Review of Environmental Factors – Road Repairs

Keevers Drive / Bellinger River

Bellingen Shire Council

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Executive summary

This Review of Environmental Factors (REF) has been prepared by Eco Logical Australia Pty Ltd (ELA) under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) on behalf of the Bellingen Shire Council (BSC). This REF assesses the potential environmental impacts associated with the road upgrade of Keevers Drive and bank work along the Bellinger River in the area of Raleigh.

The works are part of road safety improvements for flood affected sites within the BSC Local Government Area (LGA). Recent extreme weather and flooding in the BSC LGA has caused damage to public infrastructure including roads, bridges, and stormwater assets.

This REF considers the matters affecting or likely to affect the environment by reason of the proposal, including any mitigation measures to be implemented as part of the Proposed Works. To support the preparation of this REF, a review of previous reports and database information, site investigations and assessments has been carried out.

Proposed Works

Proposed Works to be undertaken include detailed design, additional ground investigations and the construction of road and riverbanks. The appointed contractor will be responsible for the following:

- Site preparation including sediment controls, site establishment, site compound and stockpile sites
- Vegetation clearing and earthworks
- All construction activities to facilitate the proposed restoration method
- Site restoration on completion of works including topdressing / turfing levees.

The impact area (works) is planned to start in October 2022 and would take up to 4 months. This REF assesses the impact area associated with a flood damaged location on Keevers Drive where bank erosion has destabilised of the bank of the Bellinger River. The site is to the north and adjacent to previously assessed sites 1375 and 1378.

This site has a 40 m length of riverbank embankment slumping impacting creating tension cracks within the road. The proposed repairs include:

- Bulk excavation of the existing riverbank to remove vegetation and loose material. Excavation estimates, approximately 3 m^3 per metre length.
- Placement of a heavy duty geofabric (Bidim A34 or similar) over the base and rear of the excavation before placement of approximately 9.75 m^3 per metre length of chemically inert angular rockfill that is approximately 1 m wide with a 1.5H:1V batter.
- Reinstate guard rails and any signage that is removed.

Refer Figure 0-1 and Figure 0-2 for locational context.

Figure 0-1: Regional Site Context

Figure 0-2: Local Site Context

Key Environmental Impacts

The Proposed Works would have some adverse impacts during construction and longer-term positive impacts. Adverse impacts would be managed by the implementation of mitigation measures as described in Chapter 7 of the REF. The main environmental impact associated with the Proposed Works are described below.

Terrestrial Biodiversity

The site contains two PCTs:

- 1235 – Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion
- 918 – Mangrove - River Mangrove low closed forest of the NSW Coastal Bioregion.

PCT918 at the site consists of 11 *Aegiceras corniculatum* (River Mangrove). This marine vegetation is assessed in Section 6.3. PCT1235 at the site corresponds to *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* listed as an Endangered Ecological Community (EEC) under the BC Act. The vegetation at the site is in poor condition, however there are no condition thresholds for the listed community under the BC Act. The PCT1235 vegetation within the site does not meet the condition thresholds for the *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* listed as an EEC under the EPBC Act due to the small size of the patch and dominance of exotic species in the understorey.

The site contains a narrow strip of low condition, modified swamp forest vegetation between the road and river. It is unlikely this area would provide important resources or be relied upon by any local populations of threatened fauna in the locality.

One small hollow was recorded within the lower trunk of a *Casuarina glauca*. The hollow was easily inspected from the ground and no fauna or evidence thereof was present. No other significant habitat features that may provide important breeding or denning were habitat recorded within the study area.

The desktop review identified three listed threatened ecological communities, 15 threatened flora species, 61 threatened fauna species listed under the BC and / or EPBC Acts, which are known or have the potential to occur within a 5 km radius of the subject site.

Aquatic Biodiversity and Waterways

No threatened fish or aquatic flora listed under the Fisheries Management Act 1995 (FM Act) or Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are likely to occur near the works, therefore, the works are not expected to directly impact threatened fish or their habitats. The site is outside of the range of the Bellinger River Snapping Turtle. There will, however, be direct impacts to Key Fish Habitat (KFH) from removal of natural banks and riparian vegetation, loss of juvenile mangroves and reclamation of sandy substrate with a rock wall.

Indirect impacts on downstream or adjacent habitat may occur if mitigation measures are not in place and effective. Potential indirect impacts during construction include turbid water, sediment deposition, and oil and pollutant spills. These impacts can reduce water quality, decrease light penetration through the water and cover natural substrate and seagrass with sediment. This may alter primary (plant) and secondary (animal) production that supports or regulates the aquatic food web.

Works would temporarily partially obstruct fish passage during construction using a silt curtain suspended parallel to the bank excavation. This impact will be minimal given the channel width of 200 m and unlikely chance of trapping many fish. Fish passage adjacent to the construction areas will be restored post construction.

Traffic and Access

During construction, the Proposed Works would cause temporary disruptions to traffic, including reduced speed limits through construction zones, potential increased heavy vehicle movements on the existing road network. During operation, the Proposed Works would provide improved road safety and efficiency for road users within the impact area.

Visual Impact

The visual environment in and near the Proposed Works are typical of a rural setting. The Proposed Works areas are dominated by the natural environment and road infrastructure. Visual impact would occur during work to remove loose material and vegetation. Such impact would include a changed visual environment due to the presence of construction plant and machinery. The main permanent change to the existing visual landscape would be the removal of trees and vegetation along the edge of the road with a noticeable disturbance area, which over time will weather and become a more natural part of the landscape.

Socio-economic Impact

During works, the community would experience temporary traffic delays, some noise and visual amenity impact. These would be minimised by the implementation of mitigation measures and mitigation measures identified in this REF. Despite the impact that would result from the proposal, there would be wider regional and local benefits in the medium to long term through improved safety, access, and connectivity.

Justification and Conclusion

The Proposed Works are consistent with NSW Natural Disaster Essential Public Assets Restoration program to improve road safety in effected locations. While there would be some environmental impacts because of the Proposed Works, they have been avoided or minimised wherever possible through design and site-specific mitigation measures. The benefits are considered to outweigh the adverse impact.

The Proposed Works are subject to assessment under Division 5.1 of the EP&A Act. This REF has fully examined and considered possible all matters affecting or likely to affect the environment by reason of the proposed activity. The Proposed Works would be unlikely to cause a significant impact on the environment.

Based on the current scope of works, the Proposed Works would require the following additional permits:

- Disturbance to the bed and bank will require a joint permit under section 200 and section 205 for dredging and reclamation works and harm to marine vegetation under Part 7 of the FM Act.

A Construction Environmental Management Plan (CEMP) and associated sub-plans will be developed prior to the commencement of the works. All mitigation measures set out in this REF will be incorporated into the site-specific CEMP and adopted for the duration of works, or longer as required.

In addition, the Proposed Works will not have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act.

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Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BC Act	*Biodiversity Conservation Act 2016*
CEMP	Construction Environmental Management Plan
CoP	*Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
BSC	Bellingen Shire Council
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, Environment and Water (Formerly DAWE)
DPE	Department of Planning and Environment
ELA	Eco Logical Australia Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FM Act	*Fisheries Management Act 1994*
LEP	*Local Environmental Plan*
LGA	Local Government Area
LLS	*Local Land Services Act 2013*
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PCT	Plant Community Type
POEO Act	*Protection of the Environment Operations Act 1997*
PWA	Public Works Advisory
REF	Review of Environmental Factors
RSWMP	Regional Strategic Weed Management Plans
SDS	*Safety Data Sheets*
SEPP	*State Environmental Planning Policy*
SoHI	State of Heritage Impact
WIRES	Wildlife Information, Rescue and Education Service
WM Act	*Water Management Act 2000*

1. Introduction

1.1. Background

ELA was engaged by BSC to prepare a REF for storm/flood impacted site within the BSC LGA. The environmental assessment of the Proposed Works has been undertaken in accordance with Part 5 of the EP&A Act.

BSC is both a public authority proponent (EP&A Act s5.3) and the determining authority (EP&A Act s5.1). This REF has assessed all environmental factors listed in Part 8, Division 1, clause 171 of the *Environmental Planning & Assessment Regulation, 2021* (EP&A Reg); and outlined impact mitigation measures to be undertaken, in line with BSC's policies and procedures. Table 1-1 below outlines the proponent contact details.

Table 1-1: Proponent details

Proposed Works Name	Review of Environmental Factors – Bellingen Flood Recovery
Proponent Name	Public Works Advisory (PWA) (on behalf of BSC)
Proponent's Project Manager	Sam Mackie
Position	Project Manager, RESFAC, North Coast Region
Contact details	sam.mackie@pwa.nsw.gov.au

The findings of the REF would be considered when assessing:

- whether the Proposed Works are likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning 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 (BDAR);
- the significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured; and
- the potential for the Proposed Works to significantly impact any other MNES or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

The reason for this REF is because significant infrastructure damage occurred across the Bellingen region from extreme weather and flooding over the period March 2021 to March 2022. Low lying areas were particularly impacted by inundation, with several public assets destroyed or damaged, including roads, bridges and stormwater assets.

1.1.1. REF Definitions

The '*impact area'* refers to the area in which the Proposed Works, once constructed, would be located. This area reflects the outer design string in the Proposed Works provided by BSC.

The '*study area*' is the area including construction area for ancillary works, facilities and access for the construction or operation of the Proposed Works and a 10 m buffer, being the broadest possible area within which the proposed assessment.

1.2. Impact area Location and Context

At a regional scale, the LGA and impact area is situated midway between Sydney and Brisbane, on the New South Wales (NSW) Mid-North coast. Coffs Harbour is located 19 km north of the impact area, Nambucca Heads 21 km south and Port Macquarie a further 82 km south and Bellingen 11 km to the west.

The impact area will take place along the western bank of the tidal Bellinger River along Keevers Drive, Raleigh. The construction area for the site will take place within the road reserve and along the edge (both bed and bank) of the Bellinger River. The sites are adjacent to the following properties identified in Table 1-2.

Table 1-2: Site Locations

Site	Road	Nearest address	Nearest Lot and DP
2273	Keevers Drive	1145 North Bank Road, Raleigh	1 / DP1188763

The impact area is located along the steep western bank of Bellinger River and are situated in a low-lying, flat and gently undulating floodplain. The area is predominantly cleared for agricultural purposes. The site is bordered by the Bellinger River to the east and Keevers Drive the west. Land to the west of Keevers Drive is cleared pastoral land and the Pacific Highway.

Vegetation at the subject site has been previously disturbed and is dominated by exotic species with native remnant vegetation present. It is consistent with road and river side vegetation within the area.

The soils are within the Raleigh Landscape include alluvial levee / overbank deposits that include fluvially deposited quartz rich sand, silt and clay. The NSW Government 'eSPADE' online mapping indicates that the site has an elevation of between 2m and 4m Australian Height Datum (AHD) and is located within an area that has a high probability of occurrence of ASS between 1 m and 3 m below the ground surface and mapped Class 3 potential acid sulfates under the Bellingen Local Environmental Plan 2010 (Bellingen LEP).

Construction is planned to start in October 2022 and would take up to 6 months. The site is identified in Figure 1-2 and Figure 1-2.

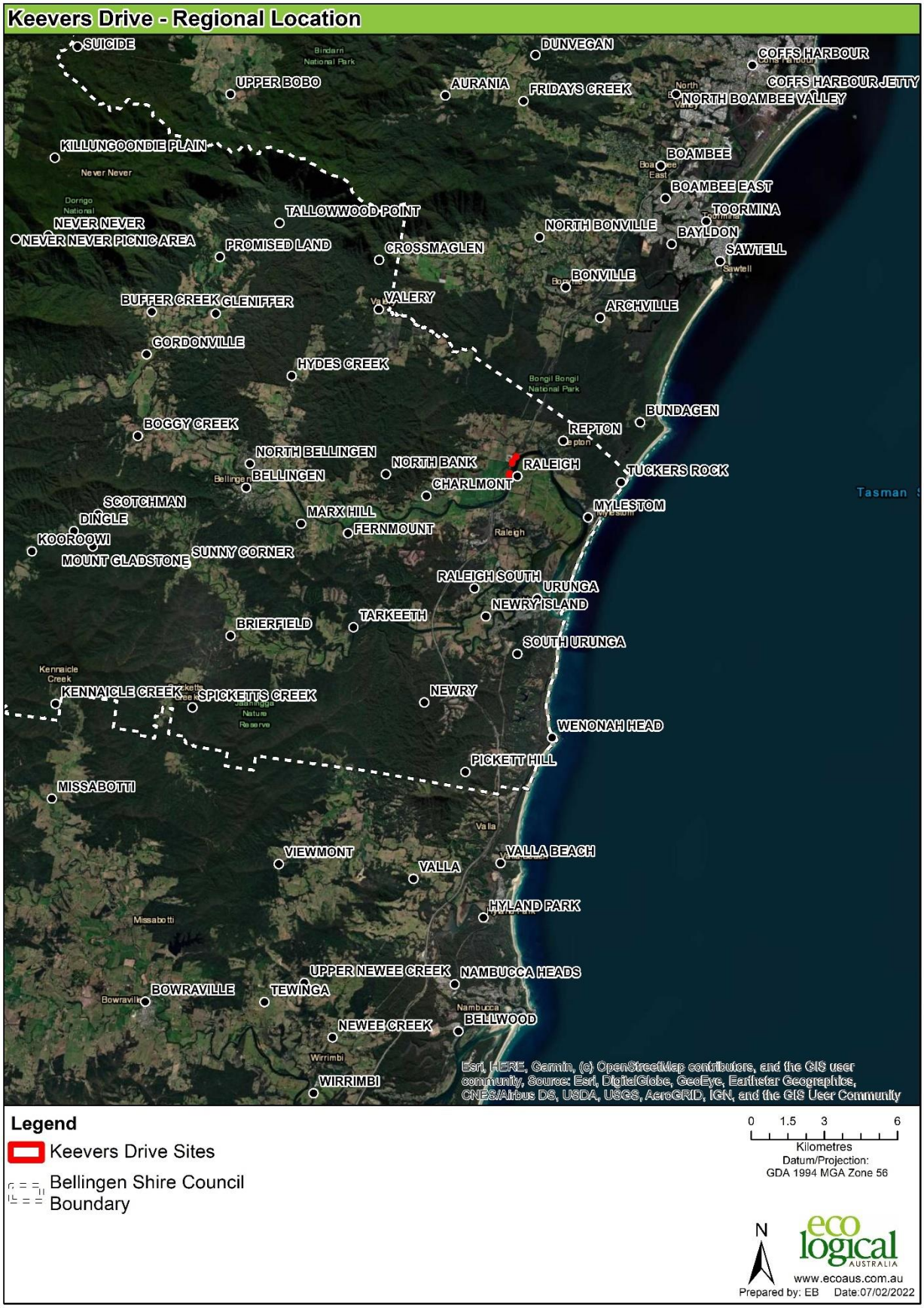

Figure 1-1: Regional location of REF site

Figure 1-2: REF site impact area – Keevers Drive

Vegetation at the study area has been previously disturbed but is generally dominated by native species with exotic vegetation. It is consistent with roadside vegetation within the immediate area. The soils are within the site are mapped as Raleigh Landscape. The NSW Government 'eSPADE' online mapping indicates that the site has an elevation of between 0 m and 10 m Australian Height Datum (AHD) and is located within an area that has a medium probability of occurrence of acid sulfate soils (ASS). The site is mapped potential acid sulfates under the *Bellingen Local Environmental Plan 2010* (Bellingen LEP).

1.3. Existing Land Ownership and Use

1.3.1. Land Ownership

The Impact area will be contained predominantly within road reserve within the following land, listed in Table 1-3.

Table 1-3: Properties affected by impact area, and their ownership

Property	Ownership
Keevers Drive	Council managed land
Bellinger River	Crown Land

1.3.2. Land Use

The impact area is predominantly zoned RU1 (Primary Production), with parts of the area zoned W2 (Recreational Waterway) the Bellinger River and a part of Compound 1 located in SP2 (Infrastructure). The land use zoning and associated objectives in accordance with the BSC LEP are shown in Figure 1-3 and detailed in Table 1-4.

Table 1-4: Land use zoning

Land zone	Objectives of land zone	Conflicts with objectives
RU1 Primary Production	To encourage sustainable primary industry production by maintaining and enhancing the natural resource base. To encourage diversity in primary industry enterprises and systems appropriate for the area. To minimise the fragmentation and alienation of resource lands. To minimise conflict between land uses within this zone and land uses within adjoining zones.	The Proposed Works do not conflict with these objectives as it would not impact on the current use of existing RU1 land zones. The Proposed Works do not conflict with these objectives as it would maintain the efficiency and safety of the surrounding road network.
W2 Recreational Waterways	To protect the ecological, scenic and recreation values of recreational waterways. To allow for water-based recreation and related uses. To provide for sustainable fishing industries and recreational fishing.	The Proposed Works do not conflict with these objectives as it would not impact on the current use of existing W2 land zones. The Proposed Works do not conflict with these objectives as it would maintain the efficiency and safety of the surrounding road network.
SP2 Infrastructure	To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure.	The Proposed Works are for a public road and would be consistent with the objectives.

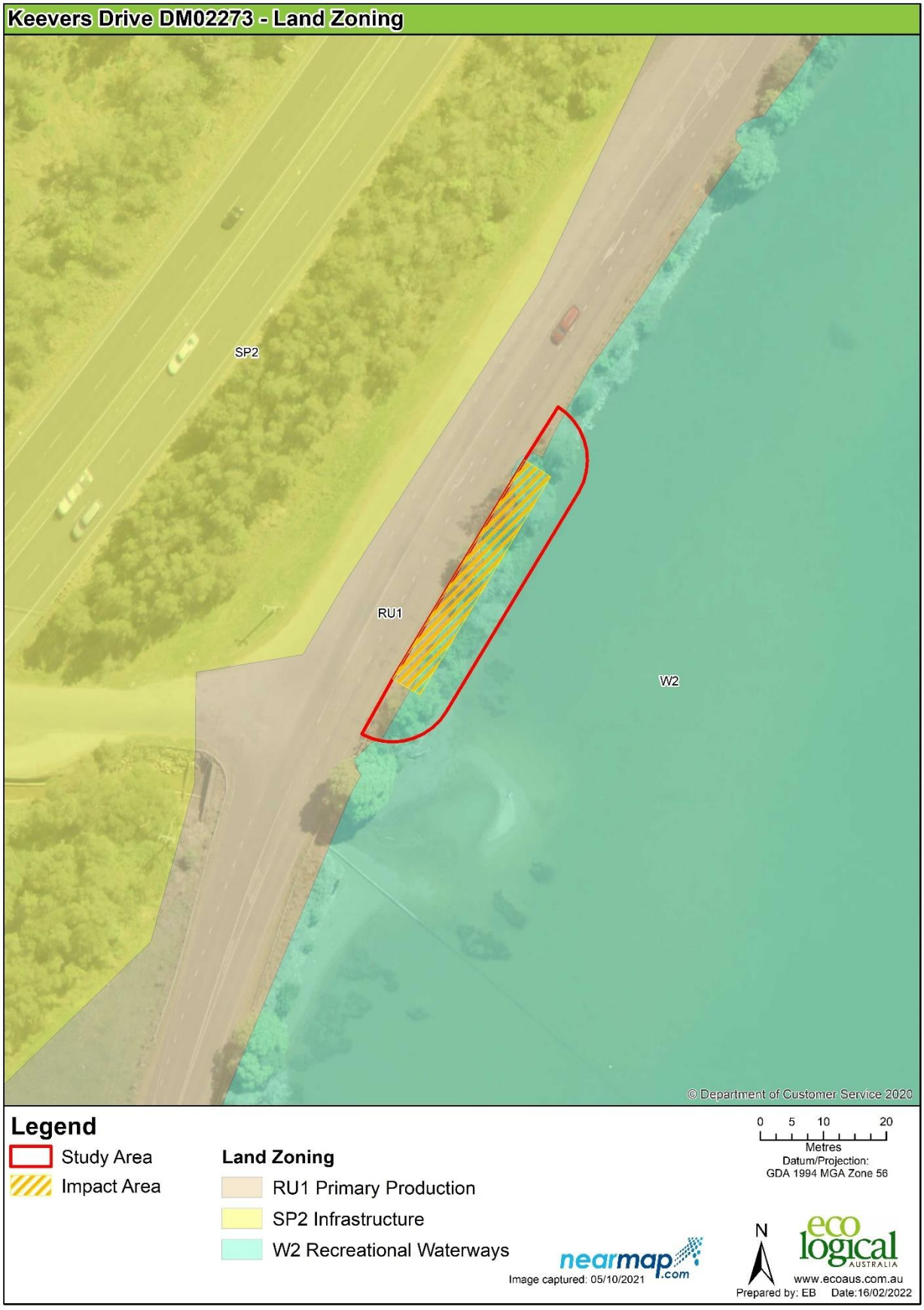

Figure 1-3: Land Zoning

2. Impact area need and options considered

2.1. Need for the proposed activity

The Impact area are considered necessary to address BSC's concerns regarding the safety and connectivity of public road infrastructure in the BSC LGA following damage to essential road infrastructure caused by recent extreme weather events and flooding. The Impact area will also aim to reduce further erosion and land slip along the study areas.

The Impact area is part of the NSW Natural Disaster Essential Public Assets Restoration program and is considered necessary to address BSC's concerns regarding the safety and connectivity of public road infrastructure in the BSC LGA. The key objectives of the Impact area are to:

- **Design Life (Durability):** The designs proposed needed to provide a target design life of 50 years. In addition to the design life, the design options also require maintenance to be minimal to reduce the whole of life design costs.
- **Road Access:** The concept designs proposed need to allow for the road to remain open during construction. The road corridor along Keevers Drive is an important route and the plant used to construct the remedial works need to be appropriately sized.
- **Environmental Constraints:** The site is located adjacent to the Bellinger River. The design of the remediation options needs to restrict direct effects to the river.
- **Safety in Design and Constructability:** Each of the design options must be able to be constructed in a safe and controlled manner. The predominant risks associated with the remediation works are the interaction with traffic and environmental protection of the river.

2.1.1. Do Nothing Scenario and Repercussions

A do-nothing scenario was considered as the base case (Option 1). Taking no action would leave the road in a condition that would compromise the ongoing safety for road users and if left unrepaired would further deteriorate and create greater environmental impact on the surrounding area.

2.1.2. Alternatives Considered

To determine the best "go forward" option, visual assessments where were undertaken and used to build viable options. Design optimisation was assessed based on recommendations from geotechnical engineer, environmental constraints and abovementioned design objectives.

2.2. Justification for the Activity

The Impact area are justified for the following reasons:

- it addresses site specific road safety improvements for the users of Keevers Drive by vehicles;
- the bank works will enhance soil stability and material and vegetation loss; and
- the upgrade will reduce the long-term maintenance costs to BSC and rate payers.

The 'do nothing' option was discounted in all scenarios as it will compromise road safety for users.

3. Description of Impact area

3.1. Impact area

This REF assesses the Impact area associated with flood damage to Keevers Drive and erosion of the adjacent banks at eleven locations. The site is within the Bellingen LGA. The following restoration and construction works will be undertaken as outlined in Table 3-1.

The Impact area more generally involves excavation of the existing bank and table drains at the study areas and reconstructing. Physical works to be undertaken by the construction contractor or other contractors includes:

- site preparation including sediment controls, site establishment, compound, and stockpile sites;
- vegetation clearing and earthworks;
- all construction activities to facilitate the proposed restoration method; and
- site restoration on completion of works including reinstating guard rails and signage, where required.

Table 3-1: Impact area details

Site	Damage details	Proposed concept restoration works	Proposed Works disturbance area
2273	Approx. 40 m of riverbank erosion causing the embankment to slump impacting the road edge and creating tension cracking.	• Bulk excavation of the existing riverbank to remove vegetation and loose material. Excavation estimates, approximately 3 m^3 per metre length. • Placement of a heavy duty geofabric (Bidim A34 or similar) over the base and rear of the excavation before placement of approximately 9.75 m^3 per metre length of chemically inert angular rockfill that is approximately 1 m wide with a 1.5H:1V batter. • Reinstate guard rails and signage.	approximately 0.031 ha.

3.1.1. Work Methodology

The proposed construction sequencing identified below may be subject to change, as determined by the construction contractor and BSC. This REF has been based on the scope of work and methodology presented below and the design concepts above.

A CEMP will be prepared prior to on-ground works. This will specify the requirement for the proposed site compound and stockpiling areas for materials and equipment, and 'no go' zones around environmentally sensitive areas. Detailed work methodologies would be determined during detailed design and construction planning.

3.1.1.1. Site Set-Up and Protection

A CEMP will be prepared to describe the mitigation measures and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to commencement of the Impact area and will be reviewed and certified by the BSC Environment Officer and/or Project Manager, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and sub-plans will be developed in accordance with the specifications set out in:

- *Managing Urban Stormwater: Soils and Construction* (blue book) Landcom, 4th edition, March 2004.
- *Best Practice Erosion and Sediment Control* (BPESC) document (white book), International Erosion Control Association Australasia (IECA) 2008 draft & 2016, draft.

The CEMP will also prescribe controls during the construction period and include all mitigation measures outlined in Chapter 7. In addition, but not limited to, the CEMP will include the following;

- weed control protocols;
- traffic management plan (TMP);
- soil and water management plan (SWMP); and
- spill response plan.

3.1.1.2. Site establishment activities

- machinery and materials would be transported to the site by truck and trailer as well as light vehicles;
- installation of erosion and sediment controls designed in accordance with The Blue Book - Managing Urban Stormwater: Soils and Construction (Landcom, 2004) and included as part of the CEMP;
- establishment of a construction compound and stockpile sites; and
- installation of traffic management measures (in accordance with the traffic control plan).

3.1.1.3. Construction activities

- carrying out of earthworks;
- clearing and grubbing of work areas;
- amelioration of subsoils;
- carrying out rock placement;
- backfill, sub-base and asphalt surfacing; and
- carrying out final work aspects (including pavement marking and road furniture).

3.1.1.4. Rehabilitation activities

- rehabilitation of disturbed areas;
- site clean-up and removal of waste and traffic management measures; and
- solid and liquid wastes would be transported by an appropriately licenced service provider and disposed of at licensed facilities.

3.1.1.5. Types of Materials

The type resources and materials needed to build the Impact area will likely include:

- steel for road furniture;
- rock for scour protection;

- pavement sub-base and base materials;
- asphalt; and
- geofabric.

Water would also be required for construction, which would be trucked into site and there is not expected to be an impact on local water availability. Activities that would require water use include (but are not limited to) compaction, dust suppression and geotechnical investigations.

3.1.1.6. Source of Materials

The Impact area would require clean rock and fill which would be sourced from local quarries where possible. Other construction materials to be imported, including materials needed for construction may include gravel and rock. All materials and equipment would be brought to the works site via road.

3.1.1.7. Plant and Equipment

The following plant and equipment may be required as part of the Impact area:

- trucks (for equipment and material transportation);
- excavators;
- boat for installing silt curtain;
- mobile cranes;
- compressors / generators;
- hand tools such as jack hammers and grinding power tools, paints;
- excavator mulch head;
- traffic control equipment;
- site compound equipment (portable toilets, lockup container);
- environmental controls (sediment fences, sandbags, floating booms, silt curtain); and
- water cart.

3.1.1.8. Ancillary facilities

Site compounds will be located approximately 100 m from each site located on the side of the road. This area would be temporarily fenced and include, shade, toilet and secure bunded area for storage of fuel, oil, and chemicals (if required). Upon completion of the Impact area all these areas would be cleared of all materials, including rubbish, and rehabilitated back to their pre-construction state.

3.1.1.9. Duration and Working Hours

Timing	Description
Work Hours	Work hours will be in accordance with Bellingen Shire Council standard work times detailed below which will minimise impacts to residents in proximity to the works: • Monday to Friday 7.00am to 6.00pm • Saturday 8.00am to 1.00pm • no work on Sunday or public holidays

3.1.1.10. Access and Traffic Management

A TMP would be prepared for the Impact area and traffic management measures would be implemented as required. The impact area is readily accessible and includes a series of local roads.

Earthworks and pavement works would require traffic control during the works. Where possible, construction activities would be programmed to minimise impact on traffic using the local road network however the temporary closure of Keevers Drive is proposed for an appropriate period to construct required pavement, drain, and bank stabilization works.

Standard traffic management measures would be implemented during construction to ensure that traffic flow along Keevers Drive. All traffic management will be managed in accordance with a requirement of the CEMP and the *Traffic Control at Construction Sites Manual V4* (RTA, 2010).

All work is located within the existing road reserve or unallocated land and no property acquisitions would be required as part of the Impact area.

4. Statutory and Planning Framework

4.1. Environmental Planning and Assessment Act 1979

The EP&A Act and the EP&A Regulation provide the framework for development and environmental assessment in NSW.

As BSC is the proponent, the works have been assessed as 'development permissible without consent' under Part 5 of the EP&A Act. Therefore, the activity has been assessed in accordance with sections 5.5, 5.6 and 5.7 of that Act by examining and considering to the fullest extent possible all matters which are likely to affect the environment. Environmental Planning Instruments made under the EP&A Act 1979 may also be relevant and are addressed below.

4.2. State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP-TI) aims to facilitate the effective delivery of infrastructure across the State.

Clause 2.109 of SEPP-TI 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 impact area are for a road and road infrastructure facilities and is to be carried out by BSC, it can be assessed under Division 5.1 of the EP&A Act.

The impact area is not located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) and does not affect land or development regulated by *State Environmental Planning Policy (Resilience and Hazards) 2021 – (Coastal Wetlands, and Littoral Rainforests)*, or *State Environmental Planning Policy (Planning Systems) 2021*.

Part 2 of the SEPP-TI contains provisions for public authorities (local councils) to consult with other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by SEPP-TI (where applicable), is discussed in Chapter 5 of this REF.

The impact area is therefore permitted and may be determined under Division 5.1 of the EP&A Act.

4.3. Other Environmental Legislation

Table 4-1 outlines how the Impact area have been considered under other relevant Commonwealth and State environmental legislation.

Table 4-1: Statutory Framework

Legislation	Relevance to the Proposed Activity
COMMONWEALTH LEGISLATION	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act protects MNES, such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (among others). Any actions that will or are likely to have a significant impact on the MNES require referral and approval from the Australian Government Environment Minister. Significant impacts for MNES are defined by the Commonwealth (reference http://www.environment.gov.au/epbc/guidelines-policies.html).

Legislation	Relevance to the Proposed Activity
	A likelihood of occurrence assessment (Appendix A) identified no MNES likely to be affected by the Impact area.
	STATE LEGISLATION
Biodiversity Conservation Act 2016 (BC Act)	The BC Act seeks to conserve biological diversity at bioregional and State scales; to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations; to assess the extinction risk of species and ecological communities and identify key threatening processes through an independent and rigorous scientific process; and to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity. Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 5 of the EP&A Act. If a significant impact is likely, a Species Impact Statement is required. A Biodiversity Development Assessment Report may also be required if the proponent elects for this. Section 7.2(1)(a) and 7.3 describe the assessment requirements and thresholds for what is considered a significant impact. Threatened species, populations or communities were recorded or considered likely to be affected by the Impact area and as such a test of significance was undertaken. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the impact area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of native habitat remaining in the surrounding landscape.
Local Land Services Act 2013 (LLS Act)	The objects of the LLS Act include 'to ensure the proper management of natural resources in the social, economic, and environmental interests of the State, consistently with the principles of ecologically sustainable development. The Act regulates the clearing of native vegetation; however, section 60(O)(b)(ii) excludes the need for consent under the LLS Act where the clearing is an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act.
Fisheries Management Act 1995 (FM Act)	The FM Act provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. Threatened aquatic species, populations and communities are listed under Schedules 4, 4A and 5 of the FM Act, while key threatening processes are listed under Schedule 6. No threatened species, populations or communities were identified within the impact area. The Bellinger River is mapped as KFH and the Proposed Works are within the buffer area which triggers for permits or inter-agency consultation under Part 7 of the FM Act. Consultation with Department of Industries (DPI) Fisheries is required to determine permit requirements, such as: • harming marine vegetation • dredging and/or reclamation of the bed or bank • obstruction of fish passage. The impact area requires dredging and reclamation to repair the bank's infrastructure and build a new rock bank. The impact area involves the removal of a small number (11) mangroves. The DPI Fisheries spatial portal also shows areas of mapped seagrass *Zostera* sp. as occurring in close proximity to the site. Mangroves and seagrass are protected under clause 205 of the FM Act and the development may require a permit from DPI Fisheries to directly or indirectly harm marine vegetation. As such a Permit must be obtained from DPI Fisheries prior to any work commencing.

Legislation	Relevance to the Proposed Activity
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act regulates the control and management of all national parks, historic sites, nature reserves, and Aboriginal areas. The main aim of the Act is to conserve the natural and cultural heritage of NSW. Where works will disturb Aboriginal objects, an Aboriginal Heritage Impact Permit (AHIP) is required. Impacts to Aboriginal heritage are assessed in Section 0. A requirement of Clause 16 of the Infrastructure SEPP is for consultation with the National Parks and Wildlife Service (NPWS) where the Impact area occur on or adjacent to National Parks Estate. The Impact area are not within or adjacent to national park and therefore consultation is not required. The Aboriginal heritage assessment has concluded that the Impact area will not likely impact on Aboriginal objects and that no additional archaeological investigation or consultation with the Aboriginal Community is required.
Heritage Act 1977	The Heritage Act provides protection of the environmental heritage of the State which includes places, buildings, works, relics, movable objects, or precincts that are of State or local heritage significance. A key measure for the identification and conservation of State significant items is listing on the State Heritage Register (SHR) as provided in Part 3A of the Heritage Act. The proposed activity does involve an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing and is therefore not a controlled activity. Approval of works on the site is therefore not required under Part 4 of the Heritage Act. Refer to Section 6.6 for the non-Aboriginal heritage impact assessment.
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act is the key environmental protection and pollution statute. The POEO Act is administered by the NSW Environmental Protection Authority (EPA) and establishes a licensing regime for waste, air, water, and pollution. Relevant sections of the Act are listed below: • Part 5.3 Water Pollution • Part 5.4 Air Pollution • Part 5.5 Noise Pollution • Part 5.6 Land Pollution and Waste Any work potentially resulting in pollution must comply with the POEO Act. Relevant licences must be obtained if required. Check the POEO Public Register for any relevant Environment Protection Licences (EPLs). No licences have been identified as being required including an Environmental Protection Licence (EPL).
Water Management Act 2000 (WM Act)	The WM Act's main objective is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. Section 91E of the Act establishes an approval regime for controlled activities within waterfront land. However, clause 41 of the Water Management (General) Regulation 2018 provides an exemption for public authorities in relation to all controlled activities on waterfront land. Therefore, approval under the WM Act is not required.
Roads Act 1993	Section 175 of the *Roads Act 1993* states: *Roads authority may take possession of land when constructing etc public road.* *(1) For the purpose of—* *a. Carrying out road work on a road or a proposed road.* *The appropriate road authority may use and occupy, for as long as may reasonably be necessary in the circumstances, any land along or near the line of the road.*

Legislation	Relevance to the Proposed Activity
	(2) However, the power may not be exercised unless the appropriate roads authority has given the occupier of the land at least 7 days written notice of its intention to exercise the power. Keevers Drive is a dedicated public road under the Roads Act 1993 and BSC is the appointed Road authority. In order to remove soils on and adjacent to Keevers Drive, the Impact area involves excavation of material to the adjacent road bank. Therefore, under section 175 of the Roads Act, BSC have authority to occupy and undertaken works within the purpose of road work. Section 88 of the Roads Act 1993 states that a roads authority may, despite any other Act or law to the contrary, remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion it is necessary to do so for the purposes of carrying out road work or removing a traffic hazard. However, the environmental mitigation measures outlined in this REF still apply.
Biosecurity Act 2015	The *Biosecurity Act 2015* and regulations provide requirements for state level priority weeds. The Act regulates all plants, with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. This legislation is considered in Chapter 6.2. Part 3 of the Biosecurity Act applies a general biosecurity duty for any person who deals with a biosecurity matter or a carrier to prevent, eliminate or minimise any biosecurity risk they may pose. Under section 23 of the Act, a person who fails to discharge a biosecurity duty is guilty of an offence. Whilst the Act provides for all biosecurity risks, implementation of the Act for weeds is supported by Regional Strategic Weed Management Plans (RSWMP) developed for each region in NSW. Appendix 1 of each RSWMP identifies the priority weeds for control at a regional scale. However, landowners and managers must take appropriate actions to reduce the impact of problem weed species regardless of whether they are listed in Appendix 1 of the RSWMP or not as the general biosecurity duty applies to these species.
	PLANNING INSTRUMENTS UNDER THE NSW EP&A ACT
State Environmental Planning Policy – Resilience ad Hazards 2021	The *State Environmental Planning Policy (Resilience ad Hazards) 2021* provides controls for undertaking development and activities in coastal management areas. The four coastal management areas are: • Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26 • Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation • Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included • Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons. Under clause 10 of the SEPP, clearing native vegetation in the mapped '*Coastal wetland and littoral rainforest area*' is permissible without consent when undertaken by or on behalf of a public authority and in accordance with a certified coastal management program, a plan of management under Division 2 of Part 2 of Chapter 6 of the *Local Government Act*, or a plan of management under Division 6 of the *Crown Land Management Act 2016*. In other cases, the clearing requires consent. The impact areas are not within the Coastal environment area.

Legislation	Relevance to the Proposed Activity
State Environmental Planning Policy Vegetation in Non-Rural Areas 2017	Clause 8 of the SEPP states that an authority to clear vegetation under this policy is not required if it is a clearing authorised under s60(O) of the LLS Act. Section 60(O) provides an exemption for clearing under Part 5 of the EP&A Act and therefore consent is not required under the SEPP.
State Environmental Planning Policy (Koala Habitat Protection) 2021	This policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. As indicated in Schedule 1 of the Koala Habitat Protection SEPP, this policy applies to the Bellingen LGA. However, under the EP&A Act this policy does not apply to Part 5 'Activities.'

4.4. State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021,* Chapter 2 Coastal management, provides controls for undertaking development and activities in coastal areas. The four coastal management areas are:

- Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
- Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation
- Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
- Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The site is not located within a coastal wetlands or littoral rainforest area or their proximity areas. The site is however located within the coastal environmental area. The SEPP (Resilience and Hazards) lists criteria for assessing development in each coastal areas, which is identified in Figure 4-1, and addressed below in Table 4-2 and **Error! Reference source not found.**.

Figure 4-1: Coastal management areas

Table 4-2: Development on land within the coastal environment area.

Consideration	Action
(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—	
(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,	The Proposed Works are located along the western bank of Bellinger River. The Bellinger River is a perennial, tidal, 7th order river in accordance with the Strahler Stream Classification and is mapped as a KFH by NSW Fisheries (Class 1 Major Key Fish Habitat). The development would directly impact the Bellinger River. Therefore, the following considerations can be addressed: • Biophysical and ecological integrity – the definitions of these attributes overlap. 'Ecology' or 'biophysics' is understanding how the biotic component (flora and fauna) interact with the abiotic component (water, fire, soil, nutrients, sunlight etc). The integrity of the biota can be protected by avoiding or minimising direct impacts (clearing) and ensuring indirect impacts are managed (e.g., weeds, erosion and water quality). Although there will be a loss of natural riverbank and vegetation, the proposed sloping seawall will dissipate boat wash and provide complex rocky habitat for marine organisms (algae and molluscs) which would compensate some loss. • Hydrological – the development along the bank would not impede the hydrology within the river or obstruct connectivity with the ocean. Surface flows would remain the same. The Proposed Works are expected to reduce the risk of erosion at the site that was increased following damage to the existing stormwater outlet, washed away end wall and undercut bank. During construction, erosion and sediment will be controlled using mitigation measures summarised in Chapter 7. Upon completion of the Proposed Works will not adversely impact this coastal management objective.
(b) coastal environmental values and natural coastal processes,	Existing values and processes for the site would not be affected because the works mimic the existing scale and geometry of the bank (in context of coastal values and processes).
(c) the water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014*), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,	The site is not within a sensitive Coastal Lake.
(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	Marine vegetation would be harmed. A negligible amount (0.031 ha) of native vegetation is proposed for removal along with 11 grey mangroves.
(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The site is not located within foreshore public open space.
(f) Aboriginal cultural heritage, practices and places,	See Section 0.
(g) the use of the surf zone.	The site is not in the surf zone.

4.5. Fisheries Permit

At a site within the Bellinger River, Road Reserve adjacent to Lot 1 DP1188763, Keevers Drive, Raleigh, Bellingen Shire LGA.

Dredging and reclamation works and harm marine vegetation, specifically:

- Excavation of approximately 201 m^3 of riverbank to remove vegetation and loose material, including removal of 11 mangroves, and construction of a graded 1.5H:1V rock revetment.

The works are associated with road embankment failure rectification works as proposed and will be subject to an application for a Fisheries Permit.

4.5.1. Offset

The direct removal of 11 mangroves is to be compensated at a ratio of 2:1 consistent with the Bellingen Shire Council document titled Bellingen Offset Strategy PN22/105 for earlier works along Keevers Drive.

The offset site will include minor dredging and reclamation works involving ripping of existing compacted surface with removal of large rocks and gravel, cutting of channels through an existing berm, and spreading of berm material over ripped surface to facilitate mangrove regrowth as per the submitted mangrove offset project plan.

Erosion and sediment mitigation devices are to be erected in a manner consistent with the currently accepted Best Management Practice (i.e. Landcom [2004], Managing Urban Stormwater: Soils and Construction [4th Edition]) to prevent the entry of sediment into the waterway, or mobilisation of sediment within the waterway, prior to any earthworks being undertaken.

Monitoring and reporting will be undertaken in accordance with the monitoring and reporting schedule.

The above will be part of a modification to the existing offset in consultation with and approval from DPI Fisheries.

5. Community and Agency Consultation

This chapter discusses the consultation to date for the proposal and the future consultation activities proposed.

5.1. SEPP (Transport and Infrastructure) consultation

Part 2.2, Division 1 of the SEPP TI provides guidance on consultation to be undertaken with stakeholders.

Table 5-1 - Relevant consultation requirements

2.10 Consultation with councils—development with impacts on council-related infrastructure or services	Yes/No/Na
(1) This section applies to development carried out by or on behalf of a public authority that this Chapter provides may be carried out without consent if, in the opinion of the public authority, the development—	
(a) will have a substantial impact on stormwater management services provided by a council.	No
(b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area.	No
(c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council.	No
(d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council.	No
(e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential.	No
(f) involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the Roads Act 1993 (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	No
(2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this section applies unless the authority or the person has—	
(a) given written notice of the intention to carry out the development (together with a scope of works) to the council for the area in which the land is located.	Na
(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	Na
2.11 Consultation with councils—development with impacts on local heritage	**Yes/No/Na**
(1) This section applies to development carried out by or on behalf of a public authority if the development—	
(a) is likely to affect the heritage significance of a local heritage item, or of a heritage conservation area, that is not also a State heritage item, in a way that is more than minor or inconsequential.	No
(b) is development that this Chapter provides may be carried out without consent.	No
(2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this section applies unless the authority, or the person has—	
(a) had an assessment of the impact prepared.	Na
(b) given written notice of the intention to carry out the development, with a copy of the assessment and a scope of works, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located.	Na

(c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	Na
2.12 Consultation with councils—development with impacts on flood liable land	**Yes/No/Na**
(1) In this section, flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government and as in force from time to time.	
(2) A public authority, or a person acting on behalf of a public authority, must not carry out, on flood liable land, development that this Chapter provides may be carried out without consent and that will change flood patterns other than to a minor extent.	No
(a) given written notice of the intention to carry out the development (together with a scope of works) to the council for the area in which the land is located	Na
(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	Na
2.13 Consultation with State Emergency Service—development with impacts on flood liable land	**Yes/No/Na**
(1) A public authority, or a person acting on behalf of a public authority, must not carry out development on flood liable land that may be carried out without development consent under a relevant provision unless the authority or person has—	
(a) given written notice of the intention to carry out the development (together with a scope of works) to the State Emergency Service	Yes
(b) taken into consideration any response to the notice that is received from the State Emergency Service within 21 days after the notice is given.	Yes
(2) Any of the following provisions in Part 2.3 is a relevant provision—	
(a) Division 1 (Air transport facilities),	
(b) Division 2 (Correctional centres and correctional complexes),	
(c) Division 6 (Emergency services facilities and bush fire hazard reduction),	
(d) Division 10 (Health services facilities),	
(e) Division 14 (Public administration buildings and buildings of the Crown),	
(f) Division 15 (Railways),	
(g) Division 16 (Research and monitoring stations),	
(h) Division 17 (Roads and traffic),	
(i) Division 20 (Stormwater management systems).	
2.14 Consultation with councils—development with impacts on certain land within the coastal zone	**Yes/No/Na**
(1) This section applies to development on land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land.	No
(2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this section applies, which this Chapter provides may be carried out without development consent, unless the authority or person has—	
(a) given written notice of the intention to carry out the development to the council for the local government area in which the land is located.	Na
(b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	Na
2.15 Consultation with public authorities other than councils	**Yes/No/Na**
(1) A public authority, or a person acting on behalf of a public authority, must not carry out specified development that this Chapter provides may be carried out without consent unless the authority or person has—	

(a) given written notice of the intention to carry out the development (together with a scope of works) to the specified authority in relation to the development.	Na
(b) taken into consideration any response to the notice that is received from that authority within 21 days after the notice is given.	Na
(2) The following development is specified development and the following authorities are specified authorities in relation to that development	
(a) development adjacent to land reserved under the National Parks and Wildlife Act 1974 or to land acquired under Part 11 of that Act—the Office of Environment and Heritage	No
(b) development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone, other than land reserved under the National Parks and Wildlife Act 1974—the Office of Environment and Heritage	No
(c) development comprising a fixed or floating structure in or over navigable waters—Transport for NSW	No
(d) development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map—the Director of the Observatory	No
(e) development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence	No
2.16 Consideration of Planning for Bush Fire Protection	**Yes/No/Na**
(1) This section applies to development for the following purposes that this Chapter provides may be carried out without development consent— (a) health services facilities, (b) correctional centres, or (c) residential accommodation.	Na
(2) A public authority, or a person acting on behalf of a public authority, must consider Planning for Bush Fire Protection before carrying out the development in an area that is bush fire prone land.	Yes

Exceptions

(1) Sections 2.10–2.15 do not apply with respect to development to the extent that—

(a) they would require notice of the intention to carry out the development to be given to a council or public authority from whom an approval is required in order for the development to be carried out lawfully, or

(b) they would require notice to be given to a council or public authority with whom the public authority that is carrying out the development, or on whose behalf it is being carried out, has an agreed consultation protocol that applies to the development, or

(c) 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, or

(d) the development is exempt development or complying development under any environmental planning instrument (including this Chapter), or

(e) the development comprises emergency works, or

(f) the development is carried out in accordance with a code of practice approved by the Minister for the purposes of this section and published in the Gazette.

The works trigger the requirement for notification of the proposal to the State Emergency Services as the works will occur of flood liable land with BSC required to take into consideration any response to the notice that is received from the State Emergency Service within 21 days after the notice is given.

5.2. Ongoing or future consultation

BSC will continue to consult with Government agencies where needed, and notify the community and affected residents, as required.

6. Environmental Assessment

This section of the REF provides a detailed description of the existing environment and potential environmental impacts associated with the construction and operation of the Impact area. All aspects of the environment potentially impacted by the Impact area are considered. This includes consideration of potential impacts on MNES under the EPBC Act. Also, the factors specified in the guidelines: Is an EIS required? (DUAP 1995 / 1996). The factors specified in clause 171 of the EP&A Reg 2021 are also considered. Site specific safeguards and management measures are provided to mitigate identified potential impacts.

6.1. Landform, Geology and Soils

6.1.1. Existing Environment

This involved a desktop review within the impact area. This included search of online databases and a review of available spatial data and relevant literature, including the following:

- *Soil Landscapes of the Coffs Harbour 1:100 000 Sheet* (Milford, 1999).
- NSW Government 'eSPADE' online mapping.
- Clause 7.1 of the Bellingen LEP.
- DPIE (2017) acid sulfate soil mapping.
- NSW EPA Contaminated Land Register.
- EPA (2014) Waste Classification Guidelines.

6.1.1.1. Soil Types and Landform

The subject site is located within the Raleigh Soil Landscape. This is defined as long, narrow, curved fluvial levees and scrolls on the meander plain of the tidal Bellinger and Bellinger River. Elevation <10 m; slopes generally <2% on upper surface and up to 33% on side-slopes. Soils are moderately to well-drained to poorly drained Earthy Sands, alluvial loams, alluvial clays, Yellow Podzolic Soils and Grey Podzolic Soils. Geology is Late Holocene fluvial sediments dominated by layered fine sands, loams, clay loams, and clays. The levee and scroll sediments overlie at varying depths, Quaternary estuarine sediments containing iron pyrites which exhibit potential acid sulphate hazard.

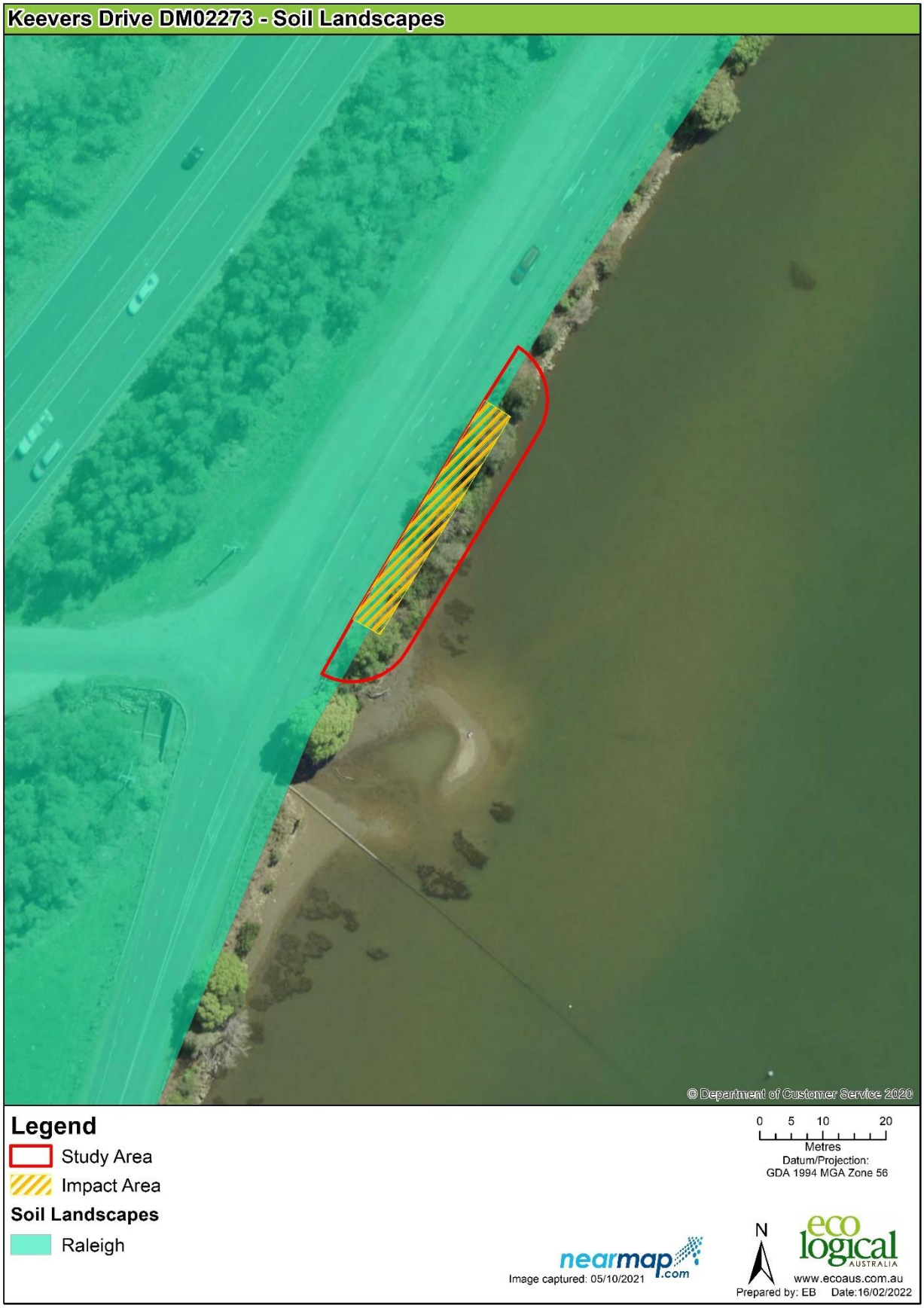

Figure 6-1: Soil landscapes

6.1.1.2. Contamination

The NSW EPA Contaminated Land Register was checked for known contaminated land or potential contamination risk within the BSC LGA. There are no current or previous contamination notices that apply within the impact area. There was no obvious indication of gross contamination (i.e., staining, odours, or distressed vegetation) noted on the soil surface during the investigation. Based on current site condition, there is low potential for other contamination to exist on site.

6.1.1.3. Acid Sulfate Soils

A review in accordance with Clause 7.1 of the Bellingen LEP and the DPIE (2017) mapping indicated that the site is in an environment where 'Class 3 acid sulphate soils may occur and are therefore likely to be impacted. The NSW Government 'eSPADE' online mapping indicates that the site has an elevation of between 0 m and 4 m AHD and are mapped within Class 3 Acid Sulphate Soils (ASS) (Figure 6-2) which are typically present between 1m and 3m below the ground surface.

A geotechnical investigation by Regional Geotechnical Solutions (2020) undertaken for Site 1378, indicated that acidic soil conditions in the area were present. Due to the proximity and similar environments, the geotechnical findings at Site 1378 are also assumed to be present at the study area.

Figure 6-2: Acid Sulphate Soils Risk

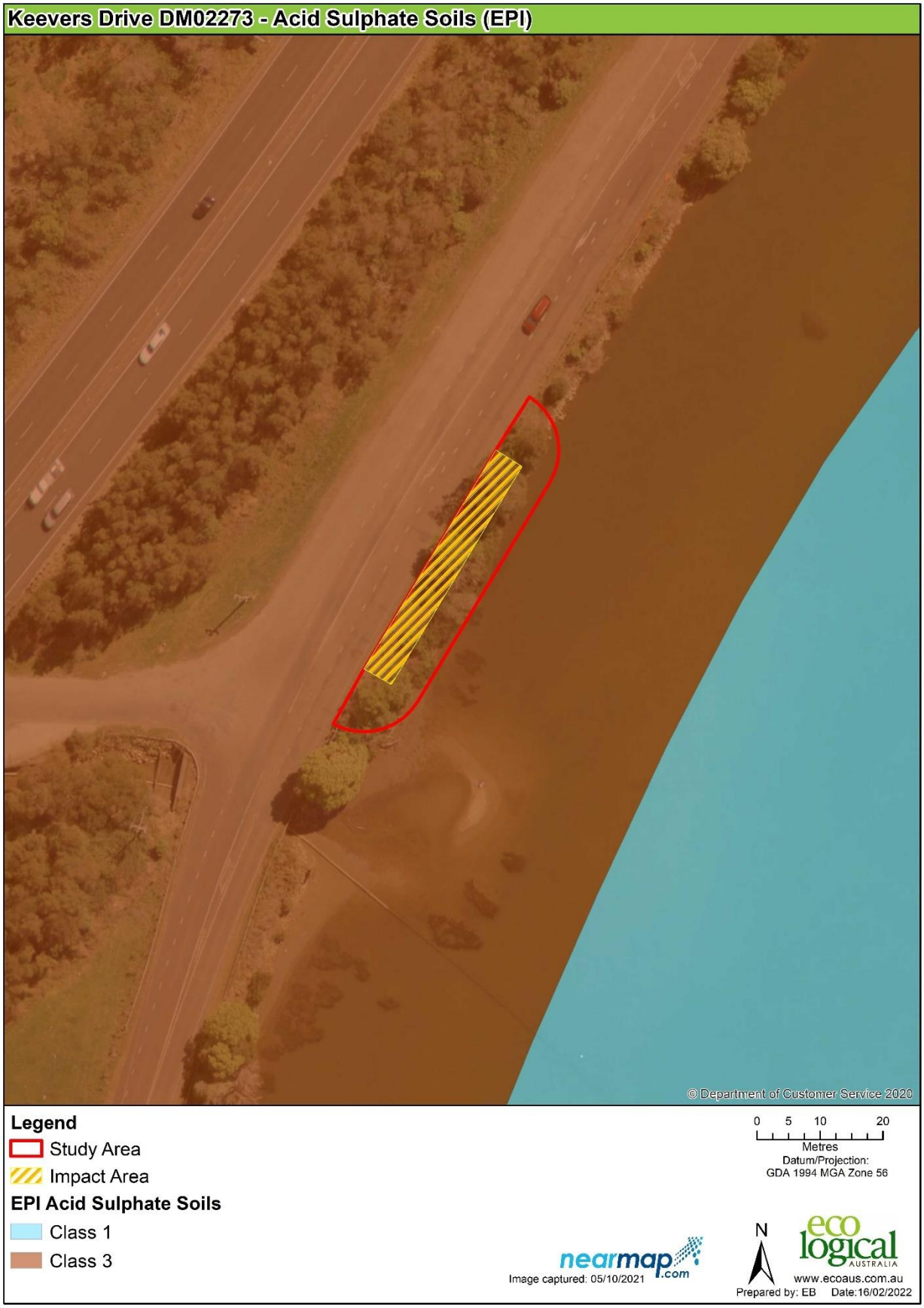

Figure 6-3: Acid Sulphate Soils EPI mapping

6.1.2. Impact Assessment

6.1.2.1. Construction

Impacts to soils and landscapes within the Impact area footprint would primarily result from earthworks associated with the bank reconstruction phase of the Impact area and temporary stockpiling material.

Excavation would remove vegetation that currently stabilises soils and would expose soils to weathering processes, increasing the risk of erosion and sedimentation. Removal of vegetation can expose the topsoil layer to erosive forces, including water and wind, which can induce erosion and subsequent loss of this valuable soil resource. Topsoil loss can reduce agricultural value and slow rehabilitation and the re-establishment of native ecosystems. Further to this, stockpiling of fill material or stripped topsoil could also be susceptible to wind and water erosion, if not placed in appropriate locations and appropriately stabilised (covered or seeded).

Compaction of soils may occur because of machinery movement and parking, stockpiling of materials and soil (including imported fill). Compaction of soils can retard the natural regeneration of ground cover and adversely affect soil stability.

A rehabilitation plan would be developed for the works to ensure that disturbed areas are stabilised. It would include triggers for further management action if natural regeneration is not enough to stabilise surfaces.

During this process, there is potential to excavate contaminated material which may further impede natural regeneration. The works are unlikely to disturb acid Sulfate soils, which are not mapped for the area.

The impact area has the potential to introduce contaminants to soils via construction machinery. These include the following:

- Hydrocarbons, lubricants, oils, or other chemical pollutants, particularly at the site compound where vehicle, machinery and other equipment may be stored.
- Spillage, dust, or leachate from concrete or concrete wash.
- Water containing biological contaminants such as nutrients and bacteria from site toilets and taps.

Overall, short term risks to soils would be high, but localised. Known (demonstrated to be effective on similar projects) mitigation strategies are considered highly likely to be able to adequately address these risks. Medium to long term impacts would be low provided stabilisation strategies are effectively implemented. Stabilisation and revegetation would act to resist soil erosion to the same extent that existing vegetation now functions.

6.1.2.2. Operational

The Impact area have the potential to increase the volume and velocity of runoff from the impermeable road and riverbank surfaces. This could result in localised erosion on the roadsides if appropriate re-vegetation is not implemented.

Post construction, the risk of soil and landform impacts, such as erosion, scouring or slumping, is considered low given the ability to stabilise and rehabilitate riverbank areas that were disturbed during construction and create longer term stability.

6.1.3. Mitigation Measures

Table 6-1: Geology and Soils Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
GS1	Earthworks and excavation may result in increased erosion risk and sedimentation of waterways	• Ensure that temporary stockpiles placed within the site are appropriately protected (i.e., sediment fencing at base) to avoid loss of sediment. • Ensure that temporary stockpiles are regularly checked for erosion and sediment control failures. • Ensure that any site access is stabilised to reduce tracking of sediment off site with approaches kept free of dust during works. • Minimise extent of disturbed area through appropriate staging and completion of works in shortest possible timeframe. • Topsoil stripping shall occur while soil is reasonably moist if possible. • Any loads of soil and other erodible materials transported, to and from, the site to be always kept covered during transportation and remain covered until unloading for use or disposal at appropriate waste facility. • Excess spoil will be placed in stockpiles, reused on site, or properly disposed of off-site. • Work areas to be watered as necessary particularly during dry and windy conditions. • Progressive rehabilitation and revegetation of disturbed areas to be undertaken during construction period to the greatest extent possible • Topsoil shall not be respread during high wind conditions. • A Sediment and Erosion Control Plan is to be prepared in accordance with *The Blue Book – Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and implemented prior to works, with the aim of achieving an outcome of 'no visible turbid plumes migrating through to the waterway'. The Plan must include, but not be limited to: ○ Locations and type of sediment controls, both adjacent to and in the nearby watercourse, to be erected surrounding the Impact area site. These can be constructed from sandbags and lined with geofabric; however, they must be secured to ensure they do not mobilise. • Prior to forecast heavy rain, work is to cease, accumulated material is to be removed from sediment controls. Any sediment controls in-stream are to be removed from the waterway to allow free movement of water and prevent them causing a flood hazard or other environmental damage downstream.
GS2	Discovery of contaminated soil	• If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with BSC and/or EPA.

Reference	Environmental Aspect	Mitigation Measures
GS3	Soil contamination resulting from accidental spills	• A site-specific emergency spill plan be developed.
GS4	Rehabilitation of disturbed areas	• A rehabilitation of all areas disturbed by Impact area construction and would include the following: ○ Ensure areas disturbed during construction (including laydown areas and ancillary sites) are stabilised progressively during construction and restored back to original condition or re-vegetated with appropriate species (native in native dominated areas) as soon as practical. ○ Include monitoring to meet clear targets, regarding vegetation establishment and stabilisation of bare areas of soil.

6.2. Terrestrial Biodiversity

The objective of the terrestrial biodiversity section is to identify the potential impacts of the Impact area on native vegetation, threatened species, populations and communities listed under the BC Act and Commonwealth EPBC Act, as well as associated habitat features, and to determine appropriate recommendations to mitigate or minimise impacts.

An Ecology Assessment is required to identify flora, and fauna values within the impact area, and, whether the impact area have potential to impact those values.

The following key terms and definitions are used in this ecology assessment:

- **Local population** – of a resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.
- **Locality** – the areas within 5 km of the impact area.

6.2.1. Existing Environment

The study areas are located wholly within the Coffs Coast and Escarpment subregion of the NSW North Coast Bioregion and sits within the Bellinger Channels and Floodplains Landscape unit. The study area is not included within an Area of Outstanding Biodiversity Value (AoBV) listed under the NSW BC Act. A photograph of on-site vegetation is shown in Table 6-2**.**

6.2.1.1. *Desktop Review*

A review of relevant literature, databases and aerial photography was undertaken prior to conducting the field surveys. The review included:

- Commonwealth EPBC Act Protected Matters Search for threatened species/populations that may occur within or near the impact area.
- NSW BioNet (Wildlife Atlas) search for threatened species/populations that have previously been recorded within or near the impact area and are listed under the BC Act.
- Aerial imagery and any available vegetation mapping.

6.2.1.2. *Field Survey*

An inspection of the study area was undertaken by ELA Ecologist Tom Schmidt on 17 August 2022. The full extent of the study area was traversed on foot to determine whether any threatened flora, fauna or threatened ecological communities (TECs) listed under the BC Act or EPBC Act were present, or likely to occur based on the habitats present.

The following were assessed as part of the field survey:

- validation of the extent and quality of terrestrial native vegetation using rapid data points;
- identification of the presence of threatened flora, fauna, or ecological communities, including potential habitat;
- searches for hollow-bearing trees or other important habitat features likely to be impacted;
- opportunistic fauna sightings; and
- rapid inspection of impact area for signs of fauna activity.

As part of the inspections rapid data points were recorded utilising Arc GIS Collector, this included recording specific data relating to Vegetation type and condition; threatened species; fauna habitat features (e.g. hollows); presence of significant weeds; other site features.

Note: due to the small size of the impact area, no systematic targeted threatened species surveys were carried out, instead the likelihood of threatened species was assessed based on habitat types and condition present. Additionally, due to the roadside location and narrow area of vegetation, no formal vegetation plots were carried out.

6.2.1.3. *Likelihood of occurrence assessment*

Results from the database searches were combined to produce a list of species, populations and communities known or predicted to occur in the locality. Following the field survey, items on the list were assigned to a category based on the likelihood of their occurrence.

Each species' likely occurrence was determined by database records, habitat availability within the study area based on the field survey and knowledge of the species ecology. Five terms for the likelihood of occurrence of species are used in this report and in the likelihood table in Appendix A. The terms for likelihood of occurrence are defined below:

- "yes" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species.

6.2.1.4. *Vegetation Communities*

The site contains two PCTs:

- 1235 – Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion
- 918 – Mangrove - River Mangrove low closed forest of the NSW Coastal Bioregion.

PCT918 at the site consists of 11 *Aegiceras corniculatum* (River Mangrove). This marine vegetation is assessed in Section 6.3.

A description of PCT1235 at the site is presented in **Table** 6-2 and mapped in Figure 6-4.

PCT1235 at the site corresponds to *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* listed as an Endangered Ecological Community (EEC) under the BC Act. The vegetation at the site is in poor condition, however there are no condition thresholds for the listed community under the BC Act. The PCT1235 vegetation within the site does not meet the condition thresholds for the *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* listed as an EEC under the EPBC Act due to the small size of the patch and dominance of exotic species in the understorey.

Table 6-2 PCT 1235 description at site

PCT 1285 - Turpentine moist open forest of the coastal hills and ranges of the NSW North Coast Bioregion	
Vegetation formation:	Forested Wetlands
Vegetation class:	Coastal Floodplain Wetlands
Vegetation structure	Forest
Conservation status:	**BC Act:** EEC - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions **EPBC Act:** Not listed – condition thresholds not met.
	PCT 1235 occurs as a narrow strip (<3 m wide) of low condition vegetation between the existing road and river. The canopy layer is sparse and is dominated by *Casuarina glauca* (Swamp Oak). The exotic tree *Cinnamomun camphora* (Camphor Laurel) is also present. Smaller trees present include *Glochidion ferdinnandi* (Cheese Tree), Cupaniopsis anacardiodes (Tuckeroo) and Guioa semiglauca (Guioa). The groundcover is predominantly exotic and dominated by species including *Chloris gayana* (Rhodes Grass), *Paspalum mandiocanum* (Broad-leaf Paspalum). Occasional native species are present including a patch of *Phragmites australis* (Common Reed) and scattered occurrences of *Pteridium esculentum* (Bracken).
Characteristic trees	*Casuarina glauca, Glochidion ferdinandi*
Characteristic midstorey	*Cupaniopsis anacardioides*, *Guioa semiglauca*
Characteristic groundcovers	*Phragmites australis*, *Oplismenus imbecillis* (Basket Grass), *Pteridium esculentum*
Exotic species	*Lantana camara* (Lantana), *Chloris gayana*, *Cinnamomum camphora* (Camphor Laurel), *Ipomea cairica* (Coastal Morning Glory), *Paspalum mandiocanum*, *Melinis repens* (Red Natal Grass)
Condition	Poor
Habitat	One low hollow, empty when inspected
Variation and disturbance	Disturbance from road construction and maintenance in proximity to road.
Soil type	Alluvial soil
% cleared in NSW	75 %
Threats	Erosion and weed invasion

Figure 6-4: Plant Community Types

6.2.1.5. *Habitats*

The site contains a narrow strip of low condition, modified swamp forest vegetation between the road and river. It is unlikely this area would provide important resources or be relied upon by any local populations of threatened fauna in the locality.

One small hollow was recorded within the lower trunk of a *Casuarina glauca*. The hollow was easily inspected from the ground and no fauna or evidence thereof was present. No other significant habitat features that may provide important breeding or denning were habitat recorded within the study area.

6.2.1.6. *Threatened Flora and Fauna*

The desktop review identified three listed threatened ecological communities, 15 threatened flora species, 61 threatened fauna species listed under the BC and / or EPBC Acts, which are known or have the potential to occur within a 5 km radius of the subject site. The BioNet Atlas database threatened species records are shown in Figure 6-5 and Figure 6-6 below.

An assessment of the likelihood of occurrence of threatened species within the study area is provided in Appendix A, and was initially used to guide the site inspection. The likelihood of occurrence was refined following habitat assessment during the site inspection. No threatened flora species were identified within the subject site during the field survey, nor were any threatened flora species identified as potential or likely to occur due to poor habitat and high disturbance (Appendix A).

No threatened fauna species were identified within the subject site during the field survey, although White-bellied Sea-Eagle was observed flying over the river nearby. The subject site is very narrow, highly disturbed, and located adjacent to a road and is unlikely to provide important habitat for threatened species. Nevertheless, suitable habitat for two threatened fauna species that may visit or fly over the site on occasion was identified (Table 6-3). Nearby Koala sighting records indicate the potential for Koalas to be present in the locality, though no suitable Koala habitat was identified within or nearby the impact area and given the narrow roadside and riverside location this species is considered unlikely to occur within the subject site. The remaining threatened fauna species were considered unlikely to occur in the subject site due to the degraded habitat and site location within a modified landscape.

One hollow was recorded within the subject site in the lower trunk of a *Casuarina glauca*. The hollow was able to be inspected from ground level and no fauna or evidence of usage was recorded. No other habitat features such as termite terrariums, hollow branches, fissures or man-made structures were recorded within the impact area. No potential bat roosting habitat was identified within the impact area.

Table 6-3: Threatened fauna species likely or with potential to occur within the impact area

Scientific name	Common name	BC Act Status	EPBC Act Status	Habitat features present within the impact area
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	Utilises the estuarine habitat. No roost trees or nests present within subject site.
Pandion cristatus	Eastern Osprey	**V**	-	Utilises the estuarine habitat. No roost trees or nests present within subject site.

Key: **M** = migratory, **CE** = critically endangered, **E** = endangered, **V** = vulnerable, **X** = extinct, - = not listed.

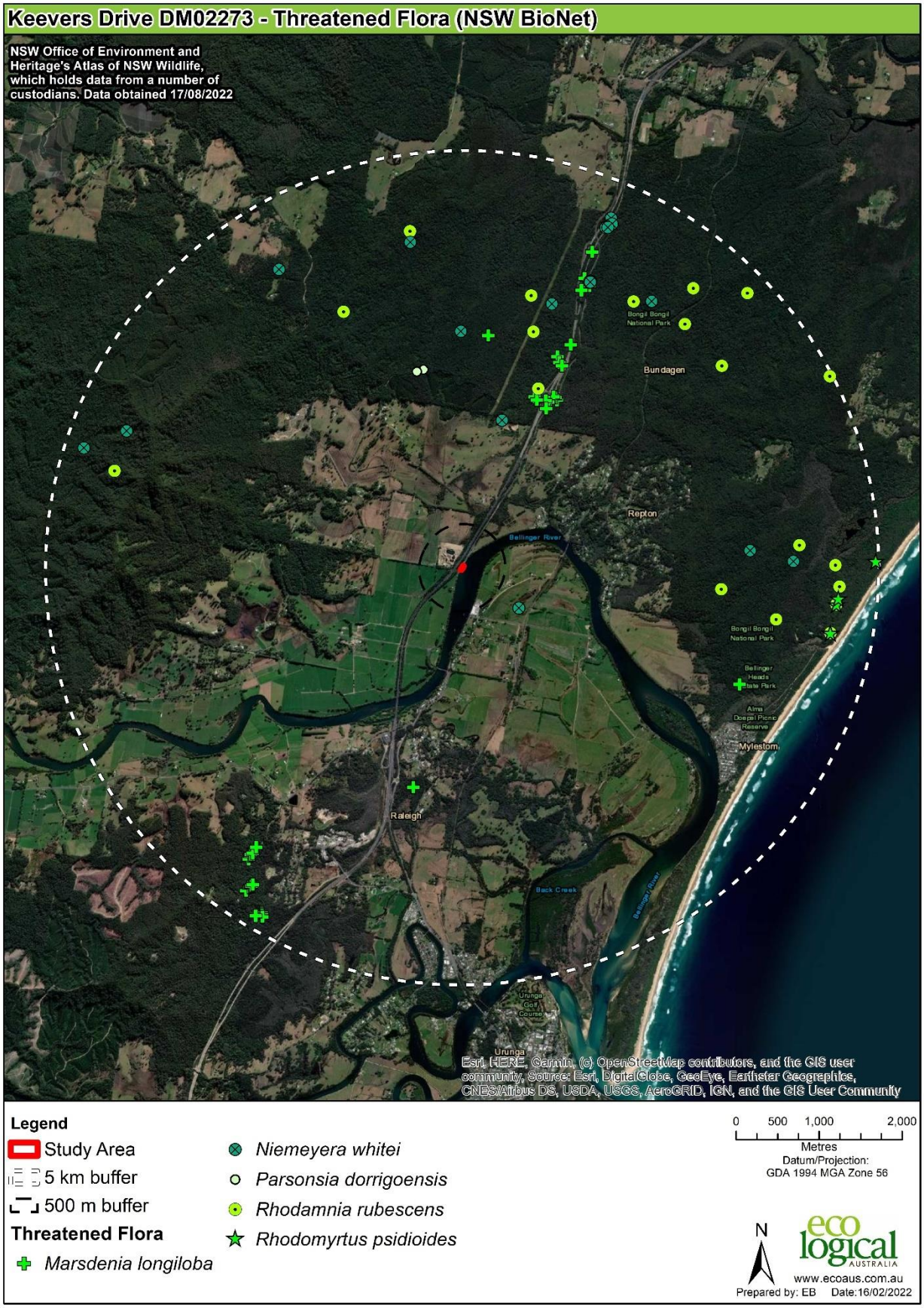

Figure 6-5: Threatened Flora species recorded within 5 km of the study area (BioNet Atlas)

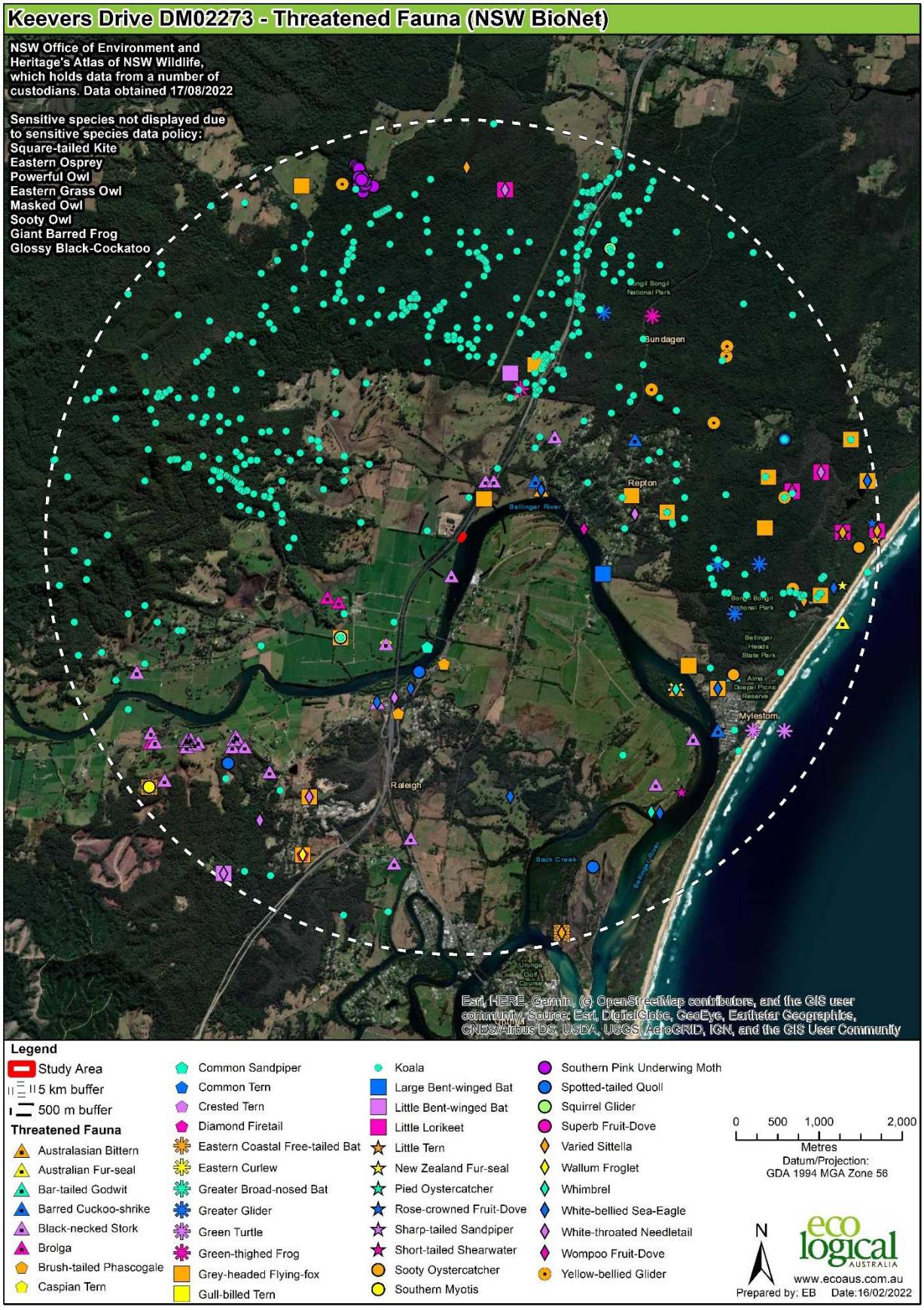

Figure 6-6: Threatened fauna species recorded within 5 km of the study area (BioNet Atlas)

6.2.1.7. *Priority Weeds and Weeds of National Environmental Significance (WoNS)*

The NSW *Biosecurity Act 2015* and regulations provide specific legal requirements for State level priority weeds. Under the Act, all exotic plants are regulated with a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable.

Specific legal requirements apply to State determined priorities under the North Coast Regional Strategic Weed Management Plan 2017-2022 (LLS 2017). Weeds listed as 'other weeds of regional concern' under the plan warrants resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, or agriculture.

Several exotic species were observed during the site inspections including three species, *Lantana camara, Ochna serrulata* and *Cinnamomum camphora*, which are listed as Priority Weeds under the *Biosecurity Act 2015* for the North Coast Region (LLS 2017). *Lantana camara* is also identified a WoNS (Table 6-4).

Table 6-4: Priority weeds and WoNS present in the impact area

Scientific Name	Common Name	Priority Weed Objective	WoNS
Lantana camara	Lantana[1, 4]	State - Asset protection	Yes
Cinnamomum camphora	Camphor laurel[3]	Regional- Asset protection	No
Ochna serrulata	Ochna	State - Asset protection	No

- *1 Prohibition on dealings:* Must not be imported into the State or sold.
- *2 Regional Recommended Measure: The plant or parts of the plant are not sold, traded, carried, grown, or released into the environment.*
- *3Rregional strategic responses: Work within existing widespread weed programs for strategic asset protection, Prioritise the application of the General Biosecurity Duty to assist with management of these species, Work with industry to develop industry standards including restrictions on sale and trade.*
- *4Rregional strategic responses: Raise awareness of plants that must not be sold, inspect nurseries, markets, and roadside stalls and use enforcement where required, identify regional containment zones where required, manage in accordance with published weed management plans.*

6.2.2. Impact Assessment

6.2.2.1. *Direct Impacts*

The total footprint is 0.031 ha. A summary of the direct impacts to native vegetation and habitat at each site is provided in Table 6-5. One HBTs would be removed however the single hollow is poorly located close to the ground and did not show any evidence of use.

Table 6-5: Direct impacts to vegetation and habitat

Vegetation type	Status	Habitat type	Area impacted (ha)
1235 – Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion	EEC (BC Act)	Swamp Forest	0.026
918: Mangrove - River Mangrove low closed forest of the NSW Coastal Bioregion		River Mangrove	0.005
Total			**0.031**

6.2.2.2. *Threatened Ecological Communities*

Areas of PCT1235 within the site represent *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* listed as an EEC under the BC Act. A total of 0.026 ha of the community would be directly impacted by the proposed activity. A Test of significance, in accordance with Section 7.3 of the BC Act, was conducted for this EEC (Appendix B). The assessment concluded that the proposed activity is unlikely to result in significant impacts to *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*.

6.2.2.3. *Threatened Flora*

No threatened flora species were recorded in the site during the inspection, and based on the habitat type and condition present, none were not considered likely to occur or be impacted by the proposed activity (Appendix A).

6.2.2.4. *Threatened Fauna*

Tests of significance, in accordance with Section 7.3 of the BC Act, were conducted for two threatened fauna species considered to have potential to occur within the study area and be affected by the proposed activity. Based on these assessments, and with the implementation of the proposed mitigation measures, the proposed activity is considered unlikely to result in significant impacts (Table 6-6).

6.2.2.5. Matters of National Environmental Significance

No threatened species listed under the EPBC Act were considered likely to occur in the study area or be impacted by the proposed works. Migratory species may occasionally fly over the site, however the proposed works are unlikely to affect important habitat or an ecologically significant proportion of the population for any migratory species and therefore significant impacts are considered unlikely.

Table 6-6: Tests of significance summary

Scientific name	Common name	BC Status	EPBC Status	Habitat types present in study area	Significant impact likely?
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Loss up of up to 0.031 ha of marginal potential foraging habitat.	No
Pandion cristatus	Eastern Osprey	V		Loss up of up to 0.031 ha of potential foraging habitat.	No

6.2.2.6. *Indirect Impacts*

An assessment of indirect impacts has been included as part of the impact assessment. Potential indirect impacts may include:

- introduction of exotic pest species;
- increase in surface water runoff, sedimentation, and nutrients during and following construction;
- temporary increase in noise and disturbance to fauna inhabitants in adjacent vegetation;
- inadvertent damage to native vegetation adjacent to the study area; and

- machinery used to construct the road and bank works may introduce new weed species to the area, including the nearby waterway.

Impacts associated with changed water runoff, increased sedimentation, and increased nutrients during and following construction should be mitigated through preparation and implementation of an erosion and sediment control plans and incorporated in the CEMP including appropriate controls on storage of chemicals.

Increases in noise and disturbance during construction to potential fauna inhabitants in adjacent vegetation is likely to be minimal, given the rural environment in which the impact area is located and the availability of suitable habitat adjacent to the study area.

6.2.3. Mitigation Measures

Mitigation measures to address these potential impacts are outlined in Table 6-7. All mitigation measures should be conducted in a manner that is consistent with RMS Guidelines (*Biodiversity Guidelines – Protection and Management Biodiversity on RTA Projects; RTA 2011*).

Table 6-7: Terrestrial Biodiversity Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
TB1	Threatened flora, fauna and vegetation communities	• Where possible, avoid clearing of native trees. • The limits of the corridor of works (disturbance footprint) should be clearly marked (for example, using temporary fencing or bunting) to ensure site disturbance occurs only within the designated works areas and is not unnecessarily extended. • Material stockpile and equipment storage areas should be restricted to existing disturbed areas. • Vegetation clearing should be undertaken in a manner to avoid damage to adjacent vegetation. • Any fauna handling would be undertaken by an appropriately licenced ecologist or wildlife rescue specialist. • If unexpected fauna (e.g. nesting birds) are discovered and have the potential to be impacted, works are to stop immediately, and the project manager notified. • Any occupied nests located or any fauna which are inadvertently injured should be reported to WIRES or a similar organisation and relocated from the works area by a suitably qualified fauna handler. • Vehicle movements should be confined to the disturbance footprint. • Machinery coming from outside the works area should be thoroughly washed down prior to entering the site to reduce the risk of introducing weed species and pathogens. • Priority weed species should be targeted in accordance with the NSW DPI WeedWise recommended control measures (DPI 2021a).

Reference	Environmental Aspect	Mitigation Measures
		• Any revegetation of disturbed areas should utilise a seed mix consisting of local provenance species that are typical of native vegetation in the landscape, where possible. • The contractor in conjunction with BSC should develop an induction plan to inform workers of appropriate safeguards to limit impacts on vegetation to be retained and to limit impacts on vegetation beyond the disturbance footprint.

6.3. Aquatic Biodiversity and Habitat

An assessment of watercourse and riparian condition and aquatic habitat was undertaken to assess the condition of the Bellinger River within the study area, identify Key Fish Habitat (KFH) areas on site or in the vicinity, as well as identify any potential habitat for threatened aquatic fauna, specifically fish and invertebrates. Potential impacts have been identified and mitigation measures recommended.

The impact area involves the construction of slope stability works on Keevers Road along the banks of the Bellinger River, identified as KFH by DPI Fisheries, Figure 6-8.

6.3.1. Existing Environment

A desktop review to identify recent records of aquatic species and habitat within the impact area and surrounding catchments, including:

- Fisheries Spatial Data Portal threatened species distribution records (Riches et al, 2016) and Primefact publications (FM Act).
- Protected Matters Search Tool for aquatic species listed under the EPBC Act (DAWE, 2021).
- KFH mapping (DPI Fisheries).
- Policy and Guidelines for Fish Habitat Conservation and Management, update 2013 (DPI, 2013).

A field survey was completed 18 August 2022 to assess the condition of the river in and adjacent to the study area and the potential for habitat for threatened aquatic species.

The Bellinger River is a 7th order Strahler stream and KFH (Figure 6-7). The river is considered to have a 'good' fish community status (Fisheries Portal). The river in this location has been and continues to be a disturbed environment, in terms of channel dredging, floodplain clearing, encroachment of riparian land (road) and poor bank condition. The Bellinger River also experiences regular flooding, the last one occurring in May 2022. The centre of the channel adjacent to the impact area is identified as 'Mineral and Resource Land' (sand mining).

6.3.1.1. Threatened species

The aquatic fauna of the Bellinger River is expected to be representative of tidal reaches in the lower coastal catchments of north-eastern NSW. The Fisheries Portal only shows freshwater species distribution, with *Mogurnda adspersa* (Southern Purple Spotted Gudgeon) expected in the surrounding survey area but not in the Bellinger River tidal reach. This species does not enter tidal waters. The site is also outside of the range of the Bellinger River Snapping Turtle. A review of threatened marine species using Primefact publications and Atlas records concluded no other threatened fish are likely to occur around the impact area or be impacted by the Proposed Works. The EPBC Act Protected Matters Search Tool (DAWE, 2021a) identified one estuarine fish, *Epinephelus daemelii* (Black Rockcod) with the potential to occur. Adults of this species inhabits caves, gutters and crevices, and juveniles may occur around rocky shores in estuaries (DPI Prime Fact for *Epinephelus daemelii* (Black Rockcod) June 2015). The shoreline in the Proposed Works area is not rocky, nor are there large areas of rocky substrate in the sub-tidal zone of the impact area, so the is no suitable habitat for Black Rockcod.

6.3.1.2. Watercourse Summary

A summary of watercourse and aquatic habitat condition is presented in Table 6-8 with representative photos in Plate 6-1 to Plate 6-4.

Table 6-8: Summary of watercourse condition and aquatic habitat

Hydrology	Physical form	Instream habitat	Streamside vegetation	Overall condition
7th order stream. Mostly cleared catchment. No artificial barriers or instream detention. Tidal river with 1.6 m average range.	Channel 220 m wide (approx.). Banks up to 3 m high, 30-45° slope. Visible bank or bed erosion, and exposed soil higher up banks. Substrate dominated by soft silty-sand and occasional gravel/cobble.	Key fish habitat – Type 1 highly sensitive (due to presence of native aquatic plants). Fisheries mapping suggested the presence of estuarine macrophytes including mangroves and *Zostera* sp. There is no saltmarsh mapped around this bank. Field surveys found no macrophytes other than some *Aegiceras corniculatum* (River Mangrove) dominant along riverbank, . No large woody debris was observed. Channel is suited to fish and wetland birds.	Poor riparian extent and continuity. Little evidence of natural recruitment of woody natives. Species composition dominated by weeds: 15% tree cover. 40% shrub cover (mostly exotic). 45% grass cover (mostly exotic).	Poor condition with unstable bank.

Plate 6-1 River bank looking north

Plate 6-2 Rock to the north of the site

Plate 6-3 Rock and river to the south of the site

Plate 6-4 Site from top of bank

Figure 6-7: Waterway macrophytes

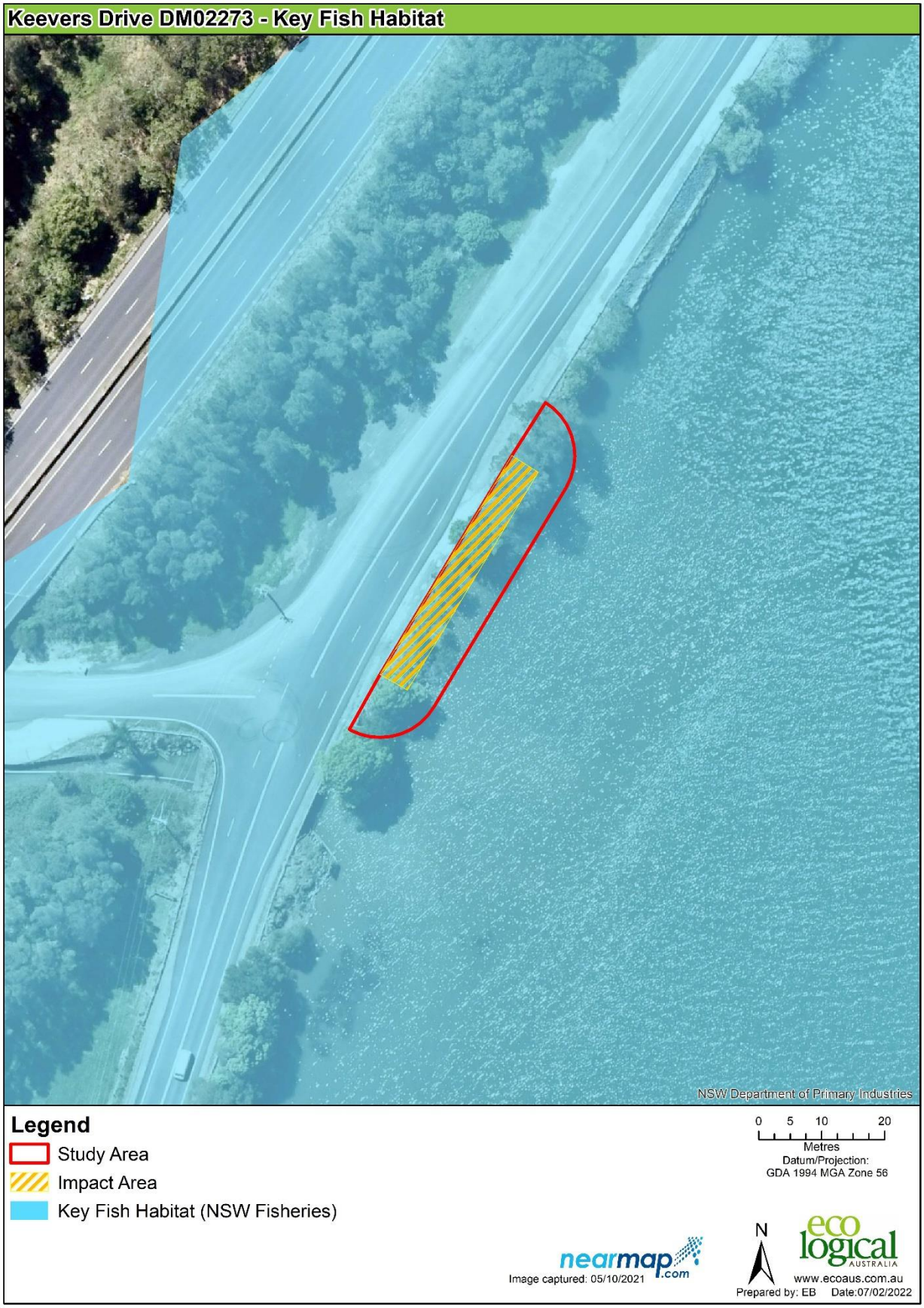

Figure 6-8: Key Fish Habitat

6.3.2. Impact Assessment

No threatened fish or aquatic flora listed under the FM or EPBC Act are likely to occur near the works, therefore, the works are not expected to directly impact threatened fish or their habitats. There will, however, be direct impacts to key fish habitat from removal of natural banks and riparian vegetation, loss of 11 *Aegiceras corniculatum* (River Mangroves) and reclamation of sandy substrate with a rock wall.

6.3.2.1. Construction

6.3.2.1.1. Aquatic

Direct loss of aquatic vegetation and habitat

The proposal would require small disturbance of the riverbed approximately 70 m^2. The existing bank would be removed, and a new rock wall bank installed. The new wall would require the installation of large inert rock protection to bank. The rock protection base would be installed in sub-tidal soft sediment.

The potential is that indirect impacts from sediment mobilisation and scour would impact the area and recommendations have been included to avoid sediment mobilisation during works.

The removal of the existing bank would also result in the removal of marine vegetation, 11 grey mangroves constituting a total area of less than 0.001 hectares. It is assumed that the material of the new rock bank would encourage natural recolonisation.

Indirect impacts to aquatic vegetation and habitat

There is potential for coarse and fine debris to be mobilised during works, removal of existing bank and rock placement. This can crush, damage and/or smother marine vegetation and habitat depending on the size of debris. Mobilisation of finer debris (i.e. sediments) can also result in the mobilisation of contamination in study area sediments. Depending on the volume and the size of fine debris, tide and current actions, finer particles may not reside in the area for long and this may only be a temporary nuisance to marine assemblages. The waters in the Bellinger River experience impacts from elevated turbidity, usually as a result of sand extraction, rainfall, and tides. Thus, marine assemblages in the study area are likely to be frequently exposed to these conditions and the proposal is unlikely to introduce vastly different conditions.

As large and small vessels currently frequent use the study area mitigation measure have been recommended to avoid indirect impacts to the area.

6.3.2.1.2. Terrestrial

Direct loss of terrestrial vegetation and habitat

The proposal would remove/disturb up to 0.031 hectares of native and exotic vegetation and tree canopy along the bank. Disturbance of vegetation can result in the introduction or spread of exotic flora and weeds. This can occur by the spread of opportunistic exotic vegetation from adjacent properties or new species can be introduced via equipment, plant and footwear. The vegetation and habitat in the study area and the surrounding areas are susceptible to weeds if not managed during construction.

Erosion and sedimentation

Ground disturbance could expose soils which can then be easily mobilised. Contaminants in the soil and can also be subsequently released into the surrounding environment. Erosion and sedimentation is most likely to impact river waters, if controls are not implemented. This could result in unfavourable, turbid conditions, the smothering of marine vegetation, habitat and fauna and water, sediment and biota contamination in the waters.

Threatened, migratory and protected species

The proposal is unlikely to significantly impact threatened species and disturbances to potential habitat would largely be temporary. The details of the Test of Significance (ToS), which assess impacts on threatened species under the BC Act, FM Act and EPBC Act considered potentially occurring in the study area, are provided in Appendix B.

6.3.2.2. Operation

6.3.2.2.1. Aquatic

All elements of the proposal, with the exception of the base of the wall, would sit permanently on or above the water's surface and avoid impacts to the riverbed. There is also potential that localised changes in currents in the vicinity around the rocks could cause a scour footprint. It is not expected that the impact of scour would extend further away or result in significant scour and sedimentation. Due to the size of these wall in proportion to the river, alterations to hydrodynamics are unlikely to produce substantial impacts to marine biodiversity.

6.3.2.2.2. Terrestrial

As there is not expected to be any change to operational activities around the wall there is limited potential for any operational terrestrial ecology impacts.

6.3.2.3. Conclusion on significance of impacts

The proposal is unlikely to significantly impact threatened species. Disturbance to potential habitat would largely be temporary and constitute a very small proportion of available habitat. The proposal would not fragment or isolate threatened species populations or substantially impact any species' lifecycle. Species impact statements (SISs), or entry into the Biodiversity Offsets Scheme or referrals are not required for the proposal.

With the replacement of a similar area of similar habitat through the installation of new rock wall, the loss of habitat would be sufficiently offset by new opportunities within the rocks. The proposed rock wall would be built from irregular shaped rock. This type of wall provides microhabitat for marine organisms, as long as voids are not filled with concrete. The proposed rock wall design techniques listed in the *Environmentally Friendly Seawall Guidelines* (OEH 2009), such as the example in Figure 6-9 below, will be included into detail design as it can maximise habitat diversity and complexity by:

- Using boulders of various size and shape
- Not cementing between blocks to create crevices
- Utilising natural building materials

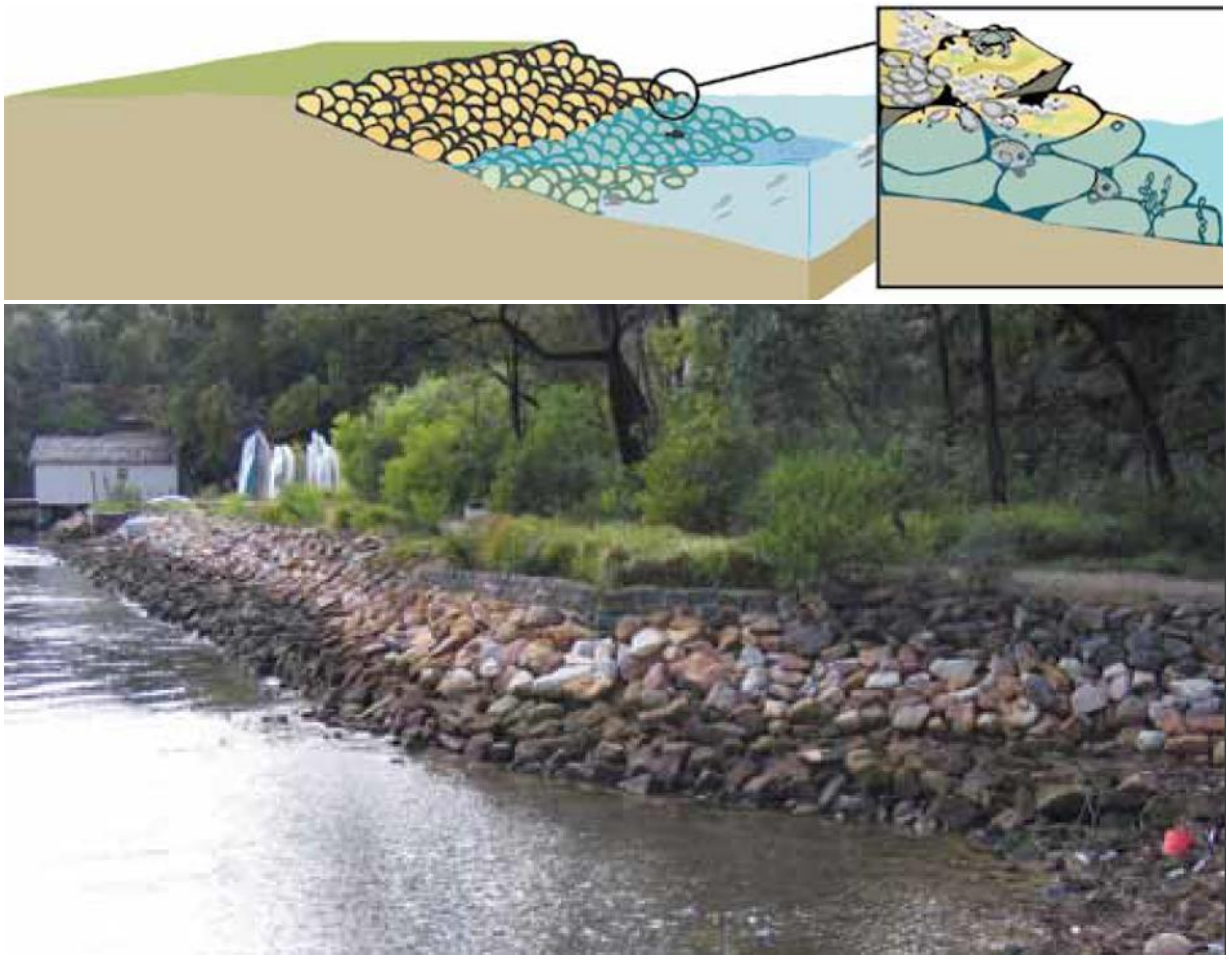

Figure 6-9: An example rock wall with fish and other organisms utilising the crevices between the rocks as sheltered habitat

The proposal is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act. Works would temporarily obstruct fish passage during construction when a silt curtain is suspended parallel to the bank excavation. This impact will be minimal and temporary, given the channel width of 200 m and unlikely chance of trapping many fish. Fish passage adjacent to the construction areas will be restored post construction.

6.3.3. Other DPI Fisheries requirements

Other DPI Fisheries requirements commonly assessed when reviewing foreshore development is presented below in Table 6-9.

Table 6-9: Fisheries Requirements for Reviewing Foreshore Developments

DPI Requirements	Response
A clear statement noting the proposed structures/works, e.g., jetty, ramp, pontoon and/or berthing structure).	Proposed Works associated with two (2) flood damaged location on Keevers Drive and erosion of the banks of the Bellinger River. See Section 3.
A single clear map of the site showing the proposed and/or existing and adjacent foreshore structures, water depth contours and the presence of marine vegetation (e.g., seagrasses, mangroves, saltmarsh and/or macroalgal beds) in relation to the structures. This map must provide the sources and dates of the information (e.g., seagrass distribution was mapped in September 2004; the redefined Mean High-Water Mark is based on Bloggy Surveyors field survey Jan 2004).	See Section 6.3.2
Information on the species and number of mangroves present; the species, area and density of seagrasses or saltmarshes present; and the groups of algae and area of each group present (forexample kelp, red coralline algae).	Site includes 0.031 ha of vegetation including 11 grey mangroves. No other macrophyte species present. Fisheries portal data suggests presence of Zostera within the surrounding area however not within the study area. Field survey did not identify the presence of Zostera with the site visit at low tide on 18 August 2022.
If aquatic noxious weed *Caulerpa taxifolia* is present, please illustrate its distribution on the above map as well as providing information on the percentage cover of the species.	Unknown if present. Unlikely.
Recent clear colour photographs of the site at low tide. If marine vegetation is present, then these shouldbe included in the photographs. Photos should indicate the extent of the structures (e.g., length of jetty). Please note photocopies and black and white photographs will not be accepted.	See **Error! Reference source not found.** and **Error! Reference source not found.**.
Details on the proposed design of the structure and methods of construction.	Construction will all be completed from land Section 3
Details of how this structure and these works may impact the aquatic environment either directly or indirectly (examples of indirect impacts include via shading or changes to localised water movements caused by the structure).	See Section 6.3.2
Details of mitigation measures proposed to minimise impacts on the aquatic environment.	See Section 6.3.4
Consideration of threatened and protected species as listed under the *Fisheries Management Act 1994* that may be affected by the Proposed Works. Please see the DPI website for current listings – these are updatedregularly:	See Section 6.3.1.1

DPI Requirements	Response
http://www.dpi.nsw.gov.au/fisheries/species-protection/conservation/what-current http://www.dpi.nsw.gov.au/fisheries/species-protection/protected-species NB: If the habitat is suitable for threatened and protected species, assume they are present. Presence is not only determined from sighting or historical records. Consideration of any threatened species as listed under the *Environment Protection and BiodiversityConservation Act 1999*.	
Location of aquaculture leases, if present.	Oyster leases are present 2-4 km downstream and would not be impacted by the small-scale construction.
Location of fish hauling/meshing grounds, if appropriate.	None known in this portion of the river.

6.3.4. Mitigation Measures

Table 6-10: Aquatic Biodiversity Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
AB1	Indirect impacts on aquatic fauna – decreased water quality	• Develop a CEMP to address pollution and contamination issues, such as silt control and oil/fuel/chemical storage/spill management, which could arise during construction. • Install sediment fences to prevent fine material from travelling into the waterway. Install silt barriers to capture fine material along the full length of construction work. • Avoid using contaminated fill and waste material (tyres, building rubble, etc) near waterways. • A visual inspection of the waterway for dead or distressed fish (indicated by fish gasping at the water surface, fish crowding in pools or at the river's banks) is to be undertaken twice daily during the works.
AB2	Impacts on marine vegetation	• Where possible mangrove trimming should occur instead of removal. Mangrove trimming is to be undertaken consistent with arboriculture guidelines (Australian Standard AS4373) and involve pruning encroaching mangrove limbs back to a suitable junction.

6.4. Hydrology and Water Quality

6.4.1. Existing Environment

The proposal is in the Bellinger River catchment approximately 15 kilometres south of Coffs Harbour. The Hydrogeology Map of Australia (Commonwealth of Australia 1987) indicates the local aquifer is of quaternary age and is an undivided aquifer with low to moderate productivity.

A search of the groundwater database indicates few groundwater bores in close proximity to the proposal site. No data was available from these bores.

6.4.1.1. Water Quality

The water quality directly at the impact site is affected by the existing loss of material along the road corridor adjacent to rivers and creeks, with runoff, disturbed ground surfaces, erosion due to bank instability and sedimentation. The water quality of the river is considered good although due to the nature of bank instability sediment is being flushed in the rivers and creeks.

The water quality directly at the impact site is affected by the existing road corridor alongside the Bellinger River, with road runoff, disturbed ground surfaces, erosion due to bank instability and sedimentation. The resulting quality is considered poor although due to the tidal nature of the river the area is flushed regularly. General water quality outside the impact area is subject to in-river sand dredging operations.

6.4.1.2. Flooding and Drainage

The subject site is characterised by low-lying farmland with most of the impact area located at elevations of between 10 m and 20 m above sea level. Road upgrades are proposed to ensure adequate protection against flood waters.

6.4.2. Impact Assessment

6.4.2.1. Construction

Impacts on water quality associated with the impact area have the potential to occur during the construction phase within the study areas and downstream. Key risks relate to the generation and release of contaminated runoff to drainage lines and watercourses and include the following:

- vegetation clearing, and exposure of soils could result in soil erosion through wind or stormwater action. Sediment could be transported into watercourses with indirect impacts on downstream environments including turbidity, sedimentation, and increased nutrient loads;
- accidental spill or leak of petrochemicals or other chemicals from the use and storage of vehicles, plant and machinery could occur on site. Such chemicals could pollute surface water;
- solid waste including construction and general domestic waste, if not appropriately collected and disposed of could be released to the environment and watercourses; and
- loss of stockpiled material could occur through wind or stormwater action and transported to watercourses. Similarly, inappropriate placement of stockpiles and construction materials could result in impacts to watercourses.

These impacts can have implications for both aquatic ecosystem health and human health when considering potential effects on sensitive receiving environments downstream. Reduced water quality,

decreased light penetration through the water column, filling pools and covering hard substrate with sediments may alter primary (plant) and secondary (animal) production that supports or regulates the aquatic food web.

Water quality impacts associated with construction works in and around watercourses can be mitigated with appropriate erosion and sediment controls, chemical and waste management procedures, and appropriately sequenced construction. Activities and scheduling should be responsive to changing weather conditions.

A neutral or beneficial effect (NorBE) on water quality was considered. While there would be risks of water quality impacts during the construction of the proposal, the safeguards and mitigation measures proposed would contain water quality impacts to the site. The construction phase of the Impact area would not lead to a long-term reduction in the quality of the water within the immediate area.

Impacts on water quality during construction can be minimised effectively with the diligent implementation of mitigation measures.

6.4.2.2. Operational

The impact area involves reconstructing existing riverside road pavement and bank works, reshaping existing road/riverbank, fill batters and rehabilitation and stabilisation of exposed areas. Operationally, this should result in the cessation of bank erosion associated with the degraded banks. The impact area is likely to have a long-term beneficial impact on water quality.

The impact area could result in a minor increase in the volume and rate of stormwater runoff due to removal of bankside vegetation. Increased runoff has potential to result in scouring of adjacent areas. These impacts would be minimised through the appropriate design of roadside planting and re-vegetation.

Consequently, the potential impacts on water quality associated with the Proposed Works are expected to be minor, and the overall benefits from the proposed action on water quality in the immediate Catchment.

6.4.3. Mitigation Measures

Table 6-11: Hydrology and Water Quality Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures

HWQ1	Loss of soil and sediment during construction	• Ensure that temporary stockpiles are placed within the site and protected (i.e., sediment fencing at base) to avoid loss of sediment.
		• Ensure that temporary stockpiles are regularly checked for erosion and sediment control failures.
		• Erosion and sediment control measures should be implemented prior to any construction works commencing and remain in place until exposed areas are rehabilitated and stabilised.
		• Measures should include some or all the following:
		  ○ Silt fencing downstream of the works including a floating boom with a silt curtain to capture fine material
		  ○ Bunding around stockpiles
		  ○ Sediment fences upslope of all drainage lines

Reference	Environmental Aspect	Mitigation Measures
		○ ESC measures to be implemented in accordance with the CEMP, manufacturers specifications and appropriately maintained at regular intervals and following any rainfall and runoff events ○ Ground disturbance works including vegetation removal and earthworks to be scheduled or periods of dry weather and not during heavy rainfall events ○ Newly constructed batters to be stabilised as soon as practicable by topsoiling and sowing an appropriate cover crop ○ All spills or soil or other erodible material on sealed access routes or roadways to be immediately cleaned up and removed (by manual means where possible)
HWQ2	Accidental petrochemical spills during construction	• Petrochemicals or other chemicals to be stored in appropriate transportable storage containers, away from watercourses and drainage lines, flow paths. • Refuelling of plant and equipment to be undertaken away from watercourses and within areas appropriately bunded. • A spill kit to be kept onsite and staff trained in its use. • Equipment, machinery, and vehicles should be regularly maintained (documented).
HWQ3	Flooding/weather during construction	• A Flood and Weather Contingency would be developed to manage the potential impacts of significant weather events on the construction site.
HWQ4	Loss of construction and domestic waste	• General solid waste to be collected and disposed of at BSC Waste Transfer facilities. • Onsite portable toilets to be maintained and waste collected and properly disposed of by licensed contractor.
HWQ5	General	• Cease work and stabilise the site when there is a medium/high rainfall event expected.

6.5. Aboriginal Heritage

The following section regarding Aboriginal heritage has been conducted in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (hereafter referred to as 'CoP') (Department of Environment, Climate Change and Water, 2010).

The aim of this assessment was to identify the likelihood of Aboriginal cultural heritage sites and/or objects being present within the area of the impact area and, if so, whether the impact area have the potential to harm those sites and/or objects. The below documents the outcomes of this assessment as required by the CoP.

6.5.1. Existing Environment

This assessment aims to determine whether Aboriginal objects will be harmed by the Proposed Works, as required under Part 6 of the NSW NPW Act. The CoP sets out the reasonable and practicable steps which individuals and organisations need to take in order to:

- identify whether or not Aboriginal objects are, or are likely to be, present in an area;
- determine whether or not their activities are likely to harm Aboriginal objects (if present); and
- determine whether an Aboriginal Heritage Impact Permit (AHIP) from the DPIE is required, and/or further assessment is required.

The aims of this Aboriginal archaeological due diligence and cultural heritage assessment are to:

- undertake a search of the Aboriginal Heritage Information Management System (AHIMS) database maintained by DPIE to establish if there are any previously recorded Aboriginal objects or places within the impact area (Table 6-12);
- undertake a search of the NSW State Heritage Register, the Australian Heritage Database, and the Bellingen LEP Schedule 5 (Environmental Heritage) in order to determine if there are any sites of Aboriginal significance or sensitivity located within the impact area;
- undertake a desktop review of relevant environmental information to determine whether the Proposed Works are located in a landform with an elevated potential to contain Aboriginal objects; and
- undertake a site inspection to confirm the conclusions of the desktop assessment and identify the potential for previously unidentified archaeological items and sites.

Consultation with the Aboriginal community is not a requirement of this Due Diligence assessment. The subject site is located with the Coffs Harbour and District Local Aboriginal Land Council area.

6.5.1.1. Database Searches

A desktop study of the area of impact area was conducted to determine the likelihood of previously unrecorded Aboriginal artefacts or areas of Aboriginal archaeological sensitivity being present, including a search of the Aboriginal Heritage Information Management System (AHIMS) database, which retains information and records pertaining to identified Aboriginal cultural heritage sites, objects, and declared places throughout NSW. It is maintained and regulated by Heritage NSW under Section 90Q of the NPW Act.

A 'Basic Search' of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken by ELA for the Proposed Works region with a 5 km buffer (Figure 6-10). This search revealed

several registered AHIMS sites and so an 'Extensive Search' of the REF site areas with 5 km buffers was submitted. A total of 141 registered AHIMS sites were returned from this search within 5 km of this REF site. A total of 51 AHIMS sites are within 5 km the Keevers Drive REF site (Table 6-12).

Table 6-12: AHIMS Heritage sites within 5 km of Keevers Damage Site

Feature	Number of Sites	Percentages
Aboriginal Ceremony and Dreaming	3	5.88%
Artefact	21	41.18%
Burial	1	1.96%
Ceremonial Ring (Stone or Earth)	4	7.84%
Modified Tree (Carved or Scarred)	3	5.88%
Potential Archaeological Deposit (PAD)	16	31.37%
Shell	3	5.88%
Total	**51**	**100.00%**

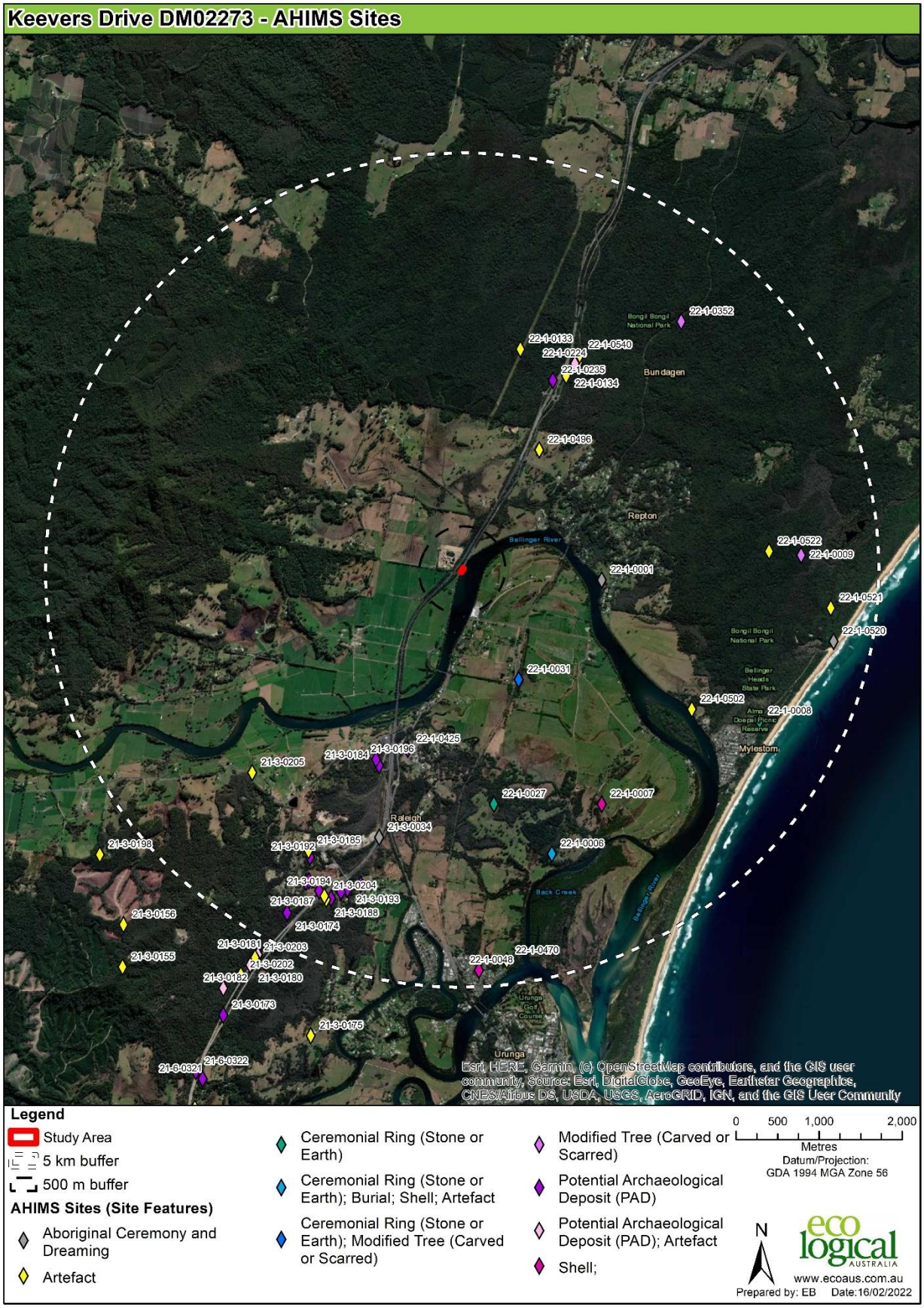

Figure 6-10: AHIMS Sites within 5km

The following heritage registers were accessed on 18 August 2022 for Indigenous and non-indigenous historic places within the Bellingen LGA in proximity to the REF site:

- **The State Heritage Register (NSW Heritage Office):** Nil related to Aboriginal heritage.
- **Bellingen LEP:** No Aboriginal Heritage sites are identified (EPI Geodatabase).
- **The World Heritage List:** Nil related to Aboriginal heritage.
- **Commonwealth Heritage List (Australian Heritage Council):** Nil related to Aboriginal heritage.
- **The National Heritage List (Australian Heritage Council**): Nil related to Aboriginal heritage.

6.5.1.2. Topography and Soil Landscapes

The CoP identifies a number of landforms with an elevated potential to contain Aboriginal sites. These include:

- within 200 m of waters, or
- located within a sand dune system, or
- located on a ridge top, ridge line or headland, or
- located within 200 m below or above a cliff face, or
- within 20m of or in a cave, rock shelter, or a cave mouth.

The subject site is located on Keevers Road approximately 2 km south-east of Raleigh, between the Pacific Highway and the Bellinger River. The area is located on the alluvial floodplain of the Bellinger River which are mapped as part of the Raleigh soil landscape which comprises “long, narrow, curved fluvial levees and scrolls on the meander plain of the tidal Bellinger River”. Significant areas of relatively undisturbed vegetation, making up Bongil National Park, are present to the north and west of the subject site, though are approximately 2 km away at the closest point. While the subject site is located on the Bellinger River it is likely that main Aboriginal campsites were located on the estuaries closer to North Beach and Urunga and on the elevated hills near Repton, Raleigh and Fernmount.

The subject site is within a heavily cleared segment of land between the Pacific Highway and Bellinger River, with the roadways and adjacent areas having been subject to previous disturbances and excavation works as Keevers Drive was the former Pacific Highway before the duplication and realignment of the highway to its current location in the late 1990s. Given the history of the subject site it is likely that if a large archaeological site was present the site would have been identified during maintenance works. This previous disturbance combined with the alluvial floodplain soils which commonly undergo flooding events would affect the archaeological integrity of any archaeological deposits.

6.5.1.3. Potential for Aboriginal sites

Generally, it would be expected that Aboriginal campsites would not be located within the low-lying floodplains which typically comprised sub-tropical rainforests and swamps. Aboriginal campsites on the NSW North Coast were typically on wide saddles, hilltops and ridges elevated above the floodplain. Proximity to water is not a reliable indicator of site potential on coastal landscapes where fresh water is abundant. The exception to this is the confluence of major creeks and rivers- however in this instance the relationship between campsites and river systems primarily related to navigation and cultural boundaries and not the ecological or economic value of the water system.

It is not considered that any of the REF site have an elevated potential to contain Aboriginal sites based on landform or topography. The Bellinger River area is a relatively uniform landscape and the REF site within this area would provide not significant access to resources or environments that are not otherwise widely available, furthermore would not be ideal for a camp site due to the low-lying topography of the area.

6.5.1.4. Disturbance History

The Due Diligence CoP defines disturbed lands as:

> *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.*
>
> *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.*

Disturbance in proximity to the Impact area generally comprise clearing for roadways and nearby farms, construction of bridges, construction of roadways through cut, fill and bulldozing methods, routine maintenance of the road surface and installation of barriers and road signs. Based on the available information the Impact area are located within areas which have been subject to disturbance as defined by the CoP.

6.5.2. Impact Assessment

A number of previously registered AHIMS sites are located within 5 km of the REF site locations, however none are within 1 km. Most of these sites are associated with the upgrade works on the Pacific Highway, with the remaining sites revealed by nearby residential developments and access tracks within Bongil National Park. Some of the recorded AHIMS sites are located on landforms which are comparable to the locations where the subject site is located.

It is unlikely that the works proposed within the subject site will cause harm to any potential subsurface deposits, given that the area of concern is within previously impacted areas in which no items were discovered. The laydown sites are within areas that have not been previously subject to disturbance from road works, however, impacts at these ancillary areas will be restricted to the upper portion of the soil profile.

The impact assessment has concluded that the Proposed Works are not likely to impact on Aboriginal objects and that additional archaeological investigation and consultation with the Aboriginal community is not considered required to comply with the Due Diligence Code of Practice for the protection of Aboriginal Objects in new South Wales (Department of Environment, Climate Change and Water, 2010)

6.5.3. Mitigation Measures

The works are not expected to disturb any Aboriginal archaeological deposits. If it is suspected that Aboriginal material has been uncovered as a result of ground disturbing activities within the Study area.

Although it is unlikely that Aboriginal Human Remains will be located at any stage during earthworks within the Study area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest Police Station (Bellingen), the relevant Local Aboriginal Land Council and the Heritage NSW Regional Office (Coffs Harbour) are all to be notified as soon as possible. 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 the Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal Human Remains, workers or contractors should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Table 6-13: Aboriginal Heritage Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
AH1	Aboriginal Heritage – General Measures	• If suspected Aboriginal objects (such as stone artefacts or midden materials like faunal remains or shell) are encountered during development, all activities must cease in the affected area and an archaeologist contacted to assess the finds. If the finds are found to be Aboriginal objects, the DPE must be notified under Section 89A of the NPW Act. Appropriate management and avoidance or approval under a Section 90 AHIP should be sought if the Aboriginal objects are to be moved or harmed.
AH2	Aboriginal Heritage	• In the extremely unlikely event that human remains are found, all activities should immediately cease, and the New South Wales Police should be contacted. If the remains are suspected to be Aboriginal, the DPE may also be contacted to assist in determining appropriate management.

6.6. Non-Aboriginal Heritage

The non-Aboriginal heritage assessment was undertaken in accordance with the *NSW Heritage Manual* (NSW Heritage Office & NSW Department of Urban Affairs and Planning, 1996), specifically the guidelines *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch Department of Planning, 2009), and with reference to the Burra Charter (the Australian ICOMOS Charter for Places of Cultural Significance) (ICOMOS (Australia), 2013).

The primary objectives of the non-Aboriginal heritage assessment were to:

- identify, through heritage register searches, historical research and targeted archaeological investigations, the historical heritage values of the land within the Site;
- assess the significance of potentially impacted heritage items in accordance with the NSW Heritage Branch guidelines: Assessing Heritage Significance (NSW Heritage Office, 2001); and
- provide, based on significance and impact assessments against the Proposed Development, appropriate management, and mitigation strategies for all identified and potential non-Aboriginal heritage items.

This involved the following key tasks:

- A search of relevant non-Aboriginal heritage registers, databases, and lists, including:
    - World Heritage List.
    - National Heritage List (NHL).
    - Commonwealth Heritage List (CHL).
    - NSW State Heritage Register (SHR).
    - Bellingen LEP Heritage Schedule.
- identify potential direct and indirect impacts to non-Aboriginal heritage items; and
- undertake a significance assessment for potentially impacted items in accordance with the guidelines *Assessing Heritage Significance* (NSW Heritage Office, 2001) to establish why a particular site or item is of significance and, if necessary, to enable appropriate mitigation strategies to be developed.

6.6.1. Existing Environment

A search of the relevant databases revealed that there are no heritage items within the Proposed Works Disturbance Footprint listed on the National Heritage Database, the CHL or the State Heritage Register.

A search of the Bellingen LEP revealed that while there are various items listed as non-Aboriginal heritage of local significance within 5 km of the Site, there are no heritage items currently listed within or adjacent to the subject site.

The assessment aimed to identify all listed historical heritage items within and in the vicinity of the impact area using relevant heritage registers to examine the heritage curtilages and identify where there is potential for impact by the proposal. The searches indicated three historic sites within proximity to the subject site (Figure 6-11).

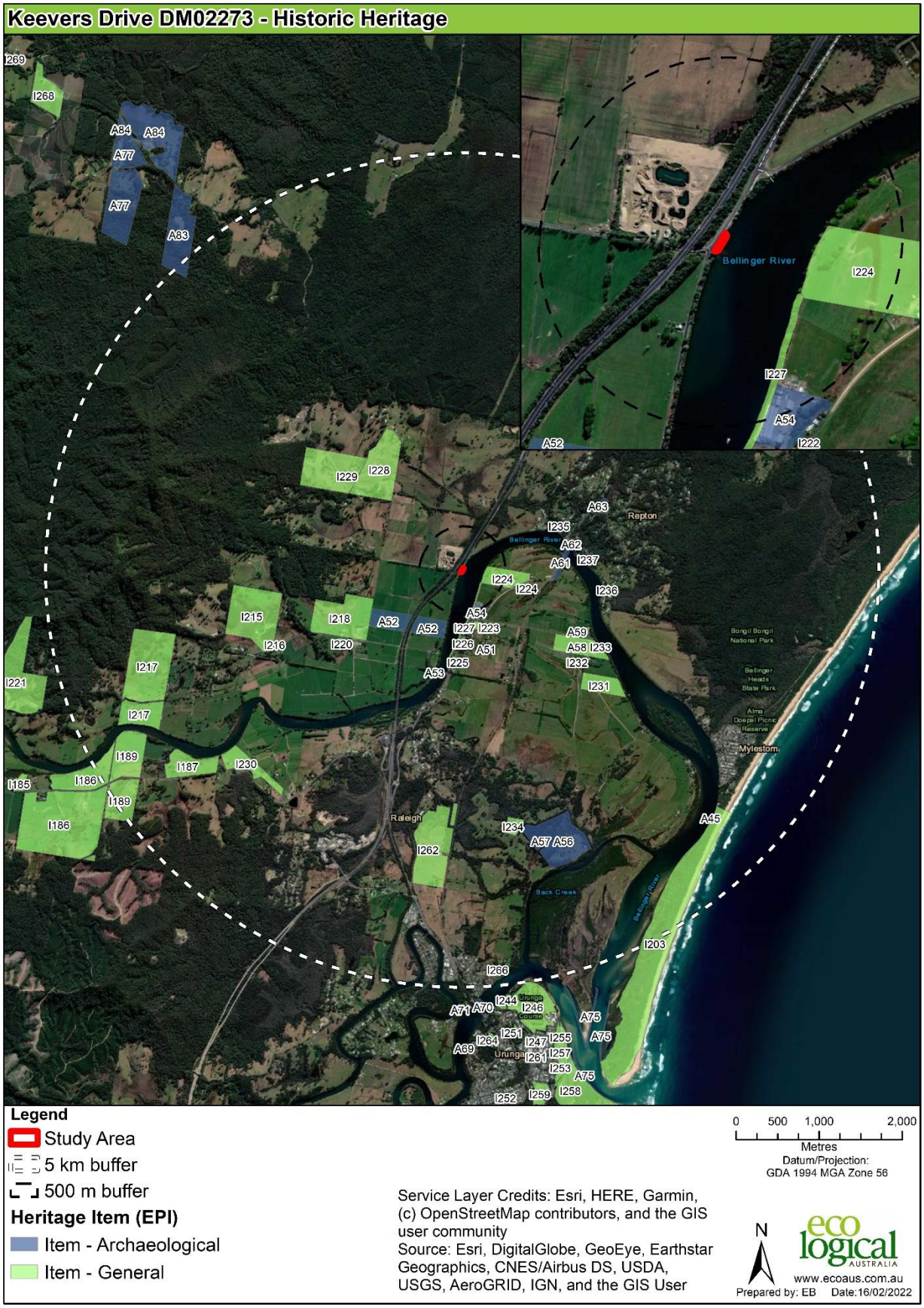

Figure 6-11: Historic Heritage mapping.

6.6.2. Impact Assessment

The impact area does not pose any potential risk to non-Aboriginal heritage sites. The closest historic sites are the silo at 77 Keevers Drive (site A52) which is a discrete heritage item clearly visible from Keevers Drive. The silo is a concrete structure and is located nearby to a mid-century dairy.

The homestead/ farmhouse complex on Old Ferry Road (site A54) is located on the eastern banks of the Bellinger River opposite the site at the Valery Road intersection. However, the farm is only partially visible from Keevers Drive and the impact area will not impact views across the river to the farmhouse complex. It is not likely that the road upgrades will impact on views north and west from the farmhouse as they will be obscured by the river.

The Norco Butter Factory (site A55) is also listed and is located directly opposite the southern-most portion of road upgrade works. It is not likely that the road upgrades will have a significant impact on views to the Butter factory. While Keevers Drive provides the better visual access to the Butter Factory than North Street Raleigh the views from Keevers Drive are mostly of more modern portions of the factory.

6.6.3. Mitigation Measures

Table 6-14: Non-Aboriginal Heritage Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
NAH1	Previously unidentified heritage sites or places are discovered	• In accordance with Section 146 of the *Heritage Act 1977*, if an archaeological relic (such as a deposit or artefact) is uncovered during works, work must cease in the affected area and a qualified archaeologist contacted to assess the find. Further advice and clarification may be sought from the Heritage Council of NSW, or the Heritage Division under delegation regarding assessment and approvals.

6.7. Noise and Vibration

6.7.1. Existing Environment

The impact area is located in a rural area that is predominantly undeveloped. The closest sensitive receiver (nearby dwelling) is located approximately 160 m of the site. Existing noise sources in the general vicinity include current vehicle movements on Keevers Drive and minor agricultural activities. There are no other sensitive receivers (residences, schools, churches, hospitals etc.) within 200 m of the impact area.

6.7.2. Impact Assessment

Given the land use of the surrounding area, and the linear nature of the activity and progression of works along the corridor, the impacts resulting from noise and vibration during the construction phase are expected to be minimal and temporary. While the Impact area may result in some minor short-term noise impacts to the nearest properties and residents, in the long term the impacts associated with the proposed road and bank upgrade are positive. Attenuation effects of soft ground and existing vegetation have been considered and will assist with amelioration of noise and vibration impacts.

6.7.2.1. Construction Noise

Rural residential properties located on Keevers Drive are likely to be the closest sensitive receivers during the impact area. The rural residences may be affected by noise from plant and machinery (performing site works as well as a general increase in traffic movements of plant, machinery, and personnel vehicles) for the duration of the impact area.

The NSW 'Interim Construction Noise Guideline' (ICNG, Department of Environment and Climate Change, 2009) sets out the Noise Management Level (NML) for residences (Table 6-15). The Rating Background Level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level. Residential receivers are considered 'noise affected' where construction noise levels are greater than the noise levels identified below.

Table 6-15: Noise Management Levels (NML)

Time of day	Management Level
Recommended Standard Hours: **Monday to Friday 7 a.m. - 6 p.m.** **Saturdays 8 a.m. – 1 p.m.**	Noise affected RBL + 10dB(A) Highly noise affected 75dB(A)
Outside recommended standard hours	Noise affected RBL + 5dB(A)

Given that the closest receiver is located within a rural setting, the RBL for the area surrounding the Impact area are assumed to be a minimum of 30dB(A). This is a conservative assumption and the lowest allowable level, as described in the NSW Noise Policy for Industry (2017).

Using the RBL of 30dBA(A), the construction noise management level for the closest receiver will be 40dB(A). Given the construction works would be carried out during standard construction hours, only the daytime period is assessed.

Noise modelling was not undertaken as part of this assessment as no receiver was predicted to be highly noise affected, as all predicted levels are likely to be below 75dB(A).

Given standard construction equipment is to be used it is recommended that a 'feasible and reasonable" approach towards noise management measures be applied to reduce noise levels as much as possible for the closest receiver. No other receivers are considered likely to be affected by construction noise.

6.7.2.2. Construction Vibration

For disturbance to human occupants of buildings, NSW EPA's 'Assessing Vibration; a technical guideline' (Department of Environment and Climate Change, 2006) provides the relevant criteria. It is based on the British Standard BS 6472-1992, 'Evaluation of human exposure to vibration in buildings (1-80Hz)'.

For damage to structures due to construction generated vibration, vibration limits are established in accordance with the German Standard DIN 4150 Part 3-1999 'Structural Vibration in Buildings – Effects on Structures'. The vibration levels during construction would vary depending on the type of activity being carried out. Construction equipment most likely to cause significant vibration includes; excavators, graders, compactors and truck traffic.

The above equipment would generally operate no closer than about 100 m from the closest receiver during work. In general, the risk of structural damage during construction is generally assessed as being very low with the risk of human disturbance also low. Specific recommendations have been provided to minimise impact to the residences nearby and it is recommended that the previously listed noise and vibration guidelines be consulted in preparation of the CEMP.

6.7.2.3. Operational Noise and Vibration

The proposal may result in a slight increase in the volume of traffic along Keevers Drive. It is possible that additional higher mass limit (HML) vehicles may elect to start using Keevers Drive. Noise associated with the transit of vehicles along the road may impact the closest receiver.

6.7.3. Mitigation Measures

Table 6-16: Noise and Vibration Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
NV1	Elevated noise and vibration levels during construction	• Hours of work limited to specified hours (Monday to Friday between 7:00 a.m. and 6:00 p.m. and Saturday 8:00 a.m. and 1:00 p.m. • Vehicles and machinery should not be left idling when not in use • Equipment, machinery, and vehicles should be regularly maintained (documented). • Well planned site layout to ensure where practical that noisy plant and machinery and overnight parking locations are located away from nearby residences with reversing also minimised in these locations. • Organise earthmoving and ground impacting operations so as not to occur in the same time period. • Select methods not involving impact where possible. • Community consultation and notification for potentially noise and vibration affected residences detailing timing of noisy activities. • Mechanism to provide noise complaints using signage and usage of a complaints register with relevant triggers for noise monitoring if required.

6.8. Air Quality and Odour

6.8.1. Existing Environment

The air quality in the locality would be generally expected to be of good quality, some agricultural land uses may generate localised dust. This would be the main source of air pollutants at the impact area. Dust levels may be exacerbated by vehicle and machinery use and in dry windy conditions.

Emissions from motor vehicles, including heavy vehicles would be the secondary source of air pollutants at the impact area.

A review of the National Pollutant Inventory reveals that there are no scheduled industries operating within the study area.

Climate data was obtained from the Bureau of Meteorology (BoM 2021) South West Rocks (Smoky Cape Lighthouse) weather station (059030) approximately 50 kilometres south of the proposal works.

The annual average maximum and minimum mean temperatures experienced are 27.1 degrees and 11.3 degrees, respectively. On average, January and February are the hottest months. July and August are the coldest months. Most of the annual mean rainfall of 1488.9 millimetres occurs in summer months (Jan to Apr) with high falls in December, May and June.

Wind speeds, which are of particular importance when determining the potential for dust impacts, are typically greater in spring and summer. Annual wind rose data for the period of 1957 to 2022 shows that average annual 9:00 am wind speeds are 18.7 kilometres per hour and winds are predominantly from the south-west.

Rose of Wind direction versus Wind speed in km/h (01 Jan 1957 to 05 Jul 2022)

Custom times selected, refer to attached note for details

SOUTH WEST ROCKS (SMOKY CAPE LIGHTHOUSE)

Site No: 059030 • Opened Jan 1939 • Still Open • Latitude: -30.9225° • Longitude: 153.0871° • Elevation 117m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

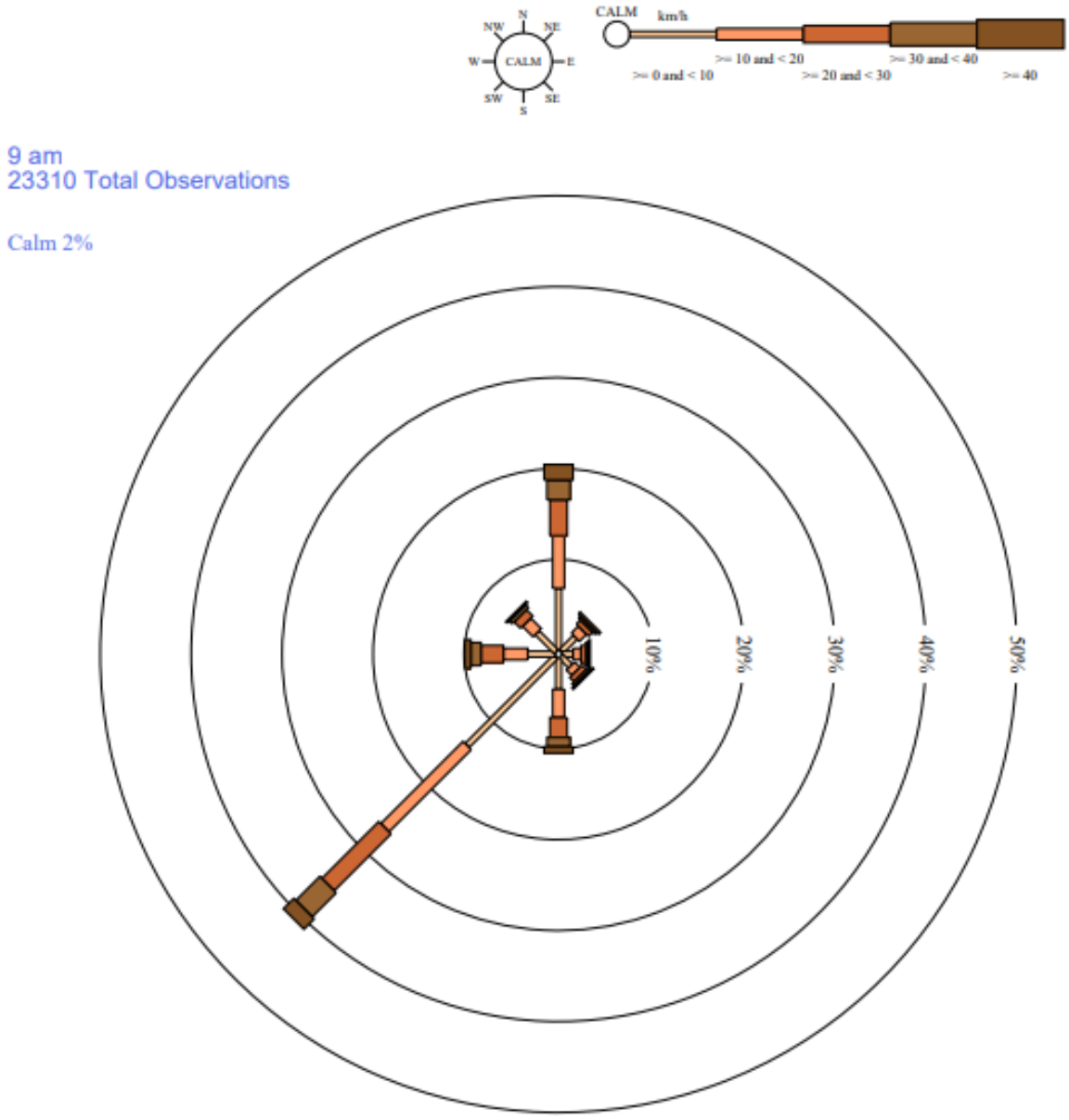

Figure 6-12 – Smokey Cape Lighthouse wind rose 9 am

The annual wind rose data for the period of 1957 to 2022 shows that average annual 3:00 pm wind speeds are 21.4 kilometres per hour and winds are predominantly from the north and south.

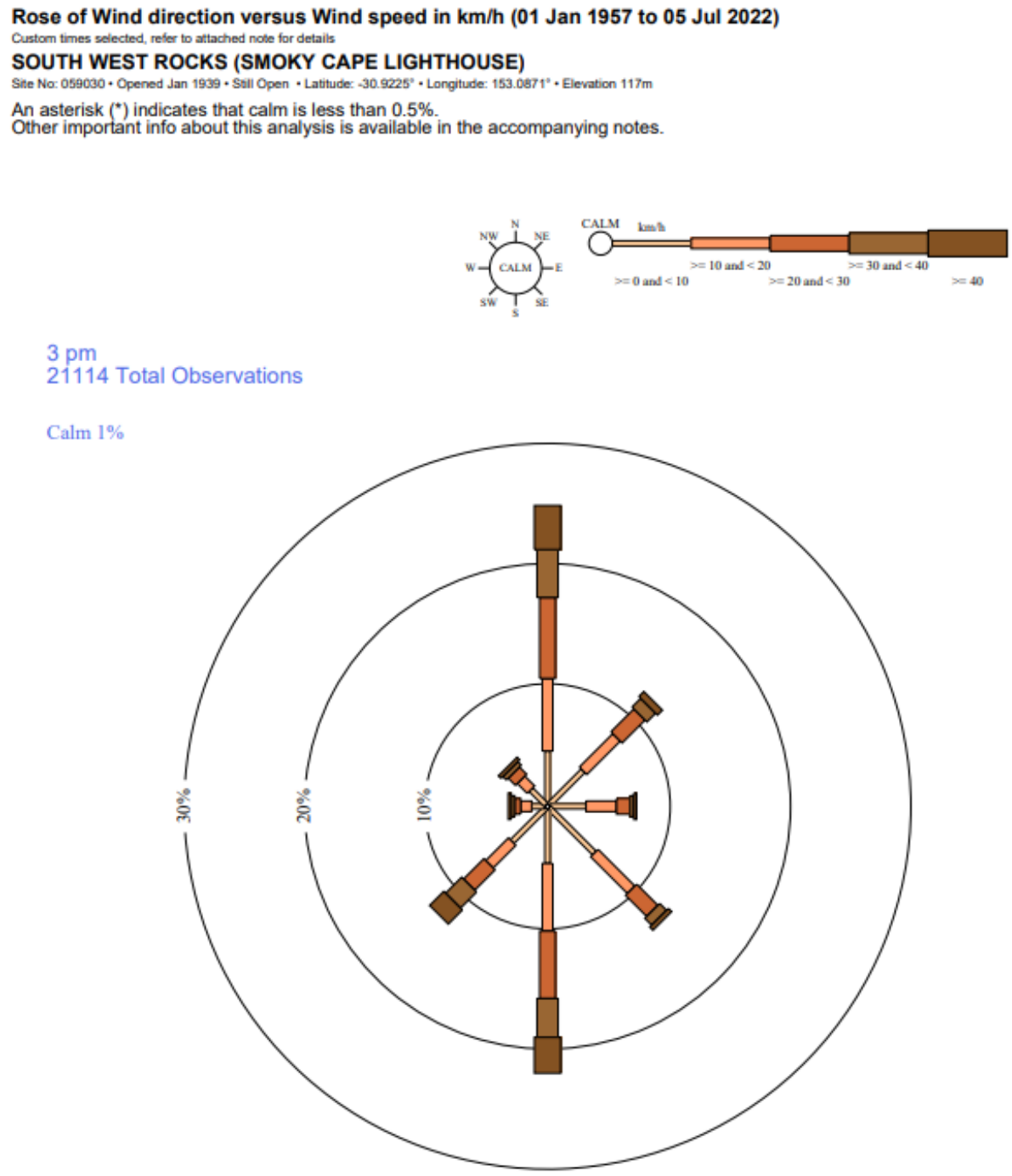

Figure 6-13 – Dorigo wind rose 3 pm

6.8.2. Impact assessment

6.8.2.1. Construction

Air quality has the potential to be impacted due to dust generation and greenhouse gas emissions from construction machinery. During construction, temporary reductions in air quality are likely to occur due to elevated particulate matter from dust generating activities and exhaust emissions from diesel-powered construction equipment. Potential sources of dust and pollutant generation may also include:

- clearing and grubbing of vegetation;
- excavation and trenching along the alignment of the pipeline;
- vehicle movements to and from, and within the site;
- uncovered loads of materials during transportation;
- unloading materials from trucks and placement; and
- transport from stockpiles (if any) during dry and windy conditions.

Significant impacts on sensitive receivers from elevated particulate matter and dust deposition are not anticipated given the location of the impact area is a rural zone and generally away from residences. Any impacts would be temporary and should only arise during dry weather with the wind blowing towards a receptor, at a time when dust is being generated and mitigation measures are not fully effective.

Similarly, relevant emissions generating activities include the general operation of plant equipment as well as stationary and idling local traffic because of the impositions of traffic controls to single lane availability. It is considered that the resulting additional exhaust emissions and associated odour from this activity will be negligible. This determination considered that any additional impacts are negligible when compared to the emissions associated with other activities in the locality i.e. agriculture as well as the existing use of the road.

The anticipated impact on residents is low given the short-term duration of the Impact area and the proximity of the closest receivers. Proposed mitigation measures to reduce this impact further are set out in Section 6.8.3.

6.8.2.2. Operation

The Impact area involves formalising existing gravel road shoulders, improving existing drainage lines, reshaping existing road cut and fill batters and rehabilitation and stabilisation of exposed earth. Operationally, this should result in the cessation of dust disturbance associated with regular vehicular use and therefore, improvements to local air quality.

6.8.3. Mitigation Measures

Table 6-17: Air Quality and Odour Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
AQ1	Construction air quality impacts – transportation	• Materials to be covered during transport to minimise dust emissions. • Stabilised and well-maintained site access to reduce tracking of sediment off site and to ensure approaches kept dust free. • Cover all loads. • Work areas to be watered as necessary particularly during dry and windy conditions. • Topsoil shall not be respread during high wind conditions. • Topsoil stripping shall occur while soil is reasonably moist if possible.
AQ2	Greenhouse Gas Emissions	• Equipment will be switched off when not required • Vehicles and equipment will be properly maintained • No vegetation matter of any kind is to be burnt.

6.9. Traffic and Safety

6.9.1. Existing Environment

The road network near the study area is Keevers Drive which connects residents in the northern reaches of the Bellinger River. Keevers Drive is BSC controlled and is used predominantly by local rural residents. Presently, vehicles are restricted due to the safety condition of sections of the road due to bank instability.

6.9.2. Impact Assessment

6.9.2.1. Construction

Negative impacts on traffic would be restricted to inconveniences associated with traffic control measures during the construction activities and impacts associated with construction noise and increase in construction traffic.

6.9.2.2. Operational

The impacts of the Impact area on community safety will be positive. The impact area will enhance the road network, improving road safety and allowing heavy vehicles currently restricted in using the road.

Community safety gains associated with the Impact area relate primarily to the upgrading of the road as well as a reduction in the risk associated with failure of existing banks. More specifically, the works will provide safer road shoulder and protection to road infrastructure during flood events.

6.9.3. Mitigation Measures

Table 6-18: Traffic and Community Safety Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
TCS1	Increased heavy vehicle traffic may disrupt traffic movement and access on local roads	• Ensure that a best practice TMP is prepared prior to works commencing to ensure traffic is safely managed and that residents with local properties continue to have road access during the implementation of the Impact area. • Ensure all workers adhere to relevant OH&S standards and provide workers compensation insurance. • Construction traffic movements associated with the Impact area will be kept to the minimum necessary to implement the Impact area efficiently and safely. • Traffic impacts in association with the Impact area will be restricted to the hours of construction, which would be undertaken between 7:00 a.m. to 6:00 p.m. Monday to Friday and Saturday 8:00 a.m. to 1:00 p.m. with no work on Sundays or public holidays. • Consultation with residents regarding access, closures and work scheduling prior to works commencing.

6.10. Visual Amenity and Landscape

6.10.1. Existing Environment

The impact area and surrounds are a rural landscape with scenic values typical for much of the area and other adjacent rural areas. Much of the vegetation in the wider landscape native vegetation species associated with agriculture and pastoral cultivation have been introduced. The study area itself is characterised by the existing sealed sections of Keevers Drive.

6.10.2. Impact Assessment

Impact area have the potential to result in a minor decline in visual amenity of the study area and subject area due to the presence of the construction site itself. Untidy work practices, cleared vegetation, haphazard storage of machinery and areas of bare earth all contribute to a reduction in visual amenity. However, it is considered unlikely that the decline in visual amenity at the site-specific scale would extend to a decline in the broader landscape.

Impact area will result in an improvement to visual amenity upon completion of the construction and rehabilitation works. The following may assist in improving visual amenity:

- Road resulting formalisation of the current road edges will remove roadside safety disturbances thereby improving the overall appearance of the road corridor.
- Implementation of natural rehabilitation to reduce visual intrusiveness of the road corridor.
- Implementation of engineered road infrastructure and furniture, particularly in areas of erosion, bank cutting, scour will improve amenity in these locations.

Rehabilitation should consider a combined approach of planting and upper bank protection.

6.10.3. Mitigation Measures

Table 6-19: Visual Amenity and Landscape Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
VAL1	Construction stage visual amenity	• Maintain tidy work practices with the site kept clean of general litter. Refer to measures relating to waste management mitigation measures. • All disturbed areas shall be rehabilitated and maintained until established.

6.11. Socio Economic

6.11.1. Existing Environment

The proposal is located between the region of Urunga. According to the 2021 Census data (https://www.abs.gov.au/census), Urunga has a population of 4822, the median age is 52.4, with 50.1% male and 49.9% female, with an average of 1.7 children per family who have children. Approximately 205 persons identifying as Aboriginal and/or Torres Strait Islander. 100% of all households have between 1 and 3 vehicles with an average of 1.2 vehicles per household.

Whilst the population of the immediate area is not high, it is assumed that there is high dependency on local travel by car given the mainly rural land uses and lack of public transportation. Furthermore, whilst the road has the potential to provide a useful link with users are currently restricted due to the current condition of the road. Keevers Drive is important to the community and the residents and businesses situated in the area. The Proposed works are largely based on enhancing road user safety given the road damage experienced along the road - particularly during 2021 weather events - and reducing ongoing maintenance costs.

Whilst the population of the rural area is not high, it is assumed that there is high dependency on local travel by car given the rural land uses and lack of public transportation. Furthermore, whilst the road has the potential to provide a useful link with users are currently restricted due to the current condition of the road. There are limited to no alternative routes, and this will need to be considered during design of detailed construction methodology.

6.11.2. Impact Assessment

6.11.2.1. Construction

The proposed road and bank works will have a temporary, negative impact on Keevers Drive and the residents who use the road regularly, as well as additional intermittent users, resulting from traffic management delays and noise, air quality and visual amenity impacts.

On the contrary, some local expenditure would occur during the construction phase potentially resulting in some economic benefit to the local community. This may be through the contracting and purchasing of local supplies and services by the Impact area contractors.

6.11.2.2. Operational

BSC recognises that sections of the community have concerns about the safety of the road. However, BSC's decision to undertake the works is predominantly about improving amenity and safety while reducing maintenance costs for ratepayers. The road, in and of itself, would not increase development in the locality. Future development would be in accordance with land use zones.

The proposed road upgrade will have a long term positive socio-economic impact, including but limited to the following benefits:

- Increasing provision of a safe road connection to coastal tourist areas.
- Providing an alternative for heavy vehicles, resulting in fewer delays.
- Decreasing maintenance costs to BSC and ratepayers – the existing un-safe banks therefore, current maintenance costs are high.

6.12. Waste Management and Resource Use

6.12.1. Existing Environment

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

- avoidance of unnecessary resource consumption;
- resource recovery (including reuse, reprocessing, recycling, and energy recovery); and
- disposal.

By adopting the above principles, BSC encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ecologically sustainable development. No significant sources of waste are present within the impact area. Some wastes may exist in the surrounding area associated with land use activities.

6.12.2. Impact assessment

6.12.2.1. Construction

The impact area is not expected to generate a significant volume of waste. However, some may be produced during the construction phase, potentially including:

- construction packaging materials;
- excess spoil from earthworks;
- vegetation waste form clearing of vegetation; and
- liquid wastes from cleaning, repairing and/or maintaining heavy construction equipment.

To ensure that waste is minimised, a CEMP will be implemented which will detail the proper avenues for the removal of waste on-site. Where possible, excavated material should be reused and emplaced from where it was removed. Only the minimum amount of vegetation required to facilitate the works should be removed. No further impact is expected to occur during the operational phase, provided the site is managed in accordance with the waste management procedures set out in the CEMP and all waste is removed.

6.12.2.2. Operation

The proposal is unlikely to result in any additional waste generation during its operational phase.

6.12.3. Mitigation Measures

Table 6-20: Waste Management and Resource Use

Reference	Environmental Aspect	Mitigation Measures
WM1	Generation of construction waste	• Cleared vegetation to be mulched and used for site rehabilitation where possible. • Waste will be reused or classified and removed as soon as practicable and disposed of in accordance with the EPA's 2014 waste classification guidelines to a licenced waste disposal facility.

Reference	Environmental Aspect	Mitigation Measures
		• Transport and disposal dockets will be kept as proof of correct disposal for everything that leaves site. • Secure all wastes to avoid pollutants escaping. • Spoil excavated from the site to be used on site where possible. • Implementation of waste management strategy documented within the CEMP. The strategy should include details of the type of waste material likely to be generated, and how it would be managed (including sorting, storage, and disposal), materials to be recycled, as well as measures to reduce or avoid waste generation. • Construction staff are to be briefed on their responsibility for removal of their own general waste.
WM2	Generation of domestic waste	• Signage detailing appropriate material to be disposed of within waste bins. • Regular emptying of the amenities waste bins. • Implementation of waste management strategy documented within the CEMP.

6.13. Energy and Climate Change

6.13.1. Impact

During the construction period, energy consumption will occur in association with the use of vehicles, plant and machinery. This energy use is negligible in the context of the energy use elsewhere in the locality. Despite this, it can be further mitigated by implementing the mitigation measures identified below.

6.13.2. Mitigation Measures

Table 6-21: Energy use and Climate Change

Reference	Environmental Aspect	Mitigation Measures
ECC1	Increased energy consumption and production of emissions	• Vehicles, plant, and machinery should be kept in good working order and used in an efficient manner. Vehicles should not be left idling when not in use.

6.14. Cumulative impacts

6.14.1. Impact assessment

6.14.1.1. Construction

Potential cumulative impacts could occur as a result of the proposal occurring simultaneously with other projects in the locality or the accumulation of a number of impacts from one project. For example, amenity impacts may rise if other major projects occur simultaneously with the proposal.

Cumulative impacts for the proposal would be minimised during construction through the application of individual environmental safeguards and management measures included in the preceding sections. Consultation with relevant stakeholders, such as neighbours and the national park, would be undertaken during construction planning to ensure that potential cumulative impacts are identified. Any additional mitigation measures from that consultation would be implemented for the proposal.

6.14.1.2. Operation

The long-term cumulative impact of the proposal relates to increased use of the road given improved road conditions. Increased numbers of vehicles and visitors could result in the following adverse impact:

- increased littering;
- loss of amenity due to removal of natural areas; and
- loss of business due to works.

Positive cumulative impacts would include:

- reduced BSC expenditure benefitting all residents and ratepayers; and
- reduced impacts on flora and fauna and aquatic environments due to improved bank conditions.

On balance, the long-term cumulative benefits of improved road safety and accessibility, fewer environmental impacts, reduced costs for ratepayers, and increased potential for businesses, outweighs the potential adverse impacts.

6.15. Matters of National Environmental Significance

Under Chapter 2, Part 3 of the EPBC Act, the following MNES are required to be considered to assist in determining whether the Proposed Activity should be referred to the Australian Government Department of the Agriculture, Water, and the Environment. Table 6-22 addresses the MNES for the Impact area.

Table 6-22: Consideration of Matters of National Environmental Significance

MNES	Significant Impact
Any environmental impact on a World Heritage property?	No
Any environmental impact on National heritage places?	No
Any environmental impact on Ramsar wetlands?	No
Any environmental impact on Commonwealth listed threatened species or ecological communities?	No
Any environmental impact on Commonwealth listed migratory species?	No
Does any part of the project involve nuclear action?	No
Any environmental impact on a Commonwealth marine area?	No
Any impact on Commonwealth land?	No

6.16. Part 8, Division 1, Clause 171 Environmental Factors of the *EP&A Reg 2021*

EP&A Reg sets out 16 factors that need to be considered when assessing environmental impact under Part 5 of the EP&A Act. These factors are addressed in this report and relevant sections are listed in Table 6-23 below.

The potential negative impacts identified by this report are unlikely to have significant effects at the local or regional scale since they will be minor and site-specific. The small-scale potential impacts are not envisaged to have substantial adverse effects on the environment including threatened and migratory species, cultural heritage, microclimate, greenhouse gas emissions, air, water, or soils or the community, as work practices will be implemented to protect such values.

Table 6-23: EP& A Reg Environmental Impacts

Clause 171 Factors		Impact
(a)	Any Environmental Impact on a Community?	There are not expected to be adverse environmental impacts on the community. Noise and other impacts associated with the construction would be temporary. BSC would notify the closest residential houses prior to works commencing and only conduct works within working hours.
(b)	Any transformation of a locality?	No significant transformation of locality is likely as part of the works. The impact area involves excavation of the riverbank and replacement of rockfill in areas previously modified due to the initial construction of the road. Vegetation removal would be minimal and is predominantly exotic vegetation.
(c)	Any environmental impact on the ecosystems of the locality?	The Impact area include minor vegetation removal, predominantly exotic vegetation. Impacts on local terrestrial ecosystems are expected to be minor, as the site is highly modified with little perceived ecological value. No direct adverse impacts on threatened flora and fauna, habitat trees, mature trees or the ecosystems surrounding the site are anticipated. Indirect impacts, such as sedimentation, would be mitigated using recommended safeguard measures. Impacts on aquatic ecosystems are anticipated to be negligible if the recommended mitigation measures are implemented.
(d)	Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	The Impact area involve excavation of the riverbank and replacing with rockfill in areas that have been previously modified. Therefore, the works will not significantly reduce the aesthetic, scientific or other environmental quality or value of the locality.
(e)	Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	No impact expected
(f)	Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act* 1974)?	The impact on threatened fauna has been addressed and mitigated. The impact, if any, will not be significant. In addition, the impact resulting from the loss of general fauna habitat as a result of vegetation disturbance is not likely to result in the loss or reduction in the viability of more common species.
(g)	Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?	Potential impacts on flora and fauna have been considered as part of this REF. There will be no significant impact on any threatened species or other more common fauna species.

Clause 171 Factors		Impact
(h)	Any long-term effects on the environment?	Potential impacts on flora and fauna have been considered as part of this REF. There will be no significant impact on any threatened species or other more common fauna species.
(i)	Any degradation of the quality of the environment?	No significant impacts to the quality of the environment were found. No degradation to the quality of the environment should occur if mitigation measures are adhered to. Impacts on water quality and aquatic habitat through sedimentation in the Bellinger River can be controlled through the implementation of recommended mitigation measures.
(j)	Any risk to the safety of the environment?	A low risk to the environment may be associated with the works, with the potential for the spread of waste materials, weeds, and possible small chemical spills (oil or petrol) during construction. There is potential for sedimentation into the Bellinger River from the works. A moderate environmental risk is associated with the site due to the likely presence of acid Sulfate soils and proposed excavation works. An acid Sulfate soils management plan should be developed to reduce this environmental risk. Long-term, the result of the Impact area would reduce the risk of ASS exposure and erosion due to the placement of rockfill to stabilise the riverbank. The risk to the environment is considered minimal if the prescribed mitigation measures are adopted.
(k)	Any reduction in the range of beneficial uses of the environment?	No reduction in the range of beneficial uses of the environment will result as part of the works. The works will not limit or modify any uses of the environment.
(l)	Any pollution of the environment?	No pollution of the environment is proposed or likely. No pollution, beyond typical construction activity, is likely. An acid Sulfate soils management plan would address potential pollution through the exposure of acid Sulfate soils. The risk is minimal if the appropriate mitigation measures are followed.
(m)	Any environmental problems associated with the disposal of waste?	All waste is to be taken offsite and disposed of appropriately, therefore, no additional problems are expected.
(n)	Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?	No resources that are being utilised as part of this Impact area are likely to become in short supply.
(o)	Any cumulative environmental effect with other existing or likely future activities?	Minimal cumulative environmental effect is likely as a result of the works. The Impact area are expected to reduce erosion and exposure of ASS risk due to the stabilisation of the riverbank using rockfill.
(p)	Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	There are no impacts on coastal processes or hazards that will result as part of the works.

7. Summary of Environmental Mitigation

This chapter describes how the proposal would be managed to reduce potential environmental impacts throughout detailed design, construction, and operation. A framework for managing the potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are also listed.

7.1. Summary of safeguards and mitigation measures

Several safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP would be prepared prior to construction of the proposal and must be reviewed and certified by the BSC Environment Officer prior to the commencement of any on-site work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

General environmental mitigation measures for the Impact area are as follows:

- If the scope of the works changes at any time, review this REF to determine any new measures to take.
- A CEMP is prepared and implemented prior to the commencement of works. The CEMP is to be submitted to and approved by DPI Fisheries prior to commencing work.
- Parking of vehicles and storage of plant/equipment is to occur on existing paved areas or within the designated laydown 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.
- All Impact area staff and contractors will be inducted on the environmental sensitivities of the work site(s) and relevant mitigation measures prior to commencement.
- The Project Manager will be notified immediately of any complaints relating to management of environmental issues.
- To ensure compliance with Section 148(3) of the *Protection of the Environment Operations Act 1997*, the BSC's Health and Building Manager must be notified of any pollution incidents that have caused or threaten material harm to the environment.
- The Asset Manager will be notified if damage occurs to an area (vegetation, etc) outside of the nominated work area.

A summary of mitigation measures and environmental management measures relating to all aspects of the Impact area are presented in Table 7-1.

Table 7-1: Summary of environmental mitigation measures to be implemented.

	Reasons	Safeguards/Mitigation Measures
Landform, Geology and Soils		
GS1	Earthworks and excavation may result in increased erosion risk and sedimentation of waterways	• Ensure that temporary stockpiles placed within the site are appropriately protected (i.e., sediment fencing at base) to avoid loss of sediment. • Ensure that temporary stockpiles are regularly checked for erosion and sediment control failures. • Ensure that any site access is stabilised to reduce tracking of sediment off site with approaches kept free of dust during works. • Minimise extent of disturbed area through appropriate staging and completion of works in shortest possible timeframe. • Topsoil stripping shall occur while soil is reasonably moist if possible. • Any loads of soil and other erodible materials transported, to and from, the site to be always kept covered during transportation and remain covered until unloading for use or disposal at appropriate waste facility. • Excess spoil will be placed in stockpiles, reused on site or properly disposed of off-site. • Work areas to be watered as necessary particularly during dry and windy conditions. • Progressive rehabilitation and revegetation of disturbed areas to be undertaken during construction period to the greatest extent possible • Topsoil shall not be respread during high wind conditions. • A Sediment and Erosion Control Plan is to be prepared in accordance with *The Blue Book – Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and implemented prior to works, with the aim of achieving an outcome of 'no visible turbid plumes migrating through to the waterway'. The Plan must include, but not be limited to: o Locations and type of sediment controls, both adjacent to and in the nearby watercourse, to be erected surrounding the Impact area site. These can be constructed from sandbags and lined with geofabric; however, they must be secured to ensure they do not mobilise. o Prior to forecast heavy rain, work is to cease, accumulated material is to be removed from sediment controls. Any sediment controls in-stream are to be removed from the waterway to allow free movement of water and prevent them causing a flood hazard or other environmental damage downstream.
GS2	Discovery of contaminated soil	• If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with BSC and/or EPA.
GS3	Soil contamination resulting from accidental spills	• A site-specific emergency spill plan be developed.

	Reasons	Safeguards/Mitigation Measures
GS4	Rehabilitation of disturbed areas	• A rehabilitation of all areas disturbed by Impact area construction and would include the following: ○ Ensure areas disturbed during construction (including laydown areas and ancillary sites) are stabilised progressively during construction and restored back to original condition or re-vegetated with appropriate species (native in native dominated areas) as soon as practical. ○ Include monitoring to meet clear targets, regarding vegetation establishment and stabilisation of bare areas of soil.
Terrestrial Biodiversity		
TB1	Threatened flora, fauna and vegetation communities	• Where possible, avoid clearing of native trees. • The limits of the corridor of works (disturbance footprint) should be clearly marked (for example, using temporary fencing or bunting) to ensure site disturbance occurs only within the designated works areas and is not unnecessarily extended. • Material stockpile and equipment storage areas should be restricted to existing disturbed areas. • Vegetation clearing should be undertaken in a manner to avoid damage to adjacent vegetation. • Any fauna handling would be undertaken by an appropriately licenced ecologist or wildlife rescue specialist. • If unexpected fauna (e.g. nesting birds) are discovered and have the potential to be impacted, works are to stop immediately, and the project manager notified. • Any occupied nests located or any fauna which are inadvertently injured should be reported to WIRES or a similar organisation and relocated from the works area by a suitably qualified fauna handler. • Vehicle movements should be confined to the disturbance footprint. • Machinery coming from outside the works area should be thoroughly washed down prior to entering the site to reduce the risk of introducing weed species and pathogens. • Priority weed species should be targeted in accordance with the NSW DPI WeedWise recommended control measures (DPI 2021a). • Any revegetation of disturbed areas should utilise a seed mix consisting of local provenance species that are typical of native vegetation in the landscape, where possible. • The contractor in conjunction with BSC should develop an induction plan to inform workers of appropriate safeguards to limit impacts on vegetation to be retained and to limit impacts on vegetation beyond the disturbance footprint.
Aquatic Biodiversity and Habitat		
AB1	Indirect impacts on aquatic fauna – decreased water quality	• Develop a CEMP to address pollution and contamination issues, such as silt control and oil/fuel/chemical storage/spill management, which could arise during construction. • Install sediment fences to prevent fine material from travelling into the waterway. Install silt barriers to capture fine material along the full length of construction work. • Avoid using contaminated fill and waste material (tyres, building rubble, etc) near waterways.

	Reasons	Safeguards/Mitigation Measures
		• A visual inspection of the waterway for dead or distressed fish (indicated by fish gasping at the water surface, fish crowding in pools or at the river's banks) is to be undertaken twice daily during the works.
AB2	Impacts on marine vegetation	• Where possible mangrove trimming should occur instead of removal. Mangrove trimming is to be undertaken consistent with arboriculture guidelines (Australian Standard AS4373) and involve pruning encroaching mangrove limbs back to a suitable junction.
Hydrology and Water Quality		
HWQ1	Loss of soil and sediment during construction	• Ensure that temporary stockpiles are placed within the site and protected (i.e., sediment fencing at base) to avoid loss of sediment. • Ensure that temporary stockpiles are regularly checked for erosion and sediment control failures. • Erosion and sediment control measures should be implemented prior to any construction works commencing and remain in place until exposed areas are rehabilitated and stabilised. • Measures should include some or all the following: o Silt fencing downstream of the works including a floating boom with a silt curtain to capture fine material o Bunding around stockpiles o Sediment fences upslope of all drainage lines o ESC measures to be implemented in accordance with the CEMP, manufacturers specifications and appropriately maintained at regular intervals and following any rainfall and runoff events o Ground disturbance works including vegetation removal and earthworks to be scheduled or periods of dry weather and not during heavy rainfall events o Newly constructed batters to be stabilised as soon as practicable by topsoiling and sowing an appropriate cover crop o All spills or soil or other erodible material on sealed access routes or roadways to be immediately cleaned up and removed (by manual means where possible)
HWQ2	Accidental petrochemical spills during construction	• Petrochemicals or other chemicals to be stored in appropriate transportable storage containers, away from watercourses and drainage lines, flow paths. • Refuelling of plant and equipment to be undertaken away from watercourses and within areas appropriately bunded. • A spill kit to be kept onsite and staff trained in its use. • Equipment, machinery, and vehicles should be regularly maintained (documented).
HWQ3	Flooding/weather during construction	• A Flood and Weather Contingency would be developed to manage the potential impacts of significant weather events on the construction site.
HWQ4	Loss of construction and domestic waste	• General solid waste to be collected and disposed of at BSC Waste Transfer facilities. • Onsite portable toilets to be maintained and waste collected and properly disposed of by licensed contractor.
HWQ5	General	• Cease work and stabilise the site when there is a medium/high rainfall event expected.

	Reasons	Safeguards/Mitigation Measures
Aboriginal Heritage		
AH1	Aboriginal Heritage – General Measures	• If suspected Aboriginal objects (such as stone artefacts or midden materials like faunal remains or shell) are encountered during development, all activities must cease in the affected area and an archaeologist contacted to assess the finds. If the finds are found to be Aboriginal objects, the DPIE must be notified under Section 89A of the NPW Act. Appropriate management and avoidance or approval under a Section 90 AHIP should be sought if the Aboriginal objects are to be moved or harmed.
AH2	Aboriginal Heritage	• In the extremely unlikely event that human remains are found, all activities should immediately cease, and the New South Wales Police should be contacted. If the remains are suspected to be Aboriginal, the DPIE may also be contacted to assist in determining appropriate management.
Non-aboriginal Heritage		
NAH1	Previously unidentified heritage sites or places are discovered	• In accordance with Section 146 of the *Heritage Act 1977*, if an archaeological relic (such as a deposit or artefact) is uncovered during works, work must cease in the affected area and a qualified archaeologist contacted to assess the find. Further advice and clarification may be sought from the Heritage Council of NSW, or the Heritage Division under delegation regarding assessment and approvals.
Noise and Vibration		
NV1	Elevated noise and vibration levels during construction	• Hours of work limited to specified hours (Monday to Friday between 7:00 a.m. and 6:00 p.m. and Saturday 8:00 a.m. and 1:00 p.m. • Vehicles and machinery should not be left idling when not in use • Equipment, machinery, and vehicles should be regularly maintained (documented). • Well planned site layout to ensure where practical that noisy plant and machinery and overnight parking locations are located away from nearby residences with reversing also minimised in these locations. • Organise earthmoving and ground impacting operations so as not to occur in the same time period. • Select methods not involving impact where possible. • Community consultation and notification for potentially noise and vibration affected residences detailing timing of noisy activities. • Mechanism to provide noise complaints using signage and usage of a complaints register with relevant triggers for noise monitoring if required.
Air Quality and Odour		
AQ1	Construction air quality impacts – transportation	• Materials to be covered during transport to minimise dust emissions. • Stabilised and well-maintained site access to reduce tracking of sediment off site and to ensure approaches kept dust free. • Cover all loads. • Work areas to be watered as necessary particularly during dry and windy conditions. • Topsoil shall not be respread during high wind conditions. • Topsoil stripping shall occur while soil is reasonably moist if possible.

	Reasons	Safeguards/Mitigation Measures
AQ2	Greenhouse Gas Emissions	• Equipment will be switched off when not required • Vehicles and equipment will be properly maintained • No vegetation matter of any kind is to be burnt.
Traffic and Safety		
TCS1	Increased heavy vehicle traffic may disrupt traffic movement and access on local roads	• Ensure that a best practice TMP is prepared prior to works commencing to ensure traffic is safely managed and that residents with local properties continue to have road access during the implementation of the Impact area. • Ensure all workers adhere to relevant OH&S standards and provide workers compensation insurance. • Construction traffic movements associated with the Impact area will be kept to the minimum necessary to implement the Impact area efficiently and safely. • Traffic impacts in association with the Impact area will be restricted to the hours of construction, which would be undertaken between 7:00 a.m. to 6:00 p.m. Monday to Friday and Saturday 8:00 a.m. to 1:00 p.m. with no work on Sundays or public holidays. • Consultation with residents regarding access, closures and work scheduling prior to works commencing.
Visual Amenity and Landscape		
VAL1	Construction stage visual amenity	• Maintain tidy work practices with the site kept clean of general litter. Refer to measures relating to waste management mitigation measures. • All disturbed areas shall be rehabilitated and maintained until established.
Waste Management and Resource Use		
WM1	Generation of construction waste	• Cleared vegetation to be mulched and used for site rehabilitation where possible. • Waste will be reused or classified and removed as soon as practicable and disposed of in accordance with the EPA's 2014 waste classification guidelines to a licenced waste disposal facility. • Transport and disposal dockets will be kept as proof of correct disposal for everything that leaves site. • Secure all wastes to avoid pollutants escaping. • Spoil excavated from the site to be used on site where possible. • Implementation of waste management strategy documented within the CEMP. The strategy should include details of the type of waste material likely to be generated, and how it would be managed (including sorting, storage, and disposal), materials to be recycled, as well as measures to reduce or avoid waste generation. • Construction staff are to be briefed on their responsibility for removal of their own general waste.
WM2	Generation of domestic waste	• Signage detailing appropriate material to be disposed of within waste bins. • Regular emptying of the amenities waste bins. • Implementation of waste management strategy documented within the CEMP.

	Reasons	Safeguards/Mitigation Measures
Energy and Climate Change		
ECC1	Increased energy consumption and production of emissions	• Vehicles, plant, and machinery should be kept in good working order and used in an efficient manner. Vehicles should not be left idling when not in use.

7.2. Licenses, permits and approvals

A summary of the licences and approvals required for the proposal is provided in Table 7-2.

Table 7-2 - Summary of licensing and approvals required Instrument

Instrument	Requirement	Timing
Fisheries Management Act 1995 (FM Act)	Part 7 of the FM Act permit requirements: • harming marine vegetation • dredging and/or reclamation of the bed or bank • obstruction of fish passage.	Prior to work commencing.

8. Justification

This chapter provides the justification for the proposal considering its biophysical, social, and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in the EP&A Reg 2021.

8.1. Justification

The proposal forms part of the BSC overall obligations to maintain it assets. Initial justification for the proposal was provided through an assessment of the existing road, which was identified as needing to rehabilitate due to poor state, failure, and erosion.

Consideration of alternatives and options was then carried out. The preferred design of the proposal was selected to best achieve the objectives outlined in this REF. The design efficacy was determined by comparison to the option of doing nothing and other options outlined in Section 2.

Potential environmental and social impacts resulting from construction and operation of the proposal have been minimised through the safeguards and management measures outlined in Chapter 7.

8.1.1. Social factors

The proposal would result in temporary social impacts whilst being built such as noise and visual impacts. However, all construction related impacts would be appropriately managed prior to and during construction.

The overall proposal has been designed where possible to minimise impacts on the environment and the community. Several safeguards and management measures would be implemented to minimise any environmental impacts associated with the overall proposal. The aesthetic outcomes of the construction performance will provide improved amenity.

Operation of the proposal provides justification over the above temporary impacts, as it would benefit the community through providing improved amenity, safety, and overall operation. It is anticipated that the proposal would also have indirect wider community benefits and extends to visual and amenity benefit of continuing unrestricted use of Keevers Drive.

8.1.2. Biophysical factors

As discussed in section 6.3, no significant biodiversity impacts have been identified. Minor adverse impacts are expected because of vegetation requiring removal during construction. Identified impacts would be managed through the safeguards and management measures outlined in this REF.

The design of the proposal includes tolerances to allow for climate change and extreme weather events, which would ensure the creek continues to be operational throughout its 50-year design life.

8.1.3. Economic factors

Rehabilitation would generate economic benefits over the next 50 years, with the road being an attractor for visitors and businesses and once complete. Design has also incorporated measures to

decrease the maintenance required for operation. The implementation of these measures would result in cost savings for the ongoing maintenance of the Keevers Drive and wider network.

8.2. Objects of the EP&A Act

The objects of the EP&A Act are considered in Table 8-1.

Table 8-1 - Objects of the EP&A Act

Objective	Comments
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	Through the assessment in Chapter 6, it has been identified that the proposal would not significantly impact on any natural or artificial resources. The proposal would result in community benefits through facilitation of an improved road system and for the next 50 years.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The proposal's urban design includes high quality, durable and low impact materials to minimise ongoing maintenance requirements. This provides for a sustainable urban environment over its 50-year design life.
1.3(c) To promote the orderly and economic use and development of land.	The proposal includes continuation of the use of the proposal location as a road.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	A biodiversity assessment has been prepared for the proposal, which is attached in Appendix C. The assessment concluded that no significant impact to aquatic or terrestrial ecology would result from the proposal.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The identified mitigation measures would minimise any potential impacts of the proposal on Aboriginal and non-Aboriginal heritage items.
1.3(g) To promote good design and amenity of the built environment.	The proposal has been designed to be consistent with the urban design objectives and amenity for the surrounding built environment.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	The proposal aligns with this objective as it involves the maintenance of and continued operation and improved safety of the road.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Stakeholder consultation would continue. Should the proposal proceed to construction, consultation with the community and stakeholders would continue throughout the work.

8.3. Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the proposal.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

8.3.1. The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

Through the assessment of the potential impacts of the proposal in Chapter 6, it has been demonstrated that threats of serious or irreversible environmental damage do not exist for the proposal.

In order to account for the subjectivity of professional judgement applied in environmental assessment and modelling uncertainty, worst-case assumptions have been incorporated into the assessment, including the following:

- conservative 'worst case' scenarios were considered while assessing environmental impact,
- specialist studies were incorporated to gain a detailed understanding of the existing environment including biodiversity, landscape character and visual assessment, noise and vibration, socio-economic, non-Aboriginal heritage, and a preliminary site investigation, and
- undertaking verification monitoring to validate results and allow modification of safeguards and mitigation controls accordingly.

8.3.2. Intergenerational equity

Social equity is concerned with the distribution of economic, social, and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposal would result in benefit to the community through improvements to the safety and overall operation for the next 50 years.

No potential impacts to future generations would be generated by the proposal.

8.3.3. Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity has been considered through the assessment of biodiversity provided in Section 6.2.

Providing the safeguard measures are implemented, the proposal would not have a material or significant impact on biological diversity and ecological integrity within the proposal footprint or surrounds.

8.3.4. Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things.

Environmental, economic, and social issues were considered in the rationale for the proposal and design options. Construction planning for the proposal would also be progressed in the most cost-effective way.

Safeguards and management measures detailed in Chapter 7, including avoiding, reusing, recycling, managing waste during construction and operation, would be implemented.

9. Conclusion

This REF has identified and assessed the potential impacts of the Impact area to reconstruct a site along Keevers Drive and adjacent bank. The long-term operational impacts of the work is expected to be positive as road safety and the road network will be improved for road users.

After consideration of the outcomes of the field investigations and analyses undertaken for this report, the identified impacts of the Impact area are unlikely to have a significant impact on Aboriginal cultural heritage, threatened flora, threatened fauna, and threatened ecological communities. Specific mitigation measures have been provided to minimise the impact on terrestrial biodiversity and to ensure protection of suspected Aboriginal objects, should they be encountered during construction.

Other environmental impacts identified and addressed in this REF are unlikely to have a significant adverse impact provided that the mitigation measures set out are adopted, and the Impact area are implemented as described. It is recommended that all mitigation measures are incorporated into the site-specific CEMP and adopted for the duration of works, or longer as required.

A CEMP will be prepared that summarises all the relevant mitigation measures from this REF. The CEMP will guide the construction works and will be used as part of the site induction to familiarise all workers with the site environmental sensitivities.

10. Certification, Review and Decision

This Review of Environmental Factors provides a true and fair review of the Impact area in relation to its potential effects on the environment. The REF addresses to the fullest extent possible, all matters affecting or likely to affect the environment because of the Impact area. It identifies the likely impacts of the Impact area on the environment and details the environmental safeguards/mitigation measures and mitigation measures to be implemented to minimise the potential impact to the environment. In consideration of the above assessment, it is considered that the overall impact on the environment is likely to be minimal and therefore acceptable. The long-term benefits of the activity will have a cumulative positive impact on the safety of road users and the activity should proceed accordingly.

Impact area Name	Keevers Drive
Project Manager Konrad Grinlaubs Eco Logical Australia Newcastle NSW	
Project Director Andrew Walsh Eco Logical Australia Coffs Harbour NSW	

10.1. Declaration and Approval

I have reviewed the document and consider that the Impact area (including the controls and mitigation measures specified in this REF) is not likely to significantly affect the environment, including threatened species or ecological communities, or their habitats. As such it is not necessary for further assessment under section 5.7 of the EP&C Act.

Impact area Name	Keevers Drive
Role: Name:	
Role: Name:	

11. References

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Appendix A – Likelihood of Occurrence Assessment

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the Proposed Works site, results of the site inspection and professional judgement. Some Migratory or offshore Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species

A test of significance was not conducted for threatened species or ecological communities that had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the impact area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of native habitat remaining in the surrounding landscape. As such, a test of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the impact area, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search (DAWE, 2021a). Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Profiles (DAWE, 2021b).

Table 11-1: Likelihood of occurrence table for threatened ecological communities

Ecological Community	BC Status	EPBC Status	Description	Likelihood of Occurrence	Impact Assessment Required
BC Act: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBC Act Name: Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	E	E	The ecological community occurs on clay-loams and sandy loams, where the groundwater is saline or sub-saline, drainage lines, lake margins, and estuarine fringes associated with coastal floodplains. The community occurs below 20 m elevation. The structure of the community varies from open forest to low woodlands, scrubs and reed-lands with scattered trees.	Yes – Community present for BC Act listed community. EPBC Act community condition thresholds not met.	Yes
Lowland Rainforest of Subtropical Australia	E	CE	The ecological community occurs on basalt and alluvial soils, including sand and floodplain alluvia. The community typically occurs in areas below 300 m elevation and high annual rainfall above 1300 mm. Generally, the community occurs more than 2 km from the coast. The community is a closed forest with greater than 70 % canopy cover with a wide range of tree species and an understorey of spare shrubs and seedlings.	No – this community does not occur within the subject site.	No
Subtropical and Temperate Coastal Saltmarsh	E	V	The ecological community occurs within the intertidal one on the shores of estuaries and lagoons that are permanently or intermittently open to the sea with poorly sorted anoxic sandy soils and clays. The community consists mainly of salt tolerant vegetation including grasses, herbs, reeds, sedges, and shrubs. Vegetation is generally less than half a metre tall.	No – this community does not occur within the subject site.	No

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered, EEC

Table 11-2: Likelihood of occurrence table for threatened flora within 5 km of subject site

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	Likelihood of Occurrence	Justification	Impact Assessment Required
Acacia chrysotricha	Newry Golden Wattle	E		In NSW, restricted to an area south of Bellingen on the north coast.	Rainforest edges and in wet or dry eucalypt forest in steep narrow gullies on quartzite soils.	Unlikely	No rainforest or wet sclerophyll forest present.	No
Acronychia littoralis	Scented Acronychia	E	E	Between Fraser Island in Qld and Port Macquarie on the north coast of NSW.	Littoral rainforest on sand.	No	No littoral rainforest on sand present.	No
Allocasuarina thalassoscopica	Mt Coolum she-oak		E	Known to occur at Mt Coolum, QLD. Considered likely to occur from Sunshine Beach, QLD south to Port Macquarie, NSW.	Occurs within low closed heathland community occurring on the upper slopes between 150 – 200 m elevation.	Unlikely	No suitable heathland habitat is present.	No
Arthraxon hispidus	Hairy Jointgrass	V	V	In NSW, found on the northern tablelands and north coast.	Edges of rainforest and in wet eucalypt forest, often near creeks or swamps.	No	No rainforest or wet eucalypt forest present.	No
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton.	Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest.	No	Marginal low quality habitat and no records in locality.	No
Cynanchum elegans	White-flowered Wax Plant	E	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley.	Dry rainforest; littoral rainforest; *Leptospermum laevigatum-Banksia integrifolia subsp. integrifolia* (Coastal Tea-tree– Coastal Banksia) coastal scrub; *Eucalyptus tereticornis* (Forest Red Gum) or *Corymbia maculata* (Spotted Gum) open forest and woodland; and *Melaleuca armillaris* (Bracelet Honeymyrtle) scrub.	No	No suitable rainforest habitat is present.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	Likelihood of Occurrence	Justification	Impact Assessment Required
Dendrobium melaleucaphilum	Spider orchid	E		Costal districts and nearby ranges, extending from Qld to the lower Blue Mountains.	Grows on *Melaleuca styphelioides,* on rainforest trees or on rocks in coastal districts.	Unlikely	No *Melaleuca styphelioides* or rainforest trees identified within the impact area.	No
Hicksbeachia pinnatifolia	Red Boppel Nut	V	V	Coastal areas of north-east NSW from the Nambucca Valley north to south-east Qld.	Subtropical rainforest, moist eucalypt forest and Brush Box forest.	No	No suitable habitat within the impact area.	No
Macadamia integrifolia	Macadamia Nut	P	V	Not known to occur naturally in the wild in NSW; recorded from Camden Haven but it is not known if the tree was cultivated or growing naturally.	Drier subtropical rainforest.	No	No suitable rainforest habitat within the impact area.	No
Macadamia tetraphylla	Rough-shelled Bush Nut	V	V	Confined chiefly to the north of the Richmond River in north-east NSW, extending just across the border into Qld.	Subtropical rainforest, usually near the coast.	No	No suitable rainforest habitat within the impact area.	No
Marsdenia longiloba	Slender Marsdenia	E	V	In NSW, occurs at scattered locations on the north coast north from Barrington Tops.	Subtropical and warm temperate rainforest, lowland moist eucalypt forest adjoining rainforest, areas with rock outcrops.	No	No suitable rainforest habitat within the impact area.	No
Niemeyera whitei	Rusty Plum, Plum Boxwood	V		Coast and adjacent ranges of northern NSW from the Macleay River into southern Qld.	Rainforest and adjacent moist eucalypt forest.	No	No suitable rainforest habitat within the impact area.	No
Parsonsia dorrigoensis	Milky Silkpod	V	E	Found only within NSW, in the north coast region between Kendall and Woolgoolga.	Subtropical and warm-temperature rainforest, rainforest margins, and moist eucalypt forest up to 800 m, on brown clay soils.	No	No suitable rainforest habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	Likelihood of Occurrence	Justification	Impact Assessment Required
Persicaria elatior	Tall Knotweed	V	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests).	Beside streams and lakes, swamp forest or disturbed areas.	No	Habitat is saline and not suitable.	No
Phaius australis	Southern Swamp Orchid	E	E	Qld and north-east NSW as far south as Coffs Harbour.	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	No	No suitable habitat within the impact area.	No
Plectranthus nitidus	Nightcap Plectranthus	E	E	Recorded in Nightcap National Park near Terania Creek, and the Nullum and Richmond Range State Forests.	Rocky cliff-faces and boulders adjacent to rainforest.	No	No suitable habitat within the impact area.	No
Rhodamnia rubescens	Scrub Turpentine	CE		Occurs north from Batemans Bay NSW to areas inland of Bundaberg QLD.	Coastal regions and occasional inland escarpments up to 600 m elevation in areas with annual rainfall of 1,000 to 1,600 mm.	Unlikely	No suitable habitat within the impact area.	No
Rhodomyrtus psidiodes	Native Guava	CE		Occurs from Broken Bay NSW to Maryborough in QLD.	Restricted to coastal and sub-coastal areas, up to 120 km inland, of low elevation.	Unlikely	No suitable habitat within the impact area.	No
Sarcochilus fitzgeraldii	Ravine Orchid	V	V	North-east NSW, north of the Macleay River, to Maleny in south-east Qld.	On rocks or rarely on bases of trees, in subtropical rainforest, usually near streams, from 500-700 m.	No	No suitable rainforest habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	Likelihood of Occurrence	Justification	Impact Assessment Required
Senna acclinis	Rainforest Cassia	E		Coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Qld.	Subtropical and dry rainforest.	No	No suitable rainforest habitat within the impact area.	No
Sophora tomentosa	Silverbush	E		Coastal areas north from Old Bar near Taree, into Qld.	Coastal dunes.	No	No suitable dune habitat within the impact area.	No
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands.	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	No	No suitable grassland habitat within the impact area.	No
Tylophora woollsii	Cryptic Forest Twiner	E	E	From the NSW north coast and New England Tablelands to southern Qld.	Moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins.	No	No suitable habitat within the impact area.	No

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered

Table 11-3: Likelihood of occurrence table for threatened fauna within 5 km of impact area

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Aves								
Actitis hypoleucos	Common Sandpiper		M	Summer migrant. In NSW, widespread along coastline	Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also, estuaries and	Unlikely	No suitable habitat is present within Impact Area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				and also occurs in many areas inland.	deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.			
Anthochaera phrygia	Regent Honeyeater	E	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions.	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of Casuarina *cunninghamiana (*River Oak).	No	No suitable habitat is present within Impact Area.	No
Apus pacificus	Fork-tailed Swift		M	Recorded in all regions of NSW.	Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Unlikely	No suitable habitat is present within Impact Area.	No
Botaurus poiciloptilus	Australasian Bittern	E	E	Found over most of NSW except for the far north-west.	Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	No	No suitable habitat is present within Impact Area.	No
Calidris acuminata	Sharp-tailed Sandpiper		M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain	Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	No	No suitable habitat is present within Impact Area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				and east Lower Western Regions.				
Calidris canutus	Red Knot		E, M	Summer migrant to Australia. In NSW, widespread in suitable habitat along the coast. Occasionally recorded inland in all regions.	Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Calidris ferruginea	Curlew Sandpiper	E	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin.	Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Calidris melanotos	Pectoral Sandpiper		M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions.	Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		In NSW, widespread along coast and inland to the southern tablelands and central western plains, with a	Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	Unlikely	Likely to utilise vegetation nearby the impact area, no suitable habitat	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				small population in the Riverina.			within the impact area.	
Charadrius leschenaultii	Greater Sand-plover	V	V, M	In NSW, recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries.	Almost entirely restricted to coastal areas in NSW, mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Coracina lineata	Barred Cuckoo-shrike	V		Rare in NSW but recorded along coast south to the Manning River.	Rainforest, eucalypt forests and woodlands, clearings in secondary growth, swamp woodlands and timber along watercourses.	Unlikely	No suitable habitat within the impact area.	No
Daphoenositta chrysoptera	Varied Sittella	V		Distribution in NSW is nearly continuous from the coast to the far west.	Inhabits eucalypt forests and woodlands, mallee and *Acacia* woodland.	Unlikely	No suitable habitat within the impact area.	No
Ephippiorhynchus asiaticus	Black-necked Stork	E		Coastal and subcoastal northern and eastern Australia, south to central-eastern NSW and with vagrants recorded further south and inland.	In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also, minor floodplains, coastal sandplain wetlands and estuaries.	Unlikely	No suitable habitat within the impact area. Known to utilise nearby habitat.	No
Erythrotriorchis radiatus	Red Goshawk	E	V	In NSW, extends to ~30°S. Recent records confined to the Northern Rivers region north of the Clarence River.	Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, *Melaleuca* swamp forest and coastal riparian *Eucalyptus* forest.	Unlikely	No suitable habitat within the impact area.	No
Esacus magnirostris	Beach Stone-curlew	E		Across northern and north-eastern Australia, south to	Exclusively along the coast, on beaches, islands, reefs and in	Unlikely	Thin line of mangroves is	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				the Manning River in north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria.	estuaries, and edges of or near mangroves.		present along riverbank, low quality habitat.	
Falco hypoleucos	Grey Falcon	E		Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range.	Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	No	No suitable habitat within the impact area.	No
Gallinago hardwickii	Latham's Snipe		M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW.	Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	No	No suitable habitat within the impact area.	No
Glossopsitta pusilla	Little Lorikeet	V		In NSW, found from the coast westward as far as Dubbo and Albury.	Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	Unlikely	Known to be within the area and may utilise nearby roadside vegetation. No Eucalypt foraging habitat within subject site.	No
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas.	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	No	No suitable habitat within the impact area.	No
Grus rubicunda	Brolga	V		Sparsely distributed across the southern part of its	Open wetlands, grassy plains, coastal mudflats and irrigated croplands	Unlikely	Thin line of mangroves is	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				range, which includes central NSW to western Victoria.	and, on the coast, mangrove-studded creeks and estuaries.		present along riverbank, low quality habitat.	
Haematopus fuliginosus	Sooty Oystercatcher	V		Distributed along the entire NSW coast.	Rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	Unlikely	No suitable habitat within the impact area.	No
Haematopus longirostris	Pied Oystercatcher	E		Thinly scattered along the entire NSW coast.	Intertidal flats of inlets and bays, open beaches and sandbanks.	Unlikely	No suitable habitat within the impact area.	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia.	Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Likely, Observed nearby	Known to utilise nearby habitat and river mouth. No nests present in the subject site or nearby. Species may use site occasionally.	Yes
Hieraaetus morphnoides	Little Eagle	V		Throughout the Australian mainland, with the exception of the most densely forested parts of the Dividing Range escarpment.	Open eucalypt forest, woodland or open woodland, including sheoak or *Acacia* woodlands and riparian woodlands of interior NSW.	No	No suitable habitat within the impact area.	No
Hirundapus caudacutus	White-throated Needletail		V, M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide.	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Unlikely	No suitable habitat within the impact area.	No
Hydroprogne caspia	Caspian Tern		M	Widespread in coastal and inland NSW.	Coastal offshore waters, beaches, mudflats, estuaries, rivers, lakes.	Unlikely	Small mud flat with mangroves along edge of riverbank,	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
							not suitable habitat.	
Irediparra gallinacea	Comb-crested Jacana	V		In NSW, occurs south along the east coast to the Hunter region, with stragglers recorded in south-eastern NSW.	Permanent freshwater wetlands, either still or slow flowing, with a good surface cover of floating vegetation or fringing and aquatic vegetation.	No	No suitable habitat within the impact area.	No
Ixobrychus flavicollis	Black Bittern	V		In NSW, records are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland.	Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	Unlikely	No suitable habitat within the impact area.	No
Lathamus discolor	Swift Parrot	E	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.	Box-ironbark forests and woodlands.	No	No suitable habitat within the impact area.	No
Lichenostomus fasciogularis	Mangrove Honeyeater	V		In NSW, mainly occurs on the north coast south to the Clarence River; also, some records further south around the mouth of the Macleay River between Stuarts Point and South West Rocks, and at Wauchope on the lower Hastings River.	Mangrove woodlands and shrublands, and adjacent forests, woodlands and shrublands.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Limosa lapponica	Bar-tailed Godwit		M	Summer migrant to Australia. Widespread along the coast of NSW, including the	Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds,	Unlikely	Small mud flat with mangroves along edge of riverbank,	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				offshore islands. Also, numerous scattered inland records.	saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.		not suitable habitat.	
Lophoictinia isura	Square-tailed Kite	V		In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast.	Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	Unlikely	No suitable habitat within the impact area.	No
Merops ornatus	Rainbow Bee-eater		M	Distributed across much of mainland Australia, including NSW.	Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	Unlikely	No suitable habitat within the impact area.	No
Monarcha melanopsis	Black-faced Monarch		M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland.	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Ninox strenua	Powerful Owl	V		In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains.	Woodland, open sclerophyll forest, tall open wet forest and rainforest.	Unlikely	No suitable habitat within the impact area.	No
Numenius madagascariensis	Eastern Curlew		CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records.	Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Numenius minutus	Little Curlew		M	Summer migrant to Australia. In NSW, most records scattered east of the Great Dividing Range, from Casino, south to Greenwell Point with a few scattered records west of the Great Dividing Range.	Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, saltfields, sewage ponds.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Numenius phaeopus	Whimbrel		M	Summer migrant to Australia. Found along almost the entire coast of NSW; scattered inland records.	Estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields, lawns.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Oxyura australis	Blue-billed Duck	V		Widespread in NSW but is most concentrated in the southern Murray-Darling Basin area.	Coastal and inland wetlands and swamps.	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Pandion cristatus	Eastern Osprey	V		Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas.	Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Likely	Known to utilise nearby habitat and river mouth. No nests present in the subject site or nearby. Species may use site occasionally.	Yes
Pluvialis fulva	Pacific Golden Plover		M	Regular widespread summer migrant to Australia, including coastal NSW, Lord Howe and Norfolk Island.	Estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		In NSW, occurs on the western slopes of the Great Dividing Range, and as far as Louth and Balranald on the western plains. Also occurs in woodlands in the Hunter Valley and in some locations on the north coast	Open woodland habitats; favours Box-gum woodlands on the slopes and Box-cypress and open Box woodlands on alluvial plains.	No	No suitable box-gum habitat within the impact area.	No
Ptilinopus magnificus	Wompoo Fruit-Dove	V		In NSW, occurs south along coast and coastal ranges to the Hunter River.	Rainforest, low-elevation moist eucalypt forest and brush box forests.	Unlikely	No suitable habitat within the impact area.	No
Ptilinopus regina	Rose-crowned Fruit-Dove	V		In NSW, found on coast and ranges north from Newcastle. Vagrants are occasionally found further south to Victoria.	Sub-tropical and dry rainforest, moist eucalypt forest and swamp forest, where fruit is plentiful.	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Rhipidura rufifrons	Rufous Fantail		M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW.	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	No	No suitable habitat within the impact area.	No
Rostratula australis	Australian Painted Snipe	E	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Swamps, dams and nearby marshy areas.	No	No suitable habitat within the impact area.	No
Stagonopleura guttata	Diamond Firetail	V		Widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland.	Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	Unlikely	No suitable habitat within the impact area.	No
Sternula albifrons	Little Tern	E	M	In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria.	Sheltered coastal environments, harbours, inlets and rivers.	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Thinornis rubricollis rubricollis	Hooded Plover	E	V	Occurs in coastal NSW north to Sussex Inlet. Occasional records from the Shoalhaven River, Comerong Beach and Lake Illawarra.	Sandy ocean beaches, tidal bays and estuaries, rock platforms, rocky or sand-covered reefs, and small beaches in lines of cliffs. Also use near-coastal saline and freshwater lakes and lagoons.	Unlikely	No suitable habitat within the impact area.	No
Tringa nebularia	Common Greenshank		M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also, widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions.	Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
Tyto longimembris	Eastern Grass Owl	V		Recorded occasionally in all mainland states. In NSW they are more likely to be resident in the north-east.	Areas of tall grass, including grass tussocks, swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains.	Unlikely	No suitable habitat within the impact area.	No
Tyto novaehollandiae	Masked Owl	V		Recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains.	Dry eucalypt forests and woodlands from sea level to 1100 m.	Unlikely	No suitable habitat within the impact area, know to utilise nearby habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Tyto tenebricosa	Sooty Owl	V		Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands.	Dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	Unlikely	No suitable habitat within the impact area, known to utilise nearby habitat.	No
Amphibians								
Crinia tinnula	Wallum Froglet	V		Along the coastal margin from Litabella National Park in south-east Qld to Kurnell in Sydney.	Acidic swamps on coastal sand plains (typically in sedgelands and wet heathlands), drainage lines, and swamp sclerophyll forests.	No	No suitable habitat within the impact area.	No
Litoria aurea	Green and Golden Bell Frog	E	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region.	Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or *Eleocharis* spp. (spikerushes). Some populations occur in highly disturbed areas.	No	No suitable habitat within the impact area.	No
Mixophyes balbus	Stuttering Frog	E	V	Along the east coast of Australia from southern Qld to north-eastern Victoria.	Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	No	No suitable habitat within the impact area.	No
Mixophyes iteratus	Giant Barred Frog	E	E	Coast and ranges from Eumundi in south-east Qld to Warrimoo in the Blue Mountains.	Freshwater permanent/semi-permanent streams, generally at lower elevation. Riparian rainforest or wet sclerophyll forest is favoured.	No	No suitable habitat within the impact area.	No

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Mammalia								
Arctocephalus forsteri	New Zealand Fur-seal	V		Reports of non-breeding animals along southern NSW coast particularly on Montague Island, but also at other isolated locations to north of Sydney.	Prefers rocky parts of islands with jumbled terrain and boulders.	No	No suitable habitat within the impact area.	No
Arctocephalus pusillus doriferus	Australian Fur-seal	V		Reported to have bred at Seal Rocks, near Port Stephens and Montague Island in southern NSW. Haul outs are observed at isolated places along the NSW coast.	Rocky parts of islands with flat, open terrain.	No	No suitable habitat within the impact area.	No
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	No	No suitable habitat within the impact area.	No
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld.	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Unlikely	No suitable habitat within the impact area.	No
Miniopterus australis	Little Bentwing-bat	V		East coast and ranges south to Wollongong in NSW.	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	Unlikely	No suitable habitat within the impact area.	No

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Miniopterus orianae oceanensis	Large Bent-winged Bat	V		In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga.	Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	Unlikely	No suitable habitat within the impact area.	No
Mormopterus norfolkensis	Eastern Freetail-bat	V		Found along the east coast from south Qld to southern NSW.	Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Unlikely	No suitable habitat within the impact area. Some mangroves, not suitable habitat.	No
Myotis macropus	Southern Myotis	V		In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers.	Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	Unlikely	Fringing vegetation does not provide suitable habitat.	No
Nyctophilus bifax	Eastern Long-eared Bat	V		In NSW, appears to be confined to the coastal plain and nearby coastal ranges, extending south to the Clarence River area, with a few records further south around Coffs Harbour.	Lowland subtropical rainforest, wet and swamp eucalypt forest, moist eucalypt forest, coastal scrub.	Unlikely	No suitable habitat within the impact area.	No
Petauroides volans	Greater Glider (population in the Eurobodalla local government area)	E	V	This population on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west.	Eucalypt forests and woodlands.	Unlikely	No suitable habitat within the impact area.	No

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Petaurus australis	Yellow-bellied Glider	V		Along the eastern coast to the western slopes of the Great Dividing Range, from southern Qld to Victoria.	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	Unlikely	No suitable habitat within the impact area.	No
Petaurus norfolcensis	Squirrel Glider	V		Widely though sparsely distributed on both sides of the Great Dividing Range in eastern Australia, from northern Qld to western Victoria.	Mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	Unlikely	No suitable habitat within the impact area.	No
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit.	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	No	No suitable habitat within the impact area.	No
Phascogale tapoatafa	Brush-tailed Phascogale	V		In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide.	Dry sclerophyll open forest, heath, swamps, rainforest and wet sclerophyll forest.	Unlikely	No suitable habitat within the impact area.	No
Phascolarctos cinereus	Koala	V	E	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at	Eucalypt woodlands and forests.	Unlikely	No suitable habitat within the impact area. Roadside vegetation may act as a connection between nearby core koala habitat fragments.	No

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				several sites on the southern tablelands.				
Phoniscus papuensis	Golden-tipped Bat	V		Along the east coast of Australia in scattered populations from Cape York Peninsula QLD to Eden NSW.	Occupies rainforest and adjacent wet and dry sclerophyll forest up to 1000 m elevation. Also recorded in tall open forest, Casuarina dominated riparian forest and coastal Melaleuca forests.	Unlikely	No suitable habitat within the impact area.	No
Potorous tridactylus	Long-nosed Potoroo	V	V	In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm.	Coastal heaths and dry and wet sclerophyll forests.	Unlikely	No suitable habitat within the impact area.	No
Pseudomys novaehollandiae	New Holland Mouse		V	Fragmented distribution across eastern NSW.	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	No	No suitable habitat within the impact area, high level of disturbance.	No
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria.	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Unlikely	No suitable habitat within the impact area.	No
Scoteanax rueppellii	Greater Broad-nosed Bat	V		Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW, it is	Woodland, moist and dry eucalypt forest and rainforest.	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
				widespread on the New England Tablelands.				
Reptiles								
Caretta caretta	Loggerhead Turtle	E	E, M	In NSW, seen in coastal waters as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney.	Marine. Nesting occurs on beaches.	No	No suitable habitat within the impact area.	No
Chelonia mydas	Green Turtle	V	V, M	Occurs in coastal waters of NSW, generally on the north or central coast, with occasional records from the south coast. Scattered nesting records along the NSW coast.	Marine. Nesting occurs on beaches.	No	No suitable habitat within the impact area.	No
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V	V	Coast and ranges from the Macleay valley in NSW to south-eastern Qld.	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils.	No	No suitable habitat within the impact area.	No
Dermochelys coriacea	Leatherback Turtle	E	E, M	All coastal waters of Australia. Large numbers feed in coastal waters south to the central coast of NSW. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW.	Marine. Nesting occurs on beaches.	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	Likelihood of occurrence	Justification	Impact Assessment Required
Hoplocephalus stephensii	Stephens' Banded Snake	V		Coast and ranges from Southern Qld to Gosford in NSW.	Rainforest and eucalypt forests and rocky areas up to 950 m in altitude.	No	No suitable habitat within the impact area.	No
Insects								
Phyllodes imperialis smithersi	Pink Underwing Moth	E	E	In NSW it is known to occur in a small number of localities from the QLD border to Wardell, and there is a disjunct population in the Bellingen area.	Subtropical rainforest below about 600 m elevation; breeding habitat is restricted to areas where the caterpillar's food plant *Carronia multisepalea* occurs.	No	No suitable subtropical rainforest habitat within the impact area.	No
Epinephelus daemelii	Black Rockcod	V (FM Act)	V	Along the entire NSW coast including Lord Howe Island.	Caves, gutters and beneath bomboras on rocky reefs. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries.	Unlikely	No suitable habitat within the impact area, rocky shores of the estuary provide potential habitat.	No
Mogurnda adspersa	Southern Purple Spotted Gudgeon	E (FM Act)		Murray-Darling basin as well as parts of coastal northern NSW and Queensland	The species can be found in a variety of habitats such as freshwater rivers, creeks, streams and billabongs with slow-flowing or still waters. Cover in the form of aquatic vegetation, overhanging vegetation from riverbanks, leaf litter, rocks or snags are important for the species.	No	Requires freshwater. The site is estuarine.	No

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory

Appendix B – BC Act Tests of Significance

Under Part 7, Division 1 of the NSW BC Act, the test of significance is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. This test has been applied to ecological communities and species listed under the BC Act that are considered to be potentially impacted by the Proposed Works. Species with similar habitat requirements have been grouped to streamline the process.

Species that have been assessed against the test of significance were identified through the development of the Likelihood of Occurrence (Appendix A). The following threatened species are assessed below:

- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (SOFF) – Endangered Ecological Community
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) – Vulnerable
- Eastern Osprey (*Pandion cristatus*) – Vulnerable

TESTS OF SIGNIFICANCE

The local occurrence is the ecological community that occurs within the study area. However, the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated. The local occurrence of SOFF is likely to include adjacent areas of the community along the river banks upstream and downstream of the site.

Test of Significance for Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (SOFF)

BC Act	Question	Response
7.3.1 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	N/A
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	The proposed activity would remove a small areas of a highly degraded patch of SOFF, larger areas occur nearby (particularly downstream adjacent to Mylestom Drive) and would be retained therefore the local occurrence is not likely to be placed at risk of extinction.

BC Act	Question	Response
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity 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.	A small patch part of the local occurrence would be removed, the remaining in the vicinity would be retained and the local occurrence of the community is not expected to be placed at risk of extinction.
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The Proposed Works will remove approximately 0.026 ha of SOFF.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: 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	The Proposed Works will remove a small area of the community. This would be a minor contribution to fragmentation of the community.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The habitat is not considered important to the long-term survival of SOFF given the low condition and small size.
7.3.1 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 on or near the site (accessed 22/08/22).
7.3.1 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.	Three key threatening processes are relevant to the proposed development. • Clearing of native vegetation
Conclusion	**Is there likely to be a significant impact?**	**No. A significant impact is not likely.**

The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area. The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time or return year to year (OEH 2018).

Eastern Osprey and White-bellied Sea-Eagle are likely to be resident in the estuary with a large home range, with the local populations of each species likely to consist of a small number of individuals.

Test of Significance for Eastern Osprey and White-bellied Sea-Eagle

BC Act	Question	Response
7.3.1 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	Viable local populations of these species are likely to use resources from a much larger area than the study area due to their nomadic nature and large home ranges. No nests/breeding habitat is present within or nearby the subject site and therefore the works are unlikely to affect their life cycles to the extent that would place the local populations at risk of extinction.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	N/A
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity 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.	N/A
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The Proposed Works will remove approximately 0.031 ha of riparian vegetation. This removal is considered minimal given the larger areas of habitat retained adjacent to the subject site and available in the broader locality.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: 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	The Proposed Works will not fragment or isolate areas of habitat for such mobile species given the small scale of the works in relation to their large home ranges.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The habitat is not considered important to the long-term survival of these species given the degraded nature of the subject site and that it only forms a minor part of the larger contiguous, more suitable habitat in the broader locality.

BC Act	Question	Response
7.3.1 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 on or near the site (accessed 22/08/22).
7.3.1 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.	Three key threatening processes are relevant to the proposed development. • Clearing of native vegetation
Conclusion	**Is there likely to be a significant impact?**	**No. A significant impact is not likely.**

Appendix C – AHIMS Searches

SITE_ID	SITE_NAME	FEATURE_TY
21-3-0034	Raleigh;	Aboriginal Ceremony and Dreaming
21-3-0174	WC-U-PAD 6	Potential Archaeological Deposit (PAD)
21-3-0180	TYSONS FLAT 1	Potential Archaeological Deposit (PAD); Artefact
21-3-0181	TYSONS FLAT 2	Potential Archaeological Deposit (PAD); Artefact
21-3-0184	WC-U BR21 PAD	Potential Archaeological Deposit (PAD)
21-3-0185	Shortcut Road Artefact 1	Artefact
21-3-0186	SOUTH ARM ROAD PAD 1	Potential Archaeological Deposit (PAD)
21-3-0187	SOUTH ARM ROAD ARTEFACT 3	Artefact
21-3-0188	SOUTH ARM ROAD ARTEFACT 2	Artefact
21-3-0189	Short Cut Road Artefact Scatter (Formerly SHORTCUT ROAD PAD 2)	Potential Archaeological Deposit (PAD)
21-3-0190	SHORTCUT ROAD PAD 2A	Potential Archaeological Deposit (PAD)
21-3-0191	SHORTCUT ROAD PAD 1	Potential Archaeological Deposit (PAD)
21-3-0192	Shortcut Road PAD 3	Potential Archaeological Deposit (PAD)
21-3-0193	Short Cut Road 4	Potential Archaeological Deposit (PAD)
21-3-0194	South Arm Road 4	Potential Archaeological Deposit (PAD)
21-3-0195	Short Cut Road 5	Potential Archaeological Deposit (PAD)
21-3-0196	Waterfall Way 1	Potential Archaeological Deposit (PAD)
21-3-0203	Tysons Flat 2 Reburial	Artefact
21-3-0204	South Arm Rd Artefact Reburial	Artefact
21-3-0205	Waterfall Way IF 01	Artefact
22-1-0001	Repton; Stingray Site;	Aboriginal Ceremony and Dreaming
22-1-0006	Yellow Rock Burial Ground	Ceremonial Ring (Stone or Earth); Burial; Shell; Artefact
22-1-0007	Myleston	Shell; Artefact
22-1-0008	Urunga; Myleston	Ceremonial Ring (Stone or Earth)
22-1-0009	Repton; Smokey Cape Lighthouse	Modified Tree (Carved or Scarred)
22-1-0027	Raleigh Bora Ground	Ceremonial Ring (Stone or Earth)
22-1-0031	Bellinger River; Myleston	Ceremonial Ring (Stone or Earth); Modified Tree (Carved or Scarred)
22-1-0048	Yellow Rock Midden;	Shell; Artefact
22-1-0133	MI-IF-1	Artefact
22-1-0134	Bonville Highway 2	Artefact
22-1-0222	Bonville Highway 3	Artefact
22-1-0224	BH3, Pacific Hwy, Bonville	Potential Archaeological Deposit (PAD); Artefact
22-1-0235	BH2, Bonville PH upgrade	Potential Archaeological Deposit (PAD)

SITE_ID	SITE_NAME	FEATURE_TY
22-1-0352	Burma Road Scar Tree 1	Modified Tree (Carved or Scarred)
22-1-0425	Waterfall Way 2	Potential Archaeological Deposit (PAD)
22-1-0470	Yellow Rock Road IF1	Artefact
22-1-0496	Lot 2 Perry's Road Repton	Artefact
22-1-0502	2URG-20 Isolated Find 01	Artefact
22-1-0520	Tuckers Rock	Aboriginal Ceremony and Dreaming
22-1-0521	Bluff Trail	Artefact
22-1-0522	Caperground Road Muddy Crossing	Artefact
22-1-0540	Speed Trap Trail	Artefact

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