Review of Environmental Factors

New Grafton Correctional Centre, Avenue Road Upgrade

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Executive Summary

The Proposal

GeoLINK has been engaged by Infrastructure New South Wales (INSW) to prepare a Review of Environmental Factors (REF) for the upgrade (widen from one lane to two) of a 2.6 km section of Avenue Road located approximately 13 km south-east of Grafton, NSW.

Need for the Proposal

The proposed upgrade of Avenue Road is adjacent to and is in support of the New Grafton Correctional Centre (NGCC). The Proposal will support an increase in traffic on Avenue Road associated with the NGCC and provide safer access to the NGCC.

Statutory and Planning Framework

All relevant statutory planning instruments have been examined in relation to the Proposal. Development consent is not required for the subject activity by virtue of Clause 94 of State Environmental Planning Policy (infrastructure) 2007 (ISEPP). The Proposal, however, becomes an 'activity' for the purposes of Part 5 of the EP&A Act, hence a REF, assessing the Proposal and any associated environmental impacts is required.

Consultation

Since the inception of the Proposal for the NGCC, there has been ongoing consultation with Clarence Valley Council including the Avenue Road upgrade Proposal. A letter was also sent to Council on 1 May 2017 to formalise consultation for this specific activity under Part 5 of the EP&A Act, as required under Clause 13 of ISEPP.

Given the nature of the Proposal, the localised scope and potential impacts, targeted consultation with the three affected landowners whose access would be temporarily impacted by the Proposal would occur. This is deemed sufficient given the scope and nature of the works. No additional/ broader community consultation is considered necessary, other than relevant on-going affected land-owner consultation and standard notification/ management measures during the works.

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken. The Proposal is considered to present a low risk to Aboriginal heritage and no consultation is required at this stage.

Environmental Assessment

This REF provides an assessment of the Proposal that takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the Proposal as is required under the EP&A Act. The main potential negative environmental impacts of the Proposal include:

- Removal of vegetation including hollow-bearing trees.
- Localised short term disturbance from construction activities such as possible noise impacts.

The Proposal would result in a positive long term outcome in relation to providing safe access to the NGCC.

- Other potential environmental impacts will generally be minor in nature and are documented within the REF. A variety of safeguards have been developed to avoid and/ or minimise the risk of potential impacts posed by the Proposal to the environment.

Justification and Conclusion

The proposed upgrade of Avenue Road is an important element of infrastructure to support the NGCC. The potential environmental impacts posed by the Proposal have been thoroughly examined through this REF. Some minor impacts would occur locally; however, it is unlikely that any significant or long-term adverse impacts would eventuate. To help ensure that the extent of impacts is limited and that unavoidable impacts likely to occur are managed and minimised, mitigation measures and safeguards have been developed and would be implement and monitored. The Proposal is considered justifiable taking into account the potential environmental impacts and subsequent mitigation measures and safeguards. The Proposal supports the establishment and operation of the NGCC. The Proposal is in accordance with ESD principles and consistent with the objectives of the EP&A Act.

1. Introduction

1.1 Proposal Identification

The Proposal involves upgrade of a section of Avenue Road, approximately 13 km south-east of Grafton, NSW, from a single lane to double lanes. The upgrade is associated with the New Grafton Correctional Centre (NGCC) and the section of the road to be upgraded runs adjacent to the NGCC site from Old Six Mile Lane to the northern boundary of the NGCC site (i.e. the entire length of the NGCC site). This upgraded section of Avenue Road would connect with a section of Avenue Road (to the south of Old Six Mile Lane) that is being upgraded by NSW Roads and Maritime Service as part of the Woolgoolga to Ballina Pacific Highway Upgrade Project.

All construction and operational activities associated with the upgrade of Avenue Road (adjacent to the NGCC) would be referred to herein as 'the Proposal'.

1.2 Purpose of this Report

This REF has been prepared by GeoLINK on behalf of engineering consultants Umow Lai who have been engaged by Infrastructure NSW (INSW) to manage the works. For the purposes of these works, INSW is the proponent and Clarence Valley Council (CVC) is the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Construction works associated with the upgrade of Avenue Road and associated works would be undertaken by contractors/ Council on behalf of INSW.

The purpose of the REF is to describe the Proposal, to document the likely impacts of the Proposal on the environment, and to detail safeguard/ mitigation measures to be implemented.

The description of the Proposal and associated environmental impacts have been undertaken in context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the REF helps to fulfil the requirements of Section 111 of the EP&A Act, which requires the determining authority to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- whether the Proposal is likely to have a significant impact on the environment and therefore the necessity to prepare an Environmental Impact Statement (EIS) under Part 5 of the EP&A Act;
- the significance of any impact on threatened species, populations or ecological communities, or their habitats as defined by the TSC Act and/ or *Fisheries Management Act 1994*, in Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement; and
- the potential for the Proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Department of the Environment and Energy for a decision by the Commonwealth Minister on whether assessment and approval is required under the EPBC Act.

2. Description of the Proposal

2.1 Site Location

The proposed road upgrade of Avenue Road is located within CVC local government area (LGA), approximately 13 km south-east of Grafton (refer to **Illustration 2.1**). All works would be within the CVC road reserve (refer to **Plate 2.1**). The section of the road to be upgraded runs adjacent to the NGCC site from Old Six Mile Lane to the northern boundary of the NGCC site (i.e. the entire length of the NGCC site). The southern end of the upgraded section would tie-in with an upgraded section of Avenue Road being undertaken by NSW Roads and Maritime Service as part of the Woolgoolga to Ballina Pacific Highway Upgrade Project (refer to **Plate 2.2**).

Plate 2.1 Avenue Road view south (trees on left require removal)

Plate 2.2 View south towards Six Mile Lane from southern extent of works

2.2 The Proposal

INSW proposes to upgrade a 2.6 km long section of Avenue Road from a single lane to double lanes (refer to **Illustration 2.2**). The proposed road upgrade works is expected to take approximately 10-12 weeks.

The upgrade of Avenue Road comprises the following works:

- Extension of eleven existing pipe culverts to accommodate increased road width.
- Existing sealed road to be widened from approximately 4 m to 8 m width as follows:
  - Clear and grub verge-side grass/ weeds/ regrowth and native vegetation with a maximum disturbance footprint of 3 m from road edge.
  - Excavation of unsuitable existing shoulder material.

- Construction of new catch and table drains along length of road using imported fill.
- Reconstruction of driveways to maintain access to existing private properties.
- Pavement construction.
- Line marking and sign installation.

Appendix A presents drawings for the proposed works.

2.2.1 Proposal Objectives

The objectives of the Proposal are to:

- Upgrade Avenue Road to service the NGCC.
- Avoid as far as possible impacts on utilities and services, property and access and ecological features including fauna habitat features, Endangered Ecological Communities (EECs) and threatened plants.

2.3 Construction Activities

2.3.1 Plant and Equipment

The main plant and equipment required for the works may include (but not be limited to):

- Chainsaws
- Grader
- Smooth and pad foot rollers
- Truck and dog
- Water truck
- Excavator
- Dozer
- Seal and asphalt trucks
- Line marking plant.

2.3.2 Working Hours

Construction activities will be undertaken in accordance with standard construction and work hours, i.e. Monday to Friday: 7:00 am to 6:00 pm and Saturday 8:00 am to 1:00 pm.

2.4 Ancillary Facilities

Given the nature and limited scope of the Proposal, ancillary facilities are not expected to be substantial, and would fall within the overall scope and environmental considerations undertaken as part of this assessment. Proposed ancillary facilities would comprise the same facilities and location as those being used for the road upgrade further south as part of the Pacific Highway upgrade (Wave 5A). The mitigation measures in this REF would also be applicable to any ancillary facilities. Once determined, if the ancillary facilities were to affect a substantially different locality or notably departed from the scope of this assessment, a review of this component may be necessary.

Information shown is for illustrative purposes only

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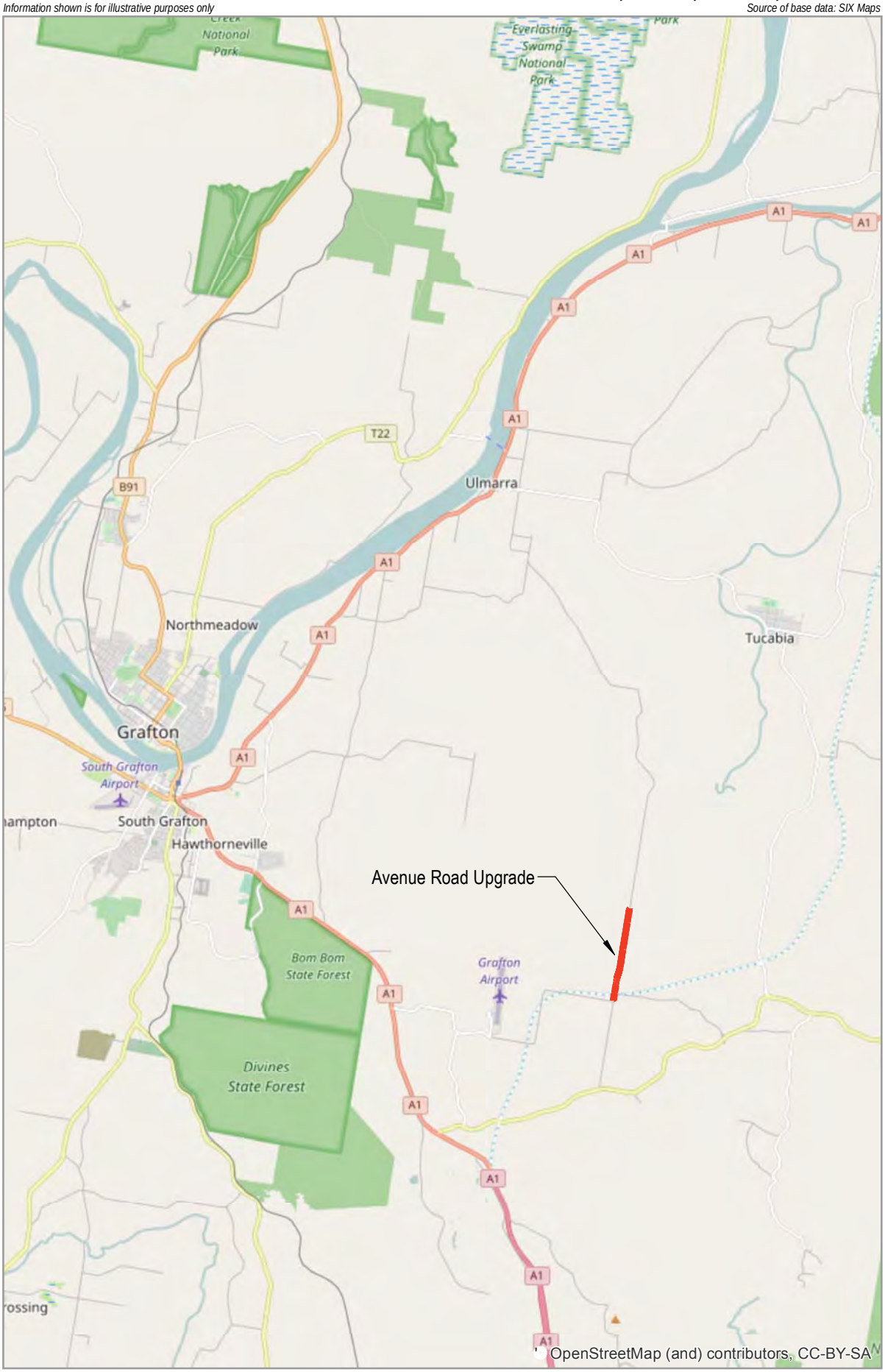
Source of base data: SIX Maps



0 3 Km

North

Site Locality

GeoLINK environmental management and design

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New Grafton Correctional Centre - Avenue Road Upgrade
2736-1023

Illustration 2.1

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Source of base data: SIX Maps

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North

The Proposal

GeoLINK environmental management and design

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New Grafton Correctional Centre - Avenue Road Upgrade
2736-1024

Illustration 2.2

3. Statutory and Planning Framework

3.1 Planning Approval Pathway

The Proposal involves the upgrade of Avenue Road, from Old Six Mile Lane to the northern end of the new Correctional Centre site, totalling approximately 2.6 km long. As part of this project, the applicable environmental planning and legislative requirements were reviewed and the planning approval pathway is outlined as follows:

Section 76 of the EP&A Act states that if an environmental planning instrument (EPI) provides that development may be carried out without the need for development consent, a person may carry the development out, in accordance with the EPI, on land to which the provision applies. However the environmental assessment of the development is required under Part 5 of the EP&A Act.

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) applies to the State and aims to facilitate the effective delivery of infrastructure across NSW. This policy overrides other EPIs, including Local Environmental Plans, and provides specific planning provisions and development controls relating to nominated types of infrastructure. Division 17 of the ISEPP outlines the approval requirements for roads and traffic.

The Proposal is for the upgrade, including widening, of the existing Avenue Road and is therefore a Proposal associated with a road and road infrastructure facilities under ISEPP and is subject to the development control provisions Division 17 of ISEPP. Specifically Clause 94 (Development permitted without consent), under the ISEPP states that (as relevant to the Proposal):

(1) Development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land. However, such development may be carried out without consent on land reserved under the National Parks and Wildlife Act 1974 only if the development:

(a) is authorised by or under the National Parks and Wildlife Act 1974, or

(b) is, or is the subject of, an existing interest within the meaning of section 39 of that Act, or

(c) is on land to which that Act applies over which an easement has been granted and is not contrary to the terms or nature of the easement.

The Proposal does not occur on land reserved under the *National Parks and Wildlife Act 1974.* Clause 94 the ISEPP allows for the roadworks and upgrade of the existing road by or on behalf of INSW without consent under Part 5 of the EP&A Act. The Proposal therefore becomes an activity and requires preparation of an environmental assessment (Review of Environmental Factors) for approval by the determining authority, in this case CVC.

3.2 Environmental Planning and Assessment Act 1979

Although the Proposal does not require development consent under Part 4 of the EP&A Act, Section 111 of the EP&A Act requires determining authorities, when assessing activities under Part 5, to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. To ensure the Proposal adequately addresses the requirements of Section 111, an assessment of the Proposal's consistency with relevant EPIs including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs) has been completed.

3.3 State Environmental Planning Policies

3.3.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State. Development consent is not required for the subject activity by virtue of Clause 94 of ISEPP. Clause 94 of ISEPP permits development for the purpose of road and road infrastructure facilities to be carried out by or on behalf of a public authority without consent on any land.

As the Proposal is for the upgrade/ widening of an existing road, the works can be assessed under Part 5 of the EP&A Act. Part 2, Division 1 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development (refer to **Section 4.3**).

3.3.2 State Environmental Planning Policy 14 – Coastal Wetlands

SEPP 14 aims to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the state. The nearest mapped SEPP 14 Coastal Wetland is SEPP 14 No. 292 located approximately 720 m east of the site. It is not expected the Proposal would impact this wetland. Safeguards would be in place to ensure the activity does not indirectly affect areas outside of the project footprint.

3.3.3 State Environmental Planning Policy 26 – Littoral Rainforest

SEPP 26 aims to provide a mechanism for the consideration of applications for development that is likely to damage or destroy littoral rainforest areas with a view to the preservation of those areas in their natural state. It is not expected that the Proposal would impact on any areas of SEPP 26 Littoral Rainforest. There are no SEPP 26 Littoral Rainforests within 10 km of the site.

3.3.4 State Environmental Planning Policy 44 - Koala Habitat Protection

SEPP 44 aims to encourage the conservation and management of natural vegetation areas that provide habitat for Koalas, to ensure permanent free-living populations would be maintained over their present range. Clause 6 of SEPP 44 states that the SEPP applies only to land 'in relation to which a development application has been made'. Clause 94 of ISEPP precludes the Proposal from requiring consent therefore Part 2 of SEPP 44 does not apply to the Proposal. However, in order to consider environmental issues to the fullest extent possible, it is prudent to assess any potential impacts on Koalas in accordance with SEPP 44.

One Schedule 2 feed tree species (Forest Red Gum; *Eucalyptus tereticornis*) occurs infrequently on site and does not comprise >15% of the canopy. The site therefore does not comprise potential Koala habitat.

3.3.5 State Environmental Planning Policy 71 – Coastal Protection

SEPP 71 predominantly aims to protect and manage the natural, cultural, recreational and economic attributes of the New South Wales coastal zone. The site is not situated within the SEPP 71 coastal zone, which is located approximately 16 km south-east of the site. No impacts would occur.

3.3.6 State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) 2008 aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. Part of this objective relates to the maintenance of the social, economic and environmental welfare of the state and the reduction of land use conflicts.

The Proposal would not impose any significant environmental impacts to local agricultural land.

3.4 Local Environmental Plan

Clarence Valley Local Environmental Plan 2011 (CVLEP 2011)

Zoning: RU2 Rural Landscape and SP2 Infrastructure (Classified Road).

Permissibility: Roads are permitted with development consent within the RU2 zone under the CVLEP. The subject SP2 zone allows a classified road and development that is ordinarily incidental or ancillary to this. It could be said that the Avenue Road upgrade that will also tie in with the Pacific Highway Upgrade at its southern end would be generally consistent with this intent.

The objectives of the RU2 Rural Landscape zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To maintain the rural landscape character of the land.
- To provide for a range of compatible land uses, including extensive agriculture.
- To provide land for less intensive agricultural production.
- To prevent dispersed rural settlement.
- To minimise conflict between land uses within the zone and with adjoining zones.
- To ensure that development does not unreasonably increase the demand for public services or public facilities.
- To ensure development is not adversely impacted by environmental hazards.

The Proposal is not directly consistent with the zone objectives as they are targeted toward primary industry activities, however the Proposal for the upgrade of a road would not contradict or hinder the achievement of these objectives in the context of the LEP.

The objectives of the SP2 Infrastructure zone are:

- To provide for infrastructure and related uses.
- To prevent development that is not compatible with or that may detract from the provision of infrastructure.

The subject SP2 Infrastructure zone is designated for a Classified Road (Pacific Highway upgrade). The Proposal would not contradict or hinder the achievement of the relevant zone objectives in the context of the LEP and the upgraded road would appropriately integrate with the Pacific Highway upgrade.

ISEPP overrides the CVLEP and development without consent for road and road infrastructure facilities is permitted on any land under ISEEP Clause 94 (by or on behalf of a public authority). The Proposal becomes an 'activity' for the purposes of Part 5 of the EP&A Act and is subject to an environmental assessment (Review of Environmental Factors).

3.5 Development Control Plans

The *Clarence Valley Council Development Control Plans – Development in Rural Zones 2011* is to encourage development of land in rural zones that complements the rural character of a locality and is at an appropriate scale and form to minimise land use conflicts. CVC DCP – *Development in Rural Zones* applies to land within the following rural zones:

- RU1 Primary Production.
- RU2 Rural Landscape.
- RU3 Forestry.

The CVC DCP – *Development in Environmental Protection, Open Space and Special Use Zones* applies to land, including the following zone:

- SP2 Infrastructure.
- The Proposal however does not require development consent and is therefore not subject to the requirements of the DCP. It is not expected however that the Proposal would limit or hinder the achievement of the DCP objectives.

3.6 Other State and Commonwealth Legislation

3.6.1 Other NSW Legislative Acts

Table 3.1 lists and describes other NSW State legislation and comments on its applicability in relation to the Proposal.

Table 3.1 NSW Legislation

Legislation	Section(s)	Comment
Fisheries Management Act 1994	Section 199 and 219	Concurrence is required from the Minister for Primary Industries for dredge and reclamation works on land that is periodically inundated by water in accordance with s199 of the *Fisheries Management Act 1994*. A permit is required under s219 of the FM Act to undertake activities that block the passage of fish. The Proposal does not involve dredge and reclamation work nor does it block fish passage.
Protection of the Environment Operations Act 1997		No Protection of the Environment Policies (PEPs) are relevant to the Proposal. No licences will be required pursuant to the *Protection of the Environment Operations Act 1997* (POEO Act). The appointed contractor/s are required to notify EPA when a 'pollution incident' occurs that is likely to impact upon the environment.
	Section 120	It is an offence to pollute any waters of the State. The REF includes mitigation measures to minimise potential impacts that may result in pollution of waters.
	Section 115	It is an offence to negligently dispose of waste in a manner that harms the environment. Waste would be managed in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The Proposal aims to reduce the environmental impact of waste and includes mechanisms to recover resources and reduce the production of waste where possible.
National Parks and Wildlife Act 1974	Sections 118D(2)(b)(ii)	It is an offence to cause damage to habitat of threatened species, endangered populations or EECs unless it was essential for the carrying out of an activity in accordance with an approval of a determining authority within the meaning of Part 5 of the EP&A Act if the determining authority has complied with that Part. This REF forms the Part 5 assessment however every measure would be implemented to minimise impacts to habitat of threatened species, endangered populations or endangered ecological communities.
	Sections 84, 90	The *National Parks and Wildlife Act 1974* (NPW Act) provides the basis for the legal protection and management of Aboriginal sites within NSW. Sections 84 and 90 of the NPW Act provide statutory protection for any physical/ material evidence of Aboriginal occupation of NSW and places of cultural significance to the Aboriginal community. The key principles of the Act in relation to Aboriginal heritage are the prevention of unnecessary or unwarranted destruction of Aboriginal objects, and the active protection and conservation of objects which are of high cultural significance. It is an offence to knowingly disturb an Aboriginal object, irrespective of its nature or significance, without the prior consent of the Director-General of the NSW OEH. An Aboriginal Heritage Information Management System (AHIMS) search was undertaken for the Proposal. Four sites were recorded; two to the east and two to the west of the works area; however no Aboriginal sites or places of cultural significance have been registered within the works footprint (refer to **Section 5.6** for further detail).

Legislation	Section(s)	Comment
		As such, and given the extent of existing disturbance at the site, the Proposal is considered to present low risk to Aboriginal heritage and no additional consultation is required. Works will cease if an artefact or place of significance is disturbed or encountered during the Proposal and the Local Aboriginal Land Council (LALC) and OEH Cultural Heritage Division notified immediately.
Threatened Species Conservation Act 1995	Schedules 1, 1A, 2 and 3	Schedules of threatened species, populations and ecological communities were confirmed prior to site assessment. Based on field assessment, the Proposal has little potential to impact on habitat for threatened species or communities. The Proposal would incrementally contribute to Anthropogenic Climate Change, through the generation of carbon dioxide during operation of machinery and vehicles and associated fuel consumption. No other KTPs would be noticeably contributed to by the Proposal.
Heritage Act 1977	Section 31 - 38A Section 170	Searches of the OEH State Heritage Branch database and Schedule 5 of the CVLEP 2011 were undertaken in relation to the Proposal. No heritage items have been identified at or in close proximity to the site.
Native Vegetation Act 2003	Section 25	Provisions of the Act do not apply to any clearing that is, or is part of, an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act if the determining authority has complied with that Part.

3.6.2 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), any action that has, or is likely to have, a significant impact on matters of national environmental significance or other aspects of the environment, such as on commonwealth land, may progress only with approval of the Commonwealth Minister for the Environment under Part 9 of the EPBC Act. There are no matters of national environmental significance that would be affected by the Proposal and therefore no Commonwealth referral or approval is necessary for the proposed works (also refer to **Section 7**).

3.7 Confirmation of Statutory Position

An assessment of the relevant statutory provisions and planning instruments has concluded that the Proposal can be carried out as development without consent under ISEPP and can be assessed under Part 5 of the EP&A Act.

4. Stakeholder Consultation

4.1 ISEPP Consultation

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State. Part 2, Division 1 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

In relation to Clauses 13 of ISEPP, the Proposal would involve excavation of or adjacent to Council road infrastructure. Hence consultation with Council is required.

Since the inception of the Proposal and planning and environmental assessment for the NGCC, there has been ongoing consultation with CVC regarding various elements of the NGCC and ancillary works. This includes the involvement of CVC in the Avenue Road upgrade project. However as the proposed Avenue Road upgrade works are to occur under the ISEPP as development without consent, a letter was sent to Council on 01 May 2017 to formalise consultation for this specific activity under Part 5 of the EP&A Act, as required under Clause 13 of ISEPP. Mr Tim Jenkin's of CVC advised via email on 12 May 2017 that *apart from the standard investigation into flora and fauna impacts and heritage issues, other issues to consider are:*

- *There is a population of threatened plant, Melaleuca irbyana, along that area of Avenue Road. This plant is both State and Commonwealth listed threatened species.*

  A substantial population of the threatened Weeping Paperbark (*Melaleuca irbyana*) occurs on adjacent land to the east of the proposed works area (Lots 19, 20 & 30 DP751376), with several hundred trees present. The closest Weeping Paperbark is within 5 m of the road reserve. Thorough searches of the eastern road reserve were completed and no Weeping Paperbark were recorded. Weeping Paperbark is listed as Endangered under the TSC Act however is not listed under the Commonwealth EPBC Act.

- *There is a watermain meant to go along the Avenue Road road corridor as well. Council has been in discussions with GeoLINK about that as they are designing the watermain. The interaction between the road and watermain construction and any impacts needs considering.*

  Design changes to the proposed route of the water main mean that the pipeline and road upgrade do not overlap. The pipeline would enter the northern end of the NGCC property rather than stay within the road reserve adjacent to the NGCC.

- *An issue Pacific Complete is dealing with is that some the culvert extensions are long, with impacts potentially extending outside the road corridor. They are trying to design these impacts out at the moment so they are not an issue. The current design by Bonacci is only conceptual at this stage so it is unknown whether they will also have similar issues.*

  The design has been checked by Bonacci and all culvert extensions would be located within the road reserve. The design of batters is being revised to steepen these to ensure they're located within the road reserve however some minor works at the boundary may be required to ensure scour as a result of these design changes does not occur.

In relation to Clauses 13 (other sub-clauses), 14 and 15 of ISEPP, the Proposal would not have a substantial impact on the other listed Council infrastructure, nor would it generate traffic that would strain the road system or impact local heritage or flood liable land. Hence consultation regarding these matters is not required.

The proposed road upgrade is not classified as specified development under the provisions of Clause 16 (2) of ISEPP; therefore consultation with relevant state government agencies is not required.

4.2 Community

Although separate to this project and REF, the EIS prepared for the NGCC also identified essential services/ infrastructure that would be required for the development. An Infrastructure Management Plan was also prepared and accompanied the EIS which gives an overview of the likely proposed infrastructure requirements and requisite upgrades associated with the NGCC project. These documents identified the need for various potential upgrades to Avenue Road. These documents were publically exhibited during the EIS and approval process and it would have been well known in the community that some level of infrastructure upgrades or extensions would be required and reasonably expected as part of the NGCC project.

The Avenue Road upgrade is not part of the NGCC approval but is rather being proposed and assessed as an Activity under Part 5 of the EP&A Act (development without consent). It would be constructed within the existing road reserve. Some design modifications are required to steepen the batters to ensure that all works are within the road reserve. The construction, including tie-in with existing private property access/ driveways would intersect three private properties. Given the nature of the Proposal subject to this, the localised scope and potential impacts, targeted consultation with the three affected landowners would occur. This is deemed sufficient given the scope and nature of the works. No additional/ broader community consultation is considered necessary, other than relevant on-going affected landowner consultation and standard notification/ management measures during the works, including those that advise local road users and/ or affected property owners of the works and any construction activities that may affect them.

4.3 Aboriginal Community

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken. Four recorded sites were identified by the search; however an extensive search revealed that these are between 150 m east and 375 m west of the Proposal. No known Aboriginal sites or places of cultural significance have been registered within the proposed works footprint (refer to **Section 5.6**). As such, and given the extent of existing disturbance at the site and nature of the works, the Proposal is considered to present a low risk to Aboriginal heritage and no consultation is required at this stage.

5. Environmental Assessment

5.1 Ecology

5.1.1 Existing Environment

5.1.1.1 Vegetation

Vegetation within the area comprises Spotted Gum (*Corymbia henryi*)/ Grey Box (*Eucalyptus moluccana*) dry grassy sclerophyll forest, equivalent to *Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion.*

Scattered vegetation occurs along the eastern road verge and the western road verge is grassed with very infrequent trees. Grassy verges are a mix of introduced species (Rhodes Grass *Chloris gayana*, Bahia Grass *Paspalum notatum*, Summer Grass *Digitaria ciliaris*) and native species (Scented-top Grass *Capillipedium spicigerum*, Blady Grass *Imperata cylindrica* and Three-awn speargrass *Aristida vagans*).

5.1.1.2 Fauna

The ecological assessment recorded the following fauna and fauna habitats within or in the vicinity of the proposed road upgrade works:

- A variety of woodland birds (34 species recorded), with open forest, native grassland and hollow-bearing trees creating good quality habitat.
- Three frog species (*Litoria fallax, Crinia signifera, Crinia parinsignifera*), one reptile species (*Lampropholis delicata*) and two mammal species (*Macropus rufogriseus, Trichosurus vulpecula*) were observed.
- Some trees show scratch marks indicative of use by arboreal species such as the Brushtail Possum, Sugar Glider, Feathertail Glider and (possibly) the Brush-tailed Phascogale.
- A number of habitat trees occur within the road reserve and would be affected by the Proposal.

5.1.1.3 Threatened Flora

A substantial population of the threatened Weeping Paperbark (*Melaleuca irbyana*) occurs on adjacent land to the east of the proposed works area (Lots 19, 20 & 30 DP751376), with several hundred trees present (refer to **Illustration 5.1**). The closest Weeping Paperbark is within 5 metres of the road reserve. Thorough searches of the eastern road reserve were completed and no Weeping Paperbark were recorded.

5.1.1.4 Threatened Ecological Communities

No threatened ecological communities were identified within or adjacent to the proposed road upgrade.

5.1.1.5 Threatened and Significant Fauna

Calls of the Grey-crowned Babbler were recorded more than 100 m east of the road reserve during ecological field surveys. While no birds or nesting dormitories were observed, this species is likely to occasionally forage within the road reserve and adjacent habitat to the east. A range of other fauna species may also occur within the road reserve on an opportunistic or seasonal basis.

5.1.2 Potential Impacts

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height). This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 m in height. Up to 23 habitat trees may require removal, all of which contain hollows.

A number of threatened fauna species are likely to utilise the hollow-bearing trees within the works footprint. A threatened species potential occurrence table is provided in **Appendix B** which assesses the likelihood of occurrence. Seven-part tests of significance were then undertaken for all species either known to occur within the study area, or likely to utilise the works footprint for a significant part of their lifecycle (refer to **Appendix B**).

It is concluded that the proposed works is unlikely to result in a significant impact on any TSC Act listed threatened species, populations or endangered communities and therefore preparation of a Species Impact Statement is not required. Similarly, the proposed works is unlikely to result in significant impacts to any threatened species, communities or migratory species listed under the EPBC Act and referral to DoEE and approval by the Minister is not required.

Plate 5.1 Habitat tree

Plate 5.2 Weeping Paperbark on adjacent property

5.1.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to minimise adverse ecological impacts:

1. Two-stage clearing procedure will be undertaken (with ecologist present) when habitat trees are to be removed. This involves:
   - Pre-clearing checks.
   - Stage 1 clearing where non-habitat trees and underscrub are cleared 24 hours prior to the habitat tree being removed.
   - Pre-clearing checks.
   - Stage 2 clearing where the habitat tree is bumped, watched then carefully felled in the presence of an ecologist.
2. Retain trees (including habitat trees) wherever possible.
3. Nest boxes will be installed to compensate for habitat trees removed. It is recommended that 23 nest boxes be installed within retained forest within the NGCC land.
4. If a Koala or threatened fauna is found to be occupying a tree at the site, a flagged exclusion zone will be established (minimum 50 m) in which works will not proceed until the individual has moved from the site.
5. Temporary erosion and sediment control devices such as silt fencing will be installed and maintained, where required.
6. A spill containment kit, including equipment to address both terrestrial and aquatic spills, will be kept on site at all times during the proposed works. Staff will also be trained in the effective deployment of the spill containment kit.
7. Ground disturbance outside of that required to undertake the proposed works will be minimised.
8. Damage to trees outside of those that require clearing will be avoided at all times.
9. Stockpiling will not occur under the crown of existing native trees (i.e. the crown comprises the full width of the branches).
10. Stockpiling will not occur near drainage lines or on overland flow paths, and where necessary will be bunded or covered to reduce sediment runoff.
11. Trees will be felled in a way that minimises disturbance to adjacent retained native vegetation.
12. Works will be completed sensitively to ensure minimal disturbance occurs.
13. All vegetation removed will be chipped and removed from the site, unless hollow-bearing limbs can be set aside for placement within NGCC forested land.
14. No vegetation waste will be burnt.
15. Any materials to be removed from the site will be taken to a licensed waste facility for disposal or recycling.
16. All plant, equipment and personnel will be free of soil and potential weed propagules prior to being brought to the site.
17. Should injured fauna be found on the site, local wildlife care groups and/ or local veterinarians will be contacted immediately and arrangements made for the immediate welfare of the animal. The phone number of the local WIRES group (ph: 1800 094 737) will be known to the project foremen.
18. Environmental safeguards will be communicated to all construction personnel as part of an Environmental Site Induction, and repeated where appropriate at toolbox sessions prior to commencement of relevant work components.

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Information shown is for illustrative purposes only

Source of base data: SIX Maps

LEGEND

- New Grafton Correctional Centre
- Extent of works
- Hollow-bearing tree
- Weeping Paperbark habitat
- Cadastre

0 60

North

Ecological Features

GeoLINK environmental management and design

Review of Environmental Factors
New Grafton Correctional Centre - Avenue Road Upgrade
2736-1028

Illustration 5.1
Sheet 1 of 3

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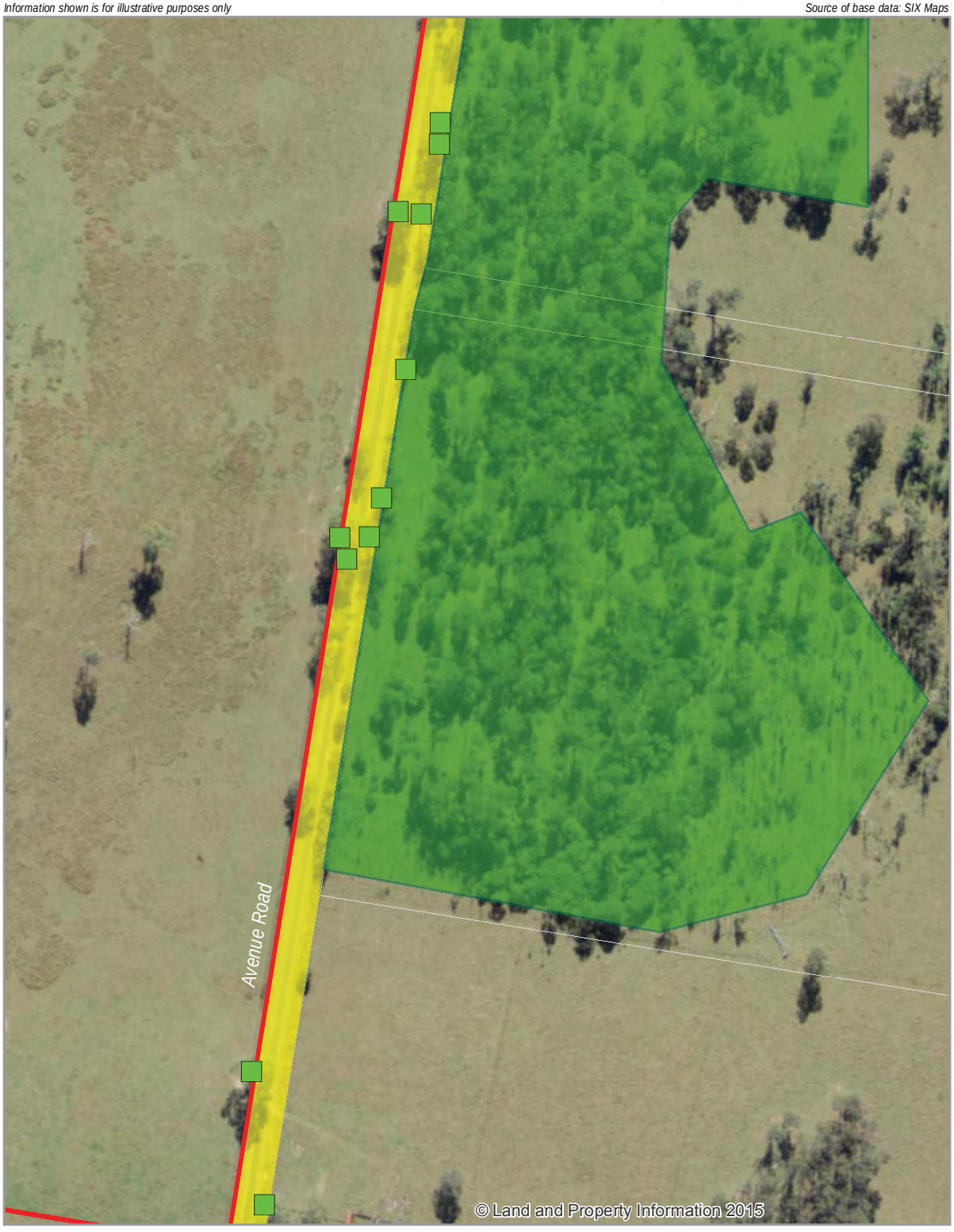
Source of base data: SIX Maps



LEGEND

- New Grafton Correctional Centre
- Extent of works
- Hollow-bearing tree
- Weeping Paperbark habitat
- Cadastre

0 60

North

Ecological Features

GeoLINK environmental management and design

Review of Environmental Factors
New Grafton Correctional Centre - Avenue Road Upgrade
2736-1028

Illustration 5.1
Sheet 2 of 3

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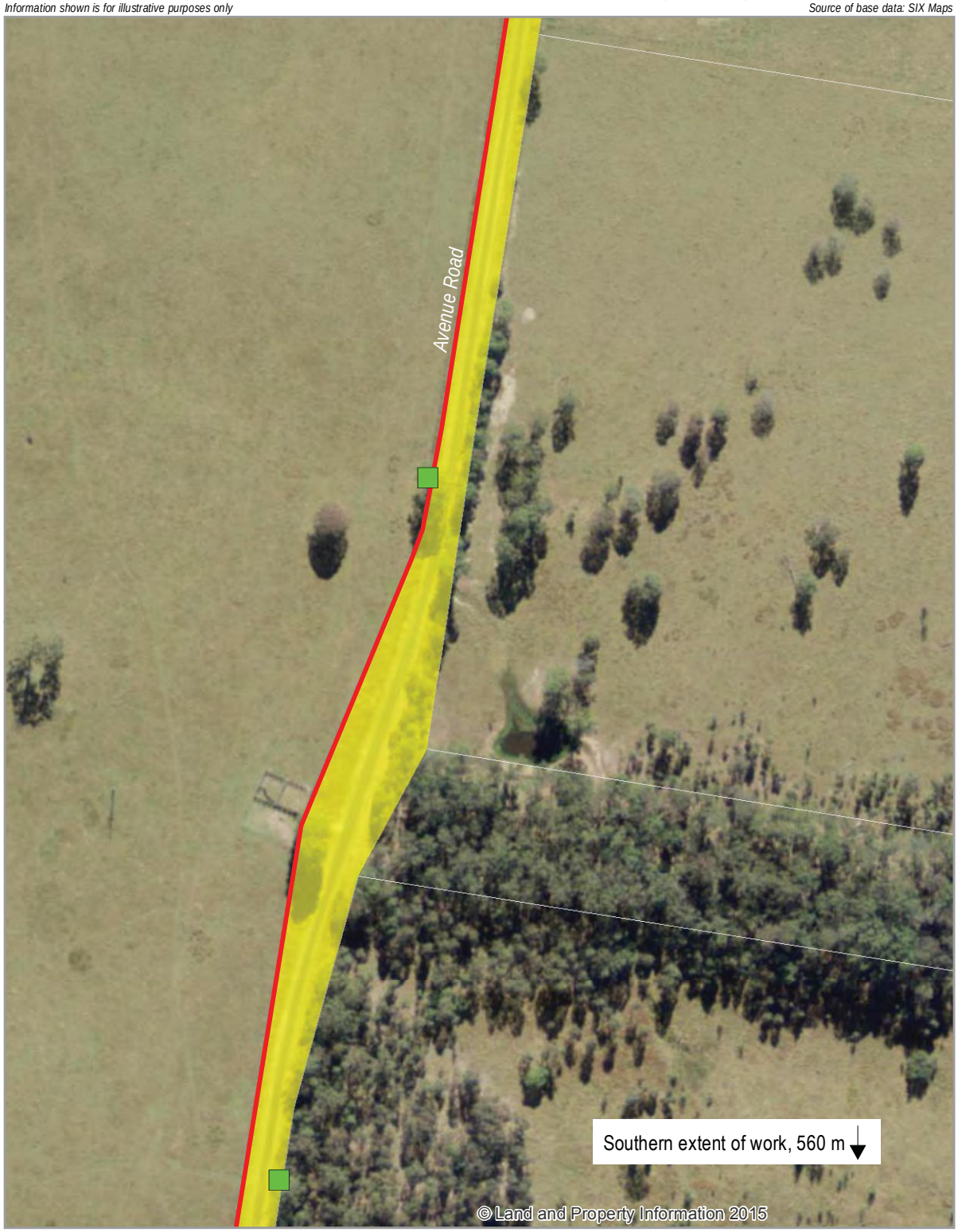
Source of base data: SIX Maps



LEGEND

- New Grafton Correctional Centre
- Extent of works
- Hollow-bearing tree
- Cadastre

0 60

North

Ecological Features

GeoLINK environmental management and design

Review of Environmental Factors
New Grafton Correctional Centre - Avenue Road Upgrade
2736-1028

Illustration 5.1
Sheet 3 of 3

5.2 Traffic and Access

5.2.1 Existing Environment

The Pacific Highway as well as local and regional road networks will be used to access the proposed work area on Avenue Road. There are three private property accesses on the section of road to be upgraded. The subject section of Avenue Road currently comprises a single lane, with a 4 m wide pavement.

5.2.2 Potential Impacts

There may be minor traffic disruptions associated with the proposed upgrade works and associated traffic control measures on Avenue Road and Old Six Mile Lane. Traffic would be generated by the Proposal during construction through:

- Construction employees entering and leaving the site;
- Equipment and plant being delivered to the site for construction purposes; and
- Periodic deliveries to the site for construction materials.

The existing volume and frequency of traffic to and from the site and on the nearby road network would render any additional traffic movements associated with the construction of the Proposal as low. This is particularly the case as most additional traffic movements would be generated during a temporary construction period. The impact of additional traffic movements associated with the proposed construction activities would represent a small and temporary increase compared to existing traffic movements. Impacts associated with increased traffic associated with the NGCC have been addressed in the relevant EIS and are not addressed here; nonetheless the proposed upgrade of Avenue Road would support any increased traffic volumes associated with the NGCC. Given the location of the works, current accessibility and the temporary nature of the construction period, no significant traffic impacts would result.

5.2.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to prevent adverse impacts relating to traffic and access:

19. Unencumbered access to a number of private properties along Avenue Road will be maintained (unless otherwise agreed in advance with the landowner) throughout the works and all driveway accesses of Avenue Road will be matched to the existing driveways.
20. In the unlikely event of a requirement to alter existing access or close a road, sufficient and appropriate notification will be provided to the affected traffic users.
21. Regard to public safety will be maintained at all times.

5.3 Soils, Erosion and Sedimentation

5.3.1 Existing Environment

The subject section of Avenue Road traverses flat to mildly undulating land. The Atlas of Australian Soils (Northcote *et. al.* 1960-1968) classifies the soil in the area as Kurosol soils. The area of works intersects two small areas mapped as having a high probability of Acid Sulfate Soil (refer to **Illustration 5.2**).

A search of the NSW DPI Cattle Dip Site Locator (http://www.dpi.nsw.gov.au/content/agriculture/livestock/health/images/information-by-species/cattle/ticks/cattle-dip-site-locator) was undertaken 19 April 2017 to determine if any cattle dip sites are recorded in proximity to the site. No recorded cattle dip sites are located within or proximate to the site.

A search of the NSW EPA Contaminated Land Register (http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx) was undertaken 19 April 2017 to determine if any areas of contaminated land occur in proximity to the site. There are two known records of contamination within the Clarence Valley LGA (Ashby Dry Dock, approximately 35 km north east of Ulmarra and the former Koolkhan Power Station, >10 km west of Ulmarra) however neither are proximate to the Proposal.

5.3.2 Potential Impacts

Excavation works associated with the Proposal would be limited to shallow depth excavations associated with the installation of erosion-sediment controls, lengthening of culverts, road widening and drainage installation. There is therefore the potential to disturb acid sulfate soils and there is a subsequent risk to soil and water resources associated with low pH runoff as well as contamination of areas associated with inappropriate management of excavated acid sulfate material.

There is also risk from erosion and sedimentation as a result of the ground disturbance. Whilst the local topography is very flat to gently undulating there are a number of drainage lines that traverse the works area; the proposed works therefore present a (manageable) risk to these watercourses from erosion and sedimentation.

There is no apparent risk associated with contaminated land. Regardless, safeguards would be in place should unexpected contamination be encountered during the works.

5.3.3 Safeguards and Management Measures

The following safeguards and management measures will be implemented in order to prevent adverse soil, erosion and sedimentation impacts:

22. Erosion and sediment controls will be implemented in accordance with the Landcom/ Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book).
23. Works will be carefully managed in accordance with an Acid Sulfate Soils Management Plan, to manage risks associated with exposure of actual and/ or potential acid sulfate material, especially in proximity to the two areas identified in **Illustration 5.2** as having a high probability of Acid Sulfate Soil.

24. Any unsuitable excavated material/ waste will be classified, managed appropriately (in accordance with the CEMP) including placement in approved stockpile locations, approved landfill facilities or Acid Sulfate Soil treatment facilities as appropriate.
25. Work will not commence prior to installation of appropriate sediment control structures.
26. Imported materials will be sourced as clean-fill from an approved site.
27. Disturbance of natural sediments and vegetation will be minimised.
28. In the event that unexpected contaminated land is encountered during the works, works will stop immediately and relevant procedures outlined in a CEMP will be followed.
29. Erosion and sedimentation controls will be checked and maintained (including clearing of sediment from behind barriers) on a regular basis (including after any precipitation events) and records kept and provided on request.
30. Works will cease and all erosion and sedimentation controls checked and repaired or re-installed (if required) if heavy rainfall was forecast.
31. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site.
32. Erosion and sediment control measures will not be removed until the works are complete or disturbed areas are stabilised.

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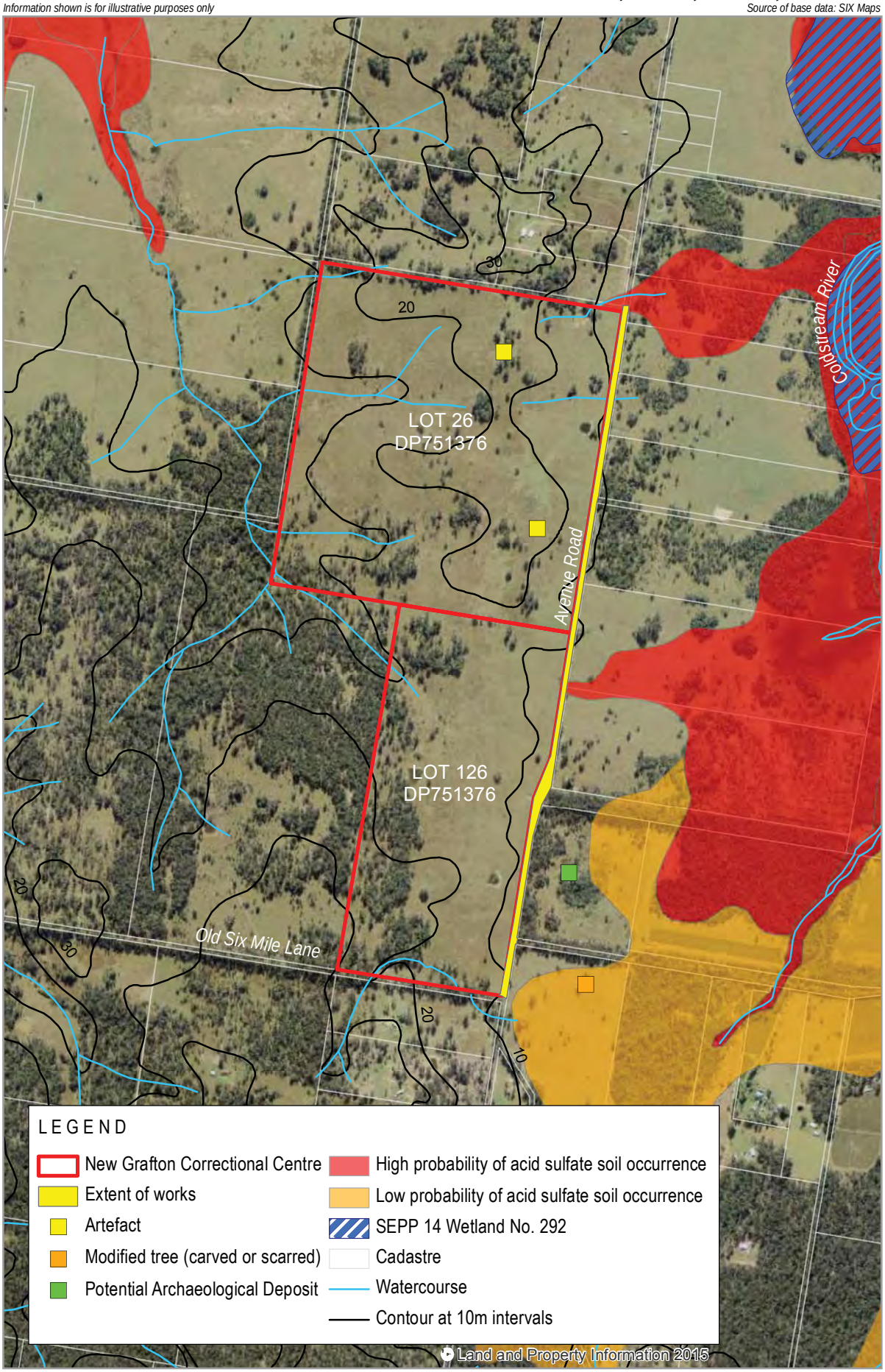

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North

Environmental Constraints

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Review of Environmental Factors
New Grafton Correctional Centre - Avenue Road Upgrade
2736-1026

Illustration 5.2

5.4 Water Quality

5.4.1 Existing Environment

The proposed Avenue Road upgrade works are not proximate to any waterways with the exception of ephemeral drainage lines that intersect Avenue Road via culverts (refer to **Illustration 5.2**). These culverts were observed to mainly be 300 mm diameter and designed to take overland flow. Coldstream River is approximately 700 m to the east of the works at its nearest point.

With the exception of a number of farm dams, the closest being approximately 40 m from the proposed works, there are no other waterbodies proximate to the proposed works. The proposed upgrade area is outside the 1:20 ARI flood zone.

5.4.2 Potential Impacts

The Proposal presents a low risk to the waterways and wetlands that are adjacent to the proposed works. There is potential for impact to water quality of waterways and wetlands from erosion and sedimentation caused by the proposed earthworks associated with the road upgrade. Construction activities that could present a risk to waterways or sensitive environments in the broader landscape include ground disturbance, erosion and sedimentation and accidental chemical spills such as fuels, oils and solvents from use of plant and equipment on-site.

Hydraulic characteristics associated with the existing culverts could be altered by the proposed works. Culvert extension would therefore be designed and constructed to ensure conveyance characteristics of the ephemeral drainage lines are maintained at the existing capacity to prevent blockages.

With appropriate controls in place during construction, the Proposal is considered unlikely to present significant risk to waterways and wetlands in the area. Post construction, the Proposal would not have any potential to negatively impact water quality above or beyond the current situation.

5.4.3 Safeguards and Management Measures

The following measures (in addition to erosion and sediment control measures listed in **Section 5.3.3**) will be implemented in order to prevent adverse impacts relating to water quality:

33. Culvert extension will be designed and constructed to ensure conveyance characteristics of the ephemeral drainage lines are maintained at the existing capacity to prevent blockages.
34. A spill containment kit will be available at all times. All personnel will be made aware of the location of the kit and trained in its effective deployment.
35. Any required fuels and other liquids will be stored in self-safe chemical storage containers.
36. All refuelling of plant and equipment will be undertaken in appropriately designated areas.
37. Cleaning of tools and equipment will occur off site.
38. All equipment will be maintained in good working order and operated according to manufacturer's specification.
39. No waste and/ or wastewater will be discharged directly or indirectly in drains or waterways.
40. The EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on 131 555).

5.5 Non-Aboriginal Heritage

5.5.1 Existing Environment

Searches of the Department of Environment and Energy Australian Heritage database, OEH State Heritage Branch database and Schedule 5 of the CVLEP 2011 were undertaken on 19 April 2017 in relation to the Proposal (refer to **Appendix C**). Only those results within or proximate to the proposed works are discussed below.

The Australian Heritage database lists Crowsnest Swamp Area, Deep Creek Road ((class: natural; Legal status: indicative place) within the Register of the National Estate. The register notes that this site is an '*Extensive wetland in good condition*'.

5.5.2 Potential Impacts

The Proposal presents some (manageable) risks to wetlands that are adjacent to the proposed works. Impacts to wetland areas from the Proposal can be appropriately managed with environmental safeguards to minimise any risk to the values of the listed wetlands.

The Proposal is considered to present low risk to Non-Aboriginal heritage; the Proposal would not represent a risk to any known heritage sites.

5.5.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to prevent adverse impacts to any items of non-Indigenous heritage:

41. If any suspected archaeological items are uncovered during the works, all works will cease in the vicinity of the material/ find. Contact with NSW OEH Heritage Branch will be made immediately.

5.6 Aboriginal Heritage

5.6.1 Existing Environment

Searches of the Office of the Environment and Heritage AHIMS were undertaken on 4 May 2017. An initial 'Basic Search' covering the area of proposed works plus a 50 m buffer indicated that four aboriginal sites are recorded in or near the search area. An 'Extensive Search' of the same areas was subsequently undertaken and indicated that the aforementioned aboriginal sites are between 150 m east and 375 m west of the proposed works area (refer to **Illustration 5.2**). The AHIMS searches are provided in **Appendix D**.

5.6.2 Potential Impacts

The Proposal is considered to present low risk to Aboriginal heritage, given the existing disturbed nature of the site and there are no registered items or objects of Aboriginal cultural heritage within the proposed works footprint.

5.6.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to prevent adverse impacts to any items of Aboriginal heritage:

42. If Aboriginal cultural material is identified on site, a Stop Work Procedure will be followed, which includes:
    - Works will cease immediately.
    - A temporary exclusion zone established.
    - Local Aboriginal Land Council contacted immediately.
    - OEH contacted immediately.
43. Aboriginal human remains – should skeletal material be exposed during ground disturbance, work will cease immediately and contact made with NSW Police, National Parks and Wildlife and the Local Aboriginal Land Council as per OEH requirements.
44. Notifying OEH – it is a legislative requirement that cultural heritage materials uncovered as a result of the Proposal are registered as Aboriginal sites with OEH on the AHIMS database within the required timeframe.

5.7 Noise and Vibration

5.7.1 Existing Environment

The land to the west of Avenue Road (within the proposed upgrade section) is currently associated with agricultural use and will be the site of the proposed NGCC. To the west of the proposed road upgrade, the land is partially cleared for agriculture. There are no private dwellings within 400 m of the proposed works. The existing background noise is typical for a rural area and includes local vehicle traffic noise and agricultural noises associated with farm machinery and livestock.

5.7.2 Potential Impacts

Noise from the Proposal would be typical of that associated with construction work and would be generated by machinery and equipment, vehicles and tree removal. Noise and possibly vibration emissions within the immediate area have the potential to affect residences; however, given the nearest property to the works is greater than 400 m to the north-west of the northern most extent of the proposed works, impacts are considered unlikely. Furthermore, the works area is linear so that the duration of any noise exposure to this nearest residence would be short lived.

Construction traffic would use the existing local road network, with traffic numbers likely to be small enough to be absorbed into general traffic numbers without an audible change in noise level.

Under the EPA's Interim Construction Noise Guidelines (NSW EPA 2009):

- The noise management level for works during the recommended standard hours is background + 10 dB(A). Above this noise level, the proponent needs to implement all feasible and reasonable work practices, as defined in the Guideline, to minimise noise impacts;
- For works outside the recommended standard hours, the noise management level is background + 5 dB(A); and

- The highly noise-affected level of LAeq 75 dB(A) represents the point above which there may be strong community reaction to noise and indicates a need to consider other feasible and reasonable ways to reduce noise, such as restricting the times of very noisy works to provide respite to affected residences.

The NSW EPA website suggests that review of predicted noise levels for some recent major construction projects indicated that a level of 75 dB(A) would not likely be triggered on many projects. Given the scale, location and methodology of the proposed works, it is unlikely that the Proposal would result in a highly noise-affected level of LAeq 75 dB(A) at any local sensitive receiver.

Overall, no significant short term or long term adverse noise and vibration impacts are expected to result from the Proposal and reasonable safeguard and management measures can be implemented to ensure no adverse impacts.

5.7.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to address adverse impacts relating to noise and vibration:

45. Construction activities will be undertaken in accordance with EPA recommended standard construction hours:
    - Monday to Friday 7 am to 6 pm;
    - Saturday 8 am to 1 pm;
    - No work on Sundays or public holidays.
46. Any noise complaints will be recorded and include suitable identification/ description of the noise source (e.g. continual/ impulsive) and general location of the complaint. Any noise complaints will be investigated and actioned as required.
47. The CEMP will include controls relevant to management of noise and vibration specific to the proposed works.
48. All vehicles and equipment will be turned off and not left idling when not required for work uses.
49. All plant will be fitted with appropriate exhaust systems to ensure compliance with pollution and noise emission standards.

5.8 Air Quality

5.8.1 Existing Environment

The Proposal is located in a predominantly rural context. Potential airborne particles within the locality are largely restricted to agricultural activities, vehicle emissions and minor dust generated by vehicle movements in the broader landscape.

5.8.2 Potential Impacts

The Proposal may temporarily affect air quality through exhaust emissions from machinery and associated transportation. There may also be minor dust generated during excavations and the removal of trees. The nearest sensitive receiver is a residence greater than 400 m to the north-west of the northern most extent of the proposed works. It is considered unlikely that emissions and dust generated from the works would result in air quality impacts to this receiver (or receivers further afield)

especially given the temporary duration of the works. Regardless, impacts to air quality would be managed or minimised through implementation of safeguards and management measures.

5.8.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to prevent adverse impacts relating to air quality:

50. Vegetation or other materials will not to be burnt on site.
51. Vehicles transporting waste or other materials that may produce odours or dust will be covered during transportation.
52. Construction works will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.
53. Machinery and vehicles not in use during construction will be turned off and not left to unnecessarily run idle.
54. Vehicles, machinery and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.

5.9 Visual Environment

5.9.1 Existing Environment

The proposed works lie predominantly within gently undulating flood plains. The visual environment is predominantly of a rural landscape.

5.9.2 Potential Impacts

During construction there may be minor visual impacts associated with views of construction plant, equipment and construction site activities. Given the low profile of the road, any visual changes or impacts to the landscape associated with the works after completion are considered negligible. There would be some visual impact associated with the removal of trees from within the road reserve. Given these trees do not represent a well-defined natural screening effect for any particular receiver (e.g. residence), nor do they represent an important scenic context of vista; their removal is not expected to contribute to any long term visual issues.

5.9.3 Safeguards and Management Measures

The following measures will be implemented in order to prevent and/ or minimise adverse impacts relating to visual amenity:

55. Vegetation will only be cleared to the minimum extent necessary to undertake the proposed works.
56. Upon completion of the works, any works areas will be restored to an acceptable visual state.
57. All sites will be maintained, kept free of rubbish and cleaned up at the end of each work day.

5.10 Land Use and Property

5.10.1 Existing Environment

The proposed Avenue Road upgrade works are within CVC road reserve. The works would intersect three existing private property accesses.

5.10.2 Potential Impacts

Potential impacts to land use and property is considered low given:

- Works are restricted to the road reserve.
- Access to privately owned property would be maintained at all times.
- Negligible effect on land use resulting from proposed works.

5.10.3 Safeguards and Management Measures

Refer to management measures listed in **Section 5.2** (Traffic and Access) regarding maintaining unencumbered access to private properties (unless otherwise agreed in advance with the landowner) throughout the works and matching ground levels of existing driveways to ensure no change in access conditions.

5.11 Socio-economic

5.11.1 Existing Environment

The land to the west of Avenue Road (within the proposed upgrade section) is currently associated with agricultural use and would be the site of the NGCC. To the east of the proposed upgrade, the land is partially cleared agricultural area. There are no residences within 400 m of the proposed works.

5.11.2 Potential Impacts

The Proposal is unlikely to cause any negative socio-economic impacts. There is unlikely to be any significant disruption to traffic or access during construction.

The Proposal would result in positive socio-economic outcomes as it would support the operation of the NGCC in the long term. The long-term community benefit resulting from the Proposal would outweigh any potential short-term effects or disturbances. Given the nature of the Proposal, the site context and temporary construction period, no adverse long-term socio-economic impacts are anticipated.

5.11.3 Safeguards and Management Measures

The following mitigation measures will be implemented in order to prevent adverse socio-economic impacts:

58. Contractors/ workers will be mindful of the needs of the local community.

59. Any potentially impacted parties or landholders will be consulted prior to construction with a goal of minimising or eliminating any adverse impacts.
60. Any changes to public or private roads (including private driveways) as a result of the works will be reinstated to an acceptable standard upon completion of the works.

5.12 Waste

5.12.1 Potential Impacts

The Proposal would be undertaken to ensure minimal impacts are generated from waste produced on site by ensuring that all waste is managed appropriately. Waste generated from the Proposal may include, but is not limited to:

- Packaging materials;
- General site rubbish;
- Oils and grease from machinery;
- Soil spoils; and
- General building materials waste.

5.12.2 Safeguards and Management Measures

Measures to prevent adverse impacts in relation to generated waste will include:

61. Working areas will be maintained, kept free of rubbish and cleaned up at the end of each day.
62. Waste material will not be left on site once the works have been completed.
63. Ensure the responsible environmental management of wastes that cannot be avoided and promote opportunities for the re-use of waste products where appropriate.
64. Waste will be disposed of at a licensed waste or recycling facility as appropriate.

5.13 Climate Change

5.13.1 Existing Environment

Climate change associated with global warming resultant from human activities and the creation of greenhouse gases affects the environment.

5.13.2 Potential Impacts

The Proposal would contribute to carbon emissions and climate change to a minor extent via the emissions of carbon dioxide by construction equipment and traffic as well as the consumption of materials requiring carbon emissions and the removal of vegetation that may otherwise act as a carbon sink. Given the scale of the works however, the influence on climate change would be negligible. However, it is appropriate to implement measures that can reduce or minimise such effects.

5.13.3 Safeguards and Management Measures

Mitigation measures to prevent adverse impacts in relation to climate change will include:

65. Vehicles and equipment will be switched off when not required for direct construction activities.
66. Waste will be minimised and is otherwise to be recycled or disposed of appropriately.

5.14 Cumulative Impacts

Under Clause 228 of the Environmental Planning and Assessment Regulation 2000, any cumulative environmental effect with other existing or likely future activities must be taken into account when assessing the impact of an activity for the purposes of Part 5 of the EP&A Act.

The Proposal is expected to add to a number of cumulative impacts including resource consumption, vegetation clearing and generation of greenhouse gas emissions (eg. through operation of vehicles and equipment). However, the mitigation measures stated within **Section 5** and the methodology for completion of the Proposal aim to minimise the extent to which the Proposal contributes to cumulative adverse environmental impacts.

5.15 Ecologically Sustainable Development

The principles of ecologically sustainable development are outlined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000, in relation to EIS requirements. Whilst an EIS is not required for this project, a consideration of these principles is useful.

5.15.1 Precautionary Principle

Schedule 2 of the Environmental Planning and Assessment Regulation 2000 states that “the ‘precautionary principle’, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
ii) an assessment of the risk-weighted consequences of various options”.

To satisfy the precautionary principle, this REF has conducted a thorough analysis of potential environmental, economic and social concerns. This assessment has identified and examined potential impacts and developed appropriate mitigation measures and safeguards to help avoid and/or minimise any impacts and safeguard the environment. Considering this assessment’s findings, the Proposal is unlikely to impose significant and/ or long-term adverse impacts on the environment, economy, or community. The mitigation measures and safeguards outlined in this REF would be implemented to ensure sound environmental outcomes in all aspects of the Proposal.

5.15.2 Intergenerational Equity

Schedule 2 of the Environmental Planning and Assessment Regulation 2000 defines inter-generational equity as “the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations”.

The Proposal would not significantly affect the viability of local or threatened species, or any EECs. Therefore local biodiversity values would not be substantially adversely affected by the Proposal and would be maintained for future generations.

5.15.3 Conservation of Biological Diversity and Ecological Integrity

Schedule 2 of the Environmental Planning and Assessment Regulation 2000 requires the “conservation of biological diversity and ecological integrity”, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

The impacts to ecological integrity and conservation of biological diversity at the site have been thoroughly assessed as part of this REF. No threatened species, endangered populations or EECs are likely to be significantly affected by the Proposal. No populations of native species are likely to be made locally rare or unviable as a result of the Proposal. Consequently the ecological integrity and biological diversity would be maintained at the site.

5.15.4 Improved Valuation, Pricing and Incentive Mechanisms

The following principles of valuation, pricing and incentive as per Schedule 2 of the Environmental Planning and Assessment Regulation 2000 are acknowledged as part of this review:

i) Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement.
ii) The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.
iii) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

It is difficult, however, to assign a monetary value to the environment of a locality or to environmental resources not considered for commercial use. The proponent has taken an approach to manage the potential environmental impacts of the Proposal by identifying appropriate safeguards to avoid or mitigate adverse environmental effects. This would ensure that the integrity of the environment is not degraded, is managed and enhanced.

6. Environmental Management

Table 6.1 provides a summary of the mitigation measures and safeguards detailed in this report that would be implemented.

Table 6.1 Summary of Mitigation Measures and Safeguards

Environmental Attribute	*Mitigation Measures/ Safeguards*
Ecology	1. Two-stage clearing procedure will be undertaken (with ecologist present) when habitat trees are to be removed. This involves: • Pre-clearing checks. • Stage 1 clearing where non-habitat trees and underscrub are cleared 24 hours prior to the habitat tree being removed. • Pre-clearing checks. • Stage 2 clearing where the habitat tree is bumped, watched then carefully felled in the presence of an ecologist. 2. Retain trees (including habitat trees) wherever possible. 3. Nest boxes will be installed to compensate for habitat trees removed. It is recommended that 23 nest boxes be installed within retained forest within the NGCC land. 4. If a Koala or threatened fauna is found to be occupying a tree at the site, a flagged exclusion zone will be established (minimum 50 m) in which works will not proceed until the individual has moved from the site. 5. Temporary erosion and sediment control devices such as silt fencing will be installed and maintained, where required. 6. A spill containment kit, including equipment to address both terrestrial and aquatic spills, will be kept on site at all times during the proposed works. Staff will also be trained in the effective deployment of the spill containment kit. 7. Ground disturbance outside of that required to undertake the proposed works will be minimised. 8. Damage to trees outside of those that require clearing will be avoided at all times. 9. Stockpiling will not occur under the crown of existing native trees (i.e. the crown comprises the full width of the branches). 10. Stockpiling will not occur near drainage lines or on overland flow paths, and where necessary will be bunded or covered to reduce sediment runoff. 11. Trees will be felled in a way that minimises disturbance to adjacent retained native vegetation. 12. Works will be completed sensitively to ensure minimal disturbance occurs. 13. All vegetation removed will be chipped and removed from the site, unless hollow-bearing limbs can be set aside for placement within NGCC forested land. 14. No vegetation waste will be burnt. 15. Any materials to be removed from the site will be taken to a licensed waste facility for disposal or recycling. 16. All plant, equipment and personnel will be free of soil and potential

Environmental Attribute	*Mitigation Measures/ Safeguards*
	weed propagules prior to being brought to the site. 17. Should injured fauna be found on the site, local wildlife care groups and/ or local veterinarians will be contacted immediately and arrangements made for the immediate welfare of the animal. The phone number of the local WIRES group (ph: 1800 094 737) will be known to the project foremen. 18. Environmental safeguards will be communicated to all construction personnel as part of an Environmental Site Induction, and repeated where appropriate at toolbox sessions prior to commencement of relevant work components.
Traffic and Access	19. Unencumbered access to a number of private properties along Avenue Road will be maintained (unless otherwise agreed in advance with the landowner) throughout the works and all driveway accesses of Avenue Road will be matched to the existing driveways. 20. In the unlikely event of a requirement to alter existing access or close a road, sufficient and appropriate notification will be provided to the affected traffic users. 21. Regard to public safety will be maintained at all times.
Soils, Erosion and Sedimentation	22. Erosion and sediment controls will be implemented in accordance with the Landcom/ Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book). 23. Works will be carefully managed in accordance with an Acid Sulfate Soils Management Plan, to manage risks associated with exposure of actual and/ or potential acid sulfate material, especially in proximity to the two areas identified in **Illustration 5.2** as having a high probability of Acid Sulfate Soil. 24. Any unsuitable excavated material/ waste will be classified, managed appropriately (in accordance with the CEMP) including placement in approved stockpile locations, approved landfill facilities or Acid Sulfate Soil treatment facilities as appropriate. 25. Work will not commence prior to installation of appropriate sediment control structures. 26. Imported materials will be sourced as clean-fill from an approved site. 27. Disturbance of natural sediments and vegetation will be minimised. 28. In the event that unexpected contaminated land is encountered during the works, works will stop immediately and relevant procedures outlined in a CEMP will be followed. 29. Erosion and sedimentation controls will be checked and maintained (including clearing of sediment from behind barriers) on a regular basis (including after any precipitation events) and records kept and provided on request. 30. Works will cease and all erosion and sedimentation controls checked and repaired or re-installed (if required) if heavy rainfall was forecast. 31. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site. 32. Erosion and sediment control measures will not be removed until the works are complete or disturbed areas are stabilised.
Water Quality	33. Culvert extension will be designed and constructed to ensure conveyance characteristics of the ephemeral drainage lines are

Environmental Attribute	Mitigation Measures/ Safeguards
	maintained at the existing capacity to prevent blockages. 34. A spill containment kit will be available at all times. All personnel will be made aware of the location of the kit and trained in its effective deployment. 35. Any required fuels and other liquids will be stored in self-safe chemical storage containers. 36. All refuelling of plant and equipment will be undertaken in appropriately designated areas. 37. Cleaning of tools and equipment will occur off site. 38. All equipment will be maintained in good working order and operated according to manufacturer's specification. 39. No waste and/ or wastewater will be discharged directly or indirectly in drains or waterways. 40. The EPA will be notified immediately in response to incidents causing or threatening actual or potential harm to the environment in accordance with section 148 of the POEO Act (via EPA Environment Line on 131 555).
Non-Aboriginal Heritage	41. If any suspected archaeological items are uncovered during the works, all works will cease in the vicinity of the material/ find. Contact with NSW OEH Heritage Branch will be made immediately.
Aboriginal Heritage	42. If Aboriginal cultural material is identified on site, a Stop Work Procedure will be followed, which includes: • Works will cease immediately. • A temporary exclusion zone established. • Local Aboriginal Land Council contacted immediately. • OEH contacted immediately. 43. Aboriginal human remains – should skeletal material be exposed during ground disturbance, work will cease immediately and contact made with NSW Police, National Parks and Wildlife and the Local Aboriginal Land Council as per OEH requirements. 44. Notifying OEH – it is a legislative requirement that cultural heritage materials uncovered as a result of the Proposal are registered as Aboriginal sites with OEH on the AHIMS database within the required timeframe.
Noise and Vibration	45. Construction activities will be undertaken in accordance with EPA recommended standard construction hours: • Monday to Friday 7 am to 6 pm; • Saturday 8 am to 1 pm; • No work on Sundays or public holidays. 46. Any noise complaints will be recorded and include suitable identification/ description of the noise source (e.g. continual/ impulsive) and general location of the complaint. Any noise complaints will be investigated and actioned as required. 47. The CEMP will include controls relevant to management of noise and vibration specific to the proposed works. 48. All vehicles and equipment will be turned off and not left idling when not required for work uses. 49. All plant will be fitted with appropriate exhaust systems to ensure compliance with pollution and noise emission standards.

Environmental Attribute	*Mitigation Measures/ Safeguards*
Air Quality	50. Vegetation or other materials will not to be burnt on site. 51. Vehicles transporting waste or other materials that may produce odours or dust will be covered during transportation. 52. Construction works will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely. 53. Machinery and vehicles not in use during construction will be turned off and not left to unnecessarily run idle. 54. Vehicles, machinery and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.
Visual Environment	55. Vegetation will only be cleared to the minimum extent necessary to undertake the proposed works. 56. Upon completion of the works, any works areas will be restored to an acceptable visual state. 57. All sites will be maintained, kept free of rubbish and cleaned up at the end of each work day.
Socio-economic	58. Contractors/ workers will be mindful of the needs of the local community. 59. Any potentially impacted parties or landholders will be consulted prior to construction with a goal of minimising or eliminating any adverse impacts. 60. Any changes to public or private roads (including private driveways) as a result of the works will be reinstated to an acceptable standard upon completion of the works.
Waste	61. Working areas will be maintained, kept free of rubbish and cleaned up at the end of each day. 62. Waste material will not be left on site once the works have been completed. 63. Ensure the responsible environmental management of wastes that cannot be avoided and promote opportunities for the re-use of waste products where appropriate. 64. Waste will be disposed of at a licensed waste or recycling facility as appropriate.
Climate Change	65. Vehicles and equipment will be switched off when not required for direct construction activities. 66. Waste will be minimised and is otherwise to be recycled or disposed of appropriately.

7. Summary of Consideration of Environmental Factors

7.1 Clause 228 Checklist (NSW Legislation)

As part of its obligation under Section 111 of the EP&A Act, the determining authority is required to take into account, to the fullest extent possible, all matters likely to affect the environment. The determining authority is required by Clause 228 of the Environmental Planning and Assessment Regulations 2000 to give consideration to a number of factors that are listed below. Table 7.1 provides a summary of the key issues relevant to each factor and the key mitigation measures proposed.

Table 7.1 Clause 228 Checklist (NSW Legislation)

	Factor	*Impact*
a	**Any Environmental Impact on a Community**	
	The community would not be affected through declines in the local environment as a result of the Proposal. Mitigation measures have been designed to reduce environmental impacts on the community to negligible levels (refer to **Section 5**).	Nil
b	**Any Transformation of a Locality**	
	The proposed works involve upgrade of a section of public road with works restricted to the road reserve. Tree removal would be the main visual change; however, the visual impacts of the Proposal are not expected to be significant.	Minor
c	**Any Environmental Impact on the Ecosystems of the Locality**	
	The ecosystems of the locality would not be affected through declines in local environmental values (e.g. biodiversity, physical environment) as a result of the Proposal. Extensive mitigation measures have been designed to reduce environmental impacts (refer to **Section 5**).	Nil
d	**Any Reduction of the Aesthetic, Recreational, Scientific or Other Environmental Quality or Value of a Locality**	
	It is not expected that a reduction in the scientific quality of the locality would occur due to the Proposal in the long term. No reduction in the quality of the environment would occur due to the mitigation measures detailed in **Section 5** of this REF. No significant changes of the locality are expected to occur.	Nil Nil
e	**Any Effect on A Locality, Place or Building Having Aesthetic, Anthropological, Archaeological, Architectural, Cultural, Historical, Scientific or Social Significance or Other Special Value for Present or Future Generations**	
	The site is within a rural area and the Proposal is not expected to impact the existing land uses. There will be no significant impacts to heritage, visual amenity or social significance and as such impacts are therefore considered to be negligible.	Negligible
f	**Any Impact on the Habitat of Protected Fauna (Within the Meaning of the National Parks and Wildlife Act 1974)**	
	With effective implementation of the safeguards provided in **Section 5** of this REF, the Proposal is not considered likely to have a significant negative impact on the habitat of any other protected fauna.	Nil

	Factor	*Impact*
g	**Any Endangering of any Species of Animal, Plant or Other Form of Life Whether Living on Land, in Water or in the Air**	
	With effective implementation of the safeguards provided in **Section 5** of this REF, the Proposal is not considered likely to significantly endanger any species of animal, plant or other form of life.	Nil
h	**Any Long Term Effects on the Environment**	
	No negative long term impacts would occur in the locality given the implementation of the proposed safeguards and measures in **Section 5** of this REF.	Nil:
i	**Any Degradation of the Quality of the Environment**	
	Degradation of the quality of the environment is not expected. Given the safeguards in **Section 5** of this REF, any impacts are considered unlikely.	Nil
j	**Any Risk to the Safety of the Environment**	
	No negative long term impacts would occur in the locality given the implementation of the proposed measures in **Section 5** of this REF.	Nil
k	**Any Reduction in the Range of Beneficial Uses of the Environment**	
	The proposed works would not result in any reduction in the range of beneficial uses of the environment.	Nil
l	**Any Pollution of the Environment**	
	The proposed works may adversely affect air quality during construction. The mitigation measures determined in **Section 5** would minimise the duration and impact. Once construction is complete, the installation is not expected to adversely impact on air quality. No reduction in the quality of the environment associated with water would occur due to the mitigation measures detailed in **Section 5** of this REF. Waste materials, fuel spills and particulate matter have the potential to cause pollution to the environment. However, given the proposed safeguards detailed in **Section 5** of this REF and all waste being disposed within an appropriate/ approved waste disposal facility, pollution to the environment would be minimised.	Minor Nil Minor
m	**Any Environmental Problems Associated with the Disposal of Waste**	
	Any wastes would be disposed of in a manner which would not damage or disturb any native flora or fauna or the physical environment. The disposal of such waste would be within a waste management facility in accordance with OEH approved methods of waste disposal. Safeguards detailed in **Section 5** of this REF would protect the environment from problems associated with waste disposal.	Nil
n	**Any Increased Demands on Resources (Natural or Otherwise) that are likely to Become in Short Supply**	
	The project does not create any demand for resources that are in short supply nor is it likely to result in an increased demand on any natural resources that are likely to become in short supply.	Nil
o	**Any Cumulative Environmental Effect with Other Existing or Likely Future Activities**	
	The proposed works are unlikely to have any significant impact on the environment, therefore would not contribute to any cumulative impacts.	Nil

7.2 EPBC Act 1999 (Commonwealth Legislation)

The EPBC Act protects/ regulates matters of national environmental significance (MNES), including:

- World heritage properties.
- National heritage places.
- Wetlands of international importance.
- Nationally threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land'. Database searches were completed in May 2017 encompassing a 1 km radius search area from the proposed works (refer to **Appendix E**). Search results following the site assessment are considered in **Table 7.2**.

Table 7.2 EPBC Act Considerations

Matter	*Impact*
Any impact on a World Heritage property?	
No World Heritage properties occur within 10 km of the site.	Nil
Any impact on a National Heritage place?	
No National Heritage places occur within 10 km of the site.	Nil
Any impact on a wetland of international importance?	
No wetlands of international importance (Ramsar Sites) occur within 10 km of the site.	Nil
Any impact on nationally threatened species and ecological communities?	
Habitat for two threatened ecological community, 36 threatened species and 23 marine species is identified within 10 km of the site. The vegetation present does not conform to the definition of any federally listed threatened ecological communities, and no federally listed threatened flora or fauna species were recorded. Based on the minor nature of the works, no listed threatened species or communities are likely to be significantly affected by the Proposal.	Negligible
Any impact on Migratory species?	
Thirteen migratory species (or their habitat) are known to or have potential to occur within 10 km of the site. Based on the minor nature of the works, no listed migratory species are likely to be significantly affected by the Proposal (refer to **Section 5**).	Negligible
Any impact on a Commonwealth marine area?	
No Commonwealth marine areas occur within 10 km of the site.	Nil
Any impact on the Great Barrier Reef Marine Park?	
The Great Barrier Reef Marine Park is distant from the site.	Nil
Does the Proposal involve a nuclear action (including uranium mining)?	
The Proposal does not involve a nuclear action.	Nil

Matter	*Impact*
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	
The Proposal does not involve any impact on a water resource, in relation to coal seam gas development and large mining development.	Nil

The assessment of the impact of the Proposal on MNES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant MNES. Accordingly, the Proposal has not been referred to the Australian Government Department of the Environment and Energy.

8. Conclusion

All relevant statutory planning instruments have been examined in relation to the Proposal. Based on the review undertaken, the Proposal does not require development consent and is subject to environmental impact assessment (this REF) under Part 5 of the EP&A Act.

The proposed upgrade of Avenue Road is an important element of infrastructure to support the NGCC. The potential environmental impacts posed by the Proposal have been thoroughly examined through this REF. Some minor impacts would occur locally; however, it is unlikely that any significant or long-term adverse impacts would eventuate. To help ensure that the extent of impacts is limited and that unavoidable impacts likely to occur are managed and minimised, mitigation measures and safeguards have been developed and would be implement and monitored. These measures are provided in **Sections 5** and **6**.

The Proposal is considered justifiable taking into account the potential environmental impacts and subsequent mitigation measures and safeguards. The Proposal supports the establishment and operation of the NGCC. The Proposal is in accordance with ESD principles and consistent with the objectives of the EP&A Act.

Certification

This Review of Environmental Factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Proposal.

Signature:

Veronica Silver

Senior Ecologist/ Planner/ Project Manager

GeoLINK

Date: 18 May 2017

I have examined this Review of Environmental Factors and the certification by Veronica Silver and accept the Review of Environmental Factors on behalf of CVC.

Signature:

Name:

Title:

Date:

References

Northcote, K. H. with Beckmann, G. G., Bettenay, E., Churchward, H. M., Van Dijk, D. C., Dimmock, G. M., Hubble, G. D., Isbell, R. F., McArthur, W. M., Murtha, G. G., Nicolls, K. D., Paton, T. R., Thompson, C. H., Webb, A. A. and Wright, M. J. (1960-1968). *Atlas of Australian Soils*, *Sheets 1 to 10*. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne).

NSW EPA (2009). *Interim Construction Noise Guideline* [Online]. Available (http://www.epa.nsw.gov.au/resources/noise/09265cng.pdf) [Assessed March 2017].

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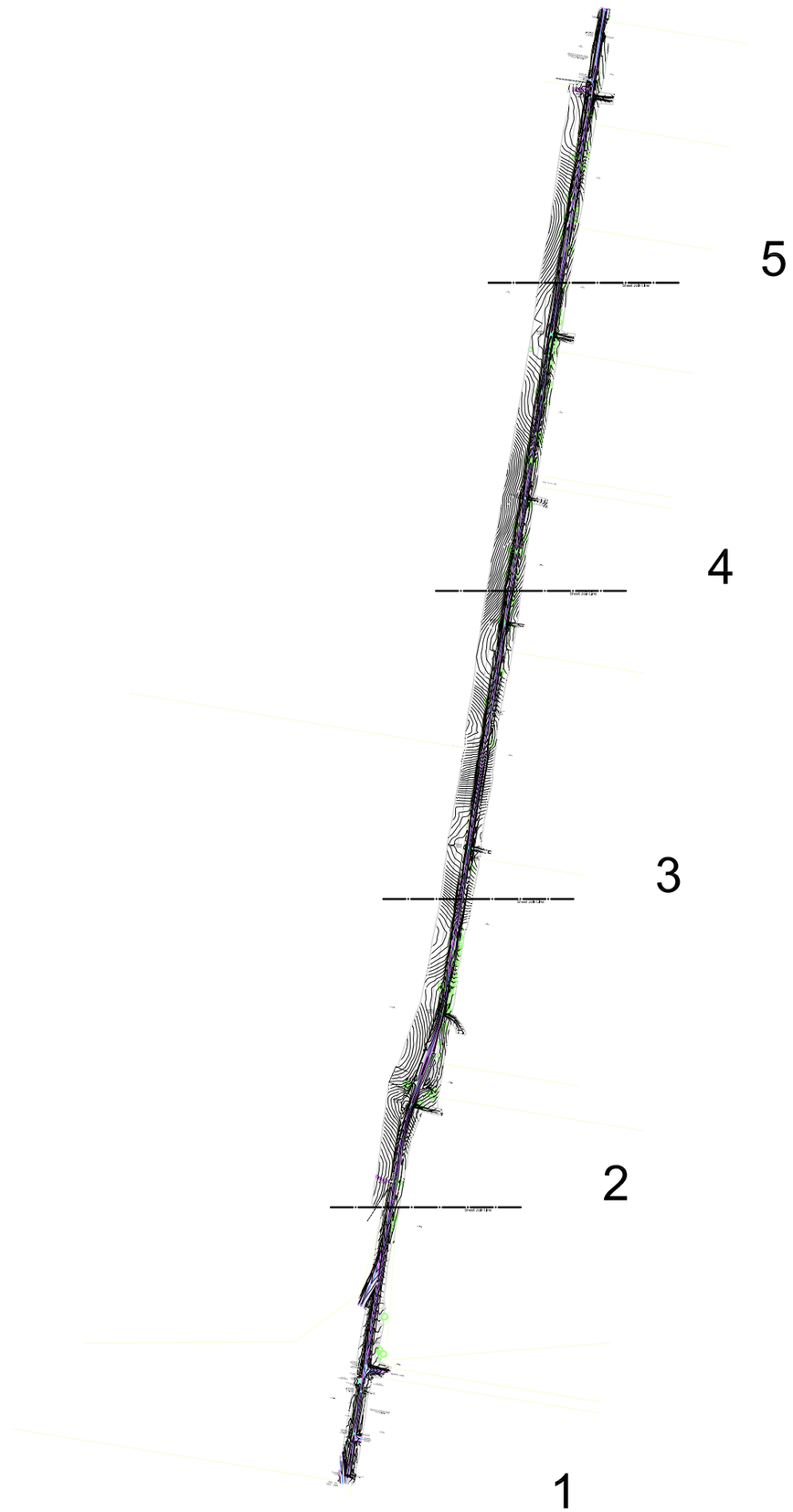
Appendix A

Drawings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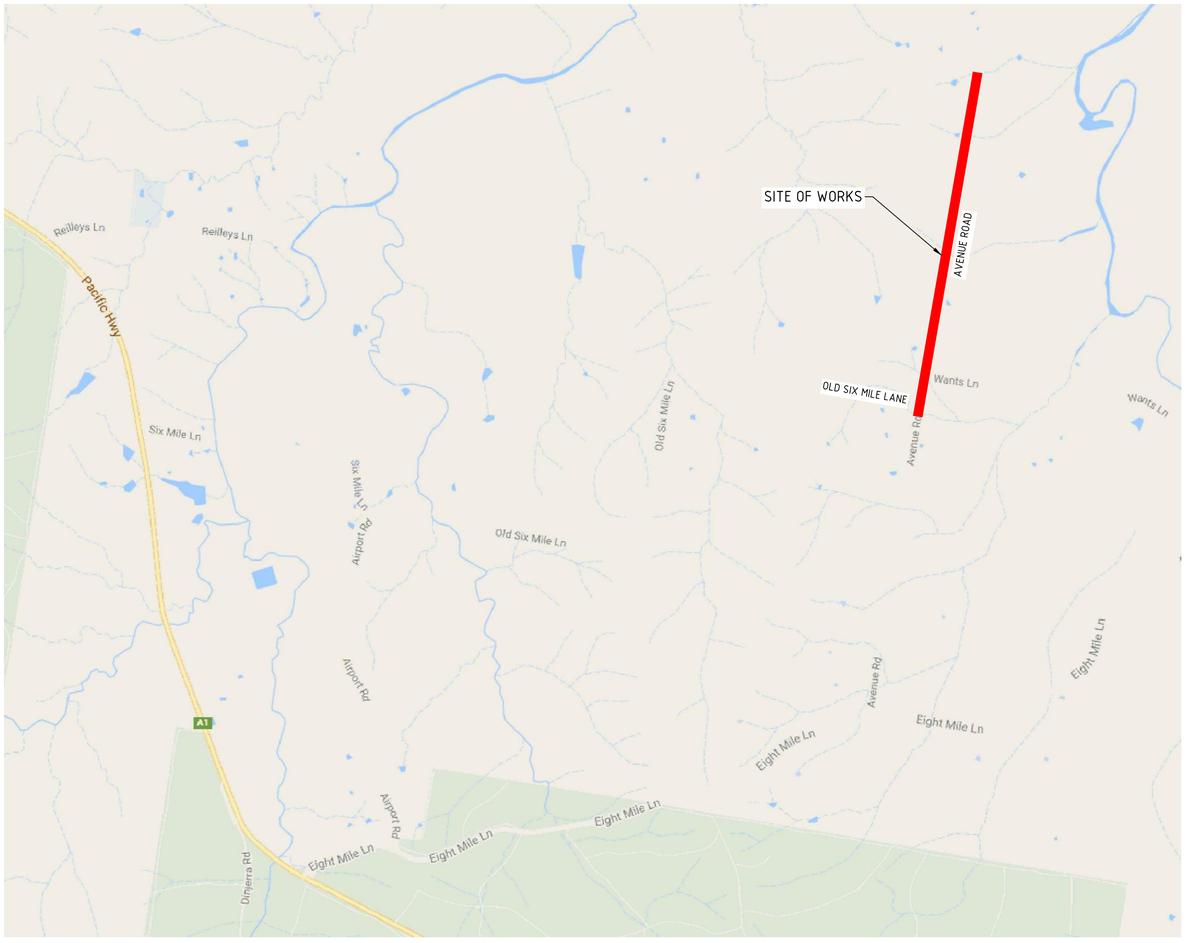
202183601C - AVENUE ROAD UPGRADE, TUCABIA

DRAWING No.	DESCRIPTION
202183601C-C200	DRAWING REGISTER AND CONSTRUCTION NOTES
202183601C-C205	TYPICAL DETAILS
202183601C-C230	ROAD DETAIL PLAN AND LONG SECTION MC50 – CH 2340 TO CH 3020 SHEET 1 OF 4
202183601C-C231	ROAD DETAIL PLAN AND LONG SECTION MC50 – CH 3020 TO CH 3700 SHEET 2 OF 4
202183601C-C232	ROAD DETAIL PLAN AND LONG SECTION MC50 – CH 3700 TO CH 4380 SHEET 3 OF 4
202183601C-C233	ROAD DETAIL PLAN AND LONG SECTION MC50 – CH 4380 TO CH 5025 SHEET 4 OF 4
202183601C-C240	ROAD CROSS SECTIONS – MC50 CH 2360 TO CH 2660 SHEET 1 OF 9
202183601C-C241	ROAD CROSS SECTIONS – MC50 CH 2680 TO CH 2980 SHEET 2 OF 9
202183601C-C242	ROAD CROSS SECTIONS – MC50 CH 3000 TO CH 3300 SHEET 3 OF 9
202183601C-C243	ROAD CROSS SECTIONS – MC50 CH 3320 TO CH 3540 SHEET 4 OF 9
202183601C-C244	ROAD CROSS SECTIONS – MC50 CH 3560 TO CH 3780 SHEET 5 OF 9
202183601C-C245	ROAD CROSS SECTIONS – MC50 CH 3800 TO CH 4100 SHEET 6 OF 9
202183601C-C246	ROAD CROSS SECTIONS – MC50 CH 4120 TO CH 4420 SHEET 7 OF 9
202183601C-C247	ROAD CROSS SECTIONS – MC50 CH 4440 TO CH 4740 SHEET 8 OF 9
202183601C-C248	ROAD CROSS SECTIONS – MC50 CH 4760 TO CH 4950 SHEET 9 OF 9



LOCALITY PLAN

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Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: DRAWING REGISTER AND LOCALITY PLAN

PRELIMINARY

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Scale	-		
Date	DEC 2016		
Sheet	A1		

North

Project Ref	Drawing No	Rev
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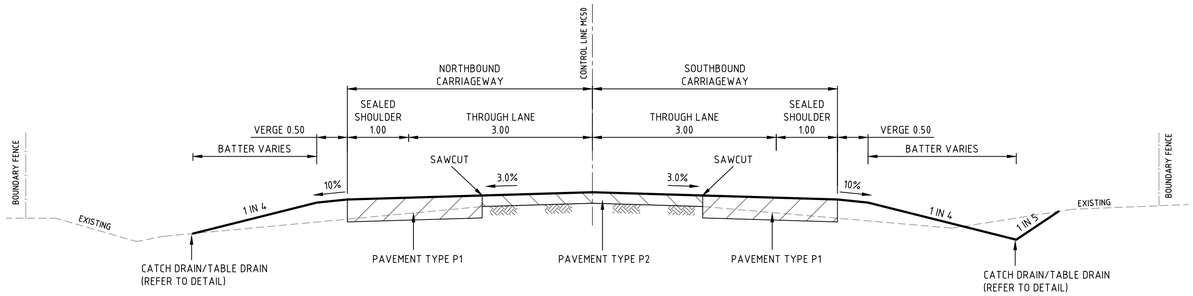

TYPICAL CROSS SECTION - AVENUE ROAD

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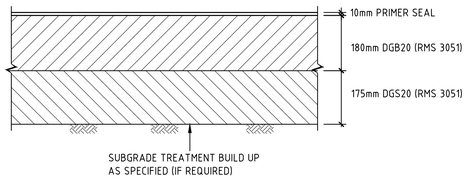

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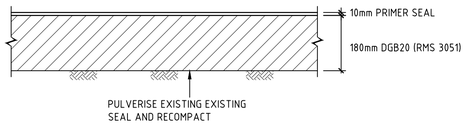

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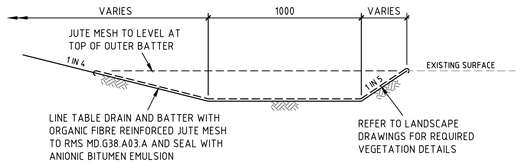

TABLE DRAIN DETAIL

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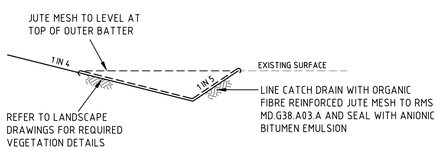

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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: TYPICAL DETAILS

PRELIMINARY

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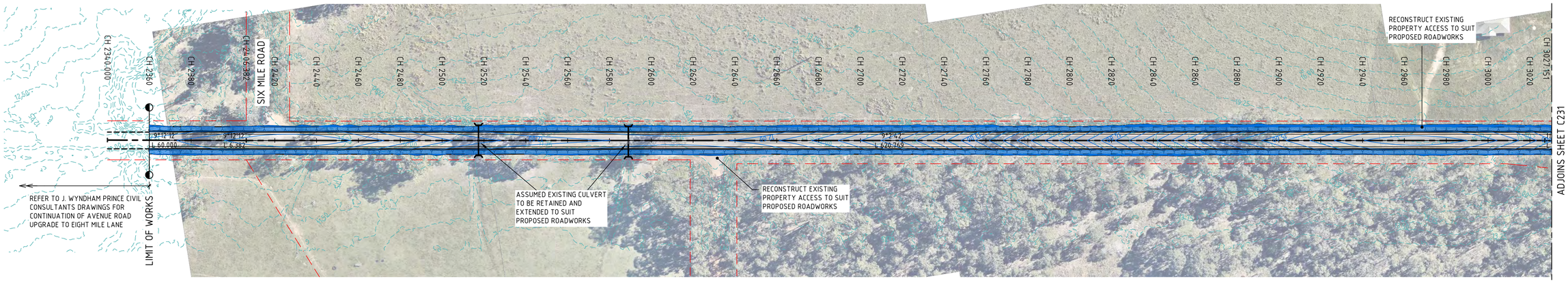
Date	DEC 2016
Sheet	A1

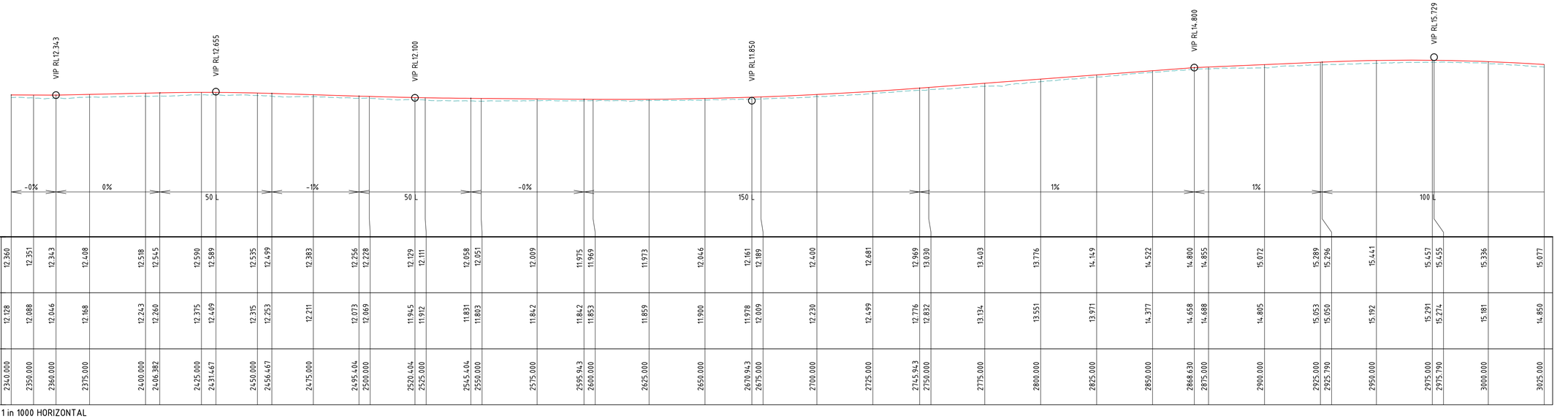
Project Director Approved | Date | North

Project Ref: 20 21836 01 | Drawing No: C205 | Rev: P1



AVENUE ROAD DETAIL PLAN

SCALE 1:1000 — 0m 10m 20m 40m 60m



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2350.000	12.351	12.088
2360.000	12.343	12.046
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2406.382	12.545	12.260
2425.000	12.590	12.375
2431.467	12.589	12.409
2450.000	12.535	12.315
2456.467	12.499	12.253
2475.000	12.383	12.211
2495.404	12.256	12.073
2500.000	12.228	12.069
2520.404	12.129	11.945
2525.000	12.111	11.912
2545.404	12.058	11.831
2550.000	12.051	11.803
2575.000	12.009	11.842
2595.943	11.975	11.842
2600.000	11.969	11.853
2625.000	11.973	11.859
2650.000	12.046	11.900
2670.963	12.161	11.978
2675.000	12.189	12.009
2700.000	12.400	12.230
2725.000	12.681	12.499
2745.943	12.969	12.776
2750.000	13.030	12.832
2775.000	13.403	13.134
2800.000	13.776	13.551
2825.000	14.149	13.971
2850.000	14.522	14.377
2868.630	14.800	14.658
2875.000	14.855	14.688
2900.000	15.072	14.805
2925.000	15.289	15.053
2925.790	15.296	15.050
2950.000	15.441	15.192
2975.000	15.457	15.291
2975.790	15.455	15.274
3000.000	15.336	15.181
3025.000	15.077	14.850

1 in 1000 HORIZONTAL
1 in 200 VERTICAL

LONGITUDINAL SECTION - AVENUE ROAD - MC50

SCALE Hor. 1:1000 — 0m 10m 20m 40m 60m
Ver. 1:200 — 0m 2m 4m 8m 12m

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: ROAD DETAIL PLAN AND LONG SECTION MC50 - CH 2340 TO CH 3020 SHEET 1 OF 4

PRELIMINARY

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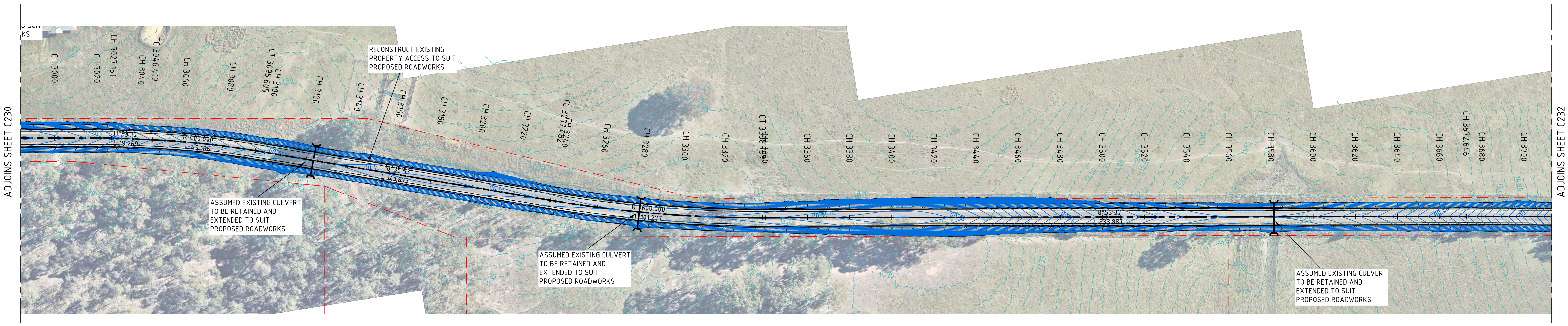
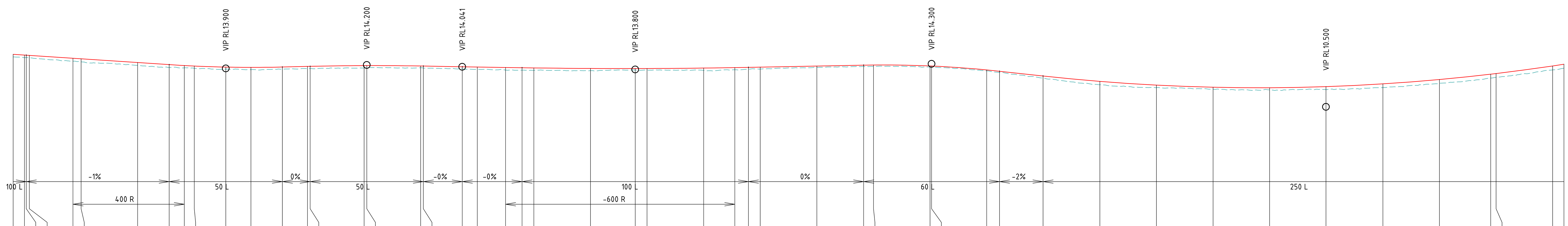


AVENUE ROAD DETAIL PLAN

SCALE 1:1000 (0m 10m 20m 40m 60m)



DESIGN GRADELINE
VERTICAL GEOMETRY
HORIZONTAL GEOMETRY

DATUM -0.1

CHAINAGES	DESIGN SURFACE	EXISTING SURFACE
3020.000	15.140	14.915
3025.000	15.077	14.850
3025.790	15.067	14.867
3027.151	15.049	14.822
3046.419	14.794	14.529
3050.000	14.746	14.486
3075.000	14.415	14.174
3088.920	14.231	13.986
3095.605	14.151	13.947
3100.000	14.107	13.909
3113.920	14.013	13.843
3125.000	13.988	13.787
3138.920	14.020	13.831
3150.000	14.074	13.878
3151.187	14.080	13.882
3175.000	14.146	13.935
3176.187	14.146	13.987
3200.000	14.110	13.952
3201.187	14.106	13.931
3218.375	14.041	13.861
3225.000	14.020	13.814
3237.482	13.981	13.753
3244.766	13.958	13.748
3250.000	13.942	13.725
3275.000	13.894	13.706
3294.766	13.887	13.764
3300.000	13.890	13.749
3325.000	13.929	13.729
3338.759	13.969	13.779
3344.766	13.991	13.822
3350.000	14.011	13.841
3375.000	14.106	13.988
3395.670	14.185	14.066
3400.000	14.198	14.065
3425.000	14.114	14.007
3425.670	14.108	13.997
3450.000	13.762	13.681
3455.670	13.646	13.542
3474.892	13.226	13.049
3500.000	12.751	12.459
3525.000	12.421	12.201
3550.000	12.234	12.062
3575.000	12.190	11.991
3599.892	12.288	12.024
3625.000	12.531	12.207
3650.000	12.916	12.586
3672.646	13.388	13.045
3675.000	13.444	13.112
3700.000	14.115	13.765
3705.000	14.266	13.920

1 in 1000 HORIZONTAL
1 in 200 VERTICAL

LONGITUDINAL SECTION - AVENUE ROAD - MC50 (CONT.)

SCALE Hor. 1:1000 Ver. 1:200 (0m 10m 20m 40m 60m / 0m 2m 4m 8m 12m)

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

BONACCI
BONACCI GROUP (NSW) Pty Ltd
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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: ROAD DETAIL PLAN AND LONG SECTION MC50 CH 3020 TO CH 3700 SHEET 2 OF 4

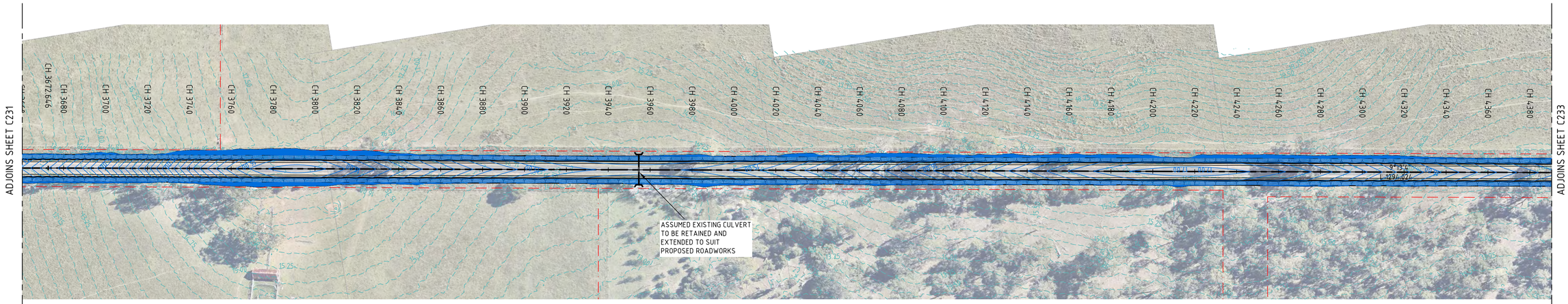
PRELIMINARY

Designed JF
Drawn JF
Scale 1:1000
Date DEC 2016
Sheet A1

Project Director Approved | Date | North

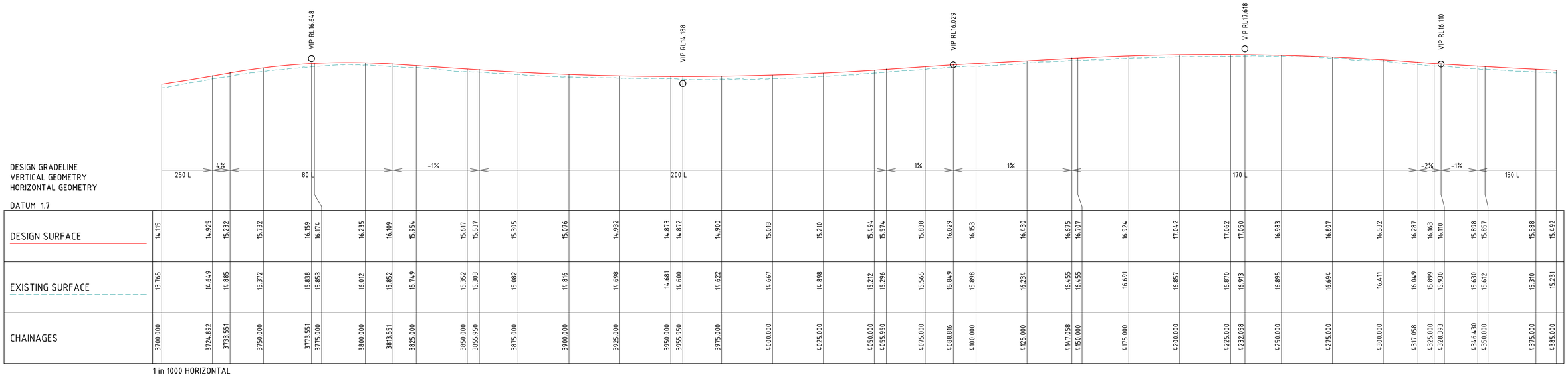
Project Ref 20 21836 01 | Drawing No C231 | Rev P1

File: G:\Job\20218360\01_Civil\202183601C-C231.dwg Plotted: 09.12.16 at 4:00 PM By: Jonathan Franco



AVENUE ROAD DETAIL PLAN

SCALE 1:1000 0m 10m 20m 40m 60m



LONGITUDINAL SECTION - AVENUE ROAD - MC50 (CONT.)

SCALE Hor. 1:1000 Ver. 1:200 0m 10m 20m 40m 60m / 0m 2m 4m 8m 12m

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: ROAD DETAIL PLAN AND LONG SECTION MC50 CH 3700 TO CH 4380 SHEET 3 OF 4

PRELIMINARY

Designed	JF	Project Director Approved	Date
Drawn	JF		
Scale	1:1000		
Date	DEC 2016		
Sheet	A1		

North

Project Ref	Drawing No	Rev
20 21836 01	C232	P1

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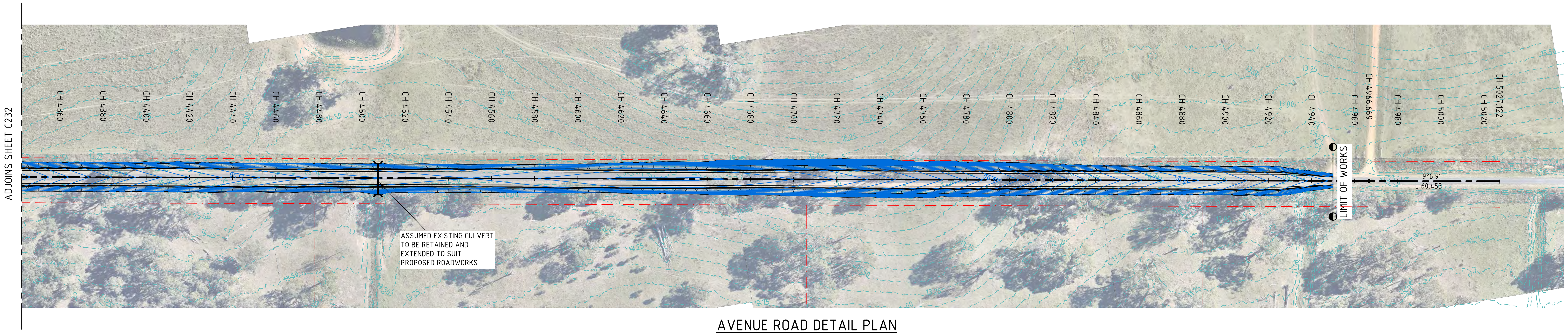
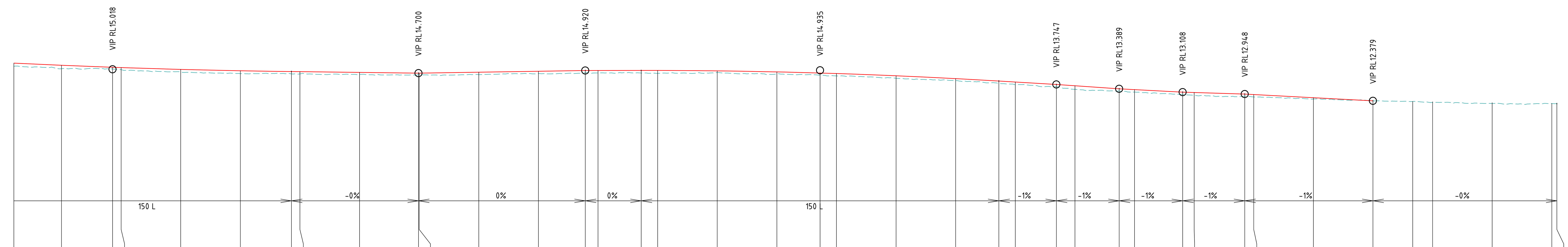


AVENUE ROAD DETAIL PLAN

SCALE 1:1000 (0m 10m 20m 40m 60m)



DESIGN GRADELINE
VERTICAL GEOMETRY
HORIZONTAL GEOMETRY

DATUM 0.0

CHAINAGES	DESIGN SURFACE	EXISTING SURFACE
4380.000	15.539	15.266
4400.000	15.358	15.066
4421.430	15.192	15.049
4425.000	15.167	14.986
4450.000	15.014	14.789
4475.000	14.900	14.656
4496.430	14.832	14.638
4500.000	14.823	14.636
4525.000	14.761	14.582
4549.703	14.700	14.574
4550.000	14.701	14.574
4575.000	14.780	14.572
4600.000	14.858	14.663
4619.671	14.920	14.740
4625.000	14.921	14.716
4643.119	14.923	14.708
4650.000	14.923	14.682
4675.000	14.887	14.748
4700.000	14.801	14.626
4718.119	14.707	14.526
4725.000	14.664	14.467
4750.000	14.477	14.269
4775.000	14.240	14.075
4793.119	14.036	13.843
4800.000	13.953	13.725
4817.222	13.747	13.567
4825.000	13.641	13.344
4843.572	13.389	13.209
4850.000	13.321	13.111
4870.178	13.108	12.928
4875.000	13.078	12.834
4896.243	12.948	12.768
4900.000	12.908	12.703
4925.000	12.643	12.528
4949.994	12.379	12.379
4966.669	12.328	12.325
4975.000	12.302	12.242
5000.000	12.226	12.157
5025.000	12.149	12.159
5027.122	12.143	12.143

1 in 1000 HORIZONTAL
1 in 200 VERTICAL

LONGITUDINAL SECTION - AVENUE ROAD - MC50 (CONT.)

SCALE Hor. 1:1000 (0m 10m 20m 40m 60m) Ver. 1:200 (0m 2m 4m 8m 12m)

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE TUCABIA NSW 2462

Drawing Title: ROAD DETAIL PLAN AND LONG SECTION MC50 CH 4380 TO CH 5025 SHEET 4 OF 4

PRELIMINARY

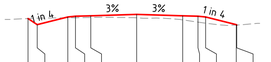
Designed JF
Drawn JF
Scale 1:1000
Date DEC 2016
Sheet A1

Project Director Approved / Date / North

Project Ref: 20 21836 01
Drawing No: C233
Rev: P1

File: G:\Job\20218360\1_Civil\202183601C-C233.dwg Plotted: 09.12.16 at 4:01 PM By: Jonathan Franco

EASTING 506088.221
NORTHING 6708172.699

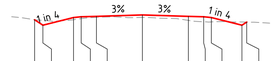


DATUM RL 9.000

DESIGN LEVEL	12.316	11.916	12.416	12.466	12.496	12.586	12.496	12.466	12.416	11.916	11.894
EXISTING SURFACE LEVEL	12.316	12.338	12.363	12.367	12.388	12.363	12.230	12.082	12.014	11.892	11.894
DESIGN OFFSET	-7.101	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.533

CH 2420.000

EASTING 506100.798
NORTHING 6708251.704

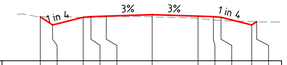


DATUM RL 9.000

DESIGN LEVEL	11.918	11.558	12.058	12.108	12.138	12.228	12.138	12.108	12.058	11.558	11.764
EXISTING SURFACE LEVEL	11.918	11.874	11.920	11.989	12.080	12.069	11.874	11.783	11.777	11.770	11.764
DESIGN OFFSET	-7.040	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.809

CH 2500.000

EASTING 506113.375
NORTHING 6708330.709

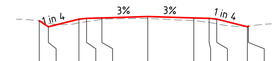


DATUM RL 9.000

DESIGN LEVEL	11.868	11.331	11.831	11.881	11.911	12.001	11.911	11.881	11.831	11.331	11.547
EXISTING SURFACE LEVEL	11.868	11.892	11.805	11.822	11.870	11.866	11.770	11.656	11.623	11.558	11.547
DESIGN OFFSET	-7.306	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.824

CH 2580.000

EASTING 506125.952
NORTHING 6708409.715

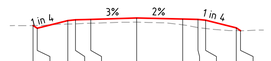


DATUM RL 9.000

DESIGN LEVEL	11.818	11.425	11.925	11.975	12.005	12.095	12.005	11.975	11.925	11.425	11.668
EXISTING SURFACE LEVEL	11.818	11.668	11.675	11.763	11.911	11.971	11.830	11.708	11.622	11.462	11.468
DESIGN OFFSET	-7.090	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.564

CH 2660.000

EASTING 506085.059
NORTHING 6708152.951

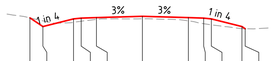


DATUM RL 9.000

DESIGN LEVEL	12.022	11.844	12.344	12.394	12.425	12.518	12.448	12.425	12.375	11.875	11.689
EXISTING SURFACE LEVEL	12.022	12.027	12.117	12.137	12.174	12.243	12.072	11.893	11.832	11.692	11.689
DESIGN OFFSET	-6.767	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.719

CH 2400.000

EASTING 506097.654
NORTHING 6708231.953

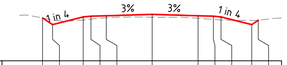


DATUM RL 9.000

DESIGN LEVEL	12.246	11.682	12.182	12.232	12.262	12.352	12.262	12.232	12.182	11.682	11.540
EXISTING SURFACE LEVEL	12.246	12.054	11.955	12.027	12.147	12.186	12.049	11.867	11.792	11.543	11.540
DESIGN OFFSET	-7.345	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.714

CH 2480.000

EASTING 506110.23
NORTHING 6708310.958



DATUM RL 9.000

DESIGN LEVEL	11.799	11.364	11.864	11.914	11.944	12.034	11.944	11.914	11.864	11.364	11.647
EXISTING SURFACE LEVEL	11.799	11.668	11.660	11.718	11.813	11.847	11.781	11.696	11.669	11.640	11.647
DESIGN OFFSET	-7.152	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.924

CH 2560.000

EASTING 506122.807
NORTHING 6708389.963

DATUM RL 9.000

DESIGN LEVEL	11.494	11.339	11.839	11.889	11.919	12.009	11.919	11.889	11.839	11.339	11.385
EXISTING SURFACE LEVEL	11.494	11.485	11.646	11.745	11.884	11.875	11.832	11.809	11.780	11.402	11.385
DESIGN OFFSET	-6.733	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.569

CH 2640.000

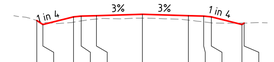
EASTING 506081.861
NORTHING 6708133.208

DATUM RL 9.000

DESIGN LEVEL	11.572	11.744	12.244	12.294	12.328	12.430	12.384	12.368	12.318	11.818	11.467
EXISTING SURFACE LEVEL	11.572	11.696	11.950	12.055	12.146	12.159	11.949	11.720	11.635	11.457	11.467
DESIGN OFFSET	-6.759	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.026

CH 2380.000

EASTING 506094.509
NORTHING 6708212.202

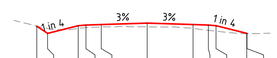


DATUM RL 9.000

DESIGN LEVEL	12.072	11.807	12.307	12.357	12.387	12.477	12.387	12.357	12.307	11.807	11.905
EXISTING SURFACE LEVEL	12.072	11.961	11.957	12.042	12.166	12.221	12.097	11.981	11.919	11.907	11.905
DESIGN OFFSET	-6.897	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.647

CH 2460.000

EASTING 506107.086
NORTHING 6708291.207

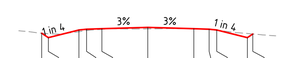


DATUM RL 9.000

DESIGN LEVEL	11.866	11.399	11.899	11.949	11.979	12.069	11.979	11.949	11.899	11.399	11.388
EXISTING SURFACE LEVEL	11.866	11.718	11.725	11.777	11.823	11.832	11.726	11.597	11.549	11.388	11.388
DESIGN OFFSET	-7.201	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.517

CH 2540.000

EASTING 506119.663
NORTHING 6708370.212



DATUM RL 9.000

DESIGN LEVEL	11.584	11.297	11.797	11.847	11.877	11.967	11.877	11.847	11.797	11.297	11.533
EXISTING SURFACE LEVEL	11.584	11.545	11.684	11.756	11.833	11.867	11.860	11.814	11.779	11.565	11.533
DESIGN OFFSET	-6.931	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.855

CH 2620.000

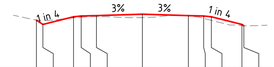
EASTING 506078.662
NORTHING 6708113.465

DATUM RL 9.000

DESIGN LEVEL	11.132	11.645	12.145	12.195	12.232	12.363	12.319	12.311	12.261	11.761	11.754
EXISTING SURFACE LEVEL	11.132	11.117	11.746	11.858	11.979	12.046	12.288	12.207	12.123	11.755	11.754
DESIGN OFFSET	-7.269	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.511

CH 2360.000

EASTING 506091.365
NORTHING 6708192.45

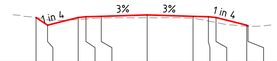


DATUM RL 9.000

DESIGN LEVEL	12.182	11.903	12.403	12.453	12.483	12.573	12.483	12.453	12.403	11.903	11.816
EXISTING SURFACE LEVEL	12.182	12.164	12.326	12.372	12.419	12.354	12.457	12.299	12.163	11.831	11.816
DESIGN OFFSET	-6.918	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.631

CH 2440.000

EASTING 506103.942
NORTHING 6708271.456

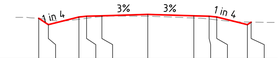


DATUM RL 9.000

DESIGN LEVEL	11.964	11.460	11.960	12.010	12.040	12.130	12.040	12.010	11.960	11.460	11.402
EXISTING SURFACE LEVEL	11.964	11.814	11.841	11.873	11.936	11.947	11.913	11.731	11.637	11.405	11.402
DESIGN OFFSET	-7.256	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.588

CH 2520.000

EASTING 506116.519
NORTHING 6708350.461



DATUM RL 9.000

DESIGN LEVEL	11.713	11.299	11.799	11.849	11.879	11.969	11.879	11.849	11.799	11.299	11.465
EXISTING SURFACE LEVEL	11.713	11.626	11.648	11.719	11.827	11.853	11.739	11.667	11.612	11.471	11.465
DESIGN OFFSET	-7.122	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.750

CH 2600.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 2360 TO CH 2660
SHEET 1 OF 9

PRELIMINARY

Designed	JF	Project Director Approved	Date
Drawn	JF		
Scale	1:200		
Date	DEC 2016		
Sheet	A1		

North

Project Ref	Drawing No	Rev
20 21836 01	C240	P1

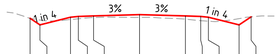
File: G:\Job\20218361\01_Civil\Issued\Dwg\20218361C-C240-CAD[P1].dwg Plotted: 09.12.16 at 2:40 PM By: Jonathan Franco

EASTING 506138.528
NORTHING 6708488.72

DATUM RL 10.000

DESIGN LEVEL	12.604	12.212	12.712	12.762	12.792	12.882	12.792	12.762	12.712	12.212	12.400
EXISTING SURFACE LEVEL	12.604	12.515	12.388	12.498	12.662	12.716	12.612	12.502	12.428	12.372	12.400
DESIGN OFFSET	-7.087	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.781

CH 2740.000



EASTING 506151.105
NORTHING 6708567.725

DATUM RL 11.000

DESIGN LEVEL	13.837	13.404	13.904	13.954	13.984	14.074	13.984	13.954	13.904	13.404	13.928
EXISTING SURFACE LEVEL	13.837	13.713	13.753	13.802	13.880	13.895	13.774	13.677	13.644	13.813	13.928
DESIGN OFFSET	-7.149	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.286

CH 2820.000

EASTING 506163.682
NORTHING 6708646.73

DATUM RL 12.000

DESIGN LEVEL	15.160	14.402	14.902	14.952	14.982	15.072	14.982	14.952	14.902	14.402	14.636
EXISTING SURFACE LEVEL	15.160	15.015	14.749	14.732	14.777	14.805	14.820	14.791	14.754	14.632	14.636
DESIGN OFFSET	-7.636	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.851

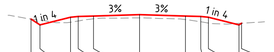
CH 2900.000

EASTING 506176.259
NORTHING 6708725.736

DATUM RL 12.000

DESIGN LEVEL	15.528	14.774	15.274	15.324	15.354	15.444	15.354	15.324	15.274	14.774	15.105
EXISTING SURFACE LEVEL	15.528	15.341	15.245	15.289	15.350	15.298	15.187	15.157	15.157	15.109	15.105
DESIGN OFFSET	-7.632	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.997

CH 2980.000

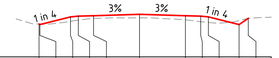


EASTING 506135.384
NORTHING 6708468.969

DATUM RL 9.000

DESIGN LEVEL	12.337	11.949	12.449	12.499	12.529	12.619	12.529	12.499	12.449	11.949	12.061
EXISTING SURFACE LEVEL	12.337	12.263	12.122	12.210	12.354	12.409	12.300	12.158	12.074	12.051	12.061
DESIGN OFFSET	-7.082	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.667

CH 2720.000



EASTING 506147.961
NORTHING 6708547.974

DATUM RL 11.000

DESIGN LEVEL	13.144	13.106	13.606	13.656	13.686	13.776	13.686	13.656	13.606	13.106	13.510
EXISTING SURFACE LEVEL	13.144	13.142	13.319	13.397	13.517	13.551	13.417	13.294	13.243	13.369	13.510
DESIGN OFFSET	-6.558	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.106

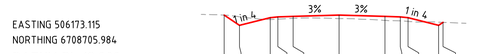
CH 2800.000

EASTING 506160.538
NORTHING 6708626.979

DATUM RL 12.000

DESIGN LEVEL	14.955	14.229	14.729	14.779	14.809	14.899	14.809	14.779	14.729	14.229	14.552
EXISTING SURFACE LEVEL	14.955	14.703	14.529	14.592	14.688	14.717	14.639	14.595	14.538	14.549	14.552
DESIGN OFFSET	-7.590	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.985

CH 2880.000



EASTING 506173.115
NORTHING 6708705.984

DATUM RL 12.000

DESIGN LEVEL	15.461	14.794	15.294	15.344	15.374	15.464	15.374	15.344	15.294	14.794	14.986
EXISTING SURFACE LEVEL	15.461	15.348	15.174	15.195	15.250	15.231	15.113	15.085	15.050	14.999	14.986
DESIGN OFFSET	-7.500	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.788

CH 2960.000

EASTING 506132.24
NORTHING 6708449.217

DATUM RL 9.000

DESIGN LEVEL	12.238	11.730	12.230	12.280	12.310	12.400	12.310	12.280	12.230	11.730	11.810
EXISTING SURFACE LEVEL	12.238	12.083	11.919	12.011	12.175	12.230	12.017	11.914	11.856	11.804	11.810
DESIGN OFFSET	-7.261	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.619

CH 2700.000

EASTING 506144.817
NORTHING 6708528.222

DATUM RL 10.000

DESIGN LEVEL	13.107	12.807	13.307	13.357	13.387	13.477	13.387	13.357	13.307	12.807	13.140
EXISTING SURFACE LEVEL	13.107	12.999	13.005	13.076	13.166	13.176	13.101	12.968	12.918	13.037	13.140
DESIGN OFFSET	-6.949	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.998

CH 2780.000

EASTING 506157.394
NORTHING 6708607.228

DATUM RL 12.000

DESIGN LEVEL	14.721	14.001	14.501	14.551	14.581	14.671	14.581	14.551	14.501	14.001	14.456
EXISTING SURFACE LEVEL	14.721	14.541	14.349	14.408	14.498	14.519	14.400	14.296	14.230	14.355	14.456
DESIGN OFFSET	-7.580	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.182

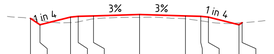
CH 2860.000

EASTING 506169.971
NORTHING 6708686.233

DATUM RL 12.000

DESIGN LEVEL	15.474	14.727	15.227	15.277	15.307	15.397	15.307	15.277	15.227	14.727	14.836
EXISTING SURFACE LEVEL	15.474	15.352	15.102	15.090	15.146	15.114	15.059	15.009	14.969	14.839	14.836
DESIGN OFFSET	-7.620	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.664

CH 2940.000

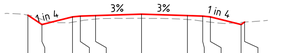


EASTING 506129.096
NORTHING 6708429.466

DATUM RL 9.000

DESIGN LEVEL	11.971	11.556	12.056	12.106	12.136	12.226	12.136	12.106	12.056	11.556	11.689
EXISTING SURFACE LEVEL	11.971	11.857	11.700	11.746	11.940	12.041	11.945	11.813	11.738	11.677	11.689
DESIGN OFFSET	-7.122	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.700

CH 2680.000



EASTING 506141.673
NORTHING 6708508.471

DATUM RL 10.000

DESIGN LEVEL	13.119	12.569	13.009	13.059	13.089	13.179	13.089	13.059	13.009	12.569	12.662
EXISTING SURFACE LEVEL	13.119	12.836	12.659	12.743	12.860	12.909	12.831	12.720	12.660	12.637	12.662
DESIGN OFFSET	-7.415	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.730

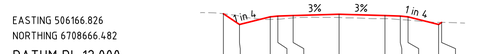
CH 2760.000

EASTING 506154.25
NORTHING 6708587.476

DATUM RL 11.000

DESIGN LEVEL	14.327	13.703	14.203	14.253	14.283	14.373	14.283	14.253	14.203	13.703	14.094
EXISTING SURFACE LEVEL	14.327	14.144	14.048	14.099	14.206	14.233	14.092	14.030	13.978	14.018	14.094
DESIGN OFFSET	-7.436	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.087

CH 2840.000



EASTING 506166.826
NORTHING 6708666.482

DATUM RL 12.000

DESIGN LEVEL	15.275	14.575	15.075	15.125	15.155	15.245	15.155	15.125	15.075	14.575	14.709
EXISTING SURFACE LEVEL	15.275	15.126	14.907	14.920	15.005	15.028	14.951	14.892	14.857	14.711	14.709
DESIGN OFFSET	-7.549	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.700

CH 2920.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

BONACCI

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 2680 TO CH 2980
SHEET 2 OF 9

PRELIMINARY

Designed	JF	Project Director Approved	Date
Drawn	JF		
Scale	1:200		
Date	DEC 2016		
Sheet	A1		

North

Project Ref: 20 21836 01
Drawing No: C241
Rev: P1

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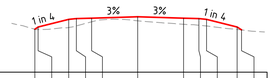
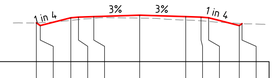
EASTING 506190.476
NORTHING 6708804.435
DATUM RL 11.000



DESIGN LEVEL	13.801	13.801	13.944	14.444	14.494	14.524	14.614	14.524	14.494	14.444	13.944	13.756	
EXISTING SURFACE LEVEL	13.801	13.787	13.916	14.016	14.287	14.352	14.126	14.064	14.012	13.788	13.756		
DESIGN OFFSET	-6.714	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.782		

CH 3060.000

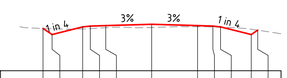
EASTING 506214.474
NORTHING 6708880.718
DATUM RL 11.000



DESIGN LEVEL	13.525	13.356	13.856	13.906	13.936	14.026	13.936	13.906	13.856	13.356	13.476
EXISTING SURFACE LEVEL	13.525	13.537	13.685	13.743	13.824	13.839	13.710	13.667	13.623	13.486	13.476
DESIGN OFFSET	-6.755	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.680

CH 3140.000

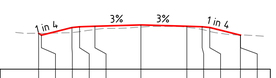
EASTING 506239.988
NORTHING 6708956.54
DATUM RL 11.000



DESIGN LEVEL	13.763	13.366	13.866	13.916	13.946	14.036	13.946	13.916	13.866	13.366	13.653
EXISTING SURFACE LEVEL	13.763	13.748	13.729	13.751	13.812	13.824	13.876	13.855	13.836	13.715	13.653
DESIGN OFFSET	-7.096	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.930

CH 3220.000

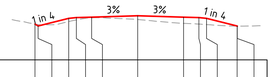
EASTING 506262.382
NORTHING 6709033.293
DATUM RL 11.000



DESIGN LEVEL	13.338	13.220	13.720	13.770	13.800	13.890	13.800	13.770	13.720	13.220	13.223
EXISTING SURFACE LEVEL	13.338	13.332	13.388	13.450	13.588	13.749	13.738	13.590	13.464	13.224	13.223
DESIGN OFFSET	-6.677	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.505

CH 3300.000

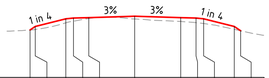
EASTING 506186.245
NORTHING 6708784.889
DATUM RL 12.000



DESIGN LEVEL	14.343	14.209	14.709	14.759	14.789	14.879	14.789	14.759	14.709	14.209	14.204
EXISTING SURFACE LEVEL	14.343	14.307	14.499	14.610	14.745	14.635	14.384	14.338	14.307	14.204	14.204
DESIGN OFFSET	-6.700	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.508

CH 3040.000

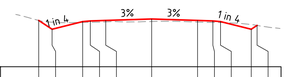
EASTING 506208.096
NORTHING 6708861.762
DATUM RL 10.000



DESIGN LEVEL	13.098	13.324	13.824	13.874	13.904	13.994	13.904	13.874	13.824	13.324	13.046
EXISTING SURFACE LEVEL	13.098	13.127	13.559	13.672	13.841	13.813	13.652	13.577	13.520	13.139	13.046
DESIGN OFFSET	-6.839	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.917

CH 3120.000

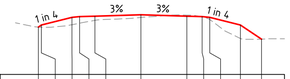
EASTING 506233.61
NORTHING 6708937.584
DATUM RL 11.000



DESIGN LEVEL	14.020	13.440	13.940	13.990	14.020	14.110	14.020	13.990	13.940	13.440	13.695
EXISTING SURFACE LEVEL	14.020	13.902	13.894	13.903	13.924	13.952	13.912	13.891	13.884	13.751	13.695
DESIGN OFFSET	-7.369	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.883

CH 3200.000

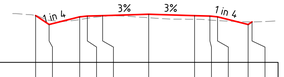
EASTING 506257.686
NORTHING 6709013.853
DATUM RL 10.000



DESIGN LEVEL	13.090	13.220	13.720	13.770	13.800	13.890	13.800	13.770	13.720	13.220	12.303
EXISTING SURFACE LEVEL	13.090	13.076	13.241	13.338	13.524	13.717	13.870	13.744	13.581	12.339	12.303
DESIGN OFFSET	-6.695	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.876

CH 3280.000

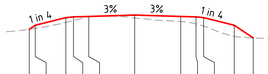
EASTING 506182.547
NORTHING 6708765.238
DATUM RL 12.000



DESIGN LEVEL	15.055	14.470	14.970	15.020	15.050	15.140	15.050	15.020	14.970	14.470	14.639
EXISTING SURFACE LEVEL	15.055	14.744	14.788	14.874	14.999	14.915	14.814	14.762	14.729	14.638	14.639
DESIGN OFFSET	-7.378	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.753

CH 3020.000

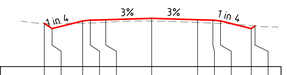
EASTING 506201.717
NORTHING 6708842.807
DATUM RL 10.000



DESIGN LEVEL	13.180	13.437	13.937	13.987	14.017	14.107	14.017	13.987	13.937	13.437	12.613
EXISTING SURFACE LEVEL	13.180	13.236	13.627	13.749	13.989	13.909	13.680	13.533	13.395	12.713	12.613
DESIGN OFFSET	-6.885	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.736

CH 3100.000

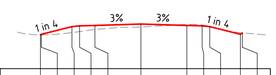
EASTING 506227.231
NORTHING 6708918.629
DATUM RL 11.000



DESIGN LEVEL	13.816	13.477	13.977	14.027	14.057	14.147	14.057	14.027	13.977	13.477	13.645
EXISTING SURFACE LEVEL	13.816	13.807	13.830	13.843	13.885	13.972	13.875	13.831	13.811	13.666	13.645
DESIGN OFFSET	-7.009	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.752

CH 3180.000

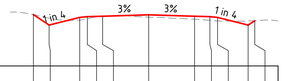
EASTING 506252.343
NORTHING 6708994.581
DATUM RL 11.000



DESIGN LEVEL	13.211	13.248	13.748	13.798	13.828	13.918	13.828	13.798	13.748	13.248	13.331
EXISTING SURFACE LEVEL	13.211	13.212	13.354	13.423	13.558	13.721	13.894	13.859	13.765	13.348	13.331
DESIGN OFFSET	-6.555	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.625

CH 3260.000

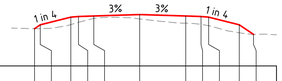
EASTING 506179.403
NORTHING 6708745.487
DATUM RL 12.000



DESIGN LEVEL	15.368	14.666	15.166	15.216	15.246	15.336	15.246	15.216	15.166	14.666	14.950
EXISTING SURFACE LEVEL	15.368	15.115	14.991	15.087	15.234	15.181	15.050	14.976	14.933	14.934	14.950
DESIGN OFFSET	-7.524	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.926

CH 3000.000

EASTING 506195.628
NORTHING 6708823.758
DATUM RL 11.000



DESIGN LEVEL	13.432	13.679	14.179	14.229	14.259	14.349	14.259	14.229	14.179	13.679	13.059
EXISTING SURFACE LEVEL	13.432	13.440	13.698	13.845	14.092	14.067	13.787	13.707	13.625	13.161	13.059
DESIGN OFFSET	-6.871	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.431

CH 3080.000

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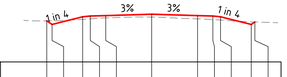
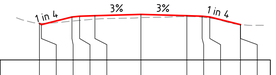
DATUM RL 11.000



DESIGN LEVEL	13.679	13.445	13.945	13.995	14.025	14.115	14.025	13.995	13.945	13.445	13.606
EXISTING SURFACE LEVEL	13.679	13.681	13.776	13.806	13.875	13.925	13.813	13.757	13.738	13.616	13.606
DESIGN OFFSET	-6.851	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.740

CH 3160.000

EASTING 506246.362
NORTHING 6708975.497
DATUM RL 11.000



DESIGN LEVEL	13.385	13.303	13.803	13.853	13.883	13.973	13.883	13.853	13.803	13.303	13.304
EXISTING SURFACE LEVEL	13.385	13.384	13.529	13.577	13.659	13.761	13.826	13.788	13.725	13.304	13.304
DESIGN OFFSET	-6.623	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.502

CH 3240.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 3000 TO CH 3300
SHEET 3 OF 9

PRELIMINARY

Designed	JF	Project Director Approved	Date
Drawn	JF		
Scale	1:200		
Date	DEC 2016		
Sheet	A1		

North

Project Ref	Drawing No	Rev
20 21836 01	C242	P1

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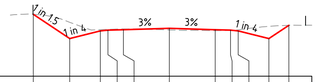

DESIGN LEVEL	15.043	13.456	13.956	14.006	14.036	14.126	14.036	14.006	13.956	13.456	14.325
EXISTING SURFACE LEVEL	15.043	14.519	14.038	14.051	14.084	14.021	13.979	13.993	14.027	14.253	14.325
DESIGN OFFSET	-8.881	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.865

CH 3380.000

EASTING 506288.443
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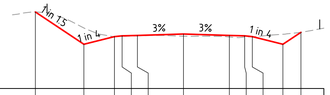
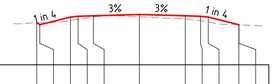
DATUM RL 10.000



DESIGN LEVEL	14.991	12.881	13.381	13.431	13.461	13.551	13.461	13.431	13.381	12.881	13.662
EXISTING SURFACE LEVEL	14.991	13.949	13.379	13.396	13.428	13.410	13.359	13.350	13.372	13.538	13.662
DESIGN OFFSET	-9.664	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.671

CH 3460.000

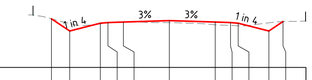
EASTING 506300.857
NORTHING 6709270.165
DATUM RL 9.000



DESIGN LEVEL	11.758	11.621	12.121	12.171	12.201	12.291	12.201	12.171	12.121	11.621	11.617
EXISTING SURFACE LEVEL	11.758	11.752	11.897	11.983	12.130	12.138	12.000	11.876	11.795	11.617	11.617
DESIGN OFFSET	-6.705	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.506

CH 3540.000

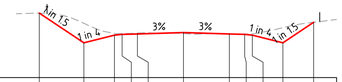
EASTING 506272.925
NORTHING 6709092.345
DATUM RL 11.000



DESIGN LEVEL	14.175	13.379	13.879	13.929	13.959	14.049	13.959	13.929	13.879	13.379	13.997
EXISTING SURFACE LEVEL	14.175	13.867	13.845	13.915	13.971	13.921	13.783	13.739	13.716	13.906	13.997
DESIGN OFFSET	-7.694	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.427

CH 3360.000

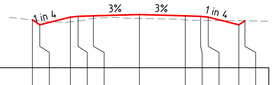
EASTING 506285.339
NORTHING 6709171.376
DATUM RL 11.000



DESIGN LEVEL	15.205	13.265	13.765	13.815	13.845	13.935	13.845	13.815	13.765	13.265	14.603
EXISTING SURFACE LEVEL	15.205	14.539	13.881	13.866	13.900	13.868	13.849	13.838	13.862	14.259	14.603
DESIGN OFFSET	-9.409	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.507

CH 3440.000

EASTING 506297.753
NORTHING 6709250.407
DATUM RL 9.000



DESIGN LEVEL	12.124	11.805	12.305	12.355	12.385	12.475	12.385	12.355	12.305	11.805	12.069
EXISTING SURFACE LEVEL	12.124	12.075	11.996	12.054	12.224	12.217	12.122	12.094	12.085	12.074	12.069
DESIGN OFFSET	-6.978	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.896

CH 3520.000

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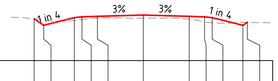
DATUM RL 11.000



DESIGN LEVEL	13.723	13.304	13.804	13.854	13.884	13.974	13.884	13.854	13.804	13.304	13.498
EXISTING SURFACE LEVEL	13.723	13.636	13.621	13.684	13.775	13.768	13.705	13.528	13.465	13.498	13.498
DESIGN OFFSET	-7.129	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.791

CH 3340.000

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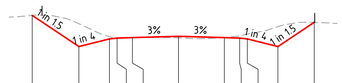
DATUM RL 11.000



DESIGN LEVEL	15.512	13.482	13.982	14.032	14.062	14.152	14.062	14.032	13.982	13.482	15.060
EXISTING SURFACE LEVEL	15.512	14.972	14.128	14.067	14.073	14.051	14.068	14.188	14.292	14.781	15.060
DESIGN OFFSET	-9.544	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.868

CH 3420.000

EASTING 506294.65
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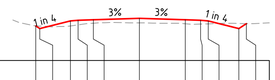
DATUM RL 10.000



DESIGN LEVEL	12.253	12.081	12.581	12.631	12.661	12.751	12.661	12.631	12.581	12.081	12.405
EXISTING SURFACE LEVEL	12.253	12.244	12.256	12.329	12.432	12.459	12.399	12.377	12.392	12.415	12.405
DESIGN OFFSET	-6.758	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.985

CH 3500.000

EASTING 506266.429
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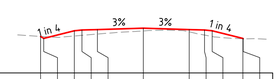
DATUM RL 11.000



DESIGN LEVEL	13.382	13.248	13.748	13.798	13.828	13.918	13.828	13.798	13.748	13.248	13.232
EXISTING SURFACE LEVEL	13.382	13.368	13.410	13.453	13.534	13.741	13.689	13.469	13.377	13.233	13.232
DESIGN OFFSET	-6.701	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.523

CH 3320.000

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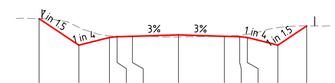

DESIGN LEVEL	15.262	13.528	14.028	14.078	14.108	14.198	14.108	14.078	14.028	13.528	14.782
EXISTING SURFACE LEVEL	15.262	14.686	14.141	14.111	14.127	14.065	14.118	14.176	14.243	14.671	14.782
DESIGN OFFSET	-9.101	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.381

CH 3400.000

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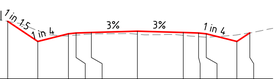

DESIGN LEVEL	13.754	12.448	12.948	12.998	13.028	13.118	13.028	12.998	12.948	12.448	13.009
EXISTING SURFACE LEVEL	13.754	13.156	12.812	12.858	12.928	12.919	12.842	12.757	12.718	12.870	13.009
DESIGN OFFSET	-8.459	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.341

CH 3480.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 3320 TO CH 3540
SHEET 4 OF 9

PRELIMINARY

Designed	JF	Project Director Approved	Date
Drawn	JF		
Scale	1:200		
Date	DEC 2016		
Sheet	A1		

North

Project Ref	Drawing No	Rev
20 21836 01	C243	P1

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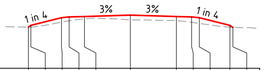

DESIGN LEVEL	11.695	11.801	12.301	12.351	12.381	12.471	12.381	12.351	12.301	11.801	11.669		
EXISTING SURFACE LEVEL	11.695	11.695	12.014	12.101	12.224	12.160	12.106	12.003	11.930	11.684	11.669		
DESIGN OFFSET	-6.659	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.698		

CH 3620.000

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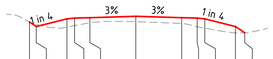
DATUM RL 11.000



DESIGN LEVEL	13.740	13.445	13.945	13.995	14.025	14.115	14.025	13.995	13.945	13.040			
EXISTING SURFACE LEVEL	13.740	13.586	13.410	13.514	13.696	13.765	13.642	13.444	13.340	13.030	13.040		
DESIGN OFFSET	-6.943	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.107		

CH 3700.000

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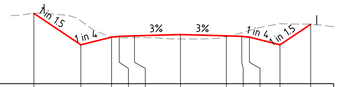
DATUM RL 13.000



DESIGN LEVEL	17.593	15.547	16.047	16.097	16.127	16.217	16.127	16.097	16.047	15.547	16.884		
EXISTING SURFACE LEVEL	17.593	17.101	16.071	16.000	16.013	15.924	16.070	16.326	16.470	16.919	16.884		
DESIGN OFFSET	-9.568	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.505		

CH 3780.000

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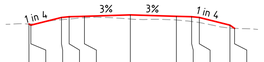
DATUM RL 9.000



DESIGN LEVEL	11.699	11.619	12.119	12.169	12.199	12.289	12.199	12.169	12.119	11.619	11.413		
EXISTING SURFACE LEVEL	11.699	11.697	11.977	12.020	12.104	12.024	11.957	11.861	11.790	11.432	11.413		
DESIGN OFFSET	-6.620	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.808		

CH 3600.000

EASTING 506322.618
NORTHING 6709408.463
DATUM RL 10.000

DESIGN LEVEL	12.886	12.897	13.397	13.447	13.477	13.567	13.477	13.447	13.397	12.897	12.595		
EXISTING SURFACE LEVEL	12.886	12.880	12.897	13.012	13.217	13.211	13.089	12.884	12.751	12.544	12.595		
DESIGN OFFSET	-6.516	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.953		

CH 3680.000

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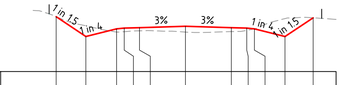
DATUM RL 13.000



DESIGN LEVEL	16.582	15.285	15.785	15.835	15.865	15.955	15.865	15.835	15.785	15.285	16.508		
EXISTING SURFACE LEVEL	16.582	15.994	15.573	15.603	15.658	15.572	15.609	15.689	15.786	16.456	16.508		
DESIGN OFFSET	-8.446	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.334		

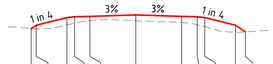
CH 3760.000

EASTING 506307.064
NORTHING 6709309.681
DATUM RL 8.000

DESIGN LEVEL	11.451	11.528	12.028	12.078	12.108	12.198	12.108	12.078	12.028	11.528	11.005		
EXISTING SURFACE LEVEL	11.451	11.430	11.865	11.964	12.077	11.954	11.972	11.667	11.412	10.978	11.005		
DESIGN OFFSET	-6.616	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.284		

CH 3580.000

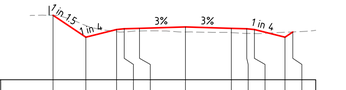
EASTING 506319.478
NORTHING 6709388.712
DATUM RL 9.000



DESIGN LEVEL	12.215	12.440	12.940	12.990	13.020	13.110	13.020	12.990	12.940	12.440	12.007		
EXISTING SURFACE LEVEL	12.215	12.188	12.462	12.572	12.734	12.728	12.612	12.471	12.350	11.973	12.007		
DESIGN OFFSET	-6.838	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.150		

CH 3660.000

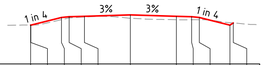
EASTING 506332.229
NORTHING 6709467.689
DATUM RL 12.000



DESIGN LEVEL	16.210	14.778	15.278	15.328	15.358	15.448	15.358	15.328	15.278	14.778	15.117		
EXISTING SURFACE LEVEL	16.210	15.534	15.141	15.114	15.187	15.119	15.075	15.023	15.015	15.104	15.117		
DESIGN OFFSET	-8.649	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.009		

CH 3740.000

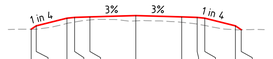
EASTING 506303.96
NORTHING 6709289.923
DATUM RL 9.000



DESIGN LEVEL	11.538	11.529	12.029	12.079	12.109	12.199	12.109	12.079	12.029	11.529	11.675		
EXISTING SURFACE LEVEL	11.538	11.538	11.889	12.002	12.067	11.980	11.883	11.884	11.886	11.691	11.675		
DESIGN OFFSET	-6.513	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.719		

CH 3560.000

EASTING 506316.374
NORTHING 6709368.954
DATUM RL 9.000



DESIGN LEVEL	11.854	12.075	12.575	12.625	12.655	12.745	12.655	12.625	12.575	12.075	11.817		
EXISTING SURFACE LEVEL	11.854	11.855	12.229	12.320	12.458	12.394	12.302	12.191	12.096	11.821	11.817		
DESIGN OFFSET	-6.830	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.886		

CH 3640.000

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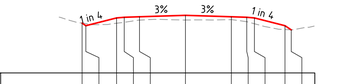

DESIGN LEVEL	14.251	14.085	14.585	14.635	14.665	14.755	14.665	14.635	14.585	14.085	13.812		
EXISTING SURFACE LEVEL	14.251	14.213	14.241	14.308	14.448	14.450	14.476	14.344	14.209	13.832	13.812		
DESIGN OFFSET	-6.749	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.910		

CH 3720.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 3560 TO CH 3780
SHEET 5 OF 9

PRELIMINARY

Designed	JF
Drawn	JF
Scale	1:200
Date	DEC 2016
Sheet	A1

Project Director Approved | Date | North

Project Ref	Drawing No	Rev
20 21836 01	C244	P1

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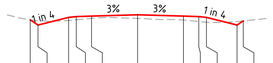

DESIGN LEVEL	15.152	14.813	15.313	15.363	15.393	15.483	15.393	15.363	15.313	14.813	15.083	
EXISTING SURFACE LEVEL	15.152	15.091	15.108	15.157	15.249	15.248	15.139	15.043	15.002	15.043	15.083	
DESIGN OFFSET	-7.008	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.904	

CH 3860.000

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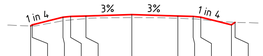
DATUM RL 12.000



DESIGN LEVEL	14.148	14.216	14.716	14.766	14.796	14.886	14.796	14.766	14.716	14.216	14.377	
EXISTING SURFACE LEVEL	14.148	14.146	14.480	14.536	14.624	14.690	14.644	14.604	14.568	14.391	14.377	
DESIGN OFFSET	-6.603	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.741	

CH 3940.000

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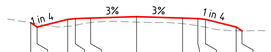
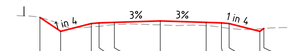
DATUM RL 12.000



DESIGN LEVEL	14.770	14.494	14.994	15.044	15.074	15.164	15.074	15.044	14.994	14.494	14.243	
EXISTING SURFACE LEVEL	14.770	14.687	14.537	14.606	14.779	14.807	14.714	14.578	14.478	14.250	14.243	
DESIGN OFFSET	-6.913	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.876	

CH 4020.000

EASTING 506389.897
NORTHING 6709823.04
DATUM RL 13.000



DESIGN LEVEL	16.387	15.483	15.983	16.033	16.063	16.153	16.063	16.033	15.983	15.483	15.662	
EXISTING SURFACE LEVEL	16.387	15.927	15.764	15.800	15.916	15.898	15.853	15.741	15.668	15.638	15.662	
DESIGN OFFSET	-7.855	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.768	

CH 4100.000

EASTING 506348.248
NORTHING 6709566.397
DATUM RL 13.000

DESIGN LEVEL	15.650	15.082	15.582	15.632	15.662	15.752	15.662	15.632	15.582	15.082	15.508	
EXISTING SURFACE LEVEL	15.650	15.484	15.467	15.478	15.496	15.497	15.494	15.460	15.447	15.411	15.508	
DESIGN OFFSET	-7.352	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.139	

CH 3840.000

EASTING 506361.063
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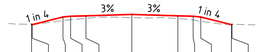
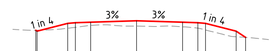
DATUM RL 12.000



DESIGN LEVEL	14.316	14.284	14.784	14.834	14.864	14.954	14.864	14.834	14.784	14.284	14.311	
EXISTING SURFACE LEVEL	14.316	14.317	14.549	14.612	14.699	14.744	14.682	14.600	14.509	14.311	14.311	
DESIGN OFFSET	-6.549	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.540	

CH 3920.000

EASTING 506373.878
NORTHING 6709724.331
DATUM RL 11.000



DESIGN LEVEL	14.395	14.343	14.843	14.893	14.923	15.013	14.923	14.893	14.843	14.343	13.932	
EXISTING SURFACE LEVEL	14.395	14.398	14.530	14.588	14.713	14.667	14.622	14.530	14.416	13.977	13.932	
DESIGN OFFSET	-6.579	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.115	

CH 4000.000

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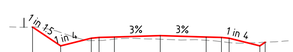
DATUM RL 13.000



DESIGN LEVEL	16.465	15.237	15.737	15.787	15.817	15.907	15.817	15.787	15.737	15.237	15.472	
EXISTING SURFACE LEVEL	16.465	16.113	15.583	15.592	15.681	15.671	15.601	15.514	15.452	15.452	15.472	
DESIGN OFFSET	-8.342	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.853	

CH 4080.000

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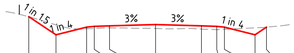
DATUM RL 13.000



DESIGN LEVEL	16.536	15.352	15.852	15.902	15.932	16.022	15.932	15.902	15.852	15.352	15.848	
EXISTING SURFACE LEVEL	16.536	15.998	15.740	15.762	15.805	15.763	15.720	15.688	15.714	15.808	15.848	
DESIGN OFFSET	-8.276	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.244	

CH 3820.000

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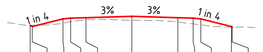
NORTHING 6709625.622
DATUM RL 12.000



DESIGN LEVEL	14.497	14.406	14.906	14.956	14.986	15.076	14.986	14.956	14.906	14.406	14.372	
EXISTING SURFACE LEVEL	14.497	14.497	14.630	14.723	14.849	14.816	14.700	14.578	14.515	14.372	14.372	
DESIGN OFFSET	-6.637	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.550	

CH 3900.000

EASTING 506370.675
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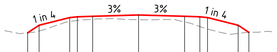
DATUM RL 11.000



DESIGN LEVEL	13.750	14.246	14.746	14.796	14.826	14.916	14.826	14.796	14.746	14.246	13.777	
EXISTING SURFACE LEVEL	13.750	13.866	14.490	14.557	14.637	14.603	14.462	14.161	13.994	13.711	13.777	
DESIGN OFFSET	-7.244	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.204	

CH 3980.000

EASTING 506383.49
NORTHING 6709783.556
DATUM RL 12.000

DESIGN LEVEL	15.561	14.960	15.460	15.510	15.540	15.630	15.540	15.510	15.460	14.960	15.039	
EXISTING SURFACE LEVEL	15.561	15.504	15.276	15.315	15.399	15.375	15.301	15.193	15.121	15.038	15.039	
DESIGN OFFSET	-7.401	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.619	

CH 4060.000

EASTING 506341.841
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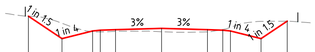

DESIGN LEVEL	17.028	15.565	16.065	16.115	16.145	16.235	16.145	16.115	16.065	15.565	16.706	
EXISTING SURFACE LEVEL	17.028	16.565	16.022	16.001	16.036	16.012	16.010	16.162	16.292	16.688	16.706	
DESIGN OFFSET	-8.694	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.211	

CH 3800.000

EASTING 506354.656
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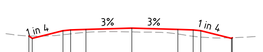
DATUM RL 12.000



DESIGN LEVEL	14.732	14.582	15.082	15.132	15.162	15.252	15.162	15.132	15.082	14.582	14.621	
EXISTING SURFACE LEVEL	14.732	14.730	14.817	14.876	14.973	15.002	14.866	14.715	14.660	14.618	14.621	
DESIGN OFFSET	-6.725	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.558	

CH 3880.000

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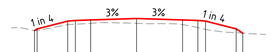

DESIGN LEVEL	14.093	14.204	14.704	14.754	14.784	14.874	14.784	14.754	14.704	14.204	13.919	
EXISTING SURFACE LEVEL	14.093	14.096	14.470	14.504	14.562	14.560	14.477	14.284	14.166	13.945	13.919	
DESIGN OFFSET	-6.666	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.926	

CH 3960.000

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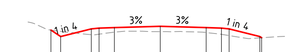

DESIGN LEVEL	15.126	14.700	15.200	15.250	15.280	15.370	15.280	15.250	15.200	14.700	14.621	
EXISTING SURFACE LEVEL	15.126	15.037	14.819	14.854	14.985	15.021	14.960	14.842	14.760	14.614	14.621	
DESIGN OFFSET	-7.139	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.618	

CH 4040.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 3800 TO CH 4100
SHEET 6 OF 9

PRELIMINARY

Designed	JF
Drawn	JF
Scale	1:200
Date	DEC 2016
Sheet	A1

Project Director Approved | Date | North

Project Ref: 20 21836 01 | Drawing No: C245 | Rev: P1

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EASTING 506402.713
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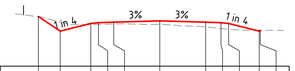

DESIGN LEVEL	17.234	16.285	16.785	16.835	16.865	16.955	16.865	16.835	16.785	16.285	16.335
EXISTING SURFACE LEVEL	17.234	16.868	16.703	16.715	16.747	16.717	16.560	16.455	16.403	16.335	16.335
DESIGN OFFSET	-7.924	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.574

CH 4180.000

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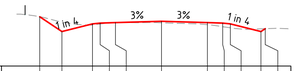
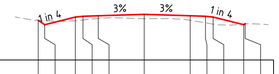


DESIGN LEVEL	17.217	16.255	16.755	16.805	16.835	16.925	16.835	16.805	16.755	16.255	16.439
EXISTING SURFACE LEVEL	17.217	16.867	16.686	16.743	16.823	16.824	16.698	16.566	16.493	16.429	16.439
DESIGN OFFSET	-7.944	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.716

CH 4260.000

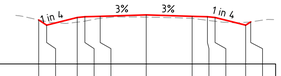
EASTING 506428.343
NORTHING 6710059.94
DATUM RL 13.000



DESIGN LEVEL	15.585	15.304	15.804	15.854	15.884	15.974	15.884	15.854	15.804	15.304	15.368
EXISTING SURFACE LEVEL	15.585	15.558	15.558	15.607	15.705	15.698	15.591	15.423	15.335	15.358	15.368
DESIGN OFFSET	-6.921	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.596

CH 4340.000

EASTING 506441.158
NORTHING 6710138.907
DATUM RL 12.000



DESIGN LEVEL	14.874	14.532	15.032	15.082	15.112	15.202	15.112	15.082	15.032	14.532	14.748
EXISTING SURFACE LEVEL	14.874	14.759	14.728	14.796	14.974	15.057	14.970	14.843	14.784	14.721	14.748
DESIGN OFFSET	-7.013	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.824

CH 4420.000

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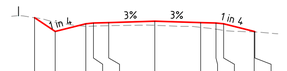
NORTHING 6709882.265
DATUM RL 13.000



DESIGN LEVEL	17.034	16.136	16.636	16.686	16.716	16.806	16.716	16.686	16.636	16.136	16.110
EXISTING SURFACE LEVEL	17.034	16.731	16.474	16.488	16.516	16.539	16.405	16.286	16.206	16.111	16.110
DESIGN OFFSET	-7.847	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.538

CH 4160.000

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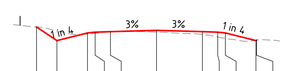
DATUM RL 14.000



DESIGN LEVEL	17.245	16.357	16.857	16.907	16.937	17.027	16.937	16.907	16.857	16.357	16.385
EXISTING SURFACE LEVEL	17.245	16.977	16.780	16.827	16.919	16.911	16.757	16.590	16.494	16.379	16.385
DESIGN OFFSET	-7.832	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.542

CH 4240.000

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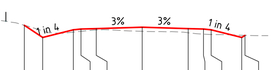
DATUM RL 13.000



DESIGN LEVEL	16.369	15.571	16.071	16.121	16.151	16.241	16.151	16.121	16.071	15.571	15.710
EXISTING SURFACE LEVEL	16.369	15.996	15.923	15.974	16.062	15.972	15.879	15.786	15.768	15.716	15.710
DESIGN OFFSET	-7.697	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.709

CH 4320.000

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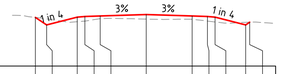

DESIGN LEVEL	15.178	14.688	15.188	15.238	15.268	15.358	15.268	15.238	15.188	14.688	14.860
EXISTING SURFACE LEVEL	15.178	15.075	14.893	14.931	15.090	15.066	15.047	14.935	14.878	14.851	14.860
DESIGN OFFSET	-7.235	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.757

CH 4400.000

EASTING 506396.305
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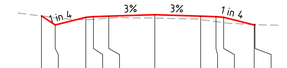
DATUM RL 13.000



DESIGN LEVEL	16.523	15.927	16.427	16.477	16.507	16.597	16.507	16.477	16.427	15.927	15.957
EXISTING SURFACE LEVEL	16.523	16.408	16.272	16.298	16.373	16.379	16.282	16.149	16.085	15.958	15.957
DESIGN OFFSET	-7.395	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.545

CH 4140.000

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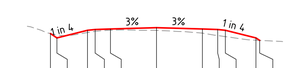
DATUM RL 14.000



DESIGN LEVEL	16.679	16.396	16.896	16.946	16.976	17.066	16.976	16.946	16.896	16.396	16.232
EXISTING SURFACE LEVEL	16.679	16.588	16.745	16.823	16.900	16.887	16.703	16.548	16.482	16.245	16.232
DESIGN OFFSET	-6.925	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.746

CH 4220.000

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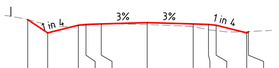
DATUM RL 13.000



DESIGN LEVEL	16.726	15.862	16.362	16.412	16.442	16.532	16.442	16.412	16.362	15.862	15.937
EXISTING SURFACE LEVEL	16.726	16.375	16.310	16.361	16.428	16.411	16.253	16.069	16.005	15.931	15.937
DESIGN OFFSET	-7.796	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.614

CH 4300.000

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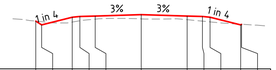

DESIGN LEVEL	15.122	14.869	15.369	15.419	15.449	15.539	15.449	15.419	15.369	14.869	14.910
EXISTING SURFACE LEVEL	15.122	15.084	15.056	15.141	15.248	15.266	15.213	15.116	15.069	14.911	14.910
DESIGN OFFSET	-6.879	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.561

CH 4380.000

EASTING 506393.101
NORTHING 6709842.781
DATUM RL 13.000

DESIGN LEVEL	16.449	15.705	16.205	16.255	16.285	16.375	16.285	16.255	16.205	15.705	15.832
EXISTING SURFACE LEVEL	16.449	16.274	16.029	16.068	16.134	16.090	16.106	15.964	15.899	15.832	15.832
DESIGN OFFSET	-7.616	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.690

CH 4120.000

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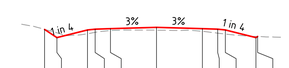

DESIGN LEVEL	16.906	16.372	16.872	16.922	16.952	17.042	16.952	16.922	16.872	16.372	16.443
EXISTING SURFACE LEVEL	16.906	16.681	16.620	16.714	16.832	16.857	16.780	16.659	16.602	16.446	16.443
DESIGN OFFSET	-7.301	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.606

CH 4200.000

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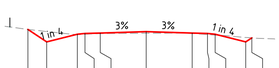

DESIGN LEVEL	16.903	16.090	16.590	16.640	16.670	16.760	16.670	16.640	16.590	16.090	16.353
EXISTING SURFACE LEVEL	16.903	16.767	16.575	16.589	16.633	16.655	16.642	16.571	16.537	16.378	16.353
DESIGN OFFSET	-7.720	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.895

CH 4280.000

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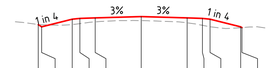

DESIGN LEVEL	15.219	15.075	15.575	15.625	15.655	15.745	15.655	15.625	15.575	15.075	15.019
EXISTING SURFACE LEVEL	15.219	15.204	15.223	15.282	15.397	15.477	15.332	15.172	15.078	15.013	15.019
DESIGN OFFSET	-6.716	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.584

CH 4360.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 4120 TO CH 4420
SHEET 7 OF 9

PRELIMINARY

Designed	JF	Project Director Approved	Date
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Scale	1:200		
Date	DEC 2016	Project Ref	Drawing No / Rev
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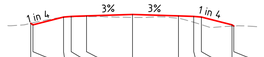

DESIGN LEVEL	14.248	14.153	14.653	14.703	14.733	14.823	14.733	14.703	14.653	14.153	14.074
EXISTING SURFACE LEVEL	14.248	14.281	14.645	14.662	14.703	14.688	14.636	14.577	14.319	14.164	14.068	14.074
DESIGN OFFSET	-6.641	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.619

CH 4500.000

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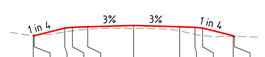

DESIGN LEVEL	14.161	14.125	14.625	14.675	14.705	14.795	14.705	14.675	14.625	14.125	14.070
EXISTING SURFACE LEVEL	14.161	14.162	14.366	14.436	14.551	14.608	14.422	14.218	14.135	14.069	14.070
DESIGN OFFSET	-6.553	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.583

CH 4580.000

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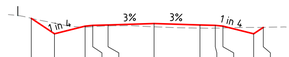

DESIGN LEVEL	15.255	14.244	14.744	14.794	14.824	14.914	14.824	14.794	14.744	14.244	14.665
EXISTING SURFACE LEVEL	15.255	14.944	14.680	14.707	14.758	14.705	14.615	14.617	14.627	14.660	14.665
DESIGN OFFSET	-8.016	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	7.131

CH 4660.000

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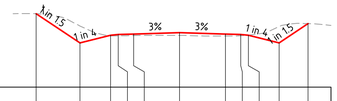

DESIGN LEVEL	15.800	13.888	14.388	14.438	14.468	14.558	14.468	14.438	14.388	13.888	15.150
EXISTING SURFACE LEVEL	15.800	14.992	14.348	14.352	14.370	14.383	14.342	14.362	14.400	14.958	15.150
DESIGN OFFSET	-9.367	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.393

CH 4740.000

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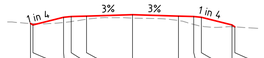

DESIGN LEVEL	14.317	14.211	14.711	14.761	14.791	14.881	14.791	14.761	14.711	14.211	14.088
EXISTING SURFACE LEVEL	14.317	14.310	14.376	14.433	14.587	14.663	14.501	14.250	14.135	14.101	14.088
DESIGN OFFSET	-6.658	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.685

CH 4480.000

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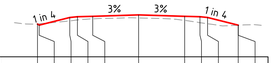

DESIGN LEVEL	14.137	14.062	14.562	14.612	14.642	14.732	14.642	14.612	14.562	14.062	14.065
EXISTING SURFACE LEVEL	14.137	14.149	14.345	14.400	14.478	14.535	14.376	14.227	14.157	14.064	14.065
DESIGN OFFSET	-6.611	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.503

CH 4560.000

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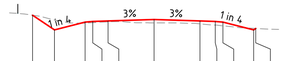

DESIGN LEVEL	15.210	14.253	14.753	14.803	14.833	14.923	14.833	14.803	14.753	14.253	14.343
EXISTING SURFACE LEVEL	15.210	14.886	14.691	14.722	14.773	14.706	14.639	14.561	14.514	14.350	14.343
DESIGN OFFSET	-7.935	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.635

CH 4640.000

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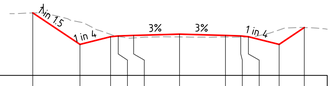

DESIGN LEVEL	16.079	14.026	14.526	14.576	14.606	14.696	14.606	14.576	14.526	14.026	15.121
EXISTING SURFACE LEVEL	16.079	15.481	14.679	14.543	14.444	14.513	14.503	14.498	14.512	14.967	15.121
DESIGN OFFSET	-9.579	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	8.143

CH 4720.000

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NORTHING 6710178.391
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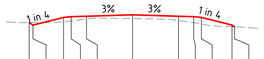

DESIGN LEVEL	14.453	14.294	14.794	14.844	14.874	14.964	14.874	14.844	14.794	14.294	14.183
EXISTING SURFACE LEVEL	14.453	14.456	14.505	14.561	14.694	14.718	14.588	14.445	14.349	14.189	14.183
DESIGN OFFSET	-6.740	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.666

CH 4460.000

EASTING 506460.381
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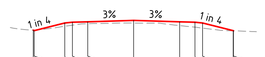
DATUM RL 11.000



DESIGN LEVEL	14.092	14.054	14.554	14.604	14.634	14.724	14.634	14.604	14.554	14.054	14.045
EXISTING SURFACE LEVEL	14.092	14.089	14.345	14.416	14.507	14.550	14.384	14.282	14.222	14.045	14.045
DESIGN OFFSET	-6.556	-6.500	-4.500	-4.000	-3.000	0.000	3.000	4.000	4.500	6.500	6.514

CH 4540.000

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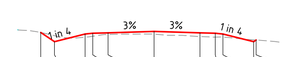

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CH 4620.000

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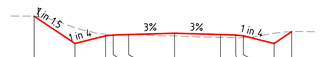
DATUM RL 12.000



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CH 4700.000

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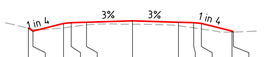
DATUM RL 12.000



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EXISTING SURFACE LEVEL	14.598	14.526	14.616	14.682	14.806	14.851	14.748	14.615	14.542	14.341	14.342
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CH 4440.000

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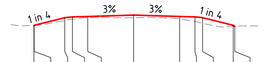
DATUM RL 11.000



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CH 4520.000

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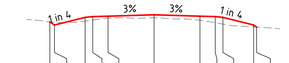

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CH 4600.000

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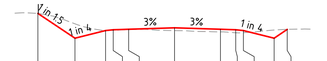

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CH 4680.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 4440 TO CH 4740
SHEET 8 OF 9

PRELIMINARY

Designed	JF
Drawn	JF
Scale	1:200
Date	DEC 2016
Sheet	A1

Project Director Approved — Date — North

Project Ref: 20 21836 01 — Drawing No: C247 — Rev: P1

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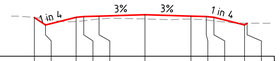

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CH 4820.000

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NORTHING 6710612.709
DATUM RL 10.000

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CH 4900.000

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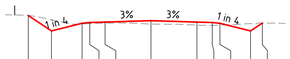

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CH 4800.000

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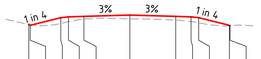

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CH 4880.000

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CH 4950.000

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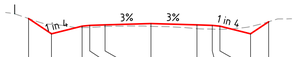

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CH 4780.000

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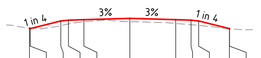

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EXISTING SURFACE LEVEL	12.579	12.575	12.736	12.852	12.994	12.999	12.880	12.802	12.758	12.536	12.535
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CH 4860.000

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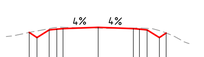

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EXISTING SURFACE LEVEL	12.152	12.245	12.398	12.475	12.483	12.431	12.431	12.432	12.409	12.266	12.111	
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CH 4940.000

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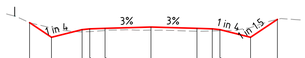

DESIGN LEVEL	14.673	13.718	14.218	14.268	14.298	14.388	14.298	14.268	14.218	13.718	14.884	
EXISTING SURFACE LEVEL	14.673	14.337	14.072	14.093	14.160	14.179	14.119	14.132	14.147	14.349	14.884	
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CH 4760.000

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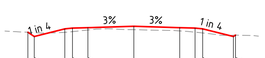

DESIGN LEVEL	13.044	12.768	13.268	13.318	13.348	13.438	13.348	13.318	13.268	12.768	12.859	
EXISTING SURFACE LEVEL	13.044	13.015	13.040	13.088	13.192	13.214	13.132	13.052	12.997	12.854	12.859	
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CH 4840.000

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NORTHING 6710632.45
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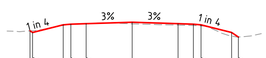

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EXISTING SURFACE LEVEL	12.138	12.149	12.497	12.555	12.608	12.592	12.516	12.486	12.465	11.800	11.737	
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CH 4920.000

Rev	Description	Date	By	App
P1	PRELIMINARY ISSUE	09.12.16	JF	-

Rev	Description	Date	By	App

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Project Name: AVENUE ROAD UPGRADE
TUCABIA NSW 2462

Drawing Title: CROSS SECTIONS
MC50 CH 4760 TO CH 4950
SHEET 9 OF 9

PRELIMINARY

Designed	JF
Drawn	JF
Scale	1:200
Date	DEC 2016
Sheet	A1

Project Director Approved | Date | North

Project Ref: 20 21836 01 | Drawing No: C248 | Rev: P1

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Appendix B

Threatened Species Potential Occurrence and Seven-part Test of Significance

Table B.1 Threatened Fauna Potential Occurrence Assessment

Scientific Name	*Common Name*	*Status*		*Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)*	*Suitability of Site Habitat*	*Potential Occurrence and Need for Assessment of Significance*
		TSC Act	*EPBC Act*			
INSECTS						
Petalura litorea	Coastal Petaltail	V	-	Permanent wetlands, swamps and bogs with some free water and open vegetation. Restricted to coastal and near coastal lowlands between Coffs Harbour and Ballina. L	Low	Low; no further assessment required.
AMPHIBIANS						
Crinia tinnula	Wallum Froglet	V	-	Acid paperbark and sedge swamps known as 'wallum', this is a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies.	Low	Low; no further assessment required.
Litoria brevipalmata	Green-thighed Frog	V	-	Rainforest, moist to dry eucalypt forest and heath, typically where surface water gathers after rain.	Low	Low; no further assessment required.
Mixophyes balbus	Stuttering Frog	V	V	Cool rainforest, moist eucalypt forest and occasionally along creeks in dry eucalypt forest.	Low	Low. No OEH records within locality; no further assessment required.
Mixophyes iteratus	Giant Barred Frog	V	V	Deep, damp leaf litter in rainforests, moist eucalypt forest and near dry eucalypt forest.	Low	Low; no further assessment required.
REPTILES						
Saiphos reticulatus	Three-toed Snake-tooth Skink	V	V	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils.	Low	Low. No OEH records within locality; no further assessment required.
AVIFAUNA						
Anthochaera phrygia	Regent Honeyeater	CE	CE	Dry open forest and woodland with an abundance of nectar-producing eucalypts, particularly box-ironbark woodland, swamp mahogany forests, and riverine sheoak woodlands.	Low	Low. No OEH records within locality; no further assessment required.
Anseranas semipalmata	Magpie Goose	V	-	Shallow wetlands (<1 m deep), large swamps and dams with dense growth of rushes or sedge.	Low	Low; no further assessment required.

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Woodlands and dry open sclerophyll forests, usually dominated by eucalypts; also recorded in shrublands, heathlands and various modified habitats.	Low	Low; no further assessment required.
Botaurus poiciloptilus	Australasian Bittern	E	E	Permanent freshwater wetlands with tall dense vegetation, particularly bullrushes and spikerushes.	Low	Low; no further assessment required.
Burhinus grallarius	Bush Stone-curlew	E	-	Lightly timbered open forest and woodland, and partly cleared farmland with woodland remnants, preferring areas with dry leaf-litter, fallen timber and sparse ground cover.	Low	Low; no further assessment required.
Calidris ferruginea	Curlew Sandpiper	E	CE	Tidal mudflats, sandy ocean shores and occasionally inland freshwater or salt-lakes.	Low	Low. No OEH records within locality; no further assessment required.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Sheoaks in coastal forests and woodlands, timbered watercourses, and moist and dry eucalypt forests of the coast and the Great Divide up to 1,000 m.	Low	Low; no further assessment required.
Chthonicola sagittata	Speckled Warbler	V	-	Eucalyptus dominated communities with sparse shrubs and grassy understorey.	Low	Low; no further assessment required.
Circus assimilis	Spotted Harrier	V	-	Grassy open woodland, inland riparian woodland, grassland and shrub steppe.	Low	Low; no further assessment required.
Climacteris picumnus	Brown Treecreeper	V	-	Eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range, and less commonly on coastal plains and ranges.	Low	Low; no further assessment required.
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low	Low; no further assessment required.
Dasyornis brachypterus	Eastern Bristlebird	E	E	High elevation open forest, woodland with dense tussock or sedge understorey adjacent to rainforest or wet eucalypt forest.	Low	Low. No OEH records within locality; no further assessment required.

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Dromaius novaehollandiae	Emu population NSW North Coast Bioregion	E	-	Open forest, woodland, coastal heath, coastal dunes, wetland areas, tea tree plantations and open farmland, and occasionally in littoral rainforest.	Low	Low; no further assessment required.
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	Swamps, mangroves, mudflats, dry floodplains.	Low	Low; no further assessment required.
Erythrotriorchis radiatus	Red Goshawk	CE	V	In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Low	Low; no further assessment required.
Glossopsitta pusilla	Little Lorikeet	V	-	Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also sources food in *Angophora, Melaleuca* and other tree species.	High	Small flocks recorded foraging near Old Six Mile Lane in late 2016 (pers. obs.). **Assessment of significance completed.**
Grantiella picta	Painted Honeyeater	V	V	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias.	Low	Low. No OEH records within locality; no further assessment required.
Grus rubicunda	Brolga	V	-	Shallow swamps, floodplains, grasslands and pastoral lands, usually in pairs or parties.	Low	Low; no further assessment required.
Haematopus longirostris	Pied Oystercatcher	E	-	Open beaches, intertidal flats, sandbanks and occasionally rocky headlands.	Low	Low; no further assessment required.
Haliaeetus leucogaster	White-bellied Sea-eagle	V	-	Coastal seas, rivers, fresh and saline lakes, lagoons, reservoirs and terrestrial habitats such as grasslands.	Low	Low; no further assessment required.
Hieraaetus morphnoides	Little Eagle	V	-	Open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	Low	Low; no further assessment required.
Irediparra gallinacea	Comb-crested Jacana	V	-	Among vegetation floating on slow-moving rivers and permanent lagoons, swamps, lakes and dams.	Low	Low; no further assessment required.
Lathamus discolor	Swift Parrot	E	E	Forests, woodlands, plantations, and banksias.	Low	Low; no further assessment required.

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Lophoictinia isura	Square-tailed Kite	V	-	Dry woodland and open forest, particularly along major rivers and belts of trees in urban or semi-urban areas. Home range can extend over at least 100 km².	Low	Low; no further assessment required.
Melithreptus gularis gularis	Black-chinned Honeyeater	V	-	Drier open forests or woodlands dominated by box and ironbark eucalypts, and open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.	Low	Low; no further assessment required.
Ninox connivens	Barking Owl	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland.	Moderate	**May forage in locality. Assessment of significance completed.**
Ninox strenua	Powerful Owl	V	-	Woodland and open forest to tall moist forest and rainforest, common along drainage lines.	Low	Low; no further assessment required.
Numenius madagascariensis	Eastern Curlew	CE	CE	Estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass	Low	Low. No OEH records within locality; no further assessment required.
Pandion cristatus	Eastern Osprey	V	-	Forages for fish in fresh, brackish or saline waters of rivers, lakes, estuaries with suitable nesting sites nearby.	Low	Low; no further assessment required.
Melanodryas cucullata	Hooded Robin	V	-	Drier Eucalypt forest, woodland, scrub with fallen logs, debris.	Low	Low; no further assessment required.
Petroica boodang	Scarlet Robin	V	-	Dry eucalypt forests and woodlands, usually with an open grassy understorey with few scattered shrubs. An abundance of logs and fallen timber appear to be an important habitat feature for this species.	Low	Low; no further assessment required.
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V	-	Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains.	Moderate	**Heard calling on adjacent land. Assessment of significance completed.**

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Ptilinopus magnificus	Wompoo Fruit-Dove	V	-	Rainforests, low-elevation moist eucalypt forest, and Brush Box forests.	Low	Low; no further assessment required.
Ptilinopus regina	Rose-crowned Fruit-dove	V	-	Subtropical and dry rainforest, moist eucalypt forest and swamp forest.	Low	Low; no further assessment required.
Rostratula australis	Australian Painted Snipe	E	V	Well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, and open timber.	Low	Low. No OEH records within locality; no further assessment required.
Stagonopleura guttata	Diamond Firetail	V	-	Grassy eucalypt woodlands, open forest, mallee, temperate grassland, and secondary grassland derived from other communities, riparian areas, and sometimes in lightly wooded farmland.	Low	Low; no further assessment required.
Turnix melanogaster	Black-breasted Button-quail	V	V	Drier rainforests and viney scrubs, often in association with Hoop Pine and a deep moist leaf litter layer.	Low	Low. No OEH records within locality; no further assessment required.
Tyto longimembris	Eastern Grass Owl	V	-	Areas of tall grass, including tussocks in swampy areas, grassy plains, swampy heath, cane grass, sedges on flood plains.	Low	Low; no further assessment required.
Tyto novaehollandiae	Masked Owl	V	-	Dry eucalypt forest and woodlands.	Moderate	**May forage in locality. Assessment of significance completed.**
MAMMALS						
Aepyprymnus rufescens	Rufous Bettong	V	-	Tall moist eucalypt forest to open woodland with tussock grass understorey.	Moderate	**May forage in locality. Assessment of significance completed.**
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Sandstone cliffs and fertile woodland valley habitat within close proximity of each other.	Low	Low. No OEH records within locality; no further assessment required.

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Chalinolobus nigrogriseus	Hoary Wattled Bat	V	-	Inhabits dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests.	Moderate	**May forage in locality. Assessment of significance completed.**
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Dry and moist eucalypt forests and rainforests, fallen hollow logs, large rocky outcrops.	Low	Low; no further assessment required.
Miniopterus australis	Little Bentwing-bat	V	-	Moist eucalypt forest, rainforest and dense coastal scrub.	Low	Low; no further assessment required.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Forest or woodland, roost in caves, old mines and stormwater channels.	Low	Low; no further assessment required.
Mormopterus lumsdenae	Northern Freetail-bat	V	-	Rainforests to open forests and woodlands often along watercourses.	Moderate	**May forage in locality. Assessment of significance completed.**
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests..	Moderate	**May forage in locality. Assessment of significance completed.**
Myotis macropus	Southern Myotis	V	-	Bodies of water, rainforest streams, large lakes, reservoirs.	Low	Low; no further assessment required.
Petauroides volans	Greater Glider	-	V	Wide range of habitats including tall open woodland, eucalypt forests and low woodlands.	Low	Low. No OEH records within locality; no further assessment required.
Petaurus australis	Yellow-bellied Glider	V	-	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	Low	Low; no further assessment required.
Petaurus norfolcensis	Squirrel Glider	V	-	Blackbutt, bloodwood and ironbark eucalypt forest with heath understorey in coastal areas, and box-ironbark woodlands and River Red Gum forest inland.	Moderate	**May forage in locality. Assessment of significance completed.**
Petrogale penicillata	Brush-tailed Rock Wallaby	V	V	North-facing cliffs and dry eucalypt forest and woodland, inhabiting rock crevices, caves and overhangs.	Low	Low. No OEH records within locality; no further assessment required.

Scientific Name	Common Name	Status		Habitat Requirement (EPBC Act SPRAT and/ or OEH Threatened Species Profiles websites)	Suitability of Site Habitat	Potential Occurrence and Need for Assessment of Significance
		TSC Act	EPBC Act			
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	Drier forests and woodlands with hollow-bearing trees and sparse ground cover.	Moderate	**May forage in locality. Assessment of significance completed.**
Phascolarctos cinereus	Koala	V	V	Appropriate food trees in forests and woodlands, and treed urban areas.	Moderate	**May forage in locality. Assessment of significance completed.**
Pseudomys novaehollandiae	New Holland Mouse	V	V	Occurs in open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low	Low. No OEH records within locality; no further assessment required.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Moderate	**May forage in locality. Assessment of significance completed.**
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Forages in a variety of habitats, roosts in tree hollows and buildings.	Moderate	**May forage in locality. Assessment of significance completed.**
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	Moderate	**May forage in locality. Assessment of significance completed.**
Vespadelus troughtoni	Eastern Cave Bat	V	-	Cave roosting species found in dry open forest and woodland near cliffs and rocky overhangs.	Low	Low; no further assessment required.

V = Vulnerable; E = Endangered; CE = Critically Endangered

Assessments of significance have been completed for the following threatened fauna species for which foraging/ breeding/ roosting habitat occurs within the project footprint:

- Barking Owl
- Brush-tailed Phascogale
- Eastern Freetail-bat
- Greater Broad-nosed Bat
- Grey-crowned Babbler
- Grey-headed Flying-fox
- Hoary Wattled Bat
- Koala
- Little Lorikeet
- Masked Owl
- Northern Free-tailed Bat
- Rufous Bettong
- Squirrel Glider
- Yellow-bellied Sheathtail-bat

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Barking Owl

The Barking Owl inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It roosts in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. Barking Owls preferentially hunt small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits.

The species requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Nesting occurs in living eucalypts and sometimes dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas). Nesting occurs during mid-winter and spring but is variable between pairs and among years. Laying generally occurs during August and fledging occurs in November. Fledging occurs 2-3 weeks later.

Threatening processes for this species include:

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures.
- Inappropriate forest harvesting practices that remove old, hollow-bearing trees and change open forest structure to dense regrowth.
- Firewood harvesting resulting in the removal of fallen logs and felling of large dead trees.
- Too-frequent fire leading to degradation of understorey vegetation which provides shelter and foraging substrates for prey species.

- Disturbance of nesting and excessive disturbance of foraging by inappropriate use of call-playback surveys.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of Avenue Road. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

The Proposal represents a minor reduction of foraging habitat from the broader area which may be utilised by the Barking Owl. It would be highly unlikely that an adverse effect on the life cycle of the Barking Owl would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Brush-tailed Phascogale

Brush-tailed Phascogales prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. They are agile climbers foraging preferentially in rough barked trees of 25 cm DBH or greater. The diet mostly comprises arthropods but also includes other invertebrates, nectar and sometimes small vertebrates. Females have exclusive territories of approximately 20 - 40 ha, while males have overlapping territories often greater than 100 ha. Brush-tailed Phascogales nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. Mating occurs May - July; males die soon after the mating season whereas females can live for up to three years but generally only produce one litter.

Threatening processes for this species include:

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Predation by foxes and cats.
- Competition for nesting hollows with the introduced honeybee.

Potential Impacts of the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

Given the occurrence of extensive forested habitat within the locality, the Proposal represents a minor reduction of foraging habitat which may be utilised by the Brush-tailed Phascogale. On this basis it would be highly unlikely that an adverse effect on the life cycle of the Brush-tailed Phascogale would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Eastern Freetail-bat

Eastern Freetail-bats occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. They mainly roost in tree hollows but would also roost under bark or in man-made structures. Roosting is usually solitary but communal roosting has also been recorded. Females give birth in late November/ early December.

Threatening processes for this species include:

- Loss of hollow-bearing trees.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.
- Artificial light sources spilling onto foraging and/or roosting habitat
- Large scale wildfire or hazard reduction burns on foraging and/or roosting habitat

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Eastern Freetail-bat such that a viable local population of the species is placed at risk of extinction.

Greater Broad-nosed Bat

The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although usually roosting in tree hollows, the species has also been found in buildings. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of the reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of a single young.

Threatening processes for this species include:

- Disturbance to roosting and summer breeding sites.

- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees.
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores.
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Greater Broad-nosed Bat such that a viable local population of the species is placed at risk of extinction.

Grey-crowned Babbler

Grey-crowned Babblers inhabit open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains; in coastal regions Woodlands on fertile soils are typical habitat. Babblers live in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. They feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses.

Grey-crowned Babblers build and maintain several conspicuous, dome-shaped stick nests about the size of a football, which are used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones.

Breeding occurs between July and February. Usually two to three eggs are laid and incubated by the female. During incubation, the adult male and several helpers in the group may feed the female as she sits on the nest. Young birds are fed by all other members of the group. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year.

Threatening processes for this species include:

- Loss, degradation and fragmentation of woodland habitat on high fertility soils.
- Excessive total grazing pressure and loss of coarse woody debris is resulting in degradation and loss of important habitat components.
- Infestation of habitat by invasive weeds including exotic perennial grasses.

- Inappropriate fire regimes - excessive fires lead to loss of tree and shrub regeneration and absence of fire may lead to the grass sward being too dense and therefore unsuitable for foraging by babblers.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Climate change impacts including reduction in resources due to drought.
- Nest predation by species such as ravens and butcherbirds may be an issue in some regions where populations are small and fragmented.

Potential Impacts of the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

Given the occurrence of extensive forested habitat within the locality, the proposal represents a minor reduction of foraging habitat which may be utilised by the Grey-crowned Babbler. On this basis it would be highly unlikely that an adverse effect on the life cycle of the Grey-crowned Babbler would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Grey-headed Flying-fox

Grey-headed Flying-foxes have a distribution that typically extends approximately 200 km from the coast of Eastern Australia, from Rockhampton in Queensland to Adelaide in South Australia. Foraging areas include subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines, as well as from cultivated gardens and orchards. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km.

Eby and Law (2008) have identified 10 trees that are key foraging resource for the Grey-headed Flying-fox in north-east NSW, consisting of Swamp Mahogany (*Eucalytus robusta*), Coastal Blackbutt (*E. pilularis*), Grey Ironbark (*E. siderophloia*), Forest Red Gum (*E. tereticornis*), Spotted Gum (*Corymbia variegata*), Large-leaved Spotted Gum (*C. henryi*), Red Bloodwood (*C. gummifera*), Pink Bloodwood (*C. intermedia*), Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Silky Oak (*Grevillea robusta*).

Threatening processes for this species include:

- Clearing of woodlands for agriculture.

- Loss of roosting and foraging sites.
- Electrocution on powerlines, entanglement in netting and on barbed-wire.
- Heat stress.
- Conflict with humans.
- Incomplete knowledge of abundance and distribution across the species' range.

Potential Impacts of the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

Given the occurrence of extensive forested habitat within the locality, the proposal represents a minor reduction of foraging habitat which may be utilised by the Grey-headed Flying-fox. On this basis it would be highly unlikely that an adverse effect on the life cycle of the Grey-headed Flying-fox would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Hoary Wattled Bat

In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat. The species roosts in hollows and rock crevices and will occupy urban areas with suitable habitat. Birthing usually occurs during October and November when twins are born.

Threatening processes for this species include:

- Clearing and fragmentation of dry forest and woodland habitat through clearing for agriculture and development.
- Loss of tree hollows for roosting and maternity sites from forest management favouring younger stands of trees.
- Loss of hollow-bearing trees used for roosting and maternity sites as a result of too-frequent burning for grazing and forestry management activities.
- Pesticides on insects and in water consumed by bats bio accumulates, resulting in poisoning of individuals. The use of pesticides also reduces available insect food sources.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash

(*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Hoary Wattled Bat such that a viable local population of the species is placed at risk of extinction.

Koala

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales it mainly occurs on the central and north coasts, with populations on the western side of the Great Dividing Range.

Habitat consists of eucalypt woodlands and forests, in which the Koala feeds on more than 70 eucalypt species and 30 non-eucalypt species. Preferred browse species are differ across regions. Koalas are inactive for most of the day and do most of their feeding and moving during the night. Although predominantly arboreal, Koalas would descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than 2 hectares to several hundred hectares in size. Generally solitary, the Koala has complex social hierarchies based on a dominant male with a territory that overlaps that of several females, with sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.

In Clarence Valley LGA, preferred food trees include Forest Red Gum (*Eucalyptus tereticornis*), Swamp Mahogany (*E. robusta*), Red Mahogany (*E. resinifera*) and Tallowwood (*E. microcorys*), with Small-fruited Grey Gum (*E. propinqua*) and several other species recognised as secondary feed trees (Mitchell 2008).

Threatening processes for this species include:

- Loss, modification and fragmentation of habitat.
- Predation by feral and domestic dogs.
- Intense fires that scorch or kill the tree canopy.
- Road-kills.
- Human-induced climate change, especially drought.

Potential Impacts of the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

One Schedule 2 feed tree species (Forest Red Gum; *Eucalyptus tereticornis*) occurs infrequently on site and does not comprise >15% of the canopy. The site therefore does not comprise potential Koala habitat.

The proposal would not increase the risk of Koala roadkill during construction as plant and vehicles would only be operational during daytime hours with extensive mitigation measures. Given the occurrence of extensive forested habitat within the locality, the proposal represents a minor reduction of foraging habitat which may be utilised by the Koala. On this basis it would be highly unlikely that an adverse effect on the life cycle of the Koala would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Little Lorikeet

The distribution of the Little Lorikeet encompasses the coast, tablelands and slopes of eastern Australia from Cape York to South Australia. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year. The Little Lorikeet mostly forages in the canopy of open eucalypt forest and woodland, utilising *Eucalyptus*, *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. This species feeds mostly on nectar and pollen, but occasionally also on native fruits such as mistletoe. Nests are generally located in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of a smooth-barked *Eucalyptus*. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees are often chosen, including species like *Allocasuarina*. Nesting season extends from May to September.

Threatening processes for this species include:

- Clearing of woodlands for agriculture.
- The loss of old hollow bearing trees.
- Competition with the introduced Honeybee.
- Infestation of habitat by invasive weeds.
- Inappropriate fire regimes.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Climate change impacts including reduction in resources due to drought.
- Degradation of woodland habitat and vegetation structure due to overgrazing.

Potential Impacts of the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

Given the occurrence of extensive forested habitat within the locality, the proposal represents a minor reduction of foraging habitat which may be utilised by the Little Lorikeet. On this basis it would be

highly unlikely that an adverse effect on the life cycle of the Little Lorikeet would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Masked Owl

Masked Owls live in dry eucalypt forests and woodlands from sea level to 1100 m. While forest owls, they often hunt along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. They roosts and breed in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

Threatening processes for this species include:

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.
- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.
- Being hit by vehicles.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

The Proposal would result in the loss of a negligible area of poor quality foraging habitat for the Masked Owl, which due to its small and fragmented nature is unlikely to be a significant source of prey. The proposed works would be unlikely to have an adverse effect on the life cycle of the Masked Owl such that a viable local population of the species is placed at risk of extinction.

Northern Freetail-bat

Northern Freetail-bats occur within a range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses. They may also occur in towns and cities. They mainly roost in tree hollows but relatively large colonies have been found under house roofs in urban areas in Queensland

Threatening processes for this species include:

- Clearing of forest and woodland habitat for agricultural, residential and infrastructure development.
- Loss of hollow-bearing trees used for roosting and maternity sites as the result dieback, too frequent burning and forest management favouring younger stands.

- Use of pesticides.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Northern Freetail-bat such that a viable local population of the species is placed at risk of extinction.

Rufous Bettong

Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. They sleep during the day in cone-shaped nests constructed of grass in a shallow depression at the base of a tussock or fallen log. At night they feed on grasses, herbs, seeds, flowers, roots, tubers, fungi and occasionally insects.

Threatening processes for this species include:

- Changes to the grassy understorey by inappropriate burning and grazing.
- Competition from rabbits.
- Predation by feral cats and foxes, whose numbers appear to increase when dingoes are reduced through baiting.
- Loss of habitat through clearing, logging and collection of fallen timber.
- Poor knowledge of the species' abundance and distribution in the western parts of its range.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It would be highly unlikely that an adverse effect on the life cycle of the Rufous Bettong would occur such that a viable local population of the species is likely to be placed at risk of extinction.

Squirrel Glider

Squirrel Gliders inhabit mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. They prefer mixed species stands with a shrub or Acacia midstorey. Squirrel Gliders live in family groups of a single adult male one or more adult females and offspring and require abundant tree hollows for refuge and nest sites. The diet varies seasonally and consists of *Acacia* gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.

Threatening processes for this species include:

- Habitat loss and degradation.
- Fragmentation of habitat.
- Loss of hollow-bearing trees.
- Loss of understorey food resources.
- Inappropriate fire regimes.
- Reduction in food resources due to drought.
- Mortality due to entanglement on barbed wire.
- Occupation of hollows by exotic species.
- Mortality due to collision with vehicles.
- Predation by exotic predators.
- Changes in spatial and temporal distribution of habitat due to climate changes.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Squirrel Glider such that a viable local population of the species is placed at risk of extinction.

Yellow-bellied Sheathtail-bat

The Yellow-bellied Sheathtail-bat forages in most habitats across a very wide range, with and without trees; the species appears to defend an aerial territory. It roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements of Sheathtail-bats are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

Threatening processes for this species include:

- Disturbance to roosting and summer breeding sites.
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees; clearing and fragmentation of forest and woodland habitat.
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores.

Potential Impacts from the Proposal

The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina glauca*). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

The proposed works would have little impact on foraging habitat of the Yellow-bellied Sheathtail-bat, given that foraging habitat would be reduced by a negligible amount. It is considered that the proposed works would be unlikely to have an adverse effect on the life cycle of the Yellow-bellied Sheathtail-bat such that a viable local population of the species is placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations are likely to occur; consideration under this part of the assessment is not required.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological communities occur.

d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,

The works occur within a highly modified environment and utilise an existing disturbed footprint within the road reserve. The Proposal would require removal of up to 420 native trees (i.e. trees >10 cm DBH or >3 m in height) along a 2.6 km long section of the roadside verge of Avenue Road which is disturbed habitat. This includes numerous small trees such as regrowth Swamp Oak (*Casuarina*

glauca). Species most commonly affected are Spotted Gum and Grey Box. Other affected species include Red Ash (*Alphitonia excelsa*), Swamp Oak, Wattles (*Acacia concurrens, A. disparrima* subsp. *disparrima*) and Forest Red Gum (*E. tereticornis*).

An estimated 110 dead native trees will also require clearing; it is noted that the majority of these are immature Swamp Oak less than 5 metres in height. Up to 23 habitat trees may require removal, all of which contain hollows.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The site is located within an already fragmented rural environment; the proposed road upgrade will not increase habitat fragmentation or create barriers to movement of dispersal for any of the subject species.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long term survival of the species, population or ecological community in the locality,

The works footprint represents the edge of mature forest within a rural environment which represents a minor contraction of forest and subsequent loss of habitat trees. As such, impacts to the subject species/communities will be negligible in a local context.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat listed under the TSC Act occur within Clarence Valley LGA.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Part 4 of the TSC Act states *"The object of a recovery plan is to promote the recovery of the threatened species, population or ecological community to which it relates to a position of viability in nature."* Any action which adversely affects threatened species or their habitat, or contributes to relevant key threatening processes (KTP) may be interpreted as being inconsistent with this general objective. Specific recovery and threat abatement strategies are discussed below.

A recovery plan has not been prepared for any of the subject species, with the exception of the Koala, Masked Owl and Barking Owl. The proposal seeks to minimise vegetation/ habitat loss where possible and minimise other threatening processes, and as such is not inconsistent with the objectives of approved recovery plans or recovery strategies in the Saving Our Species program.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process is defined under the TSC Act as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. The current list of key threatening processes under the TSC Act, and whether the Proposal is recognised as a threatening process is shown in **Table B.1**.

Table B.1 Key Threatening Processes

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	*Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?*		
	Likely	*Possible*	*Unlikely*
Alteration of habitat following subsidence due to longwall mining			✓
Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)			✓
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			✓
Anthropogenic climate change			✓
Bush rock removal			✓
Clearing of native vegetation	✓		
Competition and grazing by the feral European Rabbit (*Oryctolagus cuniculus*)			✓
Competition and habitat degradation by feral goats (*Capra hircus*)			✓
Competition from feral honeybees (*Apis mellifera*)			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			✓
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition			✓
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants (*Solenopsis invicta*)			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae			✓
Introduction of the large earth bumblebee (*Bombus terrestris*)			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion and establishment of Scotch broom (*Cytisus scoparius*)			✓
Invasion and establishment of the Cane Toad (*Bufo marinus*)			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by African Olive (*Olea europaea L. subsp. cuspidata*)			✓
Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed)			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of the yellow crazy ant (*Anoplolepis gracilipes*) into NSW			✓

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	***Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?***		
	Likely	***Possible***	***Unlikely***
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants			✓
Loss of hollow-bearing trees	✓		
Loss or degradation (or both) of sites used for hill-topping by butterflies			✓
Predation and hybridisation of feral dogs (*Canis lupus familiaris*)			✓
Predation by the European red fox (*Vulpes vulpes*)			✓
Predation by the feral cat (*Felis catus*)			✓
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)			✓
Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island			✓
Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)			✓
Removal of dead wood and dead trees	✓		

The proposed improvements may contribute to listed KTPs as follows:

- Clearing of native vegetation: loss of scattered trees within the road reserve.
- Loss of hollow-bearing trees: removal of up to 23 hollow-bearing trees within the road reserve.
- Removal of dead wood and dead trees: Loss of minor amounts of debris (branches etc) in the ground layer.

The degree that the Proposal will contribute to any KTP is not considered likely to place the local population of any of the subject species at significant risk of extinction.

Conclusion

It is considered unlikely that the local population of any of the subject species will be placed at significant risk of extinction as a result of the proposed works.

Weeping Paperbark (*Melaleuca irbyana*) Seven-part Test

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Weeping Paperbark has a restricted distribution in NSW and occurs in open eucalypt forest on poorly drained soils (usually clay, sandstone or alluvial soils). Flowering occurs between spring and summer.

Threatening processes for this species include:

- Clearing of habitat for agriculture and development.
- Fire, particularly when too frequent to allow regeneration.
- Grazing by domestic stock.
- Invasion of habitat by weeds particularly introduced grasses.
- Plantation development and logging activities.
- Road-works, including grading and slashing.
- Risk of local extinction because populations are small and may also lack genetic diversity.

Potential Impacts from the Proposal

Several hundred Weeping Paperbark (*Melaleuca irbyana*) occur on adjacent land to the east of the proposed works area (Lots 19, 20 & 30 DP751376). The closest Weeping Paperbark is within 5 m of the road reserve. Thorough searches of the eastern road reserve were completed and no Weeping Paperbark were recorded. No Weeping Paperbark therefore occur within the proposed works footprint. Trees and patches of Weeping Paperbark on private land adjacent to the works are isolated from the works footprint and there is little chance of any direct or indirect impacts to these trees. On this basis it would be highly unlikely that an adverse effect on the life cycle of Weeping Paperbark would occur such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations are likely to occur; consideration under this part of the assessment is not required.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

No endangered ecological communities occur; consideration under this part of the assessment is not required.

d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,

No Weeping Paperbark occurs within the road reserve. The proposal would remove native trees, including habitat trees from the disturbed road verge. Given the broad extent of well–connected contiguous dry sclerophyll forest habitat in the locality, loss of this habitat would not be significant for Weeping Paperbark. No Weeping Paperbark will be removed for the proposed works.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal would not further fragment available habitat for Weeping Paperbark in the locality.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

The habitat to be removed is of minor value for the life cycle requirements of Weeping Paperbark.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No areas of critical habitat listed under the TSC Act occur within the locality.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Part 4 of the TSC Act states *"The object of a recovery plan is to promote the recovery of the threatened species, population or ecological community to which it relates to a position of viability in nature."* Any action which adversely affects threatened species or their habitat, or contributes to relevant key threatening processes (KTP) may be interpreted as being inconsistent with this general objective. Specific recovery and threat abatement strategies are discussed below.

An approved recovery plan has not been prepared under the TSC Act for the Weeping Paperbark. The proposal does not affect the aims or proposed actions of any threat abatement plan or recovery actions in the *Save our Species* program prepared for Weeping Paperbark.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process is defined under the TSC Act as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. The current list of key threatening processes under the TSC Act, and whether the proposal is recognised as a threatening process is shown in **Table B.2**.

Table B.2 Key Threatening Processes

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	*Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?*		
	Likely	*Possible*	*Unlikely*
Alteration of habitat following subsidence due to longwall mining			✓
Aggressive exclusion of birds by noisy miners			✓
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			✓
Anthropogenic climate change			✓
Bush rock removal			✓
Clearing of native vegetation	✓		
Competition and grazing by the feral European Rabbit			✓
Competition and habitat degradation by feral goats			✓
Competition from feral honeybees			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			✓
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition			✓
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants			✓
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Infection of native plants by *Phytophthora cinnamomi*			✓
Introduction and Establishment of Exotic Rust Fungi of the			✓

Listed Key Threatening Process (as described in the final determination of the Scientific Committee to list the threatening process)	***Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?***		
	Likely	***Possible***	***Unlikely***
order Pucciniales pathogenic on plants of the family Myrtaceae			
Introduction of the large earth bumblebee			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion and establishment of Scotch broom			✓
Invasion and establishment of the Cane Toad			✓
Invasion, establishment and spread of *Lantana camara*			✓
Invasion of native plant communities by African Olive			✓
Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed)			✓
Invasion of native plant communities by exotic perennial grasses			✓
Invasion of the yellow crazy ant into NSW			✓
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants			✓
Loss of hollow-bearing trees		✓	✓
Loss or degradation of sites used for hill-topping by butterflies			✓
Predation and hybridisation of feral dogs			✓
Predation by the European red fox			✓
Predation by the feral cat			✓
Predation by *Gambusia holbrooki*			✓
Predation by the Ship Rat on Lord Howe Island			✓
Predation, habitat degradation, competition and disease transmission by feral pigs			✓
Removal of dead wood and dead trees	✓		

KTPs that the proposal may contribute to include the clearing of native vegetation, loss of hollow-bearing trees and removal of dead wood and dead trees (as ground litter). Clearing is defined under the TSC Act as *'the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of stand or stands'*.

The proposal will require the removal of scattered sclerophyll forest along a disturbed road verge, loss of up to 23 hollow-bearing trees, and removal; of small amounts of woody debris (fallen branches). No Weeping Paperbark will be removed. The degree that the proposal would contribute to any threatening process is not considered likely to place the local population of Weeping Paperbark at significant risk of extinction.

Conclusion

It is considered unlikely that the local population of Weeping Paperbark would be placed at significant risk of extinction as a result of the proposal.

Appendix C

Non-Aboriginal Heritage Database Search Results

Search Results

5 results found.

Crowleys Creek Area Firths Rd	Tucabia, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Crowsnest Swamp Area Deep Creek Rd	Tucabia, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Lower Clarence River Area Pacific Hwy	Maclean, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Pine Brush Nature Reserve Proposal Somervale Rd	Tucabia, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Ulmarra Flood Refuge Reserve Pillar Valley Rd	Ulmarra, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)

Report Produced: Wed May 3 14:09:47 2017

Appendix D

AHIMS Results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 2736 Avenue Rd

Client Service ID : 279500

GeoLINK Consulting Pty Ltd

PO Box 1446
Coffs Harbour New South Wales 2450

Attention: Jeremy Clifford

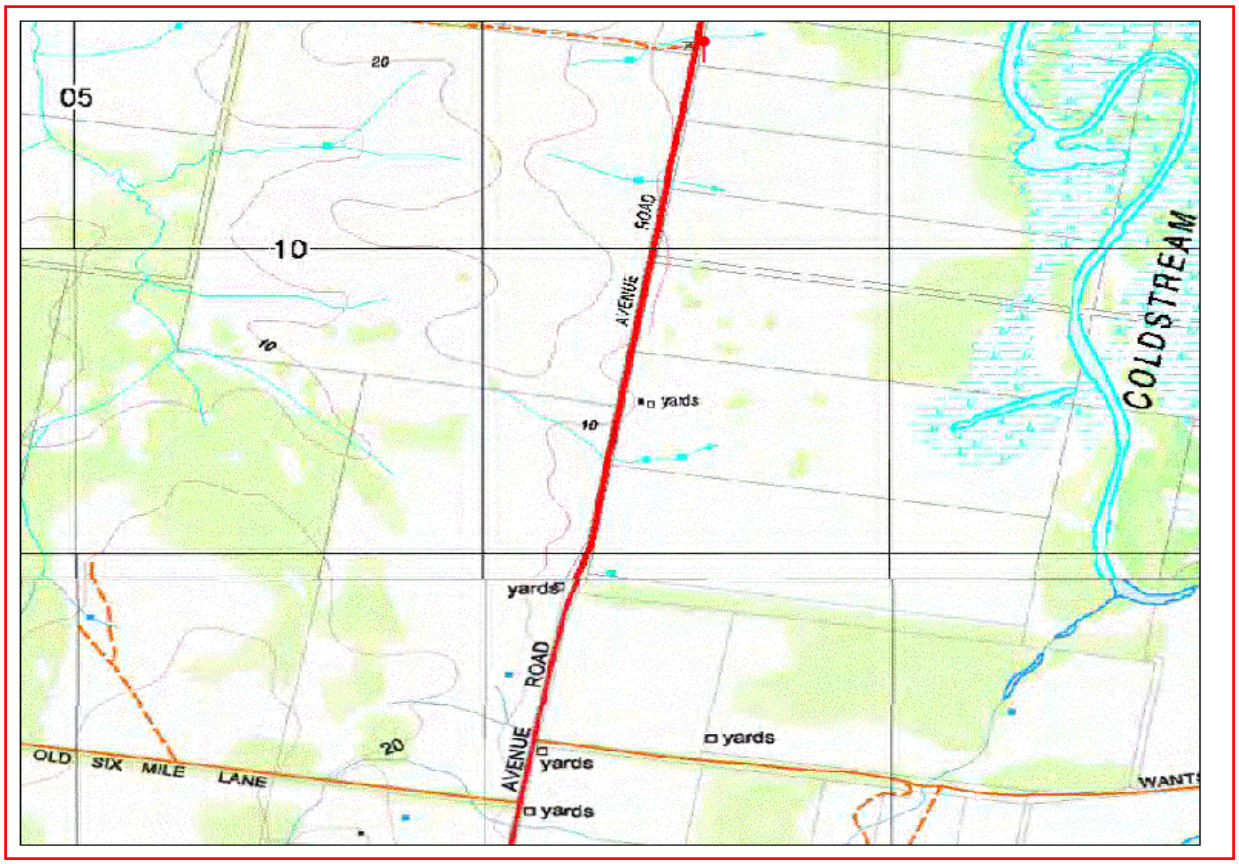
Email: jeremy.clifford@gmail.com

Date: 04 May 2017

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 505946 - 506663, Northings : 6708091 - 6710703 with a Buffer of 50 meters. Additional Info : For a Review of Environmental factors for upgrade of Avenue Rd, conducted by Jeremy Clifford on 04 May 2017.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

4	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 2736 Avenue Rd

Client Service ID : 279500

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
13-4-0193	New Grafton Corr. Centre 1	GDA	56	506089	6710493	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Jacobs Group (Australia) Pty Ltd - Melbourne,Mr.Andrew Wilkinson					**Permits**		
13-4-0192	New Grafton Corr. Centre 2	GDA	56	506208	6709859	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Jacobs Group (Australia) Pty Ltd - Melbourne,Mr.Andrew Wilkinson					**Permits**		
09-4-0108	WX2I PAD 8	GDA	56	506322	6708622	Open site	Valid	Potential Archaeological Deposit (PAD) : 1, Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Mr.Joseph Brooke,Mr.Joseph Brooke,Jacobs Group Australia Pty Ltd - North Sydney					**Permits**		
13-4-0194	Avenue Road scarred tree	GDA	56	506382	6708221	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	RPS - Echuca,Doctor.Coral Montero-Lopez					**Permits**		

Report generated by AHIMS Web Service on 04/05/2017 for Jeremy Clifford for the following area at Datum :GDA, Zone : 56, Eastings : 505946 - 506663, Northings : 6708091 - 6710703 with a Buffer of 50 meters. Additional Info : For a Review of Environmental factors for upgrade of Avenue Rd. Number of Aboriginal sites and Aboriginal objects found is 4

Appendix E

Protected Matters Search Tool Results

Australian Government
Department of the Environment and Energy

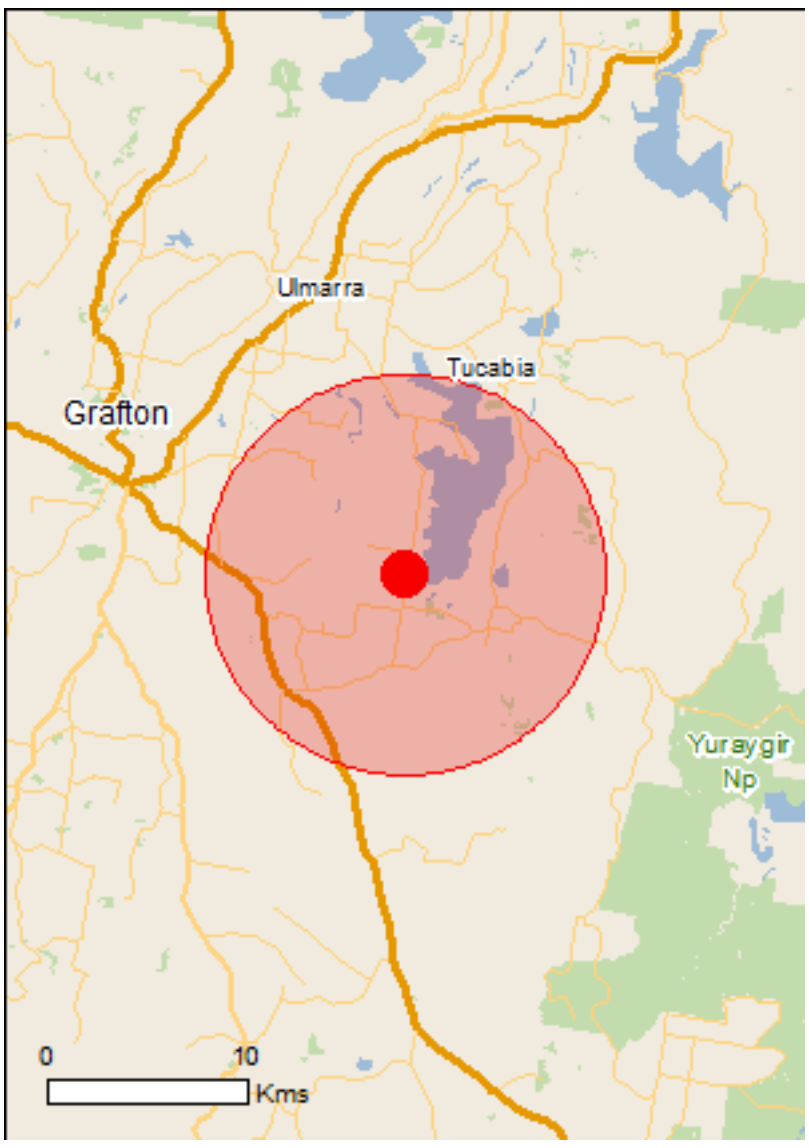
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

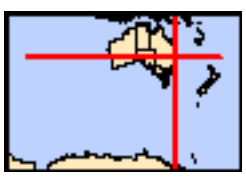
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 01/05/17 15:08:48



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	36
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	23
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	4
Regional Forest Agreements:	1
Invasive Species:	37
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Frogs		

Name	Status	Type of Presence
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus		
Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Allocasuarina defungens		
Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat may occur within area
Angophora robur		
Sandstone Rough-barked Apple [56088]	Vulnerable	Species or species habitat likely to occur within area
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Corynocarpus rupestris subsp. rupestris		
Glenugie Karaka [19303]	Vulnerable	Species or species habitat known to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus tetrapleura		
Square-fruited Ironbark [7490]	Vulnerable	Species or species habitat likely to occur within area
Grevillea quadricauda		
[64651]	Vulnerable	Species or species habitat likely to occur within area
Macadamia integrifolia		
Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Macadamia tetraphylla		
Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat likely to occur within area
Marsdenia longiloba		
Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Melichrus sp. Newfoundland State Forest (P.Gilmour 7852)		
Hairy Melichrus [82048]	Endangered	Species or species habitat likely to occur within area
Phaius australis		
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Samadera sp. Moonee Creek (J.King s.n. Nov. 1949)		
[86885]	Endangered	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Tylophora woollsii		
[20503]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Saiphos reticulatus		
Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Airservices Australia

Listed Marine Species	[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Cuculus saturatus](#) Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Monarcha trivirgatus](#) Spectacled Monarch [610]		Species or species habitat known to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Arandin	NSW
FMAs in GRAFTON	NSW
Glenugie Peak	NSW
UNE Special Management Zone No1	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Upper Coldstream	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-29.74273 153.06573

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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