 2006* and examined the standards regarding setbacks (i.e. defendable space), provision of water supply, fuel management protocols and other matters considered necessary to mitigate any potential bushfire threat to persons, property and the environment from the danger that may arise from a bushfire within or adjacent to the site.

A meeting with the Rural Fire Service was also undertaken as part of the development of the concept design (18 April 2016) to discuss the facility, its location and to ensure that the facility was designed to offer protection from bushfire risk.

4.17.2 Escape routes during a bushfire

Summary of issues raised

Five submissions noted that the Project site would not provide a safe access/egress route for emergency vehicles or evacuating workers in the event of a local bushfire.

Submission number(s)

82, 121, 129, 162, 183.

Response

The design of the maintenance facility is considered to provide a safe access/egress route for emergency vehicles or evacuating workers in the event of a local bushfire. Specifically, Section 7.15.4 of the REF notes that the following measures would be included to ensure provision of safe escape routes at the facility:

- Appropriate access tracks would be maintained to all sections of the Project site during construction and operation to allow safe access, egress and a defendable space for emergency services in the event of a bushfire or emergency

- The CEMP would include emergency evacuation procedures in the event of a bushfire or emergency. This would include a map of all potential access tracks to and from the site, in addition to the primary access route for site personnel
- The emergency/evacuation plan for the site would be prepared in accordance with the relevant NSW Rural Fire Service Guidelines for the preparation of emergency/evacuation plan(s).

In addition, the new access road to the maintenance facility is considered to provide a suitable alternative egress/evacuation route for emergency vehicles, maintenance facility employees as well as local residents (through the proposed connection to Orchard Road) during a bushfire emergency.

4.18 Waste and resources

4.18.1 Disposal of wastes

Summary of issues raised

Eight submissions expressed concern about the storage and disposal of contaminated wastes from the Project site and whether dirt bunding would be sufficient to manage potential contaminants. One submission also questioned if the EPA would be responsible for the monitoring of the operation of the site.

Submission number(s)

74, 85, 86, 112, 125, 153, 188, 191.

Response

As described in section 7.11.5 all fuels, chemicals and hazardous liquids would be stored within impervious bunded areas of the Project site in accordance with Australian standards and EPA guidelines. Section 7.12.3 of the REF also notes that removal of all wastes from site would only be undertaken by a licensed contractor. In addition, as noted in management and mitigation measure U.1, an Erosion and Sedimentation Control Plan would be developed and maintained for the site in accordance with *Managing Urban Stormwater, Soils and Construction Guidelines* (Landcom, 2004). The plan would include site access controls preventing tracking of sediment from site, limiting the removal of groundcover and ensuring that the excavation works do not block natural drains or create undrained areas.

With respect to the question regarding the responsibility for monitoring operation of the site, the operation of the maintenance facility is not currently considered to be, at this time, an activity which would require an environmental protection licence (EPL). The applicability of an EPL, and hence any need for monitoring of the site by the EPA would be confirmed following consultation with the NSW EPA.

4.19 Hazards and risks

4.19.1 Impacts to tank water

Summary of issues raised

Submissions raised concerns about potential dust and pollution impacts to the tank water of local residents. A majority of the submissions noted that increased dust and pollution from the construction of the Project would result in potential health risks to residents as a result of any contamination of their tank water. Some residents suggested methods to mitigate this potential impact during construction including:

- Connecting all local residents to town water
- Cleaning all buildings roofs every six months throughout the construction period
- All existing water tanks to be cleaned and restocked with water every six months throughout the construction period

- Provide a sufficient number of tap filters to allow replacement of existing filters throughout the construction period.

The impact of additional vehicles using Enterprise Drive during operation (such as increased brake dust) and the resultant impact on tank water were also cited as a concern in one submission.

Submission number(s)

17, 31, 32, 37, 40, 45, 46, 47, 54, 57, 64, 68, 69, 71, 72, 77, 82, 85, 86, 87, 90, 91, 92, 97, 99, 112, 118, 123, 130, 138, 153, 155, 162, 165, 175, 177, 179, 186, 188, 191, 202B.

Response

As described in Section 7.13 of the REF, the key potential risks during construction would be associated with the increase of particular matter from earthworks, wind erosion and vehicle movements.

During construction, the nominated construction contractor would be required to minimise any dust or emissions leaving the site throughout the construction period. This would be achieved through the use of the management and mitigation measures (management and mitigation measures W.1 to W.8) identified in the REF. In particular, dust monitoring of any particulate material leaving the site would need to be undertaken throughout construction (management and mitigation measure W.2 to W.4). This would include the use of dust and weather monitoring equipment at various intervals along the Project site boundary to monitor for external exceedances of dust. When this occurs, mitigation measures would be implemented for affected properties (i.e. those properties downwind at the time of an exceedance) including cleaning dust of roofs and, if required, replacement of existing tank water.

These mitigation measures would be applied in accordance with the results of a condition survey of existing buildings within the vicinity of the Project site. This survey would be undertaken as part of the preparation of the Dust Management Plan to establish a baseline extent of existing dust accumulation prior to commencement of construction works (management and mitigation measure W.1).

At this time, it is not proposed to provide connection for local residents to town water as part of the Project. This is the responsibility of the Central Coast Council. However Transport for NSW would ensure that water pipes within the site are installed to cater for future connection (by others) to the water service.

During operation, the maintenance facility is expected to produce a limited amount of emissions (due to the electric nature of the New Intercity Fleet and the fact that a majority of the proposed maintenance activities would be undertaken within enclosed areas). As such, the operation of the maintenance facility is not expected to result in any increase in potential risks to existing tank water collection.

4.19.2 Health impacts

Summary of issues raised

Submissions expressed concern regarding potential health impacts to the community as a result of the construction and operation of the facility. These included:

- Noise from the facility would cause sleep disturbance and contribute to stress for local residents
- Dust and air quality impacts would cause potential respiratory issues.

Submission number(s)

26, 37, 40, 45, 55, 68, 98, 101, 141, 142, 165, 175, 177, 179, 188.

Response

As noted in Section 7.2.5 of the REF, it is acknowledged that some receivers within the immediate vicinity of the Project would still have the potential to be impacted by noise levels above the assessment criteria during operation, even with mitigation measures in place. Further to the management and mitigation measures identified in the REF, the predicted noise levels and determination of required noise mitigation would continue to be reviewed and verified as part of an Operational Noise and Vibration Review in the next stage of the Project. This would determine the final design of management and mitigation measures, and identify any residual exceedances of the operational goals and further mitigation measures which can be implemented to minimise these impacts.

Further discussion regarding the noise and vibration concerns associated with the Project is provided in section 4.8 of this Combined Submissions Report.

With regards to air quality, as described in section 4.16 of this report, any potential air quality impacts during operation are expected to be minimal and would be able to be suitably managed through the implementation of the management and mitigation measures outlined in section 8.2 of this Combined Submissions Report.

4.19.3 Childcare safety

Summary of issues raised

Four submissions expressed concern about the safety and wellbeing of children at the Follyfoot Farm Child Care Learning Centre. Of these, two submission noted that parents and caregivers may be concerned about excessive noise, dust and emissions from the facility.

Submission number(s)

25, 40, 165, 186.

Response

As noted in Section 7.2.5 of the REF, the Central Coast Steiner School at 10 Catamaran Road and the Follyfoot Farm Child Care Learning Centre at 98 Old Chittaway Road are not expected to experience noise levels in excess of the applicable INP criteria from the Project, even without mitigation measures. Notwithstanding, Transport for NSW have identified a range of management and mitigation measures which are proposed to be implemented during construction as described in Section 7.2.6 of the REF which would further minimise the impacts of noise and vibration from the Project.

Overall, it is anticipated that the proposed management and mitigation measures would be sufficient to minimise any potential impacts to the safety and wellbeing of local residents, including attendees of the Follyfoot Farm Child Care Learning Centre and Central Coast Steiner School, during construction and operation of the maintenance facility.

In addition, safety barriers/hoardings would be installed around the Project site during construction to delineate construction versus public areas. Suitable barricades and traffic/access management measures would also be implemented to protect the public and prevent public access onto the worksite during construction. As part of the ongoing design and development of the Project, Transport for NSW would continue to liaise with local schools and childcare facilities regarding the Project and methods to further mitigate potential impacts.

4.19.4 Security of residences

Summary of issues raised

Submissions raised concern about the security of their properties as a result of the proposed maintenance facility during construction and operation. One submission also requested that the facility access point onto Orchard Road be locked at all times.

Submission number(s)

77, 79, 80, 112, 151, 175, 182, 188, 202B.

Response

Maintaining the safety and security of residences adjacent to the Project during the construction and operation of the Project is an important consideration for Transport for NSW. It is acknowledged that the Project would result in the need for additional people to access the locality during construction and operation of the maintenance facility. However, workers would not be required to access private properties outside the Project area (without reason and following prior consultation from Transport for NSW to seek approval of the property owner), in particular during construction. It is not expected that the additional workers would result in any decrease in the current existing security for adjoining residences.

During operation, it is not anticipated that any employees would be required to access adjoining properties. The entrance to the maintenance facility would be securely gated to ensure access is limited to authorised personnel only.

4.19.5 Other hazards and risks

Summary of issues raised

Two submissions made reference to a resident that almost lost their life in a 2007 floods.

Submission number(s)

183, 188.

Response

Noted. Transport for NSW takes the safety of the community very seriously.

As described in Section 7.9.3 of the REF, the current design for the proposed New Intercity Fleet Maintenance Facility would be broadly unaffected by the flood waters during the 1:100 AEP event level. However, the REF also did identify that widening of the embankment where the rail crosses an unnamed intermittent waterway may potentially impact the existing flood plain and local drainage processes. These impacts were however noted to likely be minor and the impacts were to be further investigated during the detailed design process.

4.20 Utilities and services

4.20.1 Cost for additional utilities

Summary of issues raised

The cost of installation of new utilities to meet the needs of the maintenance facility was questioned whether these costs had been considered as part of the overall Project.

Submission number(s)

32, 85, 86, 139, 153, 191.

Response

The costs associated with the installation of new utilities to meet the needs of the maintenance facility were considered as part of the economic assessment for the Project and have been included as part of the overall cost of the Project.

4.20.2 Provision of additional utilities

Summary of issues raised

Three submissions enquired about the provision of additional utilities such as sewerage, water, stormwater and NBN to properties in the area.

Submission number(s)

21, 45, 139.

Response

As part of the construction of the maintenance facility, some additional services, such as sewerage, water, stormwater and telecommunications would be installed to the site. At this stage it is not proposed to extend these utilities to properties adjacent or surrounding the maintenance facility site. However, allocation would be made as part of the Project for the potential provision of these services in the future. For example, this would include installation of empty conduits within the access road bridge deck and extension of water services to the boundary of the Project site (such as Orchard Road) which would be available for connection by other service providers (such as Central Coast Council) in the future.

4.21 Out of scope issues

4.21.1 Compensation

Summary of issues raised

Eight submissions questioned whether Transport for NSW intended to provide compensation to residents with specific regard to issues such as:

- Increased insurance costs (noted in submissions to be due to the potential for increased flooding due to the raising of the Project site)
- Loss of income as a result of the construction of the Project (as a result of restriction to or closure of local roads during construction).

Submission number(s)

45, 49, 57, 70, 110, 112, 183, 188.

Response

Transport for NSW does not provide compensation for impacts other than those which occur as a direct impact of the Project (such as direct impact to property through acquisition of land, or specific mitigation measures such as direct treatment to properties to minimise noise impacts). As described in section 4.12 of this report, the range of management and mitigation measures proposed for the Project is not expected to result in any substantial change to existing flooding flow regimes, and therefore is not anticipated to result in any increased risk of flooding to surrounding properties above or beyond the existing risks to these locations.

It is not proposed that existing local roads would typically be closed during construction. As such, it is not expected that residents would be restricted from travelling to and from their residences throughout the construction period. However it is likely that Turpentine Road would need to be temporarily closed for short periods of time during construction of the new bridges at this location. This would only occur once the new access bridge has been constructed and can provide an alternative access point for local residents.

4.21.2 Warnervale Business and Education University site

Summary of issues raised

Submissions noted that the proposed Warnervale Business and University precinct was not considered to be a feasible or viable development and that it should not proceed.

Submission number(s)

48, 73, 125, 143.

Response

The justification for and development of the Warnervale Education and Business Precinct is outside the scope of the environmental assessment for the New Intercity Fleet Maintenance Facility at Kangy Angy.

4.21.3 Justification for Link Road

Summary of issues raised

Two submissions noted that the Link Road extension through Watanobbi was not justified.

Submission number(s)

48, 143.

Response

The justification for and development of the Warnervale Link Road is outside the scope of the environmental assessment for the New Intercity Fleet Maintenance Facility at Kangy Angy.

4.21.4 Public transport

Summary of issues raised

Submissions noted that there is limited public transport in the area. One submission suggested that a public railway station be established on the western side of the railway line.

Additionally one submission suggested a cycleway is established on the western side of the line to enable access the proposed maintenance facility from Tuggerah Station, including the provision of secure bike storage lockers.

Submission number(s)

110, 112, 130, 188.

Response

The provision of additional public transport for the local area is outside the scope of the current Project. It is not proposed to construct a new railway station or cycleway as part of the Project.

4.21.5 Impacts from construction of the Gosford Passing Loops

Summary of issues raised

Two submissions noted that there were a number of traffic related impacts during the construction of the 'Passing Loops' project. Impacts noted include congestion, speeding, dust, increased litter, increased noise and incidences of graffiti.

Submission number(s)

112, 188.

Response

Concern regarding the potential impacts associated with the 'Passing Loops' project is noted by Transport for NSW. A range of management and mitigation measures are proposed to ensure that the proposed maintenance facility project is constructed with minimal impacts. These include impacts such as potential noise, dust, traffic and waste impacts.

5 Response to NSW Government submissions

This chapter includes a summary of the submission(s) received from Government agencies and representatives regarding the New Intercity Fleet Maintenance Facility Project. Responses to these submissions have been provided in the following sections.

5.1 Central Coast Council

Central Coast Council provided two submissions, with the input of their ecologist and focused on biodiversity issues, and are listed in Table 5.1 along with Transport for NSW response.

Table 5.1 Comments raised by Central Coast Council

Comment	Transport for NSW response
Adequacy of assessment for the initial SIS	
It is considered the impacts to Swamp Sclerophyll Forest on Coastal Floodplains (SSF) and threatened species habitat have been underestimated as the assessment largely focusses on direct impacts, namely, the removal of vegetation and habitat. The proposed layout shows small, narrow areas of native vegetation will be retained however; these areas are unlikely to remain viable as functional areas of habitat and will be highly susceptible to edge effects and other indirect impacts due to their size, shape and isolation. Greater consideration of the impacts to these areas should be included in the assessment.	Section 7 of the Species Impact Statement (SIS) proposes that a specific Threatened Flora Management Plan be prepared for retained areas within the site that contain *Melaleuca biconvexa* and Swamp Sclerophyll Forest. This plan will provide a framework for the management of the species and community from preclearing, construction and operation phases of the Project.
Assessment methodology for the initial SIS	
The assessment of impacts to *Melaleuca biconvexa* relies on stem counts, which have been used as the basis for various calculations and assumptions in relation to the species. An individual of the species may have numerous stems and therefore, stem counts do not provide an accurate estimate of the size of the population. Calculations and assumptions based on stem counts may be misleading. A recent study undertaken by Bell (2016) uses a condition assessment of stands of *Melaleuca biconvexa* to ascertain their value. When comparable data is available, this approach would provide a more accurate picture of the value of the stands to be removed, and be more informative for impact assessment and management of retained stands of the species. However, it is acknowledged that information regarding this method may not have been available during preparation of the SIS.	The SIS acknowledges the difficulty in estimating *Melaleuca biconvexa* populations. In estimating the population size and abundance of *Melaleuca biconvexa* for the local population, two methods incorporating a broad visual abundance assessment (Duncan 2001) and stem count were completed (Cropper 1993). In addition these surveys were undertaken in accordance with methods identified within the *Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation 2004). At the time the SIS was prepared this method was considered appropriate to enable population estimate for this species.

Comment	Transport for NSW response
Vegetation clearance	
The impacts of the proposal are considered to be significant due to the extensive removal of SSF and Biconvex Paperbark. It is Council's preference that further attempts are made to avoid impacts to SSF, *Melaleuca biconvexa* stands and habitat for threatened species, including exploration of the potential to utilise cleared and disturbed areas and retain connectivity.	Where possible, detailed design of the maintenance facility would seek to further reduce the overall footprint of the Project (operational and construction areas) to further reduce vegetation impacts. Prior to construction commencing, exclusion zones would be established to protect vegetation and fauna habitats outside of the approved clearing limits. Vegetation to be retained on site would be clearly defined on ground and "no go zones" clearly signposted and demarcated to prevent unauthorised clearing and vehicular and/foot traffic.
Offset provisions	
Offsets should be secured through the Biobanking scheme to ensure management of the land in perpetuity. This should be undertaken in preference to contributions to conservation programs as these do not benefit from the same level of ongoing security as Biobank sites.	Section 7.1.2 of the SIS provided a detailed description of the proposed Biodiversity Offset Strategy for the Project, which would be developed in accordance with the NSW Biodiversity Offset Policy and delivered using BioBanking assessment methodology. This included identification of the estimated project offset requirements, potential offset options and the security of these offset options. The development of this strategy is ongoing and would be done in consultation with the NSW Office of Environment and Heritage and the Commonwealth Department of the Environment and Energy.
Offset provisions	
The areas of habitat for Mahony's Toadlet and the Wallum Froglet that will be managed as exclusion zones are fragmented and isolated from each other and offsite habitat areas. The proposed development will further isolate them, with the construction of barriers such as roads, rail tracks and hardstand areas. According to mapping provided in the SIS, it appears the exclusion zones do not include the area in which Mahony's Toadlet was recorded. These measures are considered inadequate to maintain the local population of either species in the long-term.	As described in section 4.7.23, proposed frog exclusion zones would be conserved as part of a Conservation Management Plan that would be prepared to specifically address retained habitat for Mahony's Toadlet and Wallum Froglet in the study area. The CMP would also be developed to specify effective management and mitigation of potential impacts to Mahony's Toadlet and Wallum Froglet during the construction and operational phases of the Project. Exclusion zones in the study area include Mahony's Toadlet breeding habitat (semi-permanent water), potential breeding habitat (ephemeral water) and drier perched habitat (30 percent of this species habitat occurring within the study is to be retained). To reduce the level of potential fragmentation, specific exclusion zones are proposed in strategic locations within the study area. The intention of the exclusion zones is to maintain a level of connectivity and movement opportunities for Mahony's Toadlet and Wallum Froglet within and around the proposed infrastructure, as shown on Figure 5.1 of the Additional SIS.

5.2 Roads and Maritime Services

Roads and Maritime Services provided a submission and provided comments regarding the Project. These comments, and Transport for NSW responses, are addressed in Table 5.2 below.

Table 5.2 Comments raised by Roads and Maritime Services

Comment	Transport for NSW response
Roads and Maritime Services currently has a Project to upgrade the Wyong Road/Enterprise Drive intersection from a roundabout to traffic signals. This Project is currently under construction and scheduled for completion by December 2016.	The construction and timing of this Project is noted. It is anticipated that, based on the current program for the proposed construction of the New Intercity Fleet Maintenance Facility that there would be limited overlap between the completion of the Wyong Road/Enterprise Drive intersection and the main works associated with the maintenance facility.
The main vehicular access to the site will be via a newly constructed access road which will form a four way intersection with Enterprise Drive and Old Chittaway Road. The traffic report indicates that to accommodate the traffic generated by the Project and provide a satisfactory level of service at the intersection, several (right turn) movements would need to be banned thereby compromising local traffic accessibility. The proponent has indicated that further design work will be undertaken, including consideration of providing traffic signals or a roundabout in this location	As described in section 4.3.3, further consideration of this intersection during detailed design has been undertaken following the display of the REF. Based on the work undertaken during the ongoing design, it has been determined that the preferred arrangement for the intersection between Enterprise Drive and Old Chittaway Road would be the development of a new roundabout. Further discussion regarding the proposed intersection arrangement at this location is provided in section 6.8 of this Combined submissions report.
Results from a traffic survey undertaken during the week commencing 15 March 2016 has indicated that the AM peak hour is 7.45 to 8.45 and the PM peak is 4.45 to 5.45. It is noted that these peak periods do not coincide with the proposed start/finish times during the construction period.	Comment noted. It is expected that the difference between the proposed construction work hours and the identified peak periods along Enterprise Drive would minimise potential impacts to traffic along this road during construction.
It is considered that the proposal will not have an unacceptable impact on classified (State) road network.	Comment noted.
Furthermore, all matters relating to the intersection upgrades on Enterprise Drive and any impact of the proposed access to the facility are matters for Council to determine. However, should traffic signals be proposed for the Enterprise Drive and Old Chittaway Road intersection, the 90km/h zone will need to be reduced to 80km/h and Roads and Maritime Services' consent will be required under *Section 87* of the *Roads Act 1993*.	Transport for NSW will continue to consult with Central Coast Council regarding the ongoing development and design of the maintenance facility, including the proposed intersection works required along Enterprise Drive. As described above, and in section 4.3.3, it is currently proposed that the intersection between Enterprise Drive and Old Chittaway Road would consist of a new roundabout. Should further detailed design identify the need for traffic signals at this location, Transport for NSW would undertake further consultation with Roads and Maritime Services and seek approval under *Section 87* of the *Roads Act 1993*.

5.3 State Member of Parliament for The Entrance

The State Member of Parliament for The Entrance, provided two submissions which identified a series of concerns. These concerns, and Transport for NSW responses, are addressed in Table 5.3 below.

Table 5.3 Comments raised by the State Member of Parliament for The Entrance

Issues raised	Transport for NSW response
Site selection and opposition to the preferred site	
I write to oppose the proposed location of the above facility on the basis that the environmental damage which will occur should construction proceed at Kangy Angy site is unacceptable and better site exist for the development nearby.	It was identified as part of the *Comparative Site Analysis* (GHD, 2015a) that Kangy Angy site was identified as a better overall site for the proposed maintenance facility. Consideration of potential impacts of the Project has been undertaken; the New Intercity Fleet Maintenance facility project is expected to have both positive and negative environmental and social impacts. With the implementation of suitable management and mitigation measures, the social and environmental impacts are not anticipated to be substantial.
The strategic site selection had no regard to the *Draft Central Coast Regional Plan* (Department of Planning and Environment, 2015) which provides for the Kangy Angy locality to remain open space. Large areas of the Central Coast, near to the main north railway line, have been set aside under the plan for industrial and employment use and these should be the preferred location for the facility.	While the site is identified as an area to be retained as open space, the location of the Project site is adjacent to the outlined broader regional economic corridor between Warnervale and Tuggerah. Given the identification of this future corridor, and the adjacent industrial developments to the proposed maintenance facility, the development of the site for the purposes of a maintenance facility is not considered to be substantially inconsistent with the aims and objectives of the *Draft Central Coast Regional Plan*.
The multi-criteria used to assess Kangy Angy against the next best option, Warnervale, is not the same as the criteria used to assess the other sites. Eight criteria are used to assess the other sites while only seven were used to assess Kangy Angy. The criteria did not use, 'enabling works' includes impact on culverts, earthworks and diversion of utilities. Since Kangy Angy will require major earthworks to bridge the railway line and raise the facility above the floodplain; impact existing culverts; and, require diversion of power lines; I suggest its inclusion would have resulted in Warnervale being found the better of the two.	A response to this issue has been provided in response item 4.2.4 of this Combined Submissions Report. The *Comparative Site Analysis* (GHD, 2015a) compared the Kangy Angy and Warnervale sites. This assessment did not include 'enabling works' as an individual category because it was considered that both sites required complex enabling works and that the consideration of this single category would not provide a differentiating factor between the two sites. As a result, the enabling works criteria was expanded to include: → earthworks → new bridges (rail) → existing bridge modifications → major culverts → minor culverts → site access road → existing/proposed road relocations → existing utilities → existing railway infrastructure. The categories identified were considered as part of the option *Comparative Site Analysis* and identified that Kangy Angy was the preferred site based on all of the identified issues.

Issues raised	Transport for NSW response
Reconsideration of the Warnervale site should occur or, in the alternate, a full Environmental Impact Study of the Kangy Angy site should be undertaken.	While it was identified as part of the *Comparative Site Analysis* (GHD, 2015a) that the Warnervale site would have some environmental benefits over the Kangy Angy site, based on consideration of both the environmental and engineering criteria, in conjunction with property ownership constraints and the potential to impact on the proposed Link Road, it was considered that Kangy Angy was identified a better overall site for the proposed maintenance facility. Section 112(1C) of the EP&A Act states that an EIS is not required to be prepared for an activity for which a SIS has also been prepared in accordance with the TSC Act if, other than the potentially significant impact on protected species (which are required to be assessed by a SIS), the activity does not and is not likely to significantly affect the environment. Therefore, in order to meet this requirement, a SIS was prepared as part of the environmental assessment documentation for the Project. A detailed environmental assessment has been completed and is detailed in the Project REF SIS and Additional SIS.
Impact to threatened species	
I am concerned that the habitat of the critically endangered Regent Honey Eater and Swift Parrot, as well as an unidentified frog, will be damaged by development which does not need to be built at Kangy Angy when it could be built at site 2 (Warnervale) on industrial zoned land with little or no environmental impact.	In examining the life cycle of the Regent Honeyeaters, it is considered unlikely that this species would breed within the study area. However there is an abundance of Swamp Mahogany on site, a winter flowering species which provides suitable habitat to the Regent Honeyeater. Potential foraging habitat found within the study area spans the two broad habitat types; swamp forest and wet open forest. The study area provides approximately 30.2 hectares of foraging habitat for the Regent Honeyeater and Swift Parrot, of which 23.2 hectares is likely to be impacted, including 19.6 hectares of swamp forest and 3.6 hectares of wet open forest. In the locality, this equates to approximately 0.6 per cent of potentially suitable habitat for the Regent Honeyeater. Therefore, whilst the Project would add incrementally to the loss of foraging habitat in the locality and the loss of approximately 0.6 per cent of potentially suitable foraging habitat in the locality is not likely to have an adverse effect on the life cycle of this species. The SIS included assessments of significance for a number of flora and fauna species, including for the Regent Honey-eater, Swift Parrot and Powerful Owl. Following consideration of the SIS, approval was provided by the Department of the Environment and Energy on 5 May 2017. Kangy Angy is the preferred site for the proposed maintenance facility based on consideration of all identified site options against the assessment criteria and potential property acquisition constraints as per the Comparative Site Analysis (GHD, 2015a).
Impact to newly described frog	
I am concerned that the habitat of the critically endangered Regent Honey Eater and Swift Parrot, as well as an unidentified frog, will be damaged by development which does not need to be built at Kangy Angy when it could be built at site 2 (Warnervale) on industrial zoned land with little or no environmental impact.	On 4 November 2016, a scientific paper was published which provided a taxonomic name and classification of the unidentified frog species – *Uperoleia mahonyi* (or Mahony's Toadlet). On 10 March 2017, the NSW scientific Committee made a determination for the provisional listing, on an emergency basis, of the frog; Mahony's Toadlet, as an Endangered Species in part 1 of Schedule 1 of the TSC Act (NSW Scientific Committee, 2017). Subsequent to the provisional listing of Mahony's Toadlet as an Endangered species under the TSC Act, an assessment of significance (7-part test) was undertaken which considered the potential impacts of the project upon Mahony's Toadlet. Based on the conclusion of the 7-part test that the project was likely to have a significant impact upon Mahony's Toadlet, an Additional SIS was prepared, and placed on public exhibition in June 2017.

Issues raised	Transport for NSW response
Flooding	
The access roads to the proposed site have been rendered impassable due to flood three times this year. Whilst mapping suggest the site is generally above the 1:100 year flood level, my experience of the area is that frequent flooding is the norm. The local geomorphology of the site causes large amounts of water to be retained for long periods after heavy rainfall and the mapping doesn't allow for this ponding. The REF also makes no comment on the upstream damming impact the proposed development will have.	A response to these issues has been provided in response item 4.12.5 and response item 4.12.2 of this Combined Submissions Report respectively. With respect to the potential for changes to the flooding impacts outside of the Project site, the detailed *Flood Study and Flood Impact Assessment* (AECOM, 2016) undertaken following display of the REF identified that, overall, it is anticipated that there would be no increase in impact to the flood risk for surrounding properties. During the design stage of the Project, the understanding of the behaviour of the drainage system and how it compares to the existing overall catchment response would be further investigated and refined.
My own inspection of the site revealed standing water to just under a metre deep and abundant wildlife in the vicinity of the proposed development. These constraints, and the absurd proposal to build a new bridge over the northern line to access an inaccessible site when there is a site nearby without the same constraints is impossible to reconcile.	As described in Section 7.9.3 of the REF, the current design for the proposed New Intercity Fleet Maintenance Facility would be broadly unaffected by the flood waters during the 1:100 AEP event level. However, the REF also did identify that widening of the embankment where the rail crosses an unnamed intermittent waterway may potentially impact the existing flood plain and local drainage processes. These impacts were however noted to likely be minor and the impacts were to be further investigated during the detailed design process. The proposed detention basins would also be designed to manage drainage flows across the site, further minimising potential impacts.
Noise	
Whilst the area has industrial development nearby (e.g. the Sanitarium and Masterfoods factories), these are enclosed factories which make no impact on the amenity of the area. The noise impacts listed in Volume 2 of the REF are way above the levels the community is accustomed to.	A response to this issue has been provided in response item 4.8.4 of this Combined Submissions Report. The predicted noise levels identified in the REF and determination of required noise mitigation would be reviewed and verified as part of an Operational Noise and Vibration Review during the next stage(s) of the Project's development. The review would determine the final design of management and mitigation measures, and identify any residual exceedances of the operational noise objectives. This review would also consider the possibility of noise mitigation options for surrounding properties which may be impacted by the Project including items such as use and testing of horns, train movements and standing activities and noise barriers. These management and mitigation measures would be documented in the Project Operational Noise and Vibration Review as described in Section 7.2.6 of the REF.

Issues raised	Transport for NSW response
Visual impact	
Visual amenity of the area has been impacted by industrial development on the east side of the railway line. This is accepted by the community because the land is industrial zoned and development is sufficiently screened. This is not the case on the west side.	The potential visual impacts associated with the maintenance facility during operation have been discussed in response item 4.9.1 of this Combined Submissions Report. While it is acknowledged that the facility would have some visual impacts once constructed, a range of management and mitigation measures have been proposed to minimise these potential impacts. These include: → Retention of existing vegetation → Replanting of additional screening vegetation → Design of the facility façade (shape colour etc.) to effectively blend with the existing environment → Development and implementation of a range strategies to reduce potential lighting and light spill impacts. These measures are detailed in Chapter 8 of this report.

6 Design changes to the Project

This chapter documents and assesses a series of design changes that Transport for NSW have identified for the New Intercity Fleet Maintenance Facility Project following public display of the REF.

6.1 Overview

The design changes which are proposed were identified as a result of ongoing design development, issues raised by stakeholders and the community during the REF display period, as well as further refinement of the constructability of the Project. These changes include the following:

- Modification to number of detention basins
- Identification of the preferred alignment for the Ausgrid 33kV power line (previously identified as two options in the REF)
- Refinement of the alignment for the relocation of the existing Sydney Trains 11kV and 66kV power lines
- Nomination of location for a signalling building within the Project site
- Modification to the construction methodology for the access road bridge from Enterprise Drive
- Enterprise Drive intersection arrangement
- Further refinement of the earthwork volumes and site fill levels for the Project site.

The majority of the proposed design changes would reduce the overall environmental impact of the Project compared to the design that was presented in the REF. The following sections provide a description of each proposed design change and an assessment of the change in impacts associated with these changes. These assessments demonstrate that the proposed changes in impact would either result in improved environmental outcomes or, in some instances minor additional impacts which would be adequately managed through application of suitable environmental management measures (refer to Chapter 8 of this Combined Submissions Report).

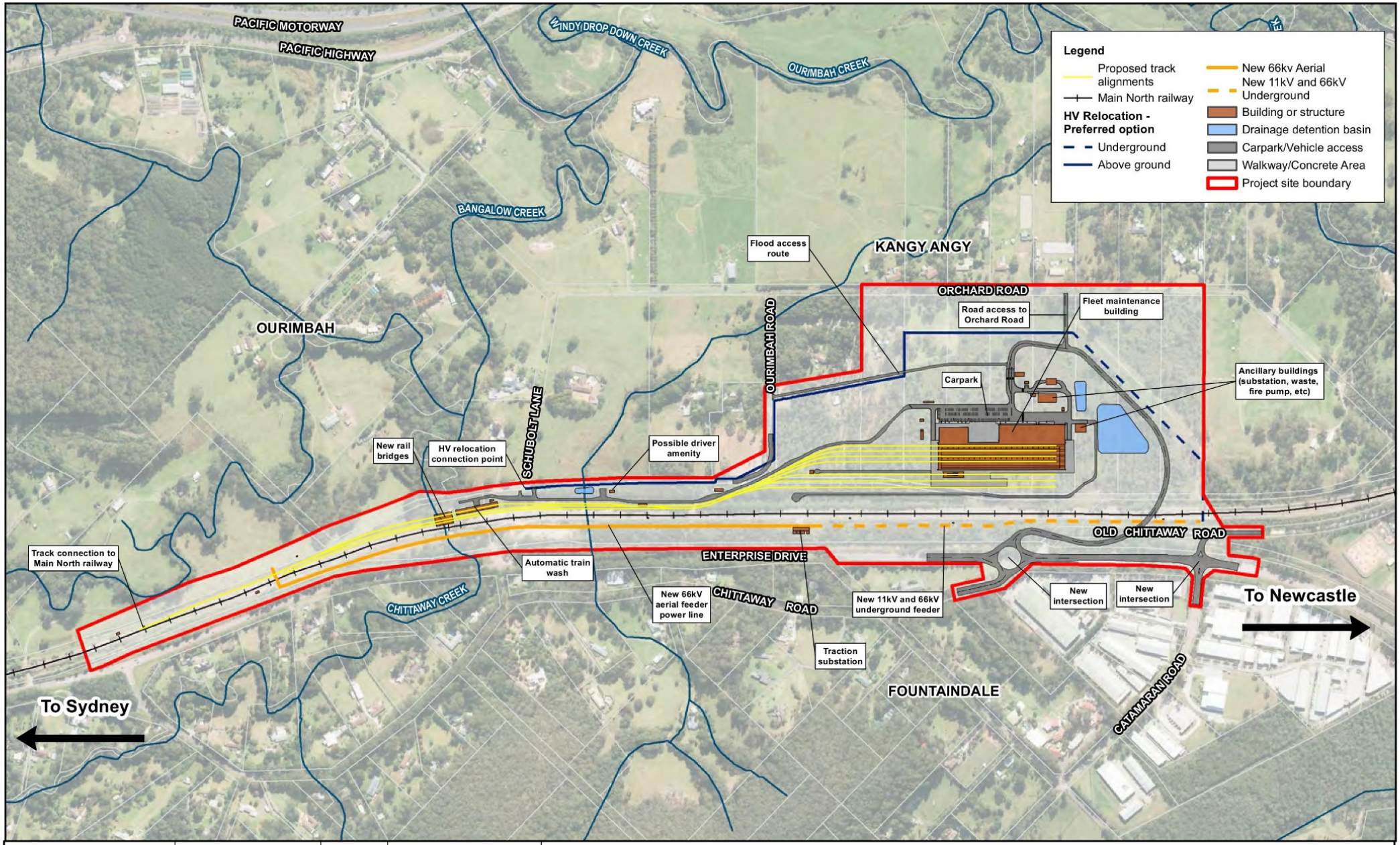
Figure 6.1 provides an overview of the Project incorporating each of the design changes identified above. Section 6.3 to section 6.9 provides further detailed descriptions and illustrations of these changes.

6.2 Assessment approach

An environmental assessment of each proposed design changes was undertaken, which included consideration of key and non-key environmental, social and economic issues and an assessment of the potential changes to the environmental impacts described and discussed in the REF. Evaluation of the proposed design changes for the Project also provided an opportunity to identify potential reduction in environmental impact and other benefits.

A summary of the potential environmental issues affected by each of the proposed design changes is provided in Table 6.1. Only the issues selected were assessed, as impacts associated with other issues were considered to be unchanged from those assessed in the REF.

Consideration of the potential impacts has been undertaken having regard to the factors provided in Clause 228 of the (NSW) *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), and the matters of national environmental significance under the EPBC Act, which includes amendments arising from the proposed design changes, has also been undertaken in Appendix C of this Combined Submissions Report.



Map: 2202522A_GIS_F015_A6	Author: BorgM
Date: 3/08/2016	Approved by: JB

Data source: - © Land and Property Information 2015

0 90 180 m

1:9,500

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

Note: Design is indicative only.
Subject to detailed design

WSP | PARSONS BRINCKERHOFF

New Intercity Fleet Maintenance Facility Project
Figure 6.1
Project overview

Table 6.1 Summary of environmental issues potentially affected by the proposed design changes

Environmental issue / Design changes	Biodiversity	Noise and vibration	Landscape and visual character	Non-Aboriginal heritage	Aboriginal heritage	Traffic, transport and access	Socio-economic	Land use and property	Hydrology, drainage and flooding	Groundwater	Soils, geology and contamination	Waste and resources	Air quality	Climate change and greenhouse gases	Bushfire	Public utilities	Hazard and risk
Detention basins	✓		✓						✓	✓							
High voltage line realignment	✓		✓														
Sydney Trains 11kV and 66kV power lines	✓		✓														
Signalling building	✓		✓														
Access road bridge construction methodology		✓															✓
Enterprise Drive intersection	✓					✓		✓									
Site fill level and earthwork volumes						✓											

6.3 Detention basins

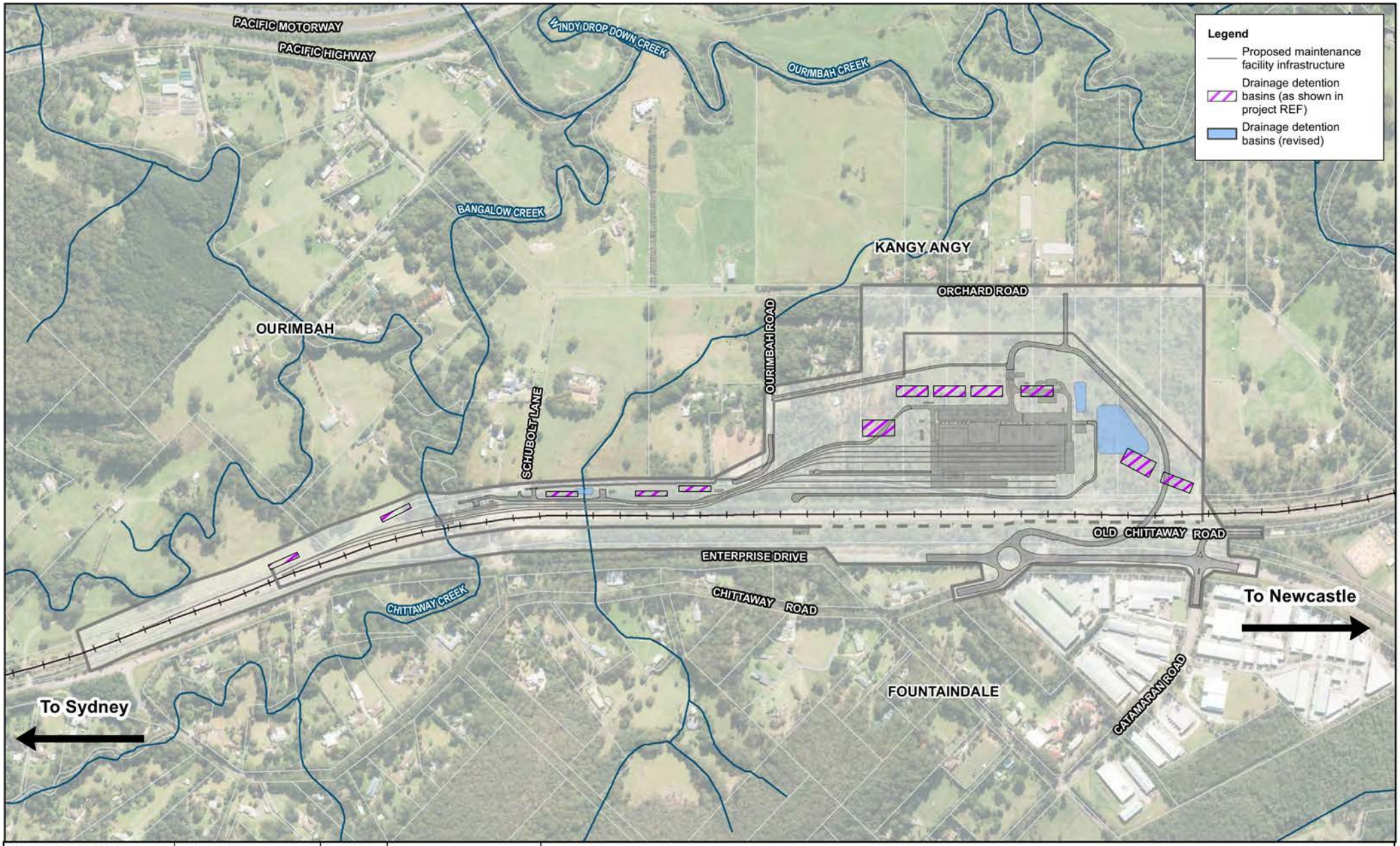
6.3.1 Description of the REF design

As part of the development of the Project, a concept plan for stormwater drainage dispersal was prepared for the Project which identified the general areas requiring drainage as part of the operation of the maintenance facility. The maintenance facility site was divided into 13 separate catchments that stretched across sections of the site. For each of these catchments, direct flows of stormwater were proposed to be directed toward a series of detention basins, generally by a piped drainage system. The areas between the new rail lines would be drained via surface drains and pipes. These would then pass into a piped network that would connect to the detention basins surrounding the site at closest possible locations.

As described in Section 4.2.6 of the REF, up to 14 detention basins were proposed to be constructed across the western side of the site to supplement the proposed drainage within the maintenance facility site. These basins would be designed to help attenuate the flows discharging into the main drainage system during a 1 in 100 year flood event. In addition, one of the detention basins would also be utilised for bushfire management on site. The largest of these basins would be located around the fleet maintenance building and car park. A series of smaller basins were also identified along the arrival and departure section of the facility along the eastern side of Turpentine Road.

6.3.2 Description of the proposed design change

The design of the on-site stormwater detention system has been modified, including the rationalisation of the number of detention basins required to manage surface water flows for the Project site. The modified design would provide for a total of three detention basins which are intended to manage all on-site stormwater detention for the Project site. While the total number of detention basins has been reduced in comparison to the design which was displayed, the overall volume of water which would be detained within the three modified detention basins would be the same as previously proposed. The approximate storage areas for each of the proposed detention basins are provided in Table 6.2. The location of the revised detention basins are also shown in Figure 6.2.



Map: 2202522A_GIS_F088_A2	Author: BorgM
Date: 3/08/2016	Approved by: JB

Data source: © Land and Property Information 2015

0 100 200 m

1:9,500

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

Note: Design is indicative only.
Subject to detailed design

New Intercity Fleet Maintenance Facility Project
Figure 6.2
Location for modified detention ponds

Table 6.2 Detention basin storage

Detention basin number	Approximate area (square metres)	Approximate volume (cubic metres)	Location
Detention basin 1	6,745m^2	12,390m^3	Between main maintenance facility and access road
Detention basin 2	1,080m^2	875m^3	Adjacent to water treatment plant
Detention basin 3	370m^2	460m^3	Between train wash plant and driver amenity building

6.3.3 Change in impact

Biodiversity

The proposed amendment to the detention basins would generally result in a smaller amount of vegetation required to be removed in comparison to the areas of vegetation that were identified for removal in the REF, due to the overall reduced number of detention basins proposed. This reduction in vegetation would also result in a reduced amount of threatened species and an EEC being impacted by the Project. Further consideration of the siting and capacity requirements of the detention basins would continue to be undertaken throughout the detailed design phase of the Project in order to further reduce potential impacts associated with the Project.

Landscape and visual character

The refinement to the design of the detention basins would result in a reduced overall number of detention basins required for the Project (and corresponding area of overall impact). In addition, the proposed detention basins would be located generally in the same locations as the previously proposed basins (one between the Main North rail line and Turpentine Road and two to the north of the main maintenance building) or where previous ground disturbance was proposed (as would be the case for the larger detention basin 1 to the north of the fleet maintenance building).

As a result of the design refinement, the locations for the previously proposed detention basins would be able to be retained or revegetated (subject to the final construction methodology) allowing for an overall increase in the amount of retained (or revegetated) landscaping within the Project site. It is therefore considered that the proposed modification would result in a slightly improved landscape and visual outcome for the overall maintenance facility site.

Hydrology, drainage and flooding

The modification to the size and location of the detention basins would not result in any overall change to hydrology, drainage and flooding impacts to those assessed in the REF.

The design of the modified detention basins would continue to be capable of discharging the main drainage system during a 1 in 100 year annual exceedance probability (AEP) flood plus 10 percent for climate change. The largest of these basins (detention basin 1) would be located around the fleet maintenance building and car park.

Similarly to what was described in the REF, drainage pipes would be connected to the detention basins. During storm events, the pipes would fill up with water and the detention basins balance between the basin and the pipe system. Drainage works associated with the modified detention basins would continue to be designed for the 1 in 100 year flood event with an allowance of 10 percent made for potential future climate change impacts.

Groundwater

During detailed design, the final dimensions for the detention basins would be determined and potential associated groundwater impacts would be considered and assessed.

6.3.4 Additional or changed management and mitigation measures

No additional management and mitigation measures are considered to be required for the design refinement to the detention basins.

6.4 High voltage (Ausgrid 33kV) power line realignment

6.4.1 Description of the REF design

As described in Section 3.2.2 of the REF, the existing (Ausgrid 33 kilovolt) feeder line that currently runs through the proposed maintenance site requires relocation as part of the new maintenance facility. Discussion with Ausgrid regarding the preferred alignment for the realignment of the Ausgrid 33 kilovolt (kV) power line was initially undertaken with respect to the relocation of this power line prior to the preparation of the REF. At that time, two options for the realignment of the power lines were identified. These options included the following:

- *Option 1* – this alignment would commence at the intersection of Turpentine Road and Schubolt Lane. The alignment would follow Schubolt Lane to Orchard Road, and would then follow Orchard Road to the northern boundary of the maintenance facility site. From this point, the alignment would follow the northern boundary of the maintenance facility site to a new connection point new Old Chittaway Road.
- *Option 2* – this alignment would commence at the intersection of Turpentine Road and Schubolt Lane and would follow Turpentine Road north to the corner of Turpentine Road and Ourimbah Road. At this point, the alignment would generally be located to within the western portion of the site towards Orchard Road. At Orchard Road, the alignment would be similar to that for Option 1, providing a new connection point along Old Chittaway Road.

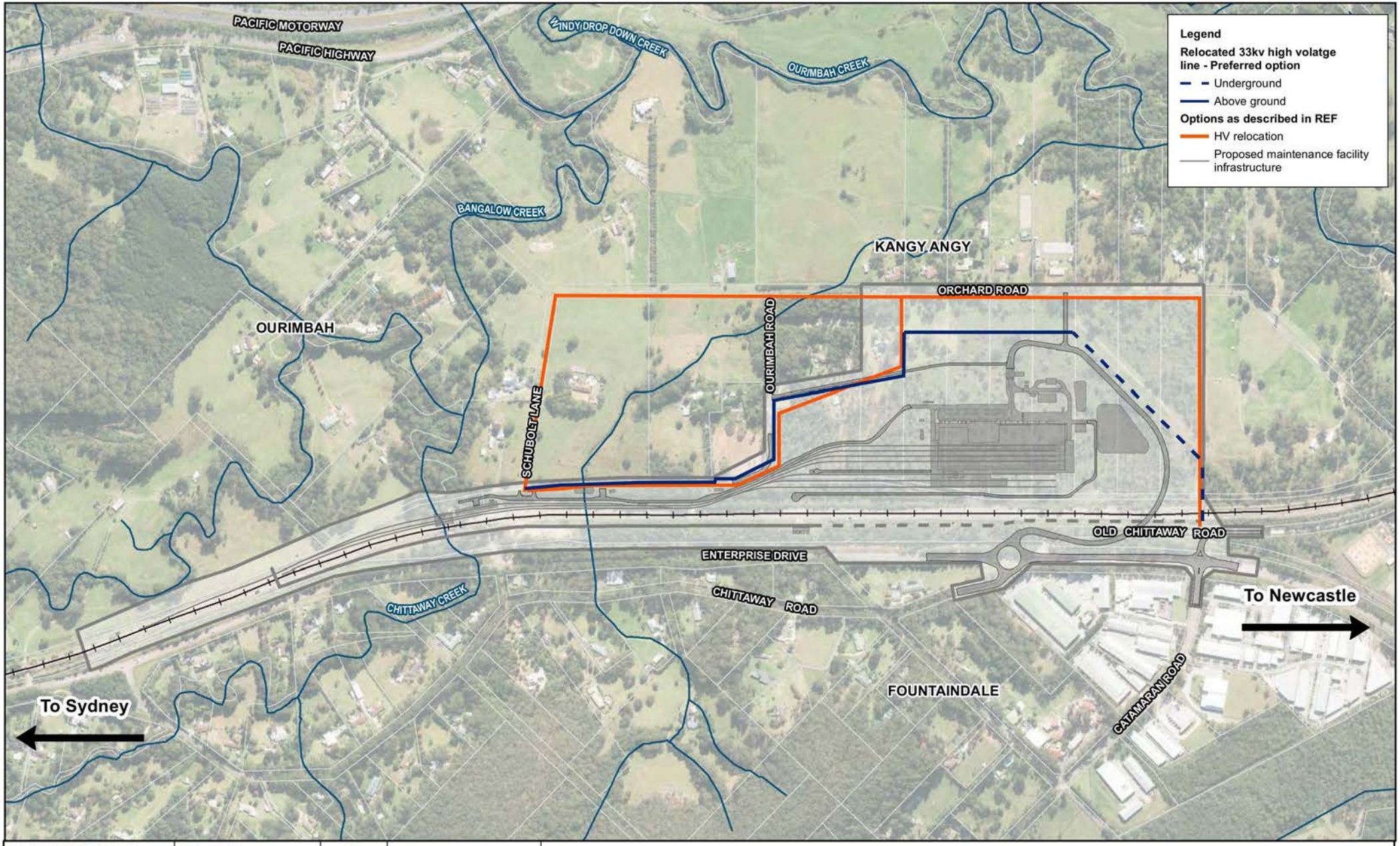
The alignments of the two potential routes were shown on Figure 4.1 and Figure 4.2 of the REF.

6.4.2 Description of the proposed design change

Following the display of the REF, ongoing consultation with Ausgrid has been undertaken to determine the final preferred alignment for the Ausgrid 33kV power line. Based on discussions with Ausgrid and ongoing detailed design of the facility, the preferred option for the preferred alignment for the relocation of the Ausgrid 33kV power line was the general alignment of Option 2 (refer to Figure 6.3).

This alignment has also been refined to further minimise potential impacts associated with the relocation of this infrastructure. The key changes to the proposed alignment from that described as Option 2 in the REF are:

- North of Ourimbah Road, the alignment of the Ausgrid 33kV power line would more closely follow the alignment of the proposed flood access route and would remain to the east (maintenance facility side) of the existing powerline easement that runs parallel to Orchard Road)
- Following the point where the relocated Ausgrid 33kV power line crosses the proposed entrance driveway from Orchard Road, the Ausgrid 33kV power line is proposed to follow the alignment of the existing transmission line easement prior to reconnection with the existing alignment at the northern end of the Project site. This alignment has been modified from the previous alignment which was proposed along the northern boundary of the Project site.



Map: 2202522A_GIS_F091_A2	Author: BorgM	
Date: 3/08/2016	Approved by: JB	

Data source: © Land and Property Information 2015

0 100 200 m

1:9,500

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

Note: Design is indicative only.
Subject to detailed design

New Intercity Fleet Maintenance Facility Project
Figure 6.3

Preferred high voltage power line alignment

6.4.3 Change in impact

The environmental assessment presented in the REF considered the potential impacts associated with each of these options. As such, the determination of the preferred option would not result in any additional environmental impacts outside of previously impacted areas compared identified in the REF. Notwithstanding, the selection (and refinement) of the preferred alignment would have the following key benefits:

- Slightly shorter overall length
- Reduced visual prominence of the power line as it would be closer to the proposed maintenance facility, located away from Orchard Road, and would more closely integrate with the infrastructure of the new facility
- The preferred alignment would remove the potential to impact on identified areas *Melaleuca biconvexa* along Orchard Road
- Generally outside of the identified 1:100 flood impact level.

6.4.4 Additional or changed management and mitigation measures

No additional management and mitigation measures are considered to be required for the determination of the alignment for the Ausgrid 33kV power lines.

6.5 Sydney Trains 11kV and 66kV power lines

6.5.1 Description of the REF design

As outlined in Section 4.2.4 of the REF, the existing Sydney Trains 66 kV power line (located on the western side of the railway tracks) would need to be relocated to the eastern side of the railway tracks as part of the overall scope of works for the Project. The proposed configuration for this relocation was to provide a combination of the following configurations:

- Between the southern extent of the Project and the proposed traction substation building, the 66kV power line would be installed as a new aerial power line (i.e. on new poles) between the Main North Line and Enterprise Drive. As part of the proposed works identified in the REF, the existing 11kV power line along this section of the Project would be retained.
- Between the proposed traction substation building and the northern extent of the Project, the 66kV power line would be installed underground in a combined trench containing the 66kV power line and the undergrounding of the existing 11kv powerline.

The proposed arrangement for the relocation of these electrical lines at this location were shown on Figure 4.1 and Figure 4.2 of the REF.

6.5.2 Description of the proposed design change

Due to spatial constraints identified as part of the ongoing development of the detailed design for the power line relocation for the Sydney Trains 11kV and 66kV services, it has been identified that the alignment between the southern extent of the Project and the traction substation cannot provide for separated alignments for these services. In order to accommodate both the 11kV and 66kV services, it is proposed to install new power poles along this section of the alignment which would house both the 11kV and 66kV power lines.

The alignment for the joint use power line and power poles would be similar to that previously proposed in the REF for the individual 66kV power line alignment. As part of the refined design, five new joint use poles (poles able to accommodate both the 11kV and 66kV services) would be required between the cross over point for the 66kV power line (from the western side of the track to the eastern side).

From a point approximately 200 metres south of the Chittaway Creek rail bridge, the existing corridor would be sufficiently wide enough to support separated power lines and would no longer be required to utilise shared poles. From this point, the proposed 66kV power line would be consistent with the alignment described in the REF.

6.5.3 Change in impact

Biodiversity

The proposed modification to the arrangement for the power lines within the rail corridor would not result in a substantial change to the overall vegetation clearance which was identified in the REF. The proposed modification would generally follow the same alignment as the previously proposed alignment for the single 66kV powerline, resulting in minimal changes to the overall vegetation required to be cleared for this component of the Project.

Landscape and visual character

The proposed modification to the arrangement for the power lines within the rail corridor would not result in a substantial change to the overall visual impact to that which was assessed in the REF. The proposed modification would result in the same number of power lines visible from adjacent receivers, however would result in a minor rationalisation of the number of power poles for the southern section of the alignment (although utilising slightly taller poles – by approximately three metres – to maintain the required clearance separation between the wires), providing a minimal reduction in overall visual clutter at this point.

6.5.4 Additional or changed management and mitigation measures

No additional management and mitigation measures are considered to be required for the revised arrangement for the 11kV and 66kV power lines.

6.6 Train signalling building

6.6.1 Description of the REF design

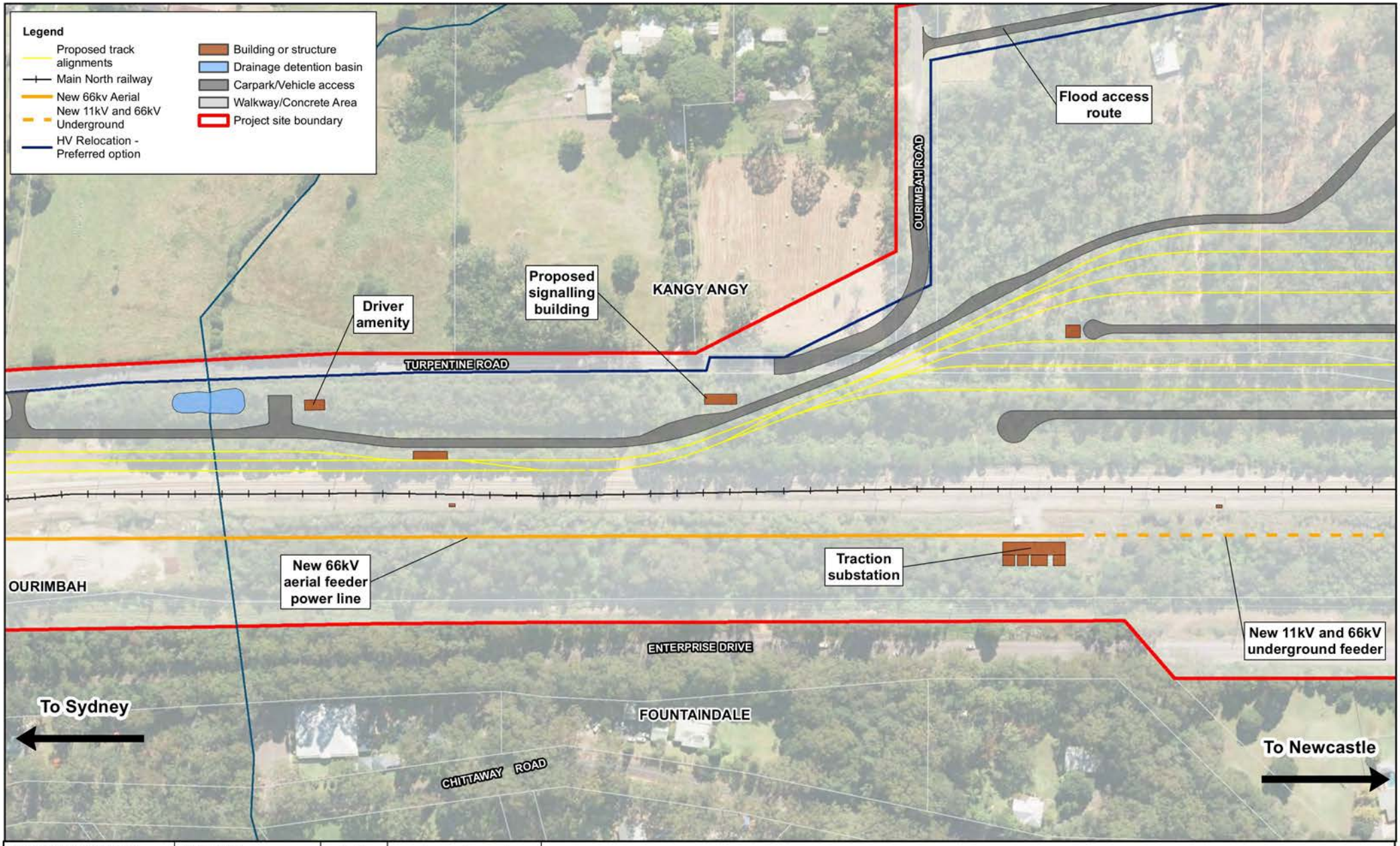
As described in Section 4.2.3 of the REF, new and relocated signals on the Main North Line would be provided to protect and control movements for the connection of the maintenance facility site from the existing railway line. These connections would be provided through a new signalling building within the Project site. This building was proposed as part of the detailed description of the maintenance facility in Section 4.1 of the REF.

6.6.2 Description of the proposed design change

As part of the ongoing design of the maintenance facility and supporting infrastructure following the display of the REF, the location of the signalling building has been determined. Due to the operational requirements for the building and required connection points, the signalling building is proposed to be located adjacent to the realigned section of Turpentine Road and Ourimbah Roads.

The signalling building would be utilised to communicate and interface with the main Sydney Trains control system and would house a range of telecommunications and signalling equipment. The building would be designed to be consistent with the requirements of RailCorp's *Engineering Specification – Signals – Construction: Small Buildings and Location Cases (SPG 0708)* and would have an area of approximately 20 metres by 10 metres (subject to detailed design). The building would also be designed to be consistent in appearance to the other buildings proposed as part of the maintenance facility such as driver's amenity building, the automatic train wash building and the main maintenance facility buildings.

The location of the proposed signalling building is shown on Figure 6.4.



Map: 2202522A_GIS_F090_A2	Author: BorgM		0 20 40 m 1:2,500
Date: 3/08/2016	Approved by: JB		Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A4

Data source: © Land and Property Information 2015

Note: Design is indicative only.
Subject to detailed design

New Intercity Fleet Maintenance Facility Project
Figure 6.4
Location of proposed signalling building

6.6.3 Change in impact

Biodiversity

The proposed amendment to allow for the inclusion of the signalling building would result in a small area of vegetation previously identified to be retained as be removed. This area would be commensurate with the final size of the signalling building (up to approximately 300 to 400 square metres including allowance for construction), however would not consist of vegetation identified as *Melaleuca biconvexa*.

Further consideration of the siting and area required to be cleared to accommodate this building would be undertaken throughout the detailed design phase of the Project in order to further reduce potential impacts associated with the Project. In addition, where possible, additional landscaping would be provided around the signalling building following construction to assist with screening the building. In particular, opportunities for additional landscaping would be sought on the western side of the building, adjacent to Turpentine Road.

Landscape and visual

The potential operational landscape and visual impacts of the Project within the vicinity of the proposed signalling building was described in Section 7.3.4 of the REF. This assessment noted that within the view point which would be affected by the proposed signalling building, that this view would include views towards the widening of Turpentine Road in this location, bringing the road into closer proximity to the dwelling and require the removal of some vegetation. In addition, it was noted that filtered views would be available to the rail tracks, trains and security fence beyond this change.

Visually, the proposed signalling building would add to the infrastructure visible from the properties through the filtered views from the adjacent side of Turpentine Road. However, the building would be screened through the use of a range of soft landscaping to soften the appearance of the building from these locations.

6.6.4 Additional or changed management and mitigation measures

The management and mitigation measures previously proposed in the REF, in particular management measures M.1, M.2 and M.4, are considered to be suitable to manage the potential impacts associated with the proposed signalling building.

6.7 Access Road bridge construction methodology

6.7.1 Description of the REF design

The initial construction methodology proposed for the construction of the access road bridge which was assessed in the REF included the use of bored piling to construct the required bridge piers. Using this methodology, foundation piles are created using crane mounted drilling equipment (or similar) to remove the soil and create a borehole which are then backfilled with concrete and reinforcing steel to create the foundation for the bridge piers.

The assessment of the construction of the access road bridge within the REF, in particular noise and vibration impacts, were based on this construction scenario. This was identified in Table 8-2 of the *Noise and Vibration Impact Assessment* (Appendix B of the REF) which noted the assumption of bored piling rigs as the relevant construction equipment for this phase of construction.

6.7.2 Description of the proposed design change

Following display of the REF, further development of the detailed construction methodology for the Project, including the constructability of the access road bridge, has been undertaken. In addition, further geotechnical information within the vicinity of the access road bridge has been obtained which has provided an increased understanding of the existing ground conditions needed to be considered for the foundations of the bridge.

Due to the current geological conditions (softer soil materials and depth to a rock), the proposed methodology for the construction of the access road bridge has been refined. The review of constructability of the access road bridge as a result of these ground conditions concluded that there would be additional construction risks including:

- Interaction and mitigation associated with existing groundwater
- Excess spoil from drilling activities
- Additional timing associated with bored piles.

The current construction methodology for the access road bridge has been refined. It is now proposed to undertake this work as driven (impact) piles instead of bored piles. A brief description of this construction methodology is outlined below.

Driven pile construction

The driven pile construction methodology would utilise pre-cast concrete square piles (approximately 500 millimetres by 500 millimetre square). The pre-cast piles would be approximately 12 to 20 metres in length and would be cast off site by a specialty manufacturer and transported by road to site.

The pre-cast pile units would be installed with a crane-like piling rig with a leader and a hammer which would be used to drive the pile into the softer ground material. The initial stage of the installation would involve the piles being lifted into the leader and aligned with the required pile location. The hammer unit would then drive the pile into the ground. Subsequent sections would then be added (as required for the final depth).

An illustrative example of this methodology is shown in Figure 6.5.

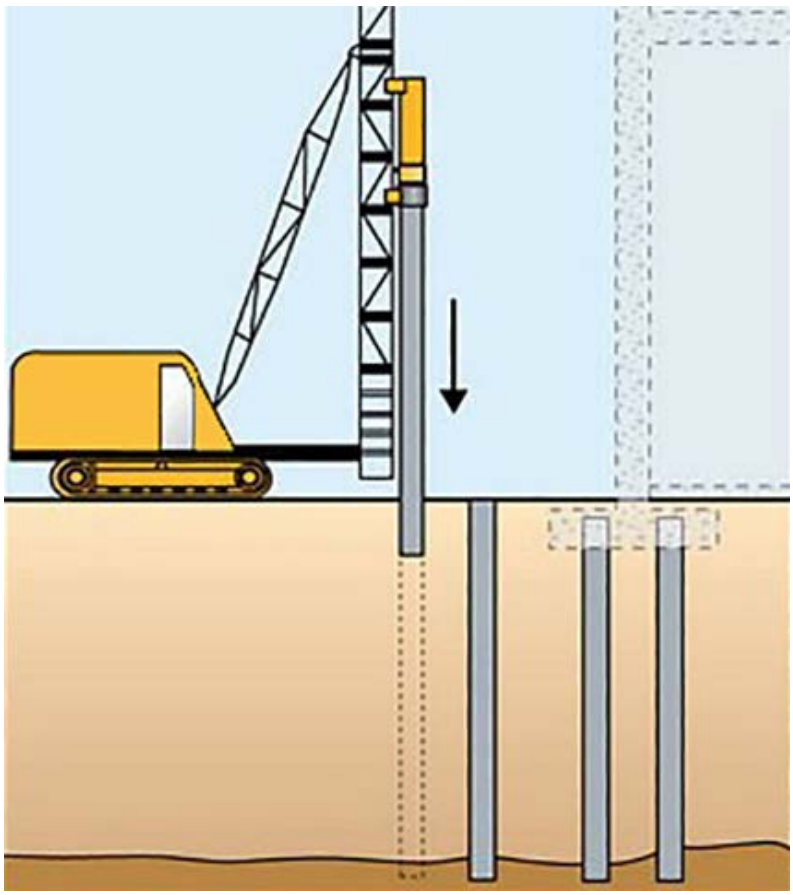


Figure 6.5 Illustration of a typical pile driven construction methodology (subject to specific equipment used)

A majority of the proposed bridge piles would be outside of the rail corridor and would be constructed during standard construction hours with two bridge piles located in the rail corridor which would be undertaken during scheduled rail shutdown periods. It is estimated that a piling rate of between approximately four and five piles per day would be achievable during standard construction hours. The two bridge piers adjacent to the rail line which would be built during a shutdown may require greater than eight hours to construct.

The anticipated duration for the bored piles allowed for approximately 90 days (approximately 18 weeks) for piling. Based on the number of piles required to construct the access road bridge and the anticipated rate of installation of the driven piles, it is estimated that driven piling would be completed within approximately four to five weeks. The required duration for driven piles is therefore substantially reduced compared to bored piles construction methodology.

6.7.3 Change in impact

Noise and vibration

In order to assess the potential change in impacts associated with the revised construction methodology, an additional noise and vibration assessment of the impacts associated with impact piling was undertaken. This assessment is provided in Appendix F and summarised below.

Construction noise impacts

As a result of the change in methodology to include impact piling, noise levels are expected to increase by between approximately 5 and 7dBA at receivers during standard hours. This would result in up to seven additional receivers (to a total of 14) of the closest receivers experiencing noise impacts above the noise management levels during standard construction hours.

Impact piling during out of hours work is expected to increase noise levels by up to 11dBA compared with the previously assessed scenario. This would means that up to 15 additional receivers would be impacted above the night time out-of-hours noise management level. The total affected number of receivers with the addition of impact piling outside of standard hours would be 56.

Under the previous piling methodology, no receivers were predicted to exceed the maximum noise levels. With an increase of up to 11dBA in the maximum noise level during piling works, ten receivers would be expected to exceed the sleep disturbance screening criteria. These receivers are the receivers on Orchard Road, 170 Old Chittaway Road, 16 Station Road and 139 Orchard Road.

Based on the revised assessment of the potential construction noise impacts for the impact piling:

- No receivers were identified that would exceed the ‘highly noise affected’ noise management levels (NML) during standard hours.
- Residential properties on Orchard Road, Old Chittaway Road and Station Road East were predicted to exceed the ‘noise affected’ NML when works are conducted during the standard hours.
- Residential properties on Turpentine Road, Schubolt Lane, Ourimbah Road, Orchard Road, Old Chittaway Road and Station Road East were predicted to exceed the NML for out-of-hours works periods.
- Some residential properties on Turpentine Road, Old Chittaway Road and Station Road were predicted to only exceed the NML for both the evening and night time out-of-hours works periods.
- The predicted construction noise levels at the child care centre on Old Chittaway Road were predicted to exceed the NML for works conducted during standard hours.
- Noise levels at the Central Coast Rudolf Steiner School during construction were predicted to exceed the NML for works conducted during standard hours.
- The closest residential properties at Orchard Road, Station Road East and Old Chittaway Road were predicted to exceed the sleep disturbance criteria
- Noise levels at the industrial land use area during construction were predicted to exceed the NML at 2 Catamaran Road during standard construction hours.

Overall, the assessment indicated that the predicted noise levels would be likely to exceed the 'noticeable', 'clearly audible' and in some cases 'moderately and highly intrusive' noise levels. Therefore additional mitigation measures have been identified to mitigate impacts to affected receivers.

Construction vibration impacts

The most dominant construction vibration sources during the construction of the access road bridge would be the use of the impact piling rigs which would have the potential to result in vibration impacts on nearby sensitive receivers. The nearest commercial receiver to the proposed bridge site is approximately 100 metres and the nearest residential receiver is approximately 300 metres away.

The additional assessment undertaken identified that, based on the estimated vibration levels and associated safe working distances, cosmetic damage is not considered to be a significant risk from to the proposed construction at the nearest sensitive receivers. While some vibration may be perceptible at the nearest buildings, it is unlikely to be a risk for the majority of receivers.

Operation impacts

The proposed refinement of the construction methodology for the construction of the access road bridge would not impact on the potential operational noise impacts identified in the REF.

Hazard and risk

Construction impacts

As part of the detailed constructability review of the previously proposed construction methodology (i.e. bored piles), concerns were identified regarding the proposed use of this methodology within close proximity to the rail corridor of the Main North Line. The use of the driven pile methodology is considered to provide a safer installation process than bored piles, in particular within proximity to the rail corridor.

6.7.4 Additional or changed management and mitigation measures

Based on the revised construction methodology, some additional noise and vibration management measures have been identified. Consistent with the measures outlined in the REF Report, it is recommended that the impact piling activities are considered as part of the CNVMP. Specific additional mitigation measures would be identified for affected receivers at the CNVMP stage of the Project. These measures could include, but are not limited to, the following:

- Using a wood block or other damper for the driving hammer
- Selecting machines which minimise auxiliary noise sources
- Shielding the impact area with a sleeve, where feasible
- Providing appropriate respite periods between periods of impact piling
- For piling activities requiring works outside of standard construction hours, carrying out intensive piling works before 10.00pm and after 7.00am on weekends
- Consulting with the community to identify periods when they are less sensitive to impact piling works and working with these timings e.g. school examination periods or community events. This would include individual briefings, phone calls and specific notifications
- Noise monitoring would be undertaken throughout the impact piling operations to monitor noise impacts from these activities.

6.8 Enterprise Drive intersection

6.8.1 Description of the REF design

Section 4.2.3 of the REF identified that due to the increased number of vehicles and size of some vehicles which would be required to access the maintenance facility during construction and operation, a new access road would be required to be constructed to allow access to the site and to provide a crossing of the Main North Line.

The REF noted that the new access road would be accessed from Enterprise Drive via a new intersection with Old Chittaway Road. From the intersection with Enterprise Drive, the access road would start to ramp up to a curved viaduct structure over the Main North Line. As identified in the REF, the new access road intersection at Enterprise Drive would consist of a four-way intersection between Enterprise Drive, the new access road and Old Chittaway Road. The proposed arrangement as described is shown in Figure 6.6 below.

Due to the design of the access road, the current southern section of Old Chittaway Road was also proposed to be removed. A diversion for Old Chittaway Road traffic would be built opposite Catamaran Drive to maintain access to Old Chittaway Road (refer to Figure 6.6).

6.8.2 Description of the proposed design change

Traffic modelling of the expected traffic conditions for the proposed new intersection of Enterprise Drive and Old Chittaway Road presented in the REF noted that the proposed intersection would not achieve a satisfactory Level of Service during both the construction and operational periods of the Project. As a result, a series of management and mitigation measures were identified in the REF for further consideration during the subsequent phases of design with the aim of improving the performance of this intersection. These measures included:

- Removal of the existing northbound right turn movements from Enterprise Drive into Old Chittaway Road, and conversion of this part of the roadway into a southbound short merge lane for right turns out of the new access road into Enterprise Drive
- Providing a ‘seagull arrangement’ (a type of three-way road intersection usually used on high traffic volume roads and dual carriageways) to improve right turn movement from the new access road into Enterprise Drive
- Prohibiting right turn movements from Old Chittaway Road into Enterprise Drive
- The use of a roundabout or signalised intersection at this location
- Removal of the access to Old Chittaway Road at this location.

Based on the recommended measures for this intersection, ongoing design of this intersection has identified that the development of a roundabout would be the preferred intersection arrangement.

The roundabout would be located within the same location as the previously proposed intersection and would allow for all traffic movements between Enterprise Drive, Old Chittaway Road and the proposed new access road. This would result in an improved outcome for the operation of this intersection in comparison to the previously proposed intersection arrangement.

The currently proposed design for the intersection would provide for a one lane roundabout with a 20 metre radius, allowing for access between Enterprise Drive, Old Chittaway Road and the proposed access road to the maintenance facility.

An indicative arrangement of the proposed roundabout arrangement is shown in Figure 6.6 and an indicative illustration comparing the existing intersection and proposed roundabout arrangement (subject to ongoing detailed design and discussion and approval with Central Coast Council) is provided in Figure 6.7.

Map: 2202522A_GIS_F089_A1	Author: GoganovskiM
Date: 21/07/2016	Approved by: -

Data source: - © Land and Property Information 2015

0 10 20 m

1:3,000

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

Note: Design is indicative only.
Subject to detailed design

WSP | PARSONS BRINCKERHOFF

\\APSYDFIL03\proj\TITPT_FOR_NSW_PROJ_D\VI\2202522A_NIF_REF_KANGY_ANGY_MA\INTENANC\10_GIS\Projects\Maps\2202522A_GIS_F089_A1.mxd

New Intercity Fleet Maintenance Facility Project
Figure 6.6
Revised Enterprise Drive intersection arrangement

Based on Concept Design, subject to change during detailed design.

Figure 6.7 View of the intersection of Enterprise Drive and Old Chittaway Road showing the existing intersection (top) and proposed new roundabout arrangement (bottom)

6.8.3 Change in impact

Traffic, transport and access

As part of the *Traffic and Transport Impact Assessment* undertaken for the REF, intersection traffic modelling was undertaken to determine the performance of the proposed intersection layout of the Enterprise Drive, Old Chittaway Road and new access road intersection during operation. As described in section 7.6.2 and section 7.6.3 of the REF, this modelling indicated that the proposed layout of the Enterprise Drive, Old Chittaway Road and the new access road intersection would operate at a level of service (LoS) of F for both construction traffic (peak period in 2017) and operational traffic during both the morning and afternoon peak hours (representing a low performance for this intersection). This intersection would also potentially require the restriction of some right hand turning movements between Enterprise Drive and Old Chittaway Road.

Following development of the roundabout, additional traffic modelling of the revised intersection was undertaken to assess this operation of this design. The revised modelling indicates that the operation of the intersection as a roundabout would continue to operate at a substantially improved LoS in comparison to the previously proposed intersection arrangement. The implementation of the roundabout would generally provide a LoS of A for most traffic movements, with some traffic approaches/movements resulting in a LoS of B. This LoS is expected to occur during both the construction and operational phases of the Project (including the 20 year Design Life to 2039 allowing for an assumption of approximately 1.5 percent per annum growth of Enterprise Drive).

Overall, the proposed modification to the arrangement of the Enterprise Drive intersection to provide a roundabout would provide an overall improved traffic and transport outcome for the Project.

Transport for NSW would continue to consult with both Roads and Maritime Services and the Central Coast Council regarding the detailed design requirements for the roundabout, including the requirements for road occupancy licence(s) or any requirements to amend the existing speed limit along Enterprise Drive within the vicinity of the new intersection.

Landscape and visual

Construction impacts

The potential construction landscape and visual impacts of the Project on the existing road corridor along Enterprise Drive were presented in Section 7.3.3 of the REF. This assessment noted that, in general, the visual impacts associated with construction would be likely to result in moderate/high to high impacts for properties with views towards the Project site, including the proposed intersection works. The proposed modification to construct the proposed roundabout would result in similar impacts to those described in the REF and would continue to result in a moderate/high to high impact during this period.

Operation impacts

The potential operational landscape and visual impacts of the Project on the existing road corridor along Enterprise Drive was presented in Section 7.3.4 of the REF. This assessment noted that for the visual impacts associated with the public viewpoint along the Enterprise Drive road corridor that the presence of existing transport infrastructure, low sensitivity of receptors and short duration of view would result in an overall visual impact rating of low. The proposed development of the roundabout would continue to provide an additional road transport element to the existing Enterprise Drive corridor, and would be consistent with the assessment provided in the REF.

Land use and property

The design of the proposed intersection arrangement as described in the REF identified that a majority of the intersection could be accommodated within the existing road reserve boundaries of Enterprise Drive, and Old Chittaway Road, with some additional land required within the adjacent rail corridor at the south-west corner of the intersection.

Whilst requiring a slightly larger footprint, the modified design would continue to be predominantly contained within the existing road reserve with some additional rail corridor land required to accommodate the turning land towards the new access road bridge. Ongoing development of this intersection during detailed design would be undertaken in order to reduce the overall size of the roundabout, and minimise potential impacts to any adjoining land outside of the road reserve.

6.8.4 Additional or changed management and mitigation measures

Additional management and mitigation measures which have been identified as a result of the proposed modification include the following:

- Transport for NSW would consult with both Roads and Maritime Services and the Central Coast Council regarding the detailed design requirements for the roundabout, including the requirements for road occupancy licence(s) or any requirements to amend the existing speed limit along Enterprise Drive.
- The lighting design would be developed by a suitably qualified lighting designer and prepared in accordance with AS 1158 "*Road Lighting*" and AS 4282 "*Control of the Obtrusive Effect of Outdoor Lighting*".

6.9 Site fill level and required earthwork volumes

6.9.1 Description of the REF design

As described in Section 4.4.6 of the REF, given the relatively flat nature of the site, it is not anticipated that substantial earthwork volumes would be required to be moved as part of the Project. However, some levelling of the site and other earthworks would be required, in particular with respect to the construction of the new rail embankments and new access road off Enterprise Drive.

An outline of the estimated cut and fill requirements that were presented in the REF are provided in Table 6.3. The estimated cut and fill requirements were based on the Project design considered in the REF in addition to information available (such as ground and soil conditions) at the time of preparing the impact assessment.

Table 6.3 REF Estimated cut and fill requirements

Activity	Approximate volume (cubic metres)
Rail embankment	
General fill	11,500m^3
Imported fill (capping and structural zone)	30,000m^3
Topsoil strip and stockpile	4,000m^3
Maintenance facility site	
Net cut for rail embankment	Between 11,500m^3 and 26,500m^3 (depending on subgrade quality)
Expected topsoil strip and stockpile	11,500m^3
Imported fill (capping and structural zone)	Between 49,000m^3 and 98,000m^3 (depending on subgrade quality)

6.9.2 Description of the proposed design change

Following display of the REF, ongoing detailed design has allowed for the refinement of the site levels for the Project site to accommodate all required Project elements. As noted above, the estimated cut and fill requirements presented in the REF were based on the Project design considered at the time of preparing the impact assessment.

Based on the ongoing refinement of the design, consideration of additional details regarding the ground conditions, additional modifications to the Project (such as the revised detention basins described in section 6.3 of this Combined Submissions Report), an updated estimate of the amount of earthworks required for the Project have been identified.

Table 6.4 identifies a revised level of estimated earthworks quantities required for the Project. These estimates include the earthwork requirements for capping materials, embankments, detention basins and the access road within the proposed site boundaries.

Table 6.4 Estimated earthwork quantities

Cut/fill requirement	Estimated volume (cubic metres) – REF (based on information in Table 6.3 above)	Estimated volume (cubic metres) – revised
Cut volume	Between 27,000m^3 and 42,000m^3	19,655m^3
Fill volume	Between 90,500m^3 and 139,500m^3	133,770m^3

As shown in Table 6.4, the total mass of suitable cut required within the Project site has been estimated to be approximately 19,655 cubic metres with an approximate total fill requirement of approximately 133,770 cubic metres. This indicates that there would be a requirement to import the balance of fill material of approximately 114,115 cubic metres for use on the site. The volumes have been extrapolated by calculating the difference between the proposed surface and existing surface.

It should also be noted that the final extent of earthworks would continue to be refined during the ongoing detailed design phase of the Project.

6.9.3 Change in impact

The change to the estimated fill volumes is not expected to result in any substantial changes to the impacts identified in the REF. The estimated fill volumes would be generally consistent with the upper estimates presented in the REF. As such, the potential for an increase in impact is considered to be minimal. However, some additional truck movements associated with the importing of fill material may be required. This is briefly discussed below.

Traffic and transport

Construction impacts

Section 4.1.1 of the REF identified that an estimated 2,700 truck movements would be required to allow for the importation of fill material over a six month period of the construction program. This was estimated to result in an average of approximately 21 trucks per day, including approximately two trucks during peak hour. This represented approximately 15 percent of the total estimated 18,000 vehicle movements that were anticipated for the overall construction of the facility.

The revised estimates for import truck movements indicates that approximately 5,705 truck movements would be required to allow for the importing of fill and other materials into the site. This would result in an increase in truck movements for this element of the Project of approximately 47 percent (or approximately nine to ten additional trucks per day during the identified six-month period). However, it should also be noted that the overall external (i.e. source of materials to site) truck movements required over the duration of the construction program has been reduced to approximately 10,900 truck movements.

As such, the overall impact of the change in truck volumes during construction is considered to result in an overall reduced impact, and would therefore provide an overall beneficial outcome with respect to traffic and transport impacts associated with the construction of the Project.

Operation impacts

The proposed refinement of the site levels and earthwork requirements would not impact on the operational traffic levels identified in the REF.

6.9.4 Additional or changed management and mitigation measures

No additional management and mitigation measures are considered to be required for the revised amount of earthworks which have been identified for the Project during the ongoing detailed design.

7 Additional investigations and clarification to the REF

This section of the Combined Submissions Report documents additional investigations that have been undertaken since the display of the REF. This section also provides clarifications to the REF in response to feedback received from the community and other stakeholders during the exhibition period.

7.1 Flood study and flood impact assessment

As part of the ongoing development of the concept design for the New Intercity Fleet Maintenance Facility Project a *Flood Study and Flood Impact Assessment* (AECOM, 2016) to further identify potential impacts and risks to the Project and surrounding property. The assessment was based on flood modelling undertaken for the *Ourimbah Creek Catchment Flood Study* (Catchment Simulation Solutions, 2013). A copy of the flood impact assessment is attached as Appendix D of this Combined Submissions Report and a summary of the findings of the assessment are provided below.

The investigation included a review of the hydrologic and hydraulic modelling used in the Ourimbah Creek Catchment Flood Study and an assessment of its suitability for the investigation. It was found that the modelling was suitable for a concept level of assessment; however further refinement of the understanding of flood risk around the site would continue to be undertaken throughout the detailed design stages of the Project. The design criteria for the New Intercity Maintenance Facility operations is to provide immunity to flooding during a one percent AEP design storm, with allowance for a ten percent increase in rainfall to account for climate change (referred to as the 'design event'). Another criteria for the Project is that any increase in flood risks to adjacent or surrounding properties, caused by the delivery of the New Intercity Facility Maintenance Facility, is to be mitigated.

7.1.1 Flood impact assessment

Site flood risk

The proposed infrastructure for the New Intercity Fleet Maintenance Facility would be raised (using imported fill for key elements such as the standing roads and buildings) and it is expected that generally only embankments would be impacted by potential flooding events up to and including the one percent AEP.

The flood impact assessment undertaken by AECOM identified that four areas of the site would be affected by the design event. These areas include three locations within the vicinity of Chittaway Creek crossing and one at the north-eastern end of the Project site. Specifically, the areas potentially impacted include:

- The turnout area at the connection to the Main North Line Line
- The Chittaway Creek rail bridge crossing
- The unnamed tributary creek crossing
- The access road bridge area.

The location of these four areas are shown on Figure 7.1 below. The potential impacts of flooding on these four locations is also briefly discussed below.

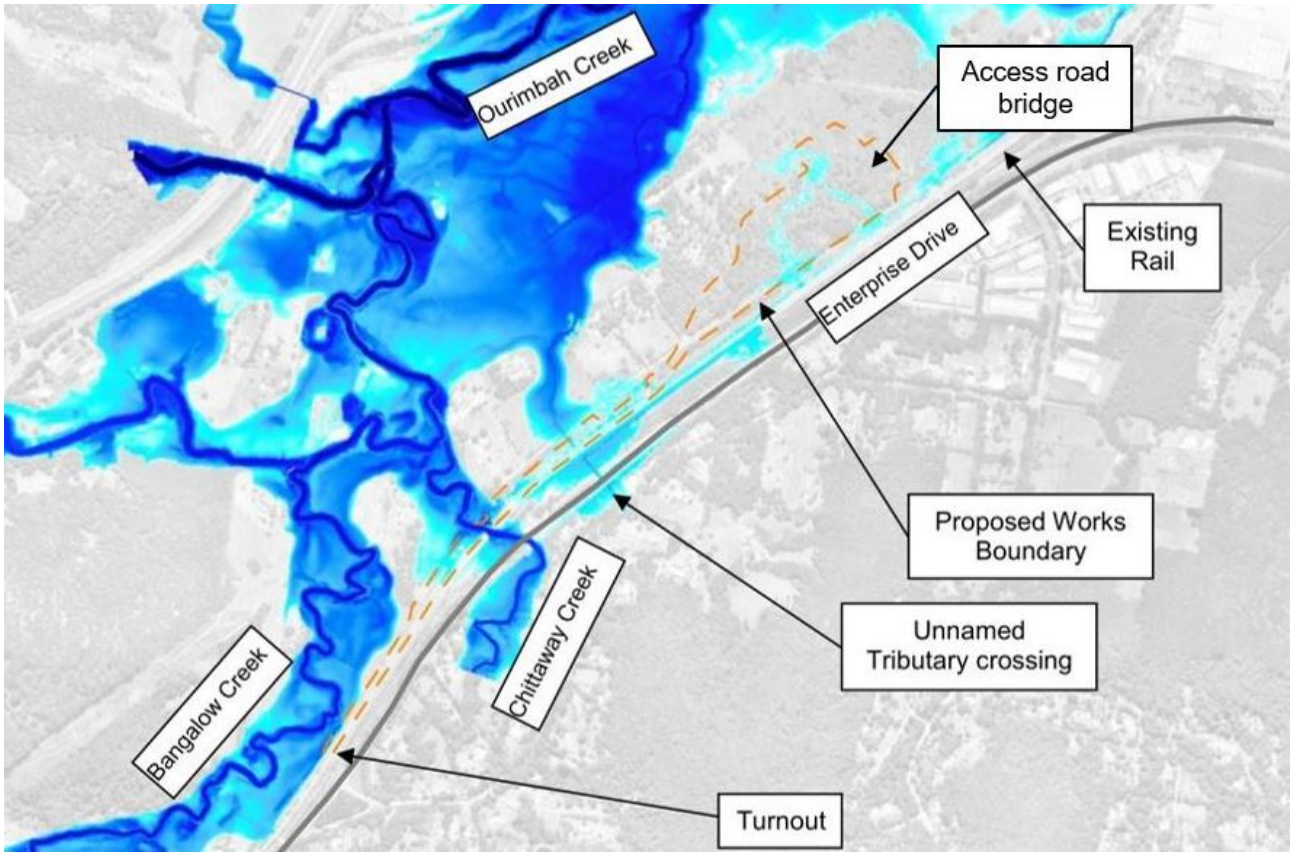


Figure 7.1 Site overview showing the design event flood extent

Main North Line turnout

The turnout area would mark the start of the proposed works and is where the rail embankment would begin to be widened to accommodate the new rail tracks. The proposed works would include a wider embankment which would marginally reduce the flow area and flood storage available for the Bangalow Creek floodplain.

Figure 7.2 shows the relative change in peak flood level between the existing scenario and the Project design scenario. It only highlights areas where the water level has changed. Where the widened embankment pushes into the floodplain, the floodwater would be displaced further from the existing rail resulting in a reduction in flood level (no floodwaters are over the new embankment). As indicated by Figure 7.2, the Project design would result in no change to the general depth or velocity of flow against the embankment. This would still represent an erosion risk and the proposed works would include rock protection for this length of embankment.

It should also be noted that the widened areas of embankment would not be inundated as part of the Project and are therefore shown as a significant reduction in flood level in Figure 7.2.

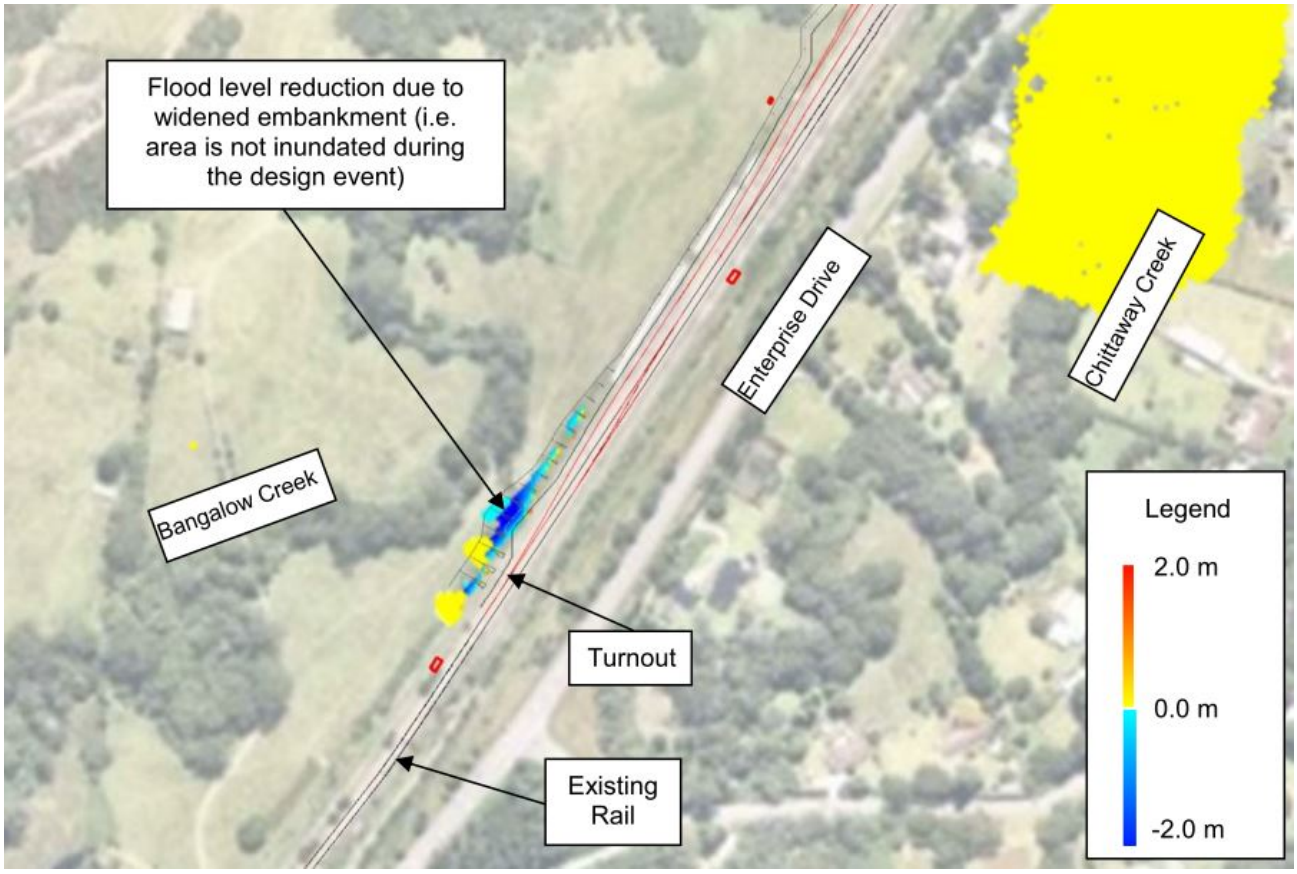


Figure 7.2 Detail of the potential flooding impacts at the Main North Line turnout

Chittaway Creek crossing

At the location of the Chittaway Creek crossing, Turpentine Road is only marginally higher than the creek bed and therefore during high flow events, the spans of the existing rail bridge are used to convey water flows.

The Project would extend the rail crossing on the northern (downstream) side of the existing rail bridge. Therefore, the entrance to the bridge would be unaffected and would continue to operate as it currently does.

As shown in Figure 7.3, the current flood model assessment indicates that the proposed works would have no impact on downstream flood levels. This is because the wider Ourimbah Creek system causes water to back up to the rail embankment and controlling the peak flood level. There would be a nominal increase in flood levels immediately upstream of the bridge, in the order of approximately 0.02 metres. This increase would propagate beyond the Enterprise Drive bridge upstream. However, given the location of surrounding property, it is unlikely to adversely change the existing flood risk.

It should also be noted that much of the change in water levels would be caused by the proposed earthworks. Around Chittaway Creek, the rail embankment would be widened, preventing that area from being inundated during the design event. In Figure 7.3 this is represented by a significant reduction in flood water level.

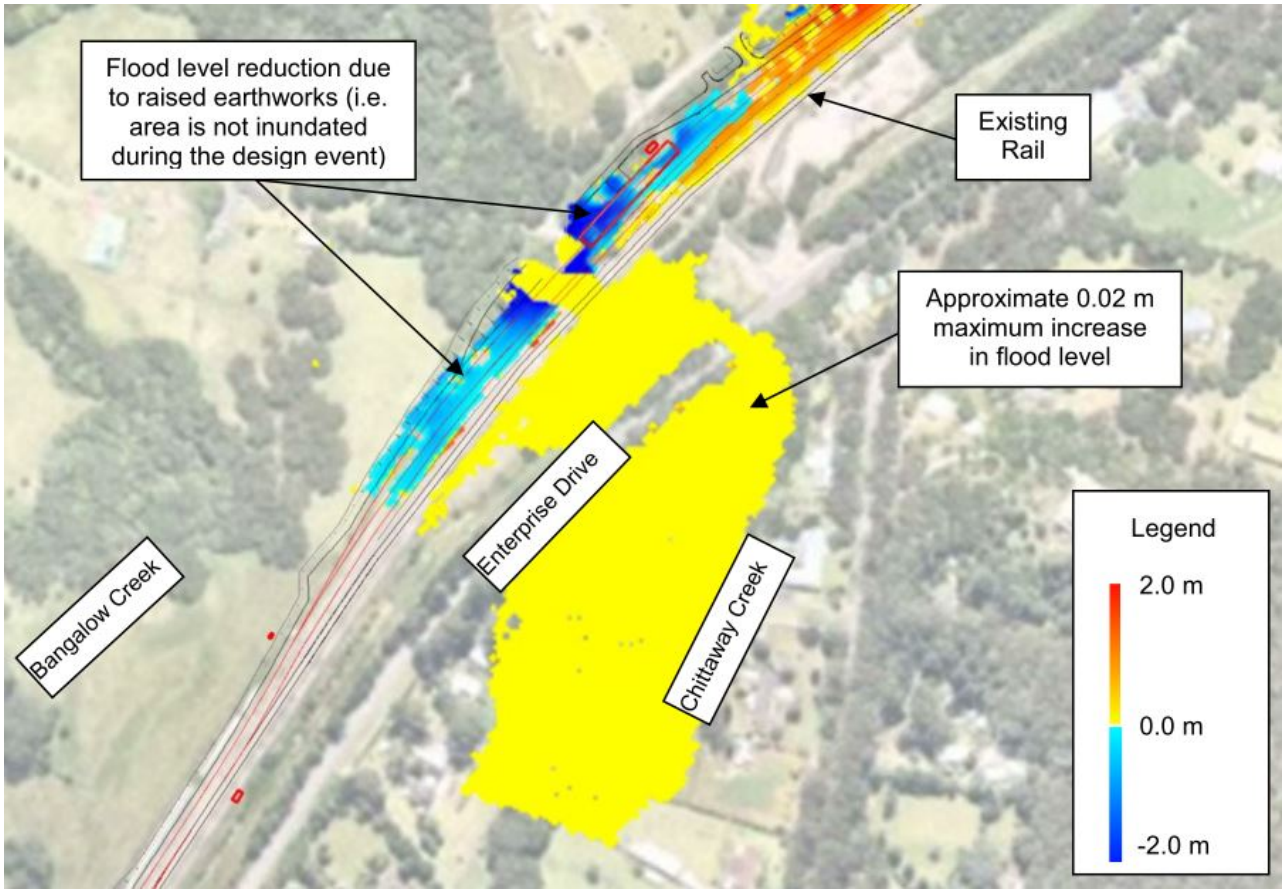


Figure 7.3 Detail of the potential flooding impacts at the Chittaway Creek crossing

Unnamed tributary

North of the Chittaway Creek crossing, a second unnamed tributary creek crosses the existing rail corridor and Turpentine Road. This crossing is assisted through an existing culvert under the rail corridor. The Project would not change the upstream face of the culvert or rail embankment at this location. However, the culvert would be incorporated into the site drainage system which may impact the capacity of the crossing. Any reduction in the capacity of the culvert could result in additional ponding upstream of the rail embankment.

Figure 7.4 shows the relative change in peak flood levels between the existing flooding scenario and the Project design scenario. The proposed design would incorporate access roads and surface drains which would convey water around the maintenance facility. It should be noted that the flood waters only impact the track at the point of overtopping and the main facility shed and building would be unaffected. It should also be noted that the new infrastructure would only flood when the existing rail line is also overtopped and therefore no rail traffic would be using the line.

Figure 7.4 shows that the relative changes in flood level generally occur within the area of the proposed works. Some areas show a significant increase in flood level; however this is caused by a shallow depth of flooding occurring on a raised area of earthworks. When the flooding returns to the existing ground level, no relative change is expected to occur.

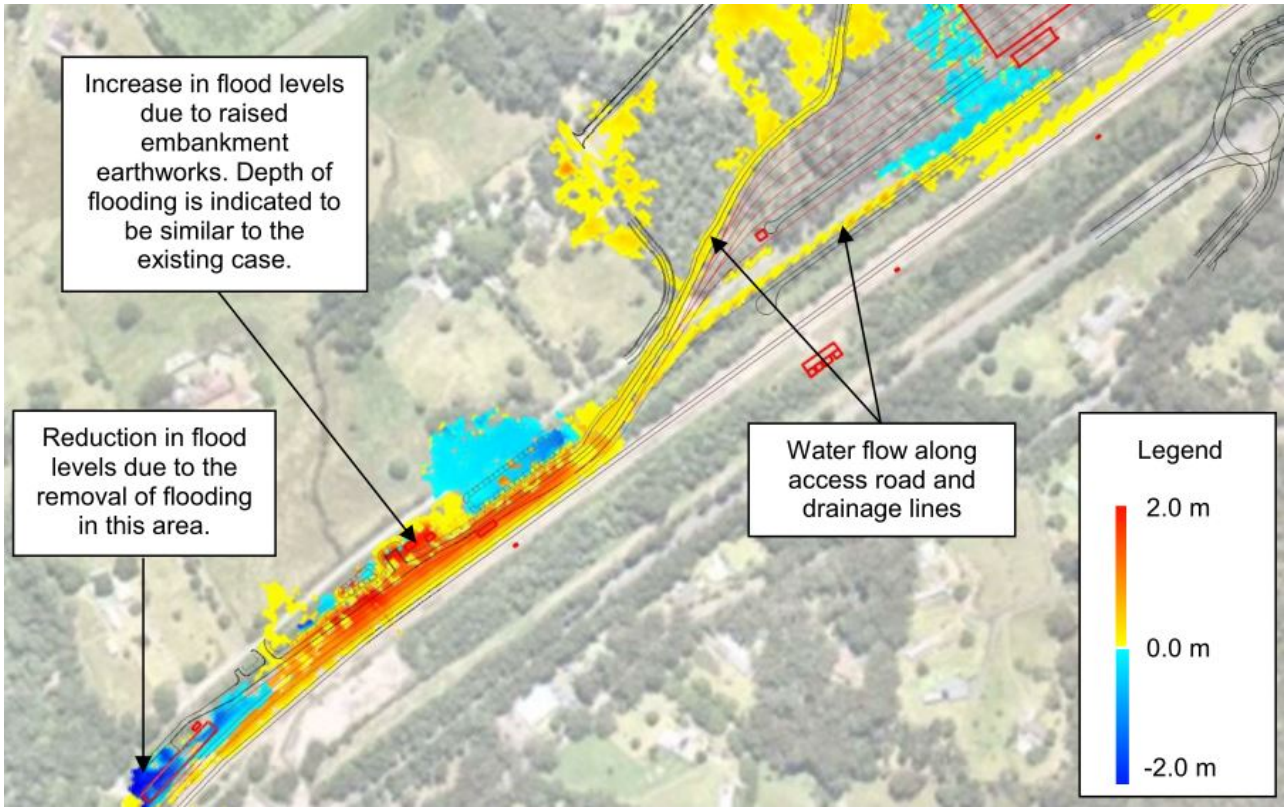


Figure 7.4 Detail of the potential flooding impacts at the unnamed tributary crossing

Access road bridge area

The proposed works include an access road with an overpass over the rail and onto the site. The overpass also crosses an existing drainage channel and a section of lower ground to the north of the rail embankment. Figure 7.5 indicates that during the design event floodwaters would back up onto the site from Ourimbah Creek. This floodwater would pass under the access road and, during the Project design scenario, would meet with flow passing down the existing drainage channel beside the rail embankment. As part of the modelling, the flood extent was not shown to interact with the main detention basin for the Project site.

The proposed design of the access road bridge would include a number of piers that would allow floodwaters to freely pass under the road. The extent of the flooding suggests that the piers would only be exposed to floodwater during very large events and the water would be shallow and slow moving. The risk of scour from catchment flooding is therefore considered to be very low.

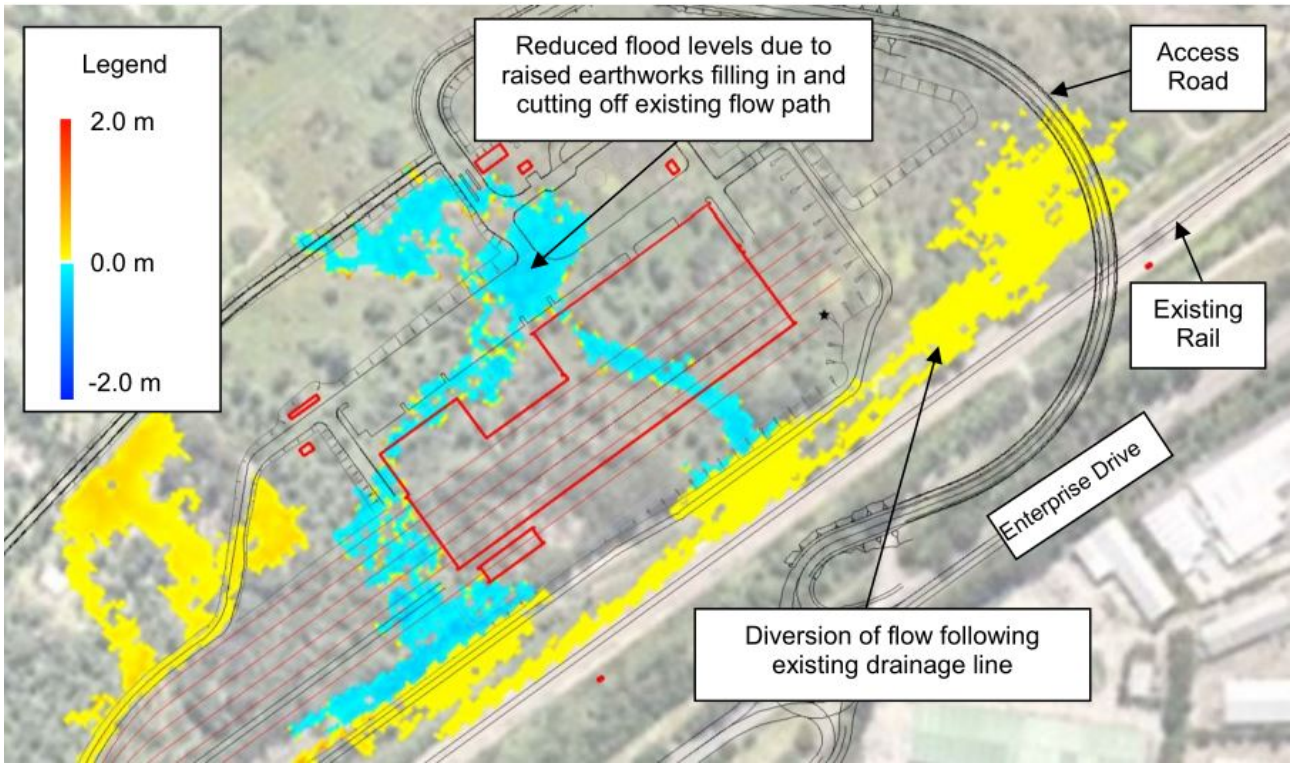


Figure 7.5 Detail of the potential flooding impacts at the location of the access road bridge

7.1.2 Flood risk to surrounding areas

Chittaway Creek and unnamed tributary

The analysis described above identifies that both Chittaway Creek and the unnamed tributary are subject to backwater effects from the greater Ourimbah Creek catchment. The assessment also showed that there would be no change to the flood levels downstream of the rail embankment due to the proposed works. This means there would be no impact on flood risk for properties situated downstream of the site.

Upstream of the Chittaway Creek crossing the results indicate there would be a nominal increase in flood levels of approximately 0.02 metres due to the new access road and culvert located immediately downstream of the bridge. This increase would propagate upstream, but would have no impact on the flood risk for surrounding property.

At the Unnamed Tributary, the refinement of the model revealed that the existing culvert under the rail embankment causes flood waters to back up and overtop the rail during the Design Event. The proposed works were shown to have no impact on this upstream ponding and consequently there is no change to the existing flood risk expected.

Bangalow Creek

The proposed works would widen the rail embankment in the vicinity of the Bangalow Creek floodplain where floodwaters currently extend to abut the existing embankment. This embankment widening would marginally reduce the floodplain waterway areas and storage available to the creek. However the analysis indicated that there would be no change to the peak flood levels at this location.

Ourimbah Creek

Ourimbah Creek would only affect the north eastern end of the site directly. The development of the Project site would not reduce the volume available for flood storage and the analysis indicates there would be no impact to surrounding flood levels.

The site drainage system would spill during larger storm events but it would be designed to collect runoff that currently flows to Ourimbah Creek anyway. The proposed drainage system would result in some change to the pattern of flow contributed to the surrounding creek system. However, any potential impacts would be minor to negligible during large rain events, including the design event. The area of the proposed works would also represent a small proportion of the total catchment providing flow to Ourimbah Creek. Therefore changes in runoff from the site would have a negligible impact on downstream flood levels.

Overall, it is anticipated that there would be no increase in impact to the flood risk for surrounding properties. During the design stage of the Project, the understanding of the behaviour of the drainage system and how it compares to the existing overall catchment response would be further investigated and refined.

7.2 Lighting impact assessment

Further to the *Landscape Character and Visual Impact Assessment* prepared as part of the REF (Appendix C of the REF), and based on community feedback during the display period, an additional *Lighting Impact Assessment* (WSP | Parsons Brinckerhoff, 2016) was undertaken to identify the potential lighting and light spill impacts associated with the Project and provide further design and mitigation measures to be considered.

A summary of this assessment is presented below and a copy of the full assessment is provided as Appendix E of this Combined Submissions Report.

7.2.1 Night-time environment

The existing night-time lighting environment surrounding the Project is predominantly semi-rural with pasture land, stands of native vegetation and woodland. The existing Project site and most surrounding topographical features are unlit. There are currently random street, security and residential lighting on and around the Project site.

The surrounding public road lighting is generally insignificant except at intersections. There is a string of widely spaced 150W high pressure sodium street lights on Enterprise Drive and Chittaway Road.
The existing lighting in the vicinity of the Project site is concentrated as street lighting at the intersection of Enterprise Drive with both Catamaran Road and Old Chittaway Road.

There is currently no public street lighting to Schubolt Lane, Turpentine Road, Ourimbah Road and Orchard Road.

7.2.2 Potential light impacts

Lighting from the Project may impact the surrounding area as spill light or obtrusive light into adjacent residential properties or as sky glow visible to the surrounding areas. These types of potential lighting impacts are briefly outlined below.

- Spill light is light emitted by a lighting installation which falls outside the boundary of the property on which the installation is sited. The impacts of this type of lighting impact on surrounding areas would include direct views of high intensity luminaires and reflected light from surfaces within the Project boundaries.
- Obtrusive light is spill light which because of quantitative, directional or spectral attributes causes annoyance, discomfort, distraction or a reduction in the ability to see essential information. The impacts of this type of lighting impact on surrounding areas would include direct views of high intensity luminaires and reflected light from surfaces within the Project boundaries.
- Sky glow is the direct or reflected light from a facility that illuminates the sky above the facility and reduces the viewer's ability to see the night sky. Sky glow is an area wide problem rather than site specific and is considered to be minimal and suitably mitigated by restricting design illuminances to the minimum necessary for the Project.

7.2.3 Sensitive receivers

The study area considered for the *Lighting Impact Assessment* comprises the land surrounding the Project site to a distance of approximately 1.5 kilometres in accordance with the study area of the *Landscape Character and Visual Assessment,* May 2016. It is important to note that some lighting from the Project may be visible from areas beyond the nominated study areas, such as elevated ground to the north (Mount Tangy Dangy) and to the west. These areas have been excluded from the current assessment.

The site is surrounded by residential receivers in the suburbs of Kangy Angy and Fountaindale, NSW. To the north, east and south of the site, the nearest residential receivers are located on Orchard Road, Ourimbah Road, Turpentine Road and Schubolt Lane. Residential receivers are also located across the main railway on Old Chittaway Road, Station Road and Enterprise Drive. There is a commercial/light industrial area located to the south east of the site on Catamaran Road.

Dense vegetation screens views towards the Project site from south of the rail line. This prevents direct views of light sources and reduces the potential for glare to the south of the Project. The light industrial area located along Enterprise Drive also has very limited views towards the Project site.

Within the study area, residential development is concentrated along Orchard, Ourimbah and Turpentine Roads. Many properties are set back from the road and surrounded with dense vegetation providing visual screens and limited views of the Project.

It is not possible to assess the sensitivity of specific locations without an individual assessment of each site. Due to the vegetation and topography, locations only short distances apart may experience vastly different impacts. For this reason, the assessment of impact is presented in this LIA have been based on selected locations which are considered to be representative of the higher impacts for the surrounding area.

The map provided in Figure 7.6 and Table 7.1 below identifies typical potential sensitive receiver locations within the vicinity of the Project and outlines the potential light impacts expected for each of these locations.

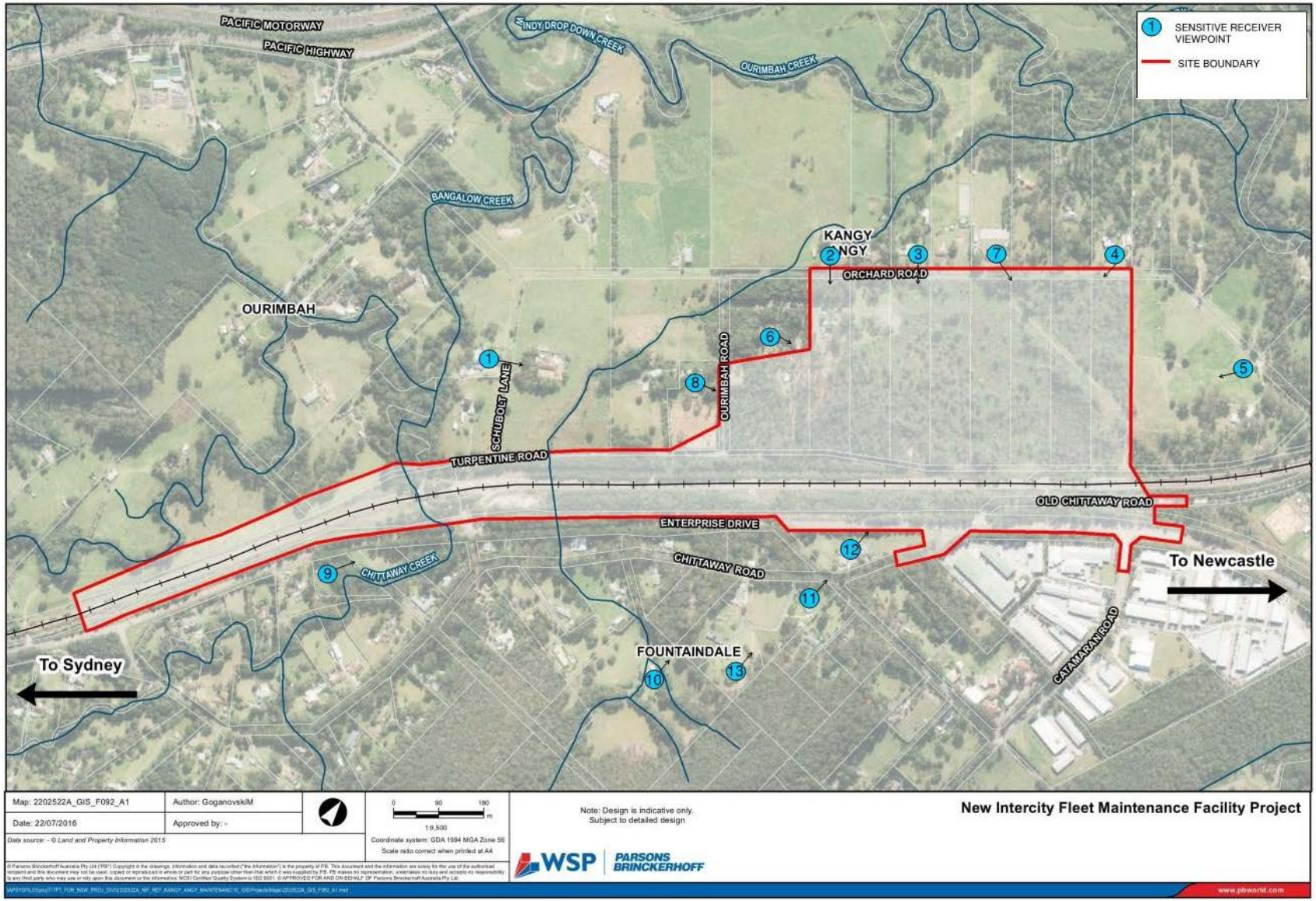


Figure 7.6 Sensitive receiver viewpoints

Table 7.1 Potential impacts to sensitive receivers

Map ref.	Location	Description of potential lighting impacts	Light impact
1	15 and 16 Schubolt Lane	Screening vegetation including trees higher than 15 metres filters views west to the Project from these properties. Despite the close proximity to the Project site, it is unlikely that lighting from the main portion of the maintenance facility would be visible from these dwellings. There may be some filtered views of lighting to the wider Project site.	Low to Moderate
2, 3, 4	50, 54, 72, 80, Lot 24 and 8660 and Lot 20 Orchard Road	These dwellings are set back from the road with screening vegetation within the property boundary and along the road verge. Some filtered views of lighting from the Project through gaps in the vegetation are possible to the south. Filtered views of road lighting to the access bridge would be likely from some of these properties.	Moderate
5	139 Orchard Road	This dwelling is set back approximately 60 metres from the road with screening native vegetation. It is unlikely that lighting from the Project site would be visible from this property.	Low to Moderate
6	Lot 31 Orchard Road	This property is in close proximity to the Project site although dense screening vegetation may filter the majority of views of the Project. The maintenance facility and exterior light poles may be visible. The final level of visual impact would depend on the quantity of vegetation removal associated with the construction of the Project.	Moderate to high
7	62 Orchard Road	This property is in close proximity to the Project site and is likely to have filtered views of lighting from the Project through vegetation. This property is also likely to have direct views of potential road lighting to the new access bridge and intermittent views of car-headlights.	High
8	Lot 121 Ourimbah Road	This property is likely to have filtered views of lighting from the Project through vegetation.	Moderate to high
9	60, 64 and 78 Old Chittaway Road	Dense screening vegetation filters views east to the Project from these properties. It is unlikely that lighting from the maintenance facility would be visible from these dwellings.	Low to Moderate
10	125 Old Chittaway Road	This dwelling is set back from Old Chittaway Road with screening vegetation within the property boundary and along Old Chittaway Road and Enterprise Drive verge. The maintenance facility and exterior light poles may be visible through the vegetation. The level of visual impact would depend on the quantity of vegetation removal associated with the Project.	Moderate
11	3 and 11 Station Road East	This property is in close proximity to the Project site although screening vegetation may filter the majority of views of the Project from these properties. It is likely that some of the maintenance facility would be visible from this dwelling. Filtered views of road lighting to the new roundabout and potential road lighting to the new access bridge would be possible. However, this property is set back from the road with vegetation filters, therefore the degree of perceptible change in road lighting would be minimised.	Moderate to high

Map ref.	Location	Description of potential lighting impacts	Light impact
12	170 Old Chittaway Road	This property is in close proximity (approximately 100 metres) to the Project site although screening vegetation may filter views of the Project. The maintenance facility and exterior light poles may be directly visible. Road lighting to the new roundabout and potential road lighting to the new access bridge may be visible from this property. However, this property is currently adjacent to Enterprise Drive with existing road lighting, therefore the degree of perceptible change is assessed as moderate. The final level of visual impact would depend on the quantity of vegetation removal associated with the Project.	Moderate to High
13	161 Old Chittaway Road	This property has little to no vegetation filtering views of the Project site. The property is on higher ground than Project site and is likely that the main portion of the maintenance facility would be visible from this dwelling.	High

As noted in Table 7.1 above, the Project site is surrounded by dense and tall tree planting that screens or blocks many views of the Project lighting from residential dwellings. Some dwellings, in particular to the south of the Project may have direct or filtered views of the Project. The retention and enhancement of this vegetation along with a considered holistic lighting design approach is crucial in limiting lighting impacts.

Overall the potential lighting impacts have been assessed as ranging from low to high (without mitigation), however with the implementation of a Lighting Management Plan it is envisaged that these impacts could be reduced to acceptable levels (refer to Section 7.2.4 for more information).

7.2.4 Mitigation strategies

The light impacts of the Project would primarily be created by the building's operational lighting, exterior and security lighting. The exterior lighting would have the potential to create a sky glow impact due to reflections from illuminated surfaces and possible direct glare at distances less than two to three kilometres. These effects may be reduced to acceptable levels by employing the following measures. The lighting principles and recommended mitigation measures would be further developed as part of a Lighting Management Plan for the facility to be developed as part of the detailed design of the Project.

Best practise lighting design principles

A key driver for of the maintenance facility is the requirement for adequate lighting to maintain CCTV security in line with ASA standards and security risk outcomes. The lighting for the Project is also required to comply with relevant Australian Standards. Road lighting (for the access road bridge and revised intersection arrangements) would also be required to be designed to relevant standards including Central Coast Council, Roads and Maritime Services and Australian Standards.

Best practice lighting design principles if applied to the Project would reduce potential light impacts significantly. These include:

- Ensure the lighting design is in accordance with relevant Australian Standards which provides recommended maximum values of light technical parameters for the control of obtrusive light. Ensure light spill and light pollution externally are avoided in accordance with this Standard.
- Appoint a qualified lighting designer who demonstrates a detailed understanding of lighting design and experience in the application of light within the interior architectural and exterior landscape environment.
- Restrict lighting to the minimum required for operations, safety and security requirements.
- Directional lighting techniques should be used to direct light away from sensitive viewpoints.

- Indirect glare from reflective surfaces must be avoided.
- Where luminaires are lighting a horizontal surface, mounting locations of luminaires should ensure that the angle of the luminaires do not exceed 30 degrees from the vertical and that the luminaires with an asymmetric light distribution are used where possible.
- Where luminaires are lighting a vertical surface and the angle of adjustment justifies a greater than 45 degree position, ensure that direct views to the light source are eliminated or avoid lighting vertical surfaces.

Car park lighting

The following strategies should be implemented to minimise potential lighting impacts associated with the facility car park:

- Lower luminaire mounting heights (for example ground level or low level garden path-type lighting) should be provided along pedestrian paths within the car park (where possible and sufficient to meet required guidelines and standards).

General area lighting

The following strategies should be implemented for lighting of general areas of the maintenance facility:

- For exterior areas, lower luminaire mounting heights (ground level or low level up to three to five metres) should be provided to minimise potential direct views of luminaires
- Lighting controls should be separated by tasks and task zones to allow for flexible control of illuminance levels
- For floodlighting of the maintenance facility, the use of a smaller number of tall poles should be avoided in favour of additional lower mounted lighting, as this can cause obtrusive light effects
- When choosing lighting categories from Australian Standards, preference would be given to choosing lower light levels where appropriate (subject to meeting minimum requirements for elements such as the use of CCTV for security purposes). This would assist in avoiding unnecessary over-design of the lighting for the maintenance facility.

Security and other areas

The following measures would minimise light impacts:

- Shielding of the perimeter should be provided through the use of planting or structural elements to prevent direct views of lit surfaces, wherever practical
- The maintenance shed doors should remain closed when activities are occurring inside the shed at night, wherever practical
- For buildings which incorporate glazed/transparent façades, it is recommended that the internal lighting be dimmed down or designed with low glare luminaires to reduce the building luminance and direct views of the façade
- Lighting for illuminated signage should be localised to ensure that, as far as practical, there is no light spill into adjacent areas, must eliminate glare and be designed such that luminance is minimised
- When choosing lighting categories for public road lighting for adjacent roads including the new access bridge and roundabout from AS1158, preference should be given to choosing categories with lower light levels where appropriate while considering the lighting requirements for public safety
- Security CCTV cameras would consider the use of Infra-red lights, where practical
- Lighting for security would utilise full cut-off luminaires and glare control accessories, where practical
- Lighting for security would apply lower mounting heights and use appropriate optics to minimise light spill, where practical.

Road lighting

- Road lighting (for the access road bridge and revised intersection arrangements) would be required to be designed to relevant standards including Central Coast Council, Roads and Maritime Services and Australian Standards.
- Road lighting to new bridge and access road would consider the use of full cut-off luminaires to minimise glare and light spill, where practical.
- Road lighting to adjacent street would consider the use of shorter poles to minimise direct views of luminaires and appropriate optics to reduce spill light.
- The use of speed bumps on the access road and internal roads should be avoided in order to minimise car headlight deflection above the horizontal.

Luminaries and lighting equipment

Luminaires and lighting equipment for the Project should include the following to minimise light impacts:

- All external luminaires should include specifically designed optics, glare shields and accessories that minimise upward light spill and control light output to direct it where required
- Full cut-off luminaires should be provided to minimise upward light spill above the horizontal
- Appropriate beam angles on luminaires should be used to ensure lighting is focussed where required, that spill light is minimised and direct views into a light source are minimised
- Luminaire correlated colour temperature (CCT) for all lamps to be consistent across the Project site. CCT to be between 3000K and 4500K, noting the warmer 3000K CCT tends to be less obtrusive at night
- All external luminaires to include LED/fluorescent light sources
- Light fittings must provide 60 percent of the lamp lumen output of the fitting in the peak intensity, as defined by the fitting beam angle.

7.3 Supplementary noise and vibration assessment

Further to the *Noise and Vibration Impact Assessment* prepared as part of the REF (Appendix B), and based on community feedback during the display period, an additional assessment of the noise impacts of the new crossover and turnout points (providing access to the maintenance facility) from trains using the Main North line has been undertaken. A summary of this assessment is presented below.

7.3.1 Criteria

The primary noise metrics used to describe railway noise emissions in the assessment criteria are as follows:

- L_{Amax}: The maximum noise level that occurred during a train passby noise event
- $L_{Aeq(15\ hour)}$: The day/evening time equivalent continuous noise level representing the cumulative effect of all train noise within the day/evening time period (7.00am–10.00pm).
- $L_{Aeq(9\ hour)}$: The night time equivalent continuous noise level representing the cumulative effect of all train noise within the night time period (10.00pm–7.00am).
- $L_{Aeq(1\ hour)}$: The equivalent continuous noise level representing the cumulative effect of all train noise within a one hour period. For the purpose of this assessment the peak hour data has been used.
- L_{AE}: The sound exposure level which is used to indicate the total acoustic energy of an individual noise event. This parameter is used in the calculation of L_{Aeq} values from individual noise events.

For airborne noise created by the operation of surface track, the NSW Rail Infrastructure Noise Guideline (RING) provides noise trigger levels for rail infrastructure Projects including a new rail line or redevelopment of an existing rail line. For the New Intercity Fleet Maintenance Facility, the *redevelopment of an existing rail*

line trigger levels were considered to be appropriate. These trigger levels are outlined in Table 7.1 and Table 2 of Appendix G of this Combined Submissions Report.

Table 7.2 Airborne residential noise trigger levels (external to building)

Type of development	Day	Night
Redevelopment of existing rail line	Development increases existing rail by 2dB or more $L_{Aeq(period)}$ or 3dB noise levels L_{Amax} AND resulting noise levels exceed.	Development increases existing rail by 2dB or more $L_{Aeq(period)}$ or 3dB noise levels L_{Amax} AND resulting noise levels exceed.
	65 $L_{Aeq(15hour)}$ dB	60 $L_{Aeq(9hour)}$ dB
	85 L_{Amax} dB	85 L_{Amax} dB

Table 7.3 Airborne noise trigger levels other sensitive land uses (internal to building)

Sensitive land use	Noise trigger levels dB
	Development increases existing rail noise levels by 2dB or more L_{Aeq} for that period and resulting noise levels exceeded
Schools, educational, child care – Internal	45 $L_{Aeq(1\ hour)}$
Places of worship – internal	45 $L_{Aeq(1\ hour)}$
Hospital wards – internal	40 $L_{Aeq(1\ hour)}$
Hospitals other uses – external	65 $L_{Aeq(1\ hour)}$
Passive open space	65 $L_{Aeq(1\ hour)}$
Active open space	65 $L_{Aeq(1\ hour)}$

7.3.2 Methodology

The noise impacts were quantified by determining the relative increase on existing noise levels. In order to complete this exercise, noise measurements were made of the existing rail passbys on the rail line and comment made on expected increase based on previous crossover measurements and previous studies. Measurements of train passby noise were undertaken on 12 July 2016 adjacent to the railway line at the locations outlined in Figure 7.7.

The attended measurements captured for each distinct train passby in terms of the L_{Aeq} and L_{Amax} acoustic parameters in A-weighting and fast response. Each noise measurement commenced as the train noise rose noticeably above background level and was stopped after the train had passed and the noise again approached background level. Only the measurements where train noise was dominant have been presented. Measurements contaminated by other extraneous events (such as loud bird calls or loud road traffic passing by at the same time as a train passby measurements were being undertaken) were discarded. The sound level meter was calibrated before and after the survey with the calibrator. No significant drift (greater than 0.5dBA) in calibration was detected.

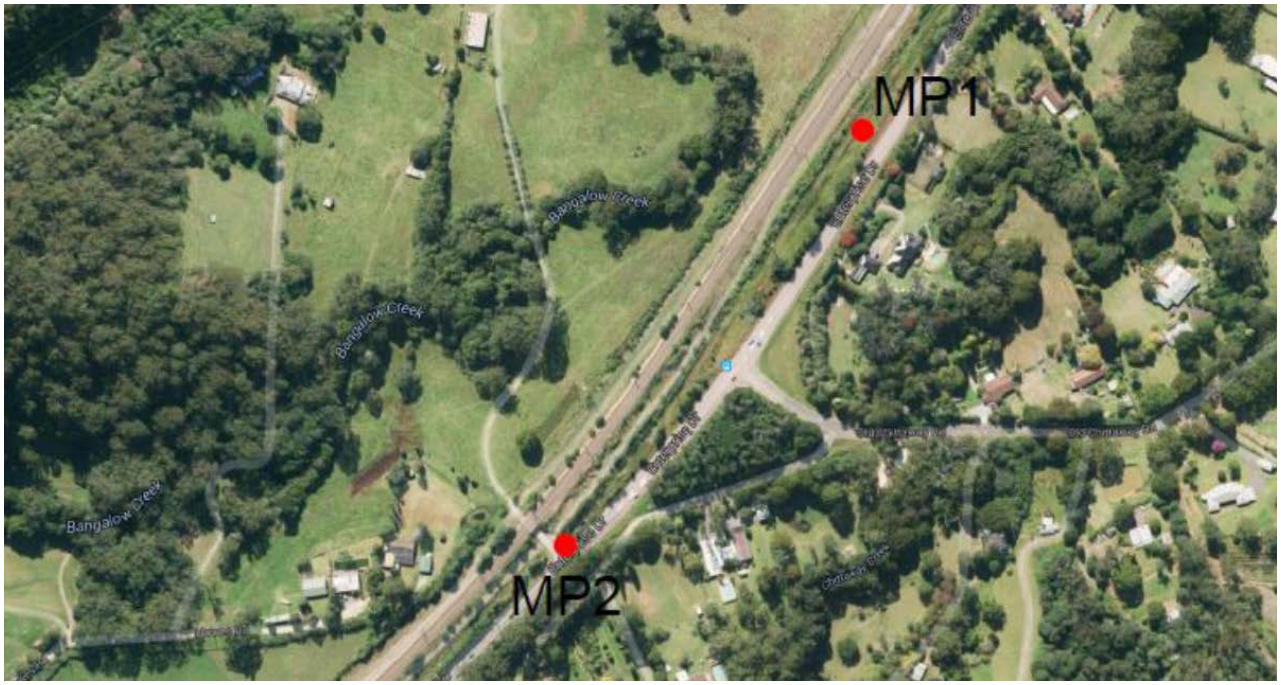


Figure 7.7 Location of monitoring locations to assess existing rail passby noise

7.3.3 Attended noise measurement results

The measured train passby noise levels are outlined in Table 7.3 for MP1 and Table 7.4 for MP2.

Table 7.4 Measured train passbys MP1

Train type	Duration, seconds	Carriages	Speed, km/h	Direction	L_{Aeq}	L_{Amax}	Observations
Freight	47	Many	100	North	79	83	No squealing observed, just regular high frequency hiss - typical of trains
Freight	27	30+	100	North	78	82	No squealing observed, just regular high frequency hiss - typical of trains
Oscar	19	6	115	South	79	85	No obvious knocking or banging - general train high frequency roar
K-Set	7	8	115	South	81	84	
Oscar	7	4	226	South	71	76	
K-Set	14	8	100	North	77	82	No knocks or tapping from train, no imperfections on the line
Oscar	11	6	100	North	78	83	
K-Set	11	8	115	South	80	86	Fast knocking during passby - flat spot on wheel. Not observed for other train passes so far
K-Set	11	8	90	South	76	79	Knocking observed, likely flat spot on wheel
K-Set	8	8	90	North	80	83	

Table 7.5 Measured train passbys MP2

Train type	Duration, seconds	Carriages	Speed, km/h	Direction	L_{Aeq}	L_{Amax}	Observations
K-Set	9	4	115	North	76	79	Knocking - rail imperfection
K-Set	6	3	115	South	74	78	Knocking
K-Set	11	8	115	North	76	80	Knocking
K-Set	7	3	115	South	77	83	Knocking
K-Set	7	5	115	South	78	82	Knocking
K-Set	9	6	115	South	76	80	Knocking
Freight	95	30+	110	South	76	89	Lots of knocking, bridge rail imperfections
K-Set	13	4	115	South	77	84	Knocking

7.3.4 Summary results at monitoring locations

For each monitoring location an overall L_{eq} and L_{max} value was determined from the overall data set collected. These are identified in Table 7.5.

Table 7.6 Calculated train noise summary level at each measurement point

Location	Distance from rail	L_{Aeq}	L_{Amax}
MP1	28 metres	79	86
MP2	28 metres	77	87

Overall L_{Aeq} and L_{Amax} parameters are calculated as per methods described in the NSW RING:

- Reported L_{Amax}, is the 95th percentile of all measured L_{Amax} train passbys as per NSW RING
- Reported L_{Aeq} is the 90th percentile (highest 10 percent) of measured L_{Aeq} train passbys.

7.3.5 Predicted noise levels

The study has identified 10 potentially noise affected residential receivers. These are identified in Figure 7.8. The existing rail passby noise levels at these 10 receivers were calculated using the measured levels presented in Table 7.5 and distance attenuation relationships from the Transport for NSW rail noise database. These being:

- 4dB per doubling of distance for L_{Amax} parameter
- 3dB per doubling of distance for L_{Aeq} parameter.

Figure 7.8 Identified noise sensitive receiver locations

In addition the L_{Aeq} values were adjusted by accounting for passby durations in line with those referenced in Table 7.3 and Table 7.4 and multiplying my the number of movements during the day and evening periods. The number of passbys were identified from the timetable at Wyong Station and are presented in Table 7.6.

Table 7.7 Average number of daily train movements

Time period	Freight	Passenger
Day (7.00am to 10.00pm)	50	87
Night (10.00pm to 7.00am)	36	38

The proposed rail crossover works include the installation of two turnouts into the existing track system. For modelling purposes we have assigned a 6dB bonus (penalty) to these turnouts. This penalty is the standard correction made to account for the additional noise made by the train travelling over a crossover at high speed. The impact of these turnouts on the operational noise profile has been assessed in terms of the following parameters:

- Equivalent sound level Daytime (7.00am to 10.00pm) – $L_{Aeq(15hy)}$
- Equivalent sound level Night time (10.00pm to 7.00am) – $L_{Aeq(9h)}$
- Maximum level across 24h – L_{Amax}.

Calculated rail noise levels for existing scenario (as is) and a scenario with turnouts is shown in Table 7.7.

The predicted noise levels have been assessed against the RING triggers. For day, the triggers are a total noise level greater than 65 $L_{Aeq(15h)}$ and a change in noise level of more than 2dBA. For night, the triggers are a total noise level greater than 60 $L_{Aeq(9h)}$ and a change in noise level of more than 2dBA.

The trigger levels for maximum noise levels during the day and night are a total maximum noise level of L_{max} 85dBA and an increase of more than 3dBA. In order to qualify for consideration of mitigation, both the total noise and change in noise trigger must be satisfied for either the L_{eq} or L_{max} noise levels.

Table 7.8 Average number of daily train movements

Location	Distance from rail line	Predicted existing level	Predicted new noise level with turnouts	NSW RING trigger criteria	Exceeds trigger level?
Res # 1	65m	63 $L_{Aeq(15h)}$ 63 $L_{Aeq(9h)}$ 82 L_{Amax}	63 $L_{Aeq(15h)}$ 63 $L_{Aeq(9h)}$ 82 L_{Amax}	> 65 $L_{Aeq(15h)}$ & +2dB change	No
Res # 2	40m	63 $L_{Aeq(15h)}$ 65 $L_{Aeq(9h)}$ 85 L_{Amax}	65 $L_{Aeq(15h)}$ 65 $L_{Aeq(9h)}$ 85 L_{Amax}	> 60 $L_{Aeq(9h)}$ & +2dB change	No
Res # 3	125m	60 $L_{Aeq(15h)}$ 60 $L_{Aeq(9h)}$ 78 L_{Amax}	61 $L_{Aeq(15h)}$ 61 $L_{Aeq(9h)}$ 78 L_{Amax}	> 85 L_{Amax} & +3dB change	No
Res # 4	150m	59 $L_{Aeq(15h)}$ 59 $L_{Aeq(9h)}$ 77 L_{Amax}	62 $L_{Aeq(15h)}$ 62 $L_{Aeq(9h)}$ 81 L_{Amax}		Yes
Res # 5	100m	61 $L_{Aeq(15h)}$ 61 $L_{Aeq(9h)}$ 80 L_{Amax}	64 $L_{Aeq(15h)}$ 64 $L_{Aeq(9h)}$ 84 L_{Amax}		Yes
Res # 6	95m	61 $L_{Aeq(15h)}$ 61 $L_{Aeq(9h)}$ 80 L_{Amax}	66 $L_{Aeq(15h)}$ 66 $L_{Aeq(9h)}$ 84 L_{Amax}		Yes
Res # 7	110m	60 $L_{Aeq(15h)}$ 60 $L_{Aeq(9h)}$ 78 L_{Amax}	66 $L_{Aeq(15h)}$ 66 $L_{Aeq(9h)}$ 84 L_{Amax}		Yes
Res # 8	210m	57 $L_{Aeq(15h)}$ 57 $L_{Aeq(9h)}$ 74 L_{Amax}	63 $L_{Aeq(15h)}$ 63 $L_{Aeq(9h)}$ 80 L_{Amax}		Yes
Res # 9	90m	61 $L_{Aeq(15h)}$ 61 $L_{Aeq(9h)}$ 79 L_{Amax}	66 $L_{Aeq(15h)}$ 66 $L_{Aeq(9h)}$ 84 L_{Amax}		Yes
Res # 10	80m	61 $L_{Aeq(15h)}$ 61 $L_{Aeq(9h)}$ 80 L_{Amax}	64 $L_{Aeq(15h)}$ 64 $L_{Aeq(9h)}$ 82 L_{Amax}		Yes

Daytime and night time train passby events per hour are similar and therefore L_{Aeq} day and night values are the same.

7.3.6 Discussion and conclusion

From the table above it can be seen that there are the following predicted exceedances of the NSW RING trigger levels:

- Daytime (7.00am to 10.00pm): Marginal 1dB exceedance (L_{eq} parameter only) is calculated at Residences #6, #7 and #9. Residence #8, although positioned between the above mentioned, is predicted to comply due to the increased set-back distance
- Night: (10.00pm to 7.00am): Up to 6dB exceedance (L_{eq} parameter only) is calculated at Residences #4, #5, #6, #7, #8, #9, #10.

These predictions are based on short term attended measurements results that are extrapolated based on distance attenuation theory only. The calculations do not account for localised shielding or ground absorption effects which may be present at some locations. The predictions are therefore likely to be conservative, and as such the results should be taken as preliminary. It is recommend that more detailed analysis techniques, such as computer aided modelling, be commissioned in order to confirm the extent of any trigger level exceedance.

Mitigation for the additional turnouts could include use of certain types of turnouts which provide additional noise damping which would be considered during detailed design. In addition, localised screening in the vicinity of the turn outs would also be considered. These barriers could be of a low height as the primary noise sources would be located at track level. Where these mitigation measures do not provide sufficient reduction, at-property treatments would be investigated for affected receivers. Treatments may also be required in combination with barriers and track treatments. Consideration of these mitigation measures would be included in the Operational Noise and Vibration Review for the Project.

7.4 REF clarifications and editorial errors

7.4.1 Incorrect addresses

The addresses of three properties were incorrectly identified in *Noise and Vibration Impact Assessment* (Appendix B of the REF) (and the noise and vibration section of the REF). The identified and correct addresses are below in Table 7.9.

Table 7.9 Clarification regarding property addresses

Address as shown in reports	Correct address
11 Enterprise Drive	11 Fountain Road
14 Enterprise Drive	14 Old Chittaway Road
16 Enterprise Drive	16 Old Chittaway Road

7.4.2 Structures proposed for removal

Section 7.8.2 of the REF incorrectly stated that the Project would include the removal of the dwelling located at 53 Orchard Road. While this property is proposed to be acquired as part of the Project, it is proposed that this dwelling would be retained as part of the Project and not removed. The only residential structure proposed to be demolished as part of the Project is located at 11 Ourimbah Road.

7.4.3 Operational noise results table

As noted in Table 4.4 of this Combined Submissions Report, the operational noise levels table presented in the Appendix C of the REF omitted the results for Scenario 8. A revised version of this table has been developed to include this scenario and is included as Appendix G of this Combined Submissions Report.

8 Environmental management

As described in the REF, an appropriate environmental management system (EMS) would be implemented as part of construction and operation of the New Intercity Fleet Maintenance Facility Project. This environmental management plan (EMP) would provide the framework for implementing the environmental management measures documented in this REF, and any conditions of other approvals, licences or permits.

8.1 Environmental management plans

8.1.1 Construction environmental management plan

A construction environmental management plan (CEMP) would be prepared for the construction phase of the Project. The CEMP would provide a centralised mechanism through which all potential environmental impacts would be managed. The CEMP would document mechanisms for demonstrating compliance with the commitments made in the REF, this Combined Submissions Report, and other relevant statutory approvals. The CEMP would outline a framework for the management of environmental impacts during construction of the Project. The plan would address (at a minimum) the following elements:

- Traffic management
- Noise and vibration management
- Air quality management (including dust suppression)
- Landscape and rehabilitation plan
- Community and stakeholder involvement
- Aboriginal and non-Aboriginal heritage management
- Water and soil management
- Flora and fauna and weed management
- Soil and erosion management
- Contamination and waste management
- Bushfire risk
- Sustainability.

It is anticipated that the contractor appointed to undertake the construction of proposed New Intercity Fleet Maintenance Facility would prepare a CEMP for the works which would be reviewed and endorsed by Transport for NSW prior to the commencement of construction..

8.1.2 Operational environmental management

The initial responsibility for the operational environmental management of the New Intercity Fleet Maintenance Facility would be undertaken by the nominated supplier/maintenance operator for the New Intercity Fleet. This would revert to NSW Train Link control once the fleet maintenance period for the supplier/maintenance operator contract has been completed.

Operational environmental management of the New Intercity Fleet Maintenance Facility would be managed through an operational environmental management plan (OEMP) (or similar plan) which would be developed in consultation between Transport for NSW and the maintenance operator for the New Intercity Fleet.

8.2 Management and mitigation measures

The REF identified a range of environmental impacts that are likely to occur as a result of the New Intercity Fleet Maintenance Facility Project. Table 8.1 to Table 8.3 of the REF provides a summary of the environmental management measures that Transport for NSW has proposed to manage the potential environmental impacts associated with the construction of the new maintenance facility.

The safeguards and management commitments documented have been revised with consideration of the submissions received in response to the public display of the REF and are provided in Table 8.1 to Table 8.3 of this Combined Submissions Report. New or amended measures that are proposed have been denoted in this report with underlined text, while any environmental management measures which have been amended, proposed to be removed or have text deleted from the measure have been shown with ~~strikethrough text~~.

Should the Project be determined by Transport for NSW for approval, the finalised safeguards and management measures would guide subsequent phases of the Project. The nominated construction contractors for the Project would be required to undertake all works in accordance with these environmental management measures.

8.2.1 Detailed design

Table 8.1 Detailed design environmental management measures

ID number	Environmental management measure
	Biodiversity
A.1	During detailed design, opportunities to further reduce the clearing of native vegetation would be investigated.
	Noise and vibration
B.1	When additional details are available for substations and other mechanical plant, they would be assessed and designed so that overall noise emission of the Project with all mobile and fixed noise sources does not exceed the environmental noise objectives of the Project.
B.2	Noise mitigation for sources such as shunt vehicles; vehicle movement alarm systems; mechanical plant (including backup generator(s)) and PA systems would be addressed during the detailed design to ensure they meet the environmental noise objectives of the Project.
B.3	An acoustic enclosure or insulation for the substation would be considered during the detailed design so as to meet the relevant environmental noise objectives.
B.4	Alternative systems would be investigated for vehicle movement alarms, such as the use of visual alarms.
B.5	The design and suitability of noise barriers would be determined where required. Noise barriers have been considered to reduce noise levels from train arrivals and departures in addition to standing trains. The final height and locations of any proposed barriers would be subject to further investigation. Currently proposed barriers for consideration include (refer to Figure 6-1 of the *Noise and Vibration Impact Assessment)*: → A barrier of approximately five metres high above the track along the standing tracks south of the maintenance shed. The side of the barrier facing the noise sources would be acoustically absorptive or the barrier should include a combination of a vegetated earth berm and barrier. → A barrier to the full height of the train wash building which extends to fully block line of sight from the train wash exit to 26 Turpentine Road. Where noise barriers are considered to be the preferred treatment method, they would be required to be constructed so as to be solid and continuous with no gaps between the ground and barrier and between barrier panels. The barriers would be constructed of a material with a surface density of at least 12 kilograms per square metre
B.6	The adoption of any proposed treatments measures at the source of residential receivers would be considered (such as architectural upgrades).

ID number	Environmental management measure
B.7	Further assessment of the potential noise impacts associated with the proposed track cross overs should be undertaken using detailed analysis techniques, such as computer aided modelling, in order to confirm the extent of any trigger level exceedance and appropriate mitigation measures. This would be undertaken as part of the Operational Noise and Vibration Review for the Project. Mitigation measures which would be considered to mitigate any exceedances would include: → Use of different types of turnouts which provide additional noise damping → Localised barrier screening in the vicinity of the turn outs → At-property treatments for affected receivers (where required).
	Traffic, transport and access
~~C.1~~	~~The following mitigation measures would be considered for the new intersection of Enterprise Drive and the proposed access road to the New Intercity Fleet Maintenance Facility as part of the detailed design:~~ ~~→ Removal and banning of the northbound right turn from Enterprise Drive into Old Chittaway Road and turning this into a southbound short merge lane for right turners out of the new access road~~ ~~→ Providing a seagull arrangement (a type of three-way road intersection usually used on high traffic volume roads and dual carriageways) to improve right turn movement from the new access road into Enterprise Drive~~ ~~→ Vanning the right turn from Old Chittaway Road into Enterprise Drive~~ ~~→ The use of a roundabout or signalised intersection at this location.~~ ***NOTE: This measure has been removed as this work has been completed. Refer to section 6.8 of this Combined Submissions Report.***
C.1	Transport for NSW would consult with both Roads and Maritime Services and the Central Coast Council regarding the detailed design requirements for the roundabout, including the requirements for road occupancy licence(s) or any requirements to amend the existing speed limit along Enterprise Drive.
C.2	The lighting design would be developed by a suitably qualified lighting designer and prepared in accordance with AS 1158 “Road Lighting” and AS 4282 “Control of the Obtrusive Effect of Outdoor Lighting”.
	Land use and property
D.1	Opportunities to further minimise impacts to properties (i.e. reduction to the Project footprint) would be undertaken during detailed design.
D.2	Provision of a vegetated earth mound to the west of the flood free access would be considered with the aim of improving visual (and noise) screening of the maintenance facility from properties along Orchard Road.
	Hydrology, drainage and flooding
E.1	A detailed Flood Impact Assessment of the site would be undertaken to provide more certainty regarding the impact the Project on the regional flood and local drainage processes, and identify any required addition management and mitigation measures to minimise any potential flooding impacts.
E.2	A Hydrologic and Hydraulic assessment would be undertaken to confirm that additional structures with the same cross-sectional area as existing would not affect the existing drainage, and identify any required addition management and mitigation measures to minimise any potential stormwater and drainage impacts.
E.3	Where possible, all Project components would be design to be above the 1:100 AEP flood event (including climate change assumptions).
E.4	Culvert openings across the floodplain would be sized to minimise the impact on the existing floodplain and local drainage processes.
E.5	All culvert extensions would be designed to match the existing culvert openings to minimise impacts to the capacity of existing drainage infrastructure.

ID number	Environmental management measure
E.6	Scour protection would be provided at both ends of culvert extensions to reduce erosion and water quality impacts.
E.7	The proposed detention basins ~~ponds~~ would be designed so as to reduce sediment loads and pollutants entering streams. These detention basins ~~ponds~~ would be installed as early as possible during the construction phase of the Project.
E.8	Stormwater from heavily polluted areas such as workshop facilities should be treated with oil interceptors or other treatment measures discharged to sewers, where feasible.
	Groundwater
F.1	Additional investigation and assessment of dewatering requirements would be undertaken to assess the proposed excavation works.
F.2	Quantification of groundwater inflows to excavations and determination of extent of drawdown would be undertaken as part of the detailed design of the maintenance facility.
F.3	A dewatering management plan would be prepared which would include information on the groundwater levels, excavation dimensions, quantification of amount of dewatering required and method of disposal of dewatered groundwater.
F.4	Consultation with DPI | Water would be undertaken regarding any addition requirements, including licensing.
	Climate change and greenhouse gases
G.1	Detailed designs for the Project would take into consideration the potential effect of climate change on the Project, including drainage requirements and the potential for increased flood frequency.
G.2	Possible treatment measures which be considered during the detailed design phase would include: → Monitoring weather forecasts and specific weather warnings → Positioning fire extinguishers at site offices and within construction vehicles (in case of bushfires) → Being alert to fire warnings and notices → Keeping the construction site clear of debris wherever possible (in case of severe winds) → Considering specific measures for wet season as part of the broader ESCP → Ensuring major earthworks are planned to reasonably not coincide with periods of expected rainfall or high winds.
	Public utilities
H.1	A further detailed services search would be completed to ensure that construction does not damage existing services.
H.2	Consultation would be undertaken with all affected utility owners as part of the ongoing design of the Project.
	Cumulative impacts
I.1	The potential cumulative impacts associated with the Project would be further considered as the design develops and as further information regarding the location and timing of potential developments is released.

8.2.2 Construction

Table 8.2 Construction environmental management measures

ID number	Environmental management measure
	General
J.1	A CEMP would be prepared prior to the commencement of construction. This plan would incorporate the mitigation measures outlined below.
J.2	Consultation with Central Coast Council would be undertaken under the requirements of the Infrastructure SEPP (as detailed in Chapter 6).
	Biodiversity
K.1	As part of CEMP for the Project, a Vegetation Management Plan (VMP) would be developed to address potential biodiversity impacts. The VMP would include a series of measures to ensure ecological impacts are minimised, including the mitigation measures listed below.
K.2	During construction, the following general measures would be implemented: → All workers would be provided an environmental induction prior to starting work on site. This would include information on the ecological values of the site, protection measures to be implemented to protect biodiversity, and penalties for breaches. → The limits of clearing would be clearly demarcated on-site (where appropriate) prior to construction to avoid unnecessary vegetation and habitat removal. This could include the installation of fencing around the Project site footprint.
K.3	Pre-clearing and construction protocols would be implemented including: → An experienced fauna ecologist would check for the presence of flora and fauna species and habitat on site before clearing begins (such as the presence of bird nests) and would be present to supervise vegetation clearing and capture and relocate fauna where required. → Prior to construction, site personnel should be adequately informed of environmental management procedures including, but not limited to, issues related to flora and fauna management, weed control, erosion and sediment control (in accordance with Landcom's *Soil and Construction Managing Urban Stormwater,* March 2004). → Establish exclusion zones to protect vegetation and fauna habitat outside of the assessed and approved clearing limits, including the threatened ecological communities recorded within the study area (including Swamp Sclerophyll Forest, *Biconvex Melaleuca* and riparian areas). Vegetation to be retained are to be clearly defined on ground and 'no go zones' clearly signposted and fenced to prevent unauthorised clearing and vehicular and/foot traffic. → The limits of clearing would be clearly demarcated on-site (where appropriate) prior to construction to avoid unnecessary vegetation and habitat removal. This could include the installation of fencing around the Project site footprint. → Carefully clearing vegetation so as not to mix topsoil with debris and to avoid impacts to surrounding native vegetation. → Avoid excessive soil disturbance. → When accessing construction sites, contractors should only use designated access tracks.
K.4	Flora and fauna control measures would be implemented including: → Clearing of vegetation would be minimised, to only vegetation that is absolutely required to be removed in order to undertake work. → Noxious weeds would be managed in accordance with the *Noxious Weeds Act 1993.* → Protocols to prevent the introduction and/or spread of Chytrid fungus would be implemented. These protocols would be based on OEH Hygiene Protocol for the Control of Disease in Frogs.
K.5	Weed species would be managed in order to control them from further spread. Management techniques may include immediate weed removal and disposal without stockpiling, disposal of weed-contaminated soils at appropriate weed disposal facilities and to ensure that all equipment is cleaned prior to and on completion of works to ensure weeds are not introduced or spread to other locations.

ID number	Environmental management measure
K.6	A Biodiversity Offset Strategy would be prepared in accordance with the BioBanking Assessment Methodology to offset impacts associated with the Project on biodiversity values in particular impacts to Swamp Sclerophyll Forest and *Melaleuca biconvexa*.
K.7	The Project would comply with all additional mitigation measures as identified in Section 7 of the SIS and Section 6.1 of Additional SIS.
	Noise and vibration
L.1	As part of overall CEMP for the Project, a construction noise and vibration management plan (CNVMP) would be developed for the Project, prior to commencement of works. The management plan would include (but is not limited to) the following: → Identified nearby residences and other sensitive land uses → Approved hours of work and what work would be undertaken → Substantial noise and vibration generating activities → Details of noise mitigation and management measures to be applied → Information for worker training to minimise noise impacts → Community consultation protocol(s) → Complaints handling protocol(s) → Processes for regular noise auditing during construction to monitor noise levels on site and identify whether additional mitigation measures are required to be implemented.
L.2	During construction the standard mitigation measured contained within the Transport for NSW *Construction Noise Strategy* (CNS) would be used as the basis for the proposed mitigation measures to be included in the CNVMP. These measures would include: → All employees, contractors and subcontractors would receive an environmental induction → No swearing or unnecessary shouting or loud stereos/radios would be allowed site → No dropping of materials from height, throwing of metal items and slamming of doors would be permitted → A noise monitoring program would be carried out for the duration of the works in accordance with the CNVMP and any approval and licence conditions → Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods → High noise and vibration generating activities would only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block → Quieter and less vibration emitting construction methods would be used where feasible and reasonable → The noise levels of plant and equipment would have operating sound power or sound pressure levels that would meet the predicted noise levels → Noise emissions would be considered as part of the selection process → Simultaneous operation of noisy plant within discernible range of a sensitive receiver would be avoided where possible → The offset distance between noisy plant and adjacent sensitive receivers would be maximised, where possible → Plant used intermittently would be throttled down or shut down when not in use → Noise-emitting plant to be directed away from sensitive receivers, where feasible → Traffic flow, parking and loading/unloading areas would be planned to minimise reversing movements within the site → Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out-of-hours work

ID number	Environmental management measure
L.2 (cont.)	→ Loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers → Dedicated loading/unloading areas would be shielded if close to sensitive receivers → Delivery vehicles would be fitted with straps rather than chains for unloading, wherever possible → Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained → Structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers would be used (where practicable) and consideration of site topography when situating plant would be undertaken.
L.3	To minimise noise levels, the following work practices would be implemented: → Respite periods would be defined by those periods where the community is less sensitive to noise such as avoiding early morning and late afternoon. → Vehicles, obstacles and stockpiles would be used on site to provide shielding to receivers, especially for static noise sources such as generators, mulchers, mobile cranes and the piling rigs. → Minimising the potential for construction vehicles to access the site prior to 7.00am along the new access road.
L.4	To minimise the risk of vibration impacts, the following would be considered: → Where possible, the use of less vibration intensive methods of construction or equipment would be considered to reduce the potential for cosmetic damage → All equipment would be maintained and operated in an efficient manner, in accordance with manufacturer's specifications, to reduce the potential for adverse vibration impacts → Where work requiring the use of vibratory rollers is required within 75 metres of a receiver, a roller of less than 200kN rating would be used, where practical → Where work is required within close distances to sensitive receivers, site-specific safe working distances would be established on-site prior to the relevant vibration generating works commencing → If vibration intensive equipment is to be used within the safe working distances, attended vibration measurements would be undertaken when work commences to determine site specific safe working distances → Vibration intensive work would not proceed within the safe working distances unless a permanent vibration monitoring system is installed approximately one metre from the building footprint, to warn operators when vibration levels are approaching the peak particle velocity trigger levels.
L.5	To minimise the potential for sleep disturbance, where night works are proposed to be undertaken, the following controls would be implemented where feasible and reasonable: → Avoiding conducting noise intensive night works for more than two consecutive nights → Scheduling noise intensive activities to before 10.00pm → Schedule activities which are likely to cause maximum noise events such as deliveries, moving material or equipment and compacting works to avoid the night time period (10.00pm to 7.00am) → Educate workers on the importance of minimising noise and avoid creating short duration high noise level events → Inform surrounding residents by mail of planned works prior to the works commencing.

ID number	Environmental management measure
L.6	To minimise the potential impacts from impact piling associated with the construction of the access road bridge, the following measures would be implemented as part of the CNVMP: → Using a wood block or other damper for the driving hammer → Selecting machines which minimise auxiliary noise sources → Shielding the impact area with a sleeve, where feasible → Providing appropriate respite periods between periods of impact piling → Carrying out intensive piling works before 10.00pm and after 7.00am on weekends → Consulting with the community to identify periods when they are less sensitive to impact piling works and working with these timings e.g. school examination periods or community events. This would include individual briefings, phone calls and specific notifications → Noise monitoring would be undertaken throughout the impact piling operations to monitor noise impacts from these activities.
	Visual and landscape character
M.1	The following measures would be considered with respect to landscape design and vegetation impacts for the New Intercity Fleet Maintenance Facility: → Restricting vegetation clearing to those areas where it is necessary. Opportunities to minimise clearing would be identified as part of the ongoing development of the Project design → Ensuring a vegetation buffer of existing planting is left between within or outside the Project site boundary to provide visual screening of the facility where possible → Locating storage areas and associated works in cleared or otherwise disturbed areas away from sensitive native vegetation where possible → Avoiding stockpiling materials in areas supporting vegetation where possible → Trimming rather than the removal of trees should be considered where possible and to be conducted by a qualified arborist → Rehabilitating vegetated areas where ground is disturbed → Planting native trees and shrubs to screen built form and reduce the scale of the infrastructure → Reinforcing the local semi-rural landscape character through the use of appropriate native vegetation, including that from the identified endangered vegetation communities → Planting a graded screen of vegetation at varied heights that includes groundcover, shrub and tree layers to form an effective visual screen → Considering the use of advanced size trees for instant effect → Restoring areas disturbed by construction to match existing condition as far as practicable → Consider additional measures to reduce potential visual privacy impacts (such as overlooking of adjacent properties) from the new access road.
M.2	The following measures would be considered with respect to the final materials and finishes for the New Intercity Fleet Maintenance Facility: → All elements including lighting columns, roof lines, cladding etc. to be considered as a whole to simplify the structure and reduce clutter → Avoid reflective surfaces.

ID number	Environmental management measure
M.3	The lighting principles and recommended mitigation measures would be further developed as part of a lighting management plan for the facility to be developed as part of the detailed design of the Project. All lighting would be installed in a manner which minimises light spill to areas beyond the maintenance facility site boundary. Best practice lighting design principles should be applied including: → Ensure the lighting design is in accordance with relevant Australian Standards which provides recommended maximum values of light technical parameters for the control of obtrusive light. Ensure light spill and light pollution externally are avoided in accordance with this Standard. → Appoint a qualified lighting designer who demonstrates a detailed understanding of lighting design and experience in the application of light within the interior architectural and exterior landscape environment. → Restrict lighting to the minimum required for operations, safety and security requirements. → Directional lighting techniques should be used to direct light away from sensitive viewpoints. → Indirect glare from reflective surfaces must be avoided. → Where luminaires are lighting a horizontal surface, mounting locations of luminaires should ensure that the angle of the luminaires do not exceed 30 degrees from the vertical and that the luminaires with an asymmetric light distribution are used where possible. → Where luminaires are lighting a vertical surface and the angle of adjustment justifies a greater than 45 degree position, ensure that direct views to the light source are eliminated or avoid lighting vertical surfaces. → When choosing lighting categories from Australian Standards, preference would be given to choosing lower light levels where appropriate (subject to meeting minimum requirements for elements such as the use of CCTV for security purposes). This would assist in avoiding unnecessary over-design of the lighting for the maintenance facility.
M.4	Tree planting outside the works boundary would be considered to assist in visually screening the facility. Offset planting for the removed vegetation would be required and would be undertaken with specialist ecological advice.
M.5	Lower luminaire mounting heights (for example ground level or low level garden path-type lighting) should be provided along pedestrian paths within the car park (where possible and sufficient to meet required guidelines and standards). This lighting could be supplemented with higher mounting light poles utilising motion detectors.
M.6	The following strategies should be implemented for lighting of general areas of the maintenance facility: → For exterior areas, lower luminaire mounting heights (ground level or low level up to three to five metres) should be provided to minimise potential direct views of luminaires → Lighting controls should be separated by tasks and task zones to allow for flexible control of illuminance levels → For floodlighting of the maintenance facility, the use of a smaller number of tall poles should be avoided in favour of additional lower mounted lighting, as this can cause obtrusive light effects.
M.7	The following measures would minimise light impacts: → Shielding of the perimeter should be provided through the use of planting or structural elements to prevent direct views of lit surfaces, wherever practical → The maintenance shed doors should remain closed when activities are occurring inside the shed at night, wherever practical → For buildings which incorporate glazed/transparent façades, it is recommended that the internal lighting be dimmed down or designed with low glare luminaires to reduce the building luminance and direct views of the façade → Lighting for illuminated signage should be localised to ensure that, as far as practical, there is no light spill into adjacent areas, must eliminate glare and be designed such that luminance is minimised

ID number	Environmental management measure
M.7 (cont.)	→ When choosing lighting categories for public road lighting for adjacent roads including the new access bridge and roundabout from AS1158, preference should be given to choosing categories with lower light levels where appropriate while considering the lighting requirements for public safety → Security CCTV cameras would consider the use of Infra-red lights, where practical → Lighting for security would utilise full cut-off luminaires and glare control accessories, where practical → Lighting for security would apply lower mounting heights and use appropriate optics to minimise light spill, where practical.
M.8	The following measures would minimise light impacts associated with road lighting: → Road lighting (for the access road bridge and revised intersection arrangements) would be required to be designed to relevant standards including Central Coast Council, Roads and Maritime Services and Australian Standards → Road lighting to new bridge and access road would consider the use of full cut-off luminaires to minimise glare and light spill, where practical → Road lighting to adjacent street would considered the use of shorter poles to minimise direct views of luminaires and appropriate optics to reduce spill light → The use of speed bumps on the access road and internal roads should be avoided in order to minimise car headlight deflection above the horizontal.
M.9	Luminaires and lighting equipment for the Project should include the following to minimise light impacts: → All external luminaires should include specifically designed optics, glare shields and accessories that minimise upward light spill and control light output to direct it where required → Full cut-off luminaires should be provided to minimise upward light spill above the horizontal → Appropriate beam angles on luminaires should be used to ensure lighting is focussed where required, that spill light is minimised and direct views into a light source are minimised → Luminaire correlated colour temperature (CCT) for all lamps to be consistent across the Project site. CCT to be between 3000K and 4500K, noting the warmer 3000K CCT tends to be less obtrusive at night → All external luminaires to include LED/fluorescent light sources → Light fittings must provide 60 percent of the lamp lumen output of the fitting in the peak intensity, as defined by the fitting beam angle.
	Non-Aboriginal heritage
N.1	If the proposed development is changed to affect areas not included in the present report, further assessment of potential non-Aboriginal heritage impact would be undertaken.
N.2	Prior to commencement of works, a photographic archival record would be completed of the Turpentine Road/Chittaway Creek underpass. Copies of the record would be lodged with Sydney Trains, Central Coast Council, the local historical society and the Heritage Division, as required by these agencies.
N.3	Unexpected archaeological relics remain protected by the *Heritage Act 1977*. If a potential relic is found in the course of the work, work would cease in the vicinity, and the heritage Division of the Office of Environment and Heritage would be contacted for advice.
	Aboriginal heritage
O.1	If the extent and nature of the Project is altered, additional archaeological assessment would be undertaken to address this.

ID number	Environmental management measure
O.2	Due to the inability to adequately access and assess some parts of the site, an Aboriginal cultural heritage assessment report (ACHAR) would be completed for the areas of the Project site identified as having moderate or high potential for Aboriginal heritage. This would include Aboriginal community consultation and archaeological test excavation. This process would be undertaken in accordance with the following guidelines issued by the OEH: → *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) → *Code of practice for archaeological investigation of Aboriginal objects in New South Wales* (DECCW 2010) → *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010).
O.3	If the results of the ACHAR confirm that Aboriginal objects are present and would be harmed by the proposed development, it would be necessary to apply for an Aboriginal Heritage Impact Permit (AHIP) prior to commencement of works.
O.4	During construction, should Aboriginal heritage items be uncovered, all work within the vicinity would cease and the Project Manager and Transport for NSW staff would be notified. The Department of Planning and Environment would also be notified in accordance with the *National Parks and Wildlife Act 1974*. Investigation of the significance of the find and approval by a suitably qualified archaeologist would be required prior to recommencement of works.
	Traffic, transport and access
P.1	A construction traffic management plan (CTMP) would be prepared as part of the pre-construction planning. The plan would be developed to address construction traffic and transport management and would also be used to develop site-specific traffic management measures once the construction methods and haulage routes are finalised.
P.2	Heavy vehicles would be restricted to the routes specified.
P.3	Disruption on the local road network would be minimised through the use of nominated haulage routes which aim to avoid sensitive areas such as schools, where possible (particularly the Central Coast Rudolf Steiner School and Follyfoot Farm Child Care Learning Centre).
P.4	Signs would be provided at each access point to assist in deliveries to each work site.
P.5	Traffic controllers would be located at each access point, where required and direct vehicle movements, vehicle deliveries, pedestrians and cyclists.
P.6	Emergency response protocols would be included in the CTMP for construction traffic incidents. Police/emergency services would respond to emergencies.
P.7	A pre and post construction assessment of road pavement assets would be conducted in areas likely to be used by construction traffic.
P.8	The potential for flooding on construction vehicle access roads would be identified and alternative access roads identified (as required).
P.9	Environmental controls would be installed at access roads so that mud or gravel is not tracked onto the road network from the access roads by construction vehicles (as required).
P.10	Public communications would be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to the site works. These methods would be detailed in the CTMP.
P.11	Access to all private properties adjacent to the works would be maintained during construction.
P.12	During Project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents.
P.13	Road safety audit(s) would be undertaken (where required or deemed necessary).
P.14	Project staging, vehicle movement and scheduling, equipment and resourcing would be co-ordinated throughout construction.

ID number	Environmental management measure
	Socio-economic
Q.1	The following measure would be undertaken to minimise impacts to local amenity and character of the area during construction: → Undertake consultation with sensitive receivers and adjacent residents about their concerns and suggestions for reducing the proposals impact, such as type of fencing, screening vegetation etc. → Ensure that consideration is given to lighting impacts from the proposal and that where possible lighting spill is directed away from surrounding residents → Develop and maintain a mechanism for recording and responding to complaints from the community with respect to air quality impacts on sensitive receptors → Consult with and inform all sensitive receptors regarding the timing of construction activities and provide advanced notice for activities which may be particularly dusty, noisy activities or which would involve night works → Develop and maintain a complaints register to monitor noise and vibration impacts on sensitive receivers.
Q.2	~~Rail customers~~ The community would be notified in advance of any rail ~~possession~~ shutdown periods where works are proposed to be undertaken as part of the Project.
Q.3	The following measures would be undertaken to minimise impacts to business and other employment services during construction: → Where possible, Transport for NSW would ensure that employment opportunities for the local and regional population are maximised → Where possible, Transport for NSW would look to target sectors where unemployment is greatest, and maximise opportunities (through training opportunities) for youths and indigenous members of the community.
Q.4	The following measure would be undertaken to minimise impacts to safety and security during construction: → Best practices and processes would be adopted for safety and security in compliance with a Workplace Health and Safety Management Plan → All construction areas would be fenced off to restrict access to public → The facility would be designed to clearly delineate public areas from restricted areas → Clear sightlines would be provided throughout the maintenance facility, where possible → A lighting design which conforms to Australian and Sydney Trains standards and provides well-lit and uniform lighting to maintenance facility would be provided → Vegetation in and around the site would be maintained to a low height to improve surveillance opportunities → Where required, vandal resistant fittings and graffiti resistant surfaces would be considered as part of the detailed design → High security perimeter fencing and signage would be provided to deter unauthorised access to the maintenance facility, including suitable vehicle and pedestrian gates at appropriate locations around the perimeter of the site → High security locking devices, window treatments and electronic access control would be considered as part of the detailed design → Intruder alarm system(s) and closed-circuit television (CCTV) to monitor nominated restricted areas would be considered during detailed design → External lighting would be provided to vehicular and pedestrian movement areas, including roads, paths and car parks, in order to provide visibility and safety at night.
	Land use and property
R.1	Consultation and communication would be undertaken with property owners near the Project about any changes to property access and local access during construction and operation.

ID number	Environmental management measure
R.2	Ongoing consultation and communication with directly affected property owners about potential property acquisition would be undertaken prior to commencement of construction. This would include the provision of information on the timing of acquisition and the process for property acquisition.
R.3	Property acquisition would be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.*
R.4	On completion of construction activities, land used for the temporary construction site, stockpiles and drainage sumps/basins would be revegetated and left in a stable condition. Where these properties have been leased by Transport for NSW, these properties would be returned to the original landowners following rehabilitation of the site(s).
	Hydrology, drainage and flooding
S.1	Site offices, staff facilities and construction compound would be located at least above the 1:100 AEP flood level, including an allowance for climate change. This may require these temporary structures to be installed on fill pads or piers.
S.2	Any temporary flood diversion works would be sized for a 1:20 AEP event to allow for the proposed construction program.
S.3	A flood evacuation plan would be developed prior to any work commencing on-site as part of the construction documentation.
S.4	No stockpiles would be located within high/medium flood risk areas or adjacent to existing culverts in order to reduce the potential impacts to surface water systems.
S.5	The proposed pier locations for the new rail bridge crossings would be situated so as to minimise the Projects impact on surface water flows and flooding.
S.6	All track drainage would be designed to meet Transport for NSW standards and Engineers Australia's Australian Rainfall and Runoff.
S.7	The existing track drainage system would remain operational throughout the construction of the main line siding and turnouts within the facility.
	Groundwater
T.1	A construction groundwater management plan would be prepared which would detail the control measures that aim to reduce potential impacts to groundwater. A groundwater monitoring program would be included in the plan, and outline the monitoring network and baseline requirements (number of piezometers, groundwater levels, and analytical suite) prior to the commencement of construction, enabling any changes to groundwater levels and quality during construction to be identified.
T.2	Excavation techniques and other mitigation measures would be implemented to minimise impacts to groundwater and reduce the take of water. Factors for consideration would include the duration the excavation would remain open, particularly in areas of expected higher inflows; the size of the excavation; the water table depth; and the material to be excavated.
T.3	Management and disposal ~~disposed~~ of any encountered groundwater would occur in accordance with the waste classification guidelines (NSW EPA, 2014) and the water discharge and reuse guideline (Transport for NSW, 2017~~5~~).
T.4	Preparation and implementation of hazardous material procedures would occur, including procedures for managing spills and refuelling.
	Soils, geology and contamination
U.1	An Erosion and Sedimentation Control Plan (ESCP) would be developed and maintained for the site in accordance with *Managing Urban Stormwater, Soils and Construction Guidelines* (Landcom, 2004). The plan would include site access controls preventing tracking of sediment from site, limiting the removal of groundcover and ensuring that the excavation works do not block natural drains or create undrained areas.

ID number	Environmental management measure
U.2	All material required for off-site disposal would be appropriately tested and classified against the Waste Classification Guidelines prior to being disposed of off-site (DECC, 2008).
U.3	Excavated material would be reassessed for reuse onsite.
U.4	Stabilised surfaces would be reinstated as quickly as practicable after construction.
U.5	Sediment would be prevented from moving off-site and sediment laden water prevented from entering any watercourse, drainage line or drainage inlet.
U.6	Site rehabilitation of disturbed areas would be undertaken progressively as activities are completed during the Project.
U.7	A hazardous material (hazmat) building survey be undertaken prior to demolition of any building structure, especially any structure likely to have been built (or include materials manufactured) before 1990.
U.8	The CEMP would include a contamination management plan and an asbestos management plan (if deemed to be required).
U.9	All fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian standards and EPA Guidelines.
U.10	Spill kits and a temporary refuelling bund would be installed and used onsite (where necessary).
U.11	If fill material is discovered during excavation works, the material should remain on-site where possible (where contaminant concentrations meet the National Environment Protection Council's National *Environment Protection (Assessment of Site Contamination) Measure 1999.*
U.12	Should any signs of contamination be identified during work within the site, the material would be tested against the National Environment Protection Council's National Environment Protection (Assessment of Site Contamination) Measure 1999, and managed accordingly.
U.13	Procedures for handling asbestos contaminated materials (if found on site), including record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements.
U.14	Characterisation of acid sulfate soil impacts in areas of known occurrence and preparation of an Acid Sulfate Soil Management Plan to manage potential impacts would be undertaken as part of the ESCP.
	Waste and resource management
V.1	All waste requiring off-site disposal would be classified in accordance with the OEH's *Waste Classification Guidelines* (DECCW 2009) prior to disposal. The following key waste mitigation and management strategies would be implemented throughout the construction of the Project and would be governed by the CEMP:
V.2	Removal of wastes from site would only be undertaken by a licensed contractor with appropriate approvals by the NSW DECCW under the POEO Act.
V.3	Construction materials would be purchased in accordance with an established procurement strategy that prioritises the selection of materials that utilise best practice recycled materials and sustainability ratings.
V.4	Where possible construction wastes would be diverted from landfill and recycled or reused within the Project areas or with an appropriate recycling contractor.
V.5	Sewage waste would be disposed of by a licensed waste contractor in accordance with Sydney Water and OEH requirements.
V.6	Construction materials that contain minimal embodied energy would be utilised.
V.7	Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.

ID number	Environmental management measure
	Air quality
W.1	A Dust Management Plan would be produced as part of the overall CEMP. This would identify specific construction activities with potential to impact air quality and contain details of the site-specific mitigation measures to be applied. Additional guidance on the control of dust at construction sites in NSW is provided as part of the NSW EPA Local Government Air Quality Toolkit. As part of the Dust Management Plan, a survey of the condition of existing buildings within the vicinity of the Project site would be undertaken to identify the extent of existing dust prior to commencement of construction works. The proposed list of properties to be assessed would be determined during detailed design and would require approval by Transport for NSW.
W.2	A mechanism for making, recording and responding to all air quality complaints from the community would be put in place during construction. This would include provision of relevant contact details and making the complaint log available to the local authority if requested.
W.3	Regular inspections of the work site to monitor compliance with the Dust Management Plan would be carried out. This would include an increased frequency of monitoring when activities with a high potential to produce dust are being carried out or during prolonged dry or windy conditions. Dust and weather monitors would be required to be maintained at reasonable intervals along the length of the Project construction boundary in order to identify any potential exceedances of dust or other emissions.
W.4	Dust mitigation measures would be developed and implemented prior to and during construction including: → Erection of solid screens around dusty activities where feasible → Planning of dusty work as far away as possible from sensitive receivers, where feasible → Use of wet methods and coverings for barriers and stockpiles → Water assisted dust sweepers would be used on the access and local roads to remove any material tracked out by the trucks → Dust suppression techniques such as ventilation during cutting, grinding or sawing activities would be used where required → Skips and chutes would be covered → An adequate supply of water would be maintained on site for dust/particulate matter suppression, including use of non-potable water where possible.
W.5	Construction plant and equipment would be well maintained so that vehicular emissions would be within relevant air quality standards.
W.6	All on-road vehicles would comply with relevant legislative requirements, where applicable, and where not in use for long periods of time, vehicles would be switched off.
W.7	The use of diesel or petrol powered generators would be avoided and mains electricity or battery powered equipment used where practicable. Where the use of this equipment is required, shielding or enclose would be utilised where possible to minimise impacts.
W.8	During earthworks, visual inspections for dust in windy or dry periods would be undertaken. Dust generating activities should be avoided or minimised during these periods. Appropriate water suppression measures would be used on exposed surfaces and equipment that may be generating dust.
W.9	Should exceedances of dust monitoring be identified, all reasonable efforts to minimise impacts to surrounding property water supplies would be undertaken including (but not limited to): → Washing/cleaning of roofs → Replacement of tank water (where there is a concern that this has been contaminated) → Replacement of filters etc.

ID number	Environmental management measure
	Climate change and greenhouse gases
X.1	During construction, the following mitigation measures would be implemented in order to reduce the amount of emissions: → Purchasing electrical energy derived from a renewable energy source, where available → Using low greenhouse gas-intensive construction materials (where a suitable substitute for a high greenhouse gas-intensive material is available) → Procuring construction services and materials locally to minimise the distance travelled and therefore emissions of vehicles accessing the site → Ensuring that deliveries are managed in an efficient manner to minimise the number of trips required and therefore reduce the amount of emissions → Implementing energy-efficient work practices, such as switching off construction plant, vehicles and equipment when not in use to minimise idling → Regularly monitoring, auditing and reporting on energy, resource use and associated greenhouse gas emissions as part of the environmental reporting requirements specified within the CEMP → Selecting materials during construction planning to ensure products that reduce embodied carbon are considered and used → Ensuring clearance of vegetation be limited to the minimum that is required for the Project → Ensuring all vegetation cleared be disposed of at a registered compost facility in the Sydney area and that it is not to be sent to landfill or burnt.
	Bushfires
Y.1	A Bushfire Management Plan would be incorporated into the overall CEMP for the Project, including emergency contact numbers in the event of a bushfire or emergency.
Y.2	The construction of the Project would ensure that an asset protection zone (APZ) around the Project site is provided for the life of the development, comprising an area of physical separation between all built structures and potential bushfire hazards. This could include elements such as the new access road and the proposed detention basins ~~ponds~~.
Y.3	Appropriate access tracks would be maintained to all sections of the Project site during construction and operation to allow safe access, egress and a defendable space for emergency services in the event of a bushfire or emergency.
Y.4	The CEMP would include emergency evacuation procedures in the event of a bushfire or emergency. This would include a map of all potential access tracks to and from the site, in addition to the primary access route for site personnel.
Y.5	The CEMP would include identification of designated ~~stipulate a no~~ smoking zones ~~policy~~ for site personnel ~~whilst working~~ within ~~or surrounding~~ the Project site during construction or operation of the maintenance facility.
Y.6	The emergency/evacuation plan for the site would be prepared in accordance with the relevant NSW Rural Fire Service Guidelines for the preparation of emergency/evacuation plan(s).
Y.7	Sources of gas and electricity would be located so as not to contribute to the risk of fire or impede the firefighting effort.

ID number	Environmental management measure
	Public utilities
Z.1	Should the location of any utilities be identified to be in conflict with the Project, a formal review of the proposed works at these location(s) would be undertaken in consultation with the construction contractor. Alternative arrangements would then be determined to provide the most beneficial outcome for the community, service provider and proposal in terms of safety and constructability. The strategy for the preferred hierarchy of utilities treatment as part of the Project would be as follows: → Do nothing – avoid impact on utilities where possible → Protect – protect utilities in their existing locations where feasible → Modify access – modify manholes/chambers to provide side access outside the alignment of the Project, where these are located beneath the proposed alignment → Relocate – utilities to be relocated only where no other options are feasible or acceptable.
Z.2	The nominated construction contractor would be responsible for monitoring existing utilities to ensure they are protected properly from damage during construction.
Z.3	A contingency management plan would be prepared to detail contingency planning in case of service interruption.
Z.4	All construction works which are near or around utilities would be carried out in accordance with relevant legislative requirements including, but not limited to: → *Work Health and Safety Act 2011* → *Safety Regulation 2001 on Work near Underground Assets* → *Dial Before You Dig Asset Protection Guidelines.*
	Hazard and risk
AA.1	Any storage of hazardous materials, and refuelling/maintenance of construction plant and equipment, would be undertaken in clearly marked designated areas that are designed to contain spills and leaks with appropriate bunding.
AA.2	Machinery would be checked daily to ensure there is no leaking oil, fuel or other liquids.
AA.3	A Work Health and Safety Plan would be developed to manage construction safety hazards for the facility.
AA.4	Contingency plans would be developed to deal with any spills which might occur during construction.
AA.5	All hazardous materials spills and leaks would be reported immediately to site managers and Transport for NSW or Sydney Trains as required. Actions would be immediately taken to remedy spills and leaks.
AA.6	Chemical spill kits would be readily available and accessible to construction workers. Kits would be kept at site compounds and on specific construction vehicles. Environmental control maps and/or site maps would illustrate the location of the spill kits.
	Cumulative impacts
AB.1	Transport for NSW and the nominated contractor would consult with the proponents of other major Projects in the area to avoid any potential cumulative impacts.
AB.2	Transport for NSW would consult with Road and Maritime Services and the OEH to identify potential opportunities to provide cumulative off-sets for the overall loss of *Melaleuca biconvexa*.

8.2.3 Operation

Table 8.3 Operational environmental management measures

ID number	Environmental management measure
	Noise
AC.1	An Operational Noise and Vibration Review ~~management plan~~ would be developed which would include management strategies designed to meet the environmental noise objectives for the Project and would include consideration of: → Alternative methodologies for horns, warning signals and horn testing at the facility → Standing of trains outside of the maintenance building and on standing tracks six and seven during evening and night periods → Restrictions on external cleaning during the evening and night period → Strategies to control other noise sources such as shunt vehicles; vehicle movement alarm systems; mechanical plant (including backup generator(s)) and PA systems.
AC.2	The maintenance shed would be constructed to achieve a sound insulation performance no less than 26dB R_w (weighted sound reduction index).
AC.3	The maintenance shed doors would remain closed when activities are occurring inside the sheds, where reasonable.
AC.4	As part of the Operational Noise and Vibration Review, surveys of existing properties with the potential for vibration impacts would be undertaken. These surveys would for a baseline for identification of potential impacts caused by the operation of the maintenance facility (for which rectification works may be required).
AC.5	Post-construction noise monitoring would be carried out during the operation to ensure compliance with the final noise goals for the facility.
	Traffic, transport and access
AD.1	The following management and mitigation measures would be implemented during operation, where these are reasonable and feasible: → Limiting of vehicle trips to outside of the road network peak hour for improved safety and intersection operation, where possible or practicable → Scheduling delivery and service vehicles to the site out of peak hour periods, where possible or practicable → Informing staff and visitors to the site of the preferred travel route and primary site access → Monitoring intersection access and obtain feedback from staff on its operation → Monitoring any parking overflow on the surrounding road network (if any).
	Groundwater
AE.1	A hazardous material procedure, including procedures for managing spills and refuelling, would be developed and implemented to minimise groundwater contamination from chemical spills and leaks.
	Air quality
AF.1	During operation of the facility, ancillary service vehicles and maintenance equipment would be operated and maintained in accordance with the manufacturer's requirement and the POEO Act.
	Climate change and greenhouse gases
AG.1	A climate change risk management plan would be developed as part of the CEMP and would provide opportunities to manage climate change risks to the Project into the future as data on climate change impacts becomes more robust.

ID number	Environmental management measure
	Hazard and risk
AH.1	An incident emergency spill plan would be developed for the site. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways. An emergency spill kit would be kept on site at all times.
AH.2	All staff would be made aware of incident emergency procedures and the location of emergency spill kits.
AH.3	The maintenance facility would be designed to comply with Sydney Trains operational safety, signalling and operating procedures. Operational hazards would be managed through Transport for NSW's standard procedures for hazard and risk that are currently in place across the entire rail network.

9 Conclusion and next steps

9.1 Conclusion

The REF, SIS and Additional SIS assessed the likely impacts of constructing and operating the proposed New Intercity Fleet Maintenance Facility at Kangy Angy. In response to the identified impacts, the REF, SIS and Additional SIS identified a range of environmental management and mitigation measures that would be implemented to minimise impacts during both the construction and operation of the maintenance facility.

This REF was publicly displayed for a period of four weeks from 6 June to 4 July 2016. This was supported by a community engagement program comprising newsletters, stakeholder meeting and briefings, community information sessions, and doorknocking. In addition, to meet the Department of the Environment and Energy display requirements as part of the Commonwealth controlled action assessment under the EPBC Act, the REF, SIS and other supporting documentation was also placed on public display between 21 October 2016 and 21 November 2016. Further to this, the Additional SIS was also placed on public display in June 2017.

Across the three display periods, Transport for NSW received a total of 210 submissions. Of these submissions, five were received from Government agencies/representatives, eight were provided on behalf of the Kangy Angy Resident Action Group, two were received on behalf of the Ourimbah Region Residents Association and two were received from the Community Environment Network. The remaining submissions were received from individual members of the community and/or businesses. This Combined Submissions Report has documented the issues identified in these submissions and outlines Transport for NSW responses to these issues.

A substantial proportion of community submissions were concerned about options development and site selection, hydrology drainage and flooding, noise and vibration, and biodiversity. Specific key issues of concern included:

- Operational noise impacts
- General impacts to biodiversity and vegetation clearance
- General site flooding impacts
- Concern regarding the potential for changes to existing flooding flows
- General opposition to preferred site.

A number of design modifications and refinements have also been proposed in response to the submissions received, ongoing consultations with key stakeholders and further design development following the display of the REF. The impacts associated with the proposed design modifications have been assessed and it is considered that the impact of these modifications would result in beneficial outcomes to the overall Project or would be manageable through the application of appropriate environmental management measures as documented in Chapter 8 of this Combined Submissions Report, which includes some new and revised measures to those identified in the REF. Overall, the benefits of the changes to the community and the environment, and the benefits for operation of the Project, are expected to outweigh the potential impacts of these changes.

The planning approval process has confirmed Kangy Angy as the preferred site for the New Intercity Fleet Maintenance Facility.

9.2 Next steps

This report has been prepared to support the determination of the Project by Transport for NSW. As part of the determination, the local community will also be notified of Transport for NSW decision to approve the Project by way of a community newsletter and the Transport for NSW website www.transport.nsw.gov.au/Projects. Transport for NSW will also provide a letter to each of the respondents who made a submission during the display periods. This correspondence will include individual submission reference numbers and contact details to obtain further information regarding the progress of the Project.

In the event that Transport for NSW determines to proceed with the approved Project, consultation activities regarding the Project would continue including ongoing updates to the community, businesses and other stakeholders in the lead up to, and during, construction.

10 References

- Australian Bushfire Protection Planners Pty Limited 2016, *Bushfire Protection Assessment Report*, 30 May 2016.
- AECOM 2016, *New Intercity Fleet Maintenance Facility – Flood Study and Flood Impact Assessment Report*, 29 July, 2016.
- Catchment Simulation Solutions 2013, *Ourimbah Creek Catchment Flood Study*. Prepared for Gosford City Council and Wyong City Council, October 2013.
- Clulow, S., Anstys, M., Keogh, J. S. & Catullo, R. 2016. A new species of Australian frog (Myobatrachidae: *Uperoleia*) from the New South Wales mid-north coast sandplains. Zootaxa, 4184, 285-315.
- EMGA Mitchell McLennan (EMM) 2015, *Preliminary Ecological Assessment, New Intercity Maintenance Facility*. Prepared for Transport for NSW, 15 October 2015.
- Environment Protection Authority 2000, *Industrial Noise Policy*.
- Department of Environment and Climate Change ,2007. Threatened species assessment guidelines. The assessment of significance. Hurstville: Department of Environment and Climate Change.
- Department of Environment and Climate Change, 2009. Threatened species survey and assessment guidelines: field survey methods for fauna - Amphibians. Department of Environment and Climate Change.
- Department of Environment and Conservation, 2004. Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft). Hurstville: Department of Environment and Conservation.
- Department of the Environment Water Heritage and the Arts, 2010. Survey guidelines for Australia's threatened frogs - guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. In: DEPARTMENT OF THE ENVIRONMENT, W., HERITAGE AND THE ARTS (ed.). Department of the Environment, Water, Heritage and the Arts.
- Department of Planning and Environment 2015, *Draft Central Coast Regional Plan,* November 2015.
- GHD 2014, Central Coast Train Stabling and Maintenance Facility – Concept Options Development. Prepared for Transport for NSW, November 2014.
- GHD 2015a, Central Coast Train Stabling and Maintenance Facility – Comparative Site Analysis. Prepared for Transport for NSW, March 2015.
- GHD 2015b, Central Coast Train Stabling and Maintenance Facility – Bushells Ridge Site Assessment. Prepared for Transport for NSW, April 2015.
- Landcom 2004, *Managing Urban Stormwater, Soils and Construction Guidelines*, March, 2004.
- Planning NSW 1995, *Is an EIS required? Best practice guidelines for Part 5 of the Environmental Planning and Assessment Act 1979.*
- NSW Government 2012a, *NSW Long Term Transport Master Plan*, December 2012.
- NSW Government 2012b, *Sydney's Rail Future Modernising Sydney's Trains*, June 2012.
- NSW Scientific Committee 2017. Determination for provisional listing of an endangered species on an emergency basis - Mahony's Toadlet (*Uperoleia mahonyi*). Hurstville: Office of Environment and Heritage.
- Transport for NSW 2016a, *New Intercity Fleet Maintenance Facility – Review of Environmental Factors*, June 2016.
- Transport for NSW 2016b, *New Intercity Fleet Maintenance Facility – Species Impact Statement*, June 2016.

- Transport for NSW 2016c, *New Intercity Fleet Maintenance Facility EPBC Act Referral*, March 2016.
- Transport for NSW 2016d, *Transport for NSW Additional Information Response*, June 2016.
- Transport for NSW 2016e, *New Intercity Fleet Maintenance Facility SIS and REF Addendum*, October 2016.
- WSP | Parsons Brinckerhoff 2016, *Lighting Impact Assessment*, August, 2016.

Appendix A

KEY ISSUE AND SUB-ISSUE CATEGORIES

Key issue and sub-issue categories

Table A.1 below provides a list of the key issue and sub-issue categories identified from submissions.

Table A.1 Key issue and sub-issue categories

Key issue	Sub-issue(s)
Justification and need	Project justification
	Cost of the Project – General
	Cost of the Project – Access road bridge
Options development and selection	Opposition to preferred site
	Community preference for Warnervale site
	Community preference for Bushells Ridge site
	Site selection options process
	Site relocation recommendation
	Support for the Project
Project description and design	Earthworks and fill materials
	Future expansion
	New Enterprise Drive intersection
	Detention basins
	Flood access road
	Hours of operation
	Fleet size
	Site area
	Public accessibility to the access bridge
	Impact to Schubolt Lane
	Proposed maintenance activities
	Relocation of 33kV high voltage powerline
	Maintenance facility access road
Project construction	Construction and traffic haulage routes
	Employee parking
	Construction compounds
	Construction program
	Number of workers

Key issue	Sub-issue(s)
Planning and statutory requirements	Planning approval process
	Adequacy of documentation
	Assessment of relevant legislation
Consultation and stakeholder engagement	Request for further and ongoing consultation
	Availability and level of detail at community information sessions
	Adequacy of consultation undertaken to date
	Consultation and submissions process
	Display period
	Website document links
Biodiversity	Assessment methodology – Orchid study surveys
	Assessment methodology – General survey undertaken
	Adequacy of assessment
	Classification of vegetation
	Consistency between assessments
	Cumulative biodiversity impacts
	Impacts to biodiversity – General
	Impact to newly described frog species
	Impact to threatened species
	Management and mitigation measures
	Offset provisions
	Vegetation clearance
	Weeds
	Impact to wildlife corridor
	Subject site definition for the initial SIS
	Assessment methodology for the initial SIS
	Adequacy of assessment for the initial SIS
	Species considered as part of the SIS
	Assessment methodology for new frog species
	Adequacy of frog SIS assessment
	EPBC referral for Mahony's Toadlet
	Impacts to Mahony's Toadlet habitat
	Suitability of identified frog exclusion zones
	Suitability of relying of existing mapping for Frog Habitat

Key issue	Sub-issue(s)
	Frog habitat assessment conclusions
	Proposed management measures for Mahony's Toadlet
Noise and vibration	Peer review of noise and vibration assessment
	Adequacy of assessment
	Construction noise impacts
	Operational noise impacts – General
	Operational noise impacts – Horn testing
	Operational curfew
	Operational vibration impacts
	Impact from track cross-overs
	Management and mitigation measures
Landscape and visual	Visual impacts during operation
	Lighting impacts and light spill
	Privacy
	Accuracy of photomontage
	Management and mitigation measures
Traffic, transport and access	Assessment methodology
	Construction traffic impacts
	Impacts to local access and local roads
	Operational traffic impacts
	Speed limits
	Management and mitigation measures
Socio-economic	Assessment methodology
	Amenity impacts
	Impacts to local businesses and schools
Hydrology, drainage and flooding	Adequacy of assessment
	Change to flooding flow regime
	Cumulative impacts
	Site flooding impacts
	Flood modelling
	Water quality and pollution to local waterways
	Management and mitigation measures
Soils, geology and contamination	Management and mitigation measures

Key issue	Sub-issue(s)
Groundwater	Impact to existing bores
Land use and property	Land zoning
	Land and property value impacts
	Land acquisition
Air quality	Assessment methodology
	Construction air quality impacts
	Operational air quality impacts
	Errors and omissions
Bushfire	Adequacy of assessment
	Escape routes during a bushfire
Waste and resources	Disposal of wastes
Hazards and risks	Impacts to tank water
	Health impacts
	Childcare safety
	Security of residences
	Other hazards and risks
Utilities and services	Cost for additional utilities
	Provision of additional utilities
Out of scope issues	Compensation
	Warnervale Business and Education University site
	Justification for Link Road
	Public transport
	Impacts from construction of the Gosford Passing Loops

Appendix B

TABLE OF ISSUES PER COMMUNITY SUBMISSION

Table of issues per Community submission

Table B.1 Table of issues per community submission

Sub. no.	Submitter	Key issue	Sub-issue	Section
1	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
2	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Bushells Ridge site	4.2.3
3	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
4	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
5	Kangy Angy Resident Action Group	Consultation and stakeholder engagement	Display period	4.6.5
6	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
7	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
	Community	Project description and design	Earthworks and fill materials	4.3.1
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
			Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Air quality	Construction air quality impacts	4.16.2
8	Community	Project description and design	New intersection at Enterprise Drive	4.3.3
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Consultation and submissions process	4.6.4
9	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Offset provisions	4.7.11
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
10	Community	Project description and design	Earthworks and fill materials	4.3.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
11	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
12	Community	Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Visual impacts during operation	4.9.1
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
13	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
14	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Land use and property	Land zoning	4.15.1
15	Community	Noise and vibration	Operational noise impacts – General	4.8.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
		Land use and property	Land and property value impacts	4.15.2
16	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
17	Community	Justification and need	Cost of the Project – General	4.1.2
		Biodiversity	Offset provisions	4.7.11
			Management and mitigation measures	4.7.14
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
			Operational curfew	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
			Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.3
		Traffic, transport and access	Management and mitigation measures	4.10.6
		Hydrology, drainage and flooding	Flood modelling	4.12.5
			Management and mitigation measure	4.12.7
		Land use and property	Land and property value impacts	4.15.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hazards and risks	Impacts to tank water	4.19.1
18	Community	Support for Project	Not applicable	n/a
19	Community	Options development and site selection	Community preference for Bushells Ridge site	4.2.3
		Noise and vibration	Operational noise impacts – General	4.8.4
20	Community	Options development and site selection	Opposition to preferred site	4.2.1
21	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Traffic, transport and access	Construction traffic impacts	4.10.2
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Groundwater	Impact to existing bores	4.14.1
		Utilities and services	Provision of additional utilities	4.20.2
22	Community	Noise and vibration	Operational noise impacts – General	4.8.4
			Management and mitigation measures	4.8.9
23	Community	Justification and need	Cost of the Project – General	4.1.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
24	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operation noise impacts – Horn testing	4.8.5
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
25	Community	Justification and need	Cost of the Project – General	4.1.2
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Noise and vibration	Operational noise impacts – General	4.8.4
			Management and mitigation	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
			Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Hazards and risks	Childcare safety	4.19.3
26	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Biodiversity	Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Health impacts	4.19.2
27	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	Future expansion	4.3.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts – general	4.8.3
			Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
			Land acquisition	4.15.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
28	Community	Options development and site selection	Community preference for Bushells Ridge site	4.2.3
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
29	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to unidentified frog species	4.7.7
		Hydrology, drainage and flooding	Cumulative impacts	4.12.3
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
30	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
		Traffic, transport and access	Construction traffic impacts	4.10.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
			Land acquisition	4.15.3
		Air quality	Construction air quality impacts	4.16.2
31	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Landscape and visual	Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Land use and property	Land zoning	4.15.1
		Hazards and risks	Impacts to tank water	4.19.1
32	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Biodiversity	Vegetation clearance	4.7.10
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Groundwater	Impact to existing bores	4.14.1
		Hazards and risks	Impacts to tank water	4.19.1
		Utilities and services	Cost for additional utilities	4.20.1
33	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
34	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
		Project description and design	Future expansion	4.3.2
			Detention basins	4.3.4
			Flood access road	4.3.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
			Management and mitigation measure	4.12.7

Sub. no.	Submitter	Key issue	Sub-issue	Section
35	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	Future expansion	4.3.2
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Land use and property	Land and property value impacts	4.15.2
36	Community	Options development and site selection	Community preference for Bushells Ridge site	4.2.3
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Operational traffic impacts	4.10.4
37	Community	Biodiversity	Impacts to threatened species	4.7.8
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
38	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	Earthworks and fill materials	4.3.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Adequacy of assessment	4.8.2
			Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
		Bushfire	Adequacy of assessment	4.17.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
39	Community	Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to threatened species	4.7.8
		Land use and property	Land acquisition	4.15.3
40	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			New intersection at Enterprise Drive	4.3.3
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to threatened species	4.7.8
			Weeds	4.7.12
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Socio-economic	Assessment methodology	4.11.1
			Amenity impacts	4.11.2
		Land use and property	Land zoning	4.15.1
		Air quality	Assessment methodology	4.16.1
			Construction air quality impacts	4.16.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
			Childcare safety	4.19.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
41	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Land use and property	Land zoning	4.15.1
42	Community	Options development and site selection	Community preference for Bushells Ridge site	4.2.3
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
43	Community	Justification and need	Cost of the Project – General	4.1.2
44	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
45	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational curfew	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
			Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.3
		Traffic, transport and access	Operational traffic impacts	4.10.4
			Management and mitigation measures	4.10.6
		Hydrology, drainage and flooding	Flood modelling	4.12.5
			Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
		Utilities and services	Provision of additional utilities	4.20.2
		Out of scope issues	Compensation	4.21.1
46	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Management and mitigation measures	4.7.14
		Noise and vibration	Construction noise impacts	4.8.3
		Hazards and risks	Impacts to tank water	4.19.1
47	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational curfew	4.8.5
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
48	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Vegetation clearance	4.7.10
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Out of scope issues	Warnervale Business and Education University site	4.21.2
			Justification for Link Road	4.21.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
49	Community	Justification and need	Project justification	4.1.1
		Options development and site selection	Opposition to preferred site	4.2.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
		Out of scope issues	Compensation	4.21.1
50	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Land use and property	Land and property value impacts	4.15.2
51	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to unidentified frog species	4.7.7
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Landscape and visual	Lighting impacts and light spill	4.9.2
52	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Impacts to unidentified frog species	4.7.7
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Flood modelling	4.12.5
53	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Site selection options process	4.2.4
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Air quality	Operational air quality impacts	4.16.3
54	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
55	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Hazards and risks	Health impacts	4.19.2
56	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Project description and design	Future expansion	4.3.2
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Impacts to biodiversity – General	4.7.6
			Impacts to unidentified frog species	4.7.7
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
57	Community	Planning and statutory requirements	Adequacy of REF documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Noise and vibration	Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Hazards and risks	Impacts to tank water	4.19.1
		Out of scope issues	Compensation	4.21.1
58	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	Earthworks and fill materials	4.3.1
		Biodiversity	Offset provisions	4.7.11
		Noise and vibration	Operational noise impacts – General	4.8.4
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
59	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Impacts to unidentified frog species	4.7.7
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Flood modelling	4.12.5
60	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Bushells Ridge site	4.2.3
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Noise and vibration	Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
61	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
62	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
63	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
64	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to unidentified frog species	4.7.7
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Hazards and risks	Impacts to tank water	4.19.1
65	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
66	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
67	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Impacts to threatened species	4.7.8
			Offset provisions	4.7.11
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
		Land use and property	Land zoning	4.15.1
68	Community	Options development and site selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			New intersection at Enterprise Drive	4.3.3
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Consultation and submissions process	4.6.4
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational vibration impacts	4.8.7
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
69	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
70	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Management and mitigation measure	4.12.7
		Out of scope issues	Compensation	4.21.1
71	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Landscape and visual	Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
72	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Landscape and visual	Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
73	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Vegetation clearance	4.7.10
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
		Land use and property	Land zoning	4.15.1
			Land acquisition	4.15.3
		Out of scope issues	Warnervale Business and Education University site	4.21.2
74	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Waste and resources	Disposal of wastes	4.18.1
75	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Impacts to unidentified frog species	4.7.7
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
76	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational vibration impacts	4.8.7
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
77	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Hours of operation	4.3.6
		Project construction	Construction and traffic haulage routes	4.4.1
			Employee parking	4.4.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Impacts to unidentified frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational curfew	4.8.5
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Landscape and visual	Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Socio-economic	Amenity impacts	4.11.2
			Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
			Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
			Security of residences	4.19.4
78	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Impacts to threatened species	4.7.8
79	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Project construction	Employee parking	4.4.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Air quality	Construction air quality impacts	4.16.2
		Hazards and risks	Security of residences	4.19.4
80	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
		Landscape and visual	Privacy	4.9.3
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Hazards and risks	Security of residences	4.19.4
81	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Operation noise impacts – Horn testing	4.8.5
			Operational vibration impacts	4.8.7
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Land use and property	Land and property value impacts	4.15.2
			Land acquisition	4.15.3
82	Kangy Angy Resident Action Group	Justification and need	Project justification	4.1.1
			Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
			New intersection at Enterprise Drive	4.3.3
			Detention basins	4.3.4
			Flood access road	4.3.5
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Request for further and ongoing consultation	4.6.1
			Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Classification of vegetation	4.7.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Consistency between assessments	4.7.5
			Impacts to unidentified frog species	4.7.7
		Noise and vibration	Adequacy of assessment	4.8.2
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
		Socio-economic	Assessment methodology	4.11.1
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
			Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Air quality	Assessment methodology	4.16.1
			Operational air quality impacts	4.16.3
		Bushfire	Adequacy of assessment	4.17.1
			Escape routes during a bushfire	4.17.2
		Hazards and risks	Impacts to tank water	4.19.1
83	Kangy Angy Resident Action Group	Options development and site selection	Site selection options process	4.2.4
		Biodiversity	Adequacy of assessment	4.7.3
			Impacts to unidentified frog species	4.7.7
			Offset provisions	4.7.11
			Subject site definition for the initial SIS	4.7.15
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for the initial SIS	4.7.17
			Species considered as part of the SIS	4.7.18
84	Kangy Angy Resident Action Group		Impacts to biodiversity – General	4.7.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
85	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
		Traffic, transport and access	Construction traffic impacts	4.10.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
		Waste and resources	Disposal of wastes	4.18.1
		Hazards and risks	Impacts to tank water	4.19.1
		Utilities and services	Cost for additional utilities	4.20.1
86	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
		Traffic, transport and access	Construction traffic impacts	4.10.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
		Waste and resources	Disposal of wastes	4.18.1
		Hazards and risks	Impacts to tank water	4.19.1
		Utilities and services	Cost for additional utilities	4.20.1
87	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational curfew	4.8.5

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Hazards and risks	Impacts to tank water	4.19.1
88	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land acquisition	4.15.3
89	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
90	Community	Options development and site selection	Site selection options process	4.2.4
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational curfew	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Flood modelling	4.12.5
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
91	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operation noise impacts – Horn testing	4.8.5
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
92	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
93	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Bushells Ridge site	4.2.3
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land acquisition	4.15.3
94	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
95	Community	Project description and design	Earthworks and fill materials	4.3.1
			New intersection at Enterprise Drive	4.3.3
			Detention basins	4.3.4
		Biodiversity	Offset provisions	4.7.11
			Adequacy of assessment for the initial SIS	4.7.17
		Noise and vibration	Adequacy of assessment	4.8.2
			Construction noise impacts	4.8.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Operational noise impacts – General	4.8.4
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Operational traffic impacts	4.10.4
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Site flooding impacts	4.12.4
96	Community	Justification and need	Project justification	4.1.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Socio-economic	Amenity impacts	4.11.2
			Impacts to local businesses and schools	4.11.3
97	Community	Justification and need	Project justification	4.1.1
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
		Land use and property	Land and property value impacts	4.15.2
			Land acquisition	4.15.3
		Hazards and risks	Impacts to tank water	4.19.1
98	Community	Justification and need	Cost of the Project – General	4.1.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Hazards and risks	Health impacts	4.19.2
99	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			New intersection at Enterprise Drive	4.3.3
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational curfew	4.8.5

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Noise and vibration (cont.)	Management and mitigation measures	4.8.9
		Landscape and visual	Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
100	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Planning approval process	4.5.1
		Noise and vibration	Operation noise impacts – Horn testing	4.8.5
			Operational curfew	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
101	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Project description and design	Earthworks and fill materials	4.3.1
		Biodiversity	Adequacy of assessment	4.7.3
			Impacts to threatened species	4.7.8
			Weeds	4.7.12
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operational curfew	4.8.5
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Landscape and visual	Visual impacts during operation	4.9.1
			Management and mitigation measures	4.9.3
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Management and mitigation measure	4.12.7
		Groundwater	Impact to existing bores	4.14.1
		Air quality	Operational air quality impacts	4.16.3
		Hazards and risks	Health impacts	4.19.2
102	Community	Biodiversity	Impacts to unidentified frog species	4.7.7
		Noise and vibration	Operational noise impacts – General	4.8.4
		Land use and property	Land acquisition	4.15.3
103	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Fleet size	4.3.7
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
		Air quality	Operational air quality impacts	4.16.3
104	Community	Options development and site selection	Site selection options process	4.2.4
		Planning and statutory requirements	Planning approval process	4.5.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
		Soils, geology and contamination	Mitigation and management measures	4.13.1
105	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Site area	4.3.8
			Public accessibility to access bridge	4.3.9
		Hydrology, drainage and flooding	Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
106	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
107	Community	Options development and site selection	Site selection options process	4.2.4
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Vegetation clearance	4.7.10
			Offset provisions	4.7.11
			Management and mitigation measures	4.7.14
108	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
			Weeds	4.7.12
		Noise and vibration	Operational noise impacts – General	4.8.4
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
109	Community	Justification and need	Cost of the Project – General	4.1.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
110	Community	Project description and design	New intersection at Enterprise Drive	4.3.3
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Adequacy of assessment	4.8.2
			Operational noise impacts – General	4.8.4
		Landscape and visual	Visual impacts during operation	4.9.1
			Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
		Out of scope issues	Compensation	4.21.1
			Public transport	4.21.4
111	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Project construction	Construction program	4.4.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Management and mitigation measure	4.12.7
112	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			Impact to Schubolt Lane	4.3.10
			Proposed maintenance activities	4.3.11
			Relocation of 33kV high voltage powerline	4.3.12
		Project construction	Number of workers	4.4.5
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Impacts to biodiversity – General	4.7.6
			Impacts to wildlife corridor	4.7.9
			Management and mitigation measures	4.7.14
			Adequacy of assessment for the initial SIS	4.7.17
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
		Air quality	Construction air quality impacts	4.16.2
		Waste and resources	Disposal of wastes	4.18.1
		Hazards and risks	Impacts to tank water	4.19.1
			Security of residences	4.19.4
		Out of scope issues	Compensation	4.21.1
			Public transport	4.21.4
			Impacts from construction of the Gosford Passing Loops	4.21.5
113	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Biodiversity	Vegetation clearance	4.7.10
		Landscape and visual	Visual impacts during operation	4.9.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
114	Community	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Impacts to wildlife corridor	4.7.9
			Weeds	4.7.12
			Adequacy of assessment for the initial SIS	4.7.17
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
115	Community	Options development and site selection	Opposition to preferred site	4.2.1
116	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
117	Community	Project description and design	Maintenance facility access road	4.3.13
		Planning and statutory requirements	Adequacy of REF documentation	4.5.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Adequacy of assessment	4.7.3
			Weeds	4.7.12
			Management and mitigation measures	4.7.14
		Noise and vibration	Adequacy of assessment	4.8.2
			Operational noise impacts – General	4.8.4
			Operational curfew	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
			Management and mitigation measure	4.12.7
118	Community	Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Impact from track cross-overs	4.8.8
		Landscape and visual	Lighting impacts and light spill	4.9.2
			Accuracy of photomontage	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
119	Community	Justification and need	Cost of the Project – General	4.1.2
		Options development and site selection	Opposition to preferred site	4.2.1
		Noise and vibration	Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
120	Community	Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
121	Community Environment Network	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
			New intersection at Enterprise Drive	4.3.3
			Detention basins	4.3.4
			Flood access road	4.3.5
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Request for further and ongoing consultation	4.6.1
			Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Classification of vegetation	4.7.4
			Consistency between assessments	4.7.5
			Impacts to unidentified frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Adequacy of assessment	4.8.2
			Operational noise impacts – General	4.8.4
			Management and mitigation measures	4.8.9

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
		Socio-economic	Assessment methodology	4.11.1
			Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
			Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Air quality	Assessment methodology	4.16.1
			Operational air quality impacts	4.16.3
		Bushfire	Adequacy of assessment	4.17.1
			Escape routes during a bushfire	4.17.2
122	State Member for the Entrance	Options development and site selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Noise and vibration	Operational noise impacts – General	4.8.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
123	Ourimbah Region Residents Association	Justification and need	Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to unidentified frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Visual impacts during operation	4.9.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
			Speed limits	4.10.5
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Hazards and risks	Impacts to tank water	4.19.1
124	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Project construction	Construction compounds	4.4.3
		Landscape and visual	Management and mitigation measures	4.9.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
125	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	New intersection at Enterprise Drive	4.3.3
			Relocation of 33kV high voltage powerline	4.3.12
			Maintenance facility access road	4.3.13
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Impacts to wildlife corridor	4.7.9
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9
		Landscape and visual	Visual impacts during operation	4.9.1
			Lighting impacts and light spill	4.9.2
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Land use and property	Land and property value impacts	4.15.2
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
		Waste and resources	Disposal of wastes	4.18.1
		Out of scope issues	Warnervale Business and Education University site	4.21.2
126	Roads and Maritime Services	Project description and design	New intersection at Enterprise Drive	4.3.3
		Traffic, transport and access	Operational traffic impacts	4.10.4
127	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project construction	Construction program	4.4.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.4
		Landscape and visual	Management and mitigation measures	4.9.3
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
128	Community	Project construction	Construction and traffic haulage routes	4.4.1
129	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
			New intersection at Enterprise Drive	4.3.3
			Detention basins	4.3.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Flood access road	4.3.5
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of REF documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Request for further and ongoing consultation	4.6.1
			Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
		Biodiversity	Assessment methodology – Orchid study surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Classification of vegetation	4.7.4
			Consistency between assessments	4.7.5
			Impacts to biodiversity – General	4.7.6
			Impacts to unidentified frog species	4.7.7
		Noise and vibration	Adequacy of assessment	4.8.2
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Socio-economic	Assessment methodology	4.11.1
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
			Management and mitigation measure	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Air quality	Assessment methodology	4.16.1
			Operational air quality impacts	4.16.3
		Bushfire	Adequacy of assessment	4.17.1
			Escape routes during a bushfire	4.17.2
130	Community	Justification and need	Cost of the Project – General	4.1.2
			Cost of the Project – Access road bridge	4.1.3
		Options development and site selection	Community preference for Warnervale site	4.2.2
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
		Project construction	Employee parking	4.4.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
			Display period	4.6.5
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to unidentified frog species	4.7.7
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Operational vibration impacts	4.8.7
			Management and mitigation measures	4.8.9
		Landscape and visual	Lighting impacts and light spill	4.9.2
130	Community	Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Socio-economic	Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
		Out of scope issues	Public transport	4.21.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
131	Community	Project description and design	Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.4
			Operation noise impacts – Horn testing	4.8.5
			Management and mitigation measures	4.8.9
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
132	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
133	Community	Planning and statutory requirements	Planning approval process	4.5.1
		Consultation and stakeholder engagement	Request for further and ongoing consultation	4.6.1
		Land use and property	Land acquisition	4.15.3
134	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
			Cost of Project – General	4.1.2
		Options development and selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Impacts to local access and local roads	4.10.3
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
135	Community	Consultation and stakeholder engagement	Website documents	4.6.6
136	Community	Consultation and stakeholder engagement	Website documents	4.6.6
137	Community	Options development and selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to threatened species	4.7.8
138	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Groundwater	Impact to existing bores	4.14.1
		Hazards and risks	Impacts to tank water	4.19.1
139	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Socio-economic	Amenity impacts	4.11.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Groundwater	Impact to existing bores	4.14.1
		Utilities and Services	Cost for additional utilities	4.20.1
140	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Site relocation recommendation	4.2.5
		Project description and design	Future expansion	4.3.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
		Out of scope issues	Public transport	4.21.4
141	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Impact to wildlife corridor	4.7.9
			Cumulative biodiversity impacts	4.7.13
			Adequacy of assessment for SIS	4.7.17
		Hazards and risks	Health impacts	
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
142	Community	Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Project description and design	Future expansion	4.3.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational vibration impacts	4.8.8
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Land use and property	Land and property value impacts	4.15.2
		Hydrology, drainage and flooding	change to flooding flow regime	4.12.2
		Hazards and risks	Health impacts	4.19.2
143	Community	Justification and need	Cost of the project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Biodiversity	Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Site flooding impacts	4.12.4
		Air quality	Construction air quality impacts	4.16.2
144	Community	Options development and selection	Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Detention basins	4.3.4
			Earthworks and fill materials	4.3.1
			Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Offset provisions	4.7.11
		Land use and property	Land zoning	4.15.1
		Out of scope issue	Warnervale Business and Education University site	4.21.2
			Justification for Link Road	4.21.3
145	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
146	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Impact to wildlife corridor	4.7.9
			Vegetation clearance	4.7.10
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
		Landscape and visual	Lighting impacts and light spill	4.9.2
147	Community	Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Site area	4.3.8
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
148	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Site relocation recommendation	4.2.5
		Project description and design	Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Construction vibration impacts	4.8.4
			Operational noise impacts – General	4.8.5
			Operational vibration impacts	4.8.8
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Land use and property	Land and property value impacts	4.15.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Socio-economic	Amenity impacts	4.11.2
149	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
			Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
		Biodiversity	Impact to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.5

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Land use and property	Land and property value impacts	4.15.2
			Land acquisition	4.15.3
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
150	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Adequacy of assessment for SIS	4.7.17
		Noise and vibration	Adequacy of assessment	4.8.2
			Construction noise impacts	4.8.3
		Land use and property	Land zoning	4.15.1
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
151	Community	Options development and selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Landscape and visual	Privacy	4.9.3
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
		Hazards and risks	Security of residents	4.19.4
152	Community	Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
153	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
			Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Landscape and visual	Visual impacts during operation	4.9.1
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Waste and resources	Disposal of waste	4.18.1
		Hazards and risks	Impacts to tank water	4.19.1
		Utilities and Services	Provision of additional utilities	4.20.1
154	Community	Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
155	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
			Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Landscape and visual	Visual impacts during operation	4.9.1
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
		Utilities and Services	Provision of additional utilities	4.20.2
156	Community	Planning and statutory requirements	Adequacy of documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to wildlife corridor	4.7.9
			Cumulative biodiversity impacts	4.7.13
			Adequacy of assessment for SIS	4.7.17
		Hydrology, drainage and flooding	Management and mitigation measures	4.12.7
157	Community	Options development and selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Land use and property	Land acquisition	4.15.3
158	Kangy Angy Resident Acton Group	Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impact to newly described frog species	4.7.7
159	Community	Options development and selection	Opposition to preferred site	4.2.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Project description and design	Future expansion	4.3.2
		Planning and statutory requirements	Planning approval process	4.5.1
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Biodiversity	Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
160	Kangy Angy Resident Acton Group	Options development and selection	Site selection options process	4.2.4
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Classification of vegetation	4.7.4
			Consistency between assessments	4.7.5
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
			Offset provisions	4.7.11
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for SIS	4.7.17
161	State member for The Entrance	Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Biodiversity	Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
162	Kangy Angy Resident Acton Group	Justification and need	Project justification	4.1.1
			Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Community preference for Warnervale site	4.2.2
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
			New Enterprise Drive Intersection	4.3.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Detention basins	4.3.4
			Flood access road	4.3.5
			Proposed maintenance activities	4.3.11
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Request for further and ongoing consultation	4.6.1
			Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
		Biodiversity	Assessment method – Orchid Study Surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Consistency between assessments	4.7.5
			Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Classification of vegetation	4.7.10
		Noise and vibration	Adequacy of assessment	4.8.2
			Construction noise impacts	4.8.3
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
		Socio-economic	Assessment methodology	4.11.1
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Management and mitigation measures	4.12.7
		Air quality	Assessment methodology	4.16.1
			Errors and omissions	4.16.4
			Operational air quality impacts	4.16.3
		Bushfire	Adequacy of assessment	4.17.1
			Escape routes	4.17.2
		Hazards and risks	Impacts to tank water	4.19.1
163	Ourimbah Region Residents Association	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Public accessibility to the access bridge	4.3.9
		Biodiversity	impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
			Vegetation clearance	4.7.10
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
		Out of scope issues	Public transport	4.21.4
164	Community	Justification and Need	Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
		Project description and design	Earthworks and fill material	4.3.1
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Adequacy of assessment	4.8.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Land use and property	Land zoning	4.15.1
		Bushfire	Adequacy of assessment	4.17.1
165	Community	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
		Project description and design	Future expansion	4.3.2
			New Enterprise Drive Intersection	4.3.3
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Cumulative biodiversity impacts	4.7.13
			Adequacy of assessment for SIS	4.7.17
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Traffic, transport and access	Assessment methodology	4.10.1
			Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
			Operational traffic impacts	4.10.4
		Socio-economic	Assessment methodology	4.11.1
			Amenity impacts	4.11.2
			Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
		Air quality	Assessment methodology	4.16.1
			Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
			Errors and omissions	4.16.4
		Hazards and risks	Impacts to tank water	4.19.1

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Health impacts	4.19.2
			Childcare safety	4.19.3
166	Community	Options development and selection	Site selection options process	4.2.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Land use and property	Land acquisition	4.15.3
167	Community	Options development and selection	Site selection options process	4.2.4
		Project description and design	Maintenance facility access road	4.3.13
		Planning and statutory requirements	Planning approval process	4.5.1
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Adequacy of assessment for SIS	4.7.17
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
		Soils, geology and contamination	Mitigation and management measures	4.13.1
		Land use and property	Land zoning	4.15.1
			Land acquisition	4.15.3
168	Community	Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to threatened species	4.7.8
			Adequacy of assessment for SIS	4.7.17
169	Community Environment Network	Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Classification of vegetation	4.7.4
			Consistency between assessments	4.7.5
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
170	Community	Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			Site area	4.3.8
		Planning and statutory requirements	Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Socio-economic	Amenity impacts	4.11.2
		Land use and property	Land and property value impacts	4.15.2
171	Community	Options development and selection	Support for project	–
172	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Noise and vibration	construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
173	Kangy Angy Resident Acton Group	Options development and selection	Site selection options process	4.2.4
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Adequacy of assessment	4.7.3
			Classification of vegetation	4.7.4
			Consistency between assessments	4.7.5
			Impacts to threatened species	4.7.8
			Subject site definition for the initial SIS	4.7.15
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for SIS	4.7.17
174	Community	Options development and selection	Site selection options process	4.2.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
		Land use and property	Land acquisition	4.15.3
		Landscape and visual	Management and mitigation measures	4.9.5
175	Community	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Site selection options process	4.2.4
		Project description and design	New Enterprise Drive Intersection	4.3.3
			Maintenance facility access road	4.3.13
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Management and mitigation measures	4.8.10

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Landscape and visual	Management and mitigation measures	4.9.5
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
		Land use and property	Land and property value impacts	4.15.2
		Air quality	Construction air quality impacts	4.16.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
			Security of residents	4.19.4
176	Community	Options development and selection	Site selection options process	4.2.4
		Planning and statutory requirements	Adequacy of documentation	4.5.2
177	Community	Options development and selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
			Operational traffic impacts	4.10.4
		Landscape and visual	Management and mitigation measures	4.9.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
178	Community	Options development and selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			Site area	4.3.8
		Planning and statutory requirements	Assessment of relevant legislation	4.5.3
		Biodiversity	Impacts to threatened species	4.7.8
179	Community	Options development and selection	Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
		Project construction	Construction and traffic haulage routes	4.4.1
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
			Operational traffic impacts	4.10.4
		Landscape and visual	Management and mitigation measures	4.9.5
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
180	Community	Hydrology, drainage and flooding	Site flooding impacts	4.12.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
181	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Site area	4.3.8
			Public accessibility to the access bridge	4.3.9
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Impact to newly described frog species	4.7.7
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for SIS	4.7.17
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
182	Community	Options development and selection	Site selection options process	4.2.4
		Planning and statutory requirements	Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Vegetation clearance	4.7.10
			Adequacy of assessment for SIS	4.7.17
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Hydrology, drainage and flooding	Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
			Land acquisition	4.15.3
		Air quality	Construction air quality impacts	4.16.2
			Operational air quality impacts	4.16.3
		Hazards and risks	Security of residents	4.19.4
		Out of scope issues	Public transport	4.21.4

Sub. no.	Submitter	Key issue	Sub-issue	Section
183	Community	Justification and need	Project justification	4.1.1
			Cost of Project – General	4.1.2
		Options development and selection	Site selection options process	4.2.4
		Project description and design	Detention basins	4.3.4
			Future expansion	4.3.2
			Maintenance facility access road	4.3.13
		Planning and statutory requirements	Planning approval process	4.5.1
			Assessment of relevant legislation	4.5.3
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Assessment method – Orchid Study Surveys	4.7.1
			Assessment methodology – General survey undertaken	4.7.2
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Offset provisions	4.7.11
			Cumulative biodiversity impacts	4.7.13
			Subject site definition for the initial SIS	4.7.15
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for SIS	4.7.17
		Noise and vibration	Adequacy of assessment	4.8.2
			Construction noise impacts	4.8.3
			Operational noise impacts – Horn testing	4.8.6
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Construction traffic impacts	4.10.2
		Socio-economic	Assessment methodology	4.11.1
			Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
			Management and mitigation measures	4.12.7
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Land use and property	Land zoning	4.15.1
			Land acquisition	4.15.3
		Air quality	Construction air quality impacts	4.16.2
		Bushfire	Adequacy of assessment	4.17.1
			Escape routes	4.17.2
		Hazards and risks	Other hazards and risks	4.19.5
		Out of scope issues	Compensation	4.21.1
184	Community	Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
185	Community	Noise and vibration	Management and mitigation measures	4.8.10
		Land use and property	Land and property value impacts	4.15.2
186	Community	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
			Site relocation recommendation	4.2.5
		Project description and design	Earthworks and fill materials	4.3.1
			Detention basins	4.3.4
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
			Adequacy of consultation undertaken to date	4.6.3
			Display period	4.6.5
			Consultation and submissions process	4.6.4
		Biodiversity	impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Construction noise impacts	4.8.3
			Construction vibration impacts	4.8.4
			Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Flood modelling	4.12.5
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
			Childcare safety	4.19.3
		Out of scope issues	Public transport	4.21.4
187	Community	Options development and selection	Opposition to preferred site	4.2.1
		Project description and design	Future expansion	4.3.2
			Maintenance facility access road	4.3.13
		Consultation and stakeholder engagement	Availability and level of detail at community information sessions	4.6.2
		Biodiversity	Impacts to biodiversity – General	4.7.6
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.8
		Landscape and visual	Lighting impacts and light spill	4.9.2
		Traffic, transport and access	Impacts to local access and local roads	4.10.3
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
		Air quality	Construction air quality impacts	4.16.2
188	Community	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	Future expansion	4.3.2
			Impact to Schubolt Lane	4.3.10
			Proposed maintenance activities	4.3.11

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Relocation of 33 kV powerline	4.3.12
		Project construction	Numbers of workers	4.4.5
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
			Consultation and submissions process	4.6.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
			Impact to wildlife corridor	4.7.9
			Subject site definition for the initial SIS	4.7.15
			Adequacy of assessment for SIS	4.7.17
		Noise and vibration	Operational noise impacts – General	4.8.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Flood modelling	4.12.5
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land and property value impacts	4.15.2
		Waste and resources	Disposal of waste	4.18.1
		Hazards and risks	Impacts to tank water	4.19.1
			Health impacts	4.19.2
			Security of residents	4.19.4
			Other hazards and risks	4.19.5
		Out of scope issues	Compensation	4.21.1
			Public transport	4.21.4
			Impacts from the construction of the Gosford Passing Loops Project	4.21.5
189	Community	Out of scope issues	Public transport	4.21.4
190	Community	Socio-economic	Amenity impacts	4.11.2

Sub. no.	Submitter	Key issue	Sub-issue	Section
191	Community	Justification and need	Cost of Project – General	4.1.2
			Cost for the Project – Access road bridge	4.1.3
		Options development and selection	Opposition to preferred site	4.2.1
		Project description and design	New intersection at Enterprise Drive	4.3.3
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational vibration impacts	4.8.10
			Management and mitigation measures	4.8.10
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Impacts to local access and local roads	4.10.3
		Landscape and visual	Visual impacts during operation	4.9.1
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impacts to tank water	4.19.1
		Waste and resources	Disposal of wastes	4.18.1
		Utilities and Services	Cost for additional utilities	4.20.1
192	Central Coast Council	Biodiversity	Vegetation clearance	4.7.10
			Offset provisions	4.7.11
			Assessment methodology for the initial SIS	4.7.16
			Adequacy of assessment for SIS	4.7.17
193	Community	Justification and need	Cost of Project – General	4.1.2
		Options development and selection	Opposition to preferred site	4.2.1
			Site selection options process	4.2.4
		Planning and statutory requirements	Planning approval process	4.5.1
			Assessment of relevant legislation	4.5.3

Sub. no.	Submitter	Key issue	Sub-issue	Section
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Impacts to biodiversity – General	4.7.6
			Impact to newly described frog species	4.7.7
			Impacts to threatened species	4.7.8
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land zoning	4.15.1
			Land acquisition	4.15.3
194	Community	Options development and selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project construction	Construction program	4.4.4
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Impacts to threatened species	4.7.8
		Noise and vibration	Operational noise impacts – General	4.8.5
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10
		Landscape and visual	Management and mitigation measures	4.9.5
		Traffic, transport and access	Operational traffic impacts	4.10.4
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
195	Community	Biodiversity	Impact to newly described frog species	4.7.7
			Impact to threatened species	4.7.8
			Vegetation clearance	4.7.10
			Impacts to Mahony's Toadlet habitat	4.7.22
196	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Biodiversity	Impact to threatened species	4.7.8
			Impact to wildlife corridor	4.7.9

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Suitability of identified frog exclusion zones	4.7.23
197	Community	Options development and site selection	Site selection options process	4.2.4
		Planning and statutory requirements	Planning approval process	4.5.1
		Biodiversity	Assessment methodology for the Additional SIS	4.7.19
			Impacts to Mahony's Toadlet habitat	4.7.22
198	Community	Biodiversity	Impacts to Mahony's Toadlet habitat	4.7.22
		Noise and vibration	Operational noise impacts – General	4.8.5
		Hydrology, drainage and flooding	Water quality and pollution to local waterways	4.12.6
199	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Biodiversity	Assessment methodology for the Additional SIS	4.7.19
			Adequacy of frog SIS assessment	4.7.20
			Proposed management measures for Mahony's Toadlet	4.7.26
		Hydrology, drainage and flooding	Change to flooding flow regime	4.12.2
200	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Bushells Ridge site	4.2.3
			Site selection options process	4.2.4
		Biodiversity	Impact to newly described frog species	4.7.7
			Impact to threatened species	4.7.8
201	Community	Biodiversity	Vegetation clearance	4.7.10
		Land use and property	Land and property value impacts	4.15.2
202A	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Adequacy of consultation undertaken to date	4.6.3
		Biodiversity	Impact to threatened species	4.7.8
			Impacts to Mahony's Toadlet habitat	4.7.22

Sub. no.	Submitter	Key issue	Sub-issue	Section
202B	Community	Justification and need	Cost for the Project – Access road bridge	4.1.3
		Options development and site selection	Opposition to preferred site	4.2.1
			Community preference for Warnervale site	4.2.2
			Site selection options process	4.2.4
		Project description and design	Earthworks and fill materials	4.3.1
			Hours of operation	4.3.6
		Project construction	Construction and traffic haulage routes	4.4.1
			Employee parking	4.4.2
		Planning and statutory requirements	Planning approval process	4.5.1
			Adequacy of documentation	4.5.2
		Consultation and stakeholder engagement	Consultation and submissions process	4.6.4
		Biodiversity	Assessment methodology – General survey undertaken	4.7.2
			Impact to newly described frog species	4.7.7
			Impact to threatened species	4.7.8
			Assessment methodology for new frog species	4.7.19
		Noise and vibration	Construction noise impacts	4.8.3
			Operational noise impacts – General	4.8.5
			Operational noise impacts – Horn testing	4.8.6
			Operational curfew	4.8.7
			Operational vibration impacts	4.8.8
			Management and mitigation measures	4.8.10
		Landscape and visual	Lighting impacts and light spill	4.9.2
			Management and mitigation measures	4.9.5
		Traffic, transport and access	Construction traffic impacts	4.10.2
			Operational traffic impacts	4.10.4
		Socio-economic	Amenity impacts	4.11.2
			Impacts to local businesses and schools	4.11.3
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
			Change to flooding flow regime	4.12.2
			Site flooding impacts	4.12.4
			Water quality and pollution to local waterways	4.12.6

Sub. no.	Submitter	Key issue	Sub-issue	Section
			Management and mitigation measures	4.12.7
		Land use and property	Land zoning	4.15.1
			Land and property value impacts	4.15.2
		Hazards and risks	Impact to tank water	4.19.1
			Security of residences	4.19.4
203	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Planning and statutory requirements	Adequacy of documentation	4.5.2
		Biodiversity	Adequacy of assessment	4.7.3
			Impact to newly described frog species	4.7.7
			Assessment methodology for new frog species	4.7.19
			EPBC referral for Mahony's Toadlet	4.7.21
			Impacts to Mahony's Toadlet habitat	4.7.22
			Suitability of identified frog exclusion zones	4.7.23
			Proposed management measures for Mahony's Toadlet	4.7.26
		Hydrology, drainage and flooding	Management and mitigation measures	4.12.7
204	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site relocation recommendation	4.2.5
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Assessment methodology for new frog species	4.7.19
			Impacts to Mahony's Toadlet habitat	4.7.22
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
205	Community	Biodiversity	Impact to newly described frog species	4.7.7
			Impact to threatened species	4.7.8
			Offset provisions – General	4.7.11
			Assessment methodology for new frog species	4.7.19
			Adequacy of frog SIS assessment	4.7.20
			Impacts to Mahony's Toadlet habitat	4.7.22
206	Community	Biodiversity	Impacts to Mahony's Toadlet habitat	4.7.22
207	Community	Options development and site selection	Opposition to preferred site	4.2.1
		Biodiversity	Impacts to Mahony's Toadlet habitat	4.7.22

Sub. no.	Submitter	Key issue	Sub-issue	Section
208	Community	Options development and site selection	Community preference for Warnervale site	4.2.2
		Socio-economic	Amenity impacts	4.11.2
		Hydrology, drainage and flooding	Site flooding impacts	4.12.4
		Land use and property	Land and property value impacts	4.15.2
209	Community	Options development and site selection	Opposition to preferred site	4.2.1
			Site relocation recommendation	4.2.5
		Biodiversity	Impacts to biodiversity – General	4.7.6
			Assessment methodology for new frog species	4.7.19
			Impacts to Mahony's Toadlet habitat	4.7.22
		Hydrology, drainage and flooding	Adequacy of assessment	4.12.1
210	Community	Biodiversity	Impact to newly described frog species	4.7.7
			Assessment methodology for new frog species	4.7.19
			Adequacy of frog SIS assessment	4.7.20
			Impacts to Mahony's Toadlet habitat	4.7.22
			Suitability of relying of existing mapping for Frog Habitat	4.7.24
			Frog habitat assessment conclusions	4.7.25
			Proposed management measures for Mahony's Toadlet	4.7.26

Appendix C

CLAUSE 228 CONSIDERATIONS

C.1. CLAUSE 228 CONSIDERATIONS

Table C.1 provides a summary checklist of matters to be considered under clause 228 of the Environmental Planning and Assessment Regulation 2000 for the proposed design changes. The checklist provides a comparison between the impacts as identified in the REF and the proposed design changes outlined in this Combined Submissions Report.

Table C.1 Clause 228 considerations

	Clause 228 considerations	Change in Impact
a	**Any environmental impact on a community?** As described in the REF, some adverse effects on the local community were anticipated to occur during the construction of the Project, particularly in relation to construction noise and vibration, heavy vehicle movements, visual amenity and dust generation during certain weather conditions. Operational noise impacts were also expected on residential properties and the child care centre nearby the Project area (refer to section 7.2 of the REF). Some visual impacts were also expected be experienced by nearby residences that may have filtered views of the most prominent elements of the Project. As a result of the proposed design changes, these impacted are still anticipated to be the same as those outlined in the REF. As such, the proposed design changes would not result in any additional environmental impact on the local community.	No change in impact to assessment presented in REF
b	**Any transformation of a locality?** The Project would introduce an industrial element into the landscape of greater scale and bulk than was previously present. This development would also have associated noise and visual impacts, resulting in impacts on the landscape character of the immediate Project area and the surrounding areas. The proposed design changes would not result in any additional transformation of the locality compared to that identified in the REF.	No change in impact to assessment presented in REF
c	**Any environmental impact on the ecosystems of the locality?** The REF described that the Project would result in clearing of up to approximately 42.3 hectares of vegetation and habitat (including approximately 30.2 hectares of native vegetation), subject to further refinement during detailed design. It was identified that this vegetation clearing would include removal of areas of the Swamp Mahogany – Cabbage Palm swamp forest, considered consistent with the Swamp Sclerophyll Forest on the Coastal Floodplains on the NSW North Coast, Sydney Basin and South East Corner Bioregion listed as endangered under the TSC Act. Additionally, the REF identified that approximately 3,984 stems of *Melaleuca biconvexa* (listed under as Vulnerable under the TSC Act and EPBC Act) would be impacted by the Project with the remaining 1,030 identified within the Project site expected to be retained. As a result of the proposed design changes identified in Chapter 6 of this Combined Submissions Report, an overall reduction in the amount of threatened species and ecological communities impacted by the Project has been able to be achieved. In particular, the proposed refinements to the detention basins across the site would result in a smaller amount of vegetation being required to be removed in comparison to the areas of vegetation that were identified for removal in the REF. This would include a reduction in the amount of *Melaleuca biconvexa* required to be removed, particularly the existing area of *Melaleuca biconvexa* adjacent to Turpentine Road.	Slight positive impact in comparison to assessment presented in REF

	Clause 228 considerations	Change in Impact
d	**Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?** As described in the REF, the Project is expected to have some ecological and visual impacts on the study area resulting in some reduction to the aesthetic and overall environmental quality of the locality. These impacts would also impact on the rural and bushland landscape character of the locality. The most noticeable impacts would be to the woodland bushland landscape of the area due to vegetation clearing required for construction. The proposed design changes, as described in this Combined Submissions Report, would not result in any change to the impacts on the recreational or scientific value of the locality in comparison to those identified in the REF.	No change in impact to assessment presented in REF
e	**Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?** No formal non-Aboriginal heritage items were identified within the study area as part of the REF. Some potential heritage items were identified, however these items were not anticipated to be substantially impacted by the Project. No change to the potential for the Project to impacts on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations are expected to occur as a result of the proposed design changes identified as part of this Combined Submissions Report.	No change in impact to assessment presented in REF
f	**Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?** As described in the REF, the Project would require clearing of up to approximately 42.3 hectares of vegetation, some of which acts as potential habitat for potentially up to 38 threatened fauna species. The REF also noted potential risk of fauna injury or death during the Project's construction phase, including habitat fragmentation, increased edge effects, weeds, noise and vibration impacts to fauna and pathogens. The proposed design changes, as described in this Combined Submissions Report, would not result in any change to the impact on the habitat of protected fauna in comparison to those identified in the REF.	No change in impact to assessment presented in REF
g	**Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?** As discussed in (c) and (f) above, there would be requirement for clearance of native vegetation for the construction of the Project. Parts of this vegetation are consistent with threatened ecological communities and include threated fauna and flora species. The proposed design changes, as described in this Combined Submissions Report, would not result in any change to the potential for the Project to result in any endangering of a species of animal, plant or other form of life in comparison to those identified in the REF.	No change in impact to assessment presented in REF
h	**Any long-term effect on the environment?** As described in the REF, the Project would result in some permanent noise and visual impacts to nearby residential receivers. The noise and visual impacts were identified to be localised and would be managed through the implementation of a range of mitigation measures (specified in 7.2.6 and 7.3.5 of the REF). It was also noted that the facility would remove several hectares of moderate-good quality bushland. While the proposed design changes would result in some reduction to the overall level of vegetation impacted by the Project (as described in (c) above), the proposed design changes would not result in any overall change to the potential for the Project to result in long-term impacts on the environment in comparison to those identified in the REF.	No change in impact to assessment presented in REF

	Clause 228 considerations	Change in Impact
i	**Any degradation of the quality of the environment?** As described in the REF, the Project would have the potential to result in contamination of land, surface and groundwater as a result of the construction and operation of the Project (refer to section 7.9, 7.10 and 7.11 of the REF). Amenity related impacts associated with the Project were also identified which may detract from the quality of the environment, particularly in respect of construction activities resulting in noise and vibration, visual amenity and dust generation. The proposed design changes, as described in this Combined Submissions Report, would not result in any additional degradation of the quality of the environment in comparison to those identified in the REF.	No change in impact to assessment presented in REF
j	**Any risk to the safety of the environment?** As described in the REF, any construction safety hazards would be managed by a Work Health and Safety Plan. Management measures have been proposed to minimise risks associated with encountering contaminated land, groundwater as well as their subsequent disposal. Some reduction to the use of some private property was however identified where the Project could not be accommodated within Central Coast Council land or within the Main North Line corridor. The proposed design changes, as described in this Combined Submissions Report, would not result in any additional risk to the safety of the environment in comparison to those identified in the REF.	No change in impact to assessment presented in REF
k	**Any reduction in the range of beneficial uses of the environment?** As described in the REF, the development of the Project would not result in a reduction in the range of beneficial uses of the environment as the Project site would be located on primarily unused land owned by Central Coast Council and land within the Main North Line corridor. The proposed design changes, as described in this Combined Submissions Report, would not result in any change to the range of beneficial uses of the environment in comparison to the REF.	No change in impact to assessment presented in REF
L	**Any pollution of the environment?** The REF for the Project noted that there was the potential for water and soil pollution during the construction of the Project as a result of excavation and other construction works. It was also noted that there would be some exceedances in noise levels (noise pollution) during construction and operation of the Project. The proposed design changes, as described in this Combined Submissions Report, would not result in any additional potential for pollution of the environment (physical or noise) in comparison to the REF.	No change in impact to assessment presented in REF
m	**Any environmental problems associated with the disposal of waste?** As described in the REF, waste generated by the Project would be managed through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001*. Waste requiring off-site disposal would be classified in accordance with the NSW OEH *Waste Classification Guidelines 2009* prior to disposal. The proposed design changes, as described in this Combined Submissions Report, would not result in any substantial change to the proposed waste disposal measures for the Project in comparison to those identified in the REF.	No change in impact to assessment presented in REF
n	**Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?** It is not anticipated that there would be any increase to the demand on resources that would likely become in short supply as a result of the Project in comparison to those identified in the REF.	No change in impact to assessment presented in REF
o	**Any cumulative environmental effect with other existing or likely future activities?** Cumulative environmental effects of the Project with other known developments within the study area were assessed in section 7.18 of the REF. No change in cumulative impacts is expected to occur as a result of the proposed design changes described in this Combined Submissions Report, in comparison to those identified in the REF.	No change in impact to assessment presented in REF

	Clause 228 considerations	Change in Impact
p	**Any impact on coastal processes and coastal hazards, including those under Projected climate change conditions?** As identified in section 5.3 of the REF, part of the Project is located within the SEPP 71 coastal zone. With respect to the proposed design changes outlined in this Combined Submissions Report, no change to the anticipated impacts on coastal processes or coastal hazards, including those Projected under climate change conditions, in comparison to that described in the REF, is expected to occur.	No change in impact to assessment presented in REF

C.2. CONSIDERATION OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Table C.2 provides a summary checklist of matters of national environmental significance to be considered under the Commonwealth EPBC Act. The checklist provides a comparison between the impacts as identified in the REF and the proposed design changes outlined in this Combined Submissions Report.

Table C.2 Check-list of EPBC Act matters

	EPBC Act matter	Change in impact
a	**Any impact on a World Heritage property?** There are no World Heritage properties in the vicinity of the Project or the associated design changes.	No change in impact
b	**Any impact on National Heritage Places?** There are no National Heritage Places in the vicinity of the Project or the associated design changes.	No change in impact
c	**Any impact on wetlands of international importance (declared Ramsar wetlands)?** There are no wetlands of international importance in the vicinity of the Project or which would be affected by the proposed design changes.	No change in impact
d	**Any impact on Commonwealth listed threatened species and ecological communities?** As described in the REF, a desktop search predicted that 23 threatened flora species and two EECs listed under the EPBC Act may occur within 10 kilometres of the Project site. Of these the Biconvex Paperbark (*Melaleuca biconvexa*) has been recorded in the Project site and surrounding area and would be impacted by the Project. Three of the remaining species identified have also been identified to have a moderate likelihood of occurrence. As a result of the potential impact to *Melaleuca biconvexa*, a SIS was prepared to assess the potential impacts. Concurrence for Project approval was provided by the NSW OEH on 22 August 2016. As a result of the proposed design changes identified in Chapter 6 of this Combined Submissions Report, an overall reduction in the amount of threatened species and ecological communities impacted by the Project has been able to be achieved. In particular, the proposed refinements to the detention basins across the site would generally result in a smaller amount of vegetation being required to be removed in comparison to the areas of vegetation that were identified for removal in the REF. This would include a reduction in the amount of *Melaleuca biconvexa* required to be removed, particularly in areas adjacent to Turpentine Road. In addition, the Department of Environment and Energy has determined that the Project is to be considered as a controlled action due to potential impacts on the Swift Parrott and Regent Honeyeater. Transport for NSW is currently working with the Department of Environment and Energy to provide the relevant information required to assess the Project based on this determination.	Slight positive impact in comparison to assessment presented in REF

	EPBC Act matter	Change in impact
e	**Any impact on Commonwealth listed migratory species?** The Project REF identified that there are 15 migratory species under the EPBC Act which would have the potential to occur within the vicinity of the Project. Impact on these species was however considered to be minimal. The proposed design changes are not anticipated to change the potential impacts to the migratory species identified as being listed under the EPBC Act	No change in impact
f	**Any impact on a Commonwealth marine area?** The Project, or proposed design changes, are not located in the vicinity of a Commonwealth marine area.	No change in impact
g	**Any impact on Commonwealth land?** The Project, or proposed design changes, would not affect Commonwealth land.	No change in impact
h	**Any impact on the Great Barrier Reef Marine Park?** The Project, or proposed design changes, are not located in the vicinity of the Great Barrier Reef Marine Park.	No change in impact
i	**Does any part of the Project involve a nuclear action?** No nuclear actions are proposed as part of the Project or proposed design changes.	No change in impact
j	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?** The Project, or proposed design changes, would not be undertaken by the Commonwealth or a Commonwealth agency.	No change in impact

Appendix D

FLOOD STUDY AND FLOOD IMPACT ASSESSMENT REPORT

AECOM

New Intercity Fleet Maintenance Facility
Transport for New South Wales
03-Aug-2016
Doc No. KFA-AECOM-CI-RP-0003

Commercial-in-Confidence

Flood Study and Flood Impact Assessment Report

Flood Study and Flood Impact Assessment Report

Client: Transport for New South Wales

ABN: 18 804 239 602

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

03-Aug-2016

Job No.: 60477500

AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

Quality Information

Document Flood Study and Flood Impact Assessment Report

Ref 60477500

Date 03-Aug-2016

Prepared by Nick Maynard

Reviewed by Bruce Withnall

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	24/06/2016	Draft Reference	Gerard Williams/Project Manager	
B	03/08/2016	Update following model assessment	Gerard Williams/Project Manager	

Table of Contents

Executive Summary

AECOM were commissioned to undertake pre-concept, concept and reference design of the New Intercity Fleet Maintenance Facility (NIF) for TfNSW. As part of the concept design process, AECOM has undertaken a flood assessment to identify potential impacts and risks to the proposed works and surrounding property. The assessment has been based on flood modelling undertaken for the Ourimbah Creek Catchment Flood Study (Flood Study).

This investigation adapted existing Flood Study modelling for use in the flood assessment of the NIF site. The most significant change was to the culvert rail crossing of the Unnamed Tributary, located north east of the Chittaway Creek bridge crossing (chainage 94 km +200). This structure was not included in the original model but rather being represented by an oversized open channel. The event used for the assessment was the 1% Annual Exceedance Probability design event with a 10% increase in rainfall to account for climate change (Design Event).

It was found that four areas of the site would be affected by the Design Event; three around the Chittaway Creek crossing, and one at the north east end of the site. The proposed infrastructure is mostly raised and therefore it is generally only embankments that are impacted. In two of the locations the flood extent reaches detention basins that form part of the site drainage system. The basins are not designed for large events, such as the Design Event, and therefore they would be expected to spill, negating the impact of the floodwater.

Only one site, located at the initial turnout, would have floodwater flowing against the embankment and the proposed works include rock protection to mitigate erosion risks.

The update to the model showed that the culvert carrying the Unnamed Tributary has the potential to be a significant hydraulic control for flows in this tributary. If sufficient capacity is not provided, the flow can back up and overtop the existing rail embankment. Past works to raise the culvert level in this area suggest that overtopping has been experienced previously.

The results suggest that the proposed works will not have any adverse impact on surrounding property. The model results show negligible changes upstream of the rail (approximately 0.02 m increase) and no changes downstream. The wider Ourimbah Creek system causes floodwaters to back up to the rail, limiting the impact that any works can have on downstream flood levels.

1.0 Introduction

1.1 General

A concept design of the New Intercity Fleet (NIF) maintenance facility has been prepared by AECOM. Construction is planned to be completed by 2019 in order to accommodate the new rolling stock being commissioned in the same year. As part of the concept design stage AECOM have undertaken an assessment of both; the impact of flooding on the site, and the impact the site may have on the flood risk for surrounding property.

This study uses published reports and available models to identify the existing flood risk across the site. It outlines the detailed hydrologic and hydraulic modelling that has been used to identify the flood risk. Locations where flood waters impact the site are identified and assessments made on what impact that may have on flood risk to surrounding properties.

The design criteria for the maintenance facility operations is immunity to flooding during a 1% Annual Exceedance Probability (AEP) design storm, with allowance for climate change (Design Event). The Ourimbah Creek Catchment Flood Study (the Flood Study) was developed by Catchment Simulation Solutions (CSS) in October 2013 for Wyong Shire and Gosford City Councils (Council).The Flood Study discusses the inclusion of climate change impact and is in accordance with the NSW Office of Water (NOW) guidance *Practical Consideration of Climate Change* (25/10/2007). The climate change scenario is based on a 10% increase in rainfall. A further design criterion requires any increase in flood risk to the adjacent areas, caused by the delivery of the Maintenance Facility, to be mitigated.

1.2 Purpose of this report

This report addresses Section 3.1.18 of the Services Brief which forms Attachment B of the Professional Services Contract for the Technical Advisor for Maintenance Facility – New Intercity Fleet (Contract No. ISD-15-4405). The section states the following:

Topographic and Hydrographic Survey and flood study and flood impact assessment must be conducted by the Technical Advisor to determine the design level(s), flood mitigation measures and drainage systems of the Maintenance Facility. Flood risks to the adjacent areas due to the delivery of the Maintenance Facility must be mitigated. All safety risks must be identified and eliminated or reduced SFAIRP. The outcome of the flood study and flood impact assessment shall be documented in a "Flood Study and Flood Impact Assessment Report".

2.0 Data Collection

2.1 Hydrologic and Hydraulic Modelling

The new Maintenance Facility is situated in the Ourimbah Creek floodplain near the confluence of Ourimbah Creek and Bangalow Creek. The Ourimbah Creek catchment was the subject of the Ourimbah Creek Catchment Flood Study (Catchment Simulation Solutions (CSS) 2013) which developed maps of flood risk for the entire Ourimbah Creek floodplain.

As part of the Flood Study, CSS developed hydrologic and hydraulic models of the Ourimbah Creek catchment using XP-Rafts and TUFLOW software. XP-Rafts is a rainfall-runoff routing package that allows flow hydrographs to be developed from rainfall data inputs. TUFLOW is a hydrodynamic modelling program for simulating depth-averaged, two and one-dimensional free-surface flows such as those that occur from floods and tides. Wyong Shire Council provided these models to TfNSW and AECOM so that they could be utilised for the flood impact assessment.

2.2 Topographic Data

The TUFLOW model contained a Digital Elevation Model (DEM) constructed from a number of different LiDAR sets collected on different dates (2005, 2007 and 2011). Discussions with Wyong Shire Council determined that they had more recent LiDAR information from 2014. This later data was used for assessing the relative merits of alternative access options; however for the purposes of identifying potential impacts for the site and surrounding floodplain, the existing modelling and results based on the earlier LiDAR were adopted in their current state. A comparison of the data sets at a number of locations across the site showed a good agreement.

3.0 Model Review

3.1 Hydrologic Model

The Ourimbah Creek model is made up of 426 sub-catchments that have been identified based on the alignment of major flow paths and topographic divides. Routing between the catchments was based on a representative cross section, roughness, slope and length. One formal flood detention basin was included in the model and the rainfall loss model was based on guidance from "Australian Rainfall and Runoff – A Guide to Flood Estimation" (Engineers Australia, 1987).

The model underwent a calibration exercise, using rainfall and stream flow data recorded in the catchment. Three storm events were used and they were selected based on the availability of data at two stream gauges. The aim of the calibration process was to refine the catchment characteristics so that the flow output at the gauge locations generally matched the recorded data.

The calibration process showed a good reproduction of recorded hydrographs at one gauge for all the test events. The other gauge was found to be less reliable; however the Flood Study questioned the reliability of the rating curve and some stage recordings at that site. The calibration was therefore considered a reliable representation of the catchment.

AECOM found the hydrologic model to be suitable for the assessment of flood risk at the site and have adopted the model and results without alteration.

3.2 Hydraulic Model

The Ourimbah Creek TUFLOW model is a linked 1-dimensional/2-dimensional model, covering 65.8 km^2 of the catchment. The model used two grid sizes to represent the overbank areas; an 8 m grid for the rural, upper catchment areas, and a 4 m grid for the lower urbanised areas. The NIF project site is located within the smaller 4m grid area, giving rise to a more detailed model representation of the ground levels.

Roughness coefficients were based on aerial photography and while they may be considered a little high in some areas, they generally appear to be appropriate. Structures have been included as culvert units with default losses, or bridges using a depth/loss relationship based on literature. Water storages were assumed to be full and an estimate of fence locations was also included. Structures were given suitable blockage factors based on their size, and fences were also assigned a blockage factor. These are reasonable approaches and were found acceptable by the model review.

It should be noted that the bridge crossings of most interest to this project were not represented in this way in the model. The Enterprise Drive and rail crossings of Chittaway Creek have been included as bridge structures based on simple cross sections, but with no form losses. The rail crossing is outlet controlled due to the high flood levels of the wider Ourimbah Creek system and therefore the impact of the structure is less critical. By maintaining a consistent approach for the Enterprise Drive crossing, it is possible to accurately compare flood impacts from the proposed works. For these reasons, the model has been considered suitable for the assessment.

The original model underwent a calibration exercise based on recorded flood marks along the creek and across the floodplain. Three events were identified where flood marks were available and inflows were developed using the calibrated XP-Rafts model. The flows were then run through the TUFLOW model and the roughness and other coefficients were adjusted until a good correlation was found with the recorded flood marks. The final result was an average difference to the recorded flood marks of 0.1 m. Some locations had more significant differences, but the marks in these areas were considered less reliable. The final conclusion was that the model provided a reliable description of flood behaviour across the floodplain.

One item of note concerns the Unnamed Tributary which crosses the site via a culvert approximately 270m north east of the Chittaway Creek crossing (chainage: 49 km + 200 m). This culvert was not included in the original model, instead a 7 m wide channel was cut across the rail and roads. There was also no inflow for this tributary with the flood extent being created by backwater from Ourimbah Creek. The Flood Study states that the flow for this tributary has a peak of 5.24 m^3/s during the Design Event. The inflow is included in the model, but applied to the main Ourimbah Creek channel, not the tributary itself.

4.0 Hydraulic Model Refinement

4.1 Base Case Model

As stated in Section 3.2, the hydraulic model was generally suitable for use in this analysis. In order to create a suitable base case, two culvert crossings of the Unnamed Tributary were added to the model.

The previous modelling used a simplified method to represent the Unnamed Tributary by creating a seven metre (7m) wide channel for its entire length. This includes the crossings of all roads and the rail embankment. A seven metre wide channel provides a significant flow capacity for the size of catchment that feeds the tributary and therefore the flood risks posed by the creek would be under estimated.

Two crossing structures have therefore been introduced to the model; one under the existing rail line, and one further upstream under Enterprise Drive. The sizes of these culverts are not available on any survey information and the locations were difficult to access. It is generally unusual for upstream structures to be larger than those lower in the catchment. Therefore it has been assumed that the culverts are the same size as the Turpentine Road crossing downstream of the rail embankment. The culvert under Turpentine Road is a single 900 mm concrete pipe. Figure 1 shows the location of the base case infrastructure.

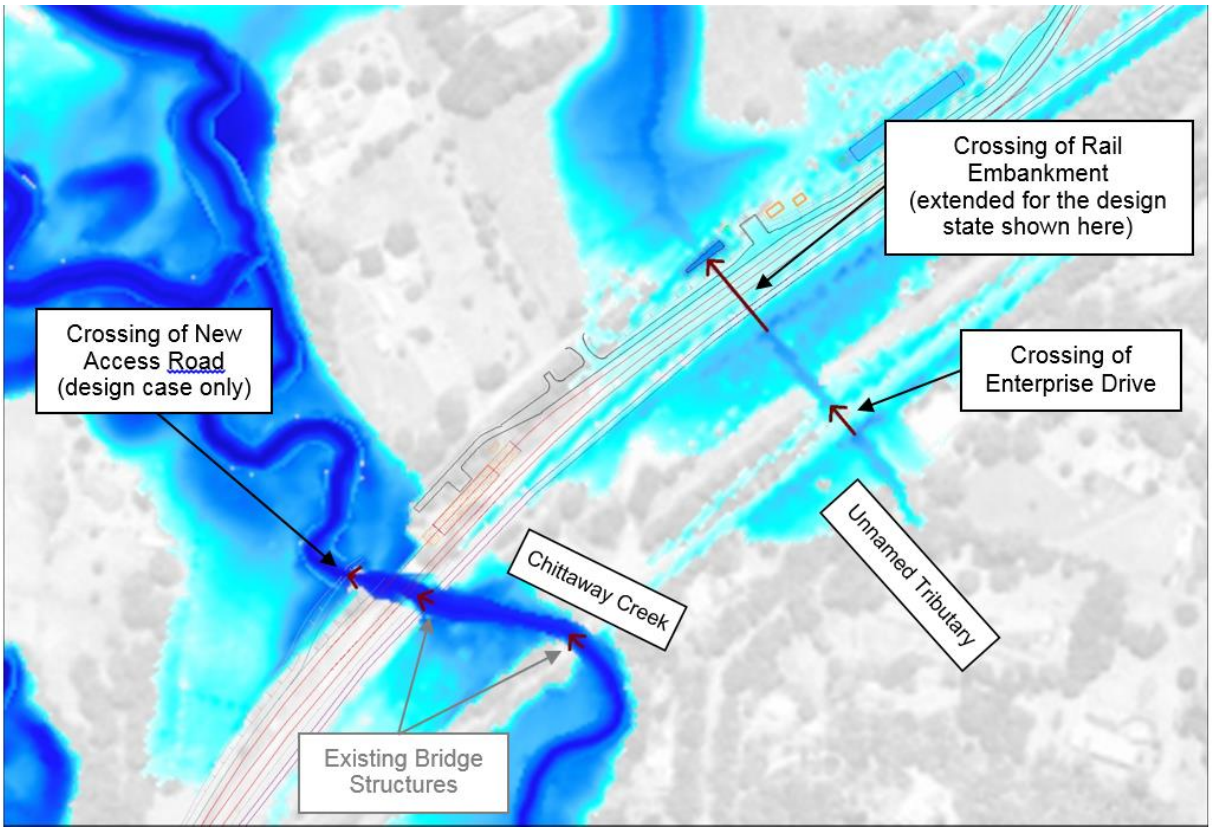


Figure 1 Locations of Infrastructure Included in the Base and Design Case modelling

It should be noted that the culverts introduced on the Unnamed Tributary provide significantly less flow area than the 7 m wide channel that was assumed in the original model.

4.2 Design Case Model

In order to model the design case, the topography of the base case was supplemented with the design earthworks model.

At Chittaway Creek the existing rail bridge crossing was lengthened (along the creek, perpendicular to the rail embankment) by including a new single span crossing of similar waterway opening. The design also had an access road that ramped up over the creek, downstream of the new bridge section. The new single span bridge

only had the abutments included in the model. This is because the peak water level did not get high enough to interact with the bridge deck. An additional culvert was also included to allow flow under the new access road.

At the Unnamed Tributary, the culvert under the existing rail was extended to convey flow under the full width, including the new rail lines. A number of design scenarios were modelled to investigate the relative impact of varying flow capacity under the rail at this location. The following design scenarios were modelled and the results are discussed in Section 5.0:

- Design01 – one 900 mm culvert under the rail line for the Unnamed Tributary
- Design02 – two 900 mm culverts under the rail line for the Unnamed Tributary
- Design03 – three 900 mm culverts under the rail line for the Unnamed Tributary
- Design04 – four 900 mm culverts under the rail line for the Unnamed Tributary

5.0 Results and Analysis

5.1 Base Case Modelling

The base case modelling identifies the current flood risk for the site. The intended location of the Maintenance Facility building is located on higher ground and therefore much of the associated infrastructure is not affected by the Design Event. Figure 2 shows an overview of the site and surrounding floodplain including the base case flood extent for the Design Event.

There are four main areas that are potentially affected by flooding; the turnout area, the Chittaway Creek crossing, the Unnamed Tributary crossing and the access road area. The impact of the proposed works on these areas is discussed further in the Section 5.2.

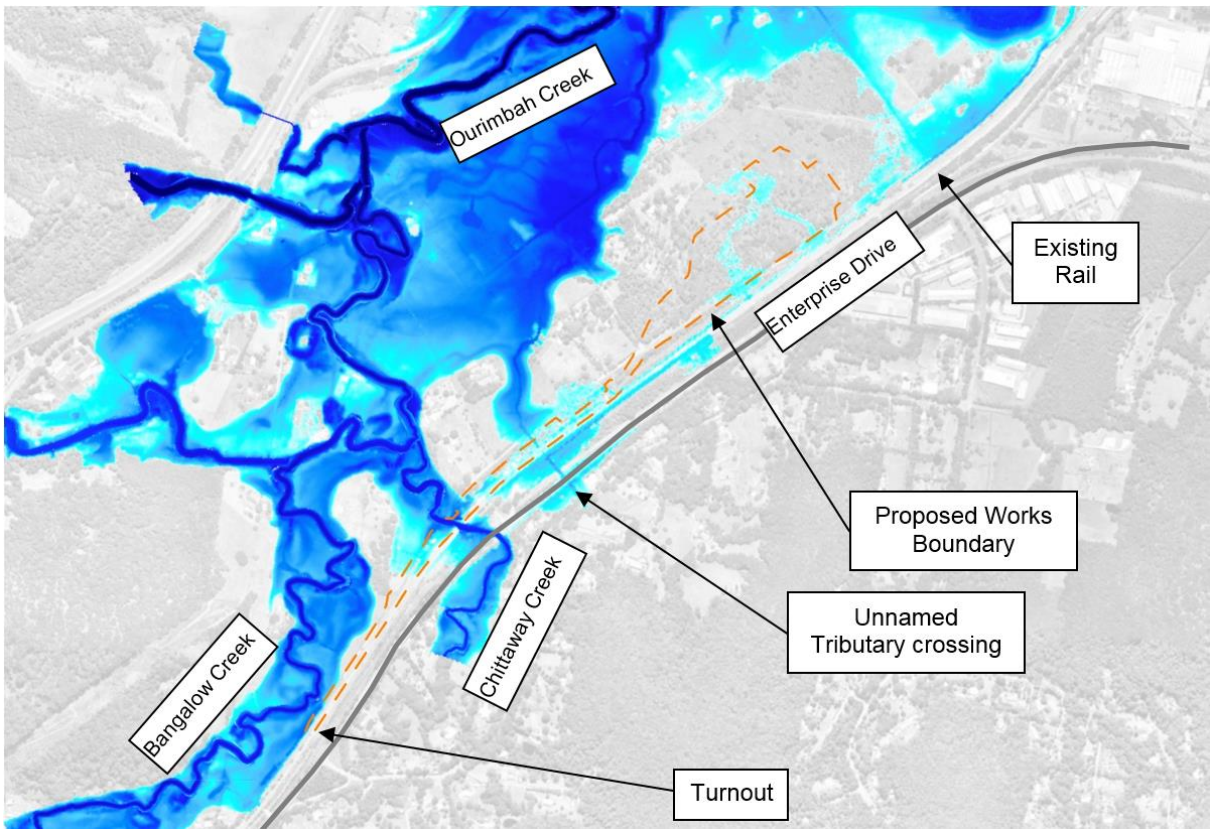


Figure 2 Site overview including Base Case flood extent for the Design Event

5.2 Design Case Site Flood Risk

5.2.1 Overview

The following sections describe the changes to the flood extent caused by the proposed design. This includes small scale figures of each of the areas impacted by the Design Event.

5.2.2 Turnout area

The turnout area marks the start of the proposed works and is where the rail embankment will begin to be widened to accommodate the new roads. The proposed works will include a wider embankment which will marginally reduce the flow area and flood storage available for the Bangalow Creek floodplain. Figure 4 shows the relative change in peak flood level between the base case and the Design01 scenario. It only highlights areas where the water level has changed. Where the widened embankment pushes into the floodplain, the floodwater has been displaced further from the existing rail resulting in a reduction in flood level (no floodwaters are over the new embankment).

The existing rail embankment both at the site and to the south is impacted by the Design Event with floodwater from Bangalow Creek flowing against the embankment at a depth of approximately 2.3 m. As indicated by Figure 4, the design condition results in no change to the general depth or velocity of flow against the embankment. This still represents an erosion risk and the proposed works include rock protection for this length of embankment. Figure 3 shows a close up of this area, allowing a better understanding of the current flood impact. The figure includes the design earthworks and the results of the Design01 model. All of the other design scenarios considered have the same results in this area.

It should be noted that the widened areas of embankment are not inundated during the design scenario and are therefore shown as a significant reduction in flood level in Figure 4.

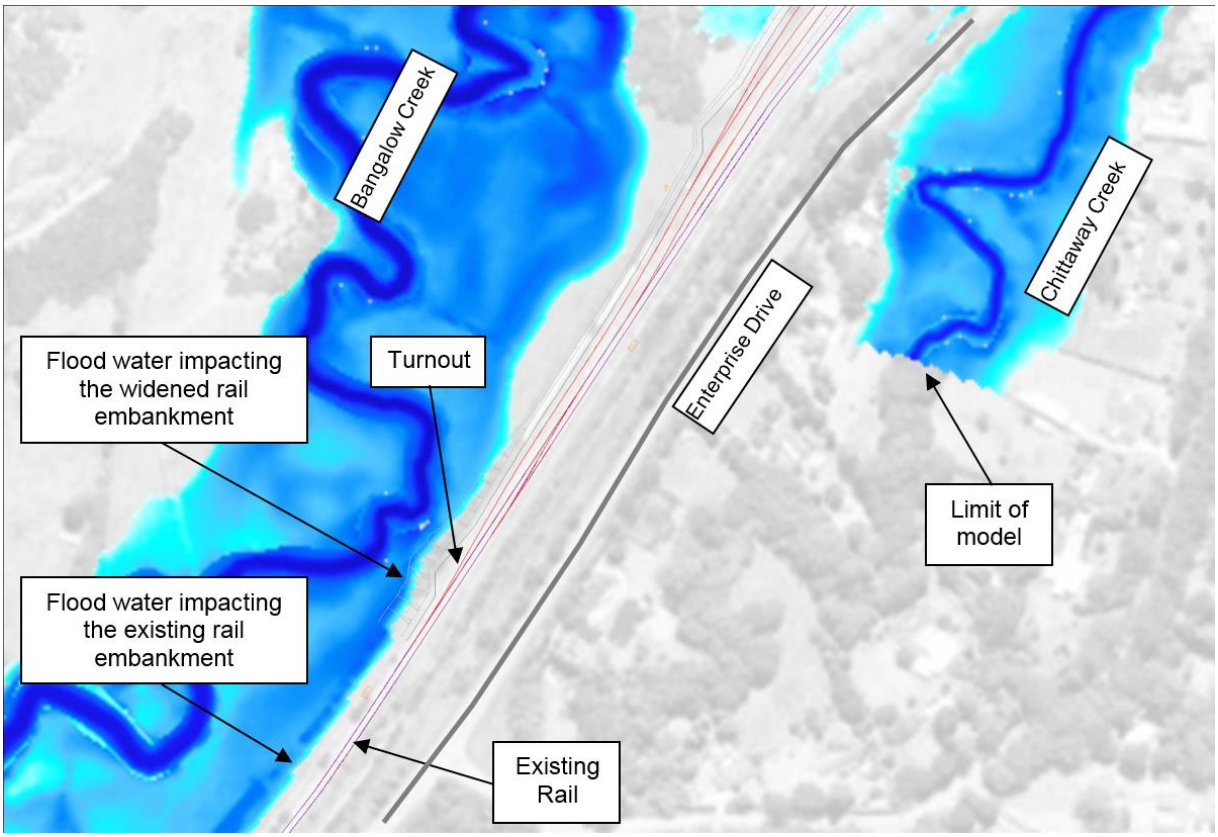


Figure 3 Turnout area flood extent for Design Even t– Desing01 scenario

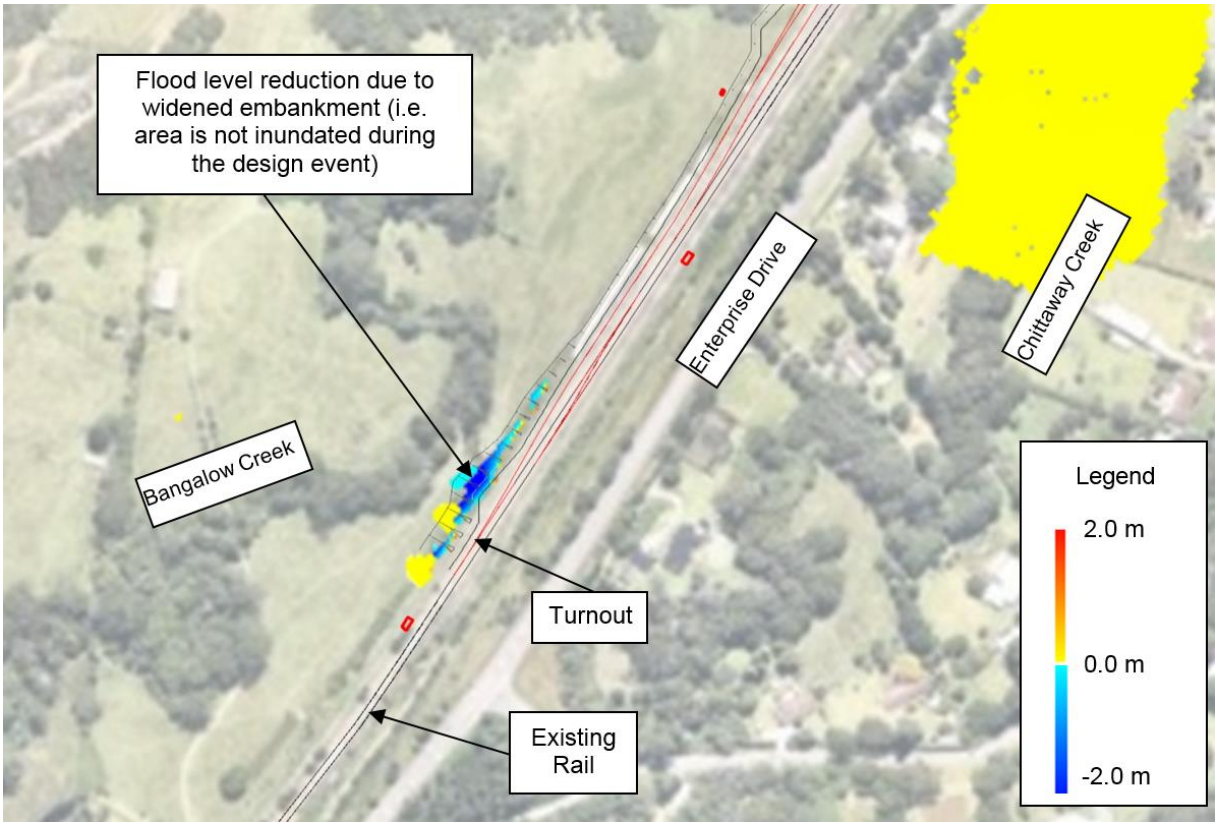


Figure 4 Turnout Area – Relative change in peak flood level (base case to Design01 scenario)

5.2.3 Chittaway Creek Crossing

The Chittaway Creek crossing (refer Figure 5) currently consists of a three span bridge where one span crosses Turpentine Road, the middle crosses Chittaway Creek and the third provides additional overbank waterway capacity. Figure 6 shows the upstream face of the rail crossing. Turpentine Road is only marginally higher than the creek bed and therefore during high flow events, all three spans are used to convey flow. It should also be noted that the bridge crossing for Enterprise Drive is located approximately 100m upstream. The bridge has a similar opening to the rail crossing and therefore acts as a control to the flow passing under the railway.

The proposed works will extend the rail crossing on the northern (downstream) side by including a new, single span bridge. Therefore the entrance to the bridge will be unaffected and will continue to operate as it does currently. The model includes the additional width of embankment crossing and therefore the additional friction from the abutments will also be included. The downstream access track is also included in the model.

As shown in Figure 8, the model assessment indicates that the proposed works had no impact on downstream flood levels. This is because the wider Ourimbah Creek system causes water to back up to the rail embankment and controlling the peak flood level. There is a nominal increase in flood levels immediately upstream of the bridge, in the order of 0.02 m. This increase propagates beyond the Enterprise Drive bridge upstream. However, given the location of surrounding property, it is unlikely to adversely change the existing flood risk.

It should be noted that much of the change in water levels is caused by the proposed earthworks. Around Chittaway Creek, the rail embankment has been widened, preventing that area from being inundated during the design event. In Figure 8 this is represented by a significant reduction in flood water level.

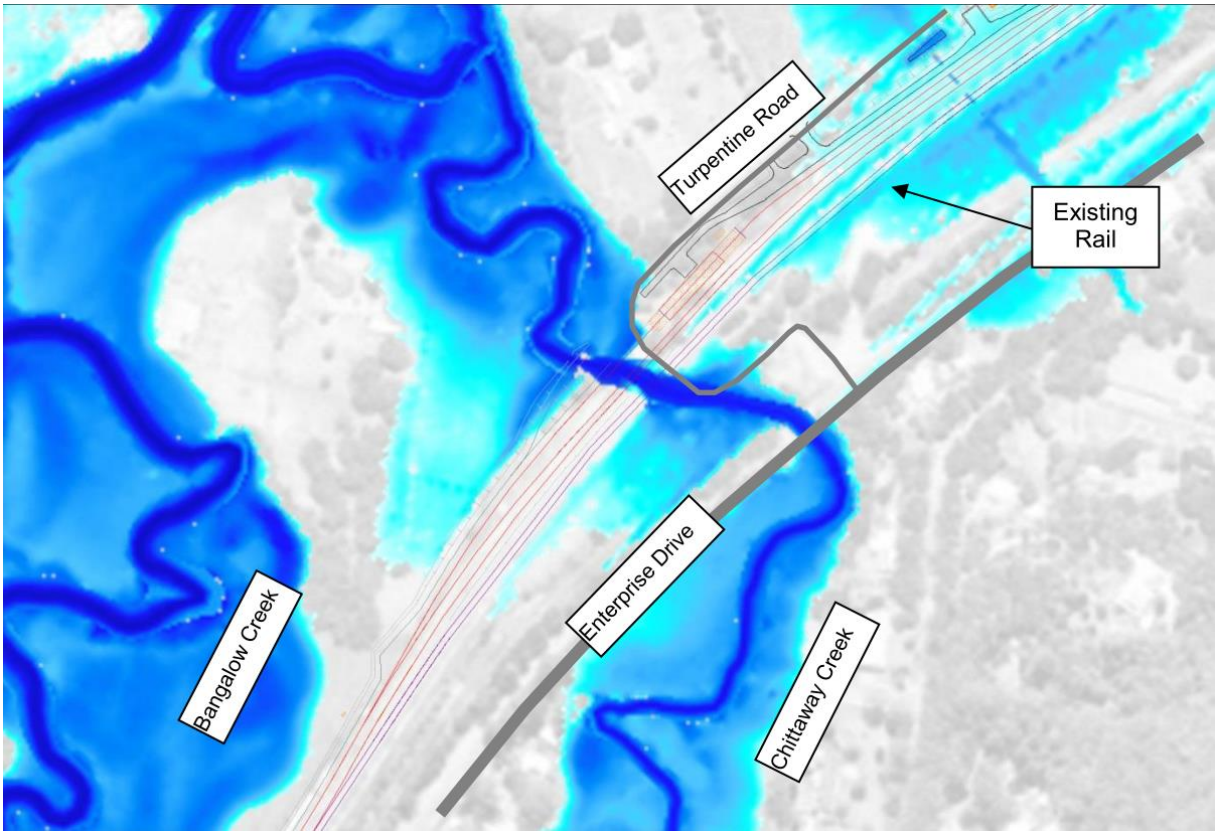


Figure 5 Chittaway Creek crossing flood extent for Design Event – Design01 scenario

Figure 6 Upstream face of the Chittaway Creek crossing

Figure 7 Downstream face of the Chittaway Creek crossing

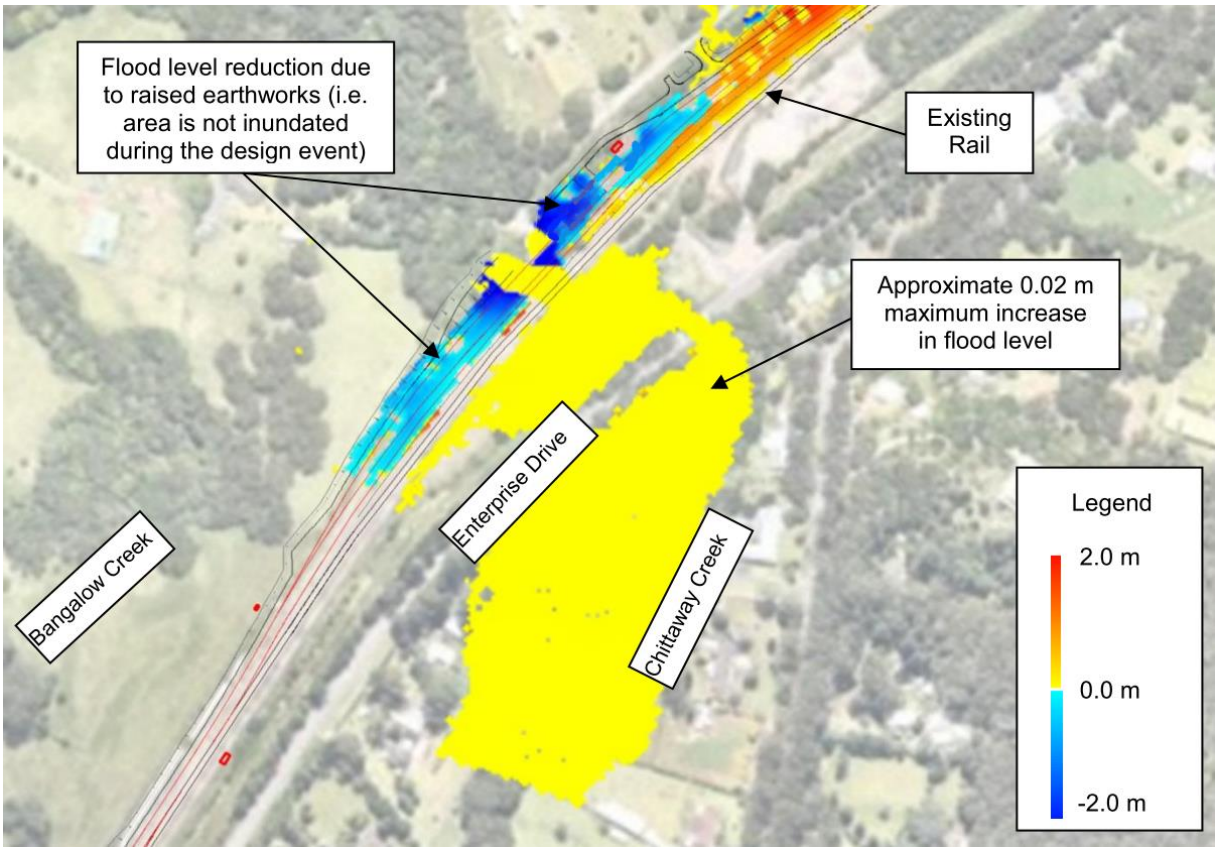


Figure 8 Chittaway Creek – Relative change in peak flood level (base case to Design01 scenario)

5.2.4 Unnamed Tributary crossing

A review of the base case assessment for this area highlighted a previously unknown issue that was not identified in the original model. The original model represented the Unnamed Tributary and its structure crossings as a seven metre wide channel. This assumption provides significantly more flow capacity than the estimated 900 mm diameter pipe culvert under Enterprise Drive and the existing rail embankment. The base case modelling showed that the Design Event caused water to back up and overtop the existing rail embankment which had a modelled height of around 13.64 mAHD at this location.

The design case extended the rail culvert to pass under the new rail infrastructure. A number of scenarios were run to investigate the impact of varying capacity under the rail embankment and the results of these are discussed below.

Maintaining the assumed 900 mm culvert (Design01) made no change to the upstream conditions and the existing rail embankment overtopped. In this location the new rail infrastructure is lower than the existing embankment and therefore its immunity is controlled by the culvert capacity and existing embankment height. Figure 9 shows the Design Event flood extent across the site for the Design01 scenario. Figure 11 shows the relative change in peak flood levels between the base case and the Design01 scenario. The proposed design incorporates access roads and surface drains which can be seen to convey water around the facility. It should be noted that the flood waters only impact the track at the point of overtopping and the main facility shed and building are unaffected. It should also be noted that the new infrastructure will only flood when the existing rail line is also overtopped and therefore no traffic would be using the line.

Figure 11 shows that the relative changes in flood level generally occur within the area of works. Some areas show a significant increase in flood level; however this is caused by a shallow depth of flooding occurring on a raised area of earthworks. When the flooding returns to the existing ground level, no relative change is shown.

Increasing the culvert capacity to incorporate two 900 mm diameter pipes (Design02) reduced the volume of overtopping flow, but the flood extent was similar to scenario Design01.

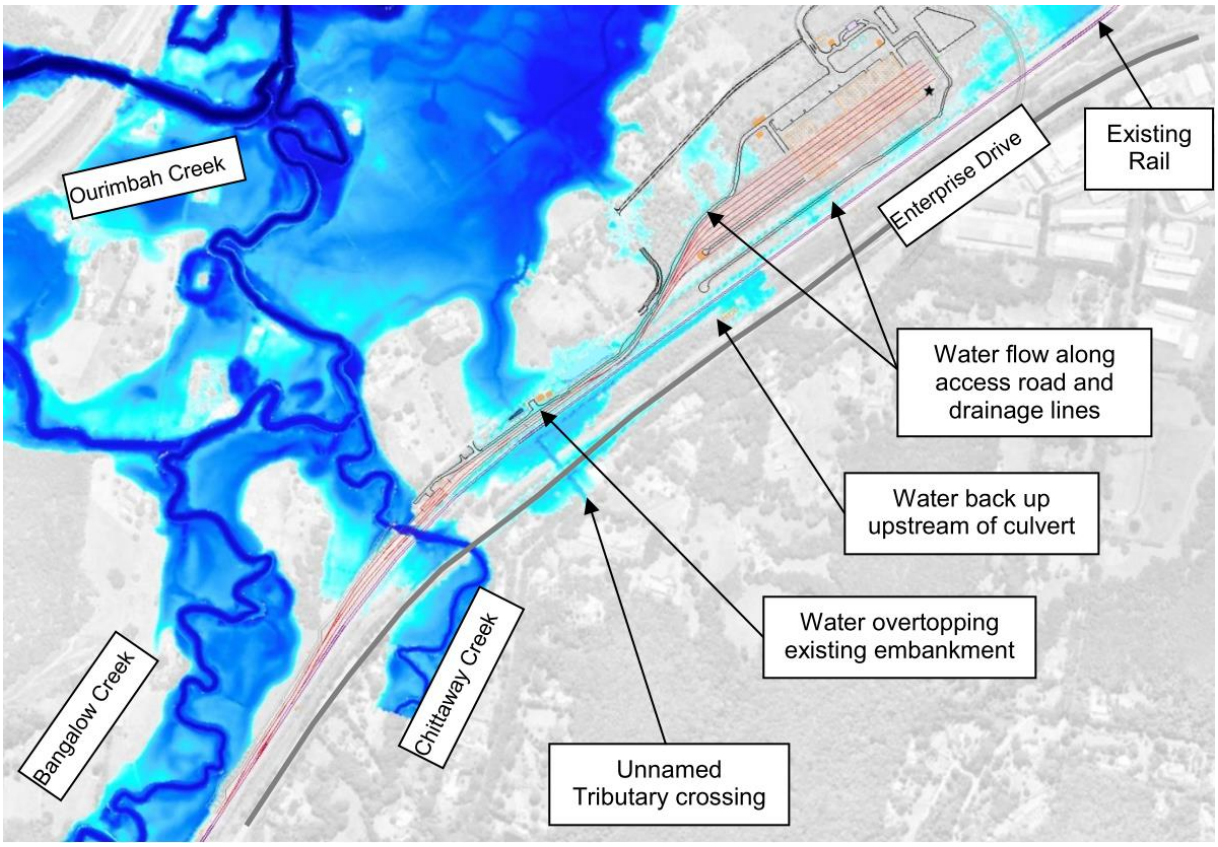


Figure 9 Unnamed Tributary flood extent for Design Event – Design01 scenario

Further increases to the culvert capacity under the rail embankment provide notable improvements to the flood immunity. When three 900 mm diameter pipes are used there is no overtopping of the embankment and all flow

passes through the structure. There is still significant ponding upstream of the rail embankment, as shown by Figure 10. When four 900 mm pipes are used, the upstream ponding is further reduced and the flood extent is contained to the immediate area surrounding the culvert inlet.

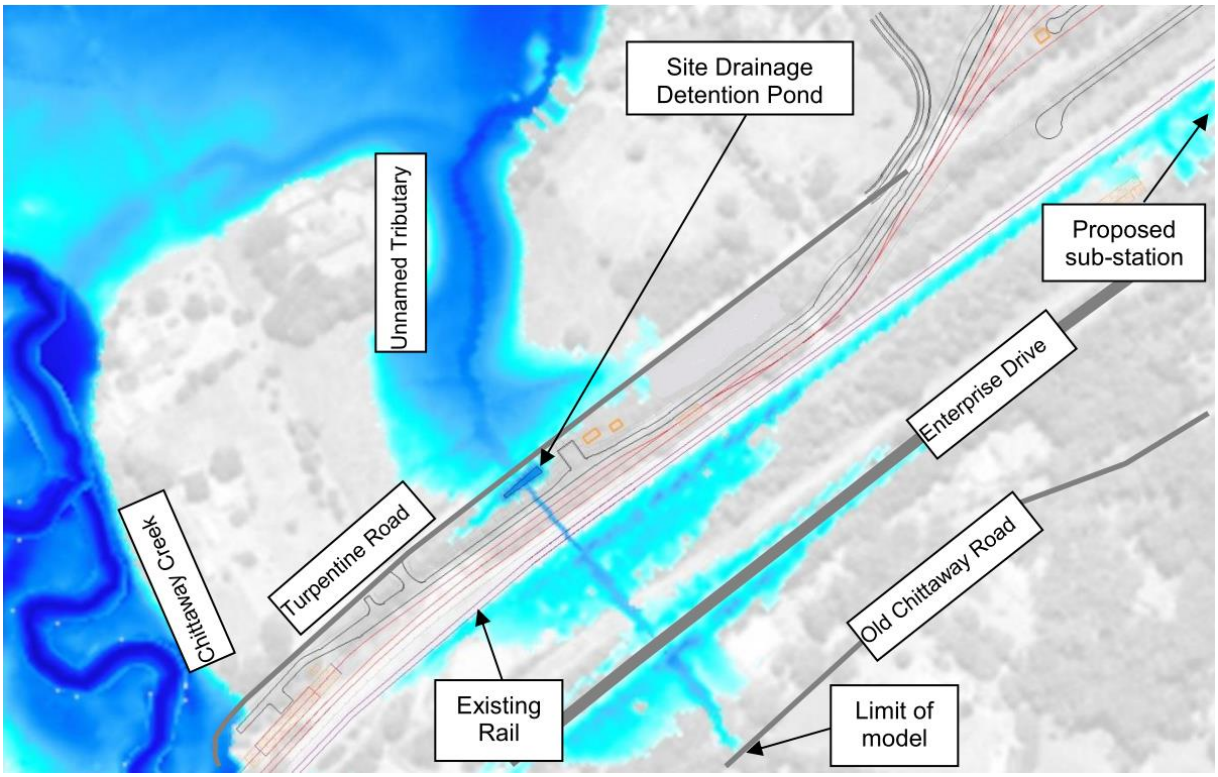


Figure 10 Unnamed Tributary flood extent for Design Event – Design03 scenario

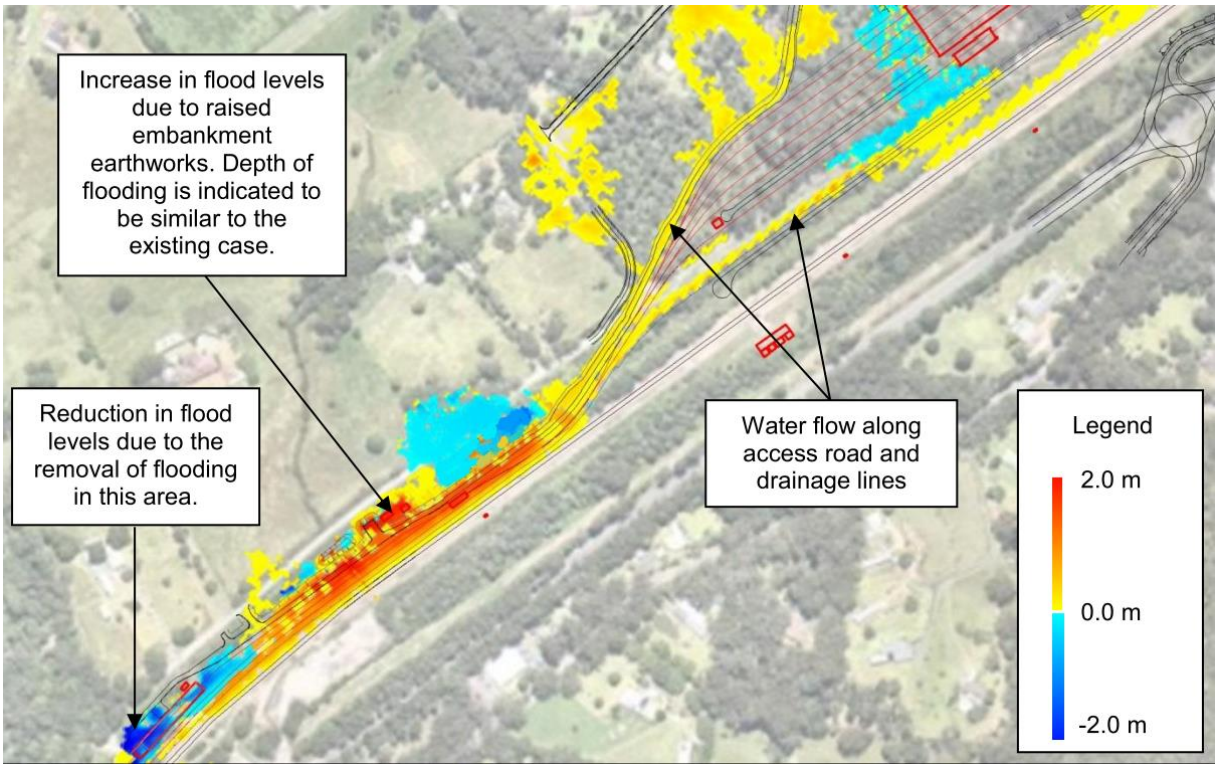


Figure 11 Unnamed Tributary – Relative change in peak flood level (base case to Design01 scenario)

5.2.5 Access Road area

The proposed works include an access road with an overpass over the rail and onto the site. The overpass also crosses an existing drainage channel and a section of lower ground to the north of the rail embankment. Figure 12 shows that during the Design Event floodwaters will back up onto the site from Ourimbah Creek. This floodwater passes under the access road and, during scenario Design01, meets with flow passing down the existing drainage channel beside the rail embankment. The flood extent is not shown to interact with the main detention pond for the site.

The proposed design of the access road bridge includes a number of piers that will allow floodwaters to freely pass under the road. The extent of the flooding suggests that the piers will only be exposed to floodwater during very large events and the water will be shallow and slow moving. The risk of scour from catchment flooding is therefore very low.

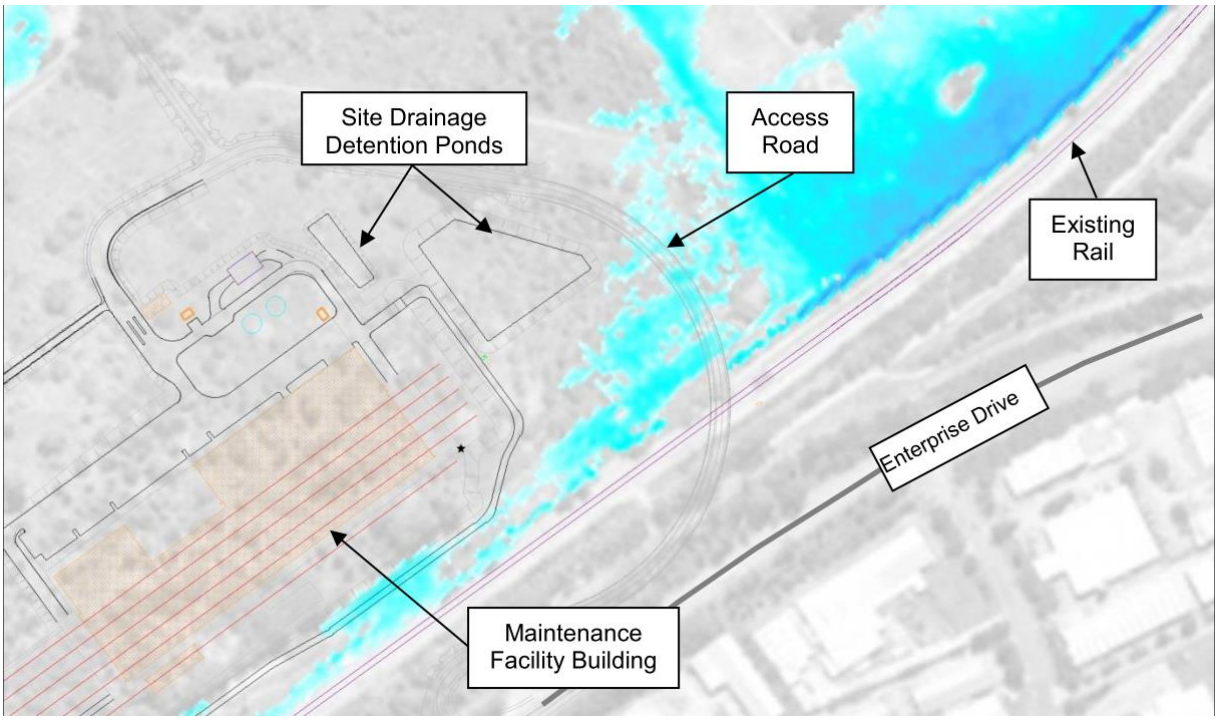


Figure 12 Access Road area flood extent for Design Event – Design01 scenario

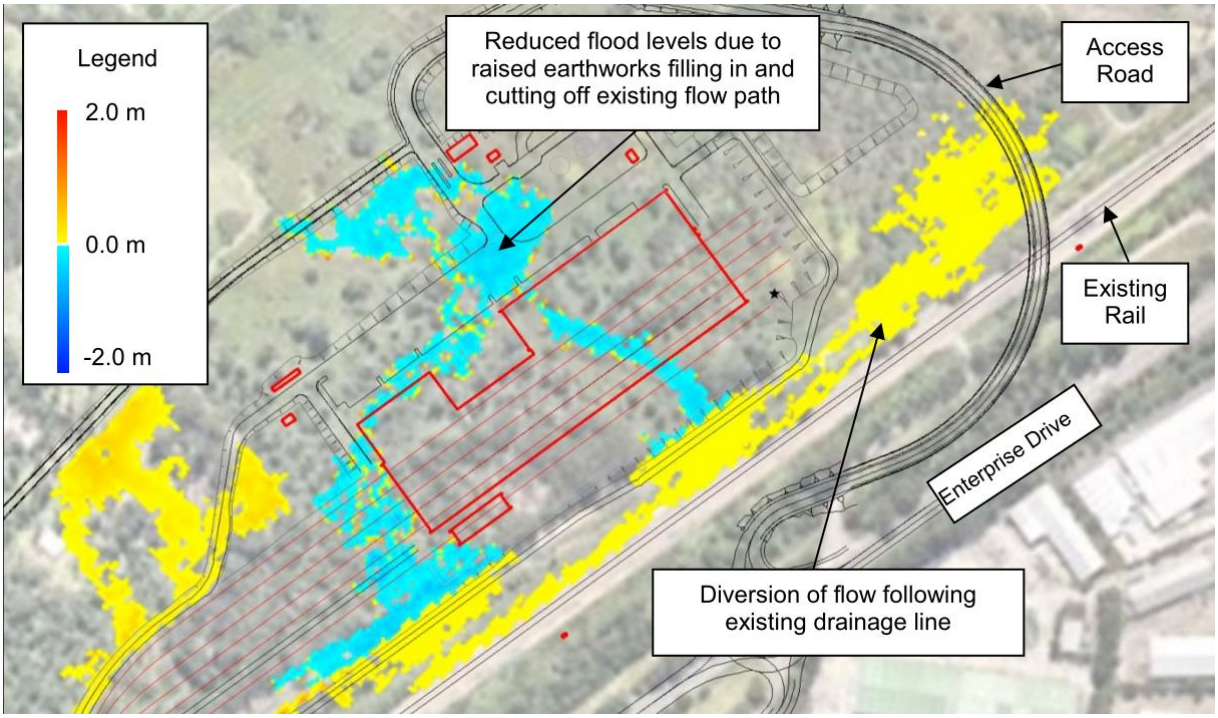


Figure 13 Access Road Area – Relative change in peak flood level (base case to Design01 scenario)

5.3 Flood Risk to surrounding areas

5.3.1 Chittaway Creek and Unnamed Tributary

The analysis in Section 5.2 shows that both Chittaway Creek and the Unnamed Tributary are subject to backwater effects from the greater Ourimbah Creek catchment. The assessment also shows that there is no change to the flood levels downstream of the rail embankment due to the proposed works. This means there will be no impact on flood risk for properties situated downstream of the site.

Upstream of the Chittaway Creek crossing the results indicate there would be a nominal increase in flood levels of approximately 0.02 m due to the new access road and culvert located immediately downstream of the bridge. This increase propagates upstream, but would have no impact on the flood risk for surrounding property.

At the Unnamed Tributary, the refinement of the model revealed that the existing culvert under the rail embankment causes flood waters to back up and overtop the rail during the Design Event. The proposed works were shown to have no impact on this upstream ponding and consequently there is no change to the existing flood risk.

5.3.2 Bangalow Creek

The proposed works will widen the rail embankment in the vicinity of the Bangalow Creek floodplain where floodwaters currently extend to abut the existing embankment. This embankment widening will marginally reduce the floodplain waterway areas and storage available to the creek. However the analysis indicates that there would be no change to the peak flood levels at this location.

5.3.3 Ourimbah Creek

Ourimbah Creek only affects the north eastern end of the site directly. The site does not reduce the volume available for flood storage and the analysis indicates there is no impact to surrounding flood levels.

The site drainage system will spill during larger storm events but it is designed to collect runoff that currently flows to Ourimbah Creek anyway. The proposed drainage system will result in some change to the pattern of flow contributed to the surrounding creek system. However, any potential impacts will be minor to negligible during large rain events, including the Design Event. The area of the proposed works is also a small proportion of the total catchment providing flow to Ourimbah Creek. Therefore changes in runoff from the site will have a negligible impact on downstream flood levels.

As suggested by the above, there will be no impact to the flood risk for surrounding properties.

6.0 Issues and Assumptions

The points below highlight the main issues and assumptions associated with this assessment.

- The assessment has been carried out using the unadjusted modelling results from the Flood Study. The assessment has only considered the 1% AEP design event with a 10% increase in rainfall to account for climate change (the Design Event).
- The coefficients used by CSS in developing the Flood Study modelling are assumed to be reasonable and representative of the catchment and floodplain. The calibration of the models, carried out as part of the Flood Study, appears to support this.
- It is assumed that no significant changes have occurred within the catchment that would significantly change the flood behaviour from that which has been modelled.
- The representation of bridge crossings in the model as structures based on basic cross sections and with no form losses is reasonable. This is acceptable for the analysis of relative flood impacts and has been adopted for this study.
- The culvert crossing of the rail embankment for the Unnamed Tributary has been assumed to be a single 900 mm diameter pipe. The structure size is not included on any survey and the location is difficult to access. The assumption is based on the site estimation of downstream culvert size.
- The culvert crossing of Enterprise Drive for the Unnamed Tributary has been assumed to be a single 900 mm diameter pipe for all modelled scenarios. The location is dangerous to approach and therefore the assumption is based on the site estimation of downstream culvert size.
- The invert levels for the structures included in the model refinement have been estimated using surrounding ground level information.
- The original derivation of flows for the Flood Study has been assumed to be correct and this is supported by the calibration carried out during the original model build. This includes the derivation of flows for the Unnamed Tributary.

Appendix E

LIGHTING IMPACT ASSESSMENT

New Intercity Fleet - Maintenance Facility

LIGHTING
IMPACT ASSESSMENT

4/08/2016

WSP | PARSONS BRINCKERHOFF

NEW INTERCITY FLEET MAINTENANCE FACILITY

LIGHTING IMPACT ASSESSMENT

Date: 04/08/2016

WSP | Parsons Brinckerhoff
Level 1, 41 McLaren Street
North Sydney
New South Wales 2060
Australia

Tel: +61 (02) 8907 0900
Fax: +61 (02) 9957 4127

fiona.venn@WSPgroup.com.au

WSP | Parsons Brinckerhoff Contacts:
Fiona Venn, Associate Lighting Designer

Quality Management

Function	Position	Name	Date
Prepared by	*Associate Lighting Designer WSP Parsons Brinkerhoff*	*Fiona Venn*	*22/07/2016*
Reviewed by	*Senior Lighting Designer WSP Parsons Brinkerhoff*	*Anthony Linard*	*22/07/2016*
Reviewed by	*Transport for NSW*		*01/08/2016*
Reviewed by	*Senior Lighting Designer WSP Parsons Brinkerhoff*	*Anthony Linard*	*03/08/2016*

Revision	Date
01	*22/07/2016*
A	*04/08/2016*

Table of Contents

1 Introduction

WSP | Parsons Brinckerhoff (WSP | PB) has been commissioned on behalf of Transport for NSW to prepare a Light Impact Assessment (LIA) for the proposed New Intercity Fleet Maintenance Facility Project (hereafter, referred to as 'the Project'. The purpose of the LIA is to support the environmental assessment for the Project.

This LIA is one of a number of technical reports supporting the environmental assessment for the Project.

This assessment addresses the potential light impact from activities, including rail movements, within the proposed New Intercity Fleet Maintenance Facility during the operation of the maintenance facility.

The existing environment in terms of its layout, topography, and lighting environment is based on desktop study of information provided as part of the *New Intercity Fleet Maintenance Facility Review of Environmental Factors* (REF) (Transport for NSW, 2016) and in particular the *Landscape Character and Visual Impact Assessment,* May 2016 which was included as Appendix C of the Project REF.

No site inspection or light modelling has been undertaken as part of this desktop assessment.

In accordance with AS4282, public lighting (roadway and pedestrian lighting outside the property boundary) has been excluded from this impact assessment as it is provided to facilitate all-night safety and security for the public at large.

2 Environment

2.1 Existing environment

Transport for NSW proposes to locate a new train maintenance facility at a site in Kangy Angy, Wyong Shire on the Central Coast of NSW. This facility is to support the procurement of the New Intercity Fleet servicing Newcastle and the Central Coast, the South Coast and the Blue Mountains.

The site is located at on the Main North Railway, between Tuggerah and Ourimbah railway stations. The site is bounded by Ourimbah Creek to the north, Orchard Road to the west, and the Main North Railway Line to the east. The site crosses Chittaway Creek to the south.

The area lies within a semi-rural suburban area, with residential properties generally surrounding the site to the north, south and west and with industrial precincts to the south east. The M1 Pacific Motorway is located approximately 0.85 kilometres to the north-west. The existing Project site is densely vegetated. Therefore, views from residential allotments towards the rail corridor are generally obscured.

2.2 Site description

The proposed facility is comprised of a single maintenance facility integrating an administration and storage/delivery area with supporting buildings and about six kilometres of electrified track. The site covers an area of approximately 48 hectares and would be bounded by a perimeter fence.

The key building structures for the Project are:

Maintenance facility elements:

- Fleet maintenance building.
- Four enclosed maintenance roads (tracks for undertaking maintenance on the train sets) and three external standing roads (tracks for holding trains within the maintenance facility) to accommodate the new trains within the site.
- Auxiliary workshops.
- Electronic clean room.
- Material storage, including flammable liquid storage.
- Wheel lathe.
- Automatic train wash.
- Site access roads.

Miscellaneous buildings:

- Administration (including training rooms).
- Facilities for presentation and train maintenance staff.
- Signalling building.
- Security building.
- Training simulator.
- Substation building.
- Power supply (traction power, bulk power, signalling power supply and backup generators).

Other infrastructure including:

- New railway track infrastructure on the western side of the existing rail corridor to allow for trains to enter and exit the maintenance facility site from the Main North railway.
- A new rail bridge over Chittaway Creek and Turpentine Road.
- A new access roadway to the maintenance facility site off Enterprise Drive.
- A new flood access road between Orchard Street and the proposed new access roadway.
- Staff car park.
- Relocation of the existing high voltage power transmission line and Combined Services Route.

The facilities buildings have an estimated maximum height of 12 metres. The proposed design minimises the apparent visual bulk of the facility by organising the buildings to fit as closely as practical to create a slim profile. The surrounding area is semi-rural with dwelling heights typically not exceeding two storeys or six to eight metres, see Figures 2.1 and 2.2.

2.3 Night-time environment

The existing night-time lighting environment surrounding the Project is predominantly dark semi-rural with pasture land, stands of native vegetation and woodland. The existing Project site and most surrounding topographical features are unlit. There are currently random street, security and residential lighting on and around the Project site.

The surrounding public road lighting is generally insignificant except at intersections. There is a string of widely spaced 150W high pressure sodium (HPS) street lights on Enterprise Drive and Chittaway Road. The lighting is concentrated at the intersection of Enterprise Drive with both Catamaran Road and Old Chittaway Road.

There is no public street lighting to Schubolt Lane, Turpentine Road, Ourimbah Road and Orchard Road, see Figure 2.3.

Figure 2-1 - Site overview

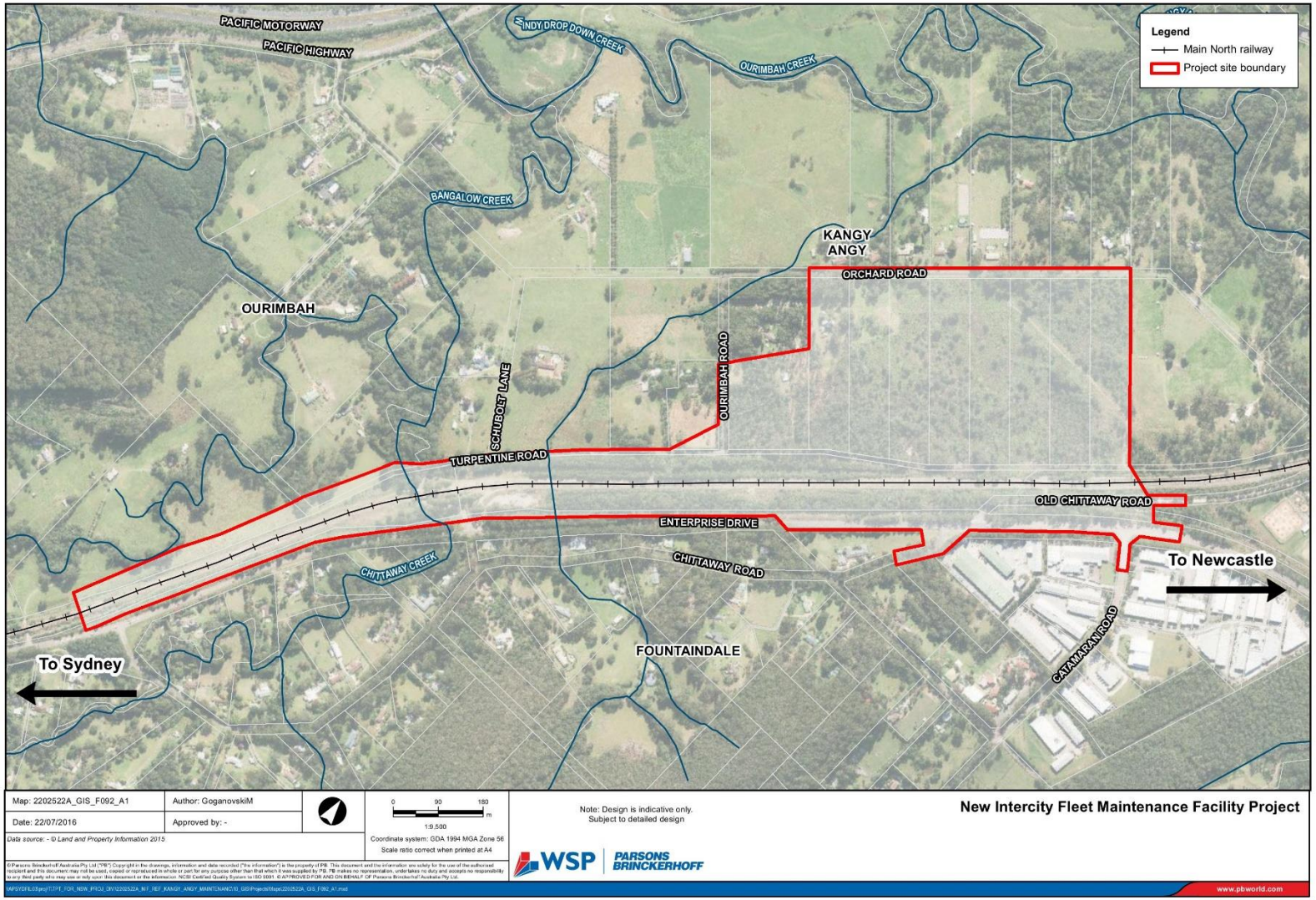


Figure 2-2 Site layout

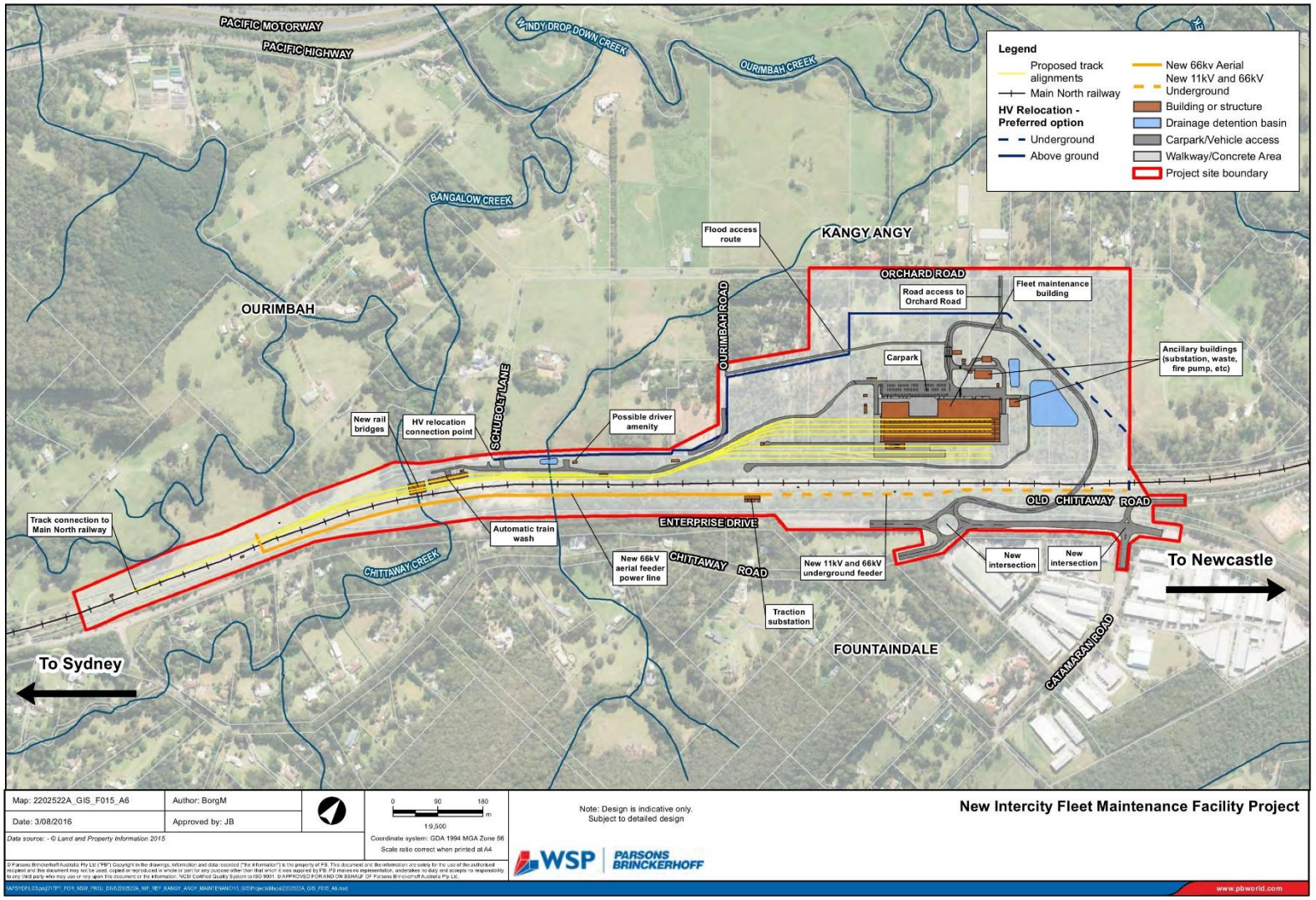
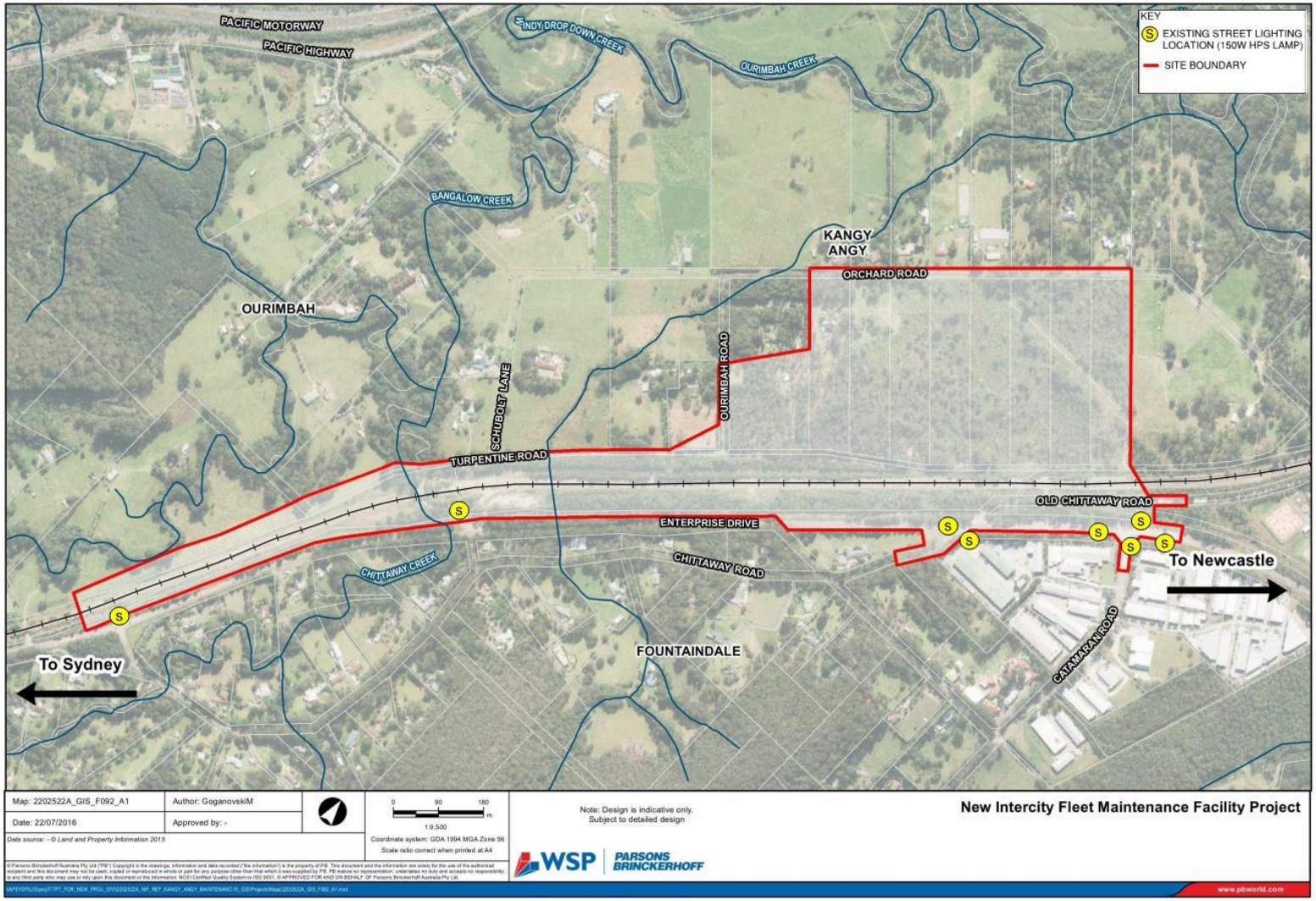


Figure 2-3 Public Street lighting – indicative



3 Potential Lighting Impacts

3.1 Assessment criteria

Potential lighting impacts have been identified following a detailed desktop review of the relevant architectural drawings and the EIS. The information provided in these documents is of a broad scale conceptual planning nature. Consequently the potential impacts are identified and described in a similar level of detail. More detailed assessments of impacts would be made during the detailed design phase.

The assessment of night time lighting impacts has been based on the following:

- *Guidance for the reduction of obtrusive light*, The Institute of Lighting Engineers UK, 2005.
- Australian Standards *AS4282 Control of the Obtrusive effects of outdoor lighting*.

The *Guidance for the reduction of obtrusive light,* (ILE, 2005) identifies a range of categories which describe the lighting situation in night-time landscape settings. These environmental zones are:

- E1: Intrinsically dark landscapes – National Parks, Areas of Outstanding Natural Beauty, etc.
- E2: Low district brightness areas – Rural, small village, or relatively dark urban locations.
- E3: Medium district brightness areas – Small town centres or urban locations.
- E4: High district brightness areas – Town/city centres with high levels of night time activity.

The visual setting of this area is considered to be E2: Low district brightness area. The operation of the Project would introduce lighting during operation into an area visually dominated by a relatively dark landscape.

As previously noted, a majority of the construction for the facility would take place during standard work hours. As such, the potential light impacts associated with the construction of the maintenance facility have not been included as part of this assessment and are anticipated to be minimal and suitably mitigated using standard construction management practices.

3.2 Light impacts

Lighting from the Project may impact the surrounding area as spill light or obtrusive light into adjacent residential properties or as sky glow visible to the surrounding areas. These types of potential lighting impacts are briefly outlined below.

- Spill light is light emitted by a lighting installation which falls outside the boundary of the property on which the installation is sited. The impacts of this type of lighting impact on surrounding areas would include direct views of high intensity luminaires and reflected light from surfaces within the Project boundaries.
- Obtrusive light is spill light which because of quantitative, directional or spectral attributes causes annoyance, discomfort, distraction or a reduction in the ability to see essential information. The impacts of this type of lighting impact on surrounding areas would include direct views of high intensity luminaires and reflected light from surfaces within the Project boundaries.
- Sky glow is the direct or reflected light from a facility that illuminates the sky above the facility and reduces the viewer's ability to see the night sky. Sky glow is an area wide problem rather than site specific and is considered to be minimal and suitably mitigated by restricting design illuminances to the minimum necessary for the Project.

3.3 Operational lighting hours

The following operational activities have been assumed as part of the consideration of lighting impacts associated with the Project:

- The Project will be operational 24 hours a day.
- The work force is expected to be organised into three shifts with up to approximately 60 staff expected to work on each shift. The shift change over times are currently expected to be around 6.00am, 1.00pm and 10.00pm.

The Project will therefore be operational during the hours of darkness with lighting to the maintenance building, auxiliary buildings, exterior circulation areas and staff carpark. There will be one to two staff shift changes during night-time hours. As such, it is expected that the maintenance facility would require lighting, both internal and external, throughout all night time periods.

3.4 Sensitive receivers

The study area comprises the land surrounding the Project site to a distance of approximately 1.5 kilometres in accordance with the study area of the *Landscape Character and Visual Assessment,* May 2016. It is important to note, that some lighting from the Project may be visible from areas beyond the nominated study areas, such as elevated ground to the north (Mount Tangy Dangy) and to the west. These areas have not been considered in the current assessment.

The site is surrounded by residential receivers in the suburbs of Kangy Angy and Fountaindale, NSW. To the north, east and south of the site, the nearest residential receivers are located on Orchard Road, Ourimbah Road, Turpentine Road and Schubolt Lane. Residential receivers are also located across the main railway on Old Chittaway Road, Station Road and Enterprise Drive. There is a commercial/light industrial area located to the south east of the site on Catamaran Road, see Figure 3.1.

Dense vegetation screens views towards the Project site from south of the rail line. This prevents direct views of light sources and reduces the potential for glare to the south of the Project. The light industrial area located along Enterprise Drive also has very limited views towards the Project site.

Within the study area, residential development is concentrated along Orchard, Ourimbah and Turpentine Roads. Many properties are set back from the road and surrounded with vegetation providing some visual screens and limited views of the Project.

It is not possible to assess the sensitivity of specific locations without an individual assessment of each site. Due to the vegetation and topography, locations only short distances apart may experience vastly different impacts. For this reason, the assessment of impact presented in this LIA has been based on selected locations which are considered to be representative of the higher impacts for the surrounding area.

The map provided in Figure 3.1 and Table 3.1 below identifies typical potential sensitive receiver locations within the vicinity of the Project and outlines the potential light impacts expected for each of these locations.

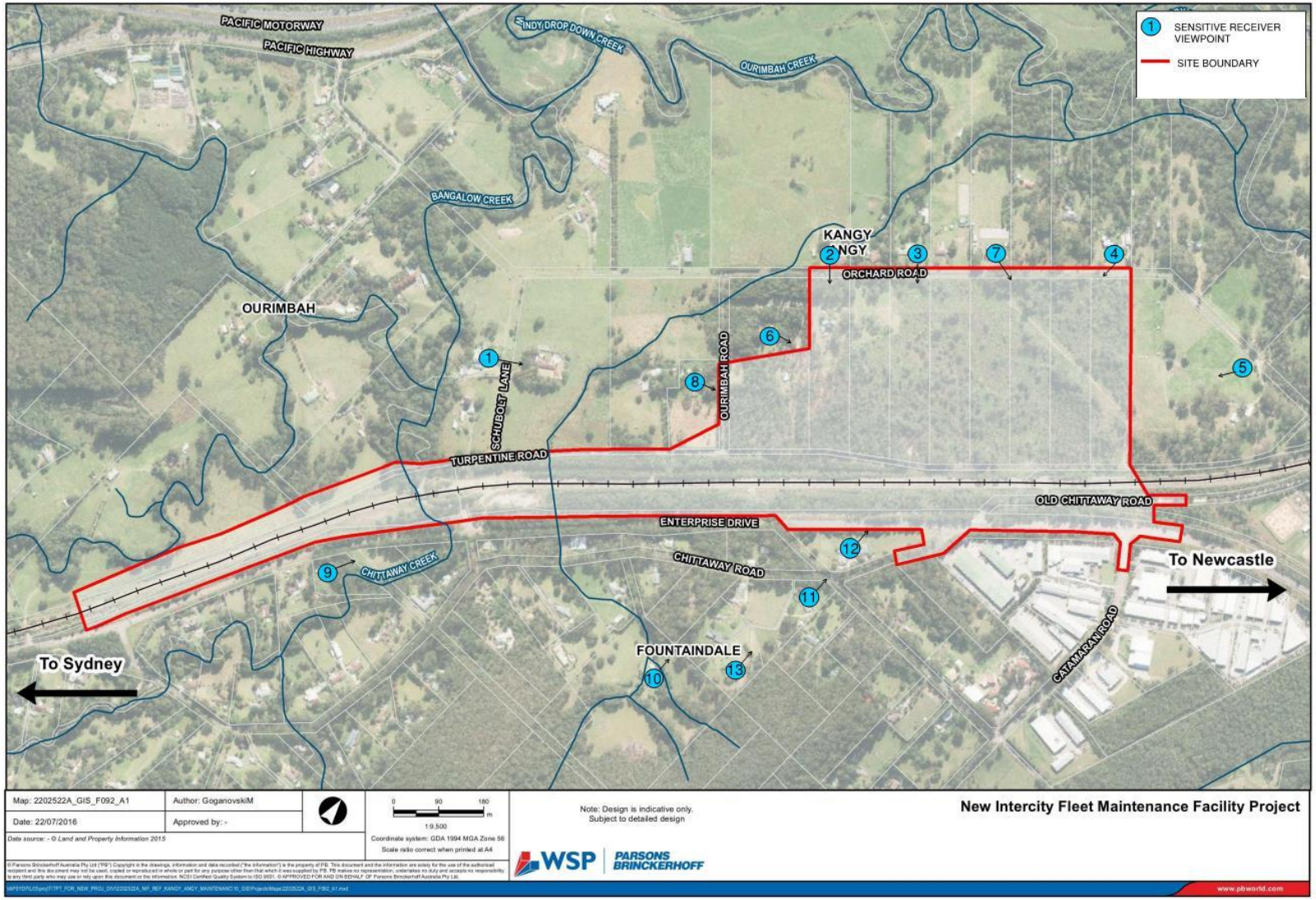


Figure 3-1 – Sensitive receiver viewpoints

Table 3.1

Map Location	Location	Description of potential lighting impacts	Light impact
1	15 Schubolt Lane 16 Schubolt Lane	Screening vegetation including trees higher than 15 metres filters views west to the Project from these properties. Despite the close proximity to the Project site, it is unlikely that lighting from the main portion of the maintenance facility will be visible from these dwellings. There may be some filtered views of lighting to the wider Project site.	*Low / Moderate*
2, 3, 4	50, 54, 72, 80, Lot 24 & 8660 Lot 20 Orchard Road	These dwellings are set back from the road with some screening vegetation within the property boundary and along the road verge. Some filtered views of lighting from the Project through gaps in the vegetation are possible to the south. Some filtered views of potential road lighting to the access bridge are likely from some of these properties.	*Moderate*
5	139Orchard Road	This dwelling is set back 60 metres from the road with screening native vegetation. It is unlikely that lighting from the Project site will be visible from these properties.	*Low / Moderate*
6	Lot 31 Orchard Road	This property is in close proximity to the Project site although dense screening vegetation may filter the majority of views of the Project. The maintenance facility and exterior light poles may be visible. The level of visual impact will depend on the quantity of vegetation removal associated with the Project.	Moderate to high
7	62 Orchard Road	This property is in close proximity to the Project site and is likely to have filtered views of lighting from the Project through vegetation. This property is also likely to have direct views of potential road lighting to the new access bridge and intermittent views of car-headlights.	High
8	Lot 121 Ourimbah Road	This property is likely to have filtered views of lighting from the Project through vegetation.	Moderate to high
9	60, 64 & 78 Old Chittaway Road	Dense screening vegetation filters views east to the Project from these properties. It is unlikely that lighting from the maintenance facility will be visible from these dwellings.	Low / Moderate
10	125 Old Chittaway Road	This dwelling is set back from Old Chittaway Road with screening vegetation within the property boundary and along Old Chittaway Road and Enterprise Drive verge. The maintenance facility and exterior light poles may be visible through the vegetation. The level of visual impact will depend on the quantity of vegetation removal associated with the Project.	*Moderate*
11	3 & 11 Station Road East	This property is in close proximity to the Project site although screening vegetation may filter the majority of views of the Project Project from these properties. It is likely that some of the maintenance facility will be visible from this dwelling. Filtered views of road lighting to the new roundabout and potential road lighting to the new access bridge are possible. However, this property is set back from the road with vegetation filters, therefore the degree of perceptible change in road lighting is assessed as low.	*Moderate to high*
12	170 Old Chittaway Road	This property is in close proximity to the Project site although screening vegetation may filter views of the Project. The maintenance facility and exterior light poles may be directly visible. Road lighting to the new roundabout and potential road lighting to the new access bridge may be visible from this property. However, this property is currently adjacent to Enterprise Drive with existing road lighting, therefore the degree of perceptible change is assessed as moderate. The level of visual impact will depend on the quantity of vegetation removal associated with the Project.	Moderate to High

13	161 Old Chittaway Road	This property has little to no vegetation filtering views of the Project site. The property is on higher ground than Project site and is likely that the main portion of the maintenance facility will be visible from this dwelling	High

As noted in Table 3.1 above, the Project site is surrounded by dense and tall tree planting that screens or blocks many views of the project lighting from residential dwellings. Some dwellings, in particular to the south of the project may have direct or filtered views of the project. The retention and enhancement of this vegetation along with a considered holistic lighting design approach is crucial in limiting lighting impacts.

4 Mitigation Strategies

4.1 Mitigation measures

The light impacts of the Project will primarily be created by the building's operational lighting, exterior and security lighting. The exterior lighting will have the potential to create a sky glow impact due to reflections from illuminated surfaces and possible direct glare at distances less than two to three kilometres. These effects may be reduced to acceptable levels by employing the following measures.

4.2 Lighting Management Plan

A lighting management plan for the project which considers the following measures would reduce potential light impacts significantly. Mitigation measures include the following:

- Ensure the lighting design is in accordance with relevant Australian Standards which provide recommended maximum values of light technical parameters for the control of obtrusive light. Ensure light spill and light pollution externally are avoided in accordance with this Standard.
- Appoint a qualified lighting designer who demonstrates a detailed understanding of lighting design and experience in the application of light within the interior architectural and exterior landscape environment.
- Restrict lighting to the minimum required for operations, safety and security requirements.
- Use directional lighting techniques to direct light away from sensitive viewpoints.
- Indirect glare from reflective surfaces must be avoided.
- Where luminaires are lighting a horizontal surface, use mounting locations of luminaires which ensure that the angle of the luminaires do not exceed 30 degrees from the vertical. Use luminaires with an asymmetric light distribution where possible.
- Where luminaires are lighting a vertical surface and the angle of adjustment justifies a greater than 45 degree position, ensure that direct views to the light source are eliminated or avoid lighting vertical surfaces.
- During construction phase, the lighting designer is to attend final commissioning of the lighting to ensure all luminaires are aimed correctly and illumination levels are set to appropriately for the application.

4.3 Project specific mitigation strategies

As noted in section 3.3, operations for the Project will be 24 hours a day and will include night time based operations and activities. Typically there would be one to two staff shift changes during hours of darkness. As such, a series of Project specific mitigation measures have been identified with the aim of minimising potential impacts to surrounding locations.

4.3.1 Carpark lighting

It is likely that the staff carpark would be accessed only occasionally between staff shift changes. The reduction of illumination levels in carparks and adjacent circulation areas would reduce light impacts from these areas significantly.

The following strategies should be implemented to minimise potential lighting impacts associated with the facility car park:

- Lower luminaire mounting heights (for example ground level or low level garden path-type lighting) should be provided along pedestrian paths within the carpark (where possible and sufficient to meet required guidelines and standards). This lighting could be supplemented with higher mounting light poles utilising motion detectors.

4.3.2 General area lighting

The following strategies should be implemented for lighting of general areas of the maintenance facility:

- For exterior areas, lower luminaire mounting heights (ground level or low level up to three to five metres) should be provided to minimise potential direct views of luminaires.
- Lighting to be applied to specific tasks, task zones and feature elements.
- Lighting controls to be separated by tasks and task zones to allow for flexible control of illuminance levels.
- Floodlighting of the maintenance facility using a smaller number of tall poles should be avoided, as this can cause obtrusive light effects.

4.3.3 When choosing lighting categories from Australian Standards, preference should be given to choosing lower light levels where appropriate and considering lighting requirements for security and CCTV coverage. This will assist in avoiding unnecessary over-design of the lighting for the maintenance facilityOther areas

The following measures would minimise light impacts:

- Shielding of the perimeter should be provided through the use of planting or structural elements to prevent direct views of lit surfaces wherever practical.
- The maintenance shed doors should remain closed when activities are occurring inside the shed at night, wherever practical
- For buildings which incorporate glazed / transparent façades, it is recommended that the internal lighting be dimmed down or designed with low glare luminaires to reduce the building luminance and direct views of the façade. Where windows are provided with automated block-out or shading devices for daylight these could be used at night to reduce spill light wherever practical.
- Lighting for illuminated signage must be localised to ensure that, as far as practical, there is no light spill into adjacent areas, must eliminate glare and be designed such that luminance is minimised.
- Avoid the use of speed bumps on access roads to site to minimise car headlight deflection above the horizontal.
- When choosing lighting categories for public road lighting for adjacent roads including the new access bridge and roundabout from AS1158, preference should be given to choosing categories with lower light levels where appropriate while considering the lighting requirements for public safety.
- Road lighting to new bridge and access road to use full cut-off luminaires to minimise glare and light spill wherever practical.
- Road lighting to adjacent street to utilise shorter poles to minimise direct views of luminaires and appropriate optics to reduce spill light
- Security CCTV cameras to utilise IR lights wherever practical.
- Lighting for security to utilise full cut-off luminaires and glare control accessories wherever practical.
- Lightng for security to be apply lower mounting heights and use appropriate optics to minimise light spill.

4.4 Luminaries and lighting equipment

Luminaires and lighting equipment for the Project should include the following to minimise light impacts:

- All external luminaires to include specifically designed optics, glare shields and accessories that minimise upward light spill and control light output to direct it where required.
- Full cut-off luminaires should be provided to minimise upward light spill above the horizontal.
- Use appropriate beam angles on luminaires to ensure lighting is focussed where required, that spill light is minimised and direct views into a light source are minimised.

- Luminaire correlated colour temperature (CCT) for all lamps to be consistent across the Project site. CCT to be between 3000K and 4500K, noting the warmer 3000K CCT tends to be less obtrusive at night.
- All external luminaires to include LED / fluorescent light sources
- Light fittings must provide 60 percent of the lamp lumen output of the fitting in the peak intensity, as defined by the fitting beam angle

In summary, the adoption of suitable best practise lighting design principles would minimise disability glare, reduce discomfort glare to acceptable levels and minimise sky glow therefore minimising the potential lighting impacts for the Project.

5 Glossary

Term	Definition
Candela	The candela is the standard unit of measurement of luminous intensity.
Colour appearance:	The colour appearance of a lamp refers to the apparent colour (chromaticity) of the light emitted. It is quantified by its correlated colour temperature (CCT). Colour appearance of daylight varies throughout the day. Colour appearance of artificial white light may be described as warm white, neutral white or cool white.
Colour rendering:	Effect of a luminaire or light source on the colour appearance of objects by conscious or subconscious comparison with their colour appearance under a reference luminaire. For design purposes, colour rendering requirements should be specified using the general colour rendering index and should take one of the following values of Ra: 20, 40, 60, 80, 90
Glare:	Glare is the sensation produced by bright areas within the field of vision and may be experienced either as discomfort glare or disability glare. When there is an excessively large contrast in the field of view the visual phenomenon of glare, will be produced. Nearly always the contrast is produced by light sources being much brighter than their background.
Horizontal illuminance:	The illuminance falling on a horizontal plane
Illuminance:	The luminous flux density at a surface in a defined plane. The SI unit of illuminance is the lux, which is equal to 1 lumen per square metre (lm / m2).
Intrusive	Impact of an object which is so discordant with its surroundings that it becomes dominant in the visual field. Lighting impacts above moderate could generally be considered intrusive.
Luminance:	The measure of brightness of a surface in a given direction. The SI unit of luminance is candela per square metre (cd / m2).
Luminaire:	An apparatus which controls the distribution of light given by a lamp or lamps and which includes all the components necessary for fixing and protecting the lamps and connecting them to the supply circuit. ‘Luminaire’ has superseded the term ‘lighting fitting’
Luminous flux:	The term used to describe the quantity of light emitted by a source, or received by a surface. The SI unit of luminous flux is the lumen (lm).
Luminous intensity:	A quantity that describes the power of a source, or an illuminated surface, to emit light in a given direction. The SI unit of luminous intensity is the candela (cd) equal to one lumen per steradian (lm/sr).
Skyglow	The direct or reflected light from the facility which lights the sky above the facility and reduces the viewers’ ability to see the night sky.
Vertical illuminance:	The illuminance falling on a vertical plane.
Visual system:	In the human, those organs and mental processes that give rise to vision. It comprises the functions of the eyes and brain.

6 References

Australian Standard, AS4282 Control of the obtrusive effects of outdoor lighting, 1997.

Guidance Notes for the Reduction of Obtrusive Light, ILE, UK.

Transport for NSW, New Intercity Fleet Maintenance Facility Architecture Concept Design Report, KFA-AECOM-BD-RP-0001, June 2016.

Transport for NSW, New Intercity Fleet Maintenance Facility Landscape Character and Visual Impact Assessment, Issue C, May 2016.

Transport for NSW, New Intercity Fleet Maintenance Facility Concept Design Report, Issue A, June 2016.

Appendix A Guidance Notes for the Reduction of Obtrusive Light

Guidelines prepared by the Institution of Lighting Engineers, UK.

The Institution of Lighting Engineers

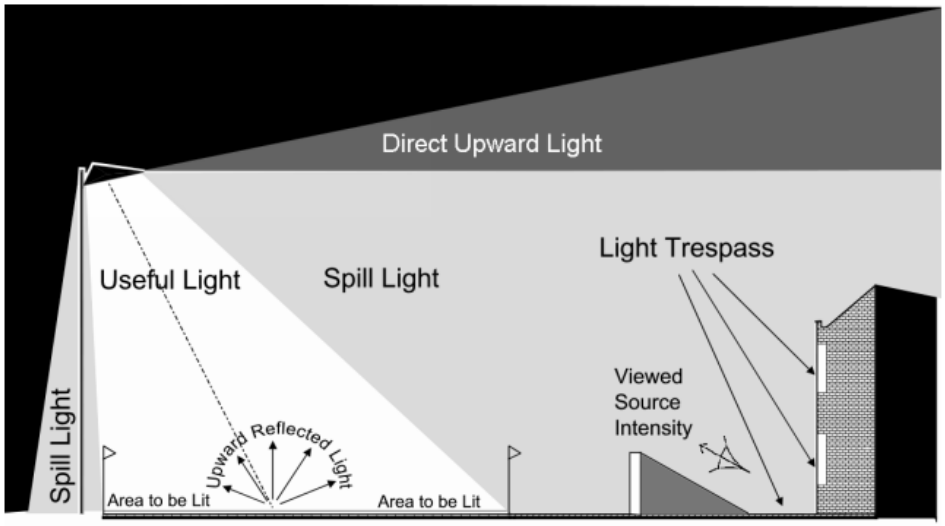
E-mail ile@ile.org.uk Website www.ile.org.uk

GUIDANCE NOTES FOR THE REDUCTION OF OBTRUSIVE LIGHT

ALL LIVING THINGS adjust their behaviour according to natural light. Man's invention of artificial light has done much to enhance our night-time environment but, if not properly controlled, **obtrusive light** (commonly referred to as light pollution) can present serious physiological and ecological problems.

Obtrusive Light, whether it keeps you awake through a bedroom window or impedes your view of the night sky, is a form of pollution and can be substantially reduced without detriment to the lighting task.

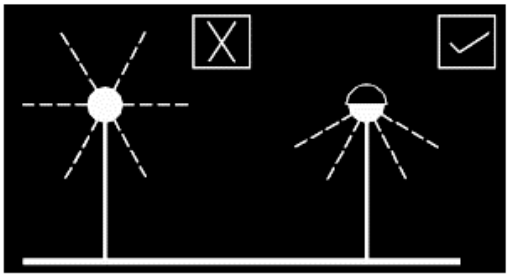
Sky glow, the brightening of the night sky above our towns, cities and countryside, **Glare** the uncomfortable brightness of a light source when viewed against a dark background, and **Light Trespass,** the spilling of light beyond the boundary of the property or area being lit, are all forms of obtrusive light which may cause nuisance to others, waste money and electricity and result in the unnecessary emissions of greenhouse gases. Think before you light. Is it necessary? What effect will it have on others? Will it cause a nuisance? How can I minimise the problem?

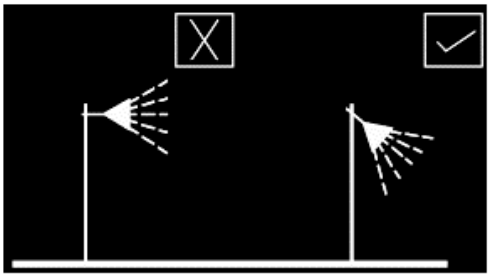


Do not "over" light. This is a major cause of obtrusive light and is a waste of energy. There are published standards for most lighting tasks, adherence to which will help minimise upward reflected light. Organisations from which full details of these standards can be obtained are given on the last page of this leaflet.

Dim or switch off lights when the task is finished. Generally a lower level of lighting will suffice to enhance the night time scene than that required for safety and security.

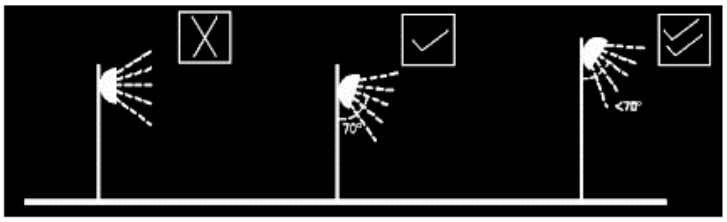
1





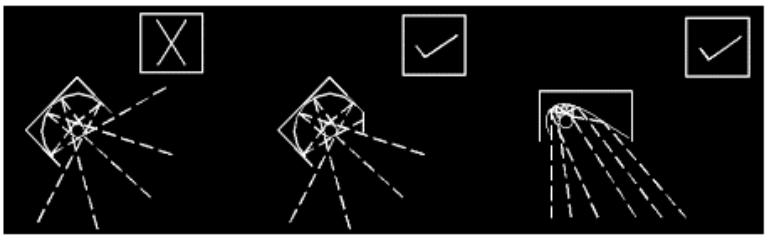
Use specifically designed lighting equipment that minimises the upward spread of light near to and above the horizontal. Care should be taken when selecting luminaires to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum. Remember that lamp light output in LUMENS is not the same as lamp wattage and that it is the former that is important in combating the problems of obtrusive light

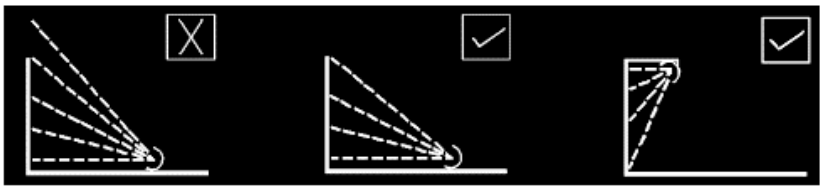
Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. In areas with low ambient lighting levels, glare can be very obtrusive and extra care should be taken when positioning and aiming lighting equipment. With regard to domestic security lighting the ILE produces an information leaflet GN02 that is freely available from its web site.



The UK Government will be providing an annex to PPS23 Planning and Pollution Control, specifically on obtrusive light. However many Local Planning Authorities (LPA's) have already produced, or are producing, policies that within the new planning system will become part of the local development framework. For new developments there is an opportunity for LPA's to impose planning conditions related to external lighting, including curfew hours.

For sports lighting installations (see also design standards listed on Page 4) the use of luminaires with double-asymmetric beams designed so that the front glazing is kept at or near parallel to the surface being lit should, if correctly aimed, ensure minimum obtrusive light. In most cases it will also be beneficial to use as high a mounting height as possible, giving due regard to the daytime appearance of the installation. The requirements to control glare for the safety of road users are given in Table 2.





When lighting vertical structures such as advertising signs direct light downwards, wherever possible. If there is no alternative to up-lighting, as with much decorative lighting of buildings, then the use of shields, baffles and louvres will help reduce spill light around and over the structure to a minimum.

For road and amenity lighting installations, (see also design standards listed on Page 4) light near to and above the horizontal should normally be minimised to reduce glare and sky glow (Note ULRs in Table 1). In sensitive rural areas the use of full horizontal cut off luminaires installed at 0° uplift will, in addition to reducing sky glow, also help to minimise visual intrusion within the open landscape. However in many urban locations, luminaires fitted with a more decorative bowl and good optical control of light should be acceptable and may be more appropriate.

ENVIRONMENTAL ZONES:

It is recommended that Local Planning Authorities specify the following environmental zones for exterior lighting control within their Development Plans.

Category	Examples	
E1:	Intrinsically dark landscapes	National Parks, Areas of Outstanding Natural Beauty, etc
E2:	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3:	Medium district brightness areas	Small town centres or urban locations
E4:	High district brightness areas	Town/city centres with high levels of night-time activity

Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

DESIGN GUIDANCE

The following limitations may be supplemented or replaced by a LPA's own planning guidance for exterior lighting installations. As lighting design is not as simple as it may seem, you are advised to consult and/or work with a professional lighting designer before installing any exterior lighting.

Table 1 – Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Sky Glow ULR [Max %] [1]	Light Trespass (into Windows) Ev [Lux] [2]		Source Intensity I [kcd] [3]		Building Luminance Pre-curfew [4]
		Pre- curfew	Post- curfew	Pre- curfew	Post- curfew	Average, L [cd/m2]
E1	0	2	1*	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

ULR = **Upward Light Ratio of the Installation** is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.

Ev = **Vertical Illuminance in Lux** and is measured flat on the glazing at the centre of the window

I = **Light Intensity in Cd**

L = **Luminance in Cd/m2**

Curfew = **The time after which stricter requirements (for the control of obtrusive light) will apply**; often a condition of use of lighting applied by the local planning authority. If not otherwise stated - 23.00hrs is suggested.

* = From Public road lighting installations only

(1) **Upward Light Ratio** – Some lighting schemes will require the deliberate and careful use of upward light – e.g. ground recessed luminaires, ground mounted floodlights, festive lighting – to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.

(2) **Light Trespass (into Windows)** – These values are suggested maxima and need to take account of existing light trespass at the point of measurement. In the case of road lighting on public highways where building facades are adjacent to the lit highway, these levels may not be obtainable. In such cases where a specific complaint has been received, the Highway Authority should endeavour to reduce the light trespass into the window down to the after curfew value by fitting a shield, replacing the luminaire, or by varying the lighting level.

(3) **Source Intensity** – This applies to each source in the potentially obtrusive direction, outside of the area being lit. The figures given are for general guidance only and for some sports lighting applications with limited mounting heights, may be difficult to achieve.

(4) **Building Luminance** – This should be limited to avoid over lighting, and related to the general district brightness. In this reference building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area.

Table 2 – Maximum Values of Threshold Increment from Non-Road Lighting Installations				
Light Technical Parameter TI	Road Classification [5]			
	No road lighting	ME5	ME4/ ME3	ME2 / ME1
	15% based on adaptation luminance of 0.1cd/m^2	15% based on adaptation luminance of 1cd/m^2	15% based on adaptation luminance of 2 cd/m^2	15% based on adaptation luminance of 5 cd/m^2

TI = **Threshold Increment** is a measure of the loss of visibility caused by the disability glare from the obtrusive light installation

(5) **Road Classifications** as given in BS EN 13201 - 2: 2003 Road lighting Performance requirements
Limits apply where users of transport systems are subject to a reduction in the ability to see essential information. Values given are for relevant positions and for viewing directions in path of travel. See CIE Publication 150:2003, Section 5.4 for methods of determination. For a more detailed description and methods for calculating and measuring the above parameters see CIE Publication 150:2003.

RELEVANT PUBLICATIONS AND STANDARDS:

British Standards: www.bsi.org.uk	BS 5489-1: 2003 Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas BS EN 13201-2:2003 Road lighting – Part 2: Performance requirements BS EN 13201-3:2003 Road lighting – Part 3: Calculation of performance BS EN 13201-4:2003 Road lighting – Part 4: Methods of measuring lighting performance. BS EN 12193: 2003 Light and lighting – Sports lighting	
Countryside Commission/DOE www.odpm.gov.uk	Lighting in the Countryside: Towards good practice (1997) *(Out of Print)*	
CIBSE/SLL Publications: www.cibse.org	CoL	Code for Lighting (2002)
	LG1	The Industrial Environment (1989)
	LG4	Sports (1990+Addendum 2000)
	LG6	The Exterior Environment (1992)
	FF7	Environmental Considerations for Exterior Lighting (2003)
CIE Publications: www.cie.co.at	01	Guide lines for minimizing Urban Sky Glow near Astronomical Observatories (1980)
	83	Guide for the lighting of sports events for colour television and film systems (1989)
	92	Guide for floodlighting (1992)
	115	Recommendations for the lighting of roads for motor and pedestrian traffic (1995)
	126	Guidelines for minimizing Sky glow (1997)
	129	Guide for lighting exterior work areas (1998)
	136	Guide to the lighting of urban areas (2000)
	150	Guide on the limitations of the effect of obtrusive light from outdoor lighting installations (2003)
	154	The Maintenance of outdoor lighting systems (2003)
Department of Transport www.defra.gov.uk		Road Lighting and the Environment (1993) (Out of Print)
ILE Publications: www.ile.org	TR 5	Brightness of Illuminated Advertisements (2001)
	TR24	A Practical Guide to the Development of a Public Lighting Policy for Local Authorities (1999)
	GN02	Domestic Security Lighting, Friend or Foe
ILE/CIBSE Joint Publications		Lighting the Environment - A guide to good urban lighting (1995)
ILE/CSS Joint Publications		Seasonal Decorations – Code of Practice (2005)
Campaign for Dark Skies (CfDS) www.dark-skies.org		

NB: These notes are intended as guidance only and the application of the values given in Tables 1 & 2 should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting, where the various and maybe conflicting visual requirements need to be balanced.

Appendix B Sensitive receivers

Address	Receiver type
2 Catamaran Road, Fountaindale	Residential
3 Bridge Street, Ourimbah	Residential
11 Bridge Street, Ourimbah	Residential
15 Bridge Street, Ourimbah	Residential
24 Bridge Street, Ourimbah	Residential
36 Bridge Street, Ourimbah	Residential
43 Bridge Street, Ourimbah	Residential
57 Bridge Street, Ourimbah	Residential
67 Pacific Highway, Kangy Angy	Residential
68 Pacific Highway, Kangy Angy	Residential
79 Pacific Highway, Kangy Angy	Residential
120 Berkeley Road, Fountaindale	Residential
56 Bridge Street, Ourimbah	Residential
52 Howes Road, Ourimbah	Residential
2 Orchard Road, Kangy Angy	Residential
8 Orchard Road, Kangy Angy	Residential
50 Orchard Road, Kangy Angy	Residential
54 Orchard Road, Kangy Angy	Residential
62 Orchard Road, Kangy Angy	Residential
72 Orchard Road, Kangy Angy	Residential
80 Orchard Road, Kangy Angy	Residential
84 Orchard Road, Kangy Angy	Residential
92 Orchard Road, Kangy Angy	Residential
106 Orchard Road, Kangy Angy	Residential
12 Ourimbah Road, Kangy Angy	Residential
19 Ourimbah Road, Kangy Angy	Residential
15 Schubolt Lane, Kangy Angy	Residential
15 Schubolt Lane, Kangy Angy	Residential
16 Schubolt Lane, Kangy Angy	Residential
16 Turpentine Road, Kangy Angy	Residential
26 Turpentine Road, Kangy Angy	Residential
26 Turpentine Road, Kangy Angy	Residential
137 Enterprise Drive, Ourimbah	Residential
11 Enterprise Drive, Fountaindale	Residential
21 Enterprise Drive, Fountaindale	Residential
14 Enterprise Drive, Fountaindale	Residential
16 Enterprise Drive, Fountaindale	Residential
28 Lillygrove Lane, Fountaindale	Residential
32 Lillygrove Lane, Fountaindale	Residential
36 Lillygrove Lane, Fountaindale	Residential
48 Lillygrove Lane, Fountaindale	Residential
6 Lorikeet Lane, Fountaindale	Residential
9 Lorikeet Lane, Fountaindale	Residential
12 Lorikeet Lane, Fountaindale	Residential
11 Manns Road, Fountaindale	Residential
22 Manns Road, Fountaindale	Residential
23 Manns Road, Fountaindale	Residential
39 Manns Road, Fountaindale	Residential
130 Old Chittaway Road, Fountaindale	Residential
86 Old Chittaway Road, Fountaindale	Residential
89 Old Chittaway Road, Fountaindale	Residential
96 Old Chittaway Road, Fountaindale	Residential

Address	Receiver type
96 Old Chittaway Road, Fountaindale	Residential
103 Old Chittaway Road, Fountaindale	Residential
105 Old Chittaway Road, Fountaindale	Residential
107 Old Chittaway Road, Fountaindale	Residential
121 Old Chittaway Road, Fountaindale	Residential
125 Old Chittaway Road, Fountaindale	Residential
127 Old Chittaway Road, Fountaindale	Residential
141 Old Chittaway Road, Fountaindale	Residential
149 Old Chittaway Road, Fountaindale	Residential
150 Old Chittaway Road, Fountaindale	Residential
157 Old Chittaway Road, Fountaindale	Residential
161 Old Chittaway Road, Fountaindale	Residential
165 Old Chittaway Road, Fountaindale	Residential
170 Old Chittaway Road, Fountaindale	Residential
32 Old Chittaway Road, Fountaindale	Residential
46 Old Chittaway Road, Fountaindale	Residential
58 Old Chittaway Road, Fountaindale	Residential
60 Old Chittaway Road, Fountaindale	Residential
64 Old Chittaway Road, Fountaindale	Residential
78 Old Chittaway Road, Fountaindale	Residential
33 Station Road, East Fountaindale	Residential
3 Station Road, Fountaindale	Residential
7 Station Road, Fountaindale	Residential
16 Station Road, Fountaindale	Residential
23 Station Road, Fountaindale	Residential
27 Station Road, Fountaindale	Residential
35 Station Road, Fountaindale	Residential
11 Station Road, East Fountaindale	Residential
139 Orchard Road, Kangy Angy	Residential
98 Old Chittaway Road, Fountaindale	Child care centre
3A Catamaran Road, Fountaindale	Commercial
1 Catamaran Road, Fountaindale	Commercial
2 Ketch Close, Fountaindale	Commercial
3 Catamaran Road, Fountaindale	Commercial
4 Catamaran Road, Fountaindale	Commercial
5 Catamaran Road, Fountaindale	Commercial
6 Catamaran Road, Fountaindale	Commercial
8 Catamaran Road, Fountaindale	Commercial
9 Catamaran Road, Fountaindale	Commercial
11 Catamaran Road, Fountaindale	Commercial
13 Catamaran Road, Fountaindale	Commercial
15 Catamaran Road, Fountaindale	Commercial
17 Catamaran Road, Fountaindale	Commercial
1 Co-wyn Close, Fountaindale	Commercial
2 Bridge Street, Ourimbah	Commercial
4 Ketch Close, Fountaindale	Commercial
5 Ketch Close, Fountaindale	Commercial
7 Ketch Close, Fountaindale	Commercial
8 Ketch Close, Fountaindale	Commercial
9 Ketch Close, Fountaindale	Commercial
10 Ketch Close, Fountaindale	Commercial
11 Ketch Close, Fountaindale	Commercial
13 Ketch Close, Fountaindale	Commercial
14 Ketch Close, Fountaindale	Commercial
15 Ketch Close, Fountaindale	Commercial
Sanitarium Factory	Commercial

Address	Receiver type
10 Catamaran Road, Fountaindale	School

www.WSPGroup.com

Appendix F

ACCESS ROAD IMPACT PILING CONSTRUCTION NOISE ASSESSMENT

WSP Buildings (Pty) Ltd
ABN 47 005 113 468

Level 1, 41 McLaren Street
North Sydney
New South Wales 2060
Australia

Tel: (02) 8907 0900
Fax: (02) 99574127

acoustics@wspgroup.com.au
wspgroup.com

Memo - Acoustics

To	**Transport for NSW**	Memo No.	**AC001**
Attention	**Tanya Coates**	Date	**19/07/2016**
From	**Chris Marsh**	Project No.	**ACG1522100**
Project	**NIF – Maintenance Facility**	No. of pages	**7**
Subject	**Additional Impact Piling Construction Assessment**		

1.0 Introduction

Further to the WSP | Parsons Brinckerhoff Noise and Vibration Impact Assessment of the New Intercity Fleet (NIF) – Maintenance Facility dated 16 May 2016 (NIF Report). A change has been made to the construction methodology replacing bored piling with impact piling during the access road bridge construction.

It is proposed to drive 500 x 500 mm piles to construct the access road bridge due to soil and ground conditions.

The driven piles would be required to be undertaken during both standard hours and outside of standard hours during scheduled rail possession to complete piling work within the rail corridor.

Scheduled possession typically occur over a weekend during the day and night in order to minimise disruption to weekday passenger services.

Piling is proposed to be commenced in March/April 2017 and will take 4-5 weeks to complete. It is estimated that 4-5 piles will be driven per day.

This memo has assessed the additional noise and vibration impacts from undertaking impact piling.

2.0 Methodology

The sensitive receivers and construction noise management levels are consistent with Sections 3 and 5 of the NIF Report.

The methodology for the noise prediction is consistent with that outlined in Section 8 of the NIF Report.

Table 1 presents the updated scenario, equipment and sound power levels for bridge construction scenario including impact piling.

Table 1 - Modelled scenario for access road bridge construction with impact piling

Item	SWL dBA	Usage factor
Impact piling rig[1]	124	1
Sheet piling rig	116	1
Cranes (mobile)	104	1
FEL	110	0.75
Concrete truck	105	0.5
Pumps	103	1
Excavators	107	0.75
Compressors	101	1
Shotcrete gun	106	1
Grader	110	0.75
Vibratory roller	108	0.75
Semi-trailer	102	1
Scenario sound power level	**125**	

Note 1: A +5 dB correction has been added to the sound power level of impact piling to account for its "annoying" characteristics.

Table 2 and Table 3 present the noise levels predicted during standard hours and outside of standard hours in addition to the applicable construction noise management level (NML) at the representative receivers presented in the NIF Report.

Table 4 presents the predicted maximum noise levels from construction activities for assessment of the potential for sleep disturbance during the night period.

A noise contour map of the predicted maximum extent noise levels is presented in Appendix A.

Activities undertaken outside of standard hours have been referred to as out of hours work (OOHW).

Table 2 - Predicted construction noise levels standard hours at representative residential receivers

Receiver	Standard hours[1] NML	Predicted noise level[2]
	$L_{eq,\ 15min}$ dBA	$L_{eq,\ 15min}$ dBA
12 Ourimbah Road	54	**55**
19 Ourimbah Road	54	**57**
15 Schubolt Lane	54	52
16 Turpentine Road	54	48
26 Turpentine Road	54	50
50 Orchard Road	54	**60**
53 Orchard Road	54	**60**
54 Orchard Road	54	**62**
62 Orchard Road	54	**63**
72 Orchard Road	54	**65**
80 Orchard Road	54	**67**
127 Old Chittaway Road	59	54
130 Old Chittaway Road	59	55
141 Old Chittaway Road	59	55
149 Old Chittaway Road	59	57
150 Old Chittaway Road	59	57
157 Old Chittaway Road	59	49
161 Old Chittaway Road	59	57
165 Old Chittaway Road	59	59
170 Old Chittaway Road	59	**63**
3 Station Road East	59	58
7 Station Road East	59	59
16 Station Road East	59	**63**
98 Old Chittaway Road (child care centre)	45	**52**
10 Catamaran Street (Rudolf Steiner School)	45	**61**

Note 1: Standard hours are defined as 7am to 6pm Monday to Friday and 8am to 1pm Saturday.
Note 2: Exceedances of the 'noise affected' noise management level are highlighted in grey with bold text.

Table 3 - Predicted construction noise levels outside of standard hours at representative residential receivers

Receiver	NML Day (OOHW)	NML Evening	NML Night	Predicted noise level
	$L_{eq,\ 15min}$ dBA	$L_{eq,\ 15min}$ dBA	$L_{eq,\ 15min}$ dBA	$L_{eq,\ 15min}$ dBA
12 Ourimbah Road	49	45	40	**55**
19 Ourimbah Road	49	45	40	**57**
15 Schubolt Lane	49	45	40	**52**
16 Turpentine Road	49	45	40	*48*
26 Turpentine Road	49	45	40	**50**
50 Orchard Road	49	45	40	**60**
53 Orchard Road	49	45	40	**60**
54 Orchard Road	49	45	40	**62**
62 Orchard Road	49	45	40	**63**
72 Orchard Road	49	45	40	**65**
80 Orchard Road	49	45	40	**67**
127 Old Chittaway Road	54	49	40	*54*
130 Old Chittaway Road	54	49	40	**55**
141 Old Chittaway Road	54	49	40	**55**
149 Old Chittaway Road	54	49	40	**57**
150 Old Chittaway Road	54	49	40	**57**
157 Old Chittaway Road	54	49	40	49
161 Old Chittaway Road	54	49	40	**57**
165 Old Chittaway Road	54	49	40	**59**
170 Old Chittaway Road	54	49	40	**63**
3 Station Road East	54	49	40	**58**
7 Station Road East	54	49	40	**59**
16 Station Road East	54	49	40	**63**

Note: Exceedances of the OOHW 'noise affected' management level for day, evening and night time periods are highlighted in grey with bold text.
Exceedances of the OOHW 'noise affected' management level for evening and night time periods are highlighted in blue in italic text.
Exceedances of the OOHW 'noise affected' management level for night time periods are highlighted in green and underlined.

Noise from intermittent high level noise events has the potential to cause sleep disturbance at the nearest residential receivers if conducted during the night time hours. These events were assessed assuming the L_{max} is approximately 5 dBA higher than the total sound power level of the scenario that takes place during the night period (not including the +5 dB correction on the impact piling). Table 4 presents the predicted L_{max} noise levels with the screening criteria, based on guidance for assessing the potential for sleep disturbance as presented in Section 5 of the NIF Report.

Table 4 - Predicted construction maximum noise levels during the night period at representative residential receivers.

Receiver	Screening criteria L_{max} dBA	Predicted maximum noise level L_{max} dBA
50 Orchard Road	65	62
53 Orchard Road	65	62
54 Orchard Road	65	64
62 Orchard Road	65	65
72 Orchard Road	65	**67**
80 Orchard Road	65	**69**
12 Ourimbah Road	65	57
19 Ourimbah Road	65	59
15 Schubolt Lane	65	54
16 Turpentine Road	65	50
26 Turpentine Road	65	52
127 Old Chittaway Road	65	56
130 Old Chittaway Road	65	57
141 Old Chittaway Road	65	57
149 Old Chittaway Road	65	59
150 Old Chittaway Road	65	59
157 Old Chittaway Road	65	51
161 Old Chittaway Road	65	59
165 Old Chittaway Road	65	61
170 Old Chittaway Road	65	**66**
3 Station Road East	65	61
7 Station Road East	65	61
16 Station Road East	65	**66**

Note 1: Exceedances of the screening criteria are highlighted in grey with bold text.

The predicted construction noise levels at the sensitive receivers indicate that:

- No receivers identified for this assessment exceed the 'highly noise affected' NML during standard hours.
- Residential properties on Orchard Road, Old Chittaway Road and Station Road East are predicted to exceed the 'noise affected' NML when works are conducted during the standard hours.
- Residential properties on Turpentine Road, Schubolt Lane, Ourimbah Road, Orchard Road, Old Chittaway Road and Station Road East are predicted to exceed the NML for all of the out of hours works periods.
- Some residential properties on Turpentine Road, Old Chittaway Road and Station Road are predicted to only exceed the NML for both the evening and night time out of hours works periods.
- The predicted construction noise levels at the child care centre on Old Chittaway Road are predicted to exceed the NML for works conducted during standard hours.
- Noise levels at the Central Coast Rudolf Steiner School during construction are predicted to exceed the NML for works conducted during standard hours.

- The closest residential properties at Orchard Road, Station Road East and Old Chittaway Road are predicted to exceed the sleep disturbance criteria.
- A review of the noise contour map indicates that noise levels at the industrial land use area during construction were predicted to exceed the NML at 2 Catamaran Road during standard construction hours.

As a result of the majority of receivers predicted to experience noise levels in excess of the noise management levels, it is recommended that a noise and vibration management plan as outlined in Section 10 of the NIF Report that includes specific measures to manage noise from impact piling is developed.

3.0 Vibration assessment

The most dominant construction vibration sources are impact and sheet piling rigs which have the potential to result in vibration impacts on nearby sensitive receivers, if appropriate mitigation measures are not implemented.

Table 3 of the CNS provides the safe working distance for dominant vibration generating equipment.

All identified sensitive receivers are located at least 75 metres or greater from the track laying and earthworks areas. The nearest commercial receiver to the proposed bridge site is approximately 100 metres and the nearest residential receiver is over 300 metres away.

Table 5 presents indicative safe working distances for impact and sheet piling activities.
The distances are based on meeting the five millimetres per second limit for cosmetic damage from the German Standard DIN4150-3 which is considered to be a conservative limit.

Where work is required within these distances, site-specific safe working distances should be developed on-site through vibration monitoring prior to the works commencing.

Table 5 Indicative vibration levels

Item	Typical PPV (mm/s)[1]	Data source	Indicative safe working distance for cosmetic damage[2] (metres)	Indicative safe working distance for human comfort[3] (metres)
Impact piles	16.5 at 7.6 m	Calculated based on the CNS safe working distances for cosmetic damage	40	50
Sheet piles	31 at 15 m	Calculated based on the CNS safe working distances for cosmetic damage	50	20

Note 1: Vibration levels are indicative only and may vary on site and are dependent on individual equipment, mode of operation and ground conditions.
Note 2: Indicative distance required to meet the DIN 4150-3, 5 mm/s limit.
Note 3: Taken from the CNS Table 3.

The vibration levels and associated safe working distances presented in Table 5 indicate that cosmetic damage is not considered to be a significant risk from to the proposed construction at the nearest sensitive receivers.

Vibration may be perceptible at the nearest houses, however it is unlikely to be a significant risk for the majority of receivers.

4.0 Noise management and mitigation measures

Consistent with the NIF Report, it is recommended that the impact piling activities are considered as part of the construction noise and vibration management plan (CNVMP). The CNVMP should provide specific measures to reduce the impacts from impact piling activities. These measures could include, but are not limited to, the following:

- Using a wood block or other damper for the driving hammer
- Selecting machines which minimise auxiliary noise sources.
- Shielding the impact area with a sleeve.
- Providing respite periods from impact piling.
- Carrying out intensive piling works before 10pm and after 7am on weekends.
- Consulting with the community to identify periods when they are less sensitive to impact piling works and working with these timings e.g. school examination periods or community events.

5.0 Application of additional mitigation measures

Section 10.1 of the NIF Report outlines the requirements of the Transport for NSW Construction Noise Strategy additional mitigation measures. This assessment indicates that the predicted noise levels exceed the noticeable, clearly audible and in some cases moderately and highly intrusive noise levels.

Therefore additional mitigation measures will be required to affected receivers including letterbox drops, noise monitoring, individual briefings, phone calls and specific notifications.

Where noise levels are identified as being highly intrusive (more than 30 dBA above the background level during the night period (10am to 7am)), an offer of alternative accommodation should be considered for these receivers.

Specific additional mitigation measures would be identified for affected receivers at the CNVMP stage of the project.

Appendix G

OPERATIONAL NOISE RESULTS TABLE REVISION

WSP Buildings (Pty) Ltd
ABN 47 005 113 468

Level 1, 41 McLaren Street
North Sydney
New South Wales 2060
Australia

Tel: (02) 8907 0900
Fax: (02) 99574127

acoustics@wspgroup.com.au
wspgroup.com

Memo - Acoustics

To	**Jarryd Barton**	Memo No.	**AC003**
Attention		Date	**03/08/2016**
From	**Chris Marsh**	Project No.	**ACG1522100**
Project	**NIF – Maintenance Facility**	No. of pages	**5 (including attachments)**
Subject	**Operational noise results table revision**		

This memo provides a revised operational noise results table from the table presented in Appendix C of the WSP | Parsons Brinckerhoff noise assessment report for the REF, New Intercity Maintenance Facility Noise and Vibration Assessment (ACG1512210 Dated 16/05/2016).

The operational noise levels table presented in the Appendix C of the report did not show the results for scenario 8. The table is a replication of the table included in the REF with Scenario 8.

The revised results table is attached to this memo. All results are presented as $L_{eq(15min)}$ dBA noise levels.

NIF maitenance facility operational noise results

Receiver	Criteria			1			2			3			4			5			6			7			8			9			10		
	D	E	N	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W
2 Bridge Street, Ourimbah	50	45	40	21	25	26	20	24	24	<20	22	23	<20	22	23	22	26	27	<20	<20	<20	<20	23	24	<20	<20	<20	<20	<20	<20	<20	<20	<20
3 Bridge Street, Ourimbah	50	45	40	20	24	25	<20	23	23	<20	21	22	<20	21	22	20	25	25	<20	<20	<20	<20	22	23	<20	<20	<20	<20	<20	<20	<20	<20	<20
11 Bridge Street, Ourimbah	50	45	40	21	25	26	<20	23	24	<20	21	22	<20	22	23	21	25	26	<20	<20	<20	<20	23	23	<20	<20	<20	<20	<20	<20	<20	<20	<20
15 Bridge Street, Ourimbah	50	45	40	23	26	27	21	25	26	<20	23	23	<20	23	24	23	27	28	<20	<20	<20	20	24	25	<20	<20	<20	<20	<20	<20	<20	<20	<20
24 Bridge Street, Ourimbah	50	45	40	23	27	28	22	26	26	20	24	25	21	25	25	24	28	29	<20	<20	<20	21	25	26	<20	<20	<20	<20	<20	20	<20	<20	<20
36 Bridge Street, Ourimbah	50	45	40	25	28	29	23	27	27	21	24	25	20	24	25	23	27	28	<20	<20	<20	21	25	25	<20	<20	<20	<20	<20	<20	<20	<20	<20
43 Bridge Street, Ourimbah	50	45	40	24	28	29	22	26	27	<20	23	24	<20	23	24	22	26	27	<20	<20	<20	<20	24	24	<20	<20	<20	<20	<20	<20	<20	<20	<20
57 Bridge Street, Ourimbah	50	45	40	27	31	31	24	28	29	<20	22	23	<20	23	23	21	25	26	<20	<20	<20	<20	23	24	<20	<20	<20	<20	<20	<20	<20	<20	<20
67 Pacific Highway, Kangy Angy	50	45	40	21	25	25	20	24	24	<20	22	23	<20	23	23	23	27	28	<20	<20	<20	21	25	25	<20	<20	<20	<20	20	21	<20	<20	<20
68 Pacific Highway, Kangy Angy	50	45	40	20	24	25	20	24	24	<20	22	23	<20	23	23	23	27	28	<20	<20	<20	20	24	25	<20	<20	<20	<20	<20	20	<20	<20	<20
79 Pacific Highway, Kangy Angy	50	45	40	22	26	27	22	26	26	21	25	26	22	26	26	26	30	31	<20	20	21	24	28	28	<20	21	22	<20	23	24	<20	<20	<20
56 Bridge Street, Ourimbah	49	42	40	34	36	37	30	33	34	<20	21	22	21	25	25	20	24	25	<20	<20	<20	<20	22	23	<20	<20	20	<20	<20	<20	<20	<20	<20
52 Howes Road, Ourimbah	49	42	40	26	30	31	23	27	28	<20	<20	<20	<20	21	21	<20	22	23	<20	<20	<20	<20	20	20	<20	21	21	<20	<20	<20	<20	<20	<20
2 Orchard Road, Kangy Angy	49	42	40	27	30	31	26	29	30	26	29	30	26	29	30	29	32	33	<20	21	22	27	30	31	<20	22	23	20	23	24	<20	<20	<20
8 Orchard Road, Kangy Angy	49	42	40	24	28	28	23	27	28	22	26	27	23	26	27	26	30	31	<20	<20	20	24	27	28	<20	20	21	<20	22	22	<20	<20	<20
50 Orchard Road, Kangy Angy	49	42	40	33	35	36	33	35	36	32	34	35	33	35	36	38	**41**	**42**	29	30	30	36	38	39	29	30	31	31	33	34	<20	<20	<20
54 Orchard Road, Kangy Angy	49	42	40	32	34	34	32	34	34	32	33	34	32	34	34	38	40	**41**	29	30	30	35	38	38	30	31	31	32	34	35	<20	<20	<20
62 Orchard Road, Kangy Angy	49	42	40	32	33	34	32	34	34	31	33	34	32	34	34	37	40	40	29	30	30	35	37	38	29	30	31	32	34	35	<20	<20	<20
72 Orchard Road, Kangy Angy	49	42	40	31	33	33	31	33	33	31	32	33	31	33	33	35	38	38	30	30	30	33	35	36	30	31	31	33	35	36	<20	<20	<20
80 Orchard Road, Kangy Angy	49	42	40	30	32	32	30	32	32	30	31	32	30	32	32	34	36	37	29	29	29	32	34	35	29	30	30	31	33	34	<20	<20	<20
84 Orchard Road, Kangy Angy	49	42	40	27	29	30	27	29	30	27	29	30	27	29	30	31	34	35	25	27	27	29	32	33	26	27	28	27	30	30	<20	<20	<20
92 Orchard Road, Kangy Angy	49	42	40	27	29	29	27	29	29	26	28	29	27	29	29	30	33	33	25	26	27	28	30	31	25	27	27	27	29	30	<20	<20	<20
106 Orchard Road, Kangy Angy	49	42	40	28	30	30	28	30	30	27	29	30	28	30	30	30	33	34	26	27	28	29	31	32	26	28	29	28	30	31	<20	<20	<20
12 Ourimbah Road, Kangy Angy	49	42	40	40	**41**	**42**	**41**	**42**	**42**	40	**42**	**42**	**41**	**42**	**42**	**42**	*44*	*44*	27	28	29	39	**41**	**42**	28	30	31	28	30	31	29	30	31
19 Ourimbah Road, Kangy Angy	49	42	40	38	39	40	38	39	40	38	39	40	38	39	40	*45*	*46*	*46*	29	30	30	**42**	*43*	*44*	30	31	31	31	32	33	22	23	25
15 Schubolt Lane, Kangy Angy	49	42	40	35	37	38	32	35	36	31	33	34	29	32	33	31	34	35	20	22	23	28	31	32	28	32	33	21	24	24	20	22	23
15 Schubolt Lane, Kangy Angy	49	42	40	34	36	37	33	35	36	32	34	35	31	33	34	32	35	36	21	23	24	30	33	34	22	25	25	22	25	25	21	23	24
16 Schubolt Lane, Kangy Angy	49	42	40	33	35	36	30	33	34	29	32	32	28	31	32	30	33	34	<20	21	22	27	30	31	26	31	31	20	23	23	<20	20	21
16 Turpentine Road, Kangy Angy	49	42	40	37	38	39	31	34	35	23	26	27	24	27	28	25	29	29	<20	<20	20	22	26	27	23	27	28	<20	<20	20	<20	<20	<20
26 Turpentine Road, Kangy Angy	49	42	40	39	40	40	34	37	37	30	33	33	29	32	33	30	34	34	20	22	23	27	31	32	24	28	28	20	24	24	<20	20	21
26 Turpentine Road, Kangy Angy	49	42	40	*42*	*42*	*43*	35	37	38	28	31	31	27	30	31	28	32	32	<20	20	21	25	29	30	26	30	31	<20	22	22	<20	<20	20
137 Enterprise Drive, Ourimbah	54	40	38	31	34	34	28	32	32	<20	21	22	<20	23	24	20	25	25	<20	<20	<20	<20	22	23	<20	23	24	<20	<20	<20	<20	<20	<20

NIF maitenance facility operational noise results

Receiver	Criteria			1			2			3			4			5			6			7			8			9			10		
	D	E	N	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W
11 Enterprise Drive, Fountaindale	54	40	38	**40**	*41*	*42*	37	**39**	39	21	25	25	22	26	27	23	27	28	<20	<20	<20	20	24	25	21	26	26	<20	<20	<20	<20	<20	<20
21 Enterprise Drive, Fountaindale	54	40	38	38	**39**	**40**	36	37	38	<20	21	22	<20	23	24	20	24	25	<20	<20	<20	<20	21	22	<20	23	23	<20	<20	<20	<20	<20	<20
14 Enterprise Drive, Fountaindale	54	40	38	**40**	*41*	*42*	37	**39**	39	20	23	24	21	25	26	22	26	27	<20	<20	<20	<20	23	24	20	25	25	<20	<20	<20	<20	<20	<20
16 Enterprise Drive, Fountaindale	54	40	38	38	**40**	*41*	36	38	38	<20	23	24	20	24	25	21	25	26	<20	<20	<20	<20	23	24	20	24	25	<20	<20	<20	<20	<20	<20
28 Lillygrove Lane, Fountaindale	54	40	38	<20	22	23	<20	22	23	<20	22	23	26	30	31	23	26	27	<20	20	21	21	24	25	27	31	32	<20	21	22	<20	<20	<20
32 Lillygrove Lane, Fountaindale	54	40	38	<20	22	22	<20	22	23	<20	22	22	27	30	31	23	27	27	<20	20	21	21	24	25	28	32	32	<20	20	21	<20	<20	<20
36 Lillygrove Lane, Fountaindale	54	40	38	<20	20	21	<20	20	21	<20	20	21	25	29	30	21	25	26	<20	<20	20	20	23	24	25	30	30	<20	<20	20	<20	<20	<20
48 Lillygrove Lane, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	24	28	29	<20	22	23	<20	<20	<20	<20	20	21	26	30	31	<20	<20	<20	<20	<20	<20
6 Lorikeet Lane, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
9 Lorikeet Lane, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
12 Lorikeet Lane, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
120 Berkeley Road, Fountaindale	54	40	38	<20	23	24	<20	23	24	<20	23	24	27	31	32	24	27	28	<20	21	22	22	25	26	28	32	33	<20	21	22	<20	<20	<20
11 Manns Road, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
22 Manns Road, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
23 Manns Road, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
39 Manns Road, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
130 Old Chittaway Road, Fountaindale	54	40	38	**39**	**40**	**40**	**39**	**40**	**40**	**39**	**40**	**40**	**39**	*41*	*41*	38	**40**	*41*	24	26	26	35	37	38	33	37	38	25	27	27	**40**	**40**	**40**
86 Old Chittaway Road, Fountaindale	54	40	38	34	36	36	30	33	34	24	27	27	23	26	27	24	28	29	<20	<20	<20	21	25	26	<20	22	23	<20	<20	<20	<20	<20	<20
89 Old Chittaway Road, Fountaindale	54	40	38	31	34	35	29	32	33	27	30	30	27	30	31	27	31	32	<20	<20	20	25	28	29	25	29	30	<20	20	21	<20	<20	20
96 Old Chittaway Road, Fountaindale	54	40	38	35	37	38	32	35	36	26	29	29	25	29	29	26	29	30	<20	<20	<20	23	27	28	24	28	29	<20	<20	20	<20	<20	<20
96 Old Chittaway Road, Fountaindale	54	40	38	37	**39**	**39**	32	35	35	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
103 Old Chittaway Road, Fountaindale	54	40	38	34	36	37	31	34	35	29	31	32	28	31	32	28	32	32	<20	20	20	25	29	30	26	30	31	<20	21	21	<20	<20	20
105 Old Chittaway Road, Fountaindale	54	40	38	30	32	33	28	31	32	28	30	31	28	31	32	28	32	33	<20	20	20	26	29	30	26	30	31	<20	20	21	<20	20	21
107 Old Chittaway Road, Fountaindale	54	40	38	32	34	35	30	32	33	29	31	32	28	31	31	23	26	27	<20	<20	<20	20	23	24	27	31	32	<20	<20	<20	<20	<20	<20
121 Old Chittaway Road, Fountaindale	54	40	38	34	36	36	33	35	36	33	35	35	31	33	34	31	34	35	<20	21	22	28	31	32	23	26	27	20	22	23	23	24	25
125 Old Chittaway Road, Fountaindale	54	40	38	27	30	30	25	28	29	24	27	27	22	24	25	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
127 Old Chittaway Road, Fountaindale	54	40	38	34	36	37	34	36	36	34	36	37	34	36	37	35	37	38	22	24	25	32	35	35	32	35	36	23	25	25	32	33	33
141 Old Chittaway Road, Fountaindale	54	40	38	33	35	36	33	35	36	33	35	36	35	37	38	35	38	**39**	23	25	25	32	35	36	32	36	37	23	25	26	30	31	32
149 Old Chittaway Road, Fountaindale	54	40	38	33	35	36	33	35	36	33	36	36	36	38	**39**	37	**39**	**40**	26	27	27	35	37	38	35	**39**	**40**	26	27	28	27	28	30
150 Old Chittaway Road, Fountaindale	54	40	38	36	38	38	36	38	38	36	38	39	39	*41*	*41*	**40**	*42*	*43*	27	28	28	38	39	**40**	37	**40**	*41*	27	29	29	32	32	33
157 Old Chittaway Road, Fountaindale	54	40	38	31	33	33	30	33	33	30	32	33	31	33	33	31	34	35	<20	<20	<20	28	31	32	22	25	26	<20	<20	<20	27	28	29
161 Old Chittaway Road, Fountaindale	54	40	38	28	31	32	28	31	32	28	30	31	32	35	35	32	35	36	22	24	24	30	32	33	31	35	36	22	24	25	21	22	24

Receiver	Criteria			1			2			3			4			5			6			7			8			9			10		
	D	E	N	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W
165 Old Chittaway Road, Fountaindale	54	40	38	33	35	35	33	35	35	33	34	35	38	**40**	**40**	38	**40**	*41*	28	28	29	36	38	38	38	*41*	*42*	28	29	29	20	21	22
170 Old Chittaway Road, Fountaindale	54	40	38	36	38	38	36	38	38	36	37	38	*45*	*46*	*47*	*42*	*44*	*45*	32	33	33	40	41	*42*	*48*	*50*	*51*	32	33	33	21	23	24
32 Old Chittaway Road, Fountaindale	54	40	38	30	34	34	28	32	32	<20	21	21	<20	23	23	<20	24	24	<20	<20	<20	<20	21	22	<20	22	23	<20	<20	<20	<20	<20	<20
46 Old Chittaway Road, Fountaindale	54	40	38	30	34	35	28	32	33	<20	21	22	<20	23	24	20	24	25	<20	<20	<20	<20	22	22	<20	23	24	<20	<20	<20	<20	<20	<20
58 Old Chittaway Road, Fountaindale	54	40	38	30	33	34	27	31	32	<20	22	23	<20	22	22	21	25	26	<20	<20	<20	<20	22	23	<20	<20	<20	<20	<20	<20	<20	<20	<20
60 Old Chittaway Road, Fountaindale	54	40	38	31	34	35	28	32	33	<20	23	24	20	24	24	21	25	26	<20	<20	<20	<20	23	24	<20	20	20	<20	<20	<20	<20	<20	<20
64 Old Chittaway Road, Fountaindale	54	40	38	31	34	35	28	32	33	20	23	24	<20	23	24	22	26	27	<20	<20	<20	<20	23	24	<20	<20	20	<20	<20	<20	<20	<20	<20
78 Old Chittaway Road, Fountaindale	54	40	38	33	36	37	30	33	34	<20	21	22	20	24	25	22	26	27	<20	<20	<20	<20	23	24	<20	22	22	<20	<20	<20	<20	<20	<20
33 Station Road, Fountaindale	54	40	38	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
3 Station Road, Fountaindale	54	40	38	30	32	33	30	32	33	30	32	33	35	37	38	35	38	38	25	27	27	32	35	36	35	**39**	**40**	26	27	27	<20	<20	21
7 Station Road, Fountaindale	54	40	38	28	31	32	28	31	32	28	30	31	34	36	37	33	36	36	24	26	26	30	33	34	36	**39**	**40**	24	26	26	<20	20	21
16 Station Road, Fountaindale	54	40	38	31	33	33	31	33	33	31	32	33	39	*41*	*41*	36	38	**39**	28	29	29	33	36	36	*41*	*44*	*45*	28	29	29	<20	<20	<20
23 Station Road, Fountaindale	54	40	38	25	28	28	26	28	28	25	27	28	32	35	36	31	34	34	23	25	25	28	31	32	35	38	**39**	24	25	26	<20	<20	<20
27 Station Road, Fountaindale	54	40	38	23	25	26	23	26	26	23	26	26	32	35	35	29	31	32	22	24	24	26	29	30	34	38	**39**	22	24	24	<20	<20	<20
35 Station Road, Fountaindale	54	40	38	23	25	25	23	25	25	23	25	26	32	35	36	27	30	31	22	24	24	25	28	28	34	38	**39**	22	24	24	<20	<20	<20
11 Station Road, Fountaindale	54	40	38	31	33	33	30	33	33	30	32	33	37	**39**	**39**	35	38	**39**	27	28	28	33	35	36	**39**	*42*	*43*	27	28	28	<20	20	21
139 Orchard Road, Kangy Angy	52	37	37	24	26	27	23	26	26	23	25	26	28	31	32	24	26	27	23	25	25	23	25	26	25	27	28	24	26	27	<20	<20	<20
98 Old Chittaway Road, Fountaindale	45	45	45	39	40	40	38	39	39	38	39	39	34	36	37	32	35	36	20	22	23	29	32	33	30	34	34	21	23	24	24	25	26
3A Catamaran Road, Fountaindale	65	65	65	<20	22	22	<20	21	22	<20	22	23	26	30	30	21	24	25	<20	20	20	20	23	23	27	31	32	<20	20	21	<20	<20	<20
1 Catamaran Road, Fountaindale	65	65	65	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
2 Ketch Close, Fountaindale	65	65	65	27	30	31	27	30	31	29	32	33	35	39	39	30	34	35	26	27	28	29	32	33	37	41	42	26	28	28	<20	<20	<20
3 Catamaran Road, Fountaindale	65	65	65	25	27	28	25	27	27	26	29	30	32	35	35	27	30	30	23	25	26	25	28	29	34	37	38	24	25	26	<20	<20	<20
4 Catamaran Road, Fountaindale	65	65	65	22	24	24	22	24	24	22	24	25	32	35	35	24	27	28	20	22	22	23	25	26	28	31	32	20	22	22	<20	<20	<20
5 Catamaran Road, Fountaindale	65	65	65	23	25	26	23	25	25	23	25	25	29	32	33	24	26	27	22	23	24	23	25	25	28	31	32	22	24	24	<20	<20	<20
6 Catamaran Road, Fountaindale	65	65	65	29	31	31	29	31	31	29	31	32	39	41	42	30	32	33	29	30	31	30	31	32	40	43	45	29	30	31	<20	<20	<20
8 Catamaran Road, Fountaindale	65	65	65	26	28	28	26	28	28	26	28	29	33	36	37	28	31	32	25	26	27	27	29	30	35	39	39	25	26	27	<20	<20	<20
9 Catamaran Road, Fountaindale	65	65	65	21	23	25	21	23	25	21	24	25	28	31	32	23	26	27	21	22	23	22	25	26	26	30	31	21	22	23	<20	<20	<20
11 Catamaran Road, Fountaindale	65	65	65	21	24	25	21	24	25	21	24	25	27	30	31	27	31	32	<20	<20	20	24	28	29	25	29	30	<20	<20	21	<20	<20	<20
13 Catamaran Road, Fountaindale	65	65	65	<20	22	23	<20	22	23	<20	22	23	27	31	32	23	26	27	<20	20	21	21	24	25	27	31	32	<20	20	21	<20	<20	<20
15 Catamaran Road, Fountaindale	65	65	65	24	27	28	24	27	28	24	27	28	31	34	35	30	33	34	21	23	25	27	31	32	27	31	32	21	23	25	<20	<20	<20
17 Catamaran Road, Fountaindale	65	65	65	25	27	28	25	27	28	25	27	28	33	36	37	28	31	32	24	26	27	26	29	30	30	33	34	24	26	27	<20	<20	<20
1 Co-wyn Close, Fountaindale	65	65	65	33	35	35	33	35	35	35	37	39	45	46	46	37	39	40	32	32	32	35	37	38	46	49	50	32	32	32	<20	<20	<20

Receiver	Criteria			1			2			3			4			5			6			7			8			9			10		
	D	E	N	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W	N	T	W
2 Catamaran Road, Fountaindale	65	65	65	31	32	33	31	32	33	33	35	36	40	42	43	34	36	37	30	31	31	32	34	35	42	46	47	30	31	31	<20	<20	<20
4 Ketch Close, Fountaindale	65	65	65	23	26	27	23	26	27	23	26	27	29	33	34	27	30	31	20	23	24	25	28	29	31	35	36	20	23	24	<20	<20	<20
5 Ketch Close, Fountaindale	65	65	65	24	26	27	23	26	27	24	27	28	30	33	33	25	28	29	22	24	25	24	27	27	30	34	35	22	25	25	<20	<20	<20
7 Ketch Close, Fountaindale	65	65	65	22	25	25	22	24	25	23	26	26	28	31	32	24	27	28	21	23	23	22	25	26	29	33	34	21	23	24	<20	<20	<20
8 Ketch Close, Fountaindale	65	65	65	22	25	25	22	25	25	22	26	26	27	31	32	23	27	28	20	22	23	22	25	26	28	32	33	20	22	23	<20	<20	<20
9 Ketch Close, Fountaindale	65	65	65	<20	22	22	<20	21	22	<20	22	22	24	27	28	20	22	23	<20	21	22	<20	22	23	22	25	26	<20	21	22	<20	<20	<20
10 Ketch Close, Fountaindale	65	65	65	<20	21	22	<20	21	21	<20	21	22	22	25	26	<20	22	23	<20	20	21	<20	21	22	21	24	25	<20	20	21	<20	<20	<20
11 Ketch Close, Fountaindale	65	65	65	21	25	26	21	25	26	22	26	27	27	30	31	25	29	30	<20	21	22	23	27	28	26	30	31	<20	21	22	<20	<20	<20
13 Ketch Close, Fountaindale	65	65	65	22	25	27	22	25	27	23	27	28	29	33	34	25	29	30	21	23	25	23	27	28	30	34	35	21	24	25	<20	<20	<20
14 Ketch Close, Fountaindale	65	65	65	<20	20	21	<20	20	21	<20	20	21	22	25	26	<20	23	24	<20	<20	20	<20	21	22	21	25	26	<20	<20	20	<20	<20	<20
15 Ketch Close, Fountaindale	65	65	65	20	24	25	<20	23	24	20	23	24	24	28	29	21	25	26	<20	<20	<20	20	23	24	23	27	28	<20	<20	<20	<20	<20	<20
Sanitarium Factory	65	65	65	23	26	27	23	26	27	24	27	28	30	33	34	24	27	28	22	24	25	23	26	26	31	35	35	22	24	25	<20	<20	<20
10 Catamaran Road, Fountaindale	45	45	45	26	27	27	26	27	28	26	27	28	35	37	38	29	32	32	25	26	26	28	30	30	37	40	41	25	26	26	<20	<20	<20