

Review of Environmental Factors

Hogbin Drive Intersection



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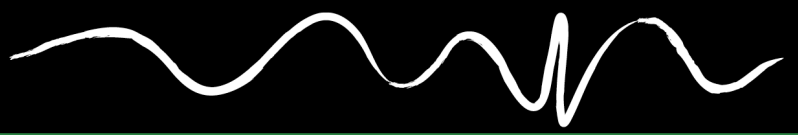
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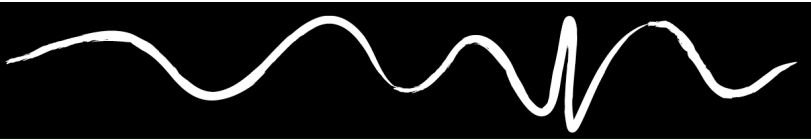


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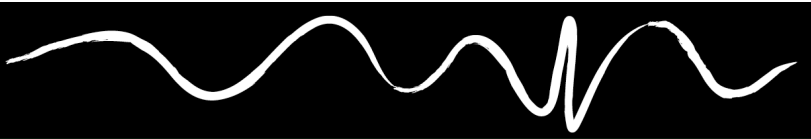


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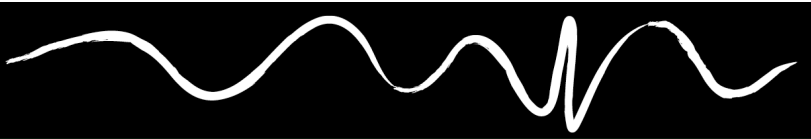
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Executive Summary

Proponent and Determining Authority	City of Coffs Harbour (The City)
Background	City of Coffs Harbour (The City) propose to upgrade the Hogbin Drive and De Havilland Way intersection by constructing a roundabout.
Location	Hogbin Drive and De Havilland Way intersection is located in Coffs Harbour, NSW. The intersection area is approximately 1.4 km north-east of the Hogbin Drive and Airport Drive intersection in Coffs Harbour.
Statutory and Planning Framework	<p>All relevant statutory planning instruments have been examined in relation to the proposed road works.</p> <p>Development consent is not required for the proposal by virtue of Section 2.109 of the SEPP (Transport and Infrastructure) which permits the development without consent. However, the proposal becomes an 'Activity' for the purposes of Part 5, Division 5.1 of the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) and is subject to an environmental impact assessment (this REF).</p>
Environmental Assessment	<p>An environmental assessment of the Activity has been undertaken. Some minor impacts would occur as a result of the Activity; however, no significant or long-term adverse impacts are expected. To ensure that the extent of impacts is limited and that unavoidable impacts are managed and minimised, safeguards and mitigation measures have been recommended and are anticipated to be implement and monitored.</p> <p>The Activity is considered justified taking into account the potential and residual environmental impacts, including the associated safeguards and mitigation measures. The Activity is in accordance with ecologically sustainable development (ESD) principles and consistent with the objectives of the EP&A Act.</p> <p>As the potential environmental impacts of the Activity are not likely to be significant, it is not necessary for an Environmental Impact Statement to be prepared under Division 5.1, Subdivision 3 of the EP&A Act or approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.</p> <p>The Activity is unlikely to significantly affect threatened species or ecological communities or their habitats, within the meaning of the <i>Biodiversity Conservation Act 2016</i> or <i>Fisheries Management Act 1994</i>; therefore, a Species Impact Statement is not required.</p> <p>The Activity is also not expected to affect Commonwealth land or have a significant impact on any matters of national environmental significance. Accordingly, the proposed Activity does not require referral to the Australian Government Department of Climate Change, Energy, the Environment and Water.</p>
Justification and Conclusion	<p>The Activity would improve access and safety for the Hogbin Drive and De Havilland Way intersection.</p> <p>With effective implementation of the safeguards of this Review of Environmental Factors, the Activity is considered unlikely to have any significant environmental impacts.</p>



1. Introduction

1.1 Background and Activity Identification

City of Coffs Harbour (The City) propose to upgrade the Hogbin Drive and De Havilland Way intersection by constructing a roundabout. The subject site is located at the intersection of Hogbin Drive and De Havilland Way, Coffs Harbour, within the City of Coffs Harbour's (The City) Local Government Area (refer to **Illustration 1.1**).

The approved development of the Airport Enterprise Park (AEP) has created increased light and heavy vehicle movements through the intersection of Hogbin Drive and De Havilland Way. The increased traffic volumes have necessitated an upgrade of the intersection to address safety and level of service concerns; a new 2 lane roundabout is proposed to address this issue.

The Activity would involve closing De Havilland Way during construction and diverting all traffic for this road south on Hogbin Drive and gain access to Christmas Bells Road and Dakota Drive via Aviation Drive.

All construction and operational activities associated with intersection upgrade (roundabout construction), including laydown areas, compound site, and ancillary works, is referred to herein as 'the Activity'.

1.2 Purpose of This Report

The purpose of this Review of Environmental Factors (REF) is to describe the Activity, assess and document the likely impacts of the Activity on the environment, detail safeguards and mitigation measures to be implemented, and to determine whether or not the Activity can proceed.

For the purposes of this work The City is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The description of the proposed works and assessment of associated environmental impacts has been undertaken in the context of section 171 of the Environmental Planning and Assessment Regulation 2021 (EP Reg), Guidelines for Division 5.1 Assessments (DPE 2022), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act) and the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

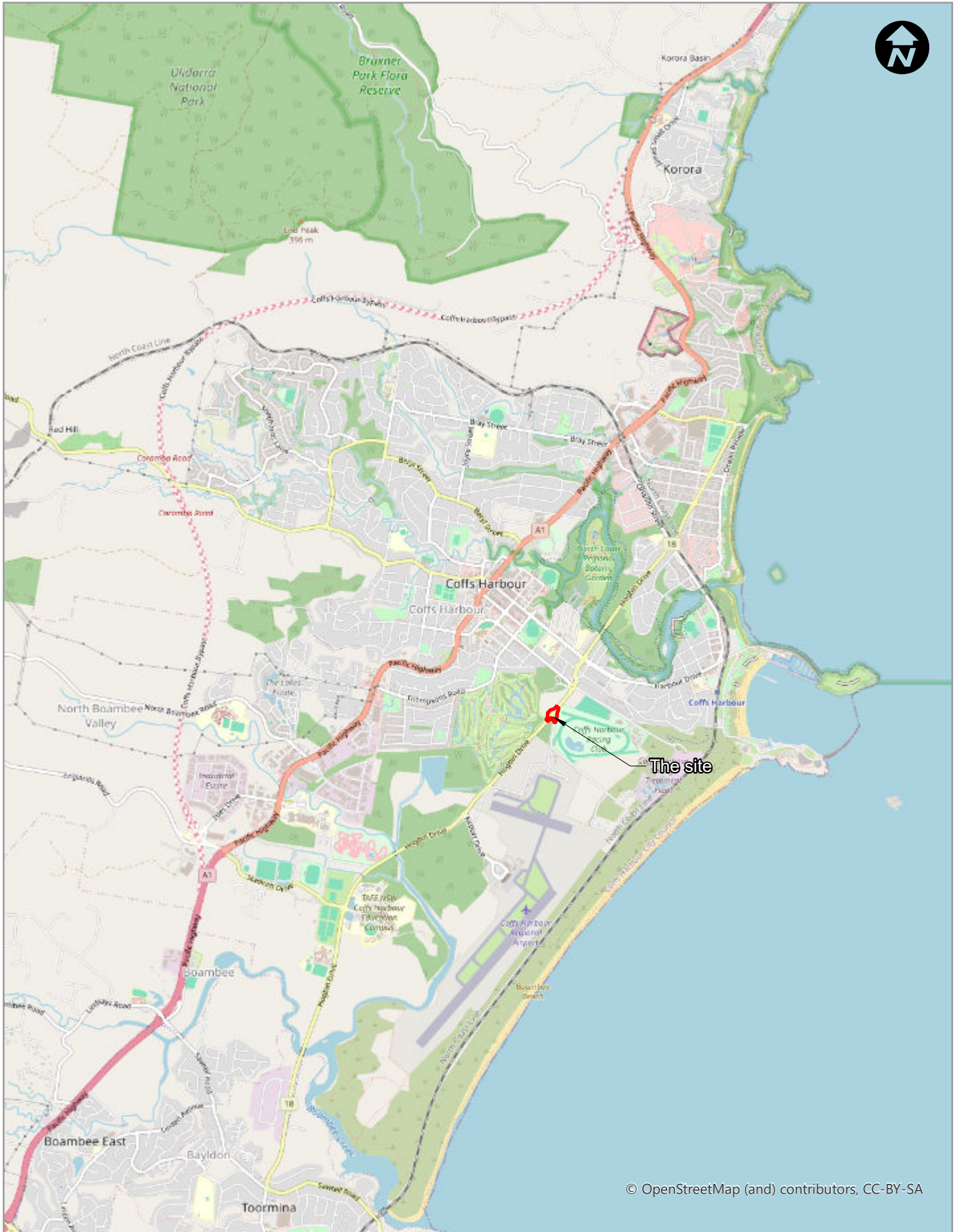
In doing so the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act, which requires the City as the determining authority to examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Activity.

The findings of the REF would be considered when assessing:

- Whether the Activity is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared under Division 5.1, Subdivision 3 of the EP&A Act or approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/ or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.



- The potential for the Activity to significantly impact a matter of national environmental significance, including nationally listed threatened biodiversity matters, or the environment of Commonwealth land, and determine the need to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water for a decision on whether assessment and approval is required under the EPBC Act.



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Spatial Reference: GDA 1994 MGA Zone 56



Site Location - Illustration 1.1

2. Description of Activity

2.1 Site Location

The Activity site is located at the intersection of Hogbin Drive and De Havilland Way, Coffs Harbour, within the City of Coffs Harbour's (The City) Local Government Area (refer to **Illustration 1.1**).

The Activity site is located adjacent to the following lots (as shown on **Illustration 2.1**):

- Lot 100 DP862869
- Lot 1 DP1039055
- Lot 519 DP726493
- Lot 3 DP860490.

Hogbin Drive (road number 540) is a sealed 3 to 4 lane road that is classified as a 'Main Road' under the Schedule of Classified Roads and Unclassified Regional Roads (Transport for NSW, 2023), the three lanes become 4 lanes on the northern side of the Hogbin Drive and De Havilland Way intersection (refer to **Figure 2.1**).

The Activity site is surrounded by heavily vegetated road reserve to the south (much of which is mapped as protected Coastal Wetland) and Council owned land (lot 100 DP862869) borders the north-western boundary (refer to **Illustration 2.1**). The north-eastern boundary is bordered by Lot 1 DP1039055 which forms part of The House of Golf – Coffs Harbour Driving Range. The south-eastern boundary borders with Lot 519 DP726493 which is currently un-occupied and undisturbed land; however, it is zoned as SP2 Health Services Facilities (as shown in **Illustration 3.1**).

The Activity boundaries are shown in **Illustration 2.1**.



Source: (Google LLC, 2024)

Figure 2.1 Hogbin Drive and De Havilland Way Intersection (Looking South)

2.2 The Activity

The Activity involves construction of a dual lane roundabout and road widening of Hogbin Drive at the roundabout area; De Havilland Way intersection will also be widened to accommodate the roundabout infrastructure (refer to **Figure 2.2**).

The intersection upgrade will include ancillary embankment and drainage works.

It is proposed that De Havilland Way north of Christmas Bells Road is closed temporarily during the works; traffic will be detoured via the Dakota Drive intersection link to Hogbin Drive (refer to **Figure 2.3**). Hogbin Drive will remain open to through traffic with one lane in each direction and with appropriate traffic controls and management.

The roundabout and widening of Hogbin Drive will be developed over lot 100 DP862869 (refer to **Illustration 2.1**) and the proposed stockpile area for the project will also be over this lot; this land is Council owned operational land and relevant discussions and (non-planning) approvals for its' use have been completed.

De Havilland way is proposed to be used as an alternative stockpile area as well as the primary material laydown area

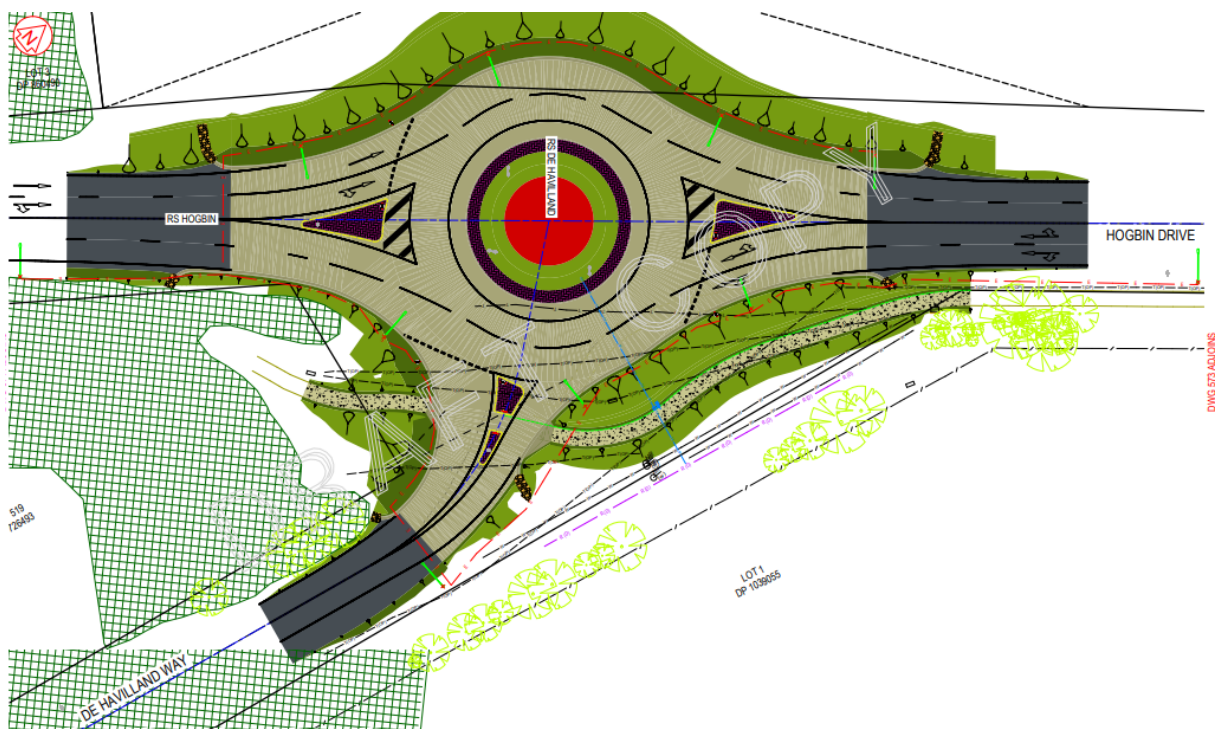


Figure 2.2 Hogbin Drive and De Havilland Way Intersection – Proposed Works



Figure 2.3 De Havilland Way Intersection – Road Closure and Traffic Detour

2.3 Alternative Options

The Activity site is located at the intersection of Hogbin Drive and De Havilland Way; currently the approved development of the Airport Enterprise Park (AEP) creates potential safety risks at the intersection and difficulty for traffic on De Havilland Way to turn onto Hogbin Drive. A new 2 lane roundabout is proposed to address this issue.

The project aims to ensure safer and more efficient vehicle access into and out of Enterprise Park. It will deliver improved freight access to the airport, reduce congestion for the local community and improve safety for all road users.

One alternative is to do nothing, which would result in unreasonable traffic delays on De Havilland Way and potentially unsafe road conditions for road users.

Other infrastructure alternatives, such as traffic lights, have been considered; however, Hogbin Drive has a high volume of traffic, approximate Annual Average Daily Traffic (AADT) volume of 26,000 vehicles per day (information provided by ASE) and De Havilland Way has a relatively low volume of traffic, which means consideration of maintaining traffic flow on Hogbin Drive was a high priority as part of the project assessment. The use of traffic signals at the intersection would cause unnecessary delays to traffic on Hogbin Drive outside of the peak hour periods.

The use of a roundabout ensures a flow of traffic whilst allowing for the low-volume manoeuvres made out of De Havilland Way.

Construction of a roundabout is consistent with the approach to the rest of Hogbin Drive to allow continuity for the commuter.



2.4 Construction Methodology

2.4.1 Construction Methods

Construction works will be carried out with the following steps:

- Site establishment and mobilisation.
- Traffic control setup.
- Removal of existing road furniture.
- Install erosion and sediment controls.
- Clearing and grubbing.
- Earthworks.
- Road construction and concrete works (in two stages).
- Drainage works.
- Installation of road furniture and line markings.
- Site demobilisation.
- Remove traffic controls.

The works will be carried out in two stages with the western carriageway and DeHavilland Way works occurring in Stage 1 and eastern carriageway works and project completion occurring in Stage 2.

2.4.2 Plant and Equipment

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

- Site vehicles – crew trucks and light vehicles.
- Excavators (various sizing for specific works).
- Rollers.
- Front end loaders
- Concrete trucks and concrete pumps.
- Graders.
- Bitumen sprayer.
- Tipper trucks.
- Cold milling machines.

2.4.3 Construction Duration and Work Hours

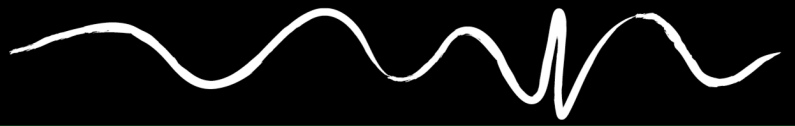
Construction activities would be undertaken in accordance with standard construction work hours:

- | | |
|------------------------------|---------------------|
| ■ Monday to Friday | 7:00 am to 6:00 pm. |
| ■ Saturday | 8:00 am to 1:00 pm. |
| ■ Sunday and Public Holidays | No work. |

The work is proposed to commence in mid to late 2024 and is expected to take 11 months to complete.

2.4.4 Ancillary Facilities

The Activity site compound and laydown areas will be located in the closed De Havilland Way Road and road reserve area.



The proposed designated stockpile area for materials and spoil is on the western side of the works area located in 100 DP862869 (refer to **Illustration 2.1**), with an alternative stockpile area located within the De Havilland Way road reserve.

2.4.5 Utility/ Services Adjustments

The Activity will require relocation/ adjustments to services which are shown in **Appendix A**. The existing street light will be removed and replaced with new lighting, electrical services will be assessed and addressed by Essential Energy and final plans are currently in the approval phase for certification. Stormwater infrastructure will get relocated to suite the new traffic infrastructure alignment and Council will complete these works in conjunction with the road works.

2.5 Vegetation Removal

The Activity will require approximately 400 m² of vegetation removal (refer to **Figure 2.4**) with approximately six native trees and eight introduced trees included in this quantity. No tree removal will be required within the site compound and stockpile areas. Discussion on biodiversity impacts for vegetation removal are included in **Section 5.1**.

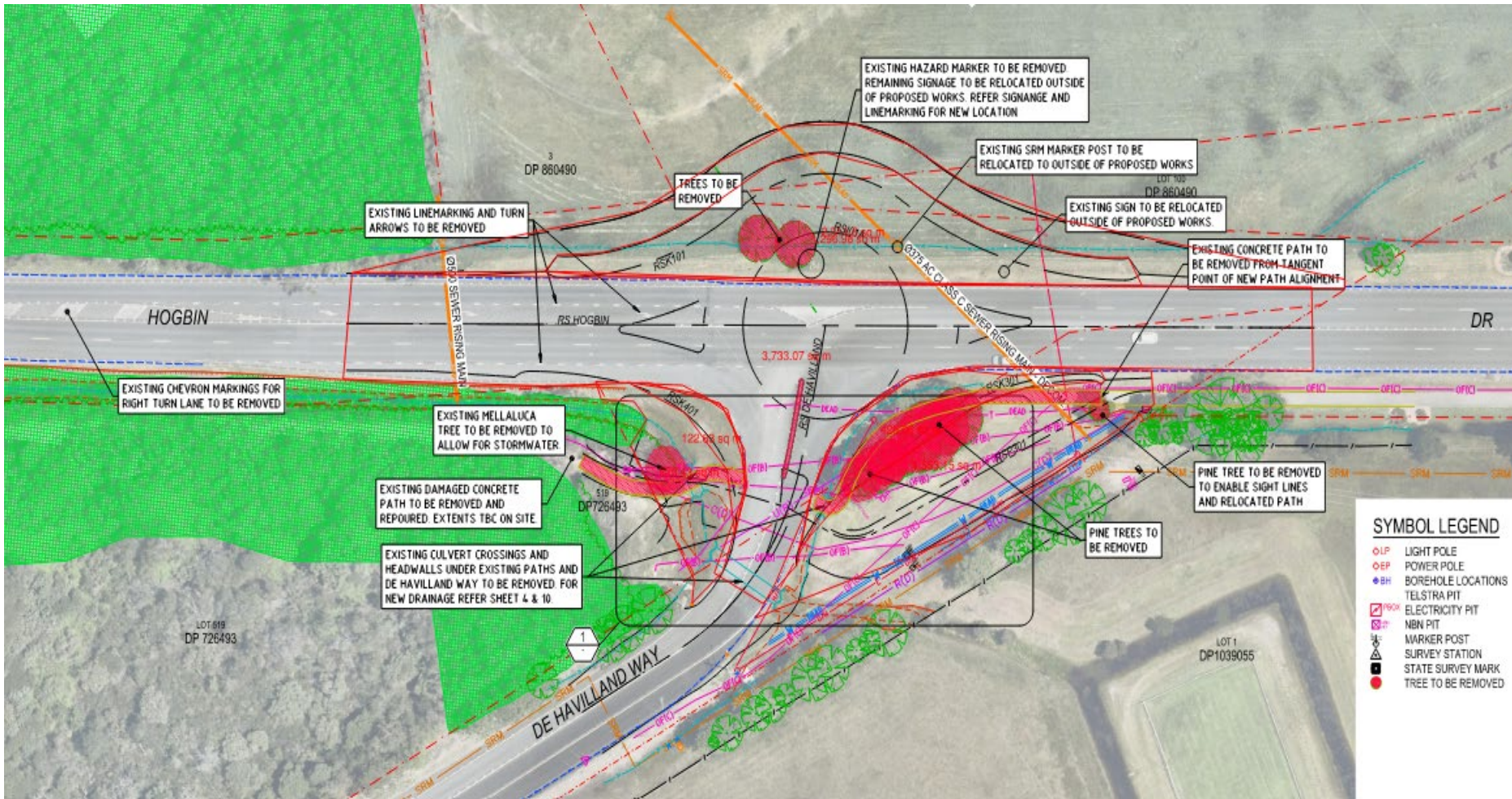
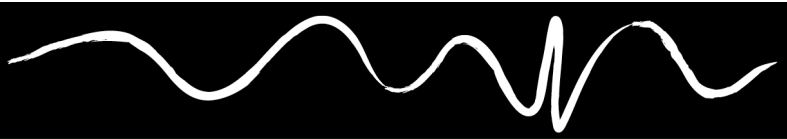


Figure 2.4 Proposed Vegetation Removal



2.6 Traffic Control

It is proposed that De Haviland Way north of Christmas Bells Road is closed temporarily during the works; traffic will be detoured via the Dakota Drive intersection link to Hogbin Drive (refer to **Figure 2.3**). Hogbin Drive will remain open to through traffic with one lane open in each direction with appropriate traffic controls and management.

2.7 Spoil Material and Waste

The site is located in a Class 3 mapped Acid Sulfate Soils area (refer to **Illustration 5.3** in **Section 5.5**) and there is mapped potentially contaminated land to the north-west of the Activity area that consists of a historical dip site (refer to **Section 5.5.2.1** for further information on this), as such all excavated material will need to be tested in accordance with the NSW EPA *Excavated Natural Material Order 2014* and should include testing for ASS parameters.

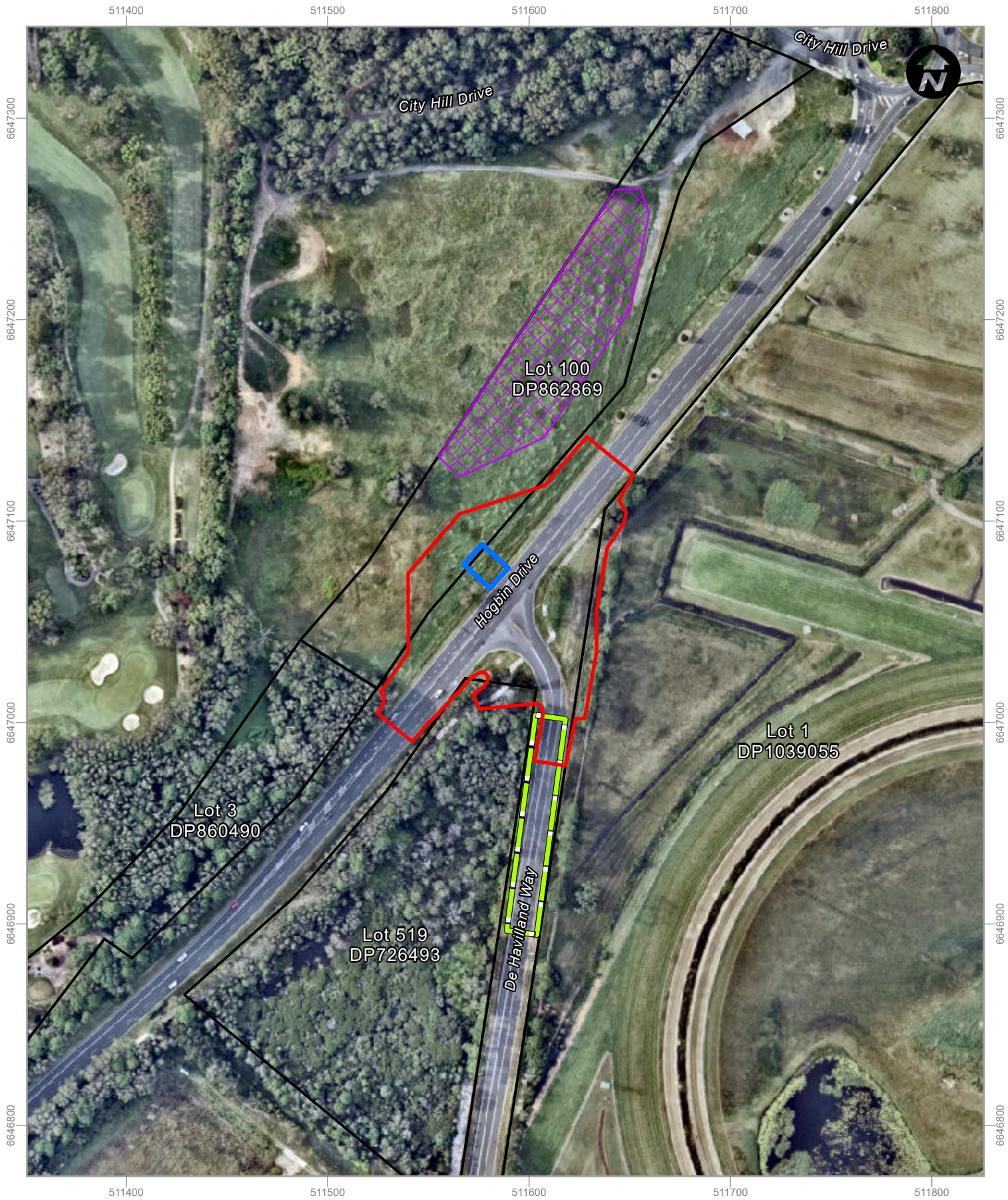
2.8 Land Acquisition

The roundabout and widening of Hogbin Drive will be developed over lot 100 DP862869 (refer to **Illustration 2.1**) and the proposed stockpile area for the project will also be over this lot; this land is Council owned operational land (refer to **Figure 2.5**) and relevant discussions and approvals for its' use have been completed.



*source: (Google LLC, 2024)

Figure 2.5 Lot 100 DP862869 - Council Owned Parcel



Spatial Reference: GDA2020 MGA Zone 56

LEGEND

- Work site boundary
- Cadastre
- Material handling and site amenities area
- Potential portable ablutions west side
- Stockpile area

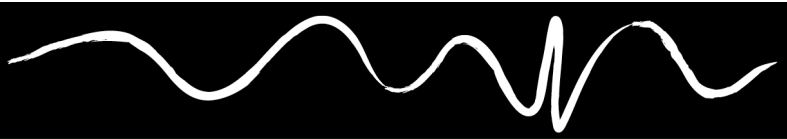


Proposed Works Area - Illustration 2.1



Review of Environmental Factors - Hogbin Drive, Coffs Harbour
4908-1005

Information shown is for illustrative purposes only
 Drawn by: AE Checked by: AB Reviewed by: LVB
 Source of base data: Nearmap 01/03/2024
 Date: 23/05/2024



3. Statutory Planning Framework

3.1 Environmental Planning and Assessment Act 1979

The Activity is permitted without development consent; however, it requires environmental assessment and approval pursuant to Division 5.1 and Section 5.5 of the EP&A Act whereby determining authorities, when assessing activities under Part 5, Division 5.1, must 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 Activity adequately addresses the requirements of Section 5.5, an assessment of the Activity's consistency with relevant EPIs including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs) has been completed.

3.2 State Environmental Planning Policies

3.2.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across the State and allows certain development by or on behalf of public authorities to be undertaken without consent.

Section 2.109 of the Transport and Infrastructure SEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. As the proposal is appropriately characterised as development for the purposes of a road or road infrastructure facilities and is to be carried out by or on behalf the City (a public authority), it can be assessed under Division 5.1 of the EP&A Act. Development consent is therefore not required, and the proposal is defined as an 'Activity' for the purposes of Part 5, Division 5.1 of EP&A Act.

Part 2.2, Division 1 of the Transport and Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development unless there is an exception. Consultation as required by Transport and Infrastructure SEPP is discussed in **Section 4** of this REF.

3.2.2 State Environmental Planning Policy (Planning Systems) 2021

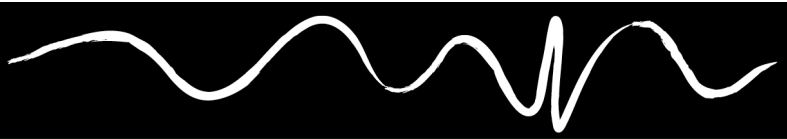
The Activity is not development identified as State or Regional development under Chapter 2 of State Environmental Planning Policy (Planning Systems) 2021.

3.2.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 3 (Koala habitat protection 2020) of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 does not apply to land zoned R3, or RE1; therefore, it does not apply to this Activity site.

Chapter 4 (Koala habitat protection 2021) of the SEPP applies to each local government area listed in Schedule 2, which includes the City.

Chapter 3 and 4 only applies to Part 4 development applications under the EP&A Act. As the proposal is an Activity under Division 5.1 of the EP&A Act, the Policy does not technically apply. It is Council's



responsibility however, to consider environmental issues relating to their works to the fullest extent possible, including impacts on Koalas. An assessment of the impacts of the Activity on biodiversity (including fauna) is provided in **Section 5.1**. No significant impact would result.

3.2.4 State Environmental Planning Policy (Resilience and Hazards) 2021

The Activity is not located on land reserved under the *National Parks and Wildlife Act 1974* ; however, it is mapped as Coastal Wetland Proximity Area under Chapter 2 (Coastal Management) of the State Environmental Planning Policy (Resilience and Hazards) 2021 (refer to **Illustration 5.2**). It is also noted that mapped Coastal Wetland occurs immediately adjacent to, yet outside, the Activity site. Pursuant to clause 2.7 of the State Environmental Planning Policy (Resilience and Hazards) 2021 development consent and preparation of an Environmental Impact Statement is required for development within mapped Coastal Wetland, and therefore this area is to be avoided.

Clause 2.8 (Coastal Wetland Proximity Area) of the State Environmental Planning Policy (Resilience and Hazards) 2021, does not affect the Part 5, Division 5.1 approval pathway, however it states the following for consideration:

Development consent must not be granted to development on land identified as “proximity area for coastal wetlands” or “proximity area for littoral rainforest” on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on—

(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or

(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

As detailed in **Section 5** of this REF the proposed Activity works will not impact on the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, and the quantity and quality of surface and ground water flows are expected to remain unchanged due to the Activity works or post construction operations.

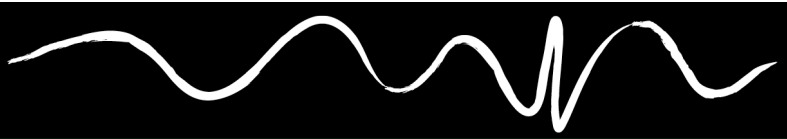
Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021 deals with Remediation of Land.

A search of the contaminated land databases was undertaken for the Coffs Harbour LGA. Records were found adjacent to the Activity area under the following searches (refer to **Section 5.5**):

- Environment Protection Authority (EPA) List of Notified Sites;
- DPI cattle dip sites; and
- Coffs Harbour Mapping tool.

Due to the presence of an historical arsenic cattle dip near the Activity site, it is recommended that further assessment of soils is completed prior to the commencement of work. Further discussion on this is provided in **Section 5.5**.

As far as the author is aware, the site is not declared to be ‘significantly contaminated land’ under Part 3 of the *Contaminated Land Management Act 1997* (CLM Act) and is not subject to a ‘management order’ within the meaning of the CLM Act.



3.3 Local Environmental Plans

The Activity is located within the Coffs Harbour LGA, and the Coffs Harbour Local Environmental Plan 2013 (CHLEP) applies.

In accordance with the CHLEP, the Activity is located on land zoned R3 Medium Density Residential, RE1 Public Recreation and SP2 Infrastructure (refer to **Illustration 3.1**).

The objectives of R3 Medium Density Residential Zone are:

- *To provide for the housing needs of the community within a medium density residential environment.*
- *To provide a variety of housing types within a medium density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To provide for associated infrastructure that supports the changing housing needs of the population that is consistent with local character.*
- *To encourage active living through the provision of healthy, walkable, green and safe built environments and streets, greener connections and walking and cycling infrastructure.*
- *To ensure that development reflects design excellence in its presentation to the public realm.*

The proposed Activity is consistent with the zone objectives and is precluded from requiring consent as it is permitted without consent pursuant to Sections 2.109 of the Transport and Infrastructure SEPP.

The objectives of RE1 Public Recreation Zone are:

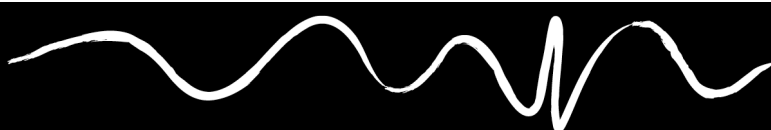
- *To enable land to be used for public open space or recreational purposes.*
- *To provide a range of recreational settings and activities and compatible land uses.*
- *To protect and enhance the natural environment for recreational purposes.*
- *To encourage active living through the provision of healthy, walkable, green and safe built environments and streets, greener connections and walking and cycling infrastructure.*
- *To ensure that development reflects design excellence and is of a high visual quality in its presentation to the public realm.*
- *To provide places that are safe and welcoming, that meet the needs of a diverse population and facilitate equitable access.*
- *To encourage places that reflect local character and identity and allow for cultural expression.*

The proposed Activity is not directly consistent with the zone objectives; however, it is essential infrastructure and is precluded from requiring consent as it is permitted without consent pursuant to Sections 2.109 of the Transport and Infrastructure SEPP.

The objectives of 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.*
- *To encourage active living through the provision of healthy, walkable, green and safe built environments and streets, greener connections and walking and cycling infrastructure.*

The proposed Activity is consistent with the zone objectives and is precluded from requiring consent as it is permitted without consent pursuant to Sections 2.109 of the Transport and Infrastructure SEPP.



3.4 Other NSW Legislation

Table 3.1 below lists other NSW legislation relevant to the assessment of the Activity and comments on their implications for the Activity.

Table 3.1 NSW Legislation

Legislation	Section(s)	Comment
<i>Environmental Planning and Assessment Act 1979 (as amended)</i>	Section 1.7	Section 1.7 of the EP&A Act relates to the application of Part 7 of the <i>Biodiversity Conservation Act 2016</i> (BC Act) and Part 7A of the <i>Fisheries Management Act 1994</i> (FM Act). Biodiversity has been assessed in Section 5.1 . The Activity is unlikely to have a significant impact on biodiversity or threatened species or communities.
	Section 5.5	The determining authority in its consideration of an activity shall examine and consider, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity. This assessment provides Council with the information required in regard to the environment to assess the Activity.
<i>Environmental Planning and Assessment Regulation 2021</i>	Section 171	As per Section 171(1) the environmental factors specified in the <i>Guidelines for Division 5.1 Assessments</i> issued under Section 170, have been considered in Section 5 . It is not expected that the Activity would result in a significant impact.
<i>Fisheries Management Act 1994</i>	Section 200	A permit is required when carrying out dredging and reclamation work on water land. The Activity does not involve work on water land that is identified as Key Fish Habitat, a permit is not required under Part 7 of the FM Act.
	Sections 219-220	A permit is required when barriers to the movement of fish including water course crossings are to be constructed or modified. The Activity is not anticipated to require temporary blocking of fish passage during construction. Therefore, a permit would not be required.
	Section 205	The Activity is not within a marine environment and no marine vegetation would be affected.
<i>Protection of the Environment Operations Act 1997</i>		At this stage, no Protection of the Environment Policies (PEPs) are relevant to the Activity. No licenses would be required pursuant to the <i>Protection of the Environment Operations Act 1997</i> (PoEO Act). The City and/ or contractors working on behalf of the City are required to notify EPA when a 'pollution incident' occurs that is likely to impact upon the environment.
	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 <i>Waste Avoidance and Resource Recovery Act 2001</i> . The Activity would aim to reduce the environmental impact of dumping waste and include mechanisms to recover resources and reduce the production of waste where possible.
	Section 120	It is an offence to pollute any waters of the State. This REF includes safeguard and mitigation measures to minimise the risk of the Activity resulting in pollution of waters.



Legislation	Section(s)	Comment
<i>National Parks and Wildlife Act 1974</i>	Sections 87(1), 90	The Activity occurs on disturbed land and the provisions of the Act are unlikely to be triggered by the Activity (refer to Section 5.2). Works would cease if any potential artefact or place of significance is encountered during the Activity; and the City and Coffs Harbour Local Aboriginal Land Council (LALC) would be notified immediately.
<i>Biodiversity Conservation Act 2016</i>	Schedules 1, 2 and 3	Threatened species and communities have been assessed in accordance with the BC Act. No significant impact is expected. Refer to Section 5.1 .
<i>Biosecurity Act 2015</i>		The Department of Primary Industries (DPI) biosecurity risk weed declarations for the north-west, including the Coffs Harbour LGA, lists numerous weed species. One priority weed species listed in the <i>Biosecurity Act 2015</i> occurs within the work footprint of the Activity, being Lantana (<i>Lantana camara</i>). This will be managed in accordance with the General Biosecurity Duty to prevent, eliminate or minimise any biosecurity risk they may pose as well as specific duties under the Act for these species in the region that includes 'Prohibition of dealings' and "Must not be imported into the State or sold".
<i>Heritage Act 1977</i>		Searches of the State Heritage Register, State Heritage Inventory and CHLEP heritage listings were undertaken. The searches did not locate any heritage items in proximity or within 1 km of the Activity. No adverse impacts to heritage are expected. Refer to Section 5.3 .
<i>Crown Land Management Act 2016</i>		Based on mapping from the NSW Planning Portal Spatial Viewer, the Activity is not mapped as Crown Land.
<i>Roads Act 1993</i>	Section 138	Section 138 of the <i>Roads Act 1993</i> requires approval from the relevant road's authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road. However, Council is both the proponent and relevant roads authority in this instance.

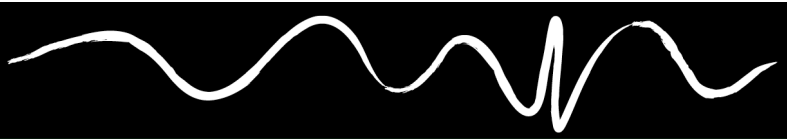
3.5 Commonwealth Legislation

3.5.1 Environmental Protection and Biodiversity Conservation Act 1999

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 Department of Climate Change, Energy, the Environment and Water (DCCEEW) under Part 9 of the EPBC Act. There are no matters of national environmental significance or Commonwealth land that would be significantly affected by the proposed Activity and therefore no Commonwealth referral or approval is necessary for the Activity (refer to **Section 7.2**).

3.5.2 Native Title Act 1993

A search of the National Native Title Register confirmed there are no active registrations for Native Title Claim for the Activity site.



3.6 Confirmation of Statutory Position

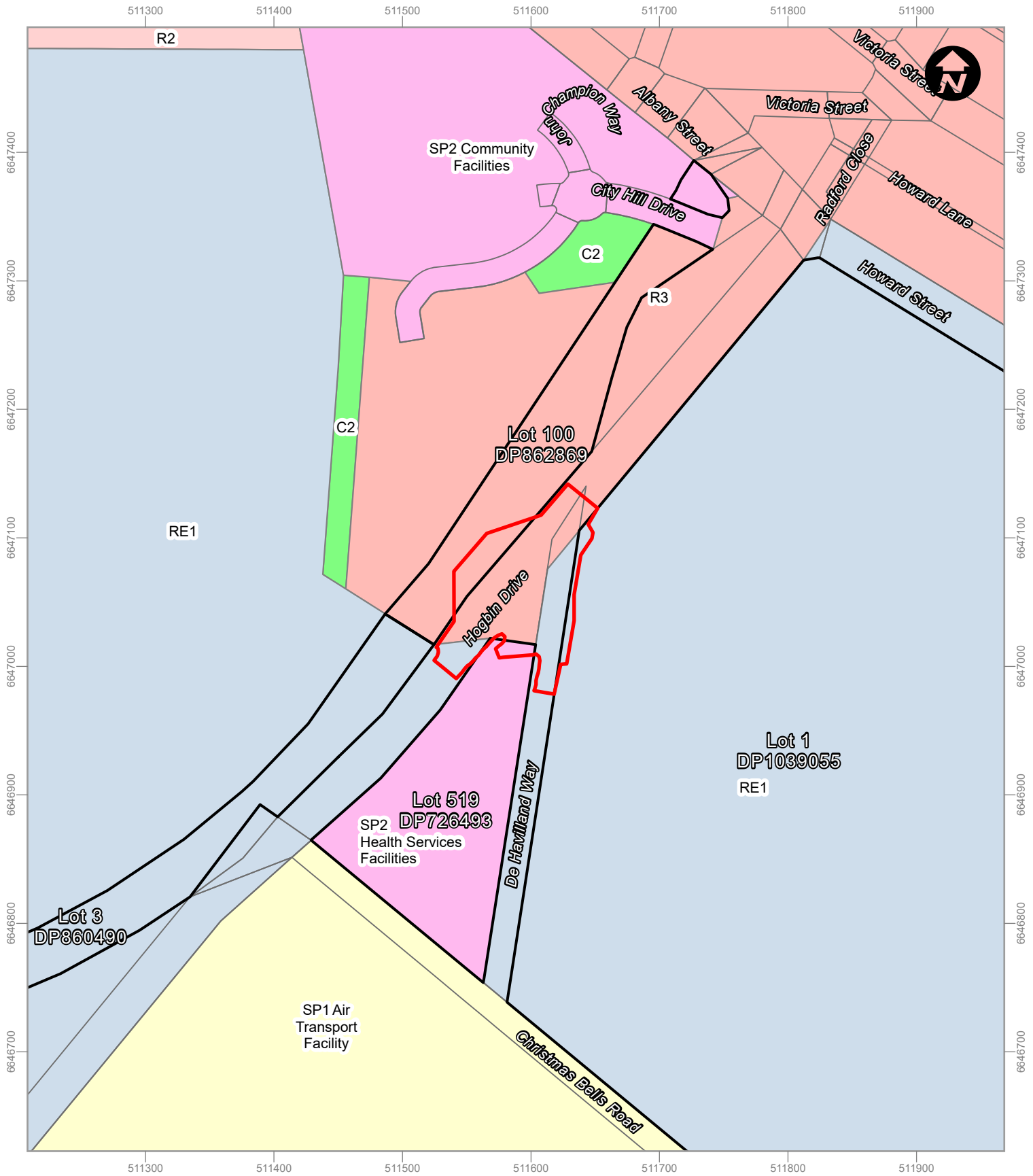
An assessment of the relevant statutory provisions and planning instruments has concluded that the proposed Activity can be carried out as development without consent under the State Environmental Planning Policy (Transport and Infrastructure) 2021 and can be assessed and determined under Part 5, Division 5.1 of the EP&A Act.

A comprehensive environmental assessment of all matters affecting or likely to affect the environment by reason of that Activity has been undertaken pursuant to Section 5.5 of the EP&A Act, including the factors outlined in the Division 5.1 Guidelines approved under Section 170 and as required by Section 171(1) of the EP&A Regulation 2021 (refer **Section 5**).

The Activity described will not affect declared areas of outstanding biodiversity value or Wilderness Areas. This REF has determined that the Activity is unlikely to significantly affect threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement (or Biodiversity Development Assessment Report (BDAR) if the proponent elected) is not required. The Activity is also unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance in relation to the EPBC Act and therefore does not require referral to or approval of the Australian Government.

Given the impacts of the Activity are not likely to be significant, an Environmental Impact Statement (EIS) is not required under Section 5.7 of the EP&A Act, nor is approval required from the Minister for Planning under Division 5.2 of the EP&A Act.

The Activity is not State Significant Development or State Significant Infrastructure as declared in State Environmental Planning Policy (Planning Systems) 2021.



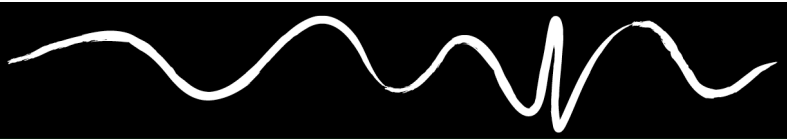
Spatial Reference: GDA2020 MGA Zone 56

LEGEND

- Work site boundary
- Cadastre
- Road
- C2 - Environmental Conservation; C2, Environmental Management
- R2 - Low Density Residential
- R3 - Medium Density Residential
- RE1 - Public Recreation
- SP1 - Special Activities
- SP2 - Infrastructure



Land Zoning - Illustration 3.1



4. Notification and Consultation

4.1 Community Consultation

No community consultation has been undertaken to date. Notice of proposed works and road changes would be given to road users and the businesses within the proximity of the site who will be affected by the road works and detours prior to works commencing. Roadworks and changed access conditions would be detailed on Council's website, via road signage, and on social media.

As previously noted, minor property acquisition to convert the City operational land to road reserve is required to undertake the works. Council has already commenced this internal process.

4.2 State Environmental Planning Policy (Transport and Infrastructure) 2021 – Consultation

Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the State. Part 2 of the Transport and Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

Pursuant to Section 2.17 (1)(c) (exceptions) of the Transport and Infrastructure SEPP, Sections 2.10–2.12 and 2.14 do not apply with respect to the Activity to the extent that (as relevant), they would require notice to be given to a council or public authority that is carrying out the development or on whose behalf it is being carried out. Given the Activity is being carried out by or on behalf of the City, and Council is the determining authority, these sections do not apply.

Section 2.13 contains provisions requiring consultation with the State Emergency Service (SES) for development with impacts on flood liable land, including development without consent under Division 17 (roads and traffic). Notice was given on 10 May 2024.

A response from SES to the notification was received within the 21-day notification period and has been incorporated into the assessment within **Section 5.5** and **Section 5.7**. Copies of the letter and response are attached at **Appendix B**.

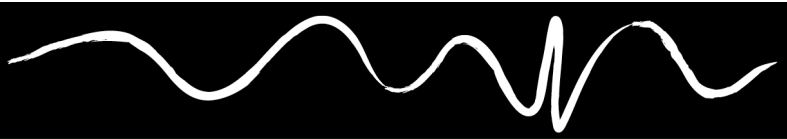
No consultation with other public authorities is triggered under Section 2.15 of the Transport and Infrastructure SEPP.

Section 2.16 (Consideration of Planning for Bush Fire Protection) of the Transport and Infrastructure SEPP is not applicable to the Activity.

No consultation is required with other agencies or public authorities under Part 2 Division 1 of Transport and Infrastructure SEPP.

4.3 Aboriginal Community

The proposed Activity is to take place within an area which has been disturbed and modified. No significant risk or impact to Aboriginal heritage is expected. Consultation with the Aboriginal community is not required under point 5 (p.3) of the document Due Diligence Code of practice for the protection of Aboriginal Objects 2010 (Department of Environment, Climate Change and Water, 2010; refer to **Section 5.2** for further details).



5. Environmental Assessment

5.1 Biodiversity

5.1.1 Desktop Assessment

BioNet Atlas Search

A search of the BioNet Atlas (08/05/2024) was completed to identify records of threatened species recorded within a 10 km search area of the Activity (refer to **Appendix G**). Results indicate 31 threatened flora species and 75 threatened fauna species have been recorded within the search area, which also contains potential habitat for seven threatened ecological communities (TECs). Relevant species are included in the potential occurrence assessments in **Appendix H**.

EPBC Protected Matters Report

The Protected Matters Search Tool (PMST) identified 112 threatened species (24 flora, 57 fauna) and seven TECs which may have habitat within a 10 km radius of the site (refer to **Appendix G**). Relevant species are included in the potential occurrence assessments in **Appendix H**.

64 migratory species listed under the EPBC Act were identified within the search area by the PMST. The site does not comprise important habitat for these species as defined in the *Matters of National Environmental Significance, Significant impact guidelines 1.1, EPBC Act 1999* (Australian Government – Department of the Environment, 2013). EPBC Act listed migratory species are thus not considered a constraint for the Activity.

Areas of Outstanding Biodiversity Value

Areas of Outstanding Biodiversity Value (AOBV) are special areas with irreplaceable biodiversity values that are important to the whole of New South Wales, Australia or globally. To date only four AOBVs have been declared in NSW, being:

- Gould's Petrel critical habitat.
- Little Penguin population in Sydney's North Harbour.
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve.
- Wollemi Pine critical habitat.

A search of the BC Act indicates that no AOBVs occur at or in proximity to the site.

Key Fish Habitat/ Fisheries NSW Spatial Data

The DPI Fisheries Spatial Data Portal does not identify any Key Fish Habitat (KFH) or mapped threatened fish habitat within the site or in close proximity.

Wildlife Corridors

The Activity occurs at the intersection of Hogbin Drive and De Havilland Way, where to the west of the roadway is the regional mapped Bongil corridor, which crosses over to the coastal fringe just south of the airport runway.

The proposed Activity occurs within the existing road footprint at an existing turnoff and the proposed works would not further exacerbate fragmentation or cause new fragmentation of regional wildlife corridors more than what already occurs.



5.1.2 Field survey

Field assessment was completed by GeoLINK on 14 May 2024. Field assessment was undertaken during mild to warm (20-25C°) conditions. The following methodology was undertaken:

- Searches within the proposed activity footprint and mapping (by GPS) of:
 - Significant habitat features including hollow-bearing trees (habitat trees).
 - Threatened flora species.
- Mapping and assessment of Plant Community Types (PCTs).
- Opportunistic survey of all fauna based on visual or aural observations.
- Direct inspections of all culverts and watercourse crossings to check for fish, amphibians, microbats, or signs of usage by microbats (urine stains, guano, and bat fly casings).

5.1.3 Existing Environment

Vegetation Description

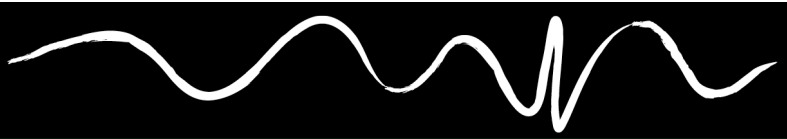
Field assessment identified several PCTs in vegetation patches occurring either side of the road corridor adjacent to the proposed Activity site and in close proximity. In the actual Activity site, past disturbance and clearing has resulted in the vegetation occurring as maintained/ disturbed grassland with some regrowth and planted introduced trees (*Pinus elliotii*) beside the cycleway. Native vegetation immediately adjacent to the Activity site were identified, these included:

- PCT 4004 – Northern *Melaleuca Quinquenervia* Swamp Forest.
- PCT 3804 – Northern Sands Wallum *Banksia-Allocasuarina* Scrub.

A description of each PCT is provided in **Table 5.1**. Regrowth or planted isolated trees (predominately introduced Slash Pine (*Pinus elliotii*)) will be impacted, and no clearing of contiguous native vegetation patches will occur. Vegetation mapping is provided in **Illustration 5.1**. Photographs of the site are shown in **Plate 5.1** to **Plate 5.6**.

Table 5.1 Summary of Vegetation

Vegetation Description
<p>PCT 4004 – Northern <i>Melaleuca Quinquenervia</i> Swamp Forest</p> <p>The canopy is dominated by Broad-leaved Paperbark (<i>Melaleuca quinquenervia</i>). Common midstory species comprise Cheese Tree (<i>Glochidion ferdinandi</i>), Bangalow Palm (<i>Archontophoenix cunninghamiana</i>) and Lilly Pilly (<i>Acmena smithii</i>). Common groundcover species and vines comprise Pouched Coral Fern (<i>Gleichenia dicarpa</i>), Jointed Twig-rush (<i>Machaerina articulata</i>), Tall Sedge (<i>Carex appressa</i>), and Common Silkpod (<i>Parsonsia straminea</i>).</p> <p>The vegetation is in intact condition, with a low occurrence of exotic species including Lantana (<i>Lantana camara</i>), Winter Senna* (<i>Senna septemtrionalis</i>), Corky Passionfruit* (<i>Passiflora suberosa</i>), Slash Pine* and Camphor Laurel* (<i>Cinnamomum camphora</i>).</p>
<p>PCT 3804 – Northern Sands Wallum <i>Banksia-Allocasuarina</i> Scrub</p> <p>The canopy comprises a sparse cover of Black She-oak (<i>Allocasuarina littoralis</i>) and Broad-leaved Paperbark (<i>Melaleuca quinquenervia</i>). Common midstory species comprise Fern-leaved Banksia (<i>Banksia oblongifolia</i>), Port Jackson Pine (<i>Callitris rhomboidei</i>) and <i>Melaleuca sieberi</i>. Common groundcover species and vines comprise Pouched Coral Fern, <i>Machaerina rubiginosa</i>, <i>Xanthorrhoea fulva</i>, Hairy Guinea Flower (<i>Hibbertia vestita</i>), Common Silkpod and <i>Cassytha</i> sp.</p> <p>The vegetation is in intact condition, with a low occurrence of exotic species including Slash Pine* and Camphor Laurel*.</p>



Vegetation Description

Miscellaneous ecosystem – Exotic dominated culvert swales and road verge

The groundlayer is dominated by exotic pasture grasses and forbs including Vasey Grass* (*Paspalum urvillei*), Paspalum* (*Paspalum spp.*), Whiskey Grass* (*Andropogon virginicus*), *Eragrostis paniciformis**, *Setaria** (*Setaria sphacelata*), White Eye* (*Richardia brasiliensis*) and *Polygala paniculata**. Common native groundcover species comprise Couch (*Cynodon dactylon*), Blady Grass (*Imperata cylindrica*) and *Cyperus polystachyos*. Within inundated areas the dominant species include *Cyperus polystachyos*, *Cuphea carthagenensis**, Red Ludwigia* (*Ludwigia repens*), Slender Knotweed (*Persicaria decipiens*), Spotted Knotweed (*Persicaria strigosa*), *Cyperus haspan* and Frogsmouth (*Philydrum lanuginosum*).

The vegetation is in a modified condition, with no canopy or midstorey.

* Denotes introduced species.

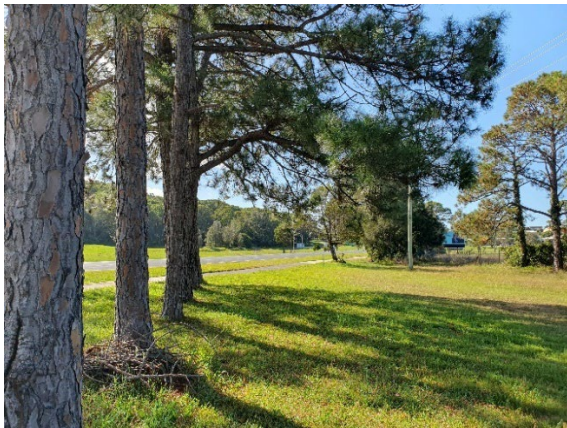


Plate 5.1 Planted Slash Pine



Plate 5.2 Planted Slash Pine adjacent to cycleway to be impacted



Plate 5.3 Broad-leaved Paperbark and Black She-Oak to be impacted on the north-west side of Hogbin Drive



Plate 5.4 Immature Broad-leaved Paperbark on southern edge of intersection



Plate 5.5 PCT 4004 occurrence along western edge of Hogbin Drive corridor



Plate 5.6 PCT 4004 on western side of Hogbin Drive

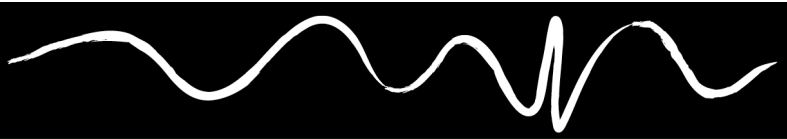


Plate 5.7 PCT 3804 on western side of De Havilland Way



Plate 5.8 Exotic dominated road verge on eastern side of De Havilland Way



Plate 5.9 Stockpile area (background) on northern side of Hogbin Drive



Plate 5.10 Existing culverts on north-west side of Hogbin Drive

Threatened Flora

No threatened flora were identified within the Activity site.

One threatened flora species was recorded during field surveys:

- 11 x Native Guava (*Rhodomyrtus psidioides*) seedlings listed as Critically Endangered under BC and EPBC Act.

The observed Native Guava are clustered together in the vegetation to the south of the intersection (refer to **Illustration 5.1** and **Plate 5.11**). The seedlings are not within the Activity site and are unlikely to be impacted by the construction or ongoing use as they are within consolidated vegetation over 100 m from the proposed roundabout.

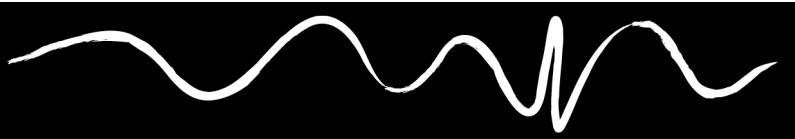


Plate 5.11 Native Guava seedlings



Threatened Ecological Communities

PCT 4004 is associated with the BC Act listed threatened ecological community (TEC) *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* as outlined in **Table 5.2**.

Table 5.2 Assessment of PCT 4004 against Scientific Determination Criteria for Swamp Sclerophyll Floodplain Forest TEC

Final Determination Listing Criteria	PCT 4004
Location: occurs in the NSW North Coast, Sydney Basin and South East Corner bioregions.	Yes – the site occurs within the north coast bioregion.
Altitude: occurs below 20 m (though sometimes up to 50 m) elevation.	Yes – occurs at approximately 6 m ASL.
Topography and geology: associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains.	Yes – occurs on waterlogged and periodically inundated flats (below the 1% AEP Flood extent).
Structure: typically open forest, although partial clearing may have reduced the canopy to scattered trees. In some areas the tree stratum is low and dense, so that the community takes on the structure of scrub. also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent	Yes – occurs as a dense stand of Broad-leaved Paperbark.
Floristic canopy composition: The most widespread and abundant dominant trees include <i>Eucalyptus robusta</i> (swamp mahogany), <i>Melaleuca quinquenervia</i> (paperbark) and, south from Sydney, <i>Eucalyptus botryoides</i> (bangalay) and <i>Eucalyptus longifolia</i> (woollybut).	Yes – is floristically analogous with species outlined in paragraph 1 of the scientific determination.
Meet TEC determination	Yes, meets scientific determination.

Based on review of the key diagnostics, PCT 4004 is also characteristic of *Coastal Swamp Sclerophyll Forest of New South Wales and South-East Queensland* TEC, which is listed as Endangered under the EPBC Act, as outlined in **Table 5.3**.

Table 5.3 Assessment of PCT 4004 against Coastal Swamp Sclerophyll Forest TEC Key Diagnostic Characteristics

Coastal Swamp Sclerophyll Forest TEC key diagnostic characteristics	PCT 4004
Location: occurs within IBRA Bioregions: South Eastern Queensland (SEQ); NSW North Coast (NNC); Sydney Basin (SYB) and the Bateman sub-region of the South East Corner (SEC).	Yes – occurs within NSW North Coast bioregion.
Position: occurs in coastal catchments typically below 20 m ASL, but occasionally up to 220 m ASL.	Yes – occurs ~ 6 m ASL.
Topography and geology: occurs on hydric soils with inundation patterns ranging from intermittent to episodic.	Yes – occurs on waterlogged and periodically inundated flats.
Structure: varies from tall closed to open forest to woodland, to dense (closed) shrubland or scrub forest. Minimum crown cover is at least 10%, but it is more typically in the range 50% to 70%.	Yes – occurs as forest with > 50 % canopy cover.
Floristic composition: From South East Queensland to the Sydney Basin Bioregion, the canopy is typically dominated or co-dominated by <i>Melaleuca quinquenervia</i> and/ or <i>Eucalyptus robusta</i> . In some areas, the canopy may be locally dominated by other melaleuca species, frequently with <i>Parsonsia straminea</i> climbing on the trunks of canopy species.	Yes – canopy dominated by <i>Melaleuca quinquenervia</i> , <i>Parsonsia straminea</i> common throughout. Groundcovers dominated by sedges and ferns; no halophytic species present.



Coastal Swamp Sclerophyll Forest TEC key diagnostic characteristics	PCT 4004
<p>The understorey typically includes a variable ground layer, depending on the canopy cover and inundation rate/ period. Tall sedges (typically <i>Gahnia</i> spp.) and/ or ferns often dominate the ground layer, mixed with graminoids and other herbs, especially <i>Imperata cylindrica</i> (Blady Grass).</p> <p>While they can occur regularly in the ground layer, the ecological community is not present if halophytic species, more typically associated with estuarine/ saltmarsh areas, dominate the ground layer of a patch.</p>	
Condition thresholds	
Does the patch meet the condition thresholds as described in Table 2 of the Conservation Advice?	Yes – the patch is at least 0.5 ha and less than 2 ha and is part of a larger area of native vegetation at least 5 ha. Non-native species comprise < 20% of the total groundlayer vegetation cover, and therefore is considered to meet category ‘B2’ condition threshold.
Meets EPBC Act diagnostics?	Yes , meets EPBC Act listing for Coastal Swamp Sclerophyll Forest TEC.

The Activity is not anticipated to directly impact areas of PCT 4004, however, due to its close proximity there is potential for indirect impacts associated with the proposed works, as such a test of significance (under both BC & EPBC Act) was completed for *Swamp Sclerophyll Forest TEC* (refer to **Appendix I**). The assessment determined that Activity would be unlikely to have a significant impact on the local occurrence of this community or place the community at risk of extinction.

Priority Weeds

The Activity site contains mostly exotic grasses that are kept mown, so they do not pose a significant threat to surrounding patches of vegetation. The eight Slash Pine marked for removal will contribute to reduced weed seed in the area. These pine trees can be seen spreading in native vegetation patches and along existing fence lines.

Several exotic flora species were recorded within the Activity site during field surveys, of these, one is listed under the *NSW Biosecurity Act 2015* (BA Act) as priority weed for the North Coast region (Department of Primary Industries 2023) (**Table 5.4**). This species is also listed as Weeds of National Significance (WONS).

Table 5.4 Priority Weeds and WoNS associated with the Activity

Species Name	Priority Weeds	WONS
Lantana (<i>Lantana camara</i>)	Prohibition on dealings Must not be imported into the state, sold, bartered, exchanged, or offered for sale.	Yes



Fauna Habitat

The Activity site provides a relatively small extent of fauna habitat in the form of regrowth vegetation and planted Slash Pines which offer opportunistic foraging (i.e. blossom and seed resources) and sheltering habitat. The Activity site also provides some ephemeral aquatic habitat (at culvert locations). Fauna habitat within the Activity site was generally considered poor due to its disturbance history and likely only provides habitat for fauna adapted to semi-urban or disturbed environments. Better quality habitat for fauna occurred outside the Activity site associated with remnant native vegetation, these areas are not anticipated to be directly impacted as a result of the Activity.

No hollow-bearing trees were recorded in the Activity site, nor in close proximity to the site.

Culverts and drainage swales at the intersection provide some suitable habitat for frogs and small fish, but are not isolated or unique, with connections to several drains and swales in the area. Inspections of culverts had no obvious signs of microbat use. They are not the ideal surface texture material, and are subjected to high inundation, making them less likely to provide roosting habitat for microbats.

Threatened Fauna

One threatened fauna species listed under the BC Act was recorded opportunistically during field investigations being Wallum Froglet (*Crinia tinnula*), several individuals were heard calling outside of the Activity site within remnant vegetation to the south. Preferred habitat does not occur within the site, but marginal habitat occurs on the edge of the site associated with PCT 4004.

The Activity site provides habitat that could potentially be utilised by threatened fauna species listed under either the BC Act and/ or the EPBC Act. A total of 21 threatened fauna species have been assessed as having a moderate or higher potential to utilise habitat within the Activity site and have the potential to be impacted by the Activity (refer to **Table 5.5**).

Table 5.5 Threatened Fauna with a Moderate or Higher Likelihood of Occurrence

Scientific Name	Common name	BC Act	EPBC Act	Likelihood of occurrence
Frogs (1)				
<i>Crinia tinnula</i>	Wallum Froglet	V	-	Known
Birds (11)				
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Moderate
<i>Calyptorhynchus lathami lathami</i>	South-Eastern Glossy Black-Cockatoo	V	V	Moderate
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Moderate
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	Moderate
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	V	-	Moderate
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Moderate
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	V	Moderate
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Moderate
<i>Ninox connivens</i>	Barking Owl	V	-	Moderate
<i>Ninox strenua</i>	Powerful Owl	V	-	Moderate
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Moderate
Mammals (9)				
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	Moderate
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	Moderate
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	Moderate
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	Moderate



Scientific Name	Common name	BC Act	EPBC Act	Likelihood of occurrence
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	-	Moderate
<i>Phascolarctos cinereus</i>	Koala	E	E	High
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	High
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Moderate
<i>Syconycteris australis</i>	Common Blossom-bat	V	-	Moderate

V = Vulnerable; E = Endangered

Tests of significance (five-part tests) were undertaken for these species in accordance with Section 7.3 of the BC Act (refer to **Appendix I**). Due to the linear alignment, the works predominantly being sited within previously disturbed areas, and the availability of equal or better-quality potential habitat for the aforementioned species within the locality, the habitat removal associated with the Activity is not likely to result in a significant impact to the local population of these species.

5.1.4 Potential Impacts

The removal of native vegetation will be kept to the minimum required to complete the Activity. The potential direct impacts from the Activity (including stormwater upgrade) include:

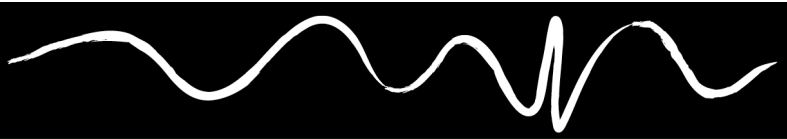
- The direct removal of six native trees and eight introduced, including:
 - Four x immature/ regrowth Broad-leaved Paperbark (*Melaleuca quinquenervia*).
 - One x immature Black She Oak (*Allocasuarina littoralis*).
 - One x Coastal Cypress Pine (*Callitris columellaris*).
 - Eight x introduced Slash Pine (*Pinus elliotii*).
- Impact to fauna habitat, including:
 - The direct removal of four immature/ regrowth Broad-leaved Paperbarks at culvert/ stormwater upgrade areas and at road edge providing blossom resources.
 - The direct removal of one Glossy Black-cockatoo feed tree (immature Black She Oak) at road edge.

Indirect impacts may include:

- Minor temporary impacts on water quality within the waterways by way of potential sediment runoff.
- Direct mortality or injury to fauna during vegetation clearing (although unlikely).
- Habitat degradation of adjacent habitat due to potential clearing phase impacts (e.g. erosion and sedimentation impacts or chemical spills).
- Unintentional damage to adjacent habitat and habitat features during clearing.

5.1.5 Conclusion

The Activity occurs within an existing road corridor with areas of intact and disturbed vegetation and is unlikely to significantly impact biodiversity within the locality. There will be no vegetation removal required for the location of ancillary facilities or laydown areas which will be located within areas which are already cleared and disturbed. Tests of significance in accordance with s7.3 of the BC Act concluded that the Activity will be unlikely to significantly impact threatened species, communities, or their habitats (refer to **Appendix I**). Impacts as a result of the Activity are relatively low in a local context and may be managed with a relatively high confidence such that biodiversity impacts may be



minimised with the implementation of safeguards. The Activity is unlikely to have a significant impact on any threatened species or communities listed under the BC Act, EPBC Act or FM Act.

5.1.6 Safeguards and Mitigation Measures

1. Prior to works commencing, mark the limit of work and clearing limits as per the site boundary/ extent of works. This includes the boundary of the adjacent mapped Coastal Wetland being identified and fenced off/ flagged as a 'no-go' area.
2. Removal of native vegetation will be kept to the minimum required to complete the Activity.
3. A pre-clearing survey will be undertaken by a suitably experienced ecologist, for fauna or habitat features including Ringtail Possum dreys or active bird nests, prior to vegetation removal.
4. Injured fauna will be taken to the nearest vet in or wildlife care organisation. The contact details of WIRES (1300 094 737) will be known to the site supervisor and Council environmental representative/ ecologist.
5. If unexpected threatened fauna or flora species are discovered, stop works immediately and notify the relevant Project Manager.
6. All vegetation removal must be undertaken by an approved vegetation clearing contractor. Vegetation removed from the site will be mulched and taken off-site to an appropriately licenced waste facility.
7. Contractors must ensure appropriate hygiene practices are in place so that all plant and machinery is clean of weed propagules or pathogens refer to DPIE Hygiene Guidelines (DPIE 2020).
8. Parking of vehicles and storage of plant/ equipment is to occur on elected ancillary areas. Where this is not possible, vehicles and plant/ equipment are to be kept away from environmentally sensitive areas and outside the dripline of trees.
9. Declared weeds (Lantana) will be managed according to requirements under the *Biosecurity Act 2015*. In addition to General Biosecurity Duties to prevent, eliminate or minimise any biosecurity risk they may pose, specific duties for these species are: 'Prohibition of dealings' and 'Must not be imported into the State or sold'.
10. Pruning of mature trees is to be in accordance with Part 5 of Australian Standard 4373-2007 Pruning of amenity trees.
11. Erosion and sediment controls will be implemented in accordance with *Managing Urban Stormwater, Soils and Construction* (the Blue Book) (Landcom, 2004) and will be maintained to prevent sediment moving off-site and sediment laden water entering any water course or adjacent vegetation (i.e. Swamp Sclerophyll community) during the construction process. This includes providing adequate erosion and sediment controls at the stockpile site west of Hogbin Drive
12. 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.
13. Six replacement trees are required as part of the site re-instatement works. The replacement tree species shall be three *Casuarina glauca* (swamp oak) and three x *Melaleuca quinquenervia* (borad leaved paperbark).

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LEGEND

- Work site boundary
- Material handling and site amenities area
- Potential portable ablutions west side
- Stockpile area
- PCT 3804 - Northern Sands Wallum Banksia-Allocasuarina Scrub
- PCT 4004 - Northern Melaleuca Quinquenervia Swamp Forest (TEC)
- Vegetation to be removed

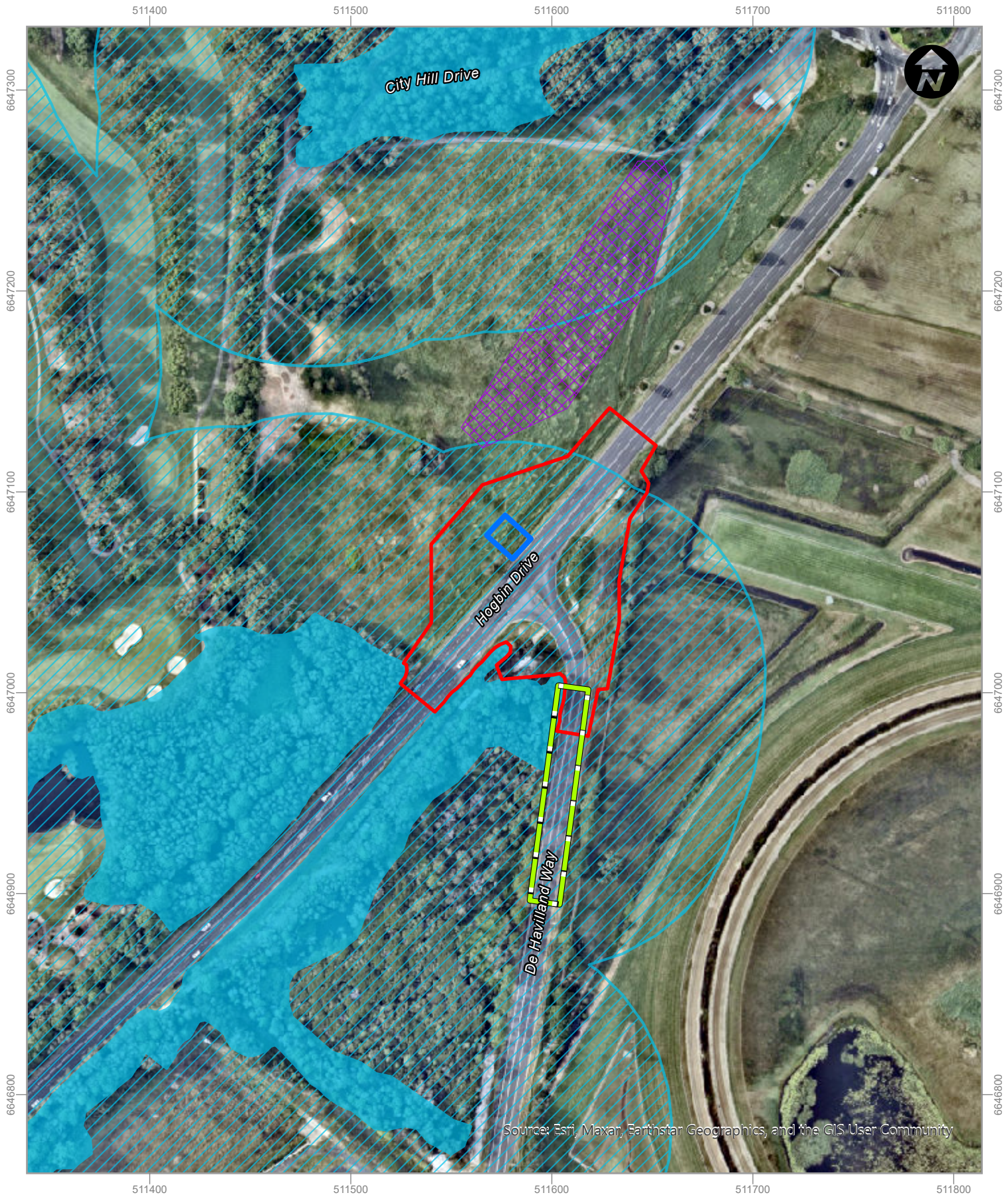
Threatened Fauna (BioNET record)

- Native Guava (11 seedlings)
- Grey-headed Flying-fox
- Koala
- Little Eagle
- Wallum Froglet



Spatial Reference: GDA2020 MGA Zone 56

Vegetation and Biodiversity Constraints - Illustration 5.1



LEGEND

- Work site boundary
- Material handling and site amenities area
- Potential portable ablutions west side
- Stockpile area
- Coastal Wetlands
- Coastal Wetlands Proximity Area



Spatial Reference: GDA2020 MGA Zone 56

Resilience and Hazards SEPP - Illustration 5.2



5.2 Aboriginal Heritage

5.2.1 Existing Environment

The Activity is located within the traditional lands of the Gumbaynggirr people and is overseen by the Coffs Harbour and District Local Aboriginal Land Council (LALC).

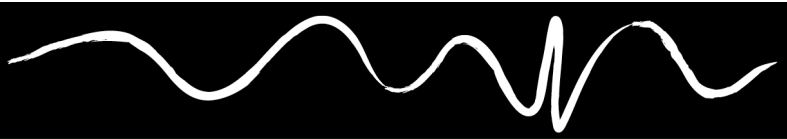
A search of the Aboriginal Heritage Information Management System (AHIMS) (NSW Department of Planning and Environment, 2023) (refer to **Appendix C**) was undertaken on 12 March 2024 (#872501) to identify any known Aboriginal sites or places within a 1 km radius of the Activity. No Aboriginal sites or places are understood to be within or proximate to the Activity.

5.2.2 Potential Impacts

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (NSW Department of Environment, Climate Change and Water, 2010) provides an assessment process to determine if the proposed Activity may harm Aboriginal objects and to determine whether an Aboriginal Heritage Impact Permit (AHIP) is required. An overview of the application of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects* is presented at **Table 5.6**.

Table 5.6 Generic Due Diligence Process

Step		Comment
1	<p>Will the activity disturb the ground surface or any culturally modified trees?</p> <p>Disturbed land is defined under the code as:</p> <p><i>Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.</i></p> <p><i>Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.</i></p>	<p>The ground surface would be disturbed by the Activity; however, the construction works would occur within the disturbed land of the road reserve, council utilised stockpile area and previously disturbed agricultural land (refer to Figure 5.1); therefore, the site is already modified and disturbed.</p> <p>The new roundabout would be constructed within the existing disturbed road alignment with only a minor portion entering the Council owned land known as lot 100 DP862869. The proposed ancillary areas would be positioned in disturbed areas of the road reserve. No culturally modified trees would be disturbed.</p>
2	<p>Are there any:</p> <p>a) Relevant confirmed site records or other associated landscape feature information on AHIMS? and/ or</p> <p>b) Any other sources of information of which a person is already aware? and/ or</p> <p>c) Landscape features that are likely to indicate presence of Aboriginal objects?</p> <p>Landscape features include:</p> <ul style="list-style-type: none"> ■ Within 200 m of waters. ■ Located within a sand dune system. ■ Located on a ridge top, ridge line or headland. 	<p>a) An AHIMS search was undertaken for the site. Search results indicate that there are no Aboriginal sites or Aboriginal places recorded within 1 km of the Activity (refer to Appendix C).</p> <p>b) There are no sources of information of which the author is aware. Given the disturbance history of the site, there is nothing to suggest that Aboriginal objects are likely to exist within the works footprint.</p> <p>c) The works are not located within a sand dune system, ridge top, ridge line or headland. The site is not within 200 m</p>



Step		Comment
	<ul style="list-style-type: none"> ■ Located within 200 m below or above a cliff face. ■ Within 20 m of or in a cave, rock shelter, or a cave mouth. ■ Is on land that is not disturbed land. <p>If after completing steps 2a and 2b it is reasonable to conclude that there are no known Aboriginal objects or a low probability of objects occurring in the area of the proposed activity, you can proceed with caution without applying for an AHIP.</p>	<p>of a cliff face or within 20 m of a cave, rock shelter or cave mouth. The land upon which the Activity is proposed is unlikely to retain any potential undiscovered archaeological sites or heritage items.</p>

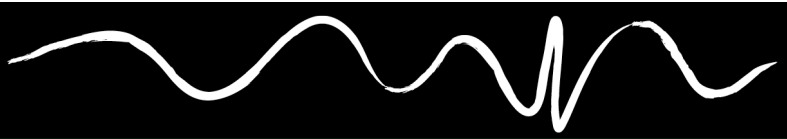


*source: (Google LLC, 2024)

Figure 5.1 2017 Aerial Imagery of Lot 100 DP862869

The outcome of the due diligence assessment indicates that it is reasonable to conclude that there are no known Aboriginal site/ objects at the site, and it is unlikely that objects/ sites would occur. The due diligence process indicates the proposed Activity is not anticipated to impact upon Aboriginal heritage and can proceed without further assessment or applying for an Aboriginal Heritage Impact Permit (AHIP).

Safeguards and mitigation measures would be implemented to minimise potential adverse impacts to any undiscovered items of Aboriginal heritage.



5.2.3 Safeguards and Mitigation Measures

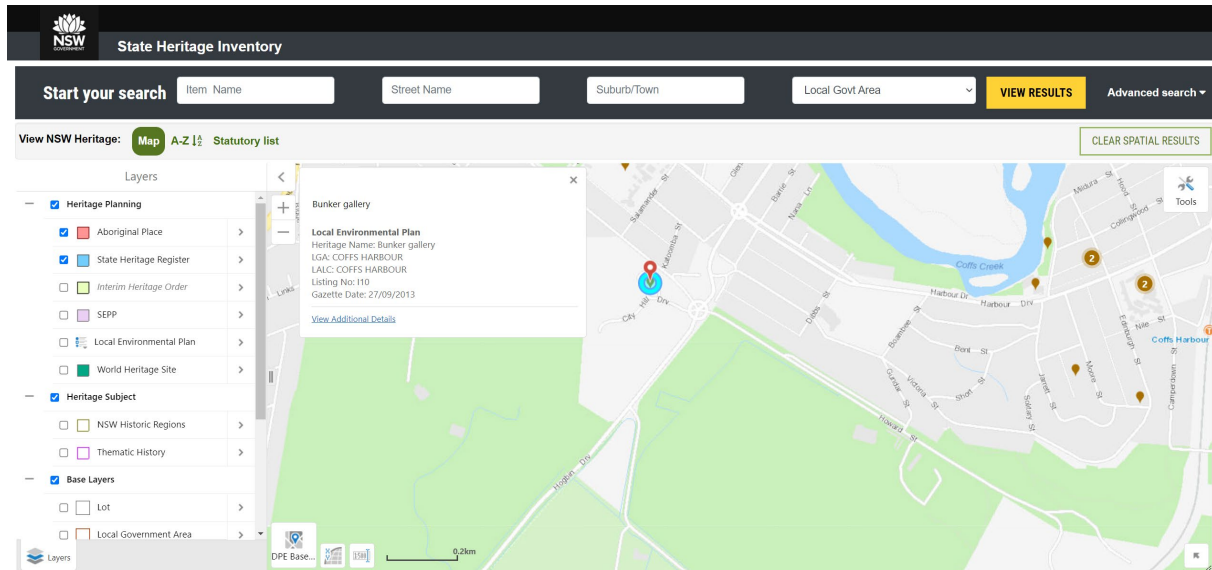
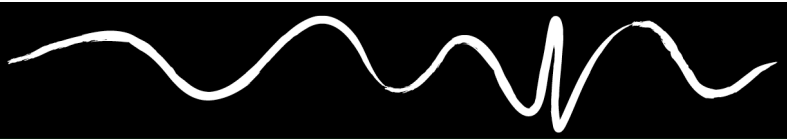
The following safeguards and mitigation measures will be implemented in order to prevent adverse impacts to any items of Aboriginal heritage:

14. All personnel working on site will be inducted and receive information on the required process, should a potential Aboriginal object be found.
15. An unexpected finds procedure should be developed as part of the Construction Environmental Management Plan (CEMP) for the Activity. The unexpected finds procedure should outline that if it is suspected that Aboriginal objects have been uncovered as a result of road upgrade works:
 - a. Work in the surrounding area is to stop immediately and records are made of the finds via project incident reporting procedures.
 - b. A temporary fence is to be erected around the site and appropriate controls put in place to ensure that no additional ground disturbance happens in the vicinity of the find.
 - c. An appropriately qualified archaeological consultant and a representative of the Coffs Harbour LALC are to be engaged to identify the material and provide an initial assessment of the significance of the object and the likely nature and extent of any associated archaeological sites.
 - d. If the material is found to be of Aboriginal origin, the find must be reported on the AHIMS database.
 - e. In the event that the Aboriginal objects are considered to have been damaged or disturbed, the incident must be reported through the EPA Environment Line (131 555).
 - f. Works may only recommence after advice from Heritage NSW on the requirement for an AHIP or where design, engineer or construction measures are identified to mitigate further damage to the Aboriginal site.
16. If human remains are located within the road reserve or ancillary work area:
 - a. All works must halt in the immediate area to prevent any further impacts to the remains.
 - b. The site must be cordoned off and the remains themselves must be left untouched.
 - c. The nearest police station (Coffs Harbour), Coffs Harbour LALC and Heritage NSW (Parramatta) are all to be notified as soon as possible.
 - d. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and Heritage NSW should be consulted as to how the remains should be dealt with.
 - e. Work may only resume after agreement is reached between all parties, provided it is in accordance with all parties' statutory obligations.

5.3 Non-Aboriginal (European) Heritage

5.3.1 Existing Environment

Searches of the Australian Heritage Database (Department of Climate Change, Energy, the Environment and Water, 2023), the NSW State Heritage Inventory (NSW Department of Planning and Environment, 2023), and environmental heritage schedule of the CHLEP (Schedule 5) were undertaken to determine the presence of known non-Aboriginal heritage items. Several items were presented in the general area; however, the nearest location is the Bunker Gallery WWII Bunker (LEP#110) located in John Champion Way (refer to **Figure 5.2**), approximately 350 m to the north of the Activity site, this infrastructure is considered 'high local significance'. It is unlikely the proposed Activity would result in any impacts on this heritage item.



*source: (NSW Government, 2024b)

Figure 5.2 State Heritage Inventory Search

5.3.2 Potential Impacts

The Activity would not impact on any known non-Aboriginal heritage sites or items. The main potential non-Aboriginal heritage impact is associated with unexpected finds.

5.3.3 Safeguards and Mitigation Measures

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

17. If any suspected archaeological items are uncovered during works associated with the Activity, all works will cease in the vicinity of the material/ find. Contact with the City and Heritage NSW will be made immediately. Works will not recommence until clearance is given.

5.4 Bushfire

5.4.1 Existing Environment

A review of the NSW Planning Portal Spatial Viewer (NSW Government, 2024a) the Activity site and adjacent land is mapped as being within a Vegetation Buffer area (refer to **Figure 5.3**).

A summary of bushfire risk associated with Vegetation Categories as described by the *Guide for Bush Fire Prone Land* (NSW Rural Fire Service, 2015) is provided in **Table 5.7**. Hogbin Drive currently may serve as an evacuation route and vehicular access for emergency services.



Table 5.7 Vegetation Categories and Bushfire Risk

Vegetation Category	Definition
Vegetation Category 1	This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production. It is considered to be the highest risk for bush fire.
Vegetation Category 2	This vegetation category has lower combustibility and/ or limited potential fire size due to the vegetation area shape and size, land geography and management practices. It is considered to be a lower bush fire risk than Category 1 and Category 3.
Vegetation Category 3	This category consists of grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands. It is higher in bush fire risk than Category 2 but lower than Category 1. It is considered to be medium bush fire risk vegetation.

*source: (NSW Rural Fire Service, 2015)

5.4.2 Potential Impacts

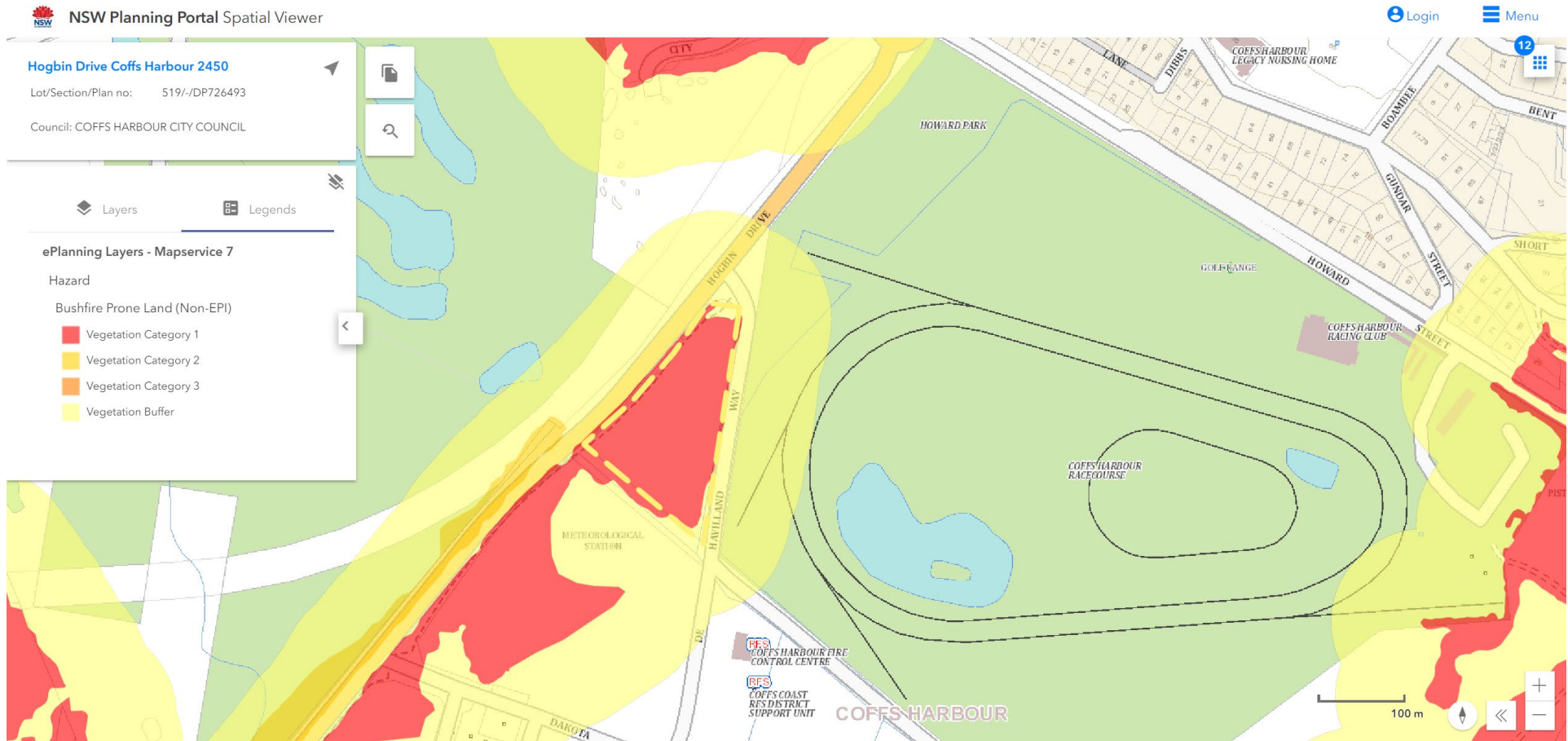
Given the site context and the nature of the Activity, the expected risk from bushfire is considered low. The works would require appropriate traffic control on Hogbin Drive, during such time the access along Hogbin Drive would be impacted for use as an evacuation route or as access for emergency services; however road thoroughfare would be maintained just constricted.

The Activity is not a Special Fire Protection Purpose and does not require a bushfire safety authority under Section 100B of the *Rural Fires Act 1997*. The Activity is not considered to increase bushfire risk.

5.4.3 Safeguards and Mitigation Measures

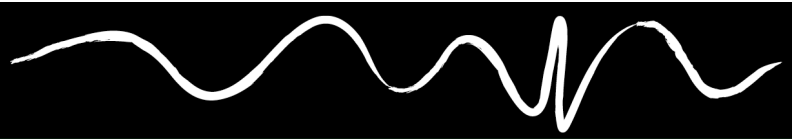
The following safeguards and mitigation measures will be implemented in order to prevent adverse impacts relating to bushfire:

18. Emergency Management Procedures are to be included as part of the Construction Management Plan developed for this Activity. The Emergency Management Procedures should include emergency management measures of the site during potential bushfire events and include the safe and efficient passage of emergency vehicles through the work area during construction works.
19. Works that are likely to cause a fire, such as general purpose hot works (welding, grinding or gas cutting), or any activity that is likely to produce a spark or flame are not to be carried on days with an elevated fire danger or a total fire ban in effect.
20. A fire extinguisher will be available on machinery for quick response if ignition occurs. All personnel will be made aware of the location of the extinguisher and trained in its effective deployment.
21. The contractor/ site manager is to maintain awareness of bushfire emergency information, in particular during a bushfire danger period, and be aware of all current bushfire alerts in the wider vicinity of the Activity site.



*source: (NSW Government, 2024a)

Figure 5.3 Bushfire Mapping



5.5 Soils and Water

5.5.1 Soils Existing Environment

The Activity site is mapped as containing Podosols (NSW Department of Planning and Environment, 2023); Podosols are mainly sandy soils with accumulations of organic materials and aluminium (with or without iron compounds), they are typically found in close proximity to the coast and are comprised of quartz sand (Isbell & National Committee on Soil and Terrain, 2021). The geotechnical assessment completed for the site by Regional Geotechnical Solutions (refer to **Appendix D**) indicates that the site soils are fine to medium grained silty sands in the topsoil profile and progress to firm marine clays in the upper 1 m of subsoil layers, becoming fine to medium grained marine sands below 1 m (as shown in **Plate 5.12** and **Plate 5.13** below).

Under the land and capability assessment tool (NSW Department of Planning and Environment, 2023), the Activity site is mapped to have severe limitations in potential use.

The surface geology is mapped as Qa, being defined as channel and flood plain alluvium; gravel, sand, silt, and/ or clay (NSW Department of Planning and Environment, 2023).

The Activity is situated at an elevation of 7 m AHD and gently drains on the flat plains towards the north-east (slope less than 1%). The western side (both from the north and south) of Hogbin Drive drains towards the site with average slopes of 2-3% towards the Activity site, refer to **Illustration 5.4** for topographic assessment.

The land use around Hogbin Drive Activity site is currently road reserve or Council reserve area, discussion around the land uses adjacent to the site are provided in **Section 2.1**.

5.5.1.1 Contaminated Land Assessment

A search of the contaminated land record of notices (NSW Environment Protection Authority, 2024), the list of notified sites (NSW Environment Protection Authority, 2024), and the PFAS Investigation Program list (NSW Environment Protection Authority, 2024), and The City Online Spatial Mapping Tool (TechOne Spatial, 2024) was undertaken to identify the presence of contaminated land within the Activity site.

Lot 24 DP1031761 is directly adjacent to 100 DP862869 (i.e. north-west of the Activity site) and identified as being Potentially Contaminated Land on the City of Coffs Harbour Online Mapping Tool (refer to **Figure 5.4**, blue shaded areas). The City outlines that (City of Coffs Harbour, 2018):

“This dataset represents locations of potentially contaminated land throughout the Coffs Harbour Local Government Area (LGA). The potential contamination is categorised as being a result of either industrial land zoning, or potentially contaminating landuse activities, or both. Landuse activities identified include, but are not limited to, railway yards, waste storage and treatment, chemical manufacture, engine works, landfill sites and service stations.”

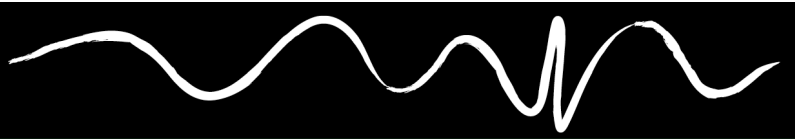
As such the blue shaded areas may not necessarily contain contaminated materials on site but just be located in an area that was previously industrial land zoning. In this case, Lot 24 DP1031761 is listed on the Department of Primary Industries cattle dip site locator as containing a historical arsenic dip; the status of this dip is ‘demolished’ which is defined as being “*The dip site has been partially or wholly dismantled or demolished prior to the introduction of the decommissioning policy. In many cases there is no physical signs of the dip ever being there.*” (DPI, 2023). A full copy of the cattle dip search records is included in **Appendix E** and the registered location is shown in **Figure 5.5**.



Figure 5.4 also identifies sites that are listed on the NSW EPA contaminated land register (refer to brown shading), there are two sites within 700 m of the proposed Activity site. Lot 12 DP790102 (6 Aviation Drive) is listed as petrol station and previously had an agreed voluntary remediation proposal over the site with the NSW EPA that was noted as complied with in 2005. Lot 103 DP1303749 (65 Victoria Street) as well as 10 and 12 Dibbs Street are also flagged as being on the NSW EPA register; however, none of these sites have current notices over them and they are not listed on the NSW EPA register of contaminated sites (refer to **Appendix E**).

A search of the Naturally Occurring Asbestos dataset (Department of Regional NSW, 2015) was undertaken to identify the presence of naturally occurring asbestos soils and regolith within the Activity site. No naturally occurring asbestos soils or regolith are understood to be within or proximate to the Activity site.

A search of the Acid Sulfate Soils Risk dataset (Department of Planning and Environment, 1998) and the CHLEP was undertaken to identify the presence of potential and actual acid sulfate soils (ASS) within the Activity site. The site is in a mapped 'Class 3' area under the CHLEP ASS mapping, this is defined by the City as "*Class 3: Acid sulfate soils in a class 3 area are likely to be found beyond 1 metre below the natural ground surface.*" (Coffs Harbour City Council, 2018). The ASS probability mapping (NSW Department of Planning and Environment, 2023) indicates that the site is low probably 1-3 m below ground surface level (refer to **Illustration 5.3**). The geotechnical investigation completed by RGS in April 2024 (refer to **Appendix D**) did not identify any visual signs or odour indicating the presence of ASS in the soils; however, no formal lab analysis or in-situ testing for ASS was completed at this time.



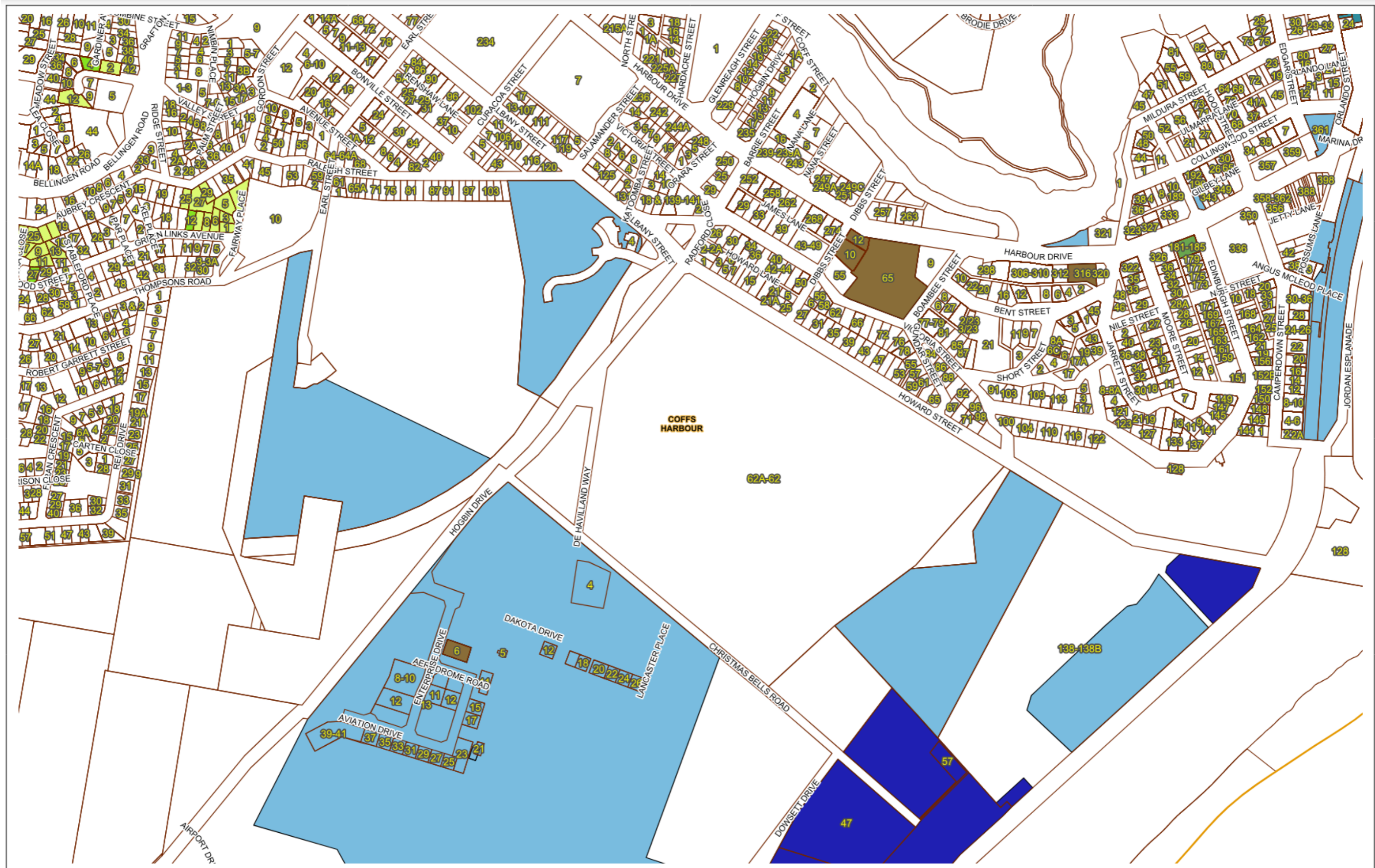
*source: ASE provided site image

Plate 5.12 Bore Hole 103 – North-Western Side of Hogbin Drive Intersection



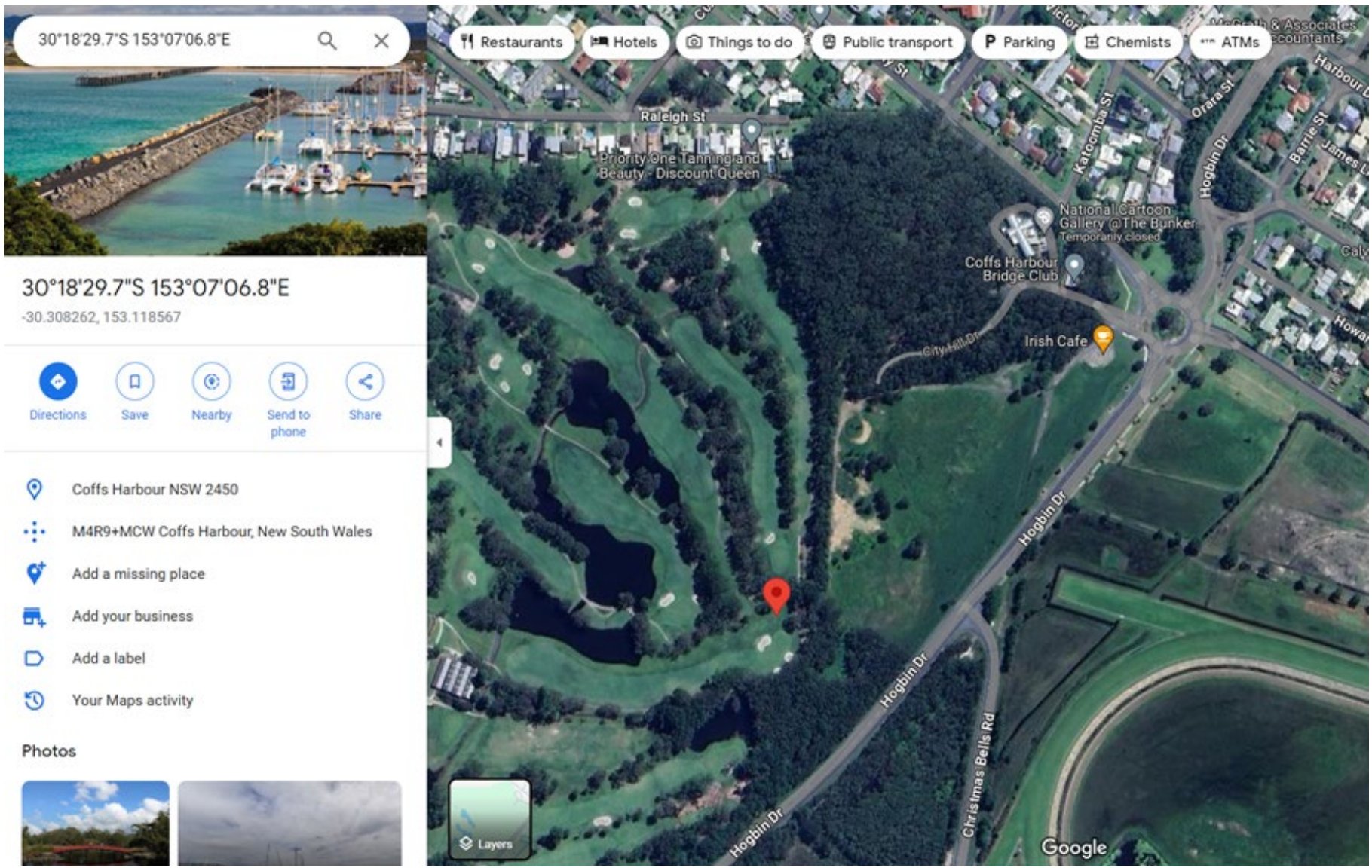
*source: RGS Geotechnical Report

Plate 5.13 Bore Hole 101 – Southern Side of Hogbin Drive Intersection



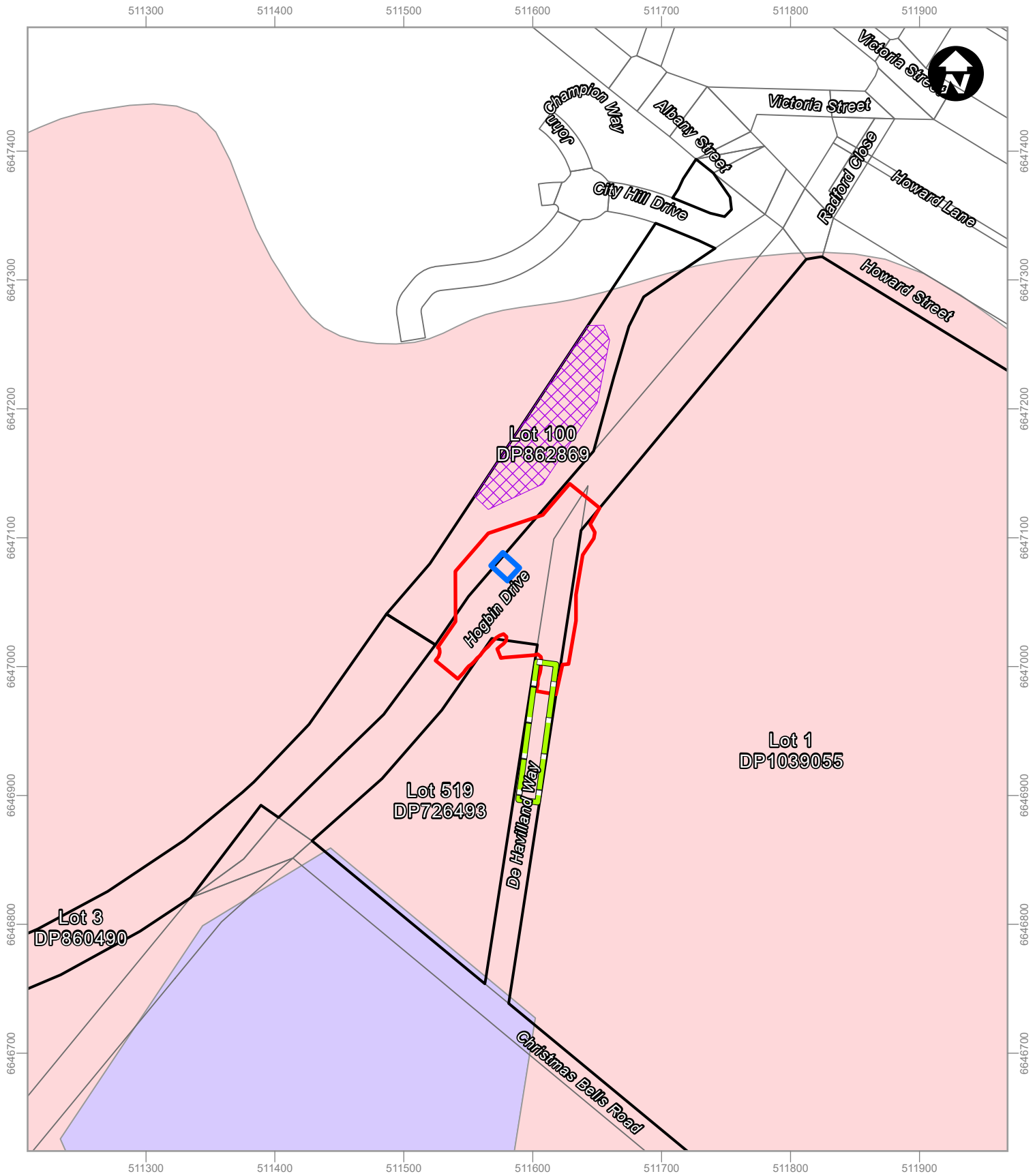
*source: (TechOne Spatial, 2024)

Figure 5.4 Contaminated Land Mapping - City of Coffs Harbour









*source: (Google LLC, 2024)

Figure 5.5 Registered Location of Historical Arsenic Cattle Dip





Spatial Reference: GDA2020 MGA Zone 56

LEGEND

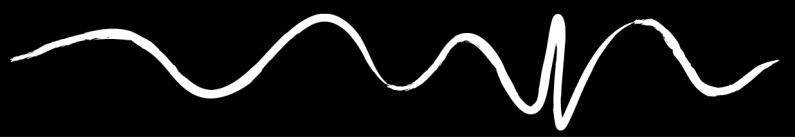
-  Work site boundary
-  Cadastre
-  Material handling and site amenities area
-  Potential portable ablutions west side
-  Stockpile area
-  Road

Acid Sulfate Soil

-  Disturbed terrain, Disturbed terrain, Not assessed, 2 - 4 m AHD
-  Low probability of occurrence, Aeolian, Sandplain, 2 - 4 m AHD, Pleistocene



Acid Sulfate Soils Mapping - Illustration 5.3



5.5.2 Water Existing Environment

The nearest waterway is Coffs Creek which is located approximately 900 m to the north-east of the site, Newports Creek is located 2.1 km to the south-west of the site (refer to **Illustration 5.4**). Drainage from the Activity area is likely to travel north-east towards Howard Street and exist through vegetated parklands that adjoin the coast area.

The Activity area is in the mapped 1% AEP flood line on the eastern side and also in the designated flood planning area on the western side (as shown in **Figure 5.6**).

The existing drainage lines in proximity to the Activity site are well vegetated with minimal exposed soils present (refer to **Plate 5.14** and **Plate 5.15**). The water quality in the existing drainage lines is low turbidity and were not observed to have presence of iron (rust staining); however, low topographical slopes are resulting in water ponding (refer to **Plate 5.16**).



Plate 5.14 De Havilland Way Cross Drainage Culvert - south side

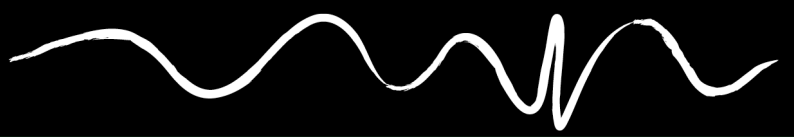


Plate 5.15 De Havilland Way Footpath Culvert - south side



Plate 5.16 De Havilland Way culvert – water quality



Spatial Reference: GDA2020 MGA Zone 56

LEGEND

- Work site boundary
- Contours at 2 m intervals
- ~ Watercourse

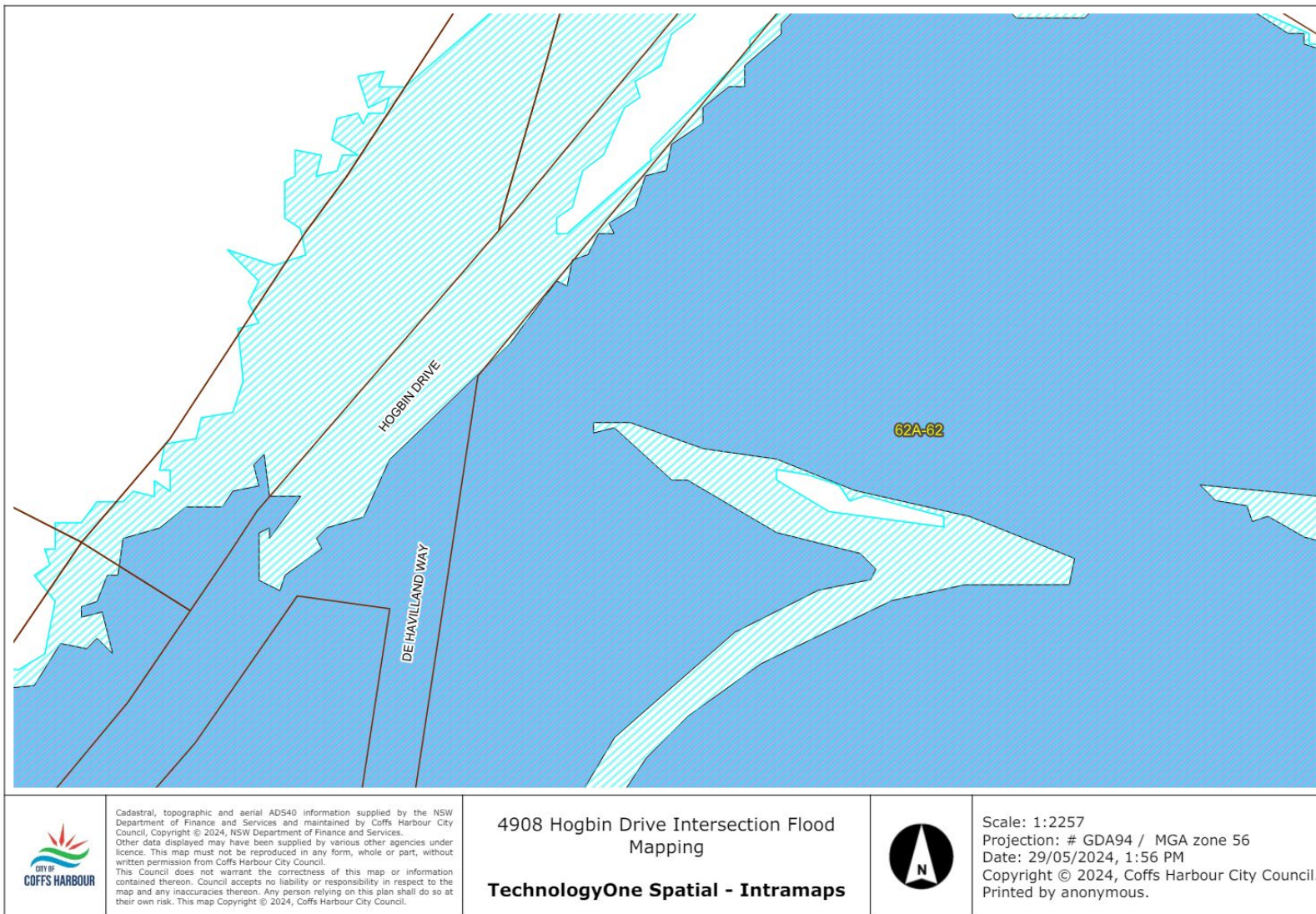
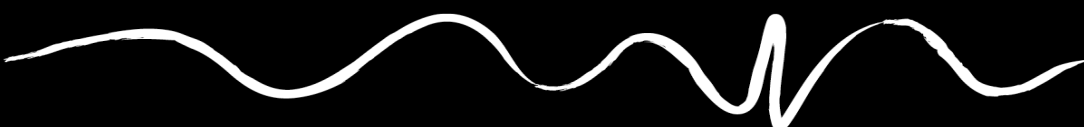


Nearby Waterways - Illustration 5.4



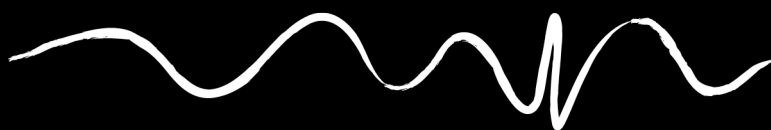
Review of Environmental Factors - Hogbin Drive, Coffs Harbour
4908-1005

Information shown is for illustrative purposes only
 Drawn by: AE Checked by: AB Reviewed by: LVB
 Source of base data: ESRI World Imagery
 Date: 23/05/2024



*source: (TechOne Spatial, 2024)

Figure 5.6 Coffs Harbour - Flood Mapping



5.5.3 Potential Impacts - Soils

5.5.3.1 Land Contamination

The Activity would impact a previously modified area that has historically been disturbed for urban and infrastructure purposes. There is no proposed change in land use, and there is no known contamination present in the proposed Activity area; however, the proximity of the site to the historical dip site may present issues for spoil material that maybe generated as part of these works. Acid sulfate soils may also be encountered during works, as such any testing of spoil material should include testing for ASS parameters as stipulated under the NSW EPA Excavated Natural Material Order 2014.

The soil at the Activity site may contain elevated levels of arsenic due to the presence of the historical dip in the nearby lot (refer to **Figure 5.4** and **Figure 5.5**). The location of this historical dip is at a higher surface elevation (as shown in **Figure 5.7**), however, this is not necessarily directly representative of the groundwater flow direction. There is potential for groundwater to be tidally influenced in this area and the soils to largely be of a sand composition which means arsenic may be less likely to bind to the soil.

There is a risk of harm if arsenic contaminated soils are present in soils with a higher or lower pH. Arsenic within soils is understood to be relatively stable under neutral conditions (~pH 7) and high clay content; however, becomes highly mobile under both acidic (~pH 4) and alkaline conditions (~pH 10) (Shaw, 2006) and with the presence of high sand composition. The pH of the soils is currently unknown, as is the potential presence of acid sulfate soils, which presents a risk to the site. The use of concrete for the Activity works and the generation of concrete wastes may elevate this risk as they are highly alkaline (Yousuf, Shafiqh, & Ibrahim, 2020) and contain leachable fractions of heavy metals (Eštoková, Palašćáková, Singovszká, & Holub, 2012), this may alter the pH of soils locally and mobilise any arsenic present.

During construction, spills of lubricants, oils and fuels may impact the soils locally. Contamination of soils with these materials may reduce permeability and shear strength and may reduce the potential for contaminated soils to be rehabilitated successfully (Sakshi, Singh, & Haritash, 2019).

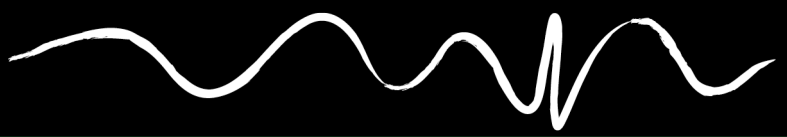
Under Section 7.1 of Part 7 of the CHLEP works that are in a mapped Class 3 area, such as the Activity area (refer to **Illustration 5.3**) that are below 1 m of the natural ground surface, or result in the watertable being lowered more than 1 m below the natural ground surface, require the development of an Acid Sulfate Soils Management Plan (ASSMP) prior to commencement of works. It is not expected that the Activity will result in soil disturbance below 1 m; however, should this change as part of the final design and construct process, then an assessment of acid sulfate soils presence should be completed in order to determine if an ASSMP is required to be developed.

The potential impacts to land contamination as a result of the Activity are limited to the construction phase, and no significant increase in contamination risk is anticipated as a result of the Activity post construction.

Safeguards would be implemented to ensure that any unexpected potential exposure of contaminated material would be dealt with effectively and in accordance with EPA and/ or the City policy and guidelines.

5.5.3.2 Soil and Erosion Control

The Activity may contribute to erosion and sedimentation impacts during the construction phase due to vegetation clearing, soil disturbance, and channel disturbance. As well as impacting on biodiversity (refer to **Section 5.1**) and visual amenity (refer to **Section 5.10**), the removal of vegetation and a



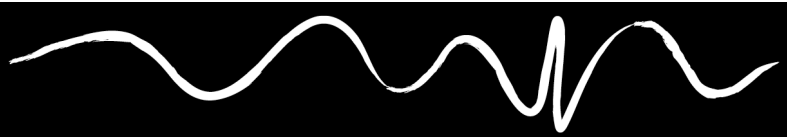
reduction in ground cover may increase the potential volume of material eroded by wind (Fryrear, 1985) and rainfall (Renard, Foster, Weesies, & Porter, 1991).

Disturbance of drainage channels will inevitably cause erosion and sedimentation within the stream; however, with the implementation of appropriate mitigation measures, these impacts are anticipated to be localised and short term. Eroded sediment entering drainage lines during construction may increase the turbidity and trophic status of downstream waters, increasing the likelihood of algal blooms, deoxygenation, and increased mortality rates for aquatic organisms (Henly, Patterson, Neves, & Lemly, 2000). Post-construction, potential for erosion and sedimentation exists in the vicinity of exposed surfaces with insufficient ground cover; however, no significant increase in erosion and sedimentation is anticipated as a result of the Activity post construction with the implementation of appropriate mitigation measures.



*source: (Google LLC, 2024)

Figure 5.7 Preliminary Topographical Analysis from Historical Dip Site



5.5.4 Potential Impacts - Water

During construction works, the direct disturbance of the drainage lines may have a negative impact on receiving waterways/environments due to an increase in turbidity and sedimentation concentrations (Foltz, Yanosek, & Brown, 2008).

In addition to impacts on waterways due to erosion and sedimentation, the Activity may have impacts on surface and groundwater quality due to contamination of drainage lines and waterways with pollutants, and this may contribute to negative effects downstream of the Activity. The contamination of waterways with pollutants such as oils, lubricants and fuels is understood to have a negative impact on aquatic ecosystems. Impacts that may result include preventing gas exchange, the formation of films may prevent light penetration, deoxygenation of the waterways, plant death and increased mortality rates of aquatic organisms (Green & Trett, 1989). While some pollutants may form films, denser pollutants such as heavy oils, bitumen and lubricants may move throughout the water column and sediments, placing stress on benthic organisms and plants (Dew, Hontela, Rood, & Pyle, 2015).

Concrete materials and concrete laden wastewaters have the potential to enter drainage lines and waterways, where they may contribute to an elevated pH, increased concentrations of phosphates, nitrates, and heavy metals, and higher levels of turbidity in nearby waterways (Ipeaiyeda, Obaje, & Rein, 2017).

Should acid sulfate soils be present on site this may also impact the quality of stormwater runoff from the site which would impact downstream receiving receptors. Acid sulfate soils can lead to reduced pH, decreased oxygen concentration in water and the release of heavy metals such as cadmium and lead, and metalloids such as arsenic. Acid and other contaminants can enter waterways and wetlands when soils are exposed and rewetted (Australian Government, 2020). As detailed in **Section 5.5.2**, should Activity works be anticipated to go below 1 m of the natural ground surface then an assessment of acid sulfate soils should be completed so an ASSMP can be developed for the works.

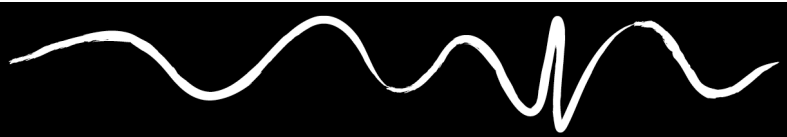
The Activity would not alter the hydrological or flooding regime of the area. However, due to the location of the Activity site in proximity to the % AEP flood line, appropriate safeguards and mitigation/management measures will need to be implemented to ensure construction works do not result in adverse downstream impacts during inclement weather. Response from the SES TISEPP referral process has indicated that the site is *'a low flood island meaning that the area becomes isolated by floodwater as all access/egress routes are cut and as the water rises the site then becomes inundated by floodwaters'* and *'the access/egress route remains open during larger floods until the PMF when Hogbin Drive becomes overtopped in all directions around the site'*; as such, an appropriate flood risk and response management plan, or emergency event contingency plan, should be developed as part of the CEMP for this Activity.

The potential impacts to water quality as a result of the Activity are limited to the construction phase, and no significant increase in risk of impact to water quality, nor riparian or wetland environments, is anticipated as a result of the Activity post construction. Following construction, the stabilisation of a road batters and drainage lines are expected to have a positive impact on water quality in the long term.

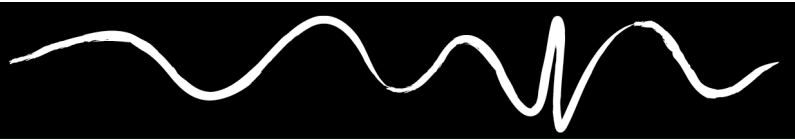
5.5.5 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented in order to prevent adverse impacts relating to soils, erosion and contamination:

22. A preliminary site investigation (PSI) is to be completed prior to the commencement of works to determine the potential presence of soil contamination. The PSI should be completed in accordance with the requirements of the:



- a. National Environment Protection (Assessment of Site Contamination) Measure (NEPM);
 - b. NSW Contaminated Land Guidelines: Sampling design part 1 – application;
 - c. NSW Contaminated Land Guidelines: Sampling design part 2 – interpretation; and
 - d. NSW EPA Contaminated Land Guidelines: Consultants Reporting on Contaminated Land.
23. If any soils assessment indicates the presence of ASS or works are anticipated to be below 1 m of the natural surface ground level, then a ASSMP will be required to be developed prior to the commencement of work.
 24. A site-specific erosion and sediment control plan will be developed by a suitably qualified professional, approved by Council, and implemented prior to commencement of the road construction works.
 25. Erosion and sediment controls will be implemented in accordance with *Managing Urban Stormwater, Soils and Construction* (the Blue Book) (Landcom, 2004) and will be maintained to prevent sediment moving off-site and sediment laden water entering any water course during the construction process.
 26. Works will only commence once all erosion and sediment controls have been established. The controls will be maintained in place until the works are complete, and all exposed erodible materials are stabilised.
 27. Where possible, avoid works during forecast high rainfall events and plan works to occur during periods of no or low flow.
 28. Disturbed areas will be progressively stabilised and or rehabilitated following construction.
 29. Permanent rehabilitation will achieve a C-factor of less than 0.1 (i.e., greater than 60% ground cover) and set in motion a program that should ensure it will drop permanently to less than 0.05 (i.e., greater than 70% ground cover) within a further 60 days.
 30. A flood risk and response management plan, or emergency event contingency plan, should be developed as part of the CEMP for this Activity.
 31. All machinery, equipment, vehicles, materials and chemicals must be stored outside of flood prone areas.
 32. Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) within construction site and adjacent area will be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls during construction.
 33. No waste and/ or wastewater will be discharged directly or indirectly in waterways or drainage lines.
 34. Cleaning or washing will not occur near waterways or drainage lines.
 35. A concrete washout area and facilities will be located away from waterways and drainage lines and wash down water is to be contained within a designated impervious bund. Excess concrete is to be removed from site.
 36. The storage of hazardous materials and refuelling/ maintenance of construction plant and equipment shall be undertaken at least 50 m from drainage lines and waterways and in clearly marked designated areas that are designed to contain spills and leaks.
 37. A spill containment kit will be available during the works. All personnel will be made aware of the location of the kit and trained in its effective deployment.
 38. An excavated material management procedure should be developed by a suitably qualified professional and implemented during construction works to ensure all excavated material is suitably handled, stored and disposed during construction works. This procedure should include safety aspects for handling potentially contaminated materials.
 39. All excavated material will be placed in a designated stockpile area that is suitably contained to ensure materials can be tested prior to re-use or off-site disposal.
 40. Any testing of excavated material should be carried out in accordance with the NSW excavated natural material order and/ or the NSW Waste Classification guidelines. Due to the potential presence of ASS, all testing should include relevant ASS assessment procedures.
 41. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site.



42. The City and 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).

5.6 Noise and Vibration

5.6.1 Existing Environment

The existing background noise within the vicinity of the Activity is typical of a built-up urban area. Information provided by ASE indicates that the AADT volume is approximately 26,000 vehicles per day on Hogbin Drive. Under AS 1055.3-1997: Acoustics - Description and measurement of environmental noise Acquisition of data pertinent to land use (Standards Australia, 1997), the site would fall into an R2 noise area category with the following expected background noise levels (LA₉₀):

- Day – 45 dBA
- Evening – 40 dBA
- Night – 35 dBA.

There are approximately 122 residential receptors within a 500 m buffer radius of the Activity area (refer to **Illustration 5.5**), with 1 Howard Street, Coffs Harbour (receptor 95), being the closest receptor at 285 m from the proposed northern extent of the Activity site.

Receptors 95, 98 and 70 all have a clear line of sight to the proposed Activity works area (refer **Figure 5.8** and **Illustration 5.5**), while all other receptors have a vegetation buffer or distance between the proposed Activity works area and the potential affected residential dwelling.



*source: (Google LLC, 2024)

Figure 5.8 Line of Sight to Nearest Receptor

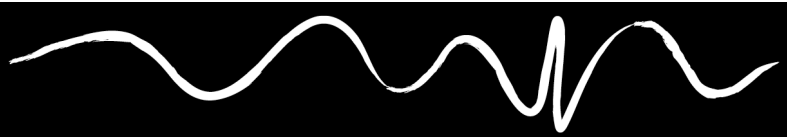


- LEGEND**
- ▭ Work site boundary
 - ▭ 500m Buffer
 - Receptor



Nearby Receptors - Illustration 5.5





5.6.2 Potential Impacts

Noise from the Activity would be typical of that associated with road construction work and would result from the use of plant and machinery, work vehicles, earthworks, and infrastructure installation.

Under the *Interim Construction Noise Guideline* (Department of Environment and Climate Change NSW, 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).
- The highly noise-affected level of L_{Aeq} 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.

Noise impacts would be temporary and are not anticipated to be conducted out of standard operating hours (refer to **Section 2.4.3**); therefore, the Activity works are not considered to be of a significant scale or constitute major construction work.

In order to assess the noise and vibration impact on the sensitive receiver and determine appropriate measures for the resulting impact, the *Construction and Maintenance Noise Estimator* (Transport for NSW, 2022) was used to estimate noise of the compound establishment based on distance from the site (refer to **Appendix F**).

There is a clear line of sight to Receptor 95 (refer **Figure 5.8**) and the noise calculations completed as part of the assessment for this REF have been based off this receptor as it is considered the most affected and results would be most conservative for the Activity works.

Distances and associated appropriate measures for residential receivers are as follows:

- Moderately intrusive noise within 85 m of site measure: notification.
- Highly intrusive noise within 30 m of site measure: notification, phone calls, respite offer.
- Highly affected within 40 m of site measure: notification, phone calls, respite offer.

No dwellings would experience moderately intrusive noise as a result of the Activity, should works be conducted within standard operating hours.

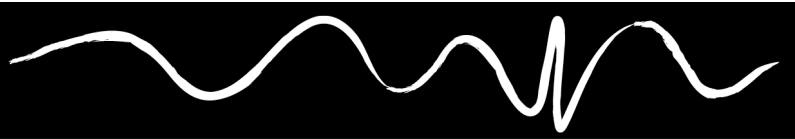
Construction traffic would use the existing local road network. The existing usage of the road network is quite high; therefore, the traffic numbers as a result of construction are not likely to result in an increased audible change in noise level.

5.6.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse impacts relating to noise and vibration:

43. Construction activities will be undertaken in within standard construction hours:

- Monday to Friday 7:00 am to 6:00 pm.
- Saturday 8:00 am to 1:00 pm.
- Sundays or public holidays No work on



44. Where practicable, noise control should occur at the source and modifications to noise control should be investigated and implemented, such as sourcing low noise power tools or hydraulic or electrically controlled equipment instead of petrol or pneumatic equipment.
45. The most appropriately sized tool for the respective job will be used, keeping in mind that the smaller the tool, the less potential noise generated.
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.

5.7 Traffic, Access and Parking

5.7.1 Existing Environment

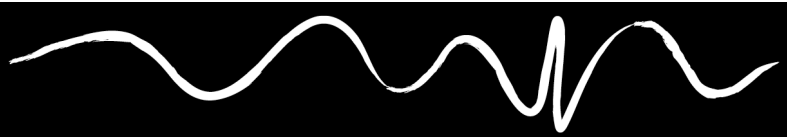
The Activity site is located at the intersection of Hogbin Drive and De Havilland Way, Coffs Harbour (refer to **Illustration 2.1**).

Hogbin Drive (road number 540) is a sealed 3 to 4 lane road that is classified as a 'Main Road' under the Schedule of Classified Roads and Unclassified Regional Roads (Transport for NSW, 2023), the three lanes become 4 lanes on the northern side of the Hogbin Drive and De Havilland Way intersection (refer to **Figure 2.1**).

Hogbin Drive has a high volume of traffic, approximate Annual Average Daily Traffic (AADT) volume of 26,000 vehicles per day (information provided by ASE).

This existing pavement is compromised around the Hogbin Drive and De Havilland Way intersection area, showing signs of wear and tear with crocodile cracking, pot holes, stripping and minor rutting.

Hogbin Drive forms part of the major public transport route in Coffs Harbour, including for school bus routes, as it is the primary connecting road infrastructure between Toormina and Coffs Harbour. De Havilland Way is the primary connecting road between Coffs Harbour (south bound traffic) to the Airport Enterprise Park (AEP).



*Source: ASE

Figure 5.9 Existing Pavement Condition

5.7.2 Potential Impacts

It is proposed that De Haviland Way north of Christmas Bells Road is closed temporarily during the works; traffic will be detoured via the Dakota Drive intersection link to Hogbin Drive (refer to **Figure 2.3**). Hogbin Drive will remain open but reduced in lanes and with appropriate traffic controls and management.

This may present a safety hazard to motorists using the Hogbin Drive if traffic is managed insufficiently. Prior to the works commencing a suitable Traffic Management Plan and Traffic Guidance Scheme would be developed which addresses the safety hazards that will arise from these works. Following construction of the new roundabout would be removed.

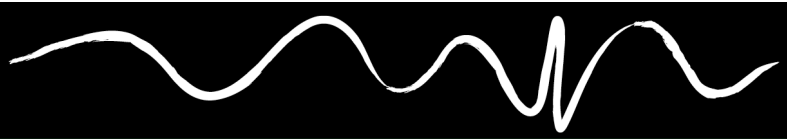
The Activity would generate additional vehicle movements on the surrounding road network. These vehicle movements would primarily be associated with:

- Equipment and plant being delivered to the site for construction purposes.
- Construction employees entering and leaving the site.
- Truck deliveries to the site for construction purposes.
- Truck removal of materials and waste from the site.

As well as impacting road safety as a result of additional dust generation (refer to **Section 5.8**), the increase in heavy vehicle traffic within the surrounding road network may result in damage to the surrounding road network.

Post construction, the new roundabout area would have a design speed of 60 km/ hr. This may present a safety hazard to motorists if appropriate road furniture is not upgraded or installed.

Overall, the Activity would have a long-term positive impact for local motorists by improving safety of this intersection area.



5.7.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse impacts relating to traffic, access and parking:

47. All works would be undertaken under an approved Traffic Management Plan and Traffic Guidance Scheme.
48. Regard to public safety would be maintained at all times.
49. Advanced warning signage would be established at appropriate and strategic locations, prior to and during the work to ensure road users and pedestrians are made aware of changed traffic/ access conditions.
50. Sufficient and appropriate notification will be provided to the affected road users and local bus operators.
51. All surrounding roads damaged as a result of the works will be repaired to an acceptable condition following completion of construction works.
52. Road furniture will be installed and/ or upgraded with reference to the 60 km/ h design speed of the roundabout.
53. Maintain cycleway access throughout the duration of the project. Provide a temporary access if the existing access is not sufficiently clear of the construction works.

5.8 Air Quality

5.8.1 Existing Environment

The Activity is located in a built-up urban environment. Potential airborne particles within the locality are largely restricted to minor dust generated by vehicle movements and exposed ground areas in the broader landscape.

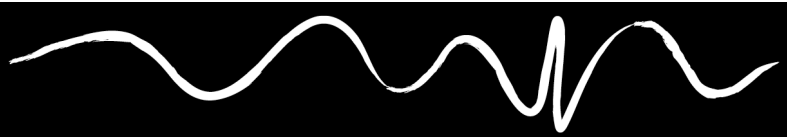
5.8.2 Potential Impacts

The Activity may contribute to a temporary increase in dust generation due to increased use of the surrounding road network by heavy machinery, the transport of dust producing material, and the exposure of soils following earthworks and stockpiling activities.

Dust generated from the Activity may negatively impact the environment, safety, and human health via several mechanisms. Dust particles are often captured by nearby vegetation, which may experience diminished capacity to carry out photosynthesis and gas exchange as a result of stomatal blockages by dust particles (Farmer, 1993). Dust particles may also significantly reduce visibility for road users, thereby presenting a safety hazard and increasing the risk of collision (Le Vern, Razakamanantsoa, Murzyn, Larrarte, & Cerezo, 2022). Additionally, human exposure to dust particles may cause health complications including respiratory inflammation and cardiovascular disease (Khan & Strand, 2018).

The Activity may also contribute to a temporary increase in exhaust emissions from construction machinery and vehicles within the wider road network. As well as contributing to climate change (refer to **Section 5.12**), exhaust emissions may contain compounds that have a deleterious effect on cardiovascular and respiratory function within humans (Adamkiewicz, Liddie, & Gaffin, 2020).

The potential air quality impacts as a result of the Activity are limited to the construction phase, and no significant decrease in air quality is anticipated as a result of the Activity post construction.



5.8.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse impacts relating to air quality:

54. Vegetation or other materials will not be burnt on-site.
55. Wherever reasonable and practicable, the grubbing and removal of any ground cover will not occur until immediately prior to earthworks occurring within that stage of works.
56. 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.
57. Dust suppression techniques would be utilised to minimise the potential for dust generation/ dispersal during works, as required.
58. Vehicles transporting waste or other materials that may produce dust will be covered during transportation.
59. Vehicles, machinery, and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the PoEO Act and associated regulation.

5.9 Waste

5.9.1 Existing Environment

The site visit conducted by GeoLINK identified that the site was free of litter and other foreign debris at the time of assessment.

5.9.2 Potential Impacts

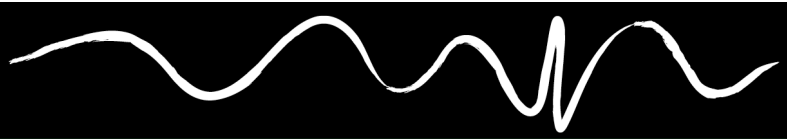
Waste generated from the construction of the Activity may include, but is not limited to:

- demolished road furniture materials;
- packaging materials;
- construction and concrete wastes;
- spoil material from excavation;
- oils and grease from machinery;
- general site rubbish; and
- removed vegetation.

As well as negatively impacting soils and water quality (refer to **Section 5.5**), improperly managed construction waste may place additional strain on existing infrastructure. Where re-use or reprocessing is not nominated as a preferred waste management option, waste materials must be transported by road to landfill, and additional materials must be manufactured and transported in their place.

As discussed in **Section 5.5**, there is mapped potentially contaminated material in land directly adjacent to the Activity site, which is registered as a historical arsenic cattle dip. As such, any excavated material may contain elevated levels of arsenic. Any excavated material to be moved off site and not reused in road construction related activities within the Activity road corridor would require testing to demonstrate compliance with the *Excavated Natural Material Order 2014* or Waste Classification Guidelines.

Activities such as road construction may produce small amounts of contaminated waste due to spills, leaks, or escapes of hydrocarbons, lubricants, and construction materials. The improper disposal of contaminated waste may lead to the contamination of soils, waterbodies, and ecosystems in the vicinity of disposal.



As well as impacting on visual amenity (refer to **Section 5.10**), the improper storage of general site rubbish may encourage wildlife to access rubbish receptacles and damage containers, potentially leading to the migration of general site rubbish off-site.

The potential waste impacts as a result of the Activity are limited to the construction phase, and no impacts due to waste are anticipated as a result of the Activity post construction.

5.9.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse impacts relating to waste:

60. A Construction Environmental Management Plan should be developed and implemented to ensure that waste materials are adequately managed and handled throughout the construction process.
61. Resource management hierarchy principles are to be followed:
 - Avoid unnecessary resource consumption as a priority.
 - Avoidance is followed by resource recovery (including re-use of materials, reprocessing, recycling, and energy recovery).
 - Disposal is undertaken as a last resort.
62. Any contaminated waste generated would be disposed of in accordance with the EPA approved methods of waste disposal.
63. Appropriately sized waste receptacles (bins) will be utilised on site.
64. Waste storage facilities and spoil placement areas shall be located in easily accessible locations, away from existing drainage lines and have appropriate secondary containment systems and drainage controls.
65. Lids and seals shall be maintained on all odour generating waste material; and all domestic and food scrap waste shall be secured to prevent wildlife access.
66. If necessary, waste will be disposed of at a licensed waste or recycling facility.
67. If excavated material is to be moved off site and not reused in road construction related activities within the road corridor, additional testing would be undertaken to demonstrate compliance with the *Excavated Natural Material Order 2014* or Waste Classification Guidelines.

5.10 Visual

5.10.1 Existing Environment

The existing environment within the vicinity of the Activity includes Hogbin Drive, De Havilland Way and the adjacent road reserve. The surrounding area is predominantly comprised of disturbed urban land use (race course, golf course, commercial developments, residential developments) and vegetated road reserve and government owned land parcels (refer to **Illustration 2.1**).

5.10.2 Potential Impacts

The site has a low sensitivity to impact; Hogbin Drive and De Havilland Way have historically been cleared for infrastructure purposes. There may, however, be some visual impacts on nearby northern receptors (refer to **Illustration 5.5**) during construction works if litter and waste materials are not managed and transported properly. The viewing of littered vistas is understood to negatively impact human emotional wellbeing (Clayton, 2021), as well as increasing the likelihood of littering by those with a propensity to do so (Schultz, Bator, Large, Bruni, & Tabanico, 2013).



The Activity would have a low magnitude of impact; the Activity involves construction of a new roundabout which is a similar visual profile to other nearby areas of Hogbin Drive. Vegetation would be retained where possible.

Given the scale, location and methodology of the Activity, and the implementation of appropriate mitigation measures, the landscape character and visual impact of the Activity is expected to be low.

5.10.3 Safeguards and Mitigation Measures

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

68. Vegetation clearing would only occur where absolutely necessary for the completion of the Activity.
69. Working areas will be maintained, kept free of rubbish, and cleaned up at the end of each day.
70. All vehicles carrying waste would be covered sufficiently so as to prevent the waste from entering the road reserve.
71. Upon completion of the works, any works areas would be restored to an acceptable visual state.

5.11 Socio-economic

5.11.1 Existing Environment

The Activity site comprises Hogbin Drive and DeHavilland Way, which is an urban, sealed road that provides a connecting route for Toormina and Coffs Harbour and the wider Coffs Harbour area. The road and associated infrastructure is of high socio-economic value to the community.

Utility services adjustments are proposed in conjunction with the Activity, largely related to electricity and stormwater connections.

The Activity would largely be confined within the cadastral road boundary; however, part of the roundabout and widening of Hogbin Drive will be developed over lot 100 DP862869 (refer to **Illustration 2.1**) and the proposed stockpile area for the project will also be over this lot; this land is Council owned land and relevant discussions and approvals for its' use have been completed.

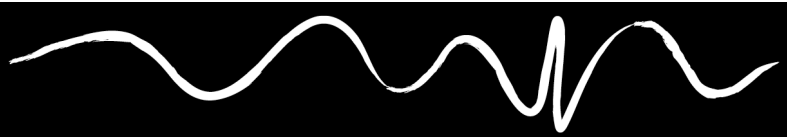
5.11.2 Potential Impacts

While there will be some impacts on traffic and access (refer to **Section 5.7**), the Activity would be temporary in nature and would improve road safety post-construction.

Working near waterways and in close proximity to heavy machinery may present a safety risk to construction workers; however, this risk can be managed with provision of appropriate safety clothing and equipment.

As well as presenting a safety hazard to construction workers, the disturbance of buried cables or overhead transmission lines may directly impact the provision of vital energy and communications services to nearby landholders. The contractor would be responsible for determining the location of such services prior to commencement of construction.

The Activity would take approximately twelve months to complete, with Hogbin Drive remaining open and under appropriate traffic control during this time. Hogbin Drive does form part of essential bus routes; however, no businesses or school buses are anticipated to be adversely impacted by the traffic controls that will be put in place.



Given the nature of the Activity and the site context, no other adverse long-term socio-economic impacts are anticipated. Overall, the Activity would have a positive socio-economic impact by upgrading road infrastructure used by the local community.

5.11.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse socio-economic impacts:

72. If required, any land acquisition would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.
73. Contractors/ workers will be mindful of the needs of the adjacent residents.
74. 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.
75. In accordance with the *Work Health and Safety Act 2011*, workers will be provided with appropriate safety clothing and equipment. Supervisory staff and any visitors to the work area will also be required to wear protective clothing. Works personnel will be provided with or expected to have protective equipment and appropriate construction training.

5.12 Climate Change

5.12.1 Existing Environment

Human activities, such as the burning of fossil fuels, the clearing of land, and the production of food, have warmed the atmosphere, ocean, and land since pre-industrial times (Eyring, et al., 2021). Anthropogenic greenhouse gas emissions and their associated impacts on the climate are listed as a key threatening process under the EPBC Act (Department of Climate Change, Energy, the Environment and Water, 2022) and the *Threatened Species Conservation Act 1995* (NSW Department of Planning and Environment, 2021).

5.12.2 Potential Impacts

As well as placing greater strain on existing waste infrastructure (refer to **Section 5.9**), any waste not beneficially reused would indirectly require additional carbon emissions for either its remanufacture or transport.

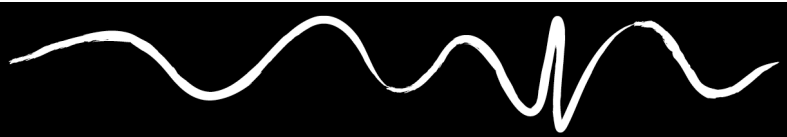
The Activity would also contribute to carbon emissions and anthropogenic climate change to a minor extent via the production of greenhouse gas emissions by concrete manufacture, construction equipment and traffic.

Given the scale of the works however, the influence on emissions and climate change would be negligible; however, it is appropriate to implement measures that can reduce or minimise cumulative emissions and related effects.

5.12.3 Safeguards and Mitigation Measures

The following safeguards and mitigation measures will be implemented to prevent and/ or minimise adverse impacts relating to climate change:

76. Vehicles and equipment will be switched off when not required for direct construction activities.



5.13 Ecologically Sustainable Development

The objectives of the EP&A Act require that the principles of Ecologically Sustainable Development (ESD) are considered and evaluated in the environmental assessment process and in the determination of a development application. Whilst a development application is not required for this project, consideration of these principles is useful.

5.13.1 Precautionary Principle

The EP&A Regulation 2021 defines the precautionary principle as the following:

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.

To satisfy the precautionary principle, this REF has conducted an 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 impacts and safeguard the environment. Considering this assessment's findings, the Activity is unlikely to impose significant and/or long-term adverse impacts on the environment, economy, or community. The safeguards and mitigation measures outlined in this REF would be implemented to ensure sound environmental outcomes in all aspects of the Activity.

5.13.2 Inter-generational Equity

The EP&A Regulation 2021 defines inter-generational equity as the following:

That the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Activity would not significantly affect the viability of threatened species, or any TECs or other environmental resources including water, soil, and air. Therefore, local environmental values would not be substantially adversely affected by the Activity and would be maintained for future generations. The Activity would have positive socio-economic effects at a local scale in relation to maintenance of access and safety of existing road infrastructure.

5.13.3 Conservation of Biological Diversity and Ecological Integrity

The EP&A Regulation 2021 defines the conservation of biological diversity and ecological integrity as the following:

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 assessed as part of this REF. No threatened species, endangered populations or TECs are likely to be significantly affected by the Activity. No populations of native species are likely to be made locally rare or unviable as a result of the Activity. Consequently, the ecological integrity and biological diversity would be maintained locally.



5.13.4 Improved Valuation, Pricing and Incentive Mechanisms

The EP&A Regulation 2021 defines improved valuation, pricing and incentive mechanisms as the following:

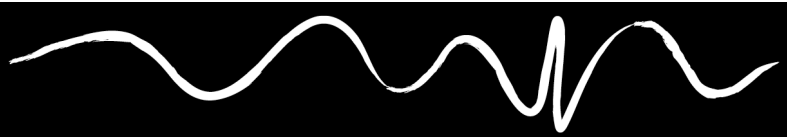
That environmental factors should be included in the valuation of assets and services.

It is difficult 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 Activity by identifying appropriate measures and safeguards to avoid or mitigate adverse environmental effects. This would ensure that the integrity of the environment is not degraded, is managed and where possible enhanced.

5.14 Cumulative Impacts

Under Section 171 of the EP&A Regulation 2021, 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 Activity is expected to add to a number of cumulative impacts including resource consumption, vegetation clearing and generation of greenhouse gas emissions (e.g. through operation of vehicles and equipment, use of resources). However, the relevant safeguards and mitigation measures stated throughout **Section 5** and the methodology for completion of the Activity aim to minimise the extent to which it contributes to cumulative adverse environmental impacts. There are no other known significant developments or works that would coincide with the proposed Activity and have the potential to result in adverse cumulative amenity and environmental impacts. No significant cumulative impacts are expected.



6. Environmental Management

6.1 Summary of Safeguards and Mitigation Measures

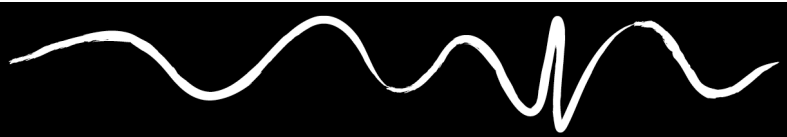
The following table (**Table 6.1**) provides a summary of the mitigation measures detailed in this report that would be implemented for the Activity.

The identified measures would be incorporated by the Contractor into a detailed Construction Environmental Management Plan (CEMP) prior to commencement of works, which also outlines how risks would be minimised, and the construction processes would be undertaken and managed.

The objective of the CEMP is to outline parameters for site management practices during construction. All construction staff and site personnel would be inducted and made aware of their obligations working on the project, their environmental responsibilities, and the safeguard measures to avoid and minimise potential impacts. Induction and toolbox talks would commence early in the program and continue as new personnel/ contractors are engaged.

Table 6.1 Summary of Safeguards and Mitigation Measures

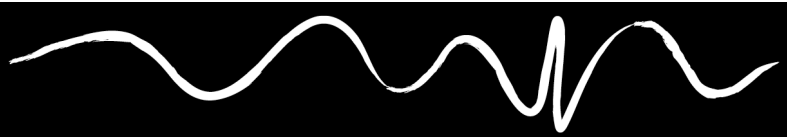
Environmental Attribute	Safeguards/ Mitigation Measures
Biodiversity	<ol style="list-style-type: none"> 1. Prior to works commencing, mark the limit of work and clearing limits as per the site boundary/ extent of works. This includes the boundary of the adjacent mapped Coastal Wetland being identified and fenced off/ flagged as a 'no-go' area. 2. Removal of native vegetation will be kept to the minimum required to complete the Activity. 3. A pre-clearing survey will be undertaken by a suitably experienced ecologist, for fauna or habitat features including Ringtail Possum dreys or active bird nests, prior to vegetation removal. 4. Injured fauna will be taken to the nearest vet in or wildlife care organisation. The contact details of WIRES (1300 094 737) will be known to the site supervisor and Council environmental representative/ ecologist. 5. If unexpected threatened fauna or flora species are discovered, stop works immediately and notify the relevant Project Manager. 6. All vegetation removal must be undertaken by an approved vegetation clearing contractor. Vegetation removed from the site will be mulched and taken off-site to an appropriately licenced waste facility. 7. Contractors must ensure appropriate hygiene practices are in place so that all plant and machinery is clean of weed propagules or pathogens refer to DPIE Hygiene Guidelines (DPIE 2020). 8. Parking of vehicles and storage of plant/ equipment is to occur on elected ancillary areas. Where this is not possible, vehicles and plant/ equipment are to be kept away from environmentally sensitive areas and outside the dripline of trees. 9. Declared weeds (Lantana) will be managed according to requirements under the <i>Biosecurity Act 2015</i>. In addition to General Biosecurity Duties to prevent, eliminate or minimise any biosecurity risk they may pose, specific duties for these species are: 'Prohibition of dealings' and 'Must not be imported into the State or sold'. 10. Pruning of mature trees is to be in accordance with Part 5 of Australian Standard 4373-2007 Pruning of amenity trees. 11. Erosion and sediment controls will be implemented in accordance with <i>Managing Urban Stormwater, Soils and Construction</i> (the Blue Book) (Landcom, 2004) and will be maintained to prevent sediment moving off-site and sediment laden water entering any water course or adjacent vegetation (i.e. Swamp Sclerophyll community) during the construction process. This includes providing adequate erosion and sediment controls at the stockpile site west of Hogbin Drive



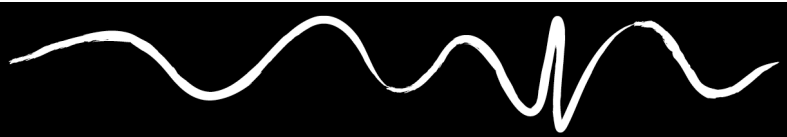
Environmental Attribute	Safeguards/ Mitigation Measures
	<p>12. Environmental safeguards will be communicated to all construction personnel as part of an Environmental Site Induction and repeated where appropriate at Toolbox Sessions prior to commencement of relevant work components.</p> <p>13. Six replacement trees are required as part of the site re-instatement works. The replacement tree species shall be three <i>Casuarina glauca</i> (swamp oak) and three x <i>Melaleuca quinquenervia</i> (borad leaved paperbark).</p>
<p>Aboriginal Heritage</p>	<p>14. All personnel working on site will be inducted and receive information on the required process, should a potential Aboriginal object be found.</p> <p>15. An unexpected finds procedure should be developed as part of the Construction Environmental Management Plan (CEMP) for the Activity. The unexpected finds procedure should outline that if it is suspected that Aboriginal objects have been uncovered as a result of road upgrade works:</p> <ol style="list-style-type: none"> a. Work in the surrounding area is to stop immediately and records are made of the finds via project incident reporting procedures. b. A temporary fence is to be erected around the site and appropriate controls put in place to ensure that no additional ground disturbance happens in the vicinity of the find. c. An appropriately qualified archaeological consultant and a representative of the Coffs Harbour LALC are to be engaged to identify the material and provide an initial assessment of the significance of the object and the likely nature and extent of any associated archaeological sites. d. If the material is found to be of Aboriginal origin, the find must be reported on the AHIMS database. e. In the event that the Aboriginal objects are considered to have been damaged or disturbed, the incident must be reported through the EPA Environment Line (131 555). f. Works may only recommence after advice from Heritage NSW on the requirement for an AHIP or where design, engineer or construction measures are identified to mitigate further damage to the Aboriginal site. <p>16. If human remains are located within the road reserve or ancillary work area:</p> <ol style="list-style-type: none"> a. All works must halt in the immediate area to prevent any further impacts to the remains. b. The site must be cordoned off and the remains themselves must be left untouched. c. The nearest police station (Coffs Harbour), Coffs Harbour LALC and Heritage NSW (Parramatta) are all to be notified as soon as possible. d. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and Heritage NSW should be consulted as to how the remains should be dealt with. e. Work may only resume after agreement is reached between all parties, provided it is in accordance with all parties' statutory obligations.
<p>Non-Aboriginal Heritage</p>	<p>17. If any suspected archaeological items are uncovered during works associated with the Activity, all works will cease in the vicinity of the material/ find. Contact with the City and Heritage NSW will be made immediately. Works will not recommence until clearance is given.</p>
<p>Bushfire</p>	<p>18. Emergency Management Procedures are to be included as part of the Construction Management Plan developed for this Activity. The Emergency Management Procedures should include emergency management measures of the site during potential bushfire events and include the safe and efficient passage of emergency vehicles through the work area during construction works.</p> <p>19. Works that are likely to cause a fire, such as general purpose hot works (welding, grinding or gas cutting), or any activity that is likely to produce a</p>



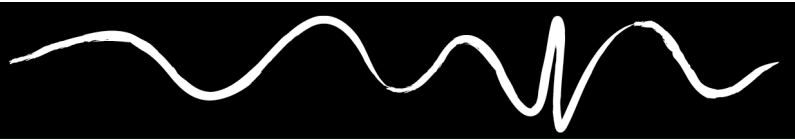
Environmental Attribute	Safeguards/ Mitigation Measures
	<p>spark or flame are not to be carried on days with an elevated fire danger or a total fire ban in effect.</p> <p>20. A fire extinguisher will be available on machinery for quick response if ignition occurs. All personnel will be made aware of the location of the extinguisher and trained in its effective deployment.</p> <p>21. The contractor/ site manager is to maintain awareness of bushfire emergency information, in particular during a bushfire danger period, and be aware of all current bushfire alerts in the wider vicinity of the Activity site.</p>
<p>Soils and Water</p>	<p>22. A preliminary site investigation (PSI) is to be completed prior to the commencement of works to determine the potential presence of soil contamination. The PSI should be completed in accordance with the requirements of the:</p> <ol style="list-style-type: none"> a. National Environment Protection (Assessment of Site Contamination) Measure (NEPM); b. NSW Contaminated Land Guidelines: Sampling design part 1 – application; c. NSW Contaminated Land Guidelines: Sampling design part 2 – interpretation; and d. NSW EPA Contaminated Land Guidelines: Consultants Reporting on Contaminated Land. <p>23. If any soils assessment indicates the presence of ASS or works are anticipated to be below 1 m of the natural surface ground level, then a ASSMP will be required to be developed prior to the commencement of work.</p> <p>24. A site-specific erosion and sediment control plan will be developed by a suitably qualified professional, approved by Council, and implemented prior to commencement of the road construction works.</p> <p>25. Erosion and sediment controls will be implemented in accordance with <i>Managing Urban Stormwater, Soils and Construction</i> (the Blue Book) (Landcom, 2004) and will be maintained to prevent sediment moving off-site and sediment laden water entering any water course during the construction process.</p> <p>26. Works will only commence once all erosion and sediment controls have been established. The controls will be maintained in place until the works are complete, and all exposed erodible materials are stabilised.</p> <p>27. Where possible, avoid works during forecast high rainfall events and plan works to occur during periods of no or low flow.</p> <p>28. Disturbed areas will be progressively stabilised and or rehabilitated following construction.</p> <p>29. Permanent rehabilitation will achieve a C-factor of less than 0.1 (i.e., greater than 60% ground cover) and set in motion a program that should ensure it will drop permanently to less than 0.05 (i.e., greater than 70% ground cover) within a further 60 days.</p> <p>30. A flood risk and response management plan, or emergency event contingency plan, should be developed as part of the CEMP for this Activity.</p> <p>31. All machinery, equipment, vehicles, materials and chemicals must be stored outside of flood prone areas.</p> <p>32. Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) within construction site and adjacent area will be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls during construction.</p> <p>33. No waste and/ or wastewater will be discharged directly or indirectly in waterways or drainage lines.</p> <p>34. Cleaning or washing will not occur near waterways or drainage lines.</p> <p>35. A concrete washout area and facilities will be located away from waterways and drainage lines and wash down water is to be contained within a designated impervious bund. Excess concrete is to be removed from site.</p> <p>36. The storage of hazardous materials and refuelling/ maintenance of construction plant and equipment shall be undertaken at least 50 m from</p>



Environmental Attribute	Safeguards/ Mitigation Measures
	<p>drainage lines and waterways and in clearly marked designated areas that are designed to contain spills and leaks.</p> <p>37. A spill containment kit will be available during the works. All personnel will be made aware of the location of the kit and trained in its effective deployment.</p> <p>38. An excavated material management procedure should be developed by a suitably qualified professional and implemented during construction works to ensure all excavated material is suitably handled, stored and disposed during construction works. This procedure should include safety aspects for handling potentially contaminated materials.</p> <p>39. All excavated material will be placed in a designated stockpile area that is suitably contained to ensure materials can be tested prior to re-use or off-site disposal.</p> <p>40. Any testing of excavated material should be carried out in accordance with the NSW excavated natural material order and/ or the NSW Waste Classification guidelines. Due to the potential presence of ASS, all testing should include relevant ASS assessment procedures.</p> <p>41. Only clean equipment and vehicles will be used, with equipment being cleaned down before being brought to the site.</p> <p>42. The City and 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).</p>
<p>Noise and Vibration</p>	<p>43. Construction activities will be undertaken in within standard construction hours:</p> <ul style="list-style-type: none"> - Monday to Friday 7:00 am to 6:00 pm. - Saturday 8:00 am to 1:00 pm. - No work on Sundays or public holidays. <p>44. Where practicable, noise control should occur at the source and modifications to noise control should be investigated and implemented, such as sourcing low noise power tools or hydraulic or electrically controlled equipment instead of petrol or pneumatic equipment.</p> <p>45. The most appropriately sized tool for the respective job will be used, keeping in mind that the smaller the tool, the less potential noise generated.</p> <p>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.</p>
<p>Traffic, Access and Parking</p>	<p>47. All works would be undertaken under an approved Traffic Management Plan and Traffic Guidance Scheme.</p> <p>48. Regard to public safety would be maintained at all times.</p> <p>49. Advanced warning signage would be established at appropriate and strategic locations, prior to and during the work to ensure road users and pedestrians are made aware of changed traffic/ access conditions.</p> <p>50. Sufficient and appropriate notification will be provided to the affected road users and local bus operators.</p> <p>51. All surrounding roads damaged as a result of the works will be repaired to an acceptable condition following completion of construction works.</p> <p>52. Road furniture will be installed and/ or upgraded with reference to the 60 km/h design speed of the roundabout.</p> <p>53. Maintain cycleway access throughout the duration of the project. Provide a temporary access if the existing access is not sufficiently clear of the construction works.</p>
<p>Air Quality</p>	<p>54. Vegetation or other materials will not be burnt on-site.</p> <p>55. Wherever reasonable and practicable, the grubbing and removal of any ground cover will not occur until immediately prior to earthworks occurring within that stage of works.</p>

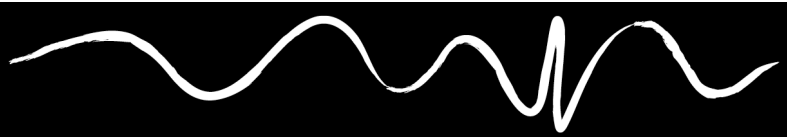


Environmental Attribute	Safeguards/ Mitigation Measures
	<p>56. Construction works will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.</p> <p>57. Dust suppression techniques would be utilised to minimise the potential for dust generation/ dispersal during works, as required.</p> <p>58. Vehicles transporting waste or other materials that may produce dust will be covered during transportation.</p> <p>59. Vehicles, machinery, and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the PoEO Act and associated regulation.</p>
Waste	<p>60. A Construction Environmental Management Plan should be developed and implemented to ensure that waste materials are adequately managed and handled throughout the construction process.</p> <p>61. Resource management hierarchy principles are to be followed:</p> <ul style="list-style-type: none"> - Avoid unnecessary resource consumption as a priority. - Avoidance is followed by resource recovery (including re-use of materials, reprocessing, recycling, and energy recovery). - Disposal is undertaken as a last resort. <p>62. Any contaminated waste generated would be disposed of in accordance with the EPA approved methods of waste disposal.</p> <p>63. Appropriately sized waste receptacles (bins) will be utilised on site.</p> <p>64. Waste storage facilities and spoil placement areas shall be located in easily accessible locations, away from existing drainage lines and have appropriate secondary containment systems and drainage controls.</p> <p>65. Lids and seals shall be maintained on all odour generating waste material; and all domestic and food scrap waste shall be secured to prevent wildlife access.</p> <p>66. If necessary, waste will be disposed of at a licensed waste or recycling facility.</p> <p>67. If excavated material is to be moved off site and not reused in road construction related activities within the road corridor, additional testing would be undertaken to demonstrate compliance with the <i>Excavated Natural Material Order 2014</i> or Waste Classification Guidelines.</p>
Visual	<p>68. Vegetation clearing would only occur where absolutely necessary for the completion of the Activity.</p> <p>69. Working areas will be maintained, kept free of rubbish, and cleaned up at the end of each day.</p> <p>70. All vehicles carrying waste would be covered sufficiently so as to prevent the waste from entering the road reserve.</p> <p>71. Upon completion of the works, any works areas would be restored to an acceptable visual state.</p>
Socio-economic	<p>72. If required, any land acquisition would be undertaken in accordance with the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>.</p> <p>73. Contractors/ workers will be mindful of the needs of the adjacent residents.</p> <p>74. 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.</p> <p>75. In accordance with the <i>Work Health and Safety Act 2011</i>, workers will be provided with appropriate safety clothing and equipment. Supervisory staff and any visitors to the work area will also be required to wear protective clothing. Works personnel will be provided with or expected to have protective equipment and appropriate construction training.</p>
Climate Change	<p>76. Vehicles and equipment will be switched off when not required for direct construction activities.</p>



6.2 Licensing and Other Approvals

Other licensing and approvals may be required depending on the final construction methodology for the proposed Activity, for example: should more than 1,000 t of excavated material be anticipated to be stored on site (that is not anticipated for direct re-use in the corridor) then the Activity would require an Environmental Protection Licence prior to commencing stockpile of excavated materials on site.



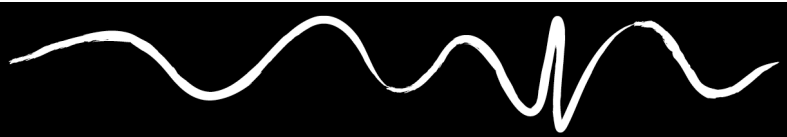
7. Summary of Consideration of Environmental Factors

7.1 Environmental Factors to be Considered

As part of its obligation under Section 5.5 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. This REF has considered the relevant assessment considerations in the Division 5.1 Guidelines approved under Section 170, and as per Section 171(1), of the EP&A Regulation, as provided below. **Table 7.1** provides a summary of the key issues relevant to each factor and a summarised assessment.

Table 7.1 Environmental Factors for Consideration as per the Division 5.1 Guidelines

	Factor	Impact
a	Any environmental impact on a community	
	The community would not be affected by declines in the local environment as a result of the Activity. Mitigation measures have been designed to reduce environmental impacts on the community to negligible levels.	Nil to Negligible
b	Any transformation of a locality	
	The Activity will result in a very minor change to the locality.	Minor
c	Any environmental impact on the ecosystems of a locality	
	No vegetation of significance will be removed to allow for the Activity. The impact of that vegetation removal is discussed in this REF. Extensive mitigation measures have been designed to reduce environmental impacts.	Minor
d	Any reduction of the aesthetic, recreational, scientific, or other environmental quality or value of a locality	
	Although the aesthetic quality will be different, it is expected that the reduction in aesthetic quality of the locality will be negligible. No reduction in the quality of the environment will occur due to the mitigation measures detailed in this REF. No significant changes to the locality will occur.	Negligible
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 Activity will not impact 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.	Nil to Negligible
f	Any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation Act 2016)	
	With effective implementation of the mitigation measures provided in this REF, the Activity is not considered likely to have a significant negative impact on the habitat of any other protected fauna.	Nil to Negligible
g	Any endangering of any species of animal, plant, or other form of life, whether living on land, in water or in the air	
	With effective implementation of the mitigation measures provided in this REF, the Activity is not considered likely to significantly endanger any species of animal, plant, or other form of life.	Nil to Negligible



Factor		Impact
h	Any long-term effects on the environment	
	No negative long-term impacts will occur in the locality given the implementation of the proposed mitigation measures in this REF.	Nil to Negligible
i	Any degradation of the quality of the environment	
	Degradation of the quality of the environment is not expected. With the mitigation measures in this REF, any impacts are unlikely to be substantial.	Negligible
j	Any risk to the safety of the environment	
	No negative long-term impacts will occur in the locality given the implementation of the mitigation measures in this REF.	Nil to Negligible
k	Any reduction in the range of beneficial uses of the environment	
	The Activity will not result in any reduction in the range of beneficial uses of the environment.	Nil
l	Any pollution of the environment	
	The Activity has minor potential to affect water quality during the works. The mitigation measures will minimise the duration and impact. Given the proposed safeguards and mitigation measures detailed in this REF and all waste being disposed within an appropriate/ approved waste disposal facility, pollution to the environment will be minimised.	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 EPA approved methods of waste disposal. Mitigation measures detailed in this REF would protect the environment from problems associated with waste disposal.	Nil to Negligible
n	Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	
	The Activity 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.	Negligible
o	Any cumulative environmental effect with other existing or likely future activities	
	The Activity would have nil to negligible cumulative impacts (e.g., resource consumption; greenhouse gas emissions; vegetation loss) but is unlikely to significantly contribute to any cumulative impacts.	Nil to Negligible
p	Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	
	The Activity could contribute to cumulative impacts to a negligible extent (e.g., greenhouse gas emissions, consumption of resources) contributing to climate change and associated impacts, however there would be no direct impact on coastal process or hazards.	Nil to Negligible
q	Any applicable local strategic planning statement, regional strategic plan or district strategic plan made under Division 3.1 of the Act	
	Not applicable	Nil
r	Any other relevant environmental factors	
	Nil	Nil



7.2 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth Legislation)

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

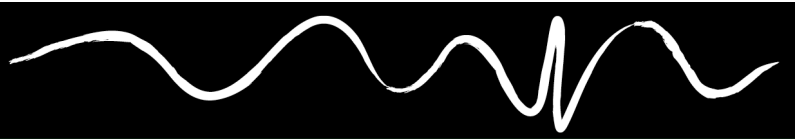
- World Heritage.
- National heritage places.
- Wetlands of international importance.
- Nationally threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in 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'.

A database search was completed on 8 May 2024 encompassing a 10 km radius search area from the centre of the proposed Activity (refer to **Appendix G**). Search results following the site assessment are considered in **Table 7.2**.

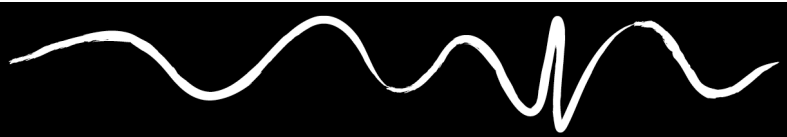
Table 7.2 EPBC Act Considerations

Matter	Impact
Any impact on a World Heritage property?	
No World Heritage properties occur at or proximal to the site.	Nil
Any impact on a National Heritage place?	
No World Heritage properties occur at or proximal to the site.	Nil
Any impact on a wetland of international importance?	
No wetlands of international importance (Ramsar Sites) were identified in the database search. No will be impacted.	Nil
Any impact on nationally threatened species and ecological communities?	
Habitat for seven TECs, 112 threatened species and 64 migratory species were listed within the 10 km search area. No Commonwealth listed threatened flora, fauna or TECs are likely to be significantly affected by the Activity (refer to biodiversity assessment at Section 5.1) and mitigation measures have been provided to minimise any potential impacts. No marine habitat would be impacted.	Negligible
Any impact on a Nationally Important Wetland?	
No nationally important wetlands occur at or near the site. Nationally Important Wetlands are not likely to be affected by the Activity.	Nil
Any impact on Migratory species?	
Based on the minor nature of the works, no listed migratory species are likely to be significantly affected by the Activity (refer to Section 5.1).	Nil to Negligible
Any impact on a Commonwealth marine area?	
No Commonwealth marine areas occur at or near the site.	Nil
Any impact on the Great Barrier Reef Marine Park?	
The Great Barrier Reef Marine Park is distant from the site.	Nil



Matter	Impact
Does the Proposal involve a nuclear action (including uranium mining)?	
The Activity does not involve a nuclear action.	Nil
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	
The Activity does not involve any impact on a water resource, in relation to coal seam gas development and large mining development.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land?	
The Activity is not expected to impact upon such land.	Nil

The assessment of the impact of the Activity on MNES and the environment of Commonwealth land has found that there is unlikely to be significant impact on relevant MNES. Accordingly, the Activity does not require referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW)



8. Conclusion and Certification

The Activity involves construction of a new roundabout at the Hogbin Drive and De Havilland Way intersection.

The Activity is permitted without development consent and subject to assessment under Part 5 (Division 5.1) of the EP&A Act. This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed Activity. The Activity would result in some impacts; however, these are not likely to be significant and can be effectively managed/ameliorated through the implementation of the safeguards and mitigation measures recommended in this REF.

The Activity described will not affect areas of outstanding biodiversity value or Wilderness Areas. The Activity is unlikely to significantly affect threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement (or Biodiversity Development Assessment Report (BDAR) if the Proponent elected) is not required. The Activity is also unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance in relation to the EPBC Act.

I certify to the best of my knowledge that:

- This REF provides a true and fair review of the Activity in relation to its potential effects on the environment, and
- the assessment satisfies the requirements of Sections 5.5 to 5.7 of the EP&A Act, the EP&A Regulation 2021, including Section 171 and the *Guidelines for Division 5.1 Assessments* approved under Section 170 of the EP&A Regulation, and other relevant legislation and guidelines, and
- The assessment has been adequately completed, and
- Subject to the inclusion of the safeguards/ measures included in this REF, it is reasonable to conclude that the project will not likely have a significant impact on the environment during both the construction and operation phases, and
- Given the impacts of the Activity are not likely to be significant, an Environmental Impact Statement is not required under Section 5.7 of the EP&A Act, and
- A Species Impact Statement or BDAR is not required, and
- The Activity does not warrant/ require referral to the Australian Department of Climate Change, Energy, the Environment and Water under the EPBC Act, and
- The Activity is not State Significant Infrastructure and does not require approval under Division 5.2 of the EP&A Act.

REF Prepared by

Signature:

Name:

Lauren Buchanan

Position:

Senior Environmental Scientist

REF Reviewed by

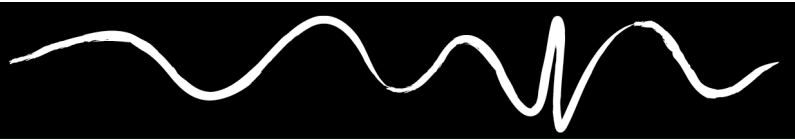
Signature:

Name:

Jacob Sickinger

Position:

Senior Environmental Planner



9. Determining Authority Sign Off

Determining Officer (Public Authority) who Approves this REF

I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under section 170 of the EP&A Regulation, and the information it contains is neither false nor misleading. Based on the completed REF and my knowledge of the project, the assessment has been adequately completed, the project has predictable impacts which would not be significant, the conclusion as to the likely environmental impact of the project is reasonable, and the project can proceed subject to the relevant measures and conditions in this REF, any approval, license or permit.

The project requires additional environmental assessment.



Reasons:

Enter Reasons.

The project should not proceed in its current form.

Reasons:

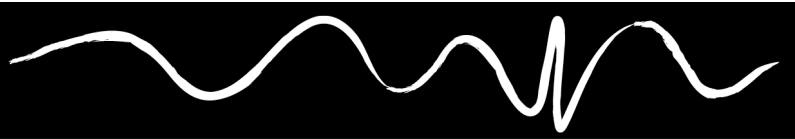
NOTE: A site visit may be required depending on the level of confidence and risk to the environment.

Reviewed by:			
Signature		Date:	22/07/2024
Name	Daniel Stewart		
Position	Section Lead Asset Services		
Determining Authority Name	The City of Coffs Harbour		
Determined By:	Andrew Beswick 	Date:	24/07/2024
Signature		Date:	



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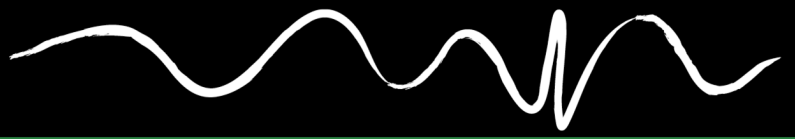
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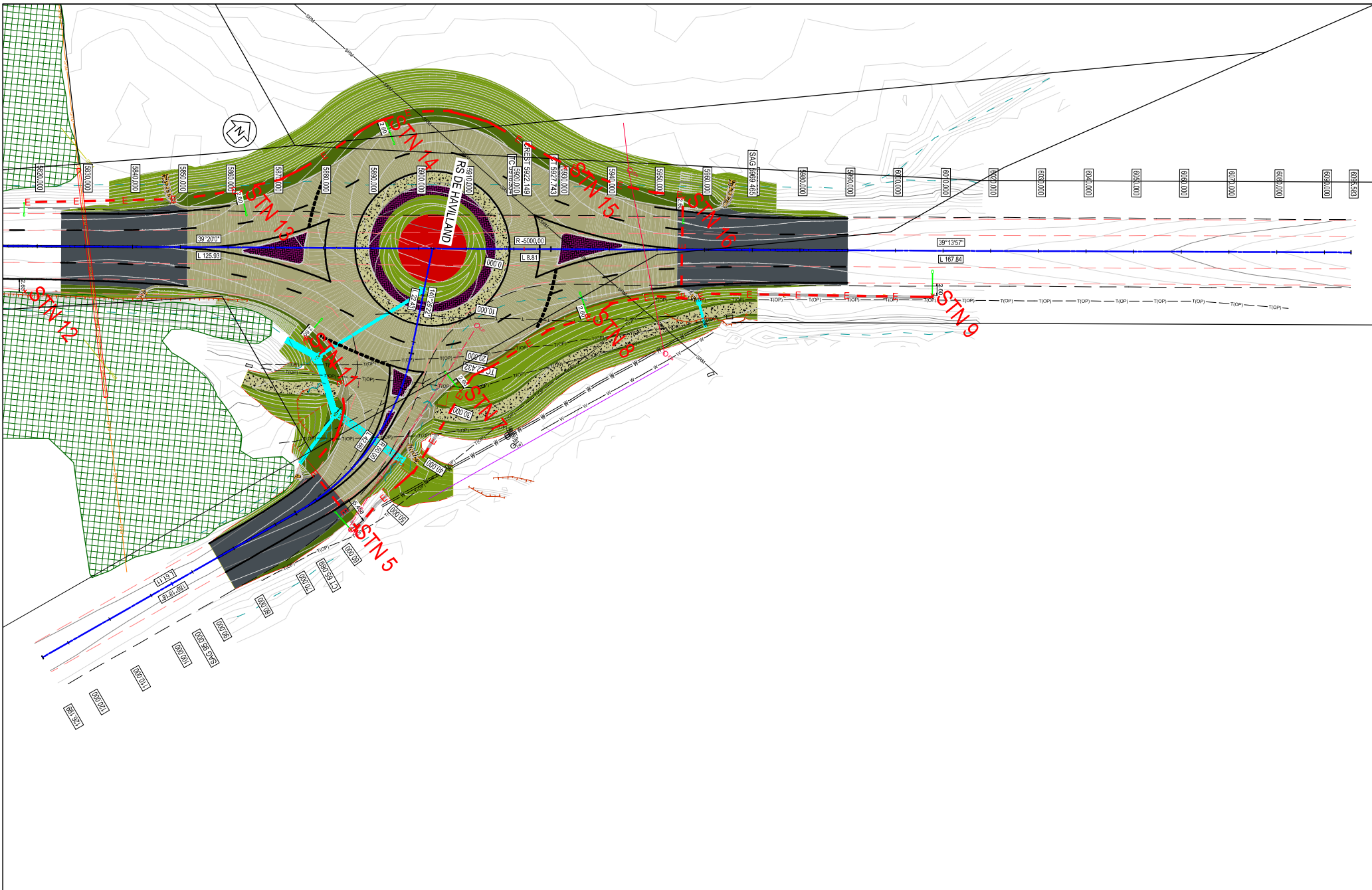
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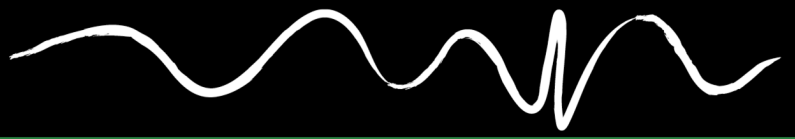
Appendix A

Design Drawings



City of Coffs Harbour - 2210906 Hogbin De Havilland Roundabout
 Electrical Design Light Poles and Trench locations. Contour Int 0.1m. Size A1. Coords MGA2020, AHD71

12d Model
 Scale 1:350



Appendix B

TISEPP SES Response

Our Ref: ID2460
Your Ref: 4908-1004

31 May 2024

Lauren Buchanan
GeoLINK
PO Box 1446
Coffs Harbour NSW 2450

email: lbuchanan@geolink.net.au
CC: elena.palamara1@ses.nsw.gov.au

Via email

Dear Lauren,

Notification under section 2.13 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 in relation to the proposed Hogbin Drive Intersection Upgrade

Thank you for the notification under section 2.13 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* in relation to the proposed construction of a new roundabout at the intersection of Hogbin Drive and DeHavilland Way, Coffs Harbour. It is understood that the proposed works include:

- road construction works for a new roundabout on Hogbin Drive and DeHavilland Way intersection;
- road closure for the duration of the works and suitable traffic control established along DeHavilland Way (between Christmas Bells Road and Hogbin Drive) to facilitate traffic flow during construction
- traffic control on Hogbin Drive;
- establishment of ancillary facilities; and
- implementation of environmental controls and vegetation removal.

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami in NSW. This role includes, planning for, responding to and coordinating the initial recovery from floods. As such, the NSW SES has an interest in the public safety aspects of the development of flood prone land, particularly the potential for changes to land use to either exacerbate existing flood risk or create new flood risk for communities in NSW.

We have reviewed the proposed upgrade and the flood risk information available to the NSW SES (e.g. Coffs Harbour Local Flood Plan 2023, Newport Creek Hydraulic Model Update 2020 etc.). The site is in the Newport Creek catchment which is affected by flash flooding and

heavily influenced by tidal fluctuations¹. Newports Creek has a history of flooding major infrastructure², consequently an effective response to flash flood will need to start before heavy rain has commenced. In addition to creek and riverine flooding, raised sea levels as a result of storm surge conditions could cause flooding of low-lying areas along the coast and impede drainage from the creeks³.

The site is a low flood island meaning that the area becomes isolated by floodwater as all access/egress routes are cut and as the water rises the site then becomes inundated by floodwaters. The site is also in a tsunami evacuation zone. The area around the site first becomes inundated during a 20% AEP flood along the length of Christmas Bells Road and DeHavilland Way, and Hogbin Drive to the southwest⁴. In this scenario, the site maintains rising road access along Hogbin Drive to the northeast. This access/egress route remains open during larger floods until the PMF when Hogbin Drive becomes overtopped in all directions around the site.

We note that whilst Coffs Council has a detailed flash flood warning system, the warning gauge that relates to this area (Industrial Drive – Newports Creek) is currently offline and has been for a period of weeks. We understand this is being investigated by Council.

Based on this review, we provide the following advice:

- **Consider** the impact of flooding on the infrastructure and people using the road up to and including the Probable Maximum Flood (PMF), along with the impact of climate change on the flood risks.
- **Pursue**, if relevant, site design and stormwater management that reduces the impact of flooding and minimises any risk to the community. Any improvements to flood resilience that can be made to reduce flood risk will benefit the community.
- **Consider** undertaking a flood impact risk assessment to determine the impact of the new infrastructure on existing roads and properties and particularly in relation to any fill.
- **Ensure** workers and people using the road during and after the upgrades are aware of the flood risk, for example through site inductions, by using signage and other flood information tools.
- **Carefully consider** the impacts of riverine, tidal and flash flooding as well as the potential for tsunami and storm surge in your emergency management planning for workers and the ability to quickly and safely evacuate them from the site.
- **Consider** closing the worksite and securing all materials and equipment prior to the start of the working day if there is a risk of riverine flooding, on receipt of advice from the Bureau of Meteorology (BoM), or when other evidence leads to an expectation of flooding.

¹ NSW SES, Coffs Harbour Local Flood Plan 2023, Volume 2 p.19

² Ibid p24

³ Ibid p.19

⁴ Newports Creek Hydraulic Model Update 2020

During site works, check the BoM website prior to start of the workday for any Flood Warnings.

- **Include** the management of residual flood impacts during construction in your traffic control plan. The plan should address:
 - challenges in relation to evacuation during flood via a road impacted by roadworks;
 - how any temporary traffic controls will affect the flow of traffic, including emergency vehicles, during a weather event.
 - how any temporary traffic controls will affect the ability of the community to evacuate during a weather event, including the NSW Rural Fire Service' Fire Control Centre at Aviation Drive.

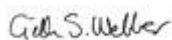
To provide additional support in doing the above, we direct you to the online resources which are available to the community on the www.ses.nsw.gov.au website which include helpful pages such as:

- [Know Your Risk | NSW State Emergency Service](#) (enter your town or postcode).
- [Local Plans and Guides](#)
- [Flood Storm and Tsunami Plans](#) which includes locally endorsed NSW SES Flood Emergency Sub Plans
- [Emergency Business Continuity Plan](#) online tool which steps you through the process of developing your own Business Emergency Plan.

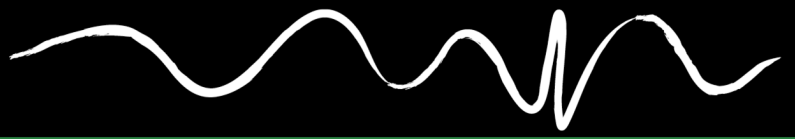
In addition, if the construction phase of the upgrades causes disruption to the operation of local roads, this may impact the ability for emergency vehicles to use these routes. **The NSW SES requests that notification be provided where there are likely to be significant delays in the operation of the roads affected by the works as road closures along Hogbin Drive will materially affect our operational triggers for evacuation and response.**

Please feel free to contact Suede Stanton-Drudy via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely,



Gillian Webber
Coordinator Emergency Risk Assessment - Regional
NSW State Emergency Service



Appendix C

AHIMS Search



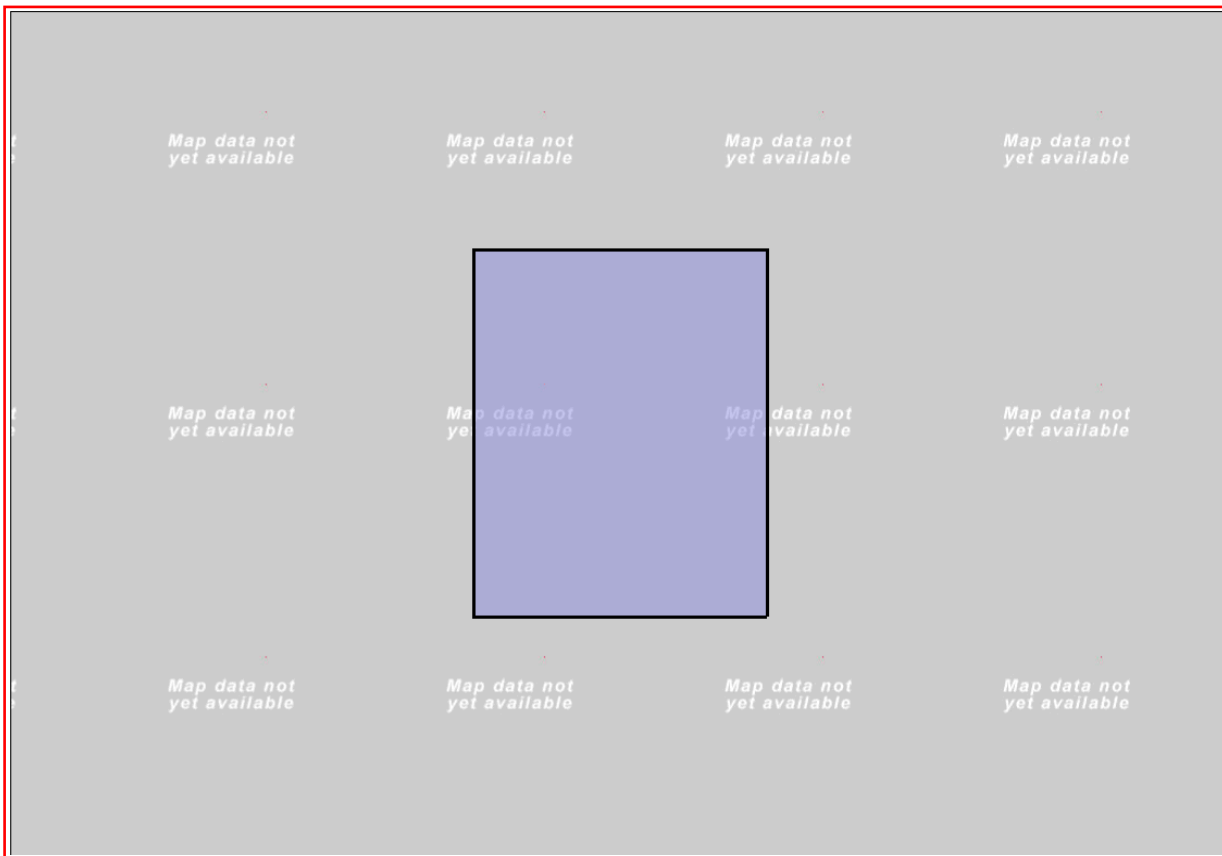
GeoLINK Consulting Pty Ltd
PO Box 1446
Coffs Harbour New South Wales 2450
Attention: Kim Fuller
Email: kfuller@geolink.net.au

Date: 12 March 2024

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -30.308341, 153.120354 - Lat, Long To : -30.307941, 153.120717, conducted by Kim Fuller on 12 March 2024.

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 Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	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 \(https://www.legislation.nsw.gov.au/gazette\)](https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW 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 to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW 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.



You are here: [Environment home](#) » [Heritage](#) » [Australian Heritage Database](#)

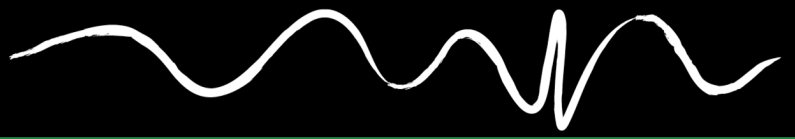
Search Results

[new search](#) [edit search](#)

10 results found.

Coffs Harbour Jetty Jordan Esp	Coffs Harbour, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Coramba Nature Reserve	Grafton Rd, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Kororo Nature Reserve Pacific Hwy	Kororo, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Manta Arch - South Solitary Island Grey Nurse Shark Habitat	Woolgoolga, NSW, Australia	(Place rejected for Emergency Listing) National Heritage List
Moonee Beach Nature Reserve Pacific Hwy	Moonee Beach, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Mutton Bird Island Nature Reserve Jordan Esp	Coffs Harbour, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Orara Ornithological Area Bruxner Park Rd	Coffs Harbour, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Solitary Islands Marine Area	Wooli, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
South Solitary Island Lighthouse Group	Moonee Beach, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Split Solitary Island Nature Reserve	Moonee Beach, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Report Produced: Thu May 30 14:06:18 2024



Appendix D

Geotechnical Report

City of Coffs Harbour

Geotechnical Assessment

Proposed Roundabout

Intersection of Hogbin Drive & De Haviland Way, Coffs Harbour

Report No. RGS34081.1-AB

23 May 2024



**REGIONAL
GEOTECHNICAL
SOLUTIONS**

RGS34081.1-AB

23 May 2024

City of Coffs Harbour
C/o: AS Engineering
Unit 1, 3 Ted Owens Drive
COFFS HARBOUR NSW 2450

Attention: Ben Pearce

Dear Ben

**RE: Proposed Roundabout
Intersection of Hogbin Drive & De Haviland Way, Coffs Harbour
Geotechnical Assessment**

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical assessment for a roundabout that is proposed at the intersection between Hogbin Drive and De Haviland Way, Coffs Harbour.

Presented herein are comments and recommendations regarding pavement thickness design and construction.

If you have any questions regarding this project, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by



Simon Keen

Associate Geotechnical Engineer

Reviewed by



Steve Morton

Principal Geotechnical Engineer



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Figure 1 Test Location Plan

Appendices

Appendix A Results of Field Investigations
Appendix B Laboratory Test Result Sheets
Appendix C Pavement Thickness Design Sheets



1 INTRODUCTION

Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical assessment for a roundabout that is to be constructed at the intersection of Hogbin Drive and De Haviland Way, Coffs Harbour.

A rigid (i.e. concrete) roundabout is proposed, with either deep lift asphalt, granular or bound pavements for the roundabout approaches. The roundabout surface is to range from near the existing pavement surface level, to up to 200mm above existing pavement level. On the western side of Hogbin Drive where widening is required for the roundabout, the finished pavement level is to be up to about 1.2m above existing surface level.

The purpose of the geotechnical assessment is to provide comments and recommendations on the following:

- Existing pavement thickness and composition;
- Subgrade conditions, materials and strength;
- Constraints to the development from a geotechnical perspective;
- Pavement thickness designs for the roundabout and approaches; and
- Pavement construction and drainage.

RGS has been provided with the factual results from a previous investigation that was undertaken by Coastal Works in 2021. The results of the previous investigation have been reviewed as part of the current assessment.

2 METHODOLOGY

Field work for the assessment was undertaken by an Associate Geotechnical Engineer from RGS on 14 April 2024 and included the following:

- Observation of site features and surrounding features relevant to the geotechnical conditions of the site;
- Drilling of six boreholes (BH101 to BH106) to depths of up to 1.1m with a 450mm auger fitted to a small excavator;
- Dynamic Cone Penetrometer (DCP) testing within the boreholes to assist with assessing the subgrade strength as considered appropriate for the materials encountered; and
- Collection of samples for subsequent laboratory testing by a NATA accredited laboratory. The following tests were undertaken:
 - Subgrade Samples:
 - One 4 day soaked CBR test;
 - One particle size distribution test and Atterberg limits test;
 - Existing pavement materials:
 - Four 4 day soaked CBR tests;
 - Three particle size distribution tests; and
 - Five Atterberg Limits tests.



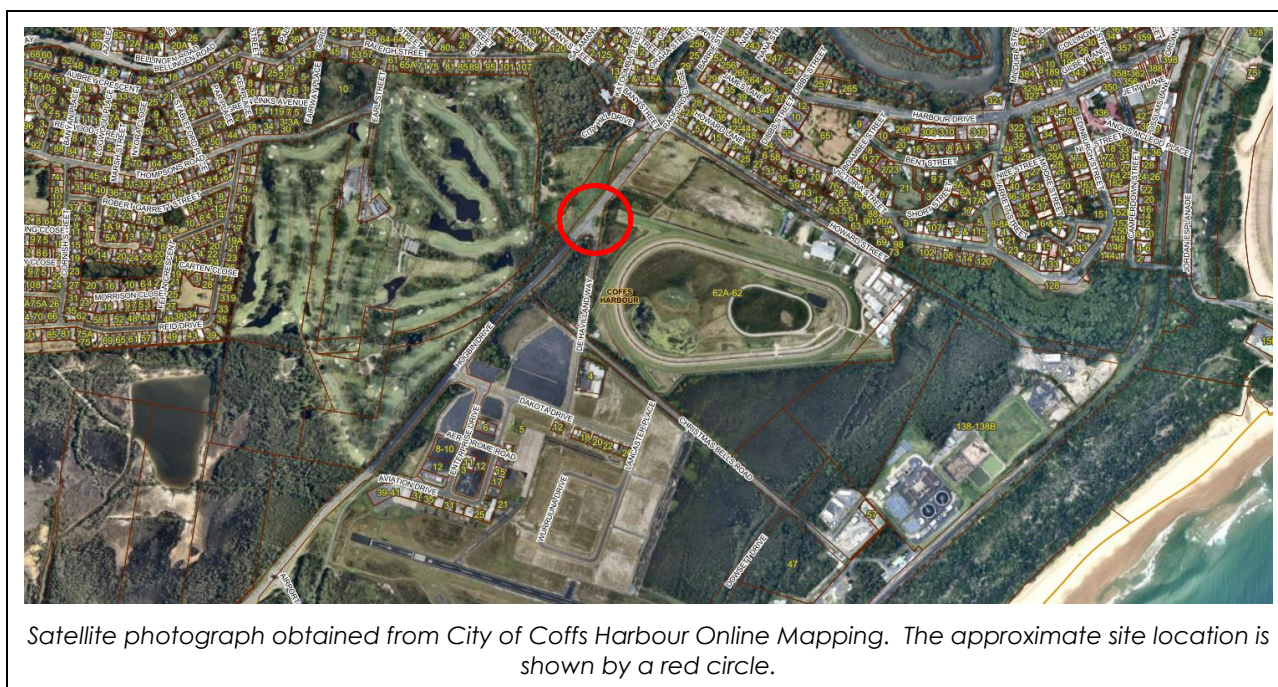
Engineering logs of the boreholes are presented in Appendix A. Test locations are shown on Figure 1 and were obtained with a hand held GPS. GPS coordinates are shown on the borehole logs.

3 SITE CONDITIONS

3.1 Surface Conditions

The site is situated within a region characterised by low lying coastal plains and is bound by a paperbark forest to the southwest and southeast, grassland to the west, and by Coffs Harbour Racing Club to the east.

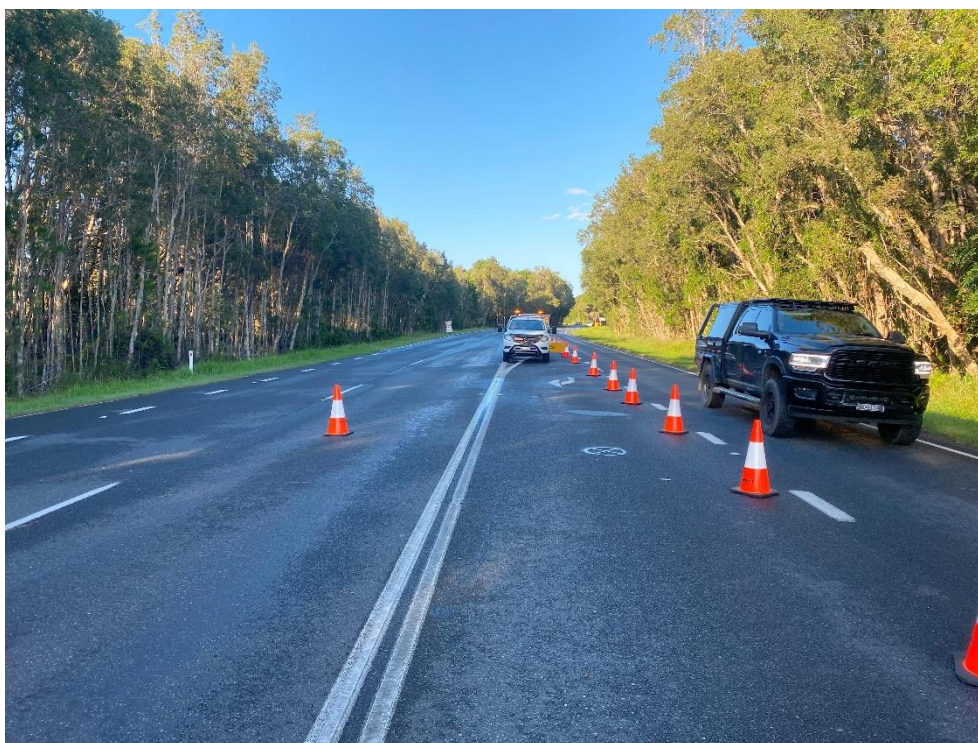
A satellite photograph that shows the location of the site and the site setting is reproduced below.



A summary of the existing pavement and site conditions is presented below:

- Water was ponding within the grassed area to the west of Hogbin Drive on the day of the site investigation;
- The pavements are elevated above the surrounding low lying ground by up to about 1.2m. Offroad drainage is fair;
- Hogbin Drive is a four lane road that is sealed with an ageing asphalt wearing course. Crocodile cracking and minor rutting is present within wheel paths in both directions in some areas. The wearing course is in fair to poor condition and there is some loss of aggregate around the asphalt joints. Minor shoving is present in the outside wheel path of the outside southbound lane near the intersection with De Haviland Way; and
- De Haviland Way is a two lane road that has an asphalt seal that is in fair condition. Crocodile cracking is present around a stormwater crossing.

Photographs from the site investigation are presented below.



Looking south at the southern approach to the proposed roundabout. The Hogbin Drive pavement is in fair condition.



Looking east across Hogbin Drive at the existing intersection with De Haviland Way. Crocodile cracking and minor rutting is present within the wheel paths within Hogbin Drive.



Looking southeast towards the existing intersection from the west of Hogbin Drive where widening is proposed for the roundabout and BH103 was drilled. Surface water was present on the day of the site investigation. To the west of Hogbin Drive, i.e. the grassed area, the site is underlain by marine clay.



Looking south along Hogbin Drive at the existing intersection. Crocodile cracking and minor rutting is present within the wheelpaths of the southbound slow lane.



Looking west along De Haviland Way towards Hogbin Drive. The pavement level at the intersection is about 1m above surrounding surface levels.



BH101 was typical of the materials encountered within the investigation and comprised a 40mm asphalt wearing course, over two pavement layers, over marine sand.



3.2 Subsurface Conditions

The NSW Government 'MinView' Geological Survey of NSW indicates that the site is underlain by Coastal backbarrier flat deposits that include fine to medium grained quartz lithic sand, indurated sand, silt, clay gravel, organic mud and peat. The materials encountered within the boreholes undertaken during the RGS investigation are summarised in Table 1. Further details are presented in Appendix A.

Table 1: Summary of Subsurface Materials

Material Name	Material Description	Depth to Base of Material Layer (m)					
		BH101	BH102	BH103	BH104	BH105	BH106
Wearing Course	Asphalt	0.04	0.03	--	0.04	0.04	0.04
Upper Pavement	GRAVEL, fine to coarse grained, with sand and low plasticity clay	0.2	0.2	--	0.2	0.2	0.25
Lower Pavement	Sandy Clayey GRAVEL, Gravelly CLAY and Clayey GRAVEL, fine to coarse grained, low plasticity, with cobbles in some locations to 100mm	0.4	0.7	--	≥ 0.7*	0.5	--
Fill	Gravelly SAND and Silty GRAVEL, fine to coarse grained	--	--	--	--	--	0.95
Topsoil	Silty SAND, fine to medium grained	--	--	0.3	--	--	--
Marine Clay	CLAY, low plasticity, firm	--	--	≥ 1.0	--	--	--
Marine Sand	SAND, fine to medium grained, medium dense	≥ 1.0	≥ 1.0	--	--	≥ 1.1	≥ 1.0

Note: ≥ Indicates that base of material layer was not encountered
 * indicates that the test was terminated due to practical auger refusal on cobbles
 -- Indicates that the material was not encountered at the test location

Groundwater inflows were encountered from the surface within BH103 which was drilled to the west of the existing Hogbin Drive pavement. Groundwater was not observed within the other boreholes drilled during the RGS investigation. Groundwater levels do fluctuate due to inclement weather, seasonal variations, tidal influences, or due to reasons that may not have been apparent at the time of the site investigation.

A summary of the laboratory test results is presented in Table 2. Laboratory test result sheets are presented in Appendix B.



Table 2: Summary of Laboratory Test Results

Sample Location	Sample Depth (m)	Material	Liquid Limit (%)	Plasticity Index (%)	OMC (%)	MDD (t/m ³)	CBR Swell (%)	CBR (%)
BH102	0.05 – 0.2	Upper Pavement	24	7	8.0	2.14	-0.5	45
BH104	0.05 – 0.15		23	8	--	--	--	--
BH106	0.05 – 0.15		25	10	10.5	2.14	-0.5	60
BH102	0.2 – 0.4	Lower Pavement	24	8	10.5	2.07	1.0	7
BH104	0.15 – 0.35		21	7	9.5	2.10	1.0	6
BH103	0.5 – 0.8	Marine Clay	34	21	18.0	1.67	1.5	2.5
BH105	0.5 – 1.1	Marine Sand	Not Obtainable	Non-Plastic	--	--	--	--

4 PAVEMENT THICKNESS DESIGN

4.1 Design Traffic

RGS has been provided with the following traffic data:

- Hogbin Drive:
 - Design life of 40 years;
 - AADT of 26,000;
 - 3% heavy vehicles with 2.2 heavy vehicle axle groups per heavy vehicle;
 - 1% annual growth rate;
- De Haviland Way:
 - Design life of 40 years;
 - AADT of 1,000;
 - 25% heavy vehicles with 2.43 heavy vehicle axle groups per heavy vehicle; and
 - 1% annual growth rate.

Based on the above and adopting the TfNSW urban presumptive TLD (ESA/HVAG ratio of 1.037), the design traffic values presented in Table 3 have been adopted for the assessment.

Table 3: Design Traffic for 40 Year Design Life

Road	Heavy Vehicle Axle Groups	Equivalent Standard Axles
Hogbin Drive & Roundabout	1.6 x 10 ⁷ HVAG	1.7 x 10 ⁷ ESA
De Haviland Way Approach	5.6 x 10 ⁶ HVAG	5.8 x 10 ⁶ ESA



4.2 Subgrade

The boreholes undertaken during the RGS investigation, and during the previous investigation, encountered a marine sand subgrade underlying the existing Hogbin Drive and De Haviland Way pavements.

To the west of the existing Hogbin Drive pavement where widening is required for the roundabout, marine clay was encountered both within the RGS investigation and the previous Coastal Works investigation. Laboratory testing indicates that the marine clay has a 4 day soaked CBR of 2.5% and a swell in the CBR mould of 1.5%. The marine clay is therefore considered to be moderately expansive.

Based on the results of the site investigations, the following design subgrade CBR values have been adopted:

- A design subgrade CBR of 8% for the marine sand subgrade that was encountered beneath the existing pavements; and
- To the west of the Hogbin Drive pavement, including the existing verge, the pavement is underlain by marine clay that has a CBR of 2.5%. The finished pavement level in this portion of the site is about 1m above existing levels (less on the verge batter). Providing at least 0.6m of granular fill (CBR>15, PI<15) is placed to achieve design subgrade level, a design subgrade CBR of 8% can be adopted.

4.3 Existing Pavement Materials

Observations during the site investigation and a review of the laboratory test results indicates that the existing upper and lower pavement materials do not meet the requirements for either DGB20, DGS20 or DGS40.

The upper pavement materials meet the requirements for select fill (CBR>15, PI<15), however, the lower pavement materials do not comply with the requirements for select material.

4.4 Pavement Thickness Design Options

The pavement thickness design options presented herein have been prepared in accordance with Austroads 'Guide to Pavement Technology Part 2: Pavement Structural Design' (2017) and in general accordance with the Coffs Harbour City Council 'Development Specification Design – 0042 Pavement' (2009).

4.4.1 Roundabout

It is recommended that the roundabout comprise a steel fibre reinforced concrete base, overlying a lean mix concrete subbase. The recommended design is presented on the Pavement Thickness Design Sheet in Appendix C and a summary is presented below. The design assumes:

- Project reliability of 90%;
- The pavement satisfies the 'with shoulders' criteria; and
- The design has been undertaken for the fatigue analysis, as joint erosion with a lean mix concrete subbase is unlikely to be the controlling factor in the pavement life.



Table 4: Summary of Roundabout Pavement Thickness Design

Pavement Layer	Material	Thickness
Base	Steel Fibre Reinforced Concrete Flexural Strength of 5.5MPa	180mm
Subbase	Lean Mix Concrete	150mm
Select	CBR>15, PI<15	≥ 600mm in widening area to west of existing Hogbin Drive Pavement.

4.4.2 Roundabout Approaches

The roundabout approach pavements are to have a finished level like the existing pavement level. Three pavement thickness design options are presented in Appendix C and are summarised below.

Table 5: Summary of Approach Pavement Thickness Design – Option 1 Deep Lift Asphalt

Pavement Layer	Material	Thickness	
		Hogbin Drive	De Haviland Way
Wearing Course	DG14 A15E	45mm	45mm
Base	DG20 AR450	300mm	255mm
Subbase	--	--	--
<i>Total Thickness</i>		<i>345mm</i>	<i>300mm</i>

Table 6: Summary of Approach Pavement Thickness Design – Option 2 Granular

Pavement Layer	Material	Thickness	
		Hogbin Drive	De Haviland Way
Wearing Course	DG14 A15E	45mm	45mm
Base	DGB20	200mm	160mm
Subbase	DGS40	150mm	155mm
<i>Total Thickness</i>		<i>395mm</i>	<i>360mm</i>

Table 7: Summary of Approach Pavement Thickness Design – Option 3 Lightly Bound

Pavement Layer	Material	Thickness	
		Hogbin Drive	De Haviland Way
Wearing Course	DG14 A15E	45mm	45mm
Base	DGB20 stabilised to achieve UCS 1 – 1.5MPa	175mm	150mm
Subbase	DGS40 stabilised to achieve UCS 1.5 – 2MPa	150mm	150mm
<i>Total Thickness</i>		<i>370mm</i>	<i>345mm</i>



4.5 Pavement Construction & Drainage

Construction should be undertaken in accordance with the following:

- In areas where widening is proposed, excavate to design subgrade level, and engage a geotechnical engineer to assess the exposed subgrade to determine the need for and extent of subgrade remediation measures. If marine clay is exposed, a minimum of 600mm of granular fill that comprises material with a CBR>15 and a PI<15 must be placed over the clay, which can include rock bridging layers. The western Hogbin Drive verge and shoulder may require excavation to ensure that the minimum 600mm of cover over the marine clay has been achieved;
- The marine clay to the west of the existing Hogbin Drive pavement is unlikely to pass a proof roll assessment. If the material fails proof roll, it is likely that a rock bridging layer will be required which would include at least 400mm of angular very high strength no fines rockfill with a maximum particle size of about 200mm, fully wrapped in a Class D geofabric and overlain by either 150mm of DGS40 or the existing upper pavement materials;
- Within the footprint of the proposed rigid pavement, mill the existing asphalt wearing course and excavate to design subgrade level. If design subgrade level is above the existing pavement level following milling, place DGS40 to design subgrade level in layers between 150mm and 200mm thick and compact to at least 100% of standard compaction;
- For the pavement approaches, if the pavements are to be constructed above the existing pavement level the existing asphalt should be milled prior to the placement of pavement layers;
- Where new construction joins onto existing pavements the existing pavement layers (including widening) should be benched to avoid a vertical joint extending through the pavements at the interface;
- Formation batters must be over-placed and compacted prior to trimming back to a design batter of no steeper than 2H:1V to provide lateral confinement to the pavement;
- Pavement seals must extend at least 1m beyond the outer wheel path and fog lines should be marked to discourage trafficking on the shoulder;
- Pavement gravels should be placed and maintained at 60% to 80% of Optimum Moisture Content. Should wet weather occur prior to final sealing, the base course should be allowed to dry back to not more than 80% of Optimum Moisture Content prior to sealing. Trapping of excess moisture below the final seal will significantly reduce pavement life;
- The implementation and maintenance of good drainage measures will be critical in ensuring the pavement achieves the required design life. It is recommended that either:
 - Subsoil drains be installed on all sides of the pavement that extend to a depth of at least 300mm below the underside of subbase. Subsoil drains must drain freely to the site stormwater system; or
 - Table drains should be constructed or maintained that extend to at least 300mm below the underside of pavement, and pavement layers should extend to the table drains to allow lateral drainage; and
- Dense graded asphalt can be expected to have a service life of between 8 to 15 years, depending on many factors such as asphalt type, traffic, climate, and location. It is therefore recommended that an allowance for resurfacing about every 10 to 15 years be included.



5 LIMITATIONS

This report comprises the results of an investigation carried out for a specific purpose and client as defined in the document. The report should not be used by other parties or for purposes or projects other than those assumed and stated within the report, as it may not contain adequate or appropriate information for applications other than those assumed or advised at the time of its preparation. The contents of the report are for the sole use of the client and no responsibility or liability will be accepted to any third party. The report should not be reproduced either in part or in full, without the express permission of Regional Geotechnical Solutions Pty Ltd.

Geotechnical site investigation is based on data collection, judgment, experience, and opinion. By its nature, it is less exact than other engineering disciplines. The findings presented in this report and used as the basis for the recommendations presented herein were obtained using normal, industry accepted geotechnical design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

The recommended depth and properties of any soil, rock, groundwater, or other material referred to in this report is an engineering estimate based on the information available at the time of its writing. The estimate is influenced and limited by the fieldwork method and testing carried out in the site investigation, and other relevant information as has been made available. In cases where information has been provided to Regional Geotechnical Solutions for the purposes of preparing this report it has been assumed that the information is accurate and appropriate for such use. No responsibility is accepted by Regional Geotechnical Solutions for inaccuracies within any data supplied by others.

If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by

Simon Keen

Associate Geotechnical Engineer

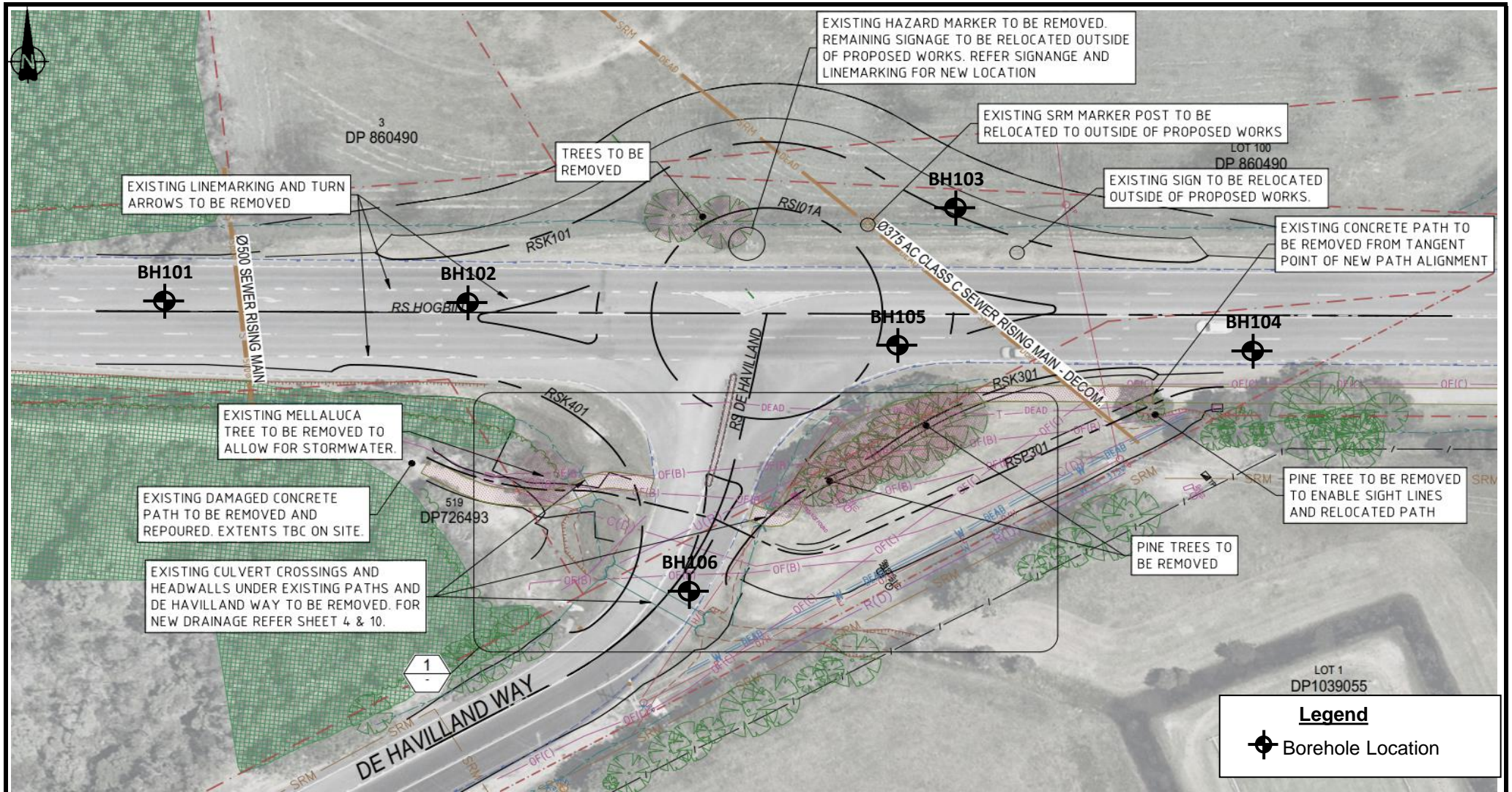
Reviewed by

Steve Morton

Principal Geotechnical Engineer



Figures



	Client:	City of Coffs Harbour	Job No.	RGS34081.1
	Project:	Proposed Roundabout	Drawn By:	SK
		Hogbin Drive & Christmas Bells Road, Coffs Harbour	Scale:	NTS
	Title:	Borehole Location Plan	Date:	14-Apr-24
			Drawing No.	Figure 1



Appendix A

Results of Field Investigations



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH101**

CLIENT: Coffs Harbour City Council
 PROJECT NAME: Proposed Roundabout
 SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour
 TEST LOCATION: Refer to Figure 1

PAGE: 1 of 1
 JOB NO: RGS34081.1
 LOGGED BY: SK
 DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger EASTING: 511531 m SURFACE RL:
 BOREHOLE DIAMETER: 450 mm INCLINATION: 90° NORTHING: 6646993 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	
AD/T	Not Observed	0.05m				GP	0.04m ASPHALT: 40mm	M	VD		AC WEARING COURSE
		2B				GC	0.20m FILL: GRAVEL, fine to coarse grained, brown, with fine to coarse grained sand and low plasticity clay				PAVEMENT
		0.20m				GC	0.20m FILL: Sandy Clayey GRAVEL, fine to coarse grained, pale brown, low plasticity clay, fine to medium grained sand, with cobbles				FILL
						SP	0.40m SAND: Fine to medium grained, pale grey to pale brown, trace silt	MD			MARINE SOIL
				1.0			1.00m SAND: Fine to medium grained, pale grey to pale brown, trace silt With medium plasticity clay				Increase in moisture content
				1.0			Hole Terminated at 1.00 m				
				1.2							
				1.4							
				1.6							
				1.8							

RG 2.00.3.LIB.GLB.Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH100 SERIES LOGS.GPJ <DrawingFiles> 6/5/2024 12:38 10.03.00.09 Dagehl Lab and In Situ Tool - DGD [Lib: RG 2.00.3.2022.03.03 P]: RG 2.00.0.2024.06.30

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH102**

CLIENT: Coffs Harbour City Council

PAGE: 1 of 1

PROJECT NAME: Proposed Roundabout

JOB NO: RGS34081.1

SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour

LOGGED BY: SK

TEST LOCATION: Refer to Figure 1

DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger

EASTING: 511559 m

SURFACE RL:

BOREHOLE DIAMETER: 450 mm

INCLINATION: 90°

NORTHING: 6647030 m

DATUM:

AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/T	Not Observed	0.05m				GP	0.03m ASPHALT: 30mm	M	VD			AC WEARING COURSE PAVEMENT
		B 0.20m				CL	0.20m FILL: GRAVEL , fine to coarse grained, brown, with fine to coarse grained sand and low plasticity clay					FILL
		B 0.40m					FILL: Gravelly CLAY , low plasticity, brown, fine to coarse grained gravel, with fine to medium grained sand					
							0.70m SAND: Fine to medium grained, grey					MD
				1.0			1.00m					Hole Terminated at 1.00 m
				1.2								
				1.4								
				1.6								
				1.8								

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W _p Plastic Limit
VSt Very Stiff	200 - 400	W _L Liquid Limit
H Hard	>400	
Fb Friable		
Density		
V Very Loose		Density Index <15%
L Loose		Density Index 15 - 35%
MD Medium Dense		Density Index 35 - 65%
D Dense		Density Index 65 - 85%
VD Very Dense		Density Index 85 - 100%

RG 2.00.3.LIB.GLB.Log_RGNON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH100 SERIES LOGS.GPJ <DrawingFiles> 6/5/2024 12:38 10.03.00.09 Dagebl Lab and In Situ Tool - DGD [Lib: RG 2.00.3.2022.08.03 P]: RG 2.00.0.2024.06.30



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH103**

CLIENT: Coffs Harbour City Council
 PROJECT NAME: Proposed Roundabout
 SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour
 TEST LOCATION: Refer to Figure 1

PAGE: 1 of 1
 JOB NO: RGS34081.1
 LOGGED BY: SK
 DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger EASTING: 511588 m SURFACE RL:
 BOREHOLE DIAMETER: 450 mm INCLINATION: 90° NORTHING: 6647090 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations									
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result								
AD/T	→	B		0.00		SM	TOPSOIL: Silty SAND, fine to medium grained, grey to dark grey, low plasticity silt	W	L	DCP (0.00-0.80m)	0	TOPSOIL/ESTUARINE SOIL								
				0.2		0														
				0.3		1														
				0.30		CL	CLAY: Low to medium plasticity, dark grey, lenses of Sandy CLAY	M > Wp	F	2	MARINE SOIL									
				0.4		1				HP=80kPa										
				0.50		2														
				0.6		3				HP=80kPa										
				0.80		4														
				1.00		Hole Terminated at 1.00 m														
														1.2						
				1.4																
				1.6																
				1.8																

RG 2.00.3.LIB.GLB.Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH100 SERIES LOGS.GPJ <DrawingFiles> 6/5/2024 12:38 10:03:00.09 Dagehl Lab and In Situ Tool - DGD [Lib: RG 2.00.3.2022.08.03 P1; RG 2.00.0.2021.06.30]

LEGEND:	Notes, Samples and Tests	Consistency	UCS (kPa)	Moisture Condition
Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Field Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard Fb Friable	<25 25 - 50 50 - 100 100 - 200 200 - 400 >400	D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
		Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense		Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH104**

CLIENT: Coffs Harbour City Council
 PROJECT NAME: Proposed Roundabout
 SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour
 TEST LOCATION: Refer to Figure 1

PAGE: 1 of 1
 JOB NO: RGS34081.1
 LOGGED BY: SK
 DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger EASTING: 511631 m SURFACE RL:
 BOREHOLE DIAMETER: 450 mm INCLINATION: 90° NORTHING: 6647106 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/T	Not Observed	0.05m				GP	0.04m ASPHALT: 40mm	M	VD			AC WEARING COURSE
		0.15m B				GP	FILL: GRAVEL , fine to coarse grained, brown, with fine to coarse grained sand and low plasticity clay					PAVEMENT
		0.35m B				GC	0.20m FILL: Clayey GRAVEL , fine to coarse grained, grey-brown, low plasticity clay With cobbles from 0.4m, angular, very high strength					FILL
				0.70m			Hole Terminated at 0.70 m Practical refusal on Cobbles					

RG 2.00.3.LIB.GLB.Log_RGNON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH100 SERIES.LOGS.GPJ <DrawingFiles> 6/5/2024 12:38 10.03.00.09 Dargel Lab and In Situ Tool - DGD [Lib: RG 2.00.3.2022.08.03.P1; RG 2.00.0.2021.06.30]

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH105**

CLIENT: Coffs Harbour City Council
 PROJECT NAME: Proposed Roundabout
 SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour
 TEST LOCATION: Refer to Figure 1

PAGE: 1 of 1
 JOB NO: RGS34081.1
 LOGGED BY: SK
 DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger EASTING: 511605 m SURFACE RL:
 BOREHOLE DIAMETER: 450 mm INCLINATION: 90° NORTHING: 6647074 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/T	Not Observed	0.05m				GP	0.04m ASPHALT: 40mm	M	VD		AC WEARING COURSE	
		2B 0.20m				GM	0.20m FILL: GRAVEL, fine to coarse grained, brown, with fine to coarse grained sand and low plasticity clay					PAVEMENT
		0.50m					SP	0.50m FILL: Clayey GRAVEL, fine to coarse grained, grey-brown, low plasticity clay, with angular very high strength cobbles to 100mm				FILL
		B 1.10m						1.10m SAND: Fine to medium grained, grey-brown		MD		MARINE SOIL
							Hole Terminated at 1.10 m					

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W _p Plastic Limit
VSt Very Stiff	200 - 400	W _L Liquid Limit
H Hard	>400	
Fb Friable		

Density	UCS (kPa)	Moisture Condition
V Very Loose		Density Index <15%
L Loose		Density Index 15 - 35%
MD Medium Dense		Density Index 35 - 65%
D Dense		Density Index 65 - 85%
VD Very Dense		Density Index 85 - 100%

RG 2.00.3.LIB.GLB.Log_RGNON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH105 SERIES [LOGS.GPJ -<DrawingFiles> 6/5/2024 12:38 10.03.00.09 Dagehl Lab and In Situ Tool - DGD] [Lib: RG 2.00.3.2022.08.03.P1; RG 2.00.0.2024.06.30]



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH106**

CLIENT: Coffs Harbour City Council
 PROJECT NAME: Proposed Roundabout
 SITE LOCATION: Hogbin Drive and Christmas Bells Road, Coffs Harbour
 TEST LOCATION: Refer to Figure 1

PAGE: 1 of 1
 JOB NO: RGS34081.1
 LOGGED BY: SK
 DATE: 14/4/24

DRILL TYPE: 6T Excavator - 450mm Auger EASTING: 511613 m SURFACE RL:
 BOREHOLE DIAMETER: 450 mm INCLINATION: 90° NORTHING: 6647027 m DATUM: AHD

Drilling and Sampling				Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
AD/T	Not Observed	0.05m				GP	0.04m ASPHALT: 40mm	M	VD			AC WEARING COURSE
		2B				GP	FILL: GRAVEL , fine to coarse grained, grey, with fine to coarse grained sand, trace low plasticity clay					PAVEMENT Remnant seal at 250mm
		0.15m				SP	0.25m FILL: Gravelly SAND , fine to medium grained, grey-brown, with low plasticity silt					
						GM	0.45m FILL: Silty GRAVEL , fine to coarse grained, grey-brown, low plasticity silt, trace to with fine to medium grained sand					
						SP	0.95m SAND: Fine to medium grained, brown					MD
							1.05m					Hole Terminated at 1.05 m
				1.2								
				1.4								
				1.6								
				1.8								

RG 2.00.3.LIB.GLB.Log_RG_NON-CORED BOREHOLE - TEST PIT_RGS34081.1_BH106 SERIES LOGS.GPJ <DrawingFile> 6/5/2024 12:38 10.03.00.09 Dagebl Lab and In Situ Tool - DGD [Lib: RG 2.00.3.2022.08.03 P1; RG 2.00.0.2021.06.30]

LEGEND: Water Water Level (Date and time shown) Water Inflow Water Outflow Strata Changes Gradational or transitional strata Definitive or distinct strata change	Notes, Samples and Tests U ₅₀ 50mm Diameter tube sample CBR Bulk sample for CBR testing E Environmental sample ASS Acid Sulfate Soil Sample B Bulk Sample	Consistency VS Very Soft <25 S Soft 25 - 50 F Firm 50 - 100 St Stiff 100 - 200 VSt Very Stiff 200 - 400 H Hard >400 Fb Friable	UCS (kPa) <25 25 - 50 50 - 100 100 - 200 200 - 400 >400	Moisture Condition D Dry M Moist W Wet W _p Plastic Limit W _L Liquid Limit
	Field Tests PID Photoionisation detector reading (ppm) DCP(x-y) Dynamic penetrometer test (test depth interval shown) HP Hand Penetrometer test (UCS kPa)	Density V Very Loose L Loose MD Medium Dense D Dense VD Very Dense	Density Index <15% Density Index 15 - 35% Density Index 35 - 65% Density Index 65 - 85% Density Index 85 - 100%	



Appendix B

Laboratory Test Result Sheets

Material Test Report



Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451A
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 02/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH102, Depth: 0.05-0.2

Nambucca Heads
6 West Street Macksville NSW 2447
Phone: 0438 857 377
Email: adam@actestingservices.com.au

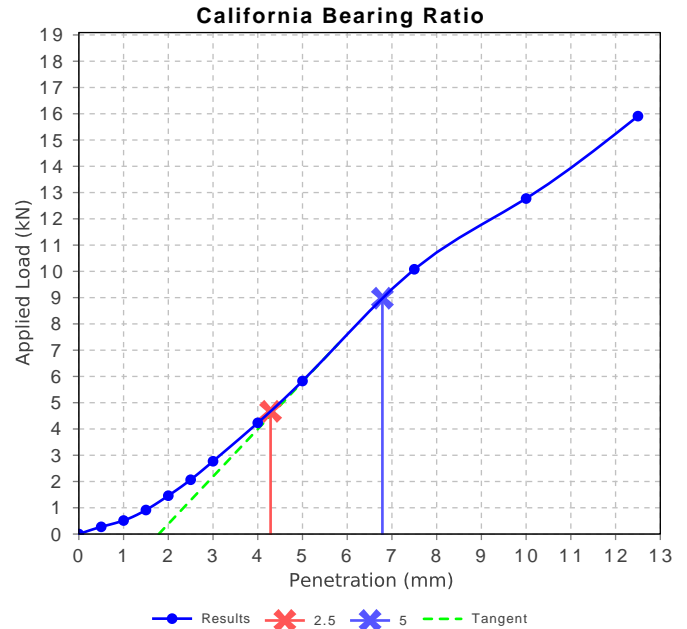


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Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	45		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual/Tactile		
Maximum Dry Density (t/m ³)	2.14		
Optimum Moisture Content (%)	8.0		
Laboratory Density Ratio (%)	95.0		
Laboratory Moisture Ratio (%)	101.5		
Dry Density after Soaking (t/m ³)	2.04		
Field Moisture Content (%)	5.5		
Moisture Content at Placement (%)	7.9		
Moisture Content Top 30mm (%)	8.7		
Moisture Content Rest of Sample (%)	7.7		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	48.0		
Swell (%)	-0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	12.0		



Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	24		
Plastic Limit (%)	17		
Plasticity Index (%)	7		

Material Test Report



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P 0438 857 377 E info@actestingservices.com.au ABN 41 634 083 793
Nambucca Valley Laboratory 6 West St, Macksville NSW 2447
Armidale Laboratory Shop 11/215 Mann St, Armidale NSW 2350

Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451A
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 02/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: **BH102, Depth: 0.05-0.2**

Nambucca Heads
6 West Street Macksville NSW 2447
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Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

Particle Size Distribution (AS1289 3.6.1)		
Sieve	Passed %	Passing Limits
75 mm	100	
63 mm	100	
53 mm	100	
37.5 mm	98	
26.5 mm	94	
19 mm	88	
13.2 mm	80	
9.5 mm	71	
6.7 mm	61	
4.75 mm	52	
2.36 mm	36	
1.18 mm	27	
0.6 mm	20	
0.425 mm	17	
0.3 mm	15	
0.15 mm	11	
0.075 mm	9	

Material Test Report



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P 0438 857 377 E info@actesting.com.au ABN 41 634 083 793
Nambucca Valley Laboratory 6 West St, Macksville NSW 2447
Armidale Laboratory Shop 11/215 Mann St, Armidale NSW 2350

Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451B
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 01/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH104, Depth: 0.05-0.15

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Phone: 0438 857 377
Email: adam@actesting.com.au



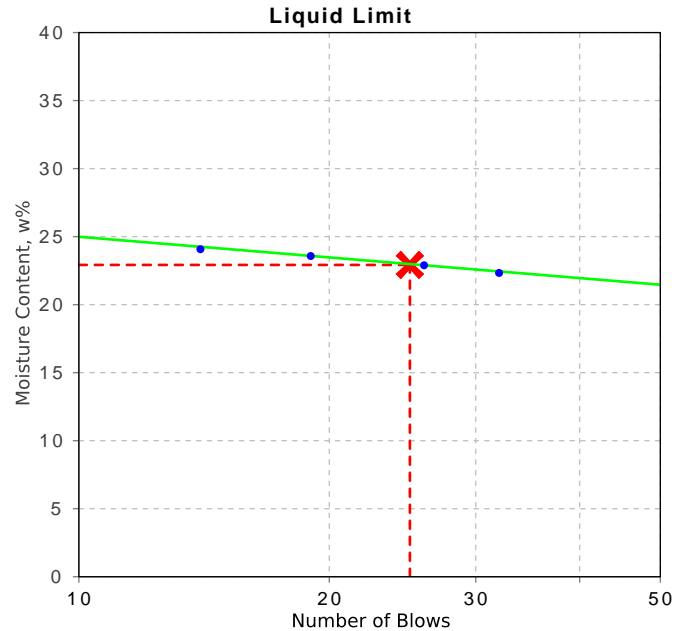
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Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	23		
Plastic Limit (%)	15		
Plasticity Index (%)	8		

Particle Size Distribution (AS1289 3.6.1)		
Sieve	Passed %	Passing Limits
53 mm	100	
37.5 mm	100	
26.5 mm	96	
19 mm	92	
13.2 mm	83	
9.5 mm	75	
6.7 mm	65	
4.75 mm	55	
2.36 mm	38	
1.18 mm	30	
0.6 mm	22	
0.425 mm	20	
0.3 mm	17	
0.15 mm	12	
0.075 mm	9	



Material Test Report



Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451C
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 02/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH106 , Depth: 0.05-0.15

Nambucca Heads
6 West Street Macksville NSW 2447
Phone: 0438 857 377
Email: adam@actestingservices.com.au

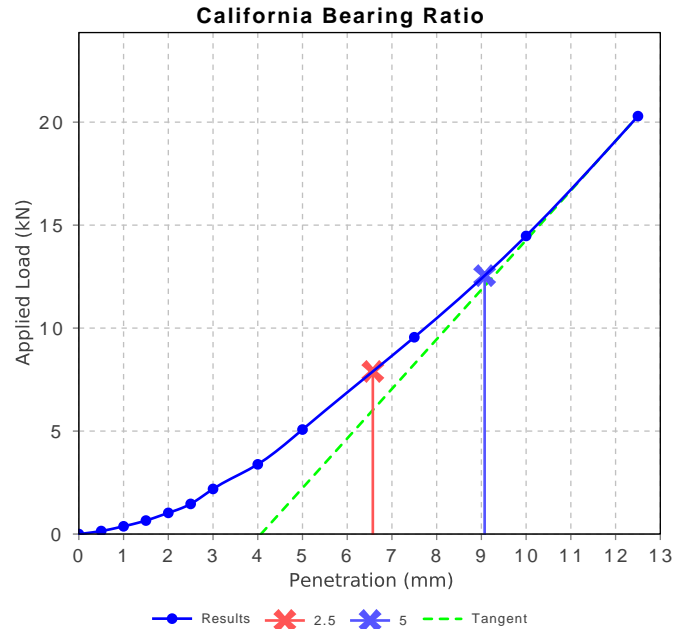


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Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	60		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual/Tactile		
Maximum Dry Density (t/m ³)	2.14		
Optimum Moisture Content (%)	10.5		
Laboratory Density Ratio (%)	95.0		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m ³)	2.05		
Field Moisture Content (%)	7.0		
Moisture Content at Placement (%)	10.6		
Moisture Content Top 30mm (%)	5.1		
Moisture Content Rest of Sample (%)	8.2		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	48.0		
Swell (%)	-0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	12.0		



Particle Size Distribution (AS1289 3.6.1)		
Sieve	Passed %	Passing Limits
53 mm	100	
37.5 mm	99	
26.5 mm	93	
19 mm	88	
13.2 mm	77	
9.5 mm	66	
6.7 mm	53	
4.75 mm	43	
2.36 mm	24	
1.18 mm	16	
0.6 mm	11	
0.425 mm	10	
0.3 mm	8	
0.15 mm	6	
0.075 mm	5	

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	25		
Plastic Limit (%)	15		
Plasticity Index (%)	10		

Material Test Report



Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451D
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 01/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH104, Depth: 0.15-0.35

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Email: adam@actestingservices.com.au



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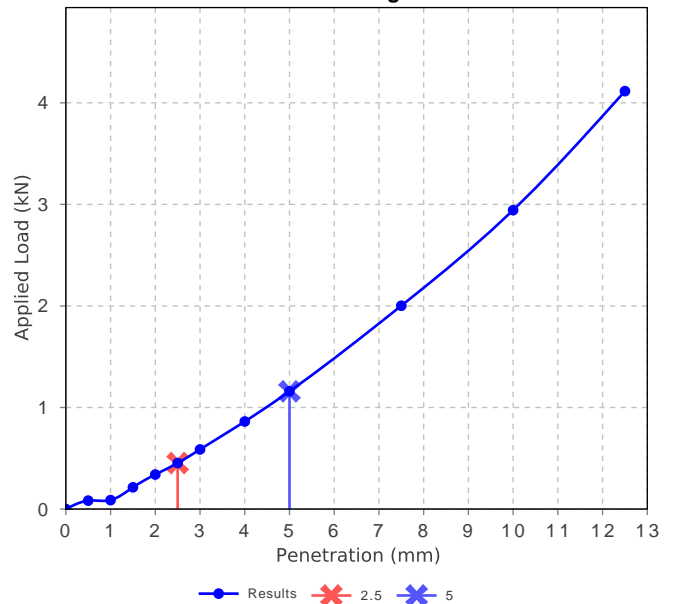
Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	6		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual/Tactile		
Maximum Dry Density (t/m ³)	2.10		
Optimum Moisture Content (%)	9.5		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m ³)	2.08		
Field Moisture Content (%)	6.7		
Moisture Content at Placement (%)	9.6		
Moisture Content Top 30mm (%)	9.4		
Moisture Content Rest of Sample (%)	9.0		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	43.0		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	14.7		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	21		
Plastic Limit (%)	14		
Plasticity Index (%)	7		

California Bearing Ratio



Material Test Report



Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451E
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 01/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH102, Depth: 0.2-0.4

Nambucca Heads
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Phone: 0438 857 377
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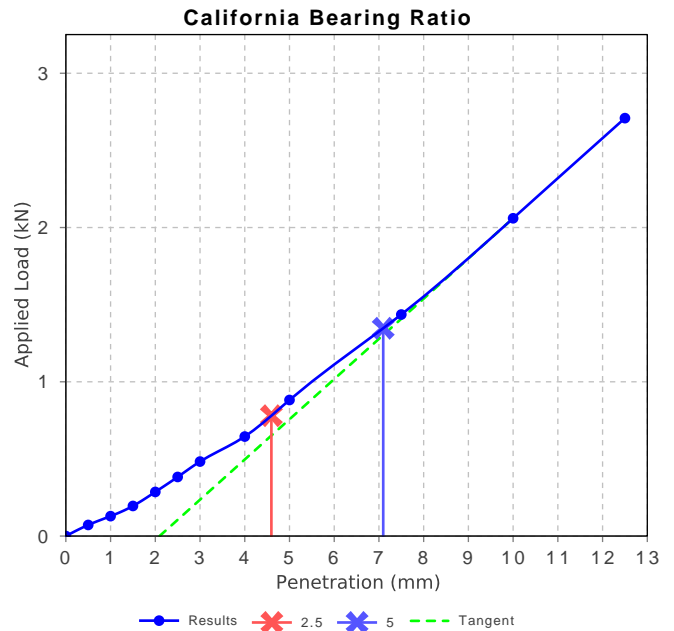
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Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	7		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual/Tactile		
Maximum Dry Density (t/m ³)	2.07		
Optimum Moisture Content (%)	10.5		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	98.5		
Dry Density after Soaking (t/m ³)	2.05		
Field Moisture Content (%)	7.3		
Moisture Content at Placement (%)	10.1		
Moisture Content Top 30mm (%)	11.1		
Moisture Content Rest of Sample (%)	9.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	42.9		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	15.1		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	24		
Plastic Limit (%)	16		
Plasticity Index (%)	8		



Material Test Report



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SOILS | AGGREGATES | CONCRETE

P 0438 857 377 E info@actestingservices.com.au ABN 41 634 083 793
Nambucca Valley Laboratory 6 West St, Macksville NSW 2447
Armidale Laboratory Shop 11/215 Mann St, Armidale NSW 2350

Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451F
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 01/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH103 , Depth: 0.5-0.8

Nambucca Heads
6 West Street Macksville NSW 2447
Phone: 0438 857 377
Email: adam@actestingservices.com.au

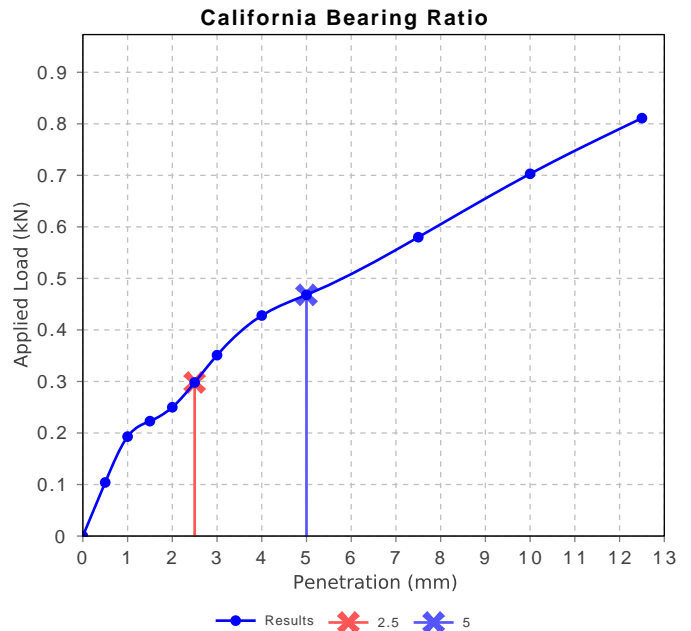


Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	2.5		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual/Tactile		
Maximum Dry Density (t/m ³)	1.67		
Optimum Moisture Content (%)	18.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m ³)	1.64		
Field Moisture Content (%)	18.2		
Moisture Content at Placement (%)	18.1		
Moisture Content Top 30mm (%)	23.4		
Moisture Content Rest of Sample (%)	20.3		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	42.8		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	34		
Plastic Limit (%)	13		
Plasticity Index (%)	21		

Material Test Report



AC TESTING SERVICES
SOILS | AGGREGATES | CONCRETE

P 0438 857 377 E info@actestingservices.com.au ABN 41 634 083 793
Nambucca Valley Laboratory 6 West St, Macksville NSW 2447
Armidale Laboratory Shop 11/215 Mann St, Armidale NSW 2350

Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Sample Number: ACTS24-7451G
Date Sampled: 14/04/2024
Dates Tested: 14/04/2024 - 02/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Remarks: RGS34081.1
Site Selection: Selected by Client
Sample Location: BH105, Depth: 0.5-1.1

Nambucca Heads
6 West Street Macksville NSW 2447
Phone: 0438 857 377
Email: adam@actestingservices.com.au



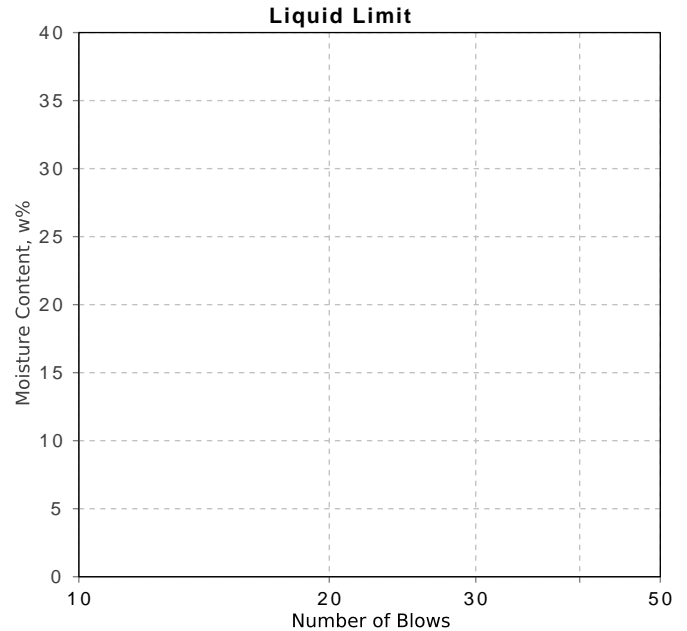
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	Not Obtainable		
Plastic Limit (%)	Not Obtainable		
Plasticity Index (%)	Non Plastic		

Particle Size Distribution (AS1289 3.6.1)		
Sieve	Passed %	Passing Limits
53 mm	100	
37.5 mm	100	
26.5 mm	100	
19 mm	100	
13.2 mm	95	
9.5 mm	92	
6.7 mm	89	
4.75 mm	86	
2.36 mm	82	
1.18 mm	81	
0.6 mm	79	
0.425 mm	76	
0.3 mm	64	
0.15 mm	16	
0.075 mm	8	



Material Test Report



AC TESTING SERVICES
SOILS | AGGREGATES | CONCRETE

P 0438 857 377 E info@actestingservices.com.au ABN 41 634 083 793
Nambucca Valley Laboratory 6 West St, Macksville NSW 2447
Armidale Laboratory Shop 11/215 Mann St, Armidale NSW 2350

Report Number: RGS-656-1
Issue Number: 1
Date Issued: 03/05/2024
Client: Regional Geotechnical Solutions
14/25-27 Hurley Drive, Coffs Harbour NSW 2450
Contact: Simon Keen
Project Number: RGS-656
Project Name: Proposed Roundabout
Project Location: Hogbin Drive & Christmas Bells Road, Coffs Harbour
Client Reference: RGS34081.1
Work Request: 7451
Dates Tested: 14/04/2024 - 19/04/2024
Remarks: RGS34081.1

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Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Adam Crawford
Lab Manager

NATA Accredited Laboratory Number: 19604

Moisture Content AS 1289 2.1.1

Sample Number	Sample Location	Moisture Content (%)	Min	Max	Material
ACTS24-7451C	BH106 , Depth: 0.05-0.15	7.0 %	**	**	**
ACTS24-7451F	BH103 , Depth: 0.5-0.8	30.1 %	**	**	**



Appendix C

Pavement Thickness Design Sheets

RIGID PAVEMENT THICKNESS DESIGN

CLIENT: City of Coffs Harbour
PROJECT: Proposed Roundabout
LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Job No.: RGS34081.1-AB

Date: 16-May-24



ROAD NAME:	Hogbin Dr & De Haviland Way Intersection	Refer to drawing:	
Chainage Interval (m):	Full Length	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	1.6 x 10 ⁷ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of ≥15% and a PI of <15%. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):			
Concrete Base thickness (mm):	180	Steel Fibre Reinforced Concrete (SFRC) to RMS QA Specification R83 with a minimum 28 day flexural strength of 5.5MPa	
Sub-base thickness (mm):	150	Lean Mix Concrete to RMS QA Specification R82	
Select thickness (mm):	As Required in Widened Area	CBR>15%, PI<15%, max particle size 100mm	100% Standard Compaction
Total thickness (mm):	330		

Definitions:

Design traffic loading:	The anticipated number of Heavy Vehicle Axle Groups (HVAG), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 1 - Deep Lift (Hogbin Dr)

CLIENT: City of Coffs Harbour

Job No.: RGS34081.1-AB

PROJECT: Proposed Roundabout

LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Date: 16-May-24



ROAD NAME:	Hogbin Drive	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	1.6 x 10 ⁷ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of $\geq 15\%$ and a PI of $< 15\%$. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. $V_L=3.0\%$, $V_U=8\%$	
Base thickness (mm):	300	DG20 AR450	$V_L=3.0\%$, $V_U=7\%$
Sub-base thickness (mm):		DGS40 or equivalent	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	345		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 1 - Deep Lift (De Haviland Way)

CLIENT: City of Coffs Harbour
PROJECT: Proposed Roundabout
LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Job No.: RGS34081.1-AB
Date: 16-May-24



ROAD NAME:	De Haviland Way	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	5.6 x 10 ⁶ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of ≥15% and a PI of <15%. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. V _L =3.0%, V _U =8%	
Base thickness (mm):	255	DG20 AR450	V _L =3.0%, V _U =7%
Sub-base thickness (mm):		DGS40 or equivalent	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	300		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 2 - Granular (Hogbin Dr)

CLIENT: City of Coffs Harbour

Job No.: RGS34081.1-AB

PROJECT: Proposed Roundabout

LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Date: 16-May-24



ROAD NAME:	Hogbin Drive	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	1.6 x 10 ⁷ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of $\geq 15\%$ and a PI of $< 15\%$. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. $V_L=3.0\%$, $V_U=8\%$	
Base thickness (mm):	200	DGB20	98% Modified Compaction
Sub-base thickness (mm):	150	DGS40	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	395		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 2 - Granular (De Haviland Way)

CLIENT: City of Coffs Harbour

Job No.: RGS34081.1-AB

PROJECT: Proposed Roundabout

LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Date: 16-May-24



ROAD NAME:	De Haviland Way	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	5.6 x 10 ⁶ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of $\geq 15\%$ and a PI of $< 15\%$. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. $V_L=3.0\%$, $V_U=8\%$	
Base thickness (mm):	160	DGB20	98% Modified Compaction
Sub-base thickness (mm):	155	DGS40	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	360		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 3 - Lightly Bound (Hogbin Dr)

CLIENT: City of Coffs Harbour

Job No.: RGS34081.1-AB

PROJECT: Proposed Roundabout

LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Date: 16-May-24



ROAD NAME:	Hogbin Drive	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	1.6 x 10 ⁷ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of ≥15% and a PI of <15%. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. V _L =3.0%, V _U =8%	
Base thickness (mm):	175	DGB20 stabilised to achieve UCS 1 - 1.5MPa	98% Modified Compaction
Sub-base thickness (mm):	150	DGS40 stabilised to achieve UCS 1.5 - 2MPa	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	370		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN - Approach Option 3 - Lightly Bound (De Haviland Way)

CLIENT: City of Coffs Harbour

Job No.: RGS34081.1-AB

PROJECT: Proposed Roundabout

LOCATION: Hogbin Drive & De Haviland Way, Coffs Harbour

Date: 16-May-24



ROAD NAME:	De Haviland Way	Refer to drawing:	
Chainage Interval (m):	Roundabout Approaches	Road classification ref:	N/A
Road Classification:	N/A	Design Traffic:	5.6 x 10 ⁶ HVAG

Subgrade Conditions

Expected subgrade:	Marine Sand. Marine Clay is located to the west of the existing pavement and must be overlain by at least 600mm of CBR15 Material.		
Adopted Subgrade CBR value:	8	Required subgrade compaction:	100%
Potential construction or performance issues:	Excavate to design subgrade level within the footprint of the existing pavement. The exposed pavement materials and marine sand are expected to be exposed. Proof Roll. To the west of the existing Hogbin Drive pavement the site is underlain by marine clay which is likely to fail proof roll and will likely require a rock bridging layer as detailed within Section 4.5 of RGS report. Where clay is exposed at subgrade level, the clay must be overlain by at least 600mm of granular fill that has a CBR of ≥15% and a PI of <15%. The bridging layer can be included within the 600mm thickness.		

Pavement Design

Recommended Pavement Layer Thickness:		Recommended Material requirements	Required Compaction
Wearing course thickness (mm):	45	DG14 A15 E polymer modified asphalt. V _L =3.0%, V _U =8%	
Base thickness (mm):	150	DGB20 stabilised to achieve UCS 1 - 1.5MPa	98% Modified Compaction
Sub-base thickness (mm):	150	DGS40 stabilised to achieve UCS 1.5 - 2MPa	95% Modified Compaction
Select thickness (mm):		Refer to above & RGS report	100% Standard Compaction
Total thickness (mm):	345		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTRROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS34081.1-AB for recommendations regarding drainage.

CIRCLY - Version 7.0 (24 August 2023)

Layer no. 1 is INCLUDED in max. CDF calculation
Layer no. 2 is INCLUDED in max. CDF calculation
Layer no. 3 is INCLUDED in max. CDF calculation
Job Title: RGS34081.1 - Hogbin Dr Roundabout

Design Method: Austroads 2017

NDT (cumulative heavy vehicle axle groups over design period): 1.60E+07

Traffic Load Distribution:

ID: NSWPresumeUrban
Name: NSW RMS Aug 2018 - Urban Presumptive (Table 17)
ESA/HVAG: 1.037

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA750-Full	ESA750-Full	Vertical Force	92.1	0.75	0.00
2	SAST53	SAST53	Vertical Force	102.4	0.80	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA750-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA750-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA750-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA750-Full	1	1965.0	0.0	1.00E+00	0.00
1	SAST53	1	0.0	0.0	1.00E+00	0.00
2	SAST53	1	2130.0	0.0	1.00E+00	0.00

Details of Layered System:

ID: RGS34081.1 A Title: Hogbin Dr - Deep Lift over granular

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	DG14 A15E - 3	Iso.	2.10E+03	0.40			
2	rough	DG14AR450 Coffs 40	Iso.	2.80E+03	0.40			
3	rough	Sub_CBR8	Aniso.	8.00E+01	0.45	5.52E+01	4.00E+01	0.45

Performance Relationships:

Layer No.	Location	Material ID	Component	Perform. Constant	Perform. Exponent	Shift Factor
1	bottom	DG14 A15E - 3	ETH	0.002361	5.000	6.0
2	bottom	DG14AR450 Coffs 40	ETH	0.002129	5.000	6.0
3	top	Sub_CBR8	EZZ	0.009150	7.000	

Reliability Factors:

Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	3.90	Asphalt
2	3.90	Asphalt
3	1.00	Subgrade (Austroads 2017)

Automatic layer thickness design:

Layer number to be designed: 2
Minimum thickness: 0
Maximum thickness: 5000

Strains:

Layer No.	Thickness	Material ID	Axle	Unitless Strain
1	45.00	DG14 A15E - 3		
			SADT (80):	1.310E-05
			SAST (53):	1.202E-05
2	297.94	DG14AR450 Coffs 40		
			SADT (80):	9.099E-05
			SAST (53):	6.810E-05
3	0.00	Sub_CBR8		
			SADT (80):	2.155E-04

Results:

Layer No.	Thickness	Material ID	Axle Group	CDF
1	45.00	DG14 A15E - 3	Total:	4.968E-05
			SAST:	1.883E-05
			SADT:	4.707E-06
			TAST:	1.432E-06
			TADT:	1.765E-05
			TRDT:	7.012E-06
			QADT:	4.926E-08

2	297.94	DG14AR450 Coffs 40	Total:	9.963E-01
			SAST:	1.846E-01
			SADT:	1.276E-01
			TAST:	1.404E-02
			TADT:	4.786E-01
			TRDT:	1.902E-01
			QADT:	1.336E-03
3	0.00	Sub_CBR8	Total:	6.675E-05

CIRCLY - Version 7.0 (24 August 2023)

Layer no. 1 is INCLUDED in max. CDF calculation
Layer no. 2 is INCLUDED in max. CDF calculation
Layer no. 3 is INCLUDED in max. CDF calculation
Job Title: RGS34081.1 - Hogbin Dr Roundabout

Design Method: Austroads 2017

NDT (cumulative heavy vehicle axle groups over design period): 5.60E+06

Traffic Load Distribution:

ID: NSWPresumeUrban
Name: NSW RMS Aug 2018 - Urban Presumptive (Table 17)
ESA/HVAG: 1.037

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA750-Full	ESA750-Full	Vertical Force	92.1	0.75	0.00
2	SAST53	SAST53	Vertical Force	102.4	0.80	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA750-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA750-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA750-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA750-Full	1	1965.0	0.0	1.00E+00	0.00
1	SAST53	1	0.0	0.0	1.00E+00	0.00
2	SAST53	1	2130.0	0.0	1.00E+00	0.00

Details of Layered System:

ID: RGS34081.1 C Title: De Haviland Way - Deep Lift over granular

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	DG14 A15E - 3	Iso.	2.10E+03	0.40			
2	rough	DG14AR450 Coffs 40	Iso.	2.80E+03	0.40			
3	rough	Sub_CBR8	Aniso.	8.00E+01	0.45	5.52E+01	4.00E+01	0.45

Performance Relationships:

Layer No.	Location	Material ID	Component	Perform. Constant	Perform. Exponent	Shift Factor
1	bottom	DG14 A15E - 3	ETH	0.002361	5.000	6.0
2	bottom	DG14AR450 Coffs 40	ETH	0.002129	5.000	6.0
3	top	Sub_CBR8	EZZ	0.009150	7.000	

Reliability Factors:

Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	3.90	Asphalt
2	3.90	Asphalt
3	1.00	Subgrade (Austroads 2017)

Automatic layer thickness design:

Layer number to be designed: 2
Minimum thickness: 0
Maximum thickness: 5000

Strains:

Layer No.	Thickness	Material ID	Axle	Unitless Strain
1	45.00	DG14 A15E - 3		
			SADT (80):	7.925E-06
			SAST (53):	4.288E-06
2	253.97	DG14AR450 Coffs 40		
			SADT (80):	1.115E-04
			SAST (53):	8.682E-05
3	0.00	Sub_CBR8		
			SADT (80):	2.631E-04

Results:

Layer No.	Thickness	Material ID	Axle Group	CDF
1	45.00	DG14 A15E - 3	Total:	8.754E-07
			SAST:	3.814E-08
			SADT:	1.335E-07
			TAST:	2.901E-09
			TADT:	5.006E-07
			TRDT:	1.989E-07
			QADT:	1.397E-09

2	253.97	DG14AR450 Coffs 40	Total:	1.006E+00
			SAST:	2.177E-01
			SADT:	1.235E-01
			TAST:	1.656E-02
			TADT:	4.632E-01
			TRDT:	1.841E-01
			QADT:	1.293E-03
3	0.00	Sub_CBR8	Total:	9.446E-05

CIRCLY - Version 7.0 (24 August 2023)

Job Title: RGS34081.1 - Hogbin Dr Roundabout

Design Method: Austroads 2017

NDT (cumulative heavy vehicle axle groups over design period): 1.60E+07

Traffic Load Distribution:

ID: NSWPresumeUrban
Name: NSW RMS Aug 2018 - Urban Presumptive (Table 17)
ESA/HVAG: 1.037

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA750-Full	ESA750-Full	Vertical Force	92.1	0.75	0.00
2	SAST53	SAST53	Vertical Force	102.4	0.80	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA750-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA750-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA750-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA750-Full	1	1965.0	0.0	1.00E+00	0.00
1	SAST53	1	0.0	0.0	1.00E+00	0.00
2	SAST53	1	2130.0	0.0	1.00E+00	0.00

Details of Layered System:

ID: RGS34081.1 B Title: Hogbin Dr - Lightly bound

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	DG14 A15E - 3	Iso.	2.10E+03	0.40			
2	rough	DGB20 UCS1.5	Iso.	1.80E+03	0.20			
3	rough	Insitu Stab to 1500	Iso.	2.00E+03	0.00			
4	rough	Sub_CBR8	Aniso.	8.00E+01	0.45	5.52E+01	4.00E+01	0.45

Performance Relationships:

Layer No.	Location	Material ID	Component	Perform. Constant	Perform. Exponent	Shift Factor
1	bottom	DG14 A15E - 3	ETH	0.002361	5.000	6.0
2	bottom	DGB20 UCS1.5	ETH	0.000480	12.000	
3	bottom	Insitu Stab to 1500	ETH	0.000480	12.000	
4	top	Sub_CBR8	EZZ	0.009150	7.000	

Reliability Factors:

Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	3.90	Asphalt
2	2.00	Cement Stabilised
3	2.00	Cement Stabilised
4	1.00	Subgrade (Austroads 2017)

Strains:

Layer No.	Thickness	Material ID	Axle	Unitless Strain
1	40.00	DG14 A15E - 3		
			SADT (80):	2.520E-05
			SAST (53):	2.223E-05
2	160.00	DGB20 UCS1.5		
			SADT (80):	2.654E-05
			SAST (53):	2.619E-05
3	150.00	Insitu Stab to 1500		
			SADT (80):	1.177E-04
			SAST (53):	8.895E-05
4	0.00	Sub_CBR8		
			SADT (80):	2.649E-04

Results:

Layer No.	Thickness	Material ID	Axle Group	CDF
1	40.00	DG14 A15E - 3	Total:	1.214E-03
			SAST:	4.083E-04
			SADT:	1.239E-04
			TAST:	3.106E-05
			TADT:	4.645E-04
			TRDT:	1.846E-04
			QADT:	1.297E-06
2	160.00	DGB20 UCS1.5	Total:	2.220E-08
			SAST:	1.373E-08

			SADT:	2.665E-09
			TAST:	1.080E-09
			TADT:	4.093E-09
			TRDT:	6.234E-10
			QADT:	3.276E-12
3	150.00	Insitu Stab to 1500	Total:	4.642E-01
			SAST:	3.232E-02
			SADT:	1.550E-01
			TAST:	2.541E-03
			TADT:	2.380E-01
			TRDT:	3.625E-02
			QADT:	1.905E-04
4	0.00	Sub_CBR8	Total:	2.830E-04

CIRCLY - Version 7.0 (24 August 2023)

Job Title: RGS34081.1 - Hogbin Dr Roundabout

Design Method: Austroads 2017

NDT (cumulative heavy vehicle axle groups over design period): 5.60E+06

Traffic Load Distribution:

ID: NSWPresumeUrban
Name: NSW RMS Aug 2018 - Urban Presumptive (Table 17)
ESA/HVAG: 1.037

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA750-Full	ESA750-Full	Vertical Force	92.1	0.75	0.00
2	SAST53	SAST53	Vertical Force	102.4	0.80	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA750-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA750-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA750-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA750-Full	1	1965.0	0.0	1.00E+00	0.00
1	SAST53	1	0.0	0.0	1.00E+00	0.00
2	SAST53	1	2130.0	0.0	1.00E+00	0.00

Details of Layered System:

ID: RGS34081.1 D Title: De Haviland Way - Lightly bound

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	DG14 A15E - 3	Iso.	2.10E+03	0.40			
2	rough	DGB20 UCS1.5	Iso.	1.80E+03	0.20			
3	rough	Insitu Stab to 1500	Iso.	2.00E+03	0.00			
4	rough	Sub_CBR8	Aniso.	8.00E+01	0.45	5.52E+01	4.00E+01	0.45

Performance Relationships:

Layer No.	Location	Material ID	Component	Perform. Constant	Perform. Exponent	Shift Factor
1	bottom	DG14 A15E - 3	ETH	0.002361	5.000	6.0
2	bottom	DGB20 UCS1.5	ETH	0.000480	12.000	
3	bottom	Insitu Stab to 1500	ETH	0.000480	12.000	
4	top	Sub_CBR8	EZZ	0.009150	7.000	

Reliability Factors:

Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	3.90	Asphalt
2	2.00	Cement Stabilised
3	2.00	Cement Stabilised
4	1.00	Subgrade (Austroads 2017)

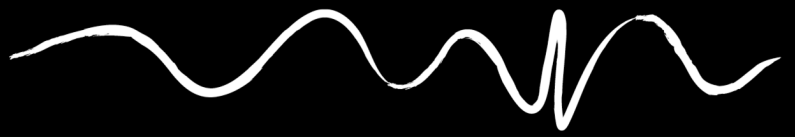
Strains:

Layer No.	Thickness	Material ID	Axle	Unitless Strain
1	45.00	DG14 A15E - 3	SADT (80):	2.529E-05
			SAST (53):	3.018E-05
2	150.00	DGB20 UCS1.5	SADT (80):	2.663E-05
			SAST (53):	2.664E-05
3	150.00	Insitu Stab to 1500	SADT (80):	1.198E-04
			SAST (53):	9.086E-05
4	0.00	Sub_CBR8	SADT (80):	2.692E-04

Results:

Layer No.	Thickness	Material ID	Axle Group	CDF
1	45.00	DG14 A15E - 3	Total:	9.841E-04
			SAST:	6.582E-04
			SADT:	4.414E-05
			TAST:	5.007E-05
			TADT:	1.655E-04
			TRDT:	6.576E-05
			QADT:	4.620E-07
2	150.00	DGB20 UCS1.5	Total:	9.047E-09
			SAST:	5.893E-09

			SADT:	9.711E-10
			TAST:	4.633E-10
			TADT:	1.491E-09
			TRDT:	2.272E-10
			QADT:	1.194E-12
3	150.00	Insitu Stab to 1500	Total:	2.016E-01
			SAST:	1.460E-02
			SADT:	6.709E-02
			TAST:	1.148E-03
			TADT:	1.030E-01
			TRDT:	1.569E-02
			QADT:	8.247E-05
4	0.00	Sub_CBR8	Total:	1.108E-04



Appendix E

Contaminated Land Searches

[Home](#) [Public registers](#) [Contaminated land record of notices](#)

Search results

Your search for: LGA: COFFS HARBOUR CITY COUNCIL

Matched 26 notices relating to 5 sites.

[Search Again](#)

[Refine Search](#)

Suburb	Address	Site Name	Notices related to this site
COFFS HARBOUR	134-136 Pacific HIGHWAY	BP Service Station	6 former
COFFS HARBOUR	Aviation DRIVE	Mobil Coffs Harbour Airport	1 former
COFFS HARBOUR	314-316 Harbour DRIVE	Mobil Service Station	9 former
CORAMBA	End of Martin Street and adjacent car park OTHER	Martin Street	1 current and 7 former
WOOLGOOLGA	56 Clarence STREET	United Petroleum Service Station (1868 Solitary Islands Way.)	2 current

Page 1 of 1

28 May 2024

[For business and industry](#) ^

[For local government](#) ^

Contact us

131 555 (tel:131555)

Online (<https://www.epa.nsw.gov.au/about-us/contact-us/feedback>)

info@epa.nsw.gov.au (mailto:info@epa.nsw.gov.au)

EPA Office Locations (<https://www.epa.nsw.gov.au/about-us/contact-us/locations>)

[Accessibility](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/help-index) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/help-index>)

[Disclaimer](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/disclaimer) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/disclaimer>)

[Privacy](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/privacy) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/privacy>)

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Find us on

[Home](#) [Public registers](#) [Contaminated land record of notices](#)

Site and notice details

Your search for: LGA: COFFS HARBOUR CITY COUNCIL 26 notices on 5 sites were matched.

[Return to list of search results](#)

[Search Again](#)

[Refine Search](#)

Area No: 3344

The information below was correct at the time the notices were issued.

Site: Mobil Coffs Harbour Airport
Address: Aviation DRIVE, COFFS HARBOUR
LGA: COFFS HARBOUR

Owner: Coffs Harbour Council
 Lot 12 DP 790102

Notices relating to this site (0 current and 1 former)

(Map) where available, maps show the part of the site affected by the notice
* notice matched search criteria

Notice recipient	Notice type & number	Status	Date
Mobil Oil Australia Pty Ltd	Agreed Voluntary Remediation Proposal * 26016	Former	Issued 02 Jul 2002 Complied with 10 Aug 2005

28 May 2024

[For business and industry](#) ^

[For local government](#) ^

Contact us

131 555 (tel:131555)

Online (<https://www.epa.nsw.gov.au/about-us/contact-us/feedback>)

info@epa.nsw.gov.au (<mailto:info@epa.nsw.gov.au>)

EPA Office Locations (<https://www.epa.nsw.gov.au/about-us/contact-us/locations>)

[Accessibility](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/help-index) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/help-index>)

[Disclaimer](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/disclaimer) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/disclaimer>)

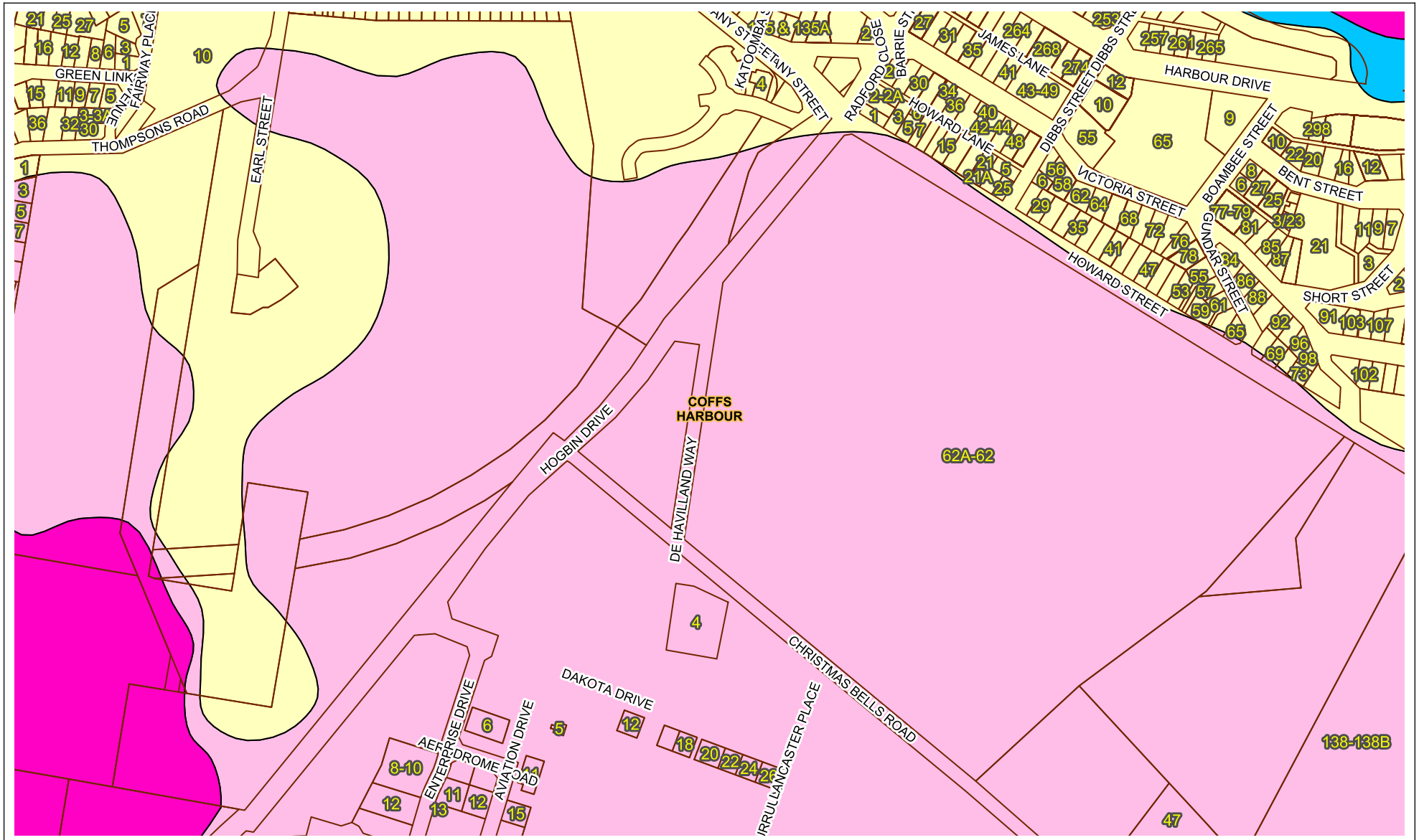
[Privacy](https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/privacy) (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/privacy>)

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in
 (https://au.li
 environmer
 protection-
 authority-
 (https://www.
 epa.nsw.gov.au/))

Find us on

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
COFFS HARBOUR	BP Service Station	134-136 Pacific HIGHWAY	Service Station	Contamination formerly regulated under the CLM Act	-30.29187037	153.1182106
COFFS HARBOUR	Dan Murphy's Coffs Harbour	10 Elbow STREET	Service Station	Regulation under CLM Act not required	-30.29439262	153.115069
COFFS HARBOUR	Mobil Service Station	314-316 Harbour DRIVE	Service Station	Contamination formerly regulated under the CLM Act	-30.3056983	153.131966
COFFS HARBOUR	Mobil Coffs Harbour Airport	Aviation DRIVE	Other Petroleum	Contamination formerly regulated under the CLM Act	-30.313385	153.1175018
COFFS HARBOUR	Woolworths Petrol	Park Beach Plaza, Arthur STREET	Service Station	Regulation under CLM Act not required	-30.28101154	153.132027
COFFS HARBOUR	Caltex Service Station	157 Orlando STREET	Service Station	Regulation under CLM Act not required	-30.28975334	153.1306354
COFFS HARBOUR	Coffs Harbour Slipway	38 Marina DRIVE	Other Industry	Regulation under CLM Act not required	-30.30325637	153.1441437
COFFS HARBOUR	Aussitel Backpackers Hostel	312 Harbour DRIVE	Service Station	Contamination formerly regulated under the CLM Act	-30.30585731	153.131645
COFFS HARBOUR	Coffs Harbour Airport Enterprise Park	Aviation DRIVE	Other Industry	Under assessment	-30.32062144	153.1181493



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4908 Hogbin Dr Intersection - ASS Mapping
TechnologyOne Spatial - Intramaps



Scale: 1:9028
 Projection: # GDA94 / MGA zone 56
 Date: 29/05/2024, 12:49 PM
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Legend

Naturally Occurring Asbestos in NSW

POINT OCCURRENCE DATA

Mineral Occurrences - Asbestos Sites

- VLGE
- LGE
- MED
- OCC
- SML

BROKEN HILL - GEOLOGICAL UNITS WITH ASBESTOS POTENTIAL

Retrograde Ultrabasic Dykes with MEDIUM asbestos potential



Dykes with HIGH asbestos potential



Geological Units with HIGH asbestos potential



STATEWIDE - GEOLOGICAL UNITS WITH ASBESTOS POTENTIAL

Geological Units with HIGH asbestos potential

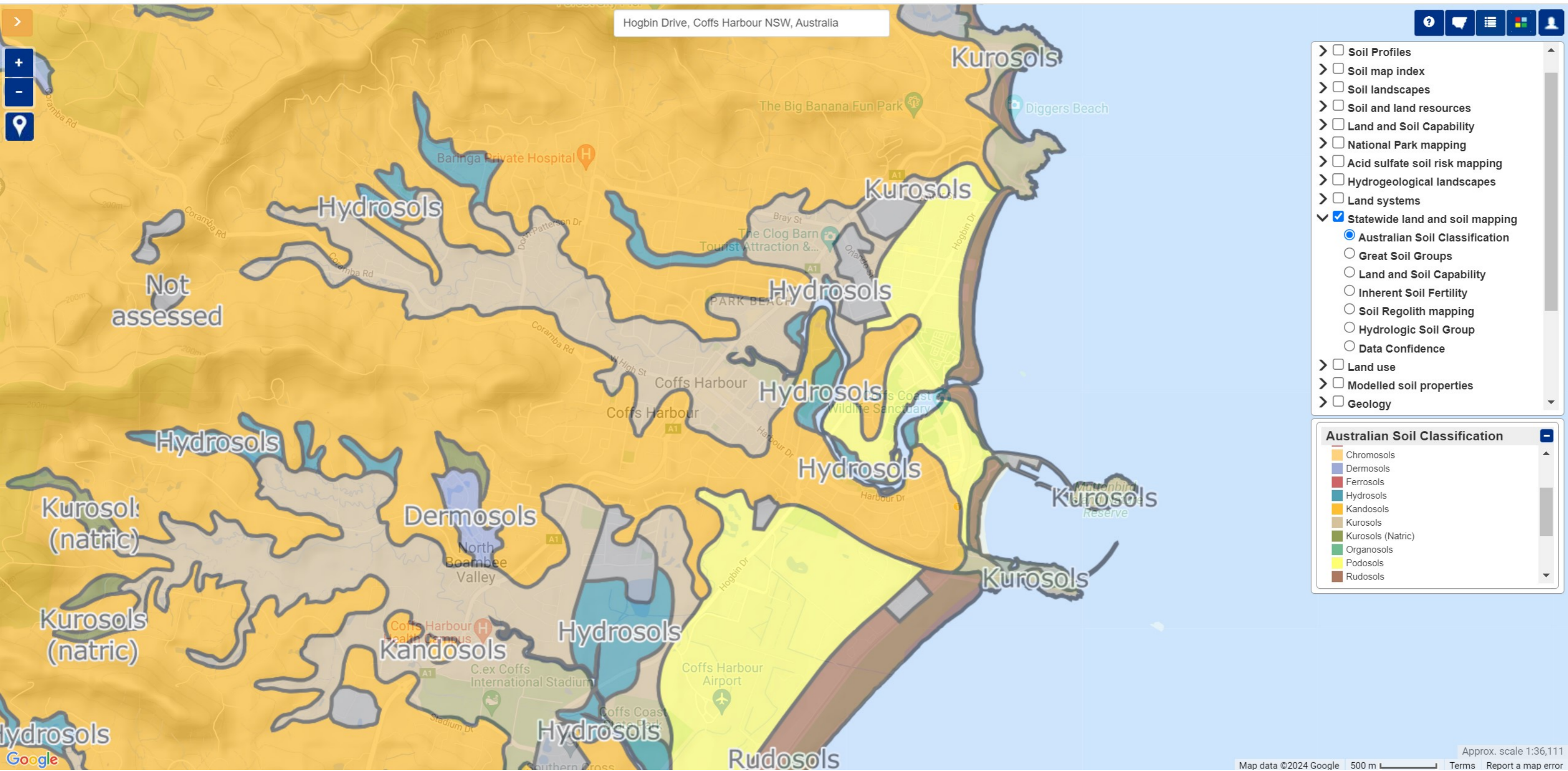


Geological Units with MEDIUM asbestos potential



Naturally Occurring Asbestos in NSW





- Soil Profiles
- Soil map index
- Soil landscapes
- Soil and land resources
- Land and Soil Capability
- National Park mapping
- Acid sulfate soil risk mapping
- Hydrogeological landscapes
- Land systems
- Statewide land and soil mapping
 - Australian Soil Classification
 - Great Soil Groups
 - Land and Soil Capability
 - Inherent Soil Fertility
 - Soil Regolith mapping
 - Hydrologic Soil Group
 - Data Confidence
- Land use
- Modelled soil properties
- Geology

- ### Australian Soil Classification
- Chromosols
 - Dermosols
 - Ferrosols
 - Hydrosols
 - Kandosols
 - Kurosols
 - Kurosols (Natric)
 - Organosols
 - Podosols
 - Rudosols

Cattle dip site locator

Dip site location

Dip name	COFFS HARBOUR	Note: Map references are for 25,000 series topographic and co-ordinates are in AGD66 AMG zone 56	
Road	CITY HILL DRIVE	Mapsheet	9537-III-N
Town/Locality	COFFS HARBOUR	Easting	511400
Council	COFFS HARBOUR	Northing	6647050
Parish	COFFS HARBOUR	County	FITZROY

Dip site status

IMPORTANT NOTE: Cattle dip site information provided by NSW DPI is based on our own hard copy files representing currently known data. NSW DPI is not a public consent authority for the development of land containing cattle dip sites. It is possible that the physical conditions of a cattle dip site - including soil, structures, access and usage - may have been changed due to extreme natural events or landowner and developer actions that NSW DPI cannot be aware of. For more specific and accurate status information a physical inspection should be made and enquiries should always be directed to the appropriate Shire Council.

Dip Status	DEMOLISHED	Licence/Lea: Status
Land Type	LEASE	Licence/Lea: Expiry Date

[Explanation of status terms \(https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-and-protozoal-diseases/ticks/cattle-dip-site-locator?sq_content_src=%2BdXJsPWh0dHBzJTnBJTJGJTJGYNrjLmRwaS5uc3cuZ292LmF1JTJGRGlwJTJGRXhwbGFpbiZhbGw9MQ%3D%3D\)](https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-and-protozoal-diseases/ticks/cattle-dip-site-locator?sq_content_src=%2BdXJsPWh0dHBzJTnBJTJGJTJGYNrjLmRwaS5uc3cuZ292LmF1JTJGRGlwJTJGRXhwbGFpbiZhbGw9MQ%3D%3D)

Chemical Details

IMPORTANT NOTE: Chemical history has been retrieved from a copied laboratory log. In some cases it may be confirmed by entries in the hard copy lease folder but generally the chemical record is based on this single lab document. It is possible that there are inaccuracies as well as errors made

Chemicals used in dip bath	Date first used
ARSENIC	1/43

Current Details

Current Chemical	NONE
Dip bath status/contents	STONES

[New search \(https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-and-protozoal-diseases/ticks/cattle-dip-site-locator?sq_content_src=%2BdXJsPWh0dHBzJTnBJTJGJTJGYNrjLmRwaS5uc3cuZ292LmF1JTJGJTJGJmFsbD0x\)](https://www.dpi.nsw.gov.au/animals-and-livestock/beef-cattle/health-and-disease/parasitic-and-protozoal-diseases/ticks/cattle-dip-site-locator?sq_content_src=%2BdXJsPWh0dHBzJTnBJTJGJTJGYNrjLmRwaS5uc3cuZ292LmF1JTJGJTJGJmFsbD0x) | [Back](#)

The information contained in this web page is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of Industry& Investment NSW or the user's independent adviser.



Animals & livestock

Beef cattle

Health and disease

Feeding and nutrition

Breeding, selection and genetics

Yards and equipment

Husbandry

Appraisal

Welfare

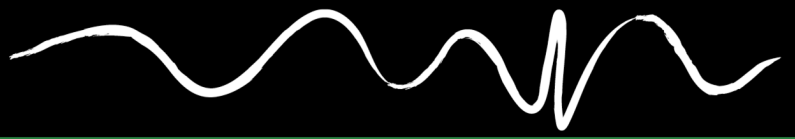
[Home](#) > [Animals & livestock](#) > [Beef cattle](#) > [Health and disease](#) > [Ticks](#)

Cattle dip site locator

This search retrieved 4 dip sites.

For more information about each dip site, click on the name below.

Dip name	Road	Town/Locality	Council
BARCONGARIE	BARCONGARIE FOREST	CORINDI	COFFS HARBOUR
COFFS HARBOUR	CITY HILL DRIVE	COFFS HARBOUR	COFFS HARBOUR
CORAMBA	CORAMBA ROAD	CORAMBA	COFFS HARBOUR
FLINTY RANGE	DIRTY CREEK	PACIFIC HWY, CORINDI	COFFS HARBOUR



Appendix F

Noise Estimator

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise management level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant, potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels.
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	40	
	Day (OOHW)	35	
	Evening	55	
	Night	50	
		45	
		40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Paving / asphaltting	113	Yes	0	285	50

Total SPL LAeq(15minute) (dBA)	50
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	5							
	Day (OOHW)	5							
	OOHW Period 1	10							
	OOHW Period 2	15							
Level above NML (dB(A))	Standard hours	0							
	Day (OOHW)	0							
	OOHW Period 1	5							
	OOHW Period 2	10							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR		-	-	-	-	-	-
	OOHW Period 2	V, N, R2, DR		-	-			-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
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10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
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 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
		R2	
RBL or LA90 Background level (dB(A))	Day	45	
	Evening	40	
	Night	35	
LAeq(15minute) Noise mangement level (dB(A))	Day	55	
	Day (OOHW)	50	
	Evening	45	
	Night	40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Bulk earthworks	123	Yes	0	285	60

Total SPL LAeq(15minute) (dBA)	60
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		Residential receiver	Non-residential receivers						
			Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	15							
	Day (OOHW)	15							
	OOHW Period 1	20							
	OOHW Period 2	25							
Level above NML (dB(A))	Standard hours	5	5		5		0		
	Day (OOHW)	10	5		5		0		
	OOHW Period 1	15			5		0		
	OOHW Period 2	20			5				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	N, R1, DR	-	N, R1, DR	-	-	-	-
	OOHW Period 1	V, N, R1, DR		-	N, R1, DR	-	-	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR		-	V, N, R2, DR	-	-	-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
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 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
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 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	40	
	Day (OOHW)	35	
	Evening	55	
	Night	50	
		45	
		40	

Representative distance (m)	200
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Compound operation	114	Yes	0	200	55

Total SPL LAeq(15minute) (dBA)	55
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	10							
	Day (OOHW)	10							
	OOHW Period 1	15							
	OOHW Period 2	20							
Level above NML (dB(A))	Standard hours	0	0	0					
	Day (OOHW)	5	0	0					
	OOHW Period 1	10		0					
	OOHW Period 2	15		0					
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR	-	-	-	-	-	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR	-	-	-	-	-	-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
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 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
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 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	35	
	Day (OOHW)	55	
	Evening	50	
	Night	45	
		40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Corridor clearing	121	Yes	0	285	58

Total SPL LAeq(15minute) (dBA)	58
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	13							
	Day (OOHW)	13							
	OOHW Period 1	18							
	OOHW Period 2	23							
Level above NML (dB(A))	Standard hours	3	3		3				
	Day (OOHW)	8	3		3				
	OOHW Period 1	13			3				
	OOHW Period 2	18			3				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR	-	-	-	-	-	-	-
	OOHW Period 2	V, IB, N, PC, SN, R2, DR	-	-	N	-	-	-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Distance Based Assessment Summary for Night Works

Please pick from drop-down list in orange cells

Please input information into yellow cells

Distanced Base (Noisiest Plant)

Noise area category	R2
Night time RBL (dB(A))	35
Night time NML (dB(A))	40
Propagation Type	Developed Settlements
Noisiest plant	Excavator Dumping Rubbles
Is there line of sight to receiver?	Yes
Shortest distance to the worst affected receiver (m)	285
L _{Aeq(15minute)} noise level at the worst affected receiver (dB(A)) [stationary source]	51
Level above RBL at the worst affected receiver [stationary source]	16
Rate of production (m/min) [moving source]	5
L _{Aeq(15minute)} noise level at the worst affected receiver (dB(A)) [moving source]	52
Level above RBL at the worst affected receiver [moving source]	17
Have all standard mitigation measures been implemented where feasible and reasonable?	Yes

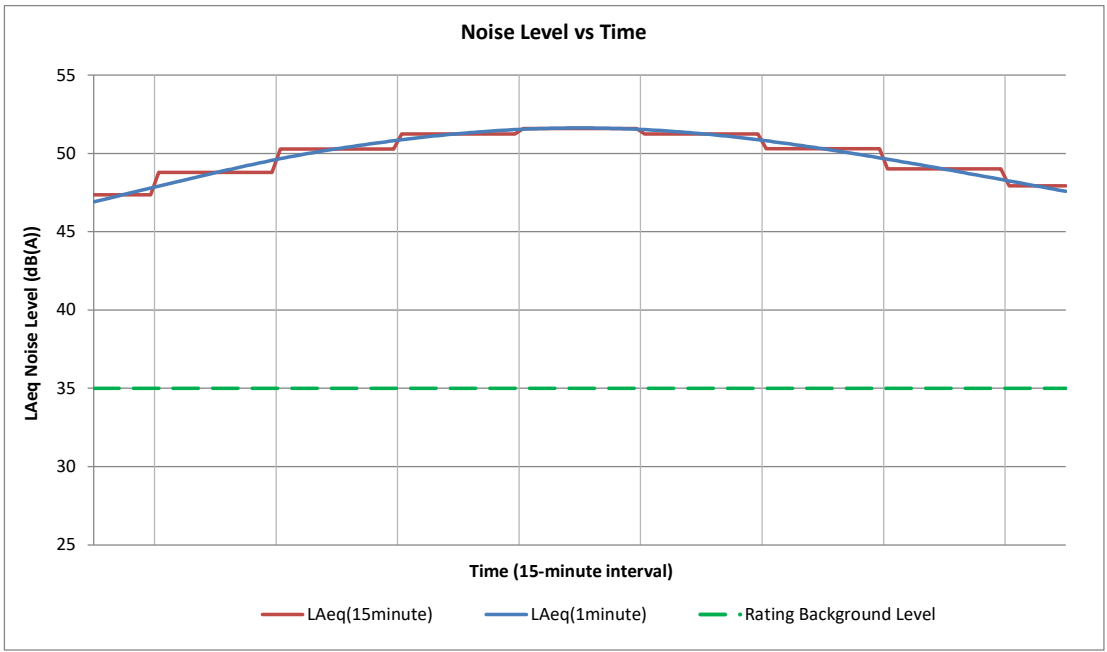
Please proceed with consideration given to the following additional mitigation measures

	Additional mitigation measures for consideration where feasible and reasonable	Mitigation level (dB(A))	Within mitigation distance (m)
5-10 dB(A) over RBL	N	40	690
10-20 dB(A) over RBL	N, R2, DR	45 (50)	460 (305)
20-30 dB(A) over RBL	N, PC, SN, R2, DR	55	200
>30 dB(A) over RBL	AA, N, PC, SN, R2, DR	65	85

Note:

(1) Notification (N) in the 5-10 dB(A) band is not considered reasonable if receivers are shielded by at least three rows of double storey houses or a row of multi-storey buildings or a sound barrier specifically design to mitigate construction noise

(2) Notification (N) in the form of letterbox drop at mitigation distances where level is less than 15 dB(A) above the RBL is not considered reasonable where Respite Period 2 (R2) is implemented. See alternate mitigation level and mitigation distance in () for letterbox drop.



Distanced Based (Scenario)

Noise area category	R2
Night time RBL (dB(A))	35
Night time NML (dB(A))	40
Propagation Type	Developed Settlements
Scenario	Bulk earthworks
Is there line of sight to receiver?	Yes
Distance to the worst affected receiver (m) [greater than 5m]	285
L _{Aeq} (15minute) noise level at the worst affected receiver (dB(A))	60
Level above RBL at the worst affected receiver	25
Have all standard mitigation measures been implemented where feasible and reasonable?	Yes

Please proceed with consideration given to the following additional mitigation measures

	Additional mitigation measures for consideration where feasible and reasonable	Mitigation level (dB(A))	Within mitigation distance (m)
5-10 dB(A) over RBL	N	40	1355
10-20 dB(A) over RBL	N, R2, DR	45 (50)	935 (635)
20-30 dB(A) over RBL	N, PC, SN, R2, DR	55	425
>30 dB(A) over RBL	AA, N, PC, SN, R2, DR	65	180

Note:

(1) Notification (N) in the 5-10 dB(A) band is not considered reasonable if receivers are shielded by at least three rows of double storey houses or a row of multi-storey buildings or a sound barrier specifically design to mitigate construction noise

(2) Notification (N) in the form of letterbox drop at mitigation distances where level is less than 15 dB(A) above the RBL is not considered reasonable where Respite Period 2 (R2) is implemented. See alternate mitigation level and mitigation distance in () for letterbox drop.

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise management level (see rows 36 to 41).
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 - (c) noise management levels.
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells	
Please pick from drop-down list in orange cells	
Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	40	
	Day (OOHW)	35	
	Evening	55	
	Night	50	
		45	
		40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Drainage infrastructure	115	Yes	0	285	52

Total SPL LAeq(15minute) (dBA)	52
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	7							
	Day (OOHW)	7							
	OOHW Period 1	12							
	OOHW Period 2	17							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)	2							
	OOHW Period 1	7							
	OOHW Period 2	12							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR							
	OOHW Period 2	V, N, R2, DR							

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))		R2	
RBL or LA90 Background level (dB(A))	Day	45	
	Evening	40	
	Night	35	
LAeq(15minute) Noise mangement level (dB(A))	Day	55	
	Day (OOHW)	50	
	Evening	45	
	Night	40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Profiling	117	Yes	0	285	54

Total SPL LAeq(15minute) (dBA)	54
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Steps:

- Enter project name (cell C9).
- Enter scenario name (cell C10).
- Enter receiver address (cell C11).
- Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
- Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
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 - where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
- Enter the representative distance in cell C24.
- Select scenario from the drop-down list in cells A27.
 - is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
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 - background noise levels.
 - noise management levels .
 - predicted noise levels for each time period.
 - sleep disturbance affected distance for night works.
 - mitigation measures.
 - team member responsible for implementing mitigation measures and managing noise and vibration.

		Residential receiver	Non-residential receivers						
			Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	9							
	Day (OOHW)	9							
	OOHW Period 1	14							
	OOHW Period 2	19							
Level above NML (dB(A))	Standard hours	4							
	Day (OOHW)	4							
	OOHW Period 1	9							
	OOHW Period 2	14							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR		-	-	-	-	-	-
	OOHW Period 2	V, N, R2, DR		-	-			-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise management level (see rows 36 to 41).
9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	35	
	Day (OOHW)	55	
	Evening	50	
	Night	45	
		40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Road furniture installation	110	Yes	0	285	47

Total SPL LAeq(15minute) (dBA)	47
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	2							
	Day (OOHW)	2							
	OOHW Period 1	7							
	OOHW Period 2	12							
Level above NML (dB(A))	Standard hours	-							
	Day (OOHW)	-							
	OOHW Period 1	2							
	OOHW Period 2	7							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	-	-	-	-	-	-	-	-
	OOHW Period 2	V, N, R2, DR	-	-	-	-	-	-	-

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Noise Estimator (Scenario)



Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))		R2	
	Day	45	
	Evening	40	
	Night	35	
LAeq(15minute) Noise mangement level (dB(A))	Day	55	
	Day (OOHW)	50	
	Evening	45	
	Night	40	

Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Local road works	120	Yes	0	285	57

Total SPL LAeq(15minute) (dBA)	57
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- Steps:**
1. Enter project name (cell C9).
 2. Enter scenario name (cell C10).
 3. Enter receiver address (cell C11).
 4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
 5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
 6. Enter the representative distance in cell C24.
 7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
 8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
 9. Identify and implement standard mitigation measures where feasible and reasonable. Include any shileiding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to receiver' drop-down list.
 10. Identify and implement feasible and reasonable additional mitigation measures (see rows 42 to 44).
 11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
 - (b) background noise levels.
 - (c) noise management levels .
 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

		Residential receiver	Non-residential receivers						
			Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	12							
	Day (OOHW)	12							
	OOHW Period 1	17							
	OOHW Period 2	22							
Level above NML (dB(A))	Standard hours	2	2		2				
	Day (OOHW)	7	2		2				
	OOHW Period 1	12			2				
	OOHW Period 2	17			2				
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	N, R1, DR	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR							
	OOHW Period 2	V, IB, N, PC, SN, R2, DR			N				

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Steps:

1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - water, undeveloped green fields (e.g. rural areas with isolated dwellings) or developed settlements (e.g. urban and suburban areas)
5. Select type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
 - (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
 - (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
 - (a) is there line of sight to receiver? Select from drop down list in cells F27. Solid barrier can be in the form of road cutting, solid construction hoarding, acoustic curtain, timber lapped and capped fence, shipping container, site office, etc. Please note that vegetation and trees are not considered to be a form of solid barrier.
8. Identify the level above background and/or noise management level (see rows 36 to 41).
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11. Document a summary report detailing:
 - (a) project description (including location, duration, hours of work, construction methodology, plant, potentially impacted receivers, etc.).
 - (b) background noise levels.
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 - (d) predicted noise levels for each time period.
 - (e) sleep disturbance affected distance for night works.
 - (f) mitigation measures.
 - (g) team member responsible for implementing mitigation measures and managing noise and vibration.

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	4908 Hogbin Drive
Scenario name	Roundabout Construction
Receiver address	1 Howard St, Coffs Harbour
Select area ground type	Developed settlements (urban and suburban areas)
Select type of background noise level input	Representative Noise Environment

Noise area category		Representative Noise Environment	User Input
RBL or LA90 Background level (dB(A))	Day	R2	
	Evening	45	
	Night	40	
LAeq(15minute) Noise mangement level (dB(A))	Day	40	
	Day (OOHW)	35	
	Evening	55	
	Night	50	
		45	
		40	

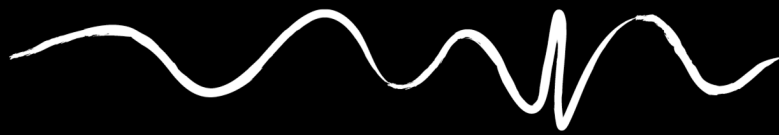
Representative distance (m)	285
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Scenario	SWL LAeq (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Utility, property, service adjustment	116	Yes	0	285	53

Total SPL LAeq(15minute) (dBA)	53
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	Residential receiver	Non-residential receivers							
		Classroom at schools and other educational institutions	Hospital wards and operating theatres	Place of worship	Active recreation	Passive recreation	Industrial premise	Offices, retail outlets	
Noise Management Level (dB(A))	Standard hours	55	55	65	55	65	60	75	70
	Day (OOHW)	50	55	65	55	65	60	75	70
	OOHW Period 1	45		65	55	65	60	75	70
	OOHW Period 2	40		65	55			75	70
Level above background (dB(A))	Standard hours	8							
	Day (OOHW)	8							
	OOHW Period 1	13							
	OOHW Period 2	18							
Level above NML (dB(A))	Standard hours								
	Day (OOHW)	3							
	OOHW Period 1	8							
	OOHW Period 2	13							
Additional mitigation measures	Standard Hours	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	N, R1, DR							
	OOHW Period 2	V, N, R2, DR							

Abbreviation	Measure
N	Notification
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Appendix G

Biodiversity Database Search Results

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -30.26 West: 153.07 East: 153.17 South: -30.36] returned a total of 3,210 records of 109 species.









Report generated on 8/05/2024 2:18 PM







Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Myobatrachidae	3137	<i>Crinia tinnula</i>		Wallum Froglet	V,P		22	
Animalia	Amphibia	Myobatrachidae	3075	^ <i>Mixophyes iteratus</i>		Giant Barred Frog	V,P,2	V	6	
Animalia	Reptilia	Cheloniidae	2004	<i>Caretta caretta</i>		Loggerhead Turtle	E1,P	E	5	
Animalia	Reptilia	Cheloniidae	2007	<i>Chelonia mydas</i>		Green Turtle	V,P	V	98	
Animalia	Reptilia	Cheloniidae	2008	<i>Eretmochelys imbricata</i>		Hawksbill Turtle	P	V	9	
Animalia	Reptilia	Elapidae	2677	<i>Hoplocephalus stephensii</i>		Stephens' Banded Snake	V,P		2	
Animalia	Aves	Casuariidae	0001	<i>Dromaius novaehollandiae</i>		Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	E2,P		1	
Animalia	Aves	Phaethontidae	0107	<i>Phaethon rubricauda</i>		Red-tailed Tropicbird	V,P	C,J	1	
Animalia	Aves	Columbidae	0025	<i>Ptilinopus magnificus</i>		Wompoo Fruit-Dove	V,P		21	
Animalia	Aves	Columbidae	0021	<i>Ptilinopus regina</i>		Rose-crowned Fruit-Dove	V,P		10	
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>		Superb Fruit-Dove	V,P		1	
Animalia	Aves	Apodidae	0334	<i>Hirundapus caudacutus</i>		White-throated Needletail	V,P	V,C,J,K	21	
Animalia	Aves	Diomedidae	0091	<i>Thalassarche cauta</i>		Shy Albatross	E1,P	E	1	
Animalia	Aves	Procellariidae	0072	<i>Ardenna carneipes</i>		Flesh-footed Shearwater	V,P	J,K	1	
Animalia	Aves	Procellariidae	0937	<i>Macronectes halli</i>		Northern Giant-Petrel	V,P	V	1	
Animalia	Aves	Procellariidae	8684	<i>Pterodroma leucoptera leucoptera</i>		Gould's Petrel	V,P	E	1	
Animalia	Aves	Procellariidae	0955	<i>Pterodroma nigripennis</i>		Black-winged Petrel	V,P		15	
Animalia	Aves	Sulidae	0105	<i>Sula dactylatra</i>		Masked Booby	V,P	J,K	1	
Animalia	Aves	Ciconiidae	0183	<i>Ephippiorhynchus asiaticus</i>		Black-necked Stork	E1,P		14	

Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		2	
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		27	
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		1	
Animalia	Aves	Accipitridae	0230	^^ <i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		9	
Animalia	Aves	Accipitridae	8739	^^ <i>Pandion cristatus</i>	Eastern Osprey	V,P,3		73	
Animalia	Aves	Rallidae	0053	<i>Amaurornis moluccana</i>	Pale-vented Bush-hen	V,P		3	
Animalia	Aves	Burhinidae	0174	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		3	
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		44	
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P		27	
Animalia	Aves	Scolopacidae	0149	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	2	
Animalia	Aves	Laridae	0120	<i>Onychoprion fuscata</i>	Sooty Tern	V,P		3	
Animalia	Aves	Laridae	0117	<i>Sternula albifrons</i>	Little Tern	E1,P	C,J,K	10	
Animalia	Aves	Cacatuidae	0268	^^ <i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	E1,P,3	E	1	
Animalia	Aves	Cacatuidae	8862	^ <i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V,P,2	V	64	
Animalia	Aves	Psittacidae	8028	^ <i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-Parrot	E4A,P,2	CE	3	
Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		18	
Animalia	Aves	Psittacidae	0309	<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE	6	
Animalia	Aves	Strigidae	0246	^^ <i>Ninox connivens</i>	Barking Owl	V,P,3		1	
Animalia	Aves	Strigidae	0248	^^ <i>Ninox strenua</i>	Powerful Owl	V,P,3		34	
Animalia	Aves	Tytonidae	0252	^^ <i>Tyto longimembris</i>	Eastern Grass Owl	V,P,3		7	
Animalia	Aves	Tytonidae	0250	^^ <i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		5	
Animalia	Aves	Tytonidae	9924	^^ <i>Tyto tenebricosa</i>	Sooty Owl	V,P,3		5	
Animalia	Aves	Alcedinidae	0327	<i>Todiramphus chloris</i>	Collared Kingfisher	V,P		8	
Animalia	Aves	Climacteridae	8127	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P	V	1	
Animalia	Aves	Meliphagidae	0603	^ <i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P,2	CE	5	
Animalia	Aves	Meliphagidae	0598	<i>Grantiella picta</i>	Painted Honeyeater	V,P	V	1	
Animalia	Aves	Neosittidae	0549	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		19	
Animalia	Aves	Campephagidae	0428	<i>Coracina lineata</i>	Barred Cuckoo-shrike	V,P		3	

Animalia	Aves	Artamidae	8519	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		2	
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P		1	
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	10	
Animalia	Mammalia	Dasyuridae	1017	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		3	
Animalia	Mammalia	Dasyuridae	1045	<i>Planigale maculata</i>	Common Planigale	V,P		1	
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	E1,P	E	996	
Animalia	Mammalia	Petauridae	1136	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P	V	3	
Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		17	
Animalia	Mammalia	Pseudocheiridae	1133	<i>Petauroides volans</i>	Southern Greater Glider	E1,P	E	1	
Animalia	Mammalia	Potoroidae	1175	<i>Potorous tridactylus</i>	Long-nosed Potoroo	V,P	V	2	
Animalia	Mammalia	Macropodidae	1234	<i>Thylogale stigmatica</i>	Red-legged Pademelon	V,P		1	
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	218	
Animalia	Mammalia	Pteropodidae	1294	<i>Syconycteris australis</i>	Common Blossom-bat	V,P		7	
Animalia	Mammalia	Molossidae	1329	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		1	
Animalia	Mammalia	Vespertilionidae	1372	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		4	
Animalia	Mammalia	Vespertilionidae	1357	<i>Myotis macropus</i>	Southern Myotis	V,P		9	
Animalia	Mammalia	Vespertilionidae	1336	<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V,P		8	
Animalia	Mammalia	Vespertilionidae	1361	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		1	
Animalia	Mammalia	Miniopteridae	1346	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		32	
Animalia	Mammalia	Miniopteridae	3330	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		17	
Animalia	Mammalia	Muridae	1455	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	2	
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P		1	
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		3	
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		3	
Animalia	Mammalia	Balaenidae	1561	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	E	3	
Animalia	Mammalia	Balaenopteridae	1567	<i>Balaenoptera musculus</i>	Blue Whale	E1,P	E	1	

e

Animalia	Mammalia	Physeteridae	1578	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		1	
Animalia	Insecta	Hesperiidae	1023	<i>Ocybadistes knightorum</i>	Black Grass-dart Butterfly	E1		161	
Animalia	Insecta	Petaluridae	1138	<i>Petalura litorea</i>	Coastal Petaltail	E1		1	
Plantae	Flora	Apocynaceae	1233	<i>Marsdenia longiloba</i>	Slender Marsdenia	E1	V	55	
Plantae	Flora	Apocynaceae	1245	<i>Tylophora woollsii</i>	Cryptic Forest Twiner	E1	E	4	
Plantae	Flora	Casuarinaceae	14655	<i>Allocasuarina thalassoscopica</i>			E	39	
Plantae	Flora	Cyperaceae	2423	<i>Eleocharis tetraquetra</i>	Square-stemmed Spike-rush	E1		4	
Plantae	Flora	Ebenaceae	2564	<i>Diospyros mabacea</i>	Red-fruited Ebony	E1	E	1	
Plantae	Flora	Fabaceae (Caesalpinioideae)	8772	<i>Senna acclinis</i>	Rainforest Cassia	E1		1	
Plantae	Flora	Fabaceae (Faboideae)	11644	<i>Pultenaea maritima</i>	Coast Headland Pea	V		40	
Plantae	Flora	Fabaceae (Faboideae)	3032	<i>Sophora tomentosa</i>	Silverbush	E1		19	
Plantae	Flora	Lauraceae	8948	<i>Endiandra floydii</i>	Crystal Creek Walnut	E1	E	1	
Plantae	Flora	Lauraceae	3491	<i>Endiandra hayesii</i>	Rusty Rose Walnut	V	V	1	
Plantae	Flora	Lindsaeaceae	8128	^^ <i>Lindsaea incisa</i>	Slender Screw Fern	E1,3		8	
Plantae	Flora	Myrtaceae	4283	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A	CE	79	
Plantae	Flora	Myrtaceae	4284	<i>Rhodomyrtus psidioides</i>	Native Guava	E4A	CE	49	
Plantae	Flora	Myrtaceae	4298	<i>Uromyrtus australis</i>	Peach Myrtle	E1	E	2	
Plantae	Flora	Orchidaceae	9027	^ <i>Diuris praecox</i>	Rough Doubletail	V,P,2	V	1	
Plantae	Flora	Orchidaceae	6990	^ <i>Oberonia complanata</i>	Yellow-flowered King of the Fairies	E1,P,2		1	
Plantae	Flora	Orchidaceae	4479	^ <i>Peristeranthus hillii</i>	Brown Fairy-chain Orchid	V,P,2		1	
Plantae	Flora	Orchidaceae	4480	^ <i>Phaius australis</i>	Southern Swamp Orchid	E1,P,2	E	6	
Plantae	Flora	Orchidaceae	4583	^ <i>Sarcochilus fitzgeraldii</i>	Ravine Orchid	V,P,2	V	1	
Plantae	Flora	Poaceae	8979	<i>Alexfloydia repens</i>	Floyd's Grass	E1		140	
Plantae	Flora	Poaceae	4776	<i>Arthraxon hispidus</i>	Hairy Jointgrass	V	V	9	
Plantae	Flora	Polygonaceae	5280	<i>Persicaria elatior</i>	Tall Knotweed	V	V	2	
Plantae	Flora	Proteaceae	11365	^ <i>Eidothea hardeniana</i>	Nightcap Oak	E1,2	CE	1	
Plantae	Flora	Proteaceae	10801	^^ <i>Hakea archaeoides</i>	Big Nellie Hakea	V,3	V	1	
Plantae	Flora	Proteaceae	5446	<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	1	
Plantae	Flora	Rutaceae	6457	<i>Acronychia littoralis</i>	Scented Acronychia	E1	E	4	
Plantae	Flora	Rutaceae	9099	<i>Boronia umbellata</i>	Orara Boronia	V,P	V	1	

Plantae	Flora	Rutaceae	9496	<i>Zieria prostrata</i>	Headland Zieria	E1	E	2	
Plantae	Flora	Rutaceae	5847	<i>Zieria smithii</i>	Low growing form of <i>Z. smithii</i> , Diggers Head	E2		2	
Plantae	Flora	Santalaceae	5871	<i>Thesium australe</i>	Austral Toadflax	V	V	11	
Plantae	Flora	Sapindaceae	5889	<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E1,2	E	1	
Plantae	Flora	Sapotaceae	11957	<i>Niemeyera whitei</i>	Rusty Plum, Plum Boxwood	V		595	
Plantae	Flora	Simaroubaceae	9497	<i>Quassia sp. Moonee Creek</i>	Moonee Quassia	E1	E	1	



Australian Government

Department of Climate Change, Energy,
the Environment and Water

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. Please see the caveat for interpretation of information provided here.

Report created: 08-May-2024

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment 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 (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	112
Listed Migratory Species:	64

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 <https://www.dcceew.gov.au/parks-heritage/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 Lands:	16
Commonwealth Heritage Places:	None
Listed Marine Species:	99
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	10
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	12
Key Ecological Features (Marine):	None
Biologically Important Areas:	5
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[\[Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name

Buffer Status

Commonwealth Marine Areas (EPBC Act)

In buffer area only

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.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name

Threatened Category

Presence Text

Buffer Status

[Coastal Swamp Oak \(Casuarina glauca\) Forest of New South Wales and South East Queensland ecological community](#)

Endangered

Community likely to occur within area

In feature area

[Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland](#)

Endangered

Community likely to occur within area

In feature area

[Dunn's white gum \(Eucalyptus dunnii\) moist forest in north-east New South Wales and south-east Queensland](#)

Endangered

Community may occur within area

In buffer area only

[Littoral Rainforest and Coastal Vine Thickets of Eastern Australia](#)

Critically Endangered

Community likely to occur within area

In buffer area only

[Lowland Rainforest of Subtropical Australia](#)

Critically Endangered

Community likely to occur within area

In feature area

[Subtropical and Temperate Coastal Saltmarsh](#)

Vulnerable

Community likely to occur within area

In feature area

[Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions](#)

Endangered

Community likely to occur within area

In feature area

Listed Threatened Species

[\[Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Breeding known to occur within area	In buffer area only
Atrichornis rufescens Rufous Scrub-bird [655]	Endangered	Species or species habitat may occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In buffer area only
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In feature area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area	In buffer area only
FISH			
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Maccullochella ikei Clarence River Cod, Eastern Freshwater Cod [26170]	Endangered	Species or species habitat known to occur within area	In buffer area only
Serirolella brama Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
FROG			
Assa darlingtoni Pouched Frog [1965]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Litoria olongburensis Wallum Sedge Frog [1821]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phyloria sphagnicola Sphagnum Frog [59709]	Vulnerable	Species or species habitat may occur within area	In buffer area only
INSECT			
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area	In feature area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Species or species habitat known to occur within area	In buffer area only
MAMMAL			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat likely to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Notamacropus parma Parma Wallaby [89289]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus tridactylus Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pseudomys oralis Hastings River Mouse, Koontoo [98]	Endangered	Species or species habitat may occur within area	In buffer area only
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
PLANT			
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat known to occur within area	In feature area
Allocasuarina thalassoscopica [21927]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area	In feature area
Bertya sp. Clouds Creek (M.Fatemi 4) [84675]	Endangered	Species or species habitat may occur within area	In buffer area only
Boronia umbellata Orara Boronia [56301]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Coleus nitidus listed as Plectranthus nitidus Nightcap Plectranthus, Silver Plectranthus [91380]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Corynocarpus rupestris subsp. rupestris Glenugie Karaka [19303]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area	In feature area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In feature area
Endiandra hayesii Rusty Rose Walnut, Velvet Laurel [13866]	Vulnerable	Species or species habitat known to occur within area	In feature area
Haloragis exalata subsp. velutina Tall Velvet Sea-berry [16839]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leichhardtia longiloba listed as Marsdenia longiloba Clear Milkvine [91911]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat known to occur within area	In feature area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area	In feature area
Owenia cepiodora Onionwood, Bog Onion, Onion Cedar [11344]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Parsonsia dorrigoensis Milky Silkpod [64684]	Endangered	Species or species habitat known to occur within area	In feature area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In feature area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Samadera sp. Moonee Creek (J.King s.n. Nov. 1949) [86885]	Endangered	Species or species habitat known to occur within area	In feature area
Sarcochilus fitzgeraldii Ravine Orchid [19131]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Syzygium hodgkinsoniae Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area	In feature area
Vincetoxicum woollsii listed as Tylophora woollsii [40080]	Endangered	Species or species habitat known to occur within area	In feature area
Zieria prostrata Headland Zieria [56782]	Endangered	Species or species habitat known to occur within area	In feature area

REPTILE

Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Harrisioniascincus zia Rainforest Cool-skink [84785]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In buffer area only

SHARK

Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
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Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Galeorhinus galeus School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Breeding known to occur within area	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Breeding likely to occur within area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

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.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [11377]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [11354]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11384]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11374]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Corporation [11373]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11378]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11379]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11381]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11380]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11382]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11385]	NSW	In buffer area only
Defence		
Defence - Training Depot [10074]	NSW	In buffer area only
Defence - Training Depot [10075]	NSW	In buffer area only
Unknown		
Commonwealth Land - [11376]	NSW	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [11383]	NSW	In buffer area only
Commonwealth Land - [11375]	NSW	In buffer area only

Listed Marine Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardena carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardena grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Breeding known to occur within area	In buffer area only
Ardena pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Ardena tenuirostris as Puffinus tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Breeding likely to occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Pterodroma nigripennis Black-winged Petrel [1038]		Breeding known to occur within area	In buffer area only
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding likely to occur within area	In buffer area only
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Fish			
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In buffer area only
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area	In buffer area only
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area	In buffer area only
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area	In buffer area only
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In buffer area only
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area	In buffer area only
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area	In buffer area only
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In buffer area only
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area	In buffer area only
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In buffer area only
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area	In buffer area only
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In buffer area only
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area	In buffer area only
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area	In buffer area only
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area	In buffer area only
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area	In buffer area only
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In buffer area only
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In buffer area only
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In buffer area only
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Mammal			
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In buffer area only
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area	In buffer area only
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In buffer area only

Whales and Other Cetaceans [[Resource Information](#)]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Australian Marine Parks [\[Resource Information \]](#)

Park Name	Zone & IUCN Categories	Buffer Status
Solitary Islands	Special Purpose Zone (Trawl) (IUCN VI)	In buffer area only

Extra Information

State and Territory Reserves [\[Resource Information \]](#)

Protected Area Name	Reserve Type	State	Buffer Status
Bongil Bongil	National Park	NSW	In buffer area only
Bruxner Park	Flora Reserve	NSW	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Coffs Coast	Regional Park	NSW	In buffer area only
Kororo	Nature Reserve	NSW	In buffer area only
Moonee Beach	Nature Reserve	NSW	In buffer area only
Muttonbird Island	Nature Reserve	NSW	In buffer area only
Solitary Islands	Marine Park	NSW	In feature area
Split Solitary Island	Nature Reserve	NSW	In buffer area only
Ulidarra	National Park	NSW	In buffer area only
Yuraarla	Flora Reserve	NSW	In buffer area only

Regional Forest Agreements

[\[Resource Information \]](#)

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
North East NSW RFA	New South Wales	In feature area

EPBC Act Referrals

[\[Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Clarence Valley and Coffs Harbour Regional Water Supply Project	2005/2191	Controlled Action	Post-Approval	In feature area
Pacific Highway Upgrade - Coffs Harbour Bypass, NSW	2017/8005	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
25km upgrade of the Pacific Highway	2007/3910	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Land clearing for horticulture (blueberries), South Moonee, NSW	2013/7023	Not Controlled Action	Completed	In buffer area only
Rehabilitation and Re-sculpting of Coffs Creek Flying Fox Camp and Adjacent Rese	2007/3771	Not Controlled Action	Completed	In buffer area only
Safe management of vegetation within Obstacle Limitation Surfaces, Coffs Harbour Regional Aerodrome,	2016/7794	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Sawtell Catholic Care of the Aged, NSW	2020/8738	Not Controlled Action	Completed	In buffer area only
Undertake vegetation removal as per CASA safety requirements	2011/6007	Not Controlled Action	Completed	In buffer area only
Vegetation removal over sewer infrastructure easement	2013/6725	Not Controlled Action	Completed	In buffer area only

Referral decision				
Breeding program for Grey Nurse Sharks	2007/3245	Referral Decision	Completed	In buffer area only
World Rally Championship 'Super Special Stage'	2013/6731	Referral Decision	Completed	In buffer area only

Biologically Important Areas [[Resource Information](#)]

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Tursiops aduncus			
Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In buffer area only
Seabirds			
Ardena carneipes			
Flesh-footed Shearwater [82404]	Foraging	Known to occur	In buffer area only
Procellaria parkinsoni			
Black Petrel [1048]	Foraging	Likely to occur	In buffer area only
Sharks			
Carcharias taurus			
Grey Nurse Shark [64469]	Foraging	Known to occur	In buffer area only
Whales			
Megaptera novaeangliae			
Humpback Whale [38]	Foraging	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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.

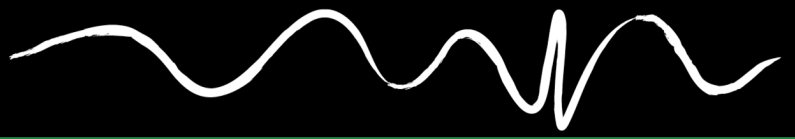
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Appendix H

Threatened Species Potential of Occurrence



Threatened Species Potential Occurrence Assessment

A potential of occurrence assessment was completed to assess the likelihood of occurrence of threatened species or populations at the subject site. All threatened biodiversity identified in background research were considered. The assessment is based on the habitat profile for the species and other habitat information in the Threatened Species Profile Database (DPE Environment and Heritage Group). The assessment also takes into consideration the dates and locations of nearby records and information about species populations in the locality.

For the Activity, the likelihood of occurrence of threatened species and populations was determined based on the criteria shown in **Table H.1**.

Table H.1 Potential of Occurrence Criteria for Threatened Species and Populations of Fauna

Potential of occurrence	Criteria
Known	The species was observed in the subject site either during the current survey or during another survey less than one year prior.
High	<p>A species has a high likelihood of occurrence if:</p> <ul style="list-style-type: none"> ■ the subject site contains or forms part of a large area of high-quality suitable habitat ■ important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are abundant within the subject site ■ the species has been recorded recently in similar habitat in the locality ■ the subject site is likely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration.
Moderate	<p>A species has a moderate likelihood of occurrence if:</p> <ul style="list-style-type: none"> ■ the subject site contains or forms part of a small area of high-quality suitable habitat ■ the subject site contains or forms part of a large area of marginal habitat ■ important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are sparse or absent within the subject site ■ the subject site is unlikely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration but is likely to be used occasionally during seasonal movements and/ or dispersal.
Low	<p>A species has a low likelihood of occurrence if:</p> <ul style="list-style-type: none"> ■ potentially suitable habitat exists but the species has not been recorded recently (previous 10 years) in the locality despite intensive survey (i.e. the species is considered to be locally extinct) ■ the species is considered to be a rare vagrant, likely only to visit the subject site very rarely, e.g. during juvenile dispersal or exceptional climatic conditions (e.g. extreme drought conditions in typical habitat of inland birds).
None	Suitable habitat is absent from the subject site.

Table H.2 Threatened Fauna Potential Occurrence Assessment

*Note: Marine and pelagic species identified in database searches were not included in table below due to the lack of suitable marine habitat.

Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
Amphibians						
<i>Crinia tinnula</i>	Wallum Froglet	V	-	Found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains such as acid paperbark and sedge swamps known as 'wallum' (a banksia-dominated lowland heath ecosystem characterised by acidic waterbodies). They typically occur in sedgelands and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests.	Known	Species heard in wetland habitat adjacent to the site. BioNet records in the locality. AoS undertaken.
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Amongst vegetation in and around permanent swamps, lagoons, farm dams and on flood-prone river flats, particularly where there are bullrushes or spikerushes.	Low	Marginal habitat occurs at the site. No BioNet records within the locality. Not considered further.
<i>Litoria olongburensis</i>	Olongburra Frog	V	V	An "acid" frog confined to the coastal sandplain Paperbark swamps and sedge swamps of the coastal 'wallum' country amongst sedges and rushes. Their life-cycle is adapted to the acidic pH (2.8-5.5) of these wetlands. Frogs are highest in abundance in relatively undisturbed wallum swamps.	Low	Preferred habitat in form of acid swamps not present. Not considered further.
<i>Mixophyes balbus</i>	Stuttering Frog	E	V	Cool rainforest, moist eucalypt forest and occasionally along creeks in dry eucalypt forest. Typically at elevations between 200 and 1420 m above sea level in their northern range.	Low	Preferred habitat not within the site. Not considered further.
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	Deep, damp leaf litter in rainforests, moist eucalypt forest and near dry eucalypt forest along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation.	Low	Preferred habitat not within the site. Not considered further.
Aves						
<i>Amauornis moluccana</i>	Pale-vented Bush-hen	V	-	Tall dense understorey or ground-layer vegetation on the margins of freshwater streams and natural or artificial wetlands, usually within or bordering rainforest, rainforest remnants or forests. Key elements of	Low	Marginal habitat occurs at the site. Preferred foraging habitat not present. No BioNet records within the



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
				their habitat are dense undergrowth 2 to 4 metres tall and within 300 metres of water.		locality. Not considered further.
<i>Anthochaera phrygia</i>	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	Marginal habitat occurs at the site. Preferred foraging habitat not present. Not considered further.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Dry, open eucalypt forests/ woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs. Ground-cover of grasses or sedges and fallen woody debris; also recorded in shrublands, heathlands and various modified habitats with forested/ woodland edges.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Atrichornis rufescens</i>	Rufous Scrub-bird	V	E	Subtropical, warm temperate, cool temperate rainforest and moist eucalypt forest with rainforest mid-storey. Moist, densely vegetated lower levels with deep leaf litter.	Low	Species occurrences typically known around northern NSW border. No BioNet records within the locality. Not considered further.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Permanent freshwater wetlands with tall dense vegetation, particularly bullrushes and spikerushes.	Low	Preferred habitat not present. May occur in greater locality. Not considered further.
<i>Burhinus grallarius</i>	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	Preferred habitat not present. May occur in greater locality. Not considered further.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M	When in Australia, around wetlands, preferring freshwater inland wetlands with grassy edges, but also coastal mudflats, salt marsh, brackish lagoons, or even fields, sewerage farms, mangroves.	Low	Preferred habitat not present. Species may occur as a vagrant during seasonal movements. No BioNet records within the locality. Not considered further.



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Calidris canutus</i>	Red Knot	-	E, M	Sheltered coasts on mudflats and sandbars of estuaries, harbors, lagoons; occasionally on beaches, reefs.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE, M	Tidal mudflats, sandy ocean shores and occasionally inland freshwater or salt-lakes.	Low	Preferred habitat not present. May occur in greater locality. Not considered further.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	E	Wetter forests and woodlands, timbered watercourses, coastal scrub.	Low	Preferred habitat not present. May occur in greater locality. Not considered further.
<i>Calyptorhynchus lathami lathami</i>	South Eastern Glossy Black-Cockatoo	V	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. Hollow nesters. In central NSW, a very high preference for E. crebra among other Eucalyptus, living or dead trees, >8 m above ground, in branches >30 cm diam, steeply angled.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V	V	Inland plains and slopes of the Great Dividing Range, and less commonly on coastal plains and ranges. Inhabits eucalypt forests and woodlands commonly dominated by stringybarks or other rough-barked eucalypts. Usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Fallen timber is an important habitat component.	Low	Preferred habitat not present. May occur in greater locality. Not considered further.
<i>Coracina lineata</i>	Barred Cuckoo-shrike	V	-	Rainforest, eucalypt woodlands, swamp woodlands and timber along watercourses. Frequently move from tree to tree and can be seen in clearings with secondary growth.	Low	Marginal habitat occurs at the site. Preferred foraging habitat not present. Not considered further.
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-parrot	CE	CE	Drier rainforests and adjacent wet eucalypt forest, wetter lowland rainforests. Limited to about five populations scattered between Bundaberg in Queensland and the Hastings River in NSW.	Low	Preferred habitat not present. May occur in



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
						greater locality. Not considered further.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Inhabits most of mainland Australia except the treeless deserts and open grasslands.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Dromaius novaehollandiae</i>	Emu population in the NSW North Coast Bioregion and Port Stephens LGA	E	-	Occur in a range of predominantly open lowland habitats, including forest woodland, grasslands, heathland, coastal heathland, coastal dunes, shrubland, open and shrubby woodlands, forest, wetlands and swamp and sedgeland communities, as well as the ecotones between these habitats. They also occur in plantations of tea-tree and open farmland, and occasionally in littoral rainforest.	None	Suitable habitat is absent from the site. No BioNet records within the locality. Not considered further.
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Build large nests high in tall trees close to water. Trees usually provide clear observation of the surroundings and are at low elevation.	Low	Preferred habitat not present. Species may occur as a vagrant during seasonal movements. No BioNet records within the locality. Not considered further.
<i>Erythrotriorchis radiatus</i>	Red Goshawk	CE	E	Open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water. Typically found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers. Population in NSW is naturally small (probably only one pair) and lies at extreme of the natural range of the species in Australia.	Low	Preferred habitat associated with watercourses and wetlands not present, unlikely to occur. Species only known to occur as vagrant to far NE NSW. No BioNet records within the locality. Not considered further.
<i>Falco hypoleucos</i>	Grey Falcon	V	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Frequents timbered lowland plains, particularly Acacia shrublands with watercourses, but also hunts in tussock grassland and open woodland, feeding almost entirely on small birds	Low	Preferred habitat not present. Species may occur as a vagrant during seasonal movements. No BioNet records within the



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
				and rarely small mammals. Nests in tall trees such as <i>E.camaldulensis</i> and <i>E.coolabah</i> , reusing other raptors nests.		locality. Not considered further.
<i>Gallinago hardwickii</i>	Latham's Snipe	-	V	Usually inhabit open, freshwater wetlands with low, dense vegetation. Can also occur in habitat with saline or brackish water, in modified or artificial wetlands, and in areas located close to humans or human activity. Can inhabit drier habitat, including open woodlands and high-altitude grasslands or herblands, usually those being in proximity to surface water.	Low	Marginal habitat occurs at the site. No BioNet records within the locality. May occur irregularly as a seasonal vagrant. Not considered further.
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	Forages in open Eucalyptus forest and woodland; also feeds on Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Grantiella picta</i>	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. Prefers mistletoes of the genus <i>Amyema</i> .	Low	Lack of preferred habitat in the form of high density of mistletoes. Not considered further.
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V	-	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Low	Preferred habitat not present. May occur irregularly whilst foraging in greater locality. No BioNet records within the locality. Not considered further.
<i>Haematopus longirostris</i>	Pied Oystercatcher	E	-	Intertidal flats of inlets and bays, open beaches, sandbanks and occasionally rocky headlands. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish.	Low	Preferred habitat not present. May occur irregularly whilst foraging in greater locality. No BioNet records within the locality. Not considered further.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	V	-	Coastal habitats and around terrestrial wetlands characterised by the presence of large areas of open water (larger rivers, swamps, lakes, ocean). Habitats may include freshwater swamps, lakes, reservoirs,	Moderate	Potential foraging habitat occurs in the site. BioNet



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
				billabongs, saltmarsh and sewage ponds in addition to bays and inlets, beaches, reefs, lagoons, estuaries and mangroves.		records in the locality. AoS undertaken.
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	V	Most often recorded aerial foraging above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. Breeding does not occur in Australia.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	Both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation including streams, swamps, tidal creeks and mudflats, particularly amongst swamp sheoaks and mangroves. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Low	Marginal habitat occurs at the site. No BioNet records within the locality. Not considered further.
<i>Lathamus discolor</i>	Swift Parrot	E	CE	On mainland Australia foraging occurs where eucalypts are flowering profusely or where abundant lerp infestations occur. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> and Yellow Box <i>E. melliodora</i> .	Low	Marginal habitat occurs at the site. Prefer foraging habitat not present. No BioNet records within the locality. Not considered further.
<i>Limosa lapponica baueri</i>	Black-tailed Godwit (baueri)	-	V	Found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms. Often occurs around beds of seagrass, and sometimes in nearby saltmarsh or the outer margins of mangrove areas.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Variety of timbered habitats including dry woodland and open forest, particularly along major rivers, timbered watercourses and belts of	Moderate	Potential foraging habitat occurs in the site. BioNet



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
				trees in urban or semi-urban areas. Home ranges can extend over at least 100 km ² .		records in the locality. AoS undertaken.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V	E	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V	V	Blue-winged parrots breed in Tasmania, coastal south-eastern South Australia and southern Victoria. During the breeding season (spring and summer), birds occupy eucalypt forests and woodlands. Outside of the breeding range, habitat critical to the survival of this species includes foraging and staging habitats found from coastal, sub-coastal and inland areas, right through to semi-arid zones including grasslands, grassy woodlands and semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs; and wetlands both near the coast and in semi-arid zones used for foraging and staging.	Low	Species more prevalent in south-west NSW and VIC. Vagrant occurrences during seasonal movements may occur. No BioNet records within the locality. Not considered further.
<i>Ninox connivens</i>	Barking Owl	V	-	Eucalypt woodland, open forest, swamp woodlands and timber along watercourses, including fragmented remnants and partly cleared farmland. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Ninox strenua</i>	Powerful Owl	V	-	Woodland and open forest to tall moist forest and rainforest. Requires large tracts of forest or woodland habitat but may also occur in fragmented landscapes.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Numenius madagascariensis</i>	Eastern Curlew	-	CE	Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats and sometimes saltmarsh of sheltered coasts.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Onychoprion fuscata</i>	Sooty Tern	V	-	Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Pandion cristatus</i>	Eastern Osprey	V	-	Littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Typically occur in coastal areas but occasionally travel inland along major rivers. Wetland habitats include inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.	Low	Preferred habitat associated with watercourses and wetlands not present. May occur in greater locality. Not considered further.
<i>Petroica boodang</i>	Scarlet Robin	V	-	Dry eucalypt forests and woodlands with an open and grassy understorey with few scattered shrubs. Both mature and regrowth vegetation are utilised; habitat usually contains abundant logs and fallen timber.	Low	Preferred habitat in the form of Grassy eucalypt woodlands not present. Not considered further.
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	V	-	Rainforests, low-elevation moist eucalypt forest, and Brush Box forests. Most often seen in mature forests, but also found in remnant and regenerating rainforest.	Low	Preferred habitat not present. May occur irregularly whilst foraging in greater locality. No BioNet records within the locality. Not considered further.
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	V	-	Subtropical and dry rainforest, moist eucalypt forest and swamp forest. Some populations are migratory in response to food availability - numbers in north-east NSW increase during spring and summer then decline in April or May.	Low	Preferred habitat not present. May occur irregularly whilst foraging in greater locality. No BioNet records within the locality. Not considered further.
<i>Ptilinopus superbus</i>	Superb Fruit-dove	V	-	Subtropical and dry rainforest, moist eucalypt forest and swamp forest.	Low	Preferred habitat not present. May occur irregularly whilst foraging in greater locality. No BioNet records within the locality. Not considered further.
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, and open timber.	Low	Marginal habitat occurs at the site. No BioNet records within the locality. May occur irregularly as a seasonal vagrant. Not considered further.



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Stagonopleura guttata</i>	Diamond Firetail	V	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	Preferred habitat in the form of Grassy eucalypt woodlands not present. Not considered further.
<i>Todiramphus chloris</i>	Collared Kingfisher	V	-	Restricted to mangroves and other estuarine habitats, occur about mouths of larger coastal rivers.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Tringa nebularia</i>	Common Greenshank	-	E, M	Sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayment's, harbours, river estuaries, deltas and lagoons. This species also occurs in a wide variety of inland wetlands.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Turnix melanogaster</i>	Black-breasted Button-quail	CE	V	Drier rainforests and vine scrubs, often in association with hoop pine, bottletree scrubs and a deep moist leaf litter layer. During drought it may move to adjacent wetter rainforests.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Tyto longimembris</i>	Eastern Grass Owl	V	-	Areas of tall grass, including tussocks in swampy areas, grassy plains, swampy heath, cane grass, sedges on flood plains. In NSW they are more likely to be resident in the north-east.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Tyto novaehollandiae</i>	Masked Owl	V	-	Dry eucalypt forest and woodlands from sea level to 1100 m asl. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Tyto tenebricosa</i>	Sooty Owl	V	-	Dry, subtropical and warm temperate rainforests and wet eucalypt forests. Nest in large tree hollows.	Low	Marginal habitat prefers rainforests/ wet sclerophyll forest. May occur irregularly whilst foraging in the greater locality.

Invertebrates



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Argynnis hyperbius</i>	Australian Fritillary	E	CE	Open swampy coastal habitat where the caterpillar's food plant, Arrowhead Violet (<i>Viola betonicifolia</i>) occurs.	None	Suitable habitat is absent from the site, food plant not identified within site. No BioNet records within the locality. Not considered further.
<i>Ocybadistes knightorum</i>	Black Grass-dart Butterfly	E	-	Confined to coastal stands of Swamp Oak and Paperbark where Floyd's Grass grows edging the upper tidal areas of mangroves.	Low	Marginal habitat associated with site; Floyd's Grass not identified within site. Not considered further.
<i>Petalura litorea</i>	Coastal Petaltail	E	-	Permanent wetlands, swamps and bogs with some free water and open vegetation. Restricted to coastal and near coastal lowlands between Coffs Harbour and Ballina.	Low	Preferred habitat not present. Not considered further.
<i>Phyllodes imperialis southern subspecies</i>	Pink Underwing Moth	E	E	Undisturbed subtropical rainforest below 600 m. Breeding habitat is restricted to areas where the caterpillar's food plant, a native rainforest vine, <i>Carronia multiseppalea</i> , grows in a collapsed shrub-like form.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
Mammals						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. Uses a large range of vegetation types including dry and wet sclerophyll forest; Cyprus Pine dominated forest; tall open eucalypt forest with a rainforest sub-canopy; sub-alpine woodland.	Low	Preferred habitat in the form of fertile vegetation patches near cliff/escarpment not present. May occur in greater locality. No BioNet records within the locality. Not considered further.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Dry and moist eucalypt forests and rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Large rocky outcrops. Hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites.	Low	Marginal habitat present. May occur in greater locality with larger patches of vegetation. Not considered further.



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	Moist and dry eucalypt forest and rainforest, particularly at high elevations.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Macropus parma</i>	Parma Wallaby	V	-	Moist eucalypt forest with thick shrubby understorey, often with nearby grassy areas and rainforest margins.	Low	Preferred habitat not present. No BioNet records within the locality. Not considered further.
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	Occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day. Often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	"Forest or woodland, caves are primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Myotis macropus</i>	Southern Myotis	V	-	Generally roost in groups of 10 - 15 close to bodies of water, rainforest streams, large lakes and reservoirs. Roosts in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and in dense foliage.	Low	Lack of preferred habitat in the form of open waterbodies for foraging, may occur in locality associated with waterways and dams. Not considered further.
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V	-	Lowland subtropical rainforest and wet and swamp eucalypt forest, extending to adjacent moist eucalypt forest. Coastal rainforest and patches of coastal scrub are favoured. Roosts in tree hollows, the	Moderate	Potential foraging habitat occurs in the site. BioNet



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
				hanging foliage of palms, in dense clumps of foliage of rainforest trees, under bark and in shallow depressions on trunks and branches, among epiphytes, in the roots of strangler figs, among dead fronds of tree ferns and less often in buildings.		records in the locality. AoS undertaken.
<i>Petauroides volans</i>	Southern Greater Glider	E	E	Ranges and coastal plains of eastern Australia, where it inhabits a variety of eucalypt forests and woodlands. Feeds on Eucalyptus leaves, with some buds and flowers, favoured species vary regionally. Prefers large hollows in large old trees.	Low	Preferred habitat not present. Not considered further.
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	V	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Dens in tree hollows of large trees, often in family groups. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Low	Preferred habitat not present. Not considered further.
<i>Petaurus norfolcensis</i>	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. Prefers mixed species stands with a shrub or Acacia midstorey.	Low	Preferred habitat not present. May occur in greater locality associated with larger intact patches of forest. Not considered further.
<i>Petrogale penicillata</i>	Brush-tailed Rock Wallaby	E	V	North-facing cliffs and dry eucalypt forest and woodland, inhabiting rock crevices, caves, overhangs during the day, and foraging in grassy areas nearby at night.	Low	Preferred habitat not present. Not considered further.
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	-	"Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter with hollow-bearing trees. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Tree hollows with entrances 2.5 - 4 cm wide.	Low	Preferred habitat not present. Not considered further.
<i>Phascolarctos cinereus</i>	Koala	E	E	Appropriate food trees in forests and woodlands, and treed urban areas. Ideally rainfall 700-1500 mm but can be found in more extreme environments. Home ranges for individuals vary widely from 3-500ha. Utilise more than 400 species of tree, with localised preferences.	High	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Planigale maculata</i>	Common Planigale	V	-	Rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas with surface cover close to water.	Low	Preferred habitat in the form of dense understorey not present. May occur in

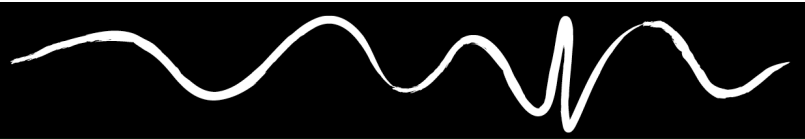


Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
						greater locality with larger patches of vegetation. Not considered further.
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	Low	Preferred habitat in the form of dense understorey not present. May occur in greater locality with larger patches of vegetation. Not considered further.
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	Occurs in open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. Social animal, living predominantly in burrows shared with other individuals.	Low	Preferred habitat not present. May occur in greater locality with larger patches of vegetation. Not considered further.
<i>Pseudomys oralis</i>	Hastings River Mouse	E	E	Dry open forests with dense, low groundcover with diverse mix of ferns, grass, sedges and herbs.	Low	Preferred habitat not present. Not considered further.
<i>Pteropus poliocephalus</i>	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. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	High	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Scoteanax rueppellii</i>	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. Roosts most commonly in hollows but has been known to utilise building and structures (bridges and culverts).	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.
<i>Syconycteris australis</i>	Common Blossom-bat	V	-	Feeds in heathland and paperbark swamps; roosts in littoral rainforest. Also recorded in subtropical rainforest, wet sclerophyll forest and other coastal forests.	Moderate	Potential foraging habitat occurs in the site. BioNet records in the locality. AoS undertaken.



Scientific Name	Common Name	Status		Habitat Requirement	Potential of occurrence	Outcome – Assessment of Significance?
		BC Act	EPBC Act			
<i>Thylogale stigmatica</i>	Red-legged Pademelon	V	-	Rainforest, vine scrub, moist eucalypt forest with dense understorey and ground cover.	Low	Preferred habitat not present. Not considered further.
Reptiles						
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	E	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils.	Low	Occurs more prominently around scenic rim and NSW/ QLD border. No BioNet records within the locality. Not considered further.
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	-	Rainforest and eucalypt forests and rocky areas up to 950 m.	Low	Preferred habitat not present. Not considered further.

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



Appendix I

Tests of Significance



Assessments of Significance (BC Act)

Based on Likelihood assessments and the site assessment, tests of significance ('five-part tests') under Section 7.3 of the BC Act have been completed for the following threatened entities:

Threatened Ecological Communities:

- *Swamp Sclerophyll Floodplain Forest of the New South Wales North Coast, Sydney Basin and South- East Corner Bioregions.*

Frogs:

- Wallum Froglet (*Crinia tinnula*).

Birds:

- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*).
- South-Eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*).
- Varied Sittella (*Daphoenositta chrysoptera*).
- Little Lorikeet (*Glossopsitta pusilla*).
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).
- Little Eagle (*Hieraaetus morphnoides*).
- White-throated Needletail (*Hirundapus caudacutus*).
- Square-tailed Kite (*Lophoictinia isura*).
- Barking Owl (*Ninox connivens*).
- Powerful Owl (*Ninox strenua*).
- Masked Owl (*Tyto novaehollandiae*).

Arboreal Mammals:

- Koala (*Phascolarctos cinereus*).

Bats:

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*).
- Little Bent-winged Bat (*Miniopterus australis*).
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*).
- Eastern Long-eared Bat (*Nyctophilus bifax*).
- Grey-headed Flying-fox (*Pteropus poliocephalus*).
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).
- Common Blossom-bat (*Syconycteris australis*).

The above species have been grouped and assessed below owing to their similar preference for habitat being impacted by the proposal.

The potential direct impacts from the Activity include:

- The direct removal of six native trees and eight introduced, including:
 - 4 x immature/regrowth Broad-leaved Paperbark (*Melaleuca quinquenervia*).
 - 1 x immature Black She Oak (*Allocasuarina littoralis*).
 - 1 x Coastal Cypress Pine (*Callitris columellaris*).
 - 8 x introduced Slash Pine (*Pinus elliottii*).
- Impact to fauna habitat, including:



- The direct removal of four immature/regrowth Broad-leaved Paperbark at culvert/ stormwater upgrade areas and at road edge.
- The direct removal of one Glossy Black-cockatoo feed tree (immature Black She Oak) at road edge.

Indirect impacts may include:

- Minor temporary impacts on water quality within the waterways by way of potential sediment runoff.
- Direct mortality or injury to fauna during vegetation clearing (although unlikely).
- Habitat degradation of adjacent habitat due to potential clearing phase impacts (e.g. erosion and sedimentation impacts or chemical spills).
- Unintentional damage to adjacent habitat and habitat features during clearing.

The following is to be taken into account for the purposes of determining whether a proposed development or Activity is likely to significantly affect threatened species or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the proposed development or activity 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,***

Frogs: Threatened frog habitat predominately exists outside the Activity area where remnant native vegetation associated with PCT 4004 exists adjacent to the site. The proposed Activity would involve a relatively small extent of impacts to native groundcovers and select trees along the existing road verge/corridor within existing disturbed areas. Habitat beyond the immediate impact areas would remain intact and are not expected to be impacted directly/ indirectly. Vegetation removal required for the works would be minor in the context of available habitat within the surrounding locality. Due to the linear alignment, and the works predominantly being sited within previously disturbed areas, it is unlikely that the Activity would impede or limit any movement of individuals within the area or reduce the breeding ability of any of the subject species.

Birds: The proposed Activity would involve minor vegetation removal of native vegetation (six x native trees and eight x introduced trees) along existing road corridor and the removal of disturbed grassland for ancillary sites. The impact of this vegetation is not considered significant for nesting/ roosting habitat for any of the subject species. Vegetation removal required for the works would be minor and largely within areas of maintained/ disturbed grassland. The small extent of PCT 4004 mapped within the site is unlikely to be directly impacted. In the context of the species home ranges or habitat requirements, a negligible amount of foraging resources would require removal. Being highly mobile, none of the subject species would be likely to be significantly impacted by the Activity (directly or indirectly). As such, the Activity is unlikely to have an adverse effect on the life cycle of such species such that a viable local population would be placed at risk of extinction.

Koala: Disturbance for the Activity would result in a narrow corridor of impacts to groundcovers, shrubs and select trees along the road verge and ancillary locations. Vegetation impacts involve removal of six x native trees and eight x introduced trees along existing road corridor and the removal of disturbed grassland for ancillary sites. None of the impacted trees are associated with Koala feed trees, however Koala feed trees are known to occur within remnant vegetation adjacent to the site and there is potential for the species to occur within the locality based on high number of BioNet records. Impacts associated with the proposed Activity would form a negligible part of the foraging and sheltering requirements of the Koala, and dispersal ability would not be impaired. As such the Activity is unlikely to have an adverse effect on the life cycle of such species such that a viable local population would be placed at risk of extinction.

Bats: Disturbance for the Activity would not significantly affect resources (foraging, shelter/ camps) for the GHFF. Vegetation removal required for the works would be minor in the context of available



foraging resources within the greater locality. As such the Activity is unlikely to have an adverse effect on the life cycle of such species such that a viable local population would be placed at risk of extinction.

In regard to threatened microbats, disturbance for the Activity would result in a narrow corridor of impacts to groundcovers, shrubs and select trees along the road verge and ancillary site. No hollow-bearing trees were identified in the site, and none will be impacted as a result of the Activity. Impacts would form a negligible part of the foraging and sheltering requirements of any of the subject microbats, and dispersal ability would not be impaired. As such the proposal is unlikely to have an adverse effect on the life cycle of microbat species such that a viable local population would be placed at risk of extinction.

b) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

- 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,***

PCT 4004 corresponds to Swamp Sclerophyll Floodplain Forest TEC, the community occurs along the edge of the existing road corridor. The proposed Activity is unlikely to directly impact this community, however indirect impacts may occur due to its immediate proximity to the site. The proposed Activity would predominately occur adjacent to Swamp Sclerophyll Forest within areas of maintained/disturbed grassland. Potential indirect impacts associated with the Activity include unintentional sedimentation if stormwater is not managed appropriately or unintentional damage to adjacent habitat and habitat features during clearing. Indirect impacts can be managed through appropriate mitigation measures proposed in the REF. With the implementation of appropriate mitigation measures it is unlikely that the Activity would significantly impact Swamp Sclerophyll Floodplain Forest TEC to the extent that local occurrence is likely to be placed at risk of extinction.

c) *in relation to the habitat of a threatened species or ecological community:*

- i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and***

The proposed Activity would result in the direct removal of six x native trees and eight x introduced trees along existing road corridor and the removal of disturbed grassland for ancillary sites. The impact is confined to a narrow corridor of impacts to groundcovers, shrubs and select trees along the road verge and ancillary locations. The potential for minor indirect impact to Swamp Sclerophyll Floodplain Forest TEC may occur if not mitigated however with the implementation of safeguards it is unlikely to be impacted nor it be considered significant.

- ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and***

The Activity requires small lineal disturbance to habitat (direct removal of six x native trees and eight x introduced trees) for the subject species, in association with areas already partly modified or fragmented by the existing road corridor. Proposed works required for the Activity are at a small scale and it is unlikely to exacerbate fragmentation than what already exists, nor would the Activity reduce the ability for dispersal, breeding, or genetic exchange between any of the subject species or TECs.

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

Swamp Sclerophyll Forest TEC: PCT 4004 corresponds to Swamp Sclerophyll Floodplain Forest TEC, the community occurs along the edge of the existing road corridor. The proposed Activity is unlikely to directly impact this community, however indirect impacts may occur due to its immediate proximity to the site. The proposed Activity would predominately occur adjacent to Swamp Sclerophyll



Forest within areas of maintained/disturbed grassland, with indirect impacts to PCT 4004 being mitigated through appropriate site safeguards. As a result, no fragmentation or loss of important habitat would occur in relation to the proposed Activity. It is unlikely that the Activity will significantly impact the long-term occurrence of Swamp Sclerophyll Forest TEC in the locality.

Frogs: The habitat to be removed for the Activity is unlikely to be important for breeding for the frog species in the context of connected remnant habitat within the locality. The proposed works would marginally impact vegetation on the edge of existing roads and culverts which mainly serves as marginal dispersal, foraging and sheltering habitat for amphibian species.

Birds: The habitat to be removed for the Activity is unlikely to be important for foraging, roosting, refuge, or breeding for any of the subject species in the context of accessible native vegetation in the locality.

Koala: The habitat to be removed for the Activity is unlikely to be important for foraging, refuge, or breeding for any for the species in the context of accessible native vegetation in the locality.

Bats: The habitat to be removed for the Activity is unlikely to be important for foraging or roosting for the GHFF in the context of in the context of accessible native vegetation in the locality. In regard to microbats, the habitat to be removed for the Activity is unlikely to be important for foraging, roosting or breeding for any microbat species in the context of accessible native vegetation in the locality.

Considering the relatively small area impacted by the Activity and the availability of similar or better-quality foraging, sheltering and dispersal habitats nearby and in the broader locality the habitat affected is not considered significant to the long-term survival of the subject species within the locality.

d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

No areas of outstanding biodiversity value occur at or in proximity to the site.

e) *whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

A Key Threatening Process (KTP) is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population, or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 39 listed KTPs. The Activity would be consistent with the following KTPs related to threatened species:

- *Clearing of native vegetation* – removal of up to 0 direct removal of 6 x native trees within the existing road corridor.
- *Invasion of native plant communities by exotic perennial grasses:* Exotic grasses occur infrequently in some disturbed areas and road verges. There is potential that the Activity may spread grass seed into areas of native vegetation or introduce propagules of other invasive grasses to the site. Mitigation measures incorporating hygiene controls will minimise this risk and would unlikely significantly exacerbate this KTP.

In the context of the lower quality of the habitat along road verge/corridor and retained areas of equal or better quality habitat adjacent to the sites, the degree that the Activity would contribute to any threatening process 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 / communities will be placed at significant risk of extinction as a result of the Activity.



Assessments of Significance (EPBC Act)

For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Department of the Environment 2013). These significance assessments have been prepared for the following threatened species:

- Coastal swamp sclerophyll forest of New South Wales and South East Queensland ecological community listed as Endangered under the EPBC Act.
- Glossy Black Cockatoo (*Calyptorhynchus lathami lathami*) listed as Vulnerable under the EPBC Act.
- Koala (*Phascolarctos cinereus*) listed as Endangered under the EPBC Act.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as Vulnerable under the EPBC Act.
- White-throated Needletail (*Hirundapus caudacutus*) listed as Vulnerable under the EPBC Act.

Significant Impact Assessment - Critically endangered and endangered species listed under the EPBC Act

Significant impact criteria: An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *Lead to a long-term decrease in the size of a population.*
- *Reduce the area of occupancy of the species.*
- *Fragment an existing population into two or more populations.*
- *Adversely affect habitat critical to the survival of a species.*
- *Disrupt the breeding cycle of a population.*
- *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.*
- *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.*
- *Introduce disease that may cause the species to decline.*
- *Interfere with the recovery of the species.*

Definitions: A 'population of a species' is an occurrence of the species in a particular area. In relation to critically endangered, endangered, or vulnerable threatened species, occurrences include but are not limited to:

- *geographically distinct regional population, or collection of local populations, or*
- *a population, or collection of local populations, that occurs within a particular bioregion.*

Assessments have been completed for two endangered or critically endangered species including Coastal Swamp Sclerophyll Forest and Koala.

An assessment of the potential impact of the proposed action on the subject species (as above) with reference to the significant impact criteria as follows. An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of a population?**

Coastal Swamp Sclerophyll Forest: PCT 4004 corresponds to Swamp Sclerophyll Floodplain Forest TEC, the community occurs along the edge of the existing road corridor. The proposed Activity is unlikely to directly impact this community, however indirect impacts may occur due to its immediate proximity to the site. The proposed Activity would predominately occur adjacent to Swamp Sclerophyll Forest within areas of maintained/disturbed grassland. Potential indirect impacts associated with the Activity include unintentional sedimentation if stormwater is not managed appropriately or



unintentional damage to adjacent habitat and habitat features during clearing. Indirect impacts can be managed through appropriate mitigation measures proposed in the REF. With the implementation of appropriate mitigation measures it is unlikely that the Activity would significantly impact Swamp Sclerophyll Floodplain Forest TEC to the extent that it would cause a long-term decrease in the extent of this TEC across its distribution.

Koala: Disturbance for the Activity would result in a narrow corridor of impacts to groundcovers, shrubs and select trees along the road verge and ancillary locations. Vegetation impacts involve removal of six x native trees and eight x introduced trees along existing road corridor and the removal of disturbed grassland for ancillary sites. None of the impacted trees are associated with Koala feed trees, however Koala feed trees are known to occur within remnant vegetation adjacent to the site and there is potential for the species to occur within the locality based on high number of BioNet records. Impacts associated with the proposed Activity would form a negligible part of the foraging and sheltering requirements of the Koala, and dispersal ability would not be impaired. As such the Activity would be unlikely to lead to a long-term decrease in the size of the local population of the Koala.

■ **Reduce the area of occupancy of the species?**

The proposed Activity would involve minor vegetation removal of native vegetation (six x native trees and eight x introduced trees) along existing road corridor and the removal of disturbed grassland for ancillary sites. Due to the relatively minor extent of habitat/ vegetation to be impacted is it unlikely that the Activity would reduce or limit the area of occupancy for Koala or Coastal Swamp Sclerophyll Forest.

■ **Fragment an existing population into two or more populations?**

The proposed Activity would involve minor vegetation removal of native vegetation (six x native trees and eight x introduced trees) along existing road corridor and the removal of disturbed grassland for ancillary sites. The Activity area occurs within areas already partly modified or fragmented by existing road corridor. Works required for the Activity are at a relatively small scale (and would not reduce the ability for dispersal, breeding, or genetic exchange between any of the subject species or TECs. As such it is unlikely the Activity would fragment an existing population into two or more

■ **Substantially adversely affect habitat critical to the survival of a species?**

The proposed Activity would involve minor vegetation removal of native vegetation (six x native trees and eight x introduced trees) along existing road corridor and the removal of disturbed grassland for ancillary sites. Indirect impacts to Swamp Sclerophyll TEC will be mitigated through appropriate site control measures. In regard to Koala, vegetation to be impacted would likely only be opportunistically utilised by the species across its home range and wouldn't be considered critical habitat for the species within the locality. Overall, the habitat to be removed for the Activity is unlikely to be important for foraging, refuge, or breeding for any of the subject entities in the context of accessible native vegetation in the locality and the negligible extent of impacts as a result of the Activity. As such, the proposed Activity is unlikely to have a significant impact on habitat critical to survival of the subject species/ TECs.

■ **Disrupt the breeding cycle of a population?**

Disturbance for the Activity would result in a narrow corridor of impacts to groundcovers, shrubs and select trees along the road verge and ancillary sites. These impacts would form a negligible part of the foraging and sheltering requirements of any of the subject species. As such the Activity is unlikely to have a significant disruption to the breeding cycle of any local populations of subject species.

■ **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?**



The habitat to be impacted for the Activity is unlikely to be important for foraging, refuge, or breeding for any of the subject species in the context of accessible areas of native vegetation in the locality. It is unlikely that the Activity would significantly impact habitat that would lead to the species to decline. Potential indirect impacts to Swamp Sclerophyll Floodplain Forest TEC is unlikely to be significant given the implementation of mitigation measures.

- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?**

The risk of any invasive species (pests or pathogens) affecting habitat for the species is relatively low and would be mitigated by prescribed biosecurity strategies/ mitigation measures.

- **Introduce disease that may cause the species to decline?**

The Activity would be unlikely to introduce any disease that may cause the subject species to decline.

- **Interfere with the recovery of the species?**

The Activity would be unlikely to interfere with the recovery of subject threatened species/ TECs due to relatively low impacts within small areas of marginal habitat within the greater context of the accessible areas of reserved land and remnant vegetation.

Conclusion

Overall due to the relatively low impacts associated with the Activity, it is unlikely that the proposed Activity would result in a significant impact to any listed threatened entity.

Significant Impact Assessment - Vulnerable species listed under the EPBC Act

Significant impact criteria: *An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:*

- *lead to a long-term decrease in the size of an important population;*
- *reduce the area of occupancy of an important population;*
- *fragment an existing population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of an important population;*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

Definitions: *An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:*

- *key source populations either for breeding or dispersal;*
- *populations that are necessary for maintaining genetic diversity, and/ or*
- *populations that are near the limit of the species range.*

Assessments have been completed for several vulnerable species including South-Eastern Glossy Black-Cockatoo, Grey-headed Flying-fox and White-throated Needletail.

South-Eastern Glossy Black-Cockatoo



Based on the definition above, Glossy Black-Cockatoo residents within the Activity area do not form part of an 'important population' as:

- The Activity area consists of a relatively small area of habitat across an extensive home range (Queensland, through eastern New South Wales to East Gippsland, Victoria), where the species is estimated to occupy ~ 40,000 km² within an area of occurrence of ~ 470,000 km² (Department of Climate Change Energy the Environment and Water, 2023b). On this basis Glossy Black-Cockatoos in the locality would be unlikely to represent a key source population for breeding or dispersal.
- Due to the species' extensive geographic range, animals within the locality would be unlikely to be necessary for maintaining genetic diversity.
- The Activity area and surrounding locality are not at the extent of the species' distributional limits.

Grey-headed Flying-fox

Based on the definition above, Grey-headed Flying-fox residents within the Activity area do not form part of an 'important population' as:

- The Activity area consists of a relatively small area in the context of the species extensive home range (from Rockhampton in central Queensland to Melbourne in Victoria). On this basis Grey-headed Flying-fox in the locality would be unlikely to represent a key source population for breeding or dispersal.
- Due to the species' extensive geographic range, animals within the locality would be unlikely to be necessary for maintaining genetic diversity.
- The Activity area and the surrounding locality are not at the extent of the species' distributional limits.
- No breeding camps occur within the site or in close proximity to the site

White-throated Needletail

Based on the definition above, White-throated Needletail residents within the Activity area do not form part of an 'important population' as:

- The Activity area consists of a relatively small area of habitat in the context of the species extensive home range (In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains), where the species is estimated to occupy ~ 126,200 km² within an area of occurrence of ~ 1,000,000–10,000,000 km². On this basis White-throated Needletail in the locality would be unlikely to represent a key source population for breeding or dispersal.
- Due to the species' extensive geographic range, animals within the locality would be unlikely to be necessary for maintaining genetic diversity.
- The Activity area and the surrounding locality are not at the extent of the species' distributional limits.

Of the above-mentioned species, no subject species are considered to meet the definition of an 'important population' as they unlikely to be key source population, important for maintain genetic diversity or at the limit of their species range. For this reason, not all questions for these entities are considered below.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- **Lead to a long-term decrease in the size of an important population**

Not applicable for species not a part of an important population (as mentioned above).

- **Reduce the area of occupancy of an important population**



Not applicable for species not a part of an important population (as mentioned above).

- **Fragment an existing important population into two or more populations**

Not applicable for species not a part of an important population (as mentioned above).

- **Adversely affect habitat critical to the survival of a species**

The habitat to be removed/ disturbed represents a small portion of available habitat for any of the mentioned species. Due to the minor nature of impact, it is unlikely that the proposed works would adversely affect habitat which would compromise the survival of any of the mentioned species.

- **Disrupt the breeding cycle of an important population**

Not applicable for species not a part of an important population (as mentioned above).

- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposed Activity would involve minor vegetation removal of native vegetation (six x native trees and eight x introduced trees) along existing road corridor and the removal of disturbed grassland for ancillary sites. Due to the linear alignment, and the works predominantly being sited within previously disturbed areas, it is unlikely that the Activity would impede or limit any movement of individuals within the area or reduce the breeding ability of any of the subject species. Overall, it is unlikely that the disturbance of habitat would result in a significant impact to the habitat of the any mentioned threatened species that it would result in the decline of the species population.

- **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The risk of any invasive species (weeds, pests, or pathogens) affecting habitat for threatened species is relatively low and would be mitigated by the prescribed biosecurity measures. It is unlikely that the Activity would result in the exacerbation of invasive species than would already exist within the locality.

- **Introduce disease that may cause the species to decline, or**

The Activity would be unlikely to introduce any disease associated with mentioned threatened fauna that may cause the species to decline, provided frog hygiene protocols are followed.

- **Interfere with the recovery of the species**

In relation to threatened fauna, the Activity would be unlikely to interfere with the recovery of the species in the context of the low impacts.

Conclusion

Overall due to the relatively low extent and magnitude of impacts associated with the Activity, it is unlikely that the proposed Activity would result in a significant impact to any listed threatened entities.