Review of Environmental Factors – Keevers Drive / Bellinger River

Bellingen Shire Council

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Template 2.8.1

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 (Council). 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 fifty (50) flood affected sites within the Bellingen Local Government Area (LGA). Recent extreme weather and flooding in the Bellingen 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 Proposed Works are planned to start in April 2022 and would take up to 6 months. This REF assesses the Proposed Works associated with two (2) flood damaged locations on Keevers Drive and erosion of the banks of the Bellinger River, Sites 1375 and 1378.

Site 1375 – Keevers Drive

This site has a 25 m length of riverbank erosion causing the embankment to slump impacting the guard rail (Figure 0-1). 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 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.
- A heavy duty Geofabric Bidim A34 or similar below the rockfill along the work site length.
- Back fill with placement of materials comprising select subbase, and soil and reinstate guard rails.

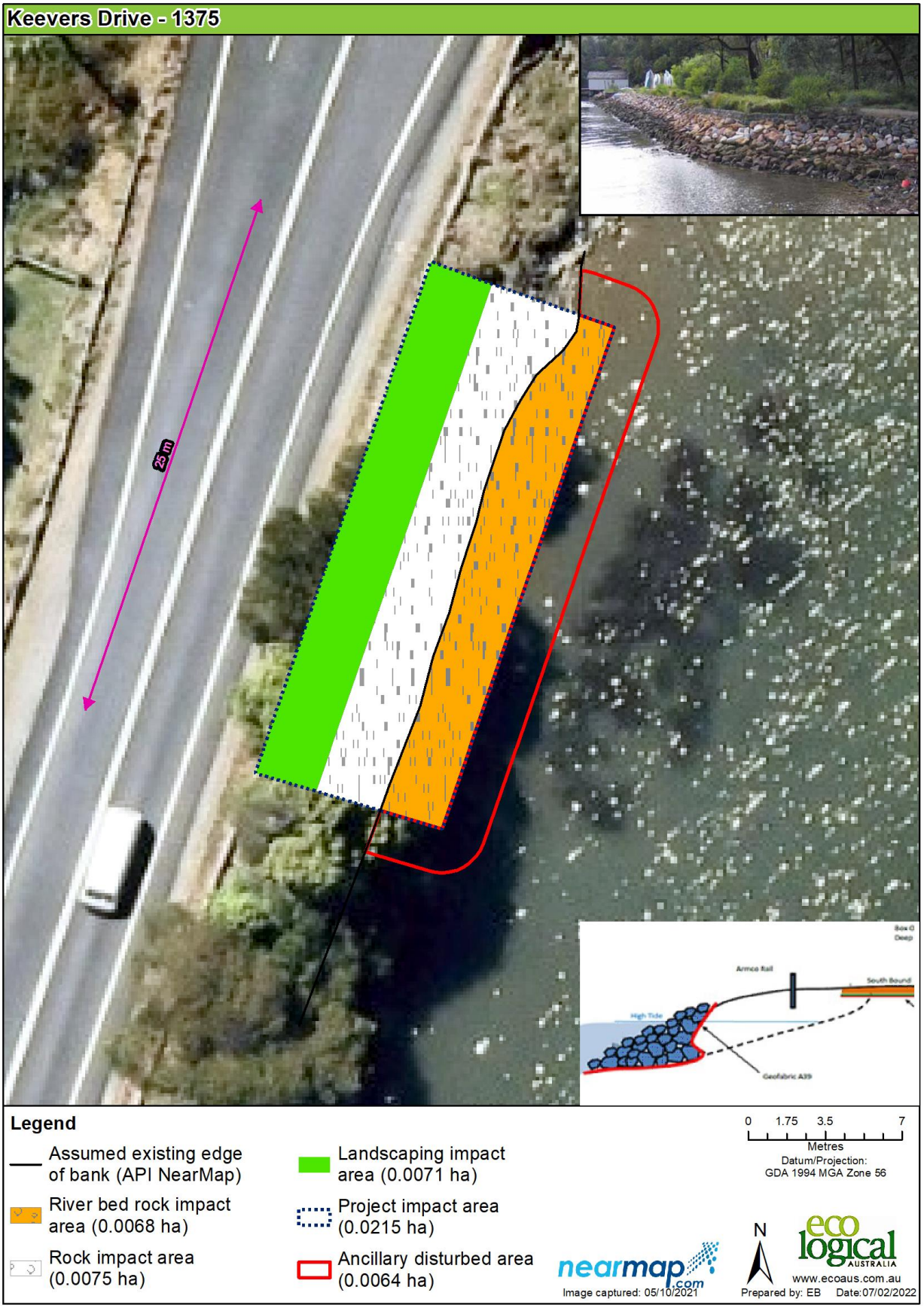

Figure 0-1: Site 1375 Keevers Drive

Site 1378 – Keevers Drive

This site has approximately 110 m of river embankment failure resulting in a 20 mm + slump in the road and a 75 m tension crack in the pavement (Figure 0-2). The proposed repairs include:

- Bulk excavation of the existing pavement to behind the exposed tension cracks to a depth of up to 700 mm below the existing road level and minor trimming of riverbank to remove vegetation and loose material.
- Excavation is approximately 3 m^3 pre metre length.
- Placement of a heavy duty geofabric over the base and rear of the excavation before placement of 9.75 m^3 per metre length of chemically inert angular rockfill that is 1 m wide with a 1.5H:1V batter.
- A heavy duty Geofabric Bidim A34 or similar below the rockfill along the work site length.
- Back fill with placement of about 3 m^3 width of pavement materials comprising select, subbase and base.
- Reseal road pavement and reinstate guard rails.

Figure 0-2: Site 1378 Keevers Drive

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 area of direct impact to vegetation and habitat types amounts to 0.1261 ha of native and exotic dominated forest / shrubland vegetation at sites 1378 and 1378, and 0.1118 ha of exotic grassland at the laydown areas. No threatened flora or fauna species were identified within the subject sites during the site inspection, nor were any threatened flora species identified as potential or likely to occur due to poor habitat and high disturbance. One record of Black-necked Stork (*Ephippiorhynchus asiaticus*) occurs within site 1378, however the accuracy of the record is 1,000 m and the habitat within the subject sites is not suitable for this species. The subject sites are highly disturbed, with exotic dominated vegetation unlikely to provide important habitat for threatened species; nevertheless, Tests of Significance were conducted for the White-bellied Sea-Eagle and Eastern Osprey, both listed as Vulnerable under the BC Act. No nests or significant perching habitat were identified within the subject sites and these species are considered likely to fly over and forage nearby to the subject sites as part of larger home ranges. Based on the Test of Significance assessments, the Proposed Works are considered unlikely to result in significant impacts. Nearby Koala sighting records indicate the potential for Koalas to move through the site between habitats, 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 sites. The remaining threatened fauna species were considered unlikely to occur in the subject sites due to the degraded habitat and site location within a modified landscape.

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 sites are also 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 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 changes to property accesses and 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 developed rural river-front setting. The Proposed Works area is dominated by the Bellinger River, road infrastructure as well as urban land uses. Visual impact would occur during major work and the removal of 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 riverbank and rock wall.

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.

Notice should also be given to Transport for NSW (TfNSW) for the carrying out of work in, on or over a public road adjacent to the Pacific Highway (M1) in accordance with Section 138 of the *Roads Act 1993*.

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*
Council	Bellingen Shire Council
DAWE	Department of Agriculture, Water and the Environment
DPIE	Department of Planning, Industry 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

Eco Logical Australia Pty Ltd (ELA) was engaged by Bellingen Shire Council (Council) to prepare a Review of Environmental Factors (REF) for flood impacted sites within the Bellingen Local Government Area (LGA). The environmental assessment of the Proposed Works has been undertaken in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Council 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 clause 228 of the *Environmental Planning & Assessment Regulation, 2000* (EP&A Regulation); and outlined impact mitigation measures to be undertaken, in line with Council'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 Council)
Proponent's Project Manager	Luke Moane
Position	Project Manager, RESFAC, North Coast Region
Contact details	luke.moane@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 *Biodiversity Conservation Act 2016* (BC Act) and / or *Fisheries Management Act 1995* (FM Act), in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally listed biodiversity matters under the *Environment Protection and Biodiversity Conservation Act 1999* (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.
- The potential for the Proposed Works to significantly impact any other Matters of National Environmental Significance (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 Agriculture, Water and the Environment (DAWE) 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 19-24 March 2021. Low lying areas were

particularly impacted by inundation, with several public assets destroyed or damaged, including roads, bridges and stormwater assets.

As part of the restoration, the Proposed Works are subject to funding and approval under the NSW Natural Disaster Essential Public Assets Restoration program. The initial stages of these works have been completed, identifying fifty (50) project restoration sites. The scope of works for each site typically include restoration/protection and road pavement repairs. REFs and subsequent designs are required for each site to allow for construction, with these sites grouped into packages as outlined in the below Table 1-2 and shown in Figure 1-1.

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 Council and PWA.

The '*impact area*' is the area without the addition of a construction area for ancillary works, facilities and access for the construction or operation of the Proposed Works.

For the purposes of carrying out the investigations detailed in this REF, being the broadest possible area within which construction works are proposed assessment includes the impact area and construction compounds.

Table 1-2: Sites grouped by Review of Environmental Factors report

REF Group	REF Site	Name	Label	Event	Longitude	Latitude	Location
REF 9 – Priority Keevers Drive Repairs	**1375**	**DM01375**	**1375**	**March 2021 Flood**	**153.010229**	**-30.444595**	**Keevers Drive**
	1378	**DM01378**	**1378**	**March 2021 Flood**	**153.009126**	**-30.448525**	**Keevers Drive**
REF 1 – Embankments - Rock Protection	1.01	DM01145	1145	March 2021 Flood	152.673841	-30.432286	Darkwood Road
	1.08	DM01079	1079	March 2021 Flood	152.953133 to 152.953547	-30.500683 to -30.500713	South Arm Road
	1.09	DM01373	1373	March 2021 Flood	153.021454	-30.438477	Man Arm Creek Bridge 115 Bellingen
	1.10	DM01206	1206	March 2021 Flood	152.920336	-30.45597	Constables Bridge 44 North Bank Road
	1.11	DM01358	1358	March 2021 Flood	153.018766	-30.479752	Yellow Rock Road
	1.12	DM00330	0330	February 2020 Flooding	152.8731494	-30.47015148	Sunny Corner Road
REF 2 – Stormwater Infrastructure	2.1	DM01000	1000	March 2021 Flood	152.89099	-30.507257	Bowraville Road
	2.2	DM00908	0908	March 2021 Flood	152.930358 to 152.942969	-30.520989 to -30.518673	Martells Road
	2.3	DM00993	0993	March 2021 Flood	152.877692 to 152.877842	-30.522887 to -30.522763	Bowraville Road
REF 3 – Upslope – Cut Batter Remediation	3.2	DM01127	1127	March 2021 Flood	152.713676 to 152.713147	-30.433257 to -30.433541	Darkwood Road
	3.3	DM01128	1128	March 2021 Flood	152.712767 to 152.712332	-30.434053 to -30.434296	Darkwood Road
	3.4	DM01163	1163	March 2021 Flood	152.625845	-30.448133	Darkwood Road
	3.5	DM01164	1164	March 2021 Flood	152.624025	-30.445129	Darkwood Road
	3.6	DM01166	1166	March 2021 Flood	152.624413	-30.445552	Darkwood Road
	3.7	DM01192	1192	March 2021 Flood	152.625796	-30.448053	Darkwood Road
REF 4 – River Gravel Relocation Works	4.1	DM01181	1181	March 2021 Flood	152.66626	-30.430103	Darkwood Road
	4.2	DM01183	1183	March 2021 Flood	152.660556	-30.438707	Darkwood Road
REF 5 – Embankment Stabilisation 1	5.1	DM01440	1440	March 2021 Flood	152.78059	-30.499094	Kalang Road
	5.2	DM01442	1442	March 2021 Flood	152.764167	-30.506629	Kalang Road
	5.3	DM01443	1443	March 2021 Flood	152.763688	-30.506806	Kalang Road
	5.4	DM01445	1445	March 2021 Flood	152.76165	-30.506901	Kalang Road
	5.5	DM01446	1446	March 2021 Flood	152.761172	-30.506724	Kalang Road
	5.6	DM01426	1426	March 2021 Flood	152.805598	-30.478009	Kalang Road

REF Group	REF Site	Name	Label	Event	Longitude	Latitude	Location
	5.7	DM01429	1429	March 2021 Flood	152.803999	-30.481471	Kalang Road
	5.8	DM01432	1432	March 2021 Flood	152.805422	-30.483302	Kalang Road
	5.9	DM01408	1408	March 2021 Flood	152.8904987	-30.38228604	Promised Land Road
REF 6 – Embankment Stabilisation 2	6.2	DM01448	1448	March 2021 Flood	152.755753	-30.502831	Kalang Road
	6.3	DM01450	1450	March 2021 Flood	152.733405	-30.50363	Kalang Road
	6.4	DM01407	1407	March 2021 Flood	152.8585996	-30.39445784	Gordonville Road
	6.5	DM01100	1100	March 2021 Flood	152.91828 to 152.918502	-30.481589 to -30.482087	Old Brierfield Road
	6.6	DM00862	0862	March 2021 Flood	152.898735	-30.449997	Hammond Street
	6.7	DM00378	0378	February 2020 Flood	152.858385 to 152.858394	-30.3940496 to -30.3937805	Gordonville Road
REF 7 – Embankment Stabilisation	7.1	DM01435	1435	March 2021 Flood	152.790751	-30.490507	Kalang Road
	7.2	DM01436	1436	March 2021 Flood	152.789981	-30.49214	Kalang Road
	7.3	DM01449	1449	March 2021 Flood	152.749623	-30.49826	Kalang Road
	7.4	DM01452	1452	March 2021 Flood	152.726388	-30.507829	Kalang Road
	7.5	DM01433	1433	March 2021 Flood	152.8048	-30.485336	Kalang Road
	7.7	DM01455	1455	March 2021 Flood	152.838424	-30.461753	Kalang Road
	7.8	DM01098	1098	March 2021 Flood	152.918623	-30.479404	Old Brierfield Road
REF 8 – Pavement Repair	8.01	DM01129	1129	March 2021 Flood	152.712025 to 152.710483	-30.434331 to -30.434106	Darkwood Road
	8.02	DM01151	1151	March 2021 Flood	152.659625 to 152.658943	-30.438609 to -30.438406	Darkwood Road
	8.03	DM00780	0780	March 2021 Flood Storm	152.790209 to 152.789893	-30.491956 to -30.492188	Kalang Road
	8.04	DM00781	0781	March 2021 Flood Storm	152.790483 to 152.790886	-30.491376 to -30.489981	Kalang Road
	8.05	DM00814	0814	March 2021 Flood Storm	152.871355 to 152.870154	-30.468353 to -30.46889	Kalang Road
	8.06	DM00840	0840	March 2021 Flood Storm	152.838772 to 152.838111	-30.461702 to -30.461968	Kalang Road
	8.07	DM00850	0850	March 2021 Flood Storm	152.808406 to 152.808307	-30.473195 to -30.473223	Kalang Road
	8.08	DM00858	0858	March 2021 Flood Storm	152.805043 to 152.803486	-30.480385 to -30.481064	Kalang Road
	8.09	DM00624	0624	March 2021 Flood Storm	152.767154	-30.313521	Breakwells Road

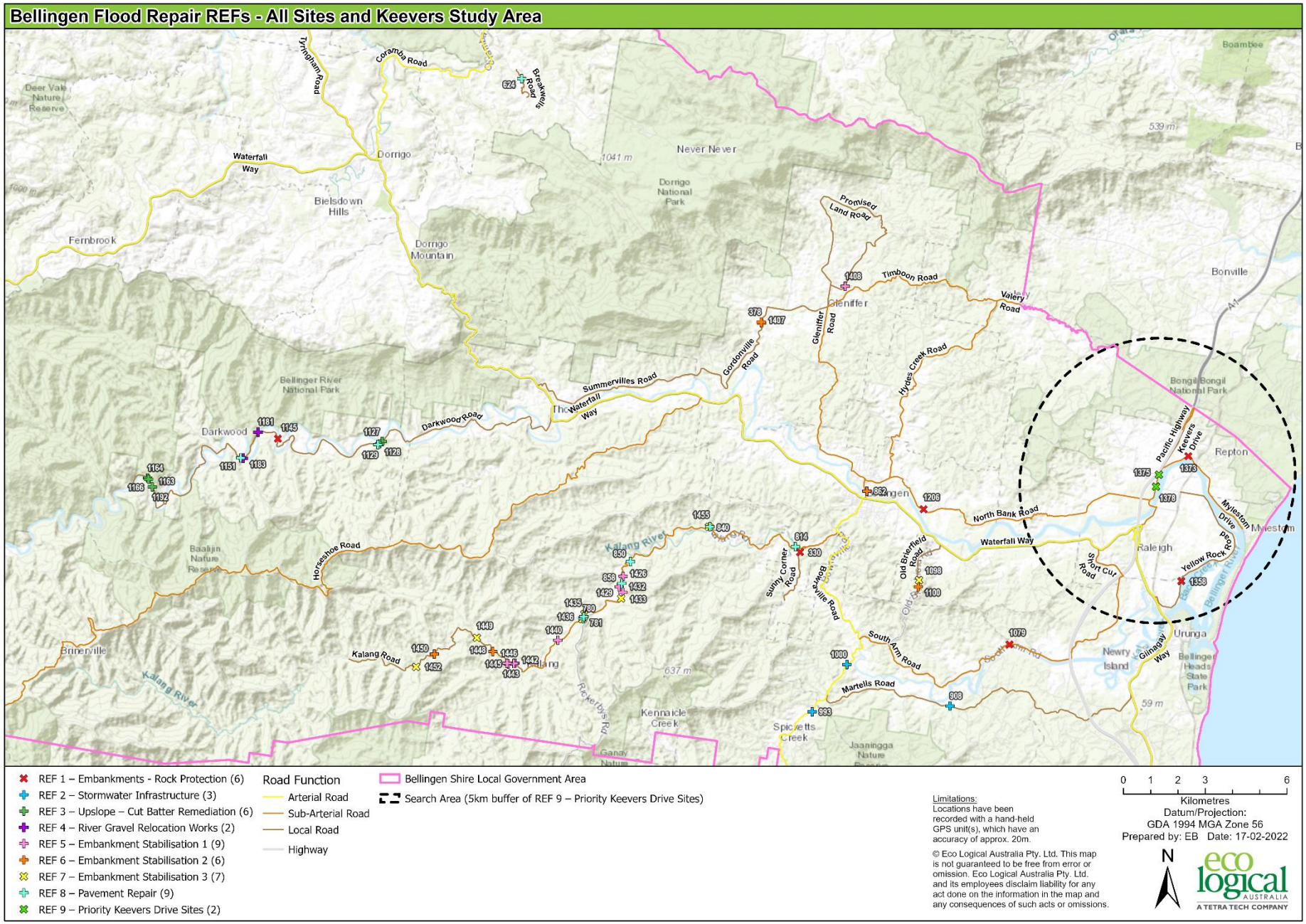

Figure 1-1: Location of all REF sites

1.2. Proposed Works Location and Context

At a regional level the Proposed Works site 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 Proposed Works site, refer Figure 1-2.

The Proposed Works will take place at two site locations along the western bank of the tidal Bellinger River (Site 1375 and 1378) along Keevers Drive, Raleigh. The construction area for both sites will take place within the road reserve and along the edge (both bed and bank) of the Bellinger River.

Table 1-3: Site Locations

Site	Road	Nearest address	Nearest Lot and DP	Latitude	Longitude
1375	Keevers Drive	1145 North Bank Road, Raleigh	Lot 1, DP 1188763	-30.444595	153.010229
1378	Keevers Drive	1145 North Bank Road, Raleigh	Lot 1, DP 1188763	-30.448525	13.009126

The subject sites are located along the steep western bank of Bellinger River and are situated in a low-lying, flat and gently undulating floodplain in Bellinger valley. The Bellinger valley is predominantly cleared for agricultural purposes. The sites are 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 sites 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 1m and 3m below the ground surface and mapped Class 3 potential acid sulfates under the *Bellingen Local Environmental Plan 2010* (Bellingen LEP).

Figure 1-2: Regional location map

1.3. Existing Land Ownership and Use

1.3.1. Land Ownership

The Proposed Works will be contained predominantly within road reserve within the following land, listed in Table 1-4.

Table 1-4: Properties affected by impact area, and their ownership

Property	Ownership
Keevers Drive	Crown Land - Council managed
Bellinger River	Crown Land

1.3.2. Land Use

The impact area is predominantly zoned RU1 (Primary Production), with parts of the area zoned Bellinger River W2 (Recreational Waterway). The land use zoning and associated objectives in accordance with the Bellingen LEP are shown in Figure 1-3 and detailed in Table 1-5.

Table 1-5: Land use zoning

Land zone	Objectives of land zone	Site(s) in 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.	1375; 1378; Compound 2, Compound 3	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.	1375; 1378.	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.	Compound 1	The Proposed Works are for a public road and would be consistent with the objectives.

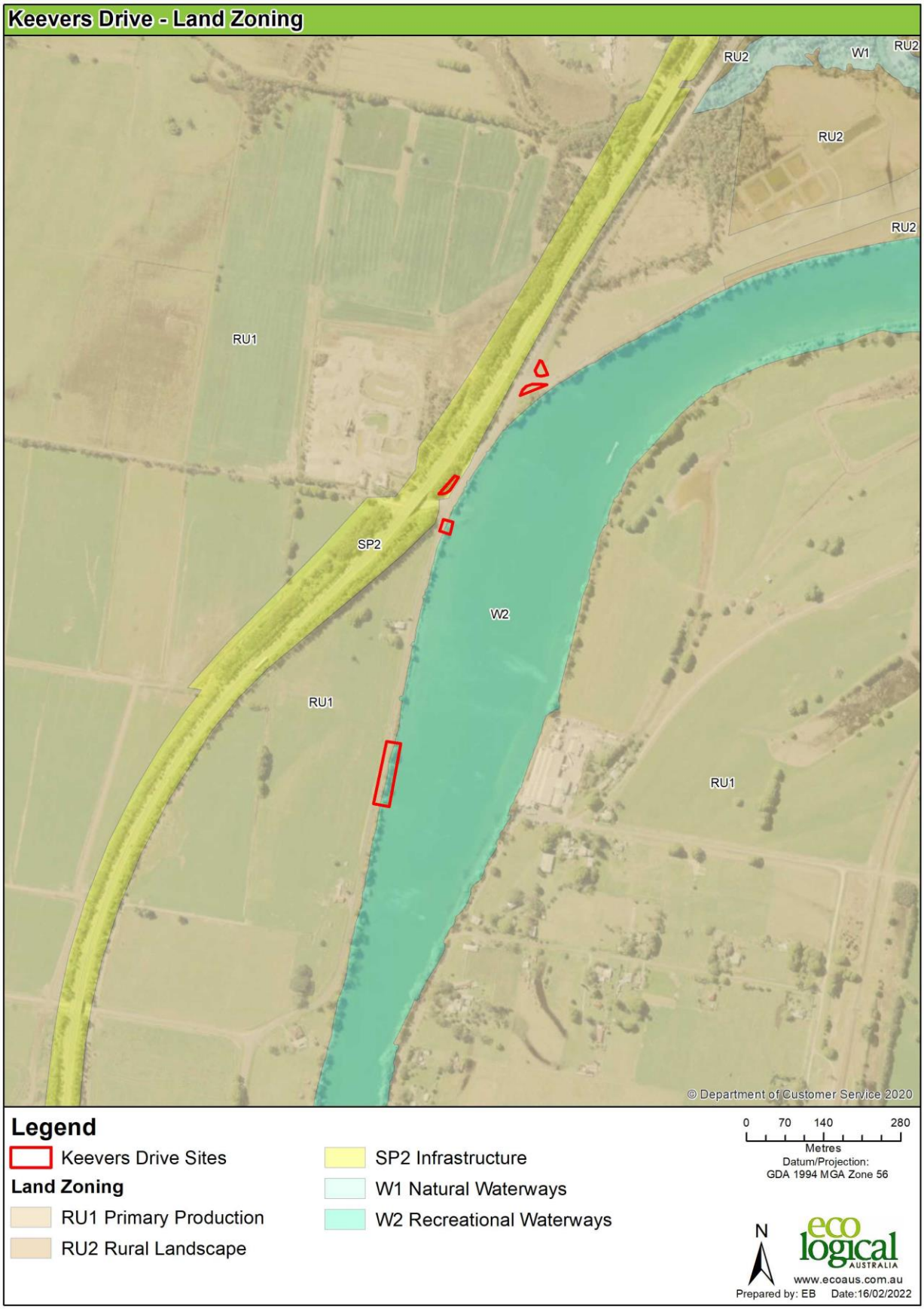

Figure 1-3: Land Zoning

2. Proposed Works Need and Options Considered

2.1. Need for the Proposed Activity

The Proposed Works are considered necessary to address Council's concerns regarding the safety and connectivity of public road infrastructure in the Bellingen LGA following damage to essential road infrastructure caused by recent extreme weather events and flooding. The Proposed Works will also aim to reduce further erosion and land slip along the bank of the Bellinger River at the subject sites.

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

- improve road safety
- improve network reliability
- deliver a design solution that can be implemented in the short-term.

2.1.1. Do Nothing Scenario and Repercussions

A do-nothing scenario was considered as the base case. Taking no action would leave Keevers 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, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical assessment (Appendix E) at Keevers Drive, Raleigh, where instability of the riverbank has affected the southbound lane. Remedial options considered for the site include reinstatement of the Keevers Drive southbound lane, including the existing pavement shoulder, achieving a factor of safety against global instability of greater than 1.5 to resistant scour during future flood events.

The scenarios included for the purpose of this assessment are:

- Option 1 - Do Nothing (Base Case).
- Option 2 - Rockfill, placement of clean angular rockfill and the placement of a 500 mm thick pavement (comprising a 200 mm select layer, 150 mm subbase and 180 mm base) and two coat seal to re-establish the southbound Keevers Drive.
- Option 3 - Soldier Pile Wall, installing treated hardwood timber piles with a nominal minimum diameter of 450 mm and a centre to centre spacing of about 1.5 m. The southbound Keevers Drive lane would require reconstruction with a new 530 mm thick pavement.
- Option 4 - Retaining Wall, construction of retaining wall structure comprising Elcorock bags, a gabion wall or concrete block wall. The southbound lane of Keevers Drive would require reconstruction with a new 530 mm thick pavement.
- Option 5 – Realign Keevers Drive, moving the south and northbound lanes westward into Lot 1 DP 1188763. Acquire suitable land for new road reserve and reconstruction with a new road base and pavement, property fencing and drainage.

Design optimisation was assessed based on recommendations from RGS, environmental constraints and design standards with the following factors used as measures.

- Improve safety.
- Improve long-term reliability.
- Ability to be delivered in the short-term.
- Minimise environmental impacts.
- Value for money.
- Constructability.

The option outcomes are detailed in Table 2-1 below.

Table 2-1: Options considered

Option	Meets design requirements (Safety and Reliability)	Relative cost	Able to be delivered in the short-term	Constructability and Environmental impacts
Option 1 – Do Nothing (Base Case)	No	No immediate cost although has the potential for significant long-term costs.	Yes, although has the potential for significant long-term reoccurring issues.	Significant issues as current road remains unsafe. Potential for significant long-term reoccurring environmental issues.
Option 2 – Rockfill	Yes	Cost effective solution and will achieve long-term benefits.	Yes	Constructability is good and environmental impacts are considered manageable.
Option 3 – Soldier Pile Wall	Yes	Cost effective solution and will achieve long-term benefits.	Possible, although additional time required for design and geotechnical investigations.	Constructability is good subject to additional Geotech results and environmental impacts are considered manageable.
Option 4 – Retaining Wall	Yes	Significant cost although remains an effective solution that will achieve long-term benefits.	No	Constructability is difficult and environmental impacts are considered problematic.
Option 5 – Realign Keevers Drive	Yes	Significant cost due to land acquisition, and full road construction	No	Constructability is considered moderate. Environmental impacts remain unresolved with existing bank to continue to be undercut and likely further damage to continue to occur during flood events.

2.1.3. Why the Proposed Remediation Activities were Selected as the Preferred Option

The Geotechnical Assessment conducted by Regional Geotechnical Solutions: *Riverbank Stability – Conceptual Remedial Options Keevers Drive Raleigh 2020* outlined and recommended remedial options for Council to undertake for the Proposed Works (Appendix E). Based off the recommendations of the

geotechnical assessment, excavating the existing riverbank and reconstructing with rockfill (Option 2) was the remedial action adopted for the Proposed Works.

2.2. Justification for the Activity

The Proposed Works are justified for the following reasons:

- It addresses site specific road safety improvements, the use of Keevers Road by vehicles.
- The bank works will enhance soil stability and sediment loss.
- The Proposed Works will increase productivity in the Raleigh Area and region.
- The upgrade will reduce the long-term maintenance costs to Council and rate payers.

The 'do nothing' option will compromise road safety.

3. Proposed Works Description

3.1. Proposed Works Description

This REF assesses the Proposed Works associated with flood damage to Keevers Drive and erosion of the banks of the Bellinger River at two locations in the Bellingen LGA. The following restoration works will be undertaken as outlined in Table 3-1 within the areas demarcated in Figure 3-1.

Table 3-1: Proposed Works details

Site	Damage details	Proposed concept restoration works	Proposed Works disturbance area
1375	Approx. 29 m of riverbank erosion causing the embankment to slump impacting the guard rail.	• 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 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. • A heavy duty Geofabric Bidim A34 or similar below the rockfill along the work site length. • Back fill with placement of materials comprising select subbase, and soil and reinstate guard rails.	approximately 0.0215 ha.
1378	Approx. 110 m of riverbank failure resulting in a >20 mm slump in the road and a 75 m tension crack in the pavement.	• Bulk excavation of the existing pavement to behind the exposed tension cracks to a depth of up to 700 mm below the existing road level and minor trimming of riverbank to remove vegetation and loose material. • Excavation is approximately 3 m^3 pre metre length. • Placement of a heavy duty geofabric over the base and rear of the excavation before placement of 9.75 m^3 per metre length of chemically inert angular rockfill that is 1 m wide with a 1.5H:1V batter. • A heavy duty Geofabric Bidim A34 or similar below the rockfill along the work site length. • Back fill with placement of about 3 m^3 width of pavement materials comprising select, subbase and base. • Reseal road pavement and reinstate guard rails.	approximately 0.1442 ha

The Proposed Works more generally involves excavation of the existing riverbank at the two subject sites and reconstructing with rockfill to create a seawall. Physical Proposed 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.
- Site restoration on completion of works including topdressing / turfing.

3.1.1. Work Methodology

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

A Construction Environmental Management Plan (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 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.
- Installation of traffic management measures (in accordance with the traffic control plan).

3.1.1.2. Construction activities

- Relocation or protection of utilities as required.
- Carrying out of earthworks.
- Carrying out rock placement.
- Backfill, sub-base and asphalt surfacing.
- Carrying out final work aspects (including pavement marking and road furniture).

3.1.1.3. Rehabilitation activities

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

3.1.1.4. Types of Materials

The type resources and materials needed to build the Proposed Works will likely include:

- natural material (from earthworks and imported materials)
- steel for road furniture
- rock for scour protection
- pavement sub-base and base materials
- asphalt
- geofabric.

Water would also be required for construction, which would be either trucked into site or sourced from an existing water supply in the area. Activities that would require water use include (but are not limited to) compaction, dust suppression and geotechnical investigations.

3.1.1.5. Source of Materials

The Proposed Works 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 pavement construction, gravel, concrete, and rock for bank stabilisation components. All materials and equipment would be brought to the works site via road.

3.1.1.6. Plant and Equipment

The following plant and equipment may be required as part of the Proposed Works:

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

3.1.1.7. Ancillary facilities

A site compound is located north west corner of the intersection with Keevers Drive and Valery Road. This area would be temporarily fenced and include, shade, toilets and secure bunded area for storage of fuel, oil, and chemicals (if required). Stockpile / laydown sites are located on the south east corner of the intersection with Keevers Drive and Mylestom Drive and north east corner of the intersection with Keevers Drive and Mylestom Drive. Upon completion of the Proposed Works all three areas would be cleared of all materials, including rubbish, and rehabilitated back to their pre-construction state. The sites were chosen using the following principles:

- Minimise damage to vegetation and trees by locating ancillary infrastructure on existing cleared areas that would not require vegetation removal.
- Locate ancillary infrastructure outside the drip lines of trees.
- Locate ancillary infrastructure to ensure existing surface drainage is maintained.
- Locate within the impact area assessed for potential impact in this REF.

The compound areas are shown in Figure 3-1.

Figure 3-1: Compound areas

3.1.1.8. Duration and Working Hours

Timing	Description
Commencement date	Tendering for the design and construction works is currently scheduled for early March 2022.
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

3.1.1.9. Access and Traffic Management

A traffic management plan would be prepared for the Proposed Works and traffic management measures would be implemented as required. The Proposed Works 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 Road is proposed for an appropriate period to construct required pavement and bank stabilization works.

Standard traffic management measures would be implemented during construction to ensure that traffic flow along Keevers Road. 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).

3.1.1.10. 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 Proposed Works and will be reviewed and certified by the Council Environment Officer and 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 sub-plans;

- Weed Control Protocols.
- Traffic Management Plan (TMP).
- Air Quality Management Plan (AQMP).
- Waste Management Plan (WMP).

- Hazard and Risk Management Plan (HRMP).
- Soil and Water Management Plan (SWMP).
- Acid Sulfate Soil Management Plan (ASSMP).
- Spill Response Plan.

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

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 Council 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 (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP 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 Proposed Works are for a road and road infrastructure facilities and is to be carried out by Council, it can be assessed under Division 5.1 of the EP&A Act.

The Proposed Works are 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 No. 14 - Coastal Wetlands*, *State Environmental Planning Policy No. 26 - Littoral Rainforests*, *State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (Major Development) 2005*.

Part 2 of the ISEPP 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 ISEPP (where applicable), is discussed in Chapter 5 of this REF.

The Proposed Works would be permitted without consent under clause 94 of the ISEPP as the Proposed Works are road infrastructure facilities, and on behalf of a public authority (Council). The Proposed Works are 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 Proposed Works 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). A likelihood of occurrence assessment (Appendix B) identified no MNES likely to be affected by the Proposed Works.
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. No threatened species, populations or communities were recorded or considered likely to be affected by the Proposed Works 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

Legislation	Relevance to the Proposed Activity
	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 Proposed Works at both sites require dredging and reclamation to repair the bank's infrastructure and build a new seawall. The Proposed Works involve the removal of a small number (0.0396 ha) of mangroves. The DPI Fisheries spatial portal also shows areas of mapped seagrass *Zostera* sp. as occurring in close proximity to site 1375 and 1378. Mangroves and seagrass are protected under clause 204 of the FM Act and the development may require a permit from DPI Fisheries to directly or indirectly harm marine vegetation.
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 6.5. A requirement of Clause 16 of the Infrastructure SEPP is for consultation with the National Parks and Wildlife Service (NPWS) where the Proposed Works occur on or adjacent to National Parks Estate. The Proposed Works are not within or adjacent to national park and therefore consultation is not required. The Aboriginal heritage assessment has concluded that the Proposed Works 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 not 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).

Legislation	Relevance to the Proposed Activity
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.* *(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 Council is the appointed Road authority. In order to repair damage to Keevers Drive, the Proposed Works involves excavation of the adjacent bank of the Bellinger River that is dedicated Crown land. Therefore, under section 175 of the Roads Act, Council have authority to occupy and undertaken works within adjacent Crown land for the purpose of road work provided at least 7 days of written notice. Written notice will need to be given to Crown lands at least 7 days prior to any work commencing. 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. *Lantana camara,* a priority weed, as identified within the North Coast RSWMP, was present at Site 1378. Weed management measures detailed in Chapter 7 should be undertaken to ensure weeds are not spread from or introduced to the impact area during works.
PLANNING INSTRUMENTS UNDER THE NSW EP&A ACT	
State Environmental Planning Policy – Coastal Management 2018	The *State Environmental Planning Policy (Coastal Management) 2018* provides controls for undertaking development and activities in coastal management areas. The four coastal management areas are:

Legislation	Relevance to the Proposed Activity
	• 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 area is within the Coastal environment area as such a response to objectives is included in Section 0.
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 (Vegetation in Non-Rural Areas).
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.'

4.3.1. Coastal Management State Environment Planning Policy 2018 (Coastal SEPP)

The *State Environmental Planning Policy (Coastal Management) 2018* 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.

None of the sites are located within a coastal wetlands or littoral rainforest area or their proximity areas. Both sites are located within the coastal environmental area and coastal use area. The Coastal Management SEPP lists criteria for assessing development in each coastal zone, which is addressed below in Figure 4-1, Table 4-2 and Table 4-3.

Figure 4-1: Coastal management SEPP

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 both sites 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 sites are not within a sensitive Coastal Lake.
(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	Marine vegetation would not be harmed. A negligible amount (0.0396 ha) of native vegetation is proposed for removal.

Consideration	Action
(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 sites are not located within foreshore public open space.
(f) Aboriginal cultural heritage, practices and places,	See **Section 6.5**.
(g) the use of the surf zone.	The sites are not in the surf zone.

Table 4-3: Development on land within the coastal use area

Consideration	Action
(1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority—(a) has considered whether the proposed development is likely to cause an adverse impact on the following—	
(i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The sites are not located near accessible foreshore areas.
(ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,	Not applicable.
(iii) the visual amenity and scenic qualities of the coast, including coastal headlands,	The scale of works would not alter the scenic quality of the coastal river.
(iv) Aboriginal cultural heritage, practices and places,	See **Section 6.5**.
(v) cultural and built environment heritage.	See **Section 6.5**.

In regard to Clause 15 of the CM SEPP, development consent is not required for the proposed works as the works are permissible without consent under the ISEPP. Therefore, the provisions of Clauses 15 do not apply.

In regard to Clause 19 of the CM SEPP, the proposed development is not '*Coastal protection works*', therefore, the provisions of Clauses 19 do not apply.

As such, the provisions of the Coastal Management SEPP have not been considered further

5. Community and Agency Consultation

No consultation was undertaken with nearby residents or the wider community.

DPI Fisheries were contacted regarding which permits were required. Emails are provided in Appendix F.

Shannon Powell of Department of Planning, Industry and Environment (DPIE) Crown lands was called on 10 December 2021. She advised of the requirement of the proponent to provide notice to Crown Lands prior to works commencing.

Division 1 of the ISEPP provides guidance on consultation with stakeholders (Table 5-1).

Table 5-1: Infrastructure SEPP consultation requirements

ISEPP Clause	Clause Relevance	Consultation Undertaken
Clause 13	Impacts on council-related infrastructure or services Consultation is required if the public authority is of the opinion that the development: (a) will have a substantial impact on stormwater management services provided by a council, or (b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area, or (c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council, or (d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council, or (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, or (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, Council is the proponent.
Clause 14	Impacts on local heritage Consultation is required if the development: (a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and (b) is development that this Policy provides may be carried out without consent.	No consultation is required. Impacts on local heritage are unlikely. Council is the proponent.
Clause 15	Impacts on flood liable land In this clause, 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.	No, Council is the proponent.

ISEPP Clause	Clause Relevance	Consultation Undertaken
Clause 16	Consultation with public authorities other than councils Consultation is required if the development is: (a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974*—the Department of Environment and Climate Change, (b) development adjacent to a marine park declared under the *Marine Parks Act 1997*—the Marine Parks Authority, (c) development adjacent to an aquatic reserve declared under the *Fisheries Management Act 1994*—the Department of Environment and Climate Change, (d) development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*—the Sydney Harbour Foreshore Authority, (e) development comprising a fixed or floating structure in or over navigable waters—the Maritime Authority of NSW, (f) development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act)—the NSW Rural Fire Service. Note. The Act defines bush fire prone land, in relation to an area, as land recorded for the time being as bush fire prone land on a map certified as referred to in section 146 (2) of the Act. Note. When carrying out development of a kind referred to in paragraph (f), consideration should be given to the publication of the *NSW Rural Fire Service Planning for Bush Fire Protection 2006*. (g) (Repealed)	The Proposed Works will not be carried out on land specified under clause 16.

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 Proposed Works. All aspects of the environment potentially impacted by the Proposed Works are considered. This includes consideration of:

- Potential impacts on MNES under the EPBC Act
- The factors specified in the guidelines: Is an EIS required? (DUAP 1995 / 1996) as required under clause 228(1) of the *Environmental Planning and Assessment Regulation 2000* and the Roads and Related Facilities EIS Guideline (DUAP 1996). The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* 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. Methods

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

- Geotechnical investigation by Regional Geotechnical Solutions (2020)
- *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.

6.1.2. Existing Environment

6.1.2.1. Land use

The subject sites have been subject to previous earthworks and clearing due to construction of Keevers Drive. The subject sites are located within low lying, flat and gently undulating floodplain in Bellinger valley.

6.1.2.2. 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 Kalang Rivers. 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

6.1.2.3. Contamination

The NSW EPA Contaminated Land Register was checked for known contaminated land or potential contamination risk within the Bellingen 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.

6.1.2.4. 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 sites have an elevation of between 2m and 4m 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 at Site 1378, indicated that acidic soil conditions were present (Appendix E). Due to the proximity and similar environments, the geotechnical findings at Site 1378 are also assumed to be present at Site 1375.

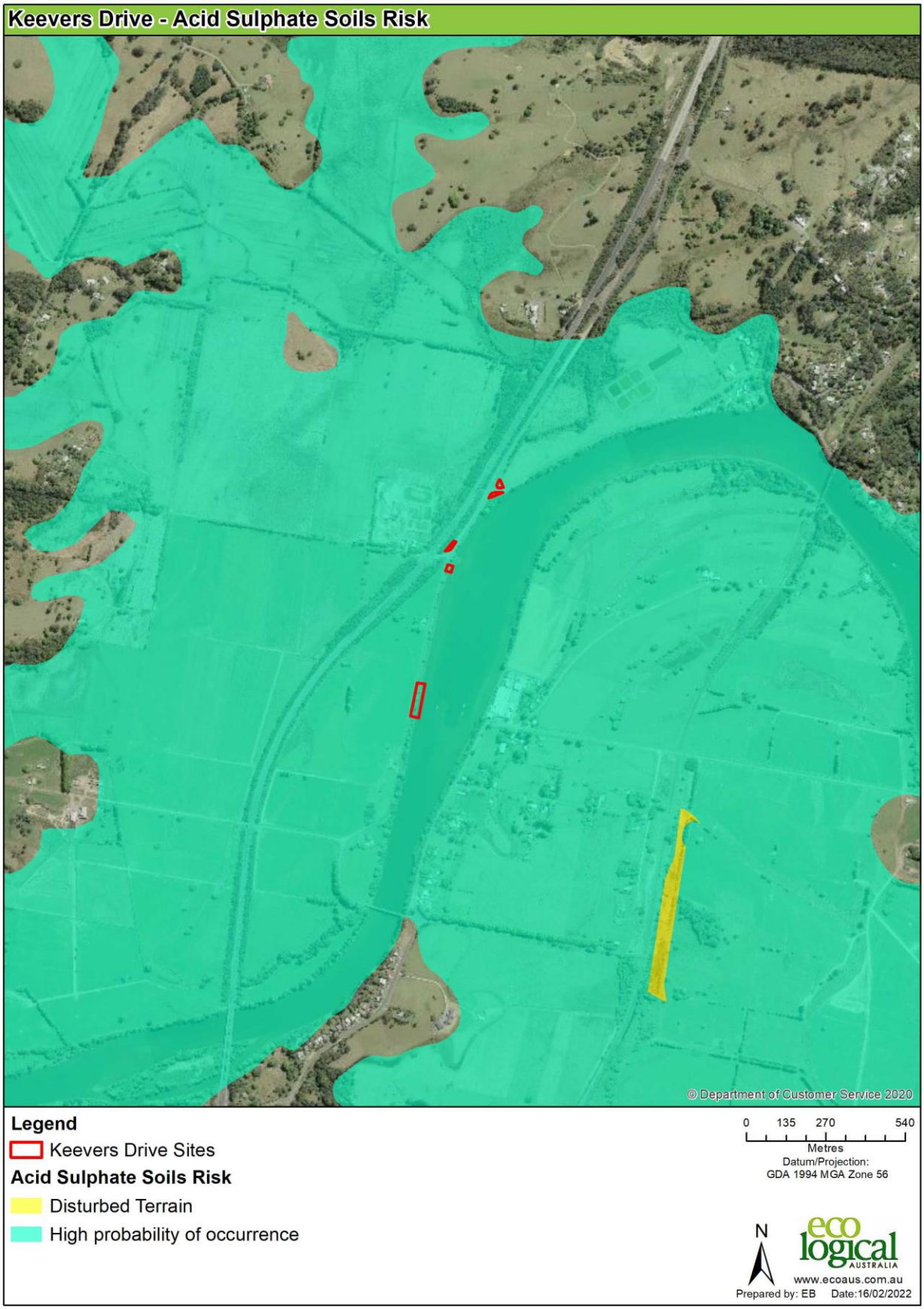

Figure 6-2: Acid Sulphate Soils Risk

6.1.3. Impact Assessment

6.1.3.1. Construction

Impacts to soils and landscapes within the Proposed Works footprint would primarily result from earthworks associated with the bank reconstruction phase of the Proposed Works 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 likely to disturb acid sulphate soils, which are mapped for the area.

The proposed works have 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.

6.1.3.2. Operational

The Proposed Works 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.

6.1.4. 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 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 Proposed Works 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 Council and/or EPA. • Develop and implement an Acid Sulphate Management Plan (ASSMP).

Reference	Environmental Aspect	Mitigation Measures
		• Acid sulphate soils uncovered during works must be treated in accordance with an Acid Sulphate Management Plan (ASSMP). • Keep soil wet during excavation to avoid unintended exposure of acid sulphate soils. • All soils should be removed from the site and disposed of at a licenced waste facility and not re-used on-site.
GS3	Soil contamination resulting from accidental spills	• A site-specific emergency spill plan will be developed.
GS4	Rehabilitation of disturbed areas	• A rehabilitation plan would be prepared for all areas disturbed by Proposed Works 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 Proposed Works 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.

6.2.1. Methodology

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 (DAWE, 2021a).
- 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 Impact area and subject site was undertaken by ELA Ecologists Lachlan Copeland and Caitlin Orr on 23 November 2021. The full extent of the impact 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.

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
- Rapid inspection of impact area for signs of bird or bat activity.

6.2.1.3. Likelihood of occurrence assessment

The list of threatened species and ecological communities returned by the database searches was supplemented or amended based on local ecological knowledge of the area and used as a basis for the likelihood assessment (Appendix B). This assessment was conducted using database, presence/absence of suitable habitat within or adjacent to the impact area, and professional judgement.

6.2.2. Existing Environment

The subject sites are located wholly within the Coffs Coast and Escarpment subregion of the NSW North Coast Bioregion and sits within the Ingalba Coastal Hills Landscape unit. The subject sites are not included within a roadside area designated as high conservation value vegetation under Council Roadside Reserves Program, nor is the area located within an Area of Outstanding Biodiversity Value (AoBV) listed under the NSW BC Act.

6.2.2.1. Vegetation Communities

Due to the high level of existing disturbance present within the two sites and dominance of exotic species, the terrestrial vegetation present at sites 1378 and 1378 have been classified as non-native (exotic) vegetation and are not considered to conform to a native Plant Community Type (PCT). The exotic dominated vegetation occurs as a narrow strip between the pavement edge and river. The canopy layer, where present, is dominated by exotic species including *Cinamomum camphora* (Camphor Laurel), *Erythrina crista-galli* (Cockspur Coral Tree) and *Senna pendula* (Easter Cassia), with the exotic climber *Ipomea cairica* (Coastal Morning Glory) also common. Exotic grasses dominate the roadside edge and understorey including *Chloris gayana* (Rhodes Grass). Occasional native species were scattered throughout the area including native canopy and mid-storey species *Casuarina glauca* (Swamp Oak), *Pittosporum undulatum* (Sweet Pittosporum) and *Guioa semiglauca* (Guioa); and the understorey species *Phragmites australis* (Common Reed). Neither site fits the characteristics of a streetscape, avenue or roadside planting.

Two laydown areas have been identified off Keevers Drive, on Mylestom Drive and Valery Road. Both laydown areas have been cleared in the past and comprise gravel and exotic grasses. Disturbed native vegetation borders both sites, with *Casuarina glauca* (Swamp Oak) as the dominant overstorey resembling PCT 1235 Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion.

No TECs were recorded in the impact area. Areas of PCT 1235 adjacent to the laydown areas represent *Swamp Oak Floodplain Forest* TEC listed as an Endangered Ecological Community (EEC) under both the BC Act and EPBC Act. No direct impacts to this community are proposed and indirect impacts would be mitigated through the measures outlined in Section 6.2.4.

Photographs of on-site vegetation are shown in Figure 6-3 to Figure 6-7.

Figure 6-3: Site 1375 vegetation

Figure 6-4: Site 1378 vegetation

Figure 6-5: Mylestom Drive 2 laydown areas

Figure 6-6: Valery Road 1 laydown area

Figure 6-7: Valery Road laydown area

6.2.2.2. Threatened Flora and Fauna

A literature review, including a search for threatened species using DPIE BioNet Atlas and Australian Protected Matters Search Tool (DAWE, 2021a) identified three listed threatened ecological communities, 15 threatened flora species, 61 threatened fauna species listed under the BC and / or EPBC Acts, which may have the potential to occur within a 5 km radius of the impact area. The BioNet Atlas database threatened species records are shown in Figure 6-8 - Figure 6-12 below.

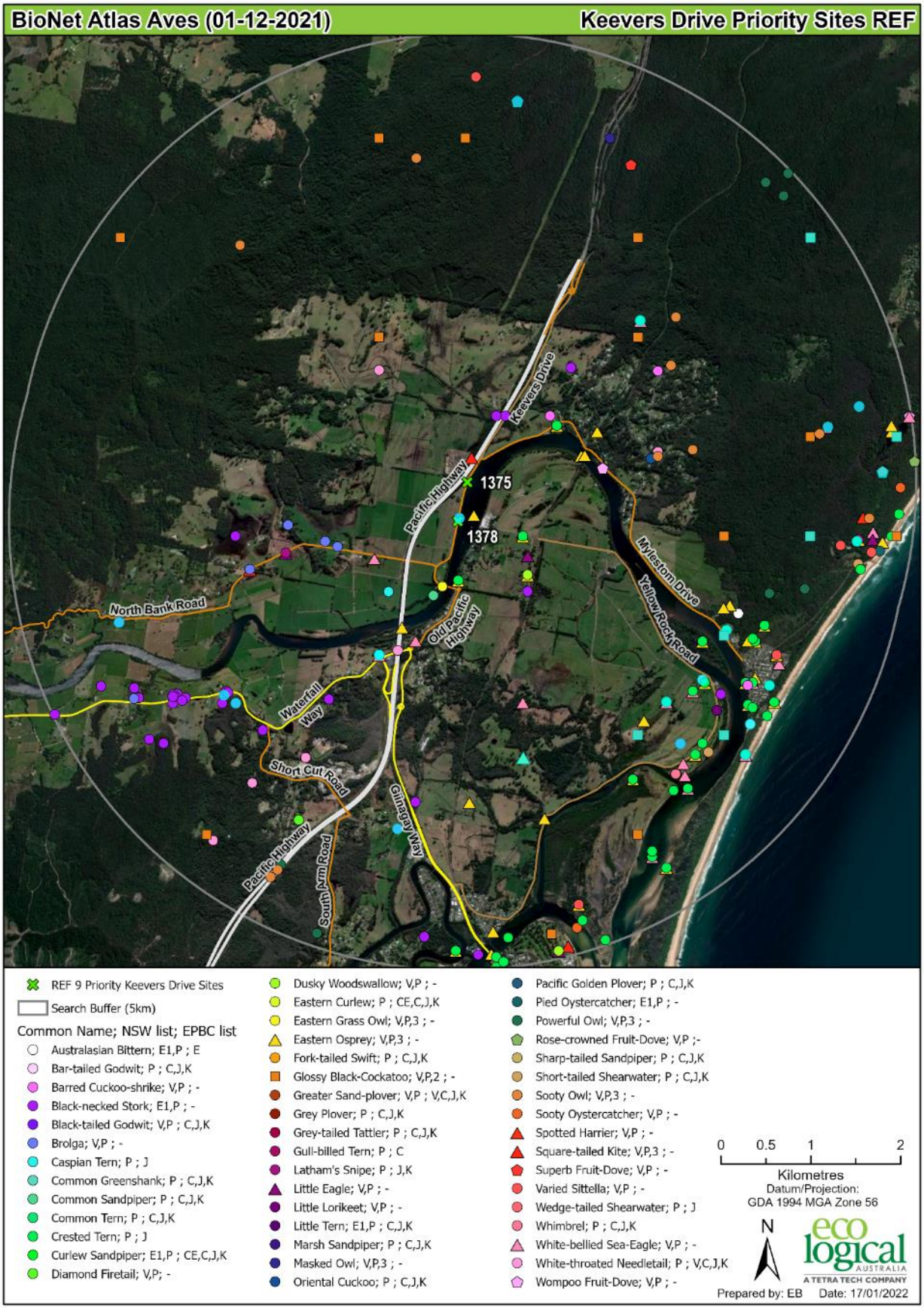

Figure 6-8: Threatened Aves species recorded within 5 km of the subject site (BioNet Atlas)

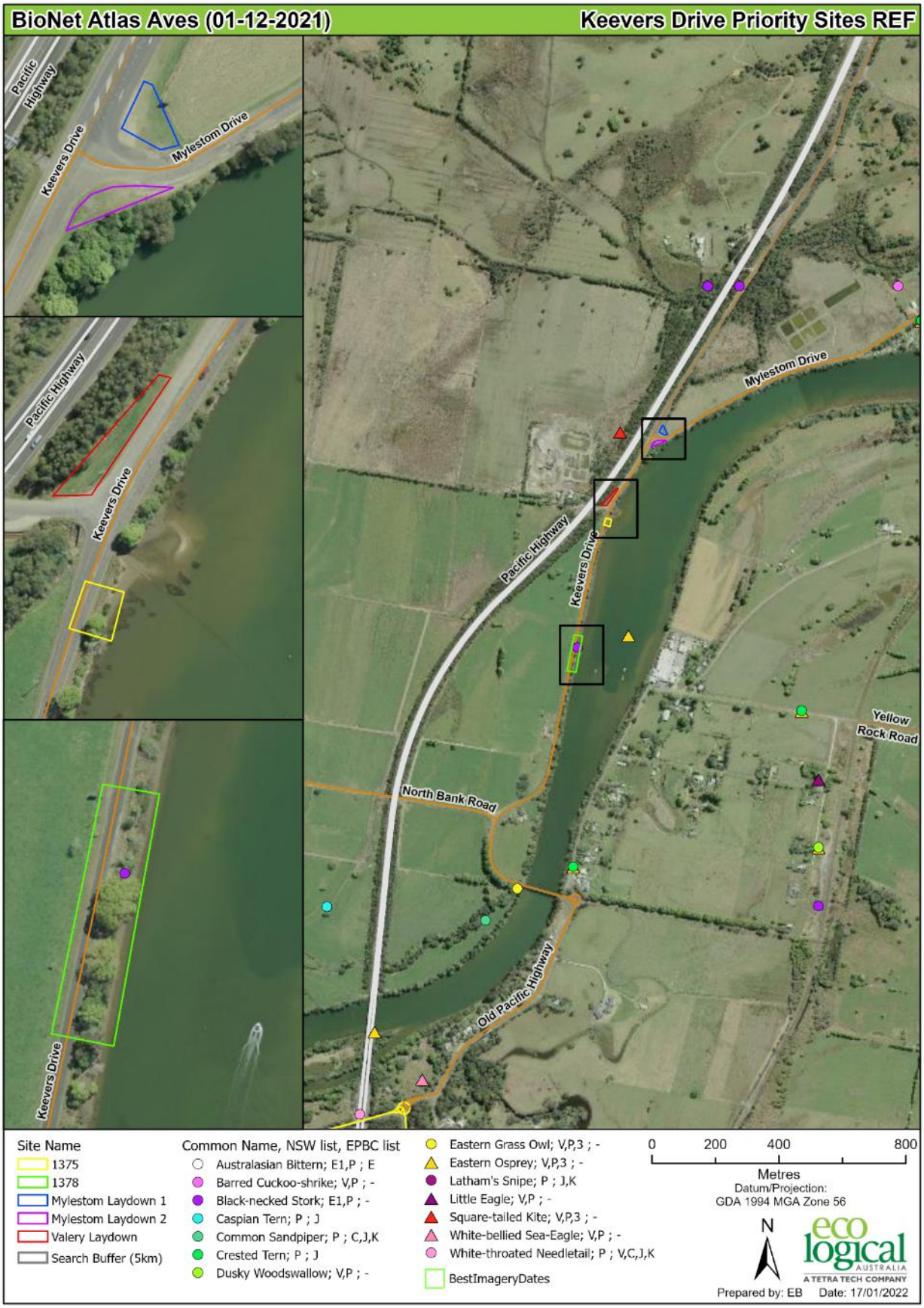

Figure 6-9: Threatened Aves species recorded within 1 km of the subject site (BioNet Atlas)

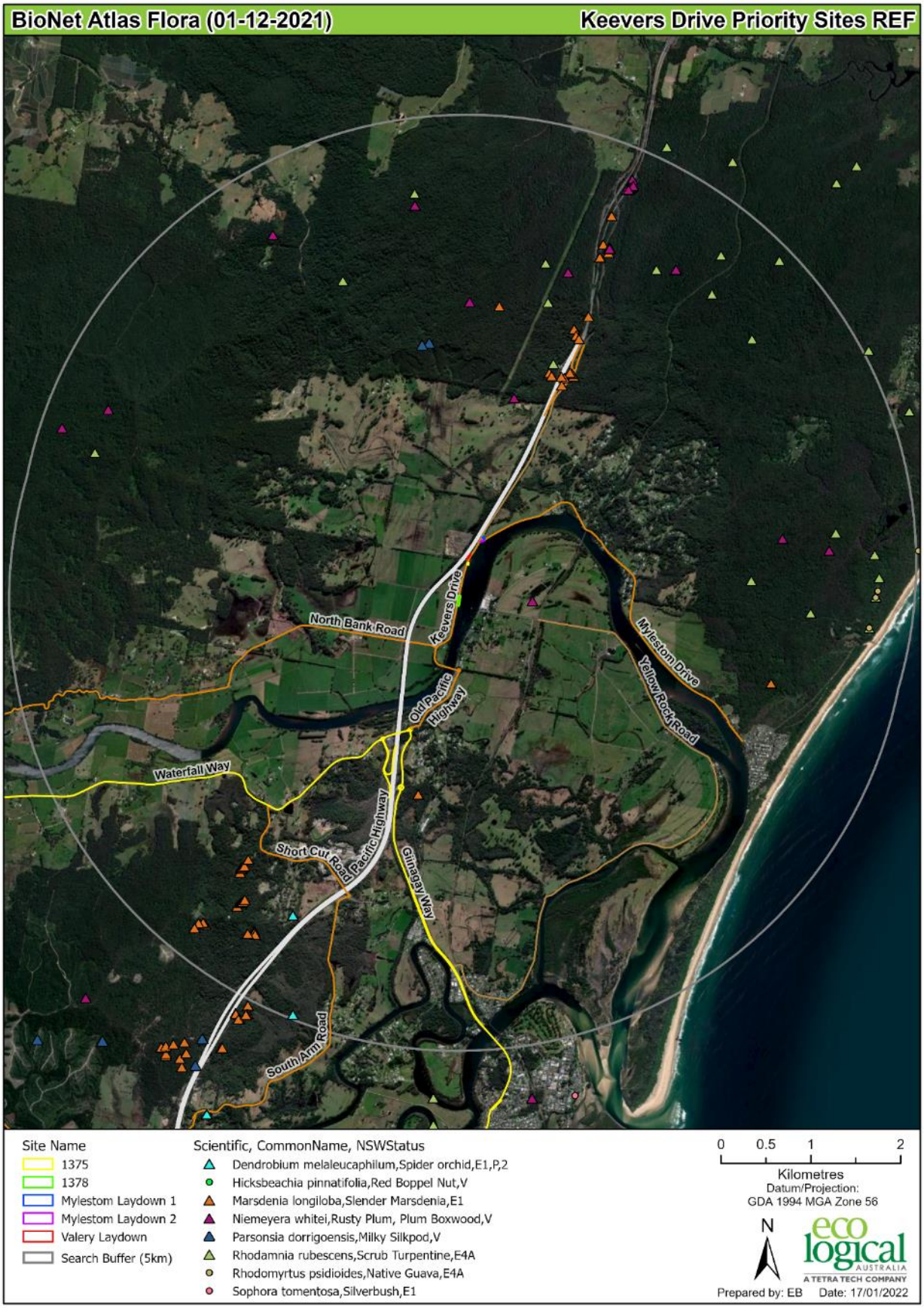

Figure 6-10: Threatened Flora species recorded within 5 km of the subject site (BioNet Atlas)

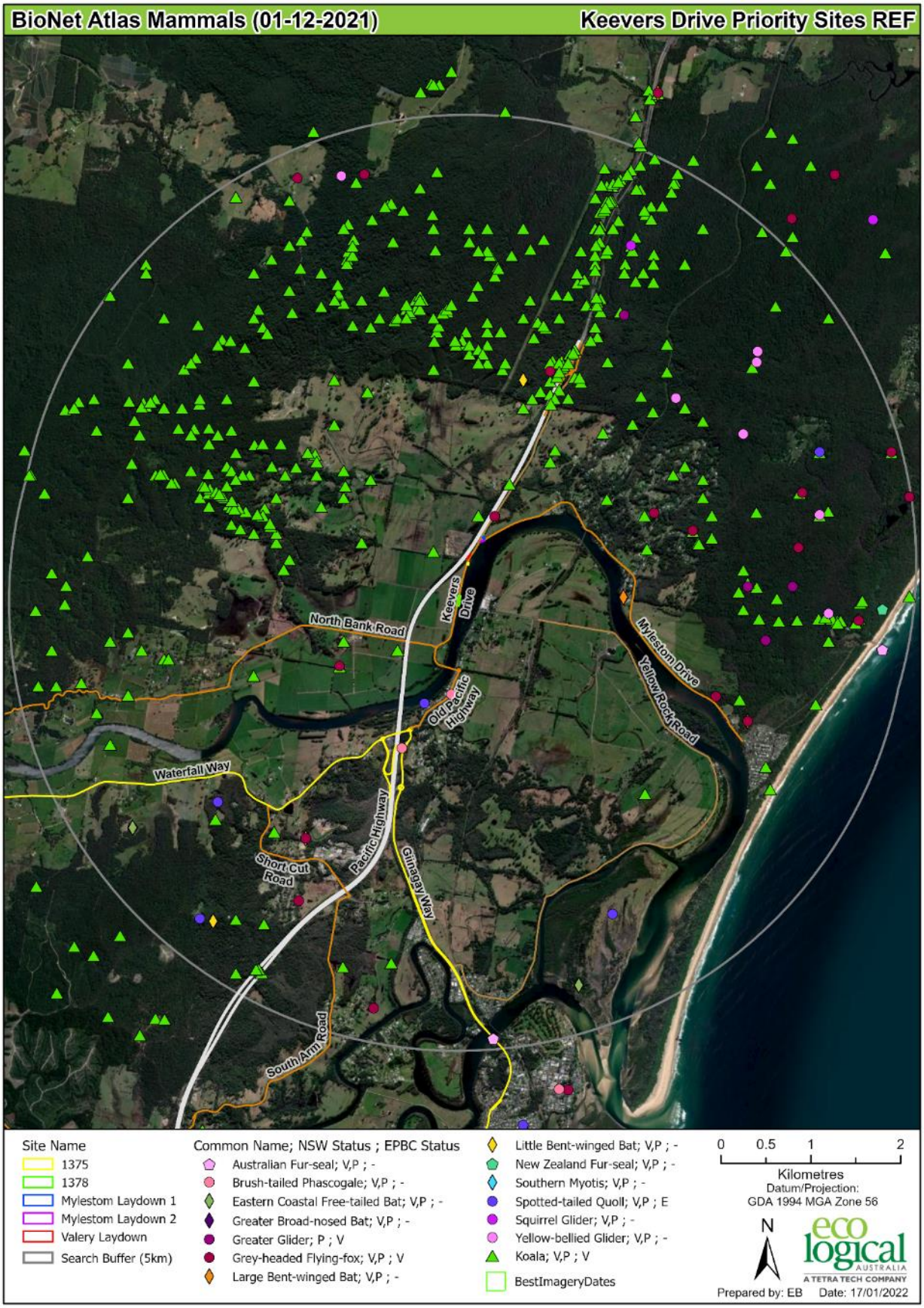

Figure 6-11: Threatened Mammals species recorded within 5 km of the subject site (BioNet Atlas)

Figure 6-12: Threatened reptile, frog and insect species recorded within 5 km of the subject site (BioNet Atlas)

No threatened flora species were identified within the subject sites 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 B).

No threatened fauna species were identified within the subject sites during the field survey. One record of Black-necked Stork (*Ephippiorhynchus asiaticus*) occurs within site 1378 (Figure 6-8 and Figure 6-9), however the accuracy of the record is 1000 m and the habitat within the subject sites is not suitable for this species. The subject sites are highly disturbed, with exotic dominated vegetation unlikely to provide important habitat for threatened species; nevertheless, suitable habitat for two threatened fauna species that may visit or fly over the sites on occasion was identified (Table 6-2). Nearby Koala sighting records indicate the potential for Koalas to move through the site between habitats, 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 sites. The remaining threatened fauna species were considered unlikely to occur in the subject sites due to the degraded habitat and site location within a modified landscape (Appendix B).

No hollow bearing trees or other habitat features such as termite terrariums, dead branches, fissures or man-made structures were recorded within the impact area. No potential bat roosting habitat was identified within the impact area.

Table 6-2: 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	Site
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Utilises the estuarine habitat. No roost trees or nests present within subject sites.	1375 and 1378
Pandion cristatus	Eastern Osprey	**V**		Utilises the estuarine habitat. No roost trees or nests present within subject sites.	1375 and 1378

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

6.2.2.3. Priority Weeds and Weeds of National Environmental Significance (WoNS)

The *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*. 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.

A total of five exotic species were recorded during floristic surveys within the Impact area. These include three species which are listed as a Priority Weeds under the *Biosecurity Act 2015* for the North Coast Region (LLS 2017). One of these species are also identified as Weeds of National Significance (WoNS). The Priority Weeds present, their management class and whether they are a WoNS is presented in Table 6-3.

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

Scientific Name	Common Name	Priority Weed Objective	WoNS	Site
Lantana camara	Lantana[1, 4]	State - Asset protection	Yes	1378
Cinnamomum camphora	Camphor laurel[3]	Regional- Asset protection	No	1378 and 1375
Erythrina crista-galli	Cockspur Coral Tree	Regional – Asset protection	No	1375

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.

6.2.3. Impact Assessment

6.2.3.1. Removal of vegetation

The total footprint (i.e., the subject site) of the proposed works is 0.2379 ha. The area of direct impact to vegetation and habitat types amounts to 0.1261 ha of native and exotic dominated forest/shrubland vegetation at sites 1378 and 1378, and 0.1118 ha of exotic grassland at the laydown areas. No HBTs or large woody debris are present within terrestrial vegetation in the subject sites.

Table 6-3: Vegetation and habitat within the subject sites

Site #	Vegetation type	Status	Habitat type	Area impacted (ha)
1375	Exotic	Exotic/Not listed	Forest/shrubland	0.0147
1378	Exotic	Exotic/Not listed	Forest/shrubland	0.1114
Mylestom Laydown 1	Exotic grassland	Exotic/Not listed	Grassland	0.0394
Mylestom Laydown 2	Exotic grassland	Exotic/Not listed	Grassland	0.0366
Valery Laydown	Exotic grassland	Exotic/Not listed	Grassland	0.0358
	Total			**0.2379**

6.2.3.2. Threatened ecological Communities

No vegetation within the subject site corresponded to a Commonwealth EPBC Act or NSW BC Act listed TEC. Therefore, no impacts to TECs are expected to occur as a result of the Proposed Works.

6.2.3.3. Threatened flora

Tests of Significance were not conducted as no threatened flora species were considered likely to occur within the impact area and potentially be affected by the Proposed Works.

6.2.3.4. Threatened fauna

No threatened species were identified within the subject sites during the site inspection. Two threatened fauna species were identified in the likelihood of occurrence assessment (Appendix B) as having potential to utilise the subject sites on occasion - White-bellied Sea-Eagle and Eastern Osprey, both listed as Vulnerable under the BC Act. These species are raptors with large home ranges that utilise estuarine habitat. No nests or significant perching habitat was identified within the subject sites and these species are considered likely to fly over and forage nearby to the subject sites as part of larger home ranges. Tests of Significance were conducted for these species (Appendix C) and based on these assessments the proposed activity is considered unlikely to result in significant impacts.

6.2.3.5. 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 subject site.
- 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 Plan and 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 subject site.

6.2.4. Mitigation Measures

Mitigation measures to address these potential impacts are outlined in Table 6-4. 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 6-4: 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. • The removal of hollow-bearing trees is to be supervised by a suitably qualified and vaccinated person for the purpose of rescuing any displaced fauna and placing in care any fauna injured in the removal operations. Where

Reference	Environmental Aspect	Mitigation Measures
		possible, hollows should be inspected prior to removal to determine if they are occupied and determine the best practicable way to minimise any impacts to any fauna present. • Nest boxes are to replace the loss of hollows at a ratio of at least 2:1 (two (2) nest boxes installed for each hollow removed). • 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 Council 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

A brief site visit was conducted to assess the condition of the river and identify any potential habitat for threatened aquatic fauna listed under the FM Act or EPBC Act. Potential impacts have been identified and mitigation measures recommended.

The proposed works involve the reconstruction of Keevers Road along the banks of the Bellinger River, identified as KFH by DPI Fisheries.

6.3.1. Methods

The assessment involved 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 from the bank was completed by Principal Botanist Lachlan Copeland and Environmental Scientist Caitlin Orr on 23 November 2021 and on 4 December 2021. No fish were observed during the field survey, although young mangroves were seen growing sparsely along most of the bank. A second field survey was completed by Eliza Biggs on 12 February 2022. No fish were observed during the field

survey, although young mangroves were seen growing sparsely along most of the bank within the impact area.

6.3.2. Existing Environment

The proposed works interferes with the edge of one tidal watercourse identified on the 1:25,000 topographic mapping, the Bellinger River, a 7th order Strahler stream and KFH (Figure 6-13). 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 on 8 January 2022. The centre of the channel adjacent to the impact area is identified as 'Mineral and Resource Land' (sand mining). A summary of watercourse and aquatic habitat condition is presented in Table 6-5 with representative photos in Figure 6-14 and Figure 6-15 and KFH types in Figure 6-13.

Table 6-5: 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 220m 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 poor juvenile *Aegiceras corniculatum* (River Mangrove) dominant along riverbank with some *Avicennia marina* (Grey Mangrove). Attempts were made for visual search for seagrass, but the water was too turbid. Visibility was less than ten centimetres. No large woody debris was observed. Channel is suited to fish and wetland birds. Water was turbid.	Poor riparian extent and continuity. Little evidence of natural recruitment of woody natives. Species composition dominated by weeds: 5% tree cover (*Acacia* sp. and *Salix* sp.). 40% shrub cover (mostly exotic). 60% grass cover (mostly exotic).	Poor condition with unstable bank.

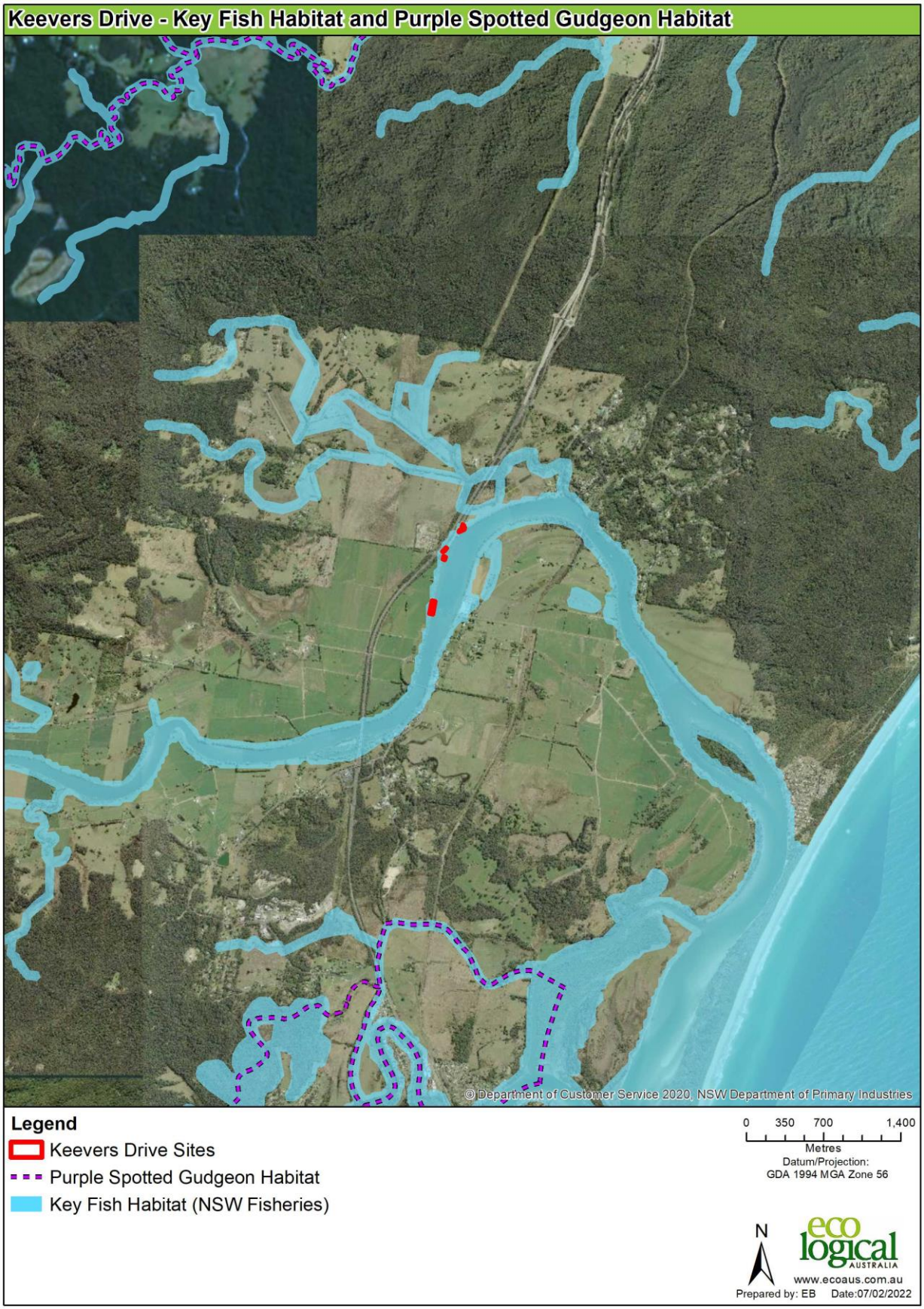

Figure 6-13: Adjacent waterway constraints – Strahler streams, Key Fish Habitat

Figure 6-14: Bank area of site 1375, facing upstream

Figure 6-15: Bank area of site 1378, facing downstream

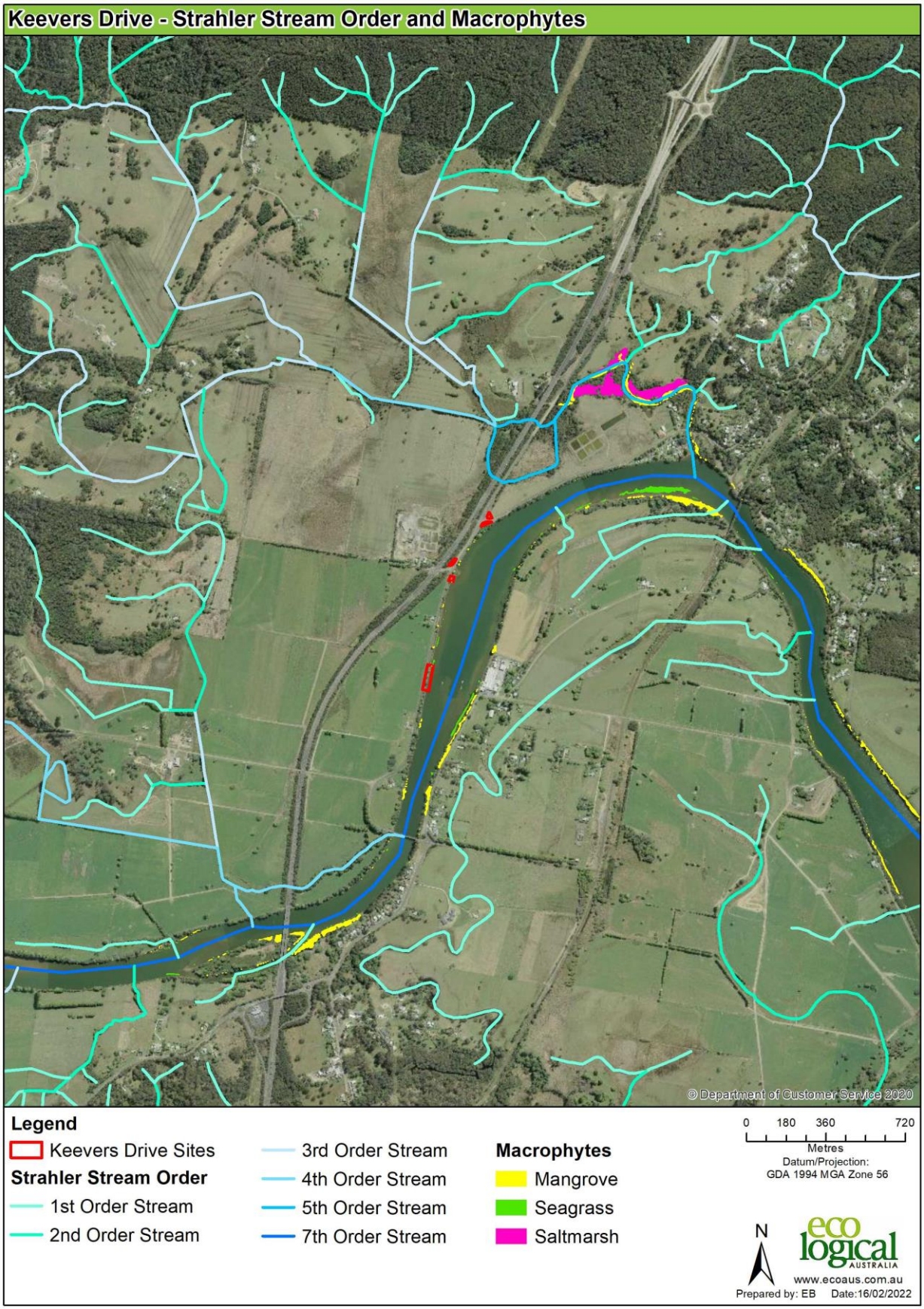

Figure 6-16: Strahler streams and macrophytes

Figure 6-17: Strahler streams and macrophytes - 1375

Figure 6-18: Strahler streams and macrophytes - 1378

6.3.2.1. 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 survey area but not in the Bellinger River tidal reach. This species does not enter tidal waters. The sites are 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 (Appendix B).

6.3.3. 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 juvenile mangroves and reclamation of sandy substrate with a rock seawall.

Indirect impacts on downstream or adjacent habitat may occur if mitigation measures are not in place and effective. 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.

- The proposed seawall 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 seawall design techniques listed in the *Environmentally Friendly Seawall Guidelines* (OEH 2009), such as the example in Figure 6-19 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

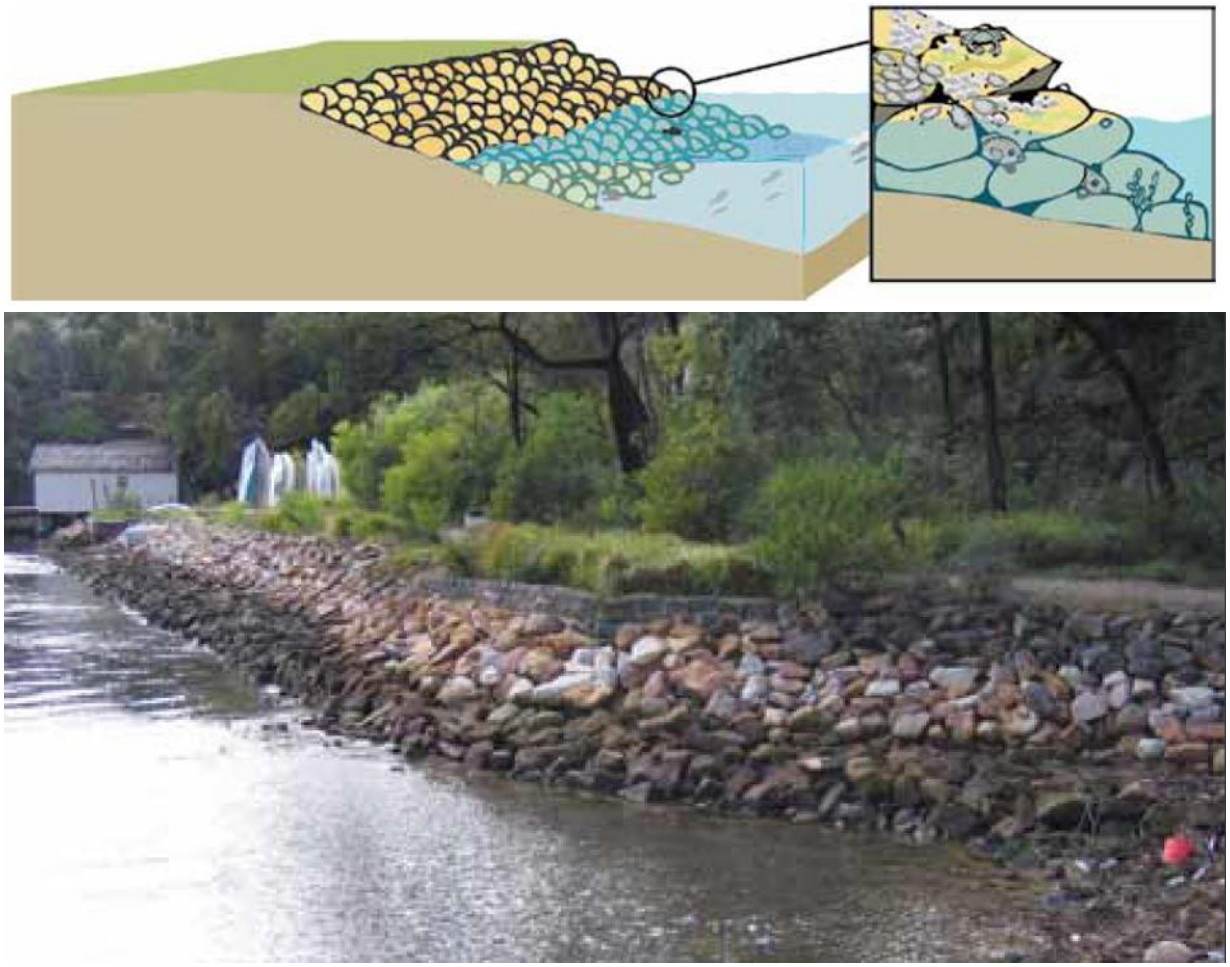

Figure 6-19: A boulder seawall with fish and other organisms utilising the crevices between the rocks as sheltered habitat (from pages 13 and 14 of the guidelines)

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.

6.3.4. Other DPI Fisheries requirements

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

Table 6-6: 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	See Section 6.3.2

DPI Requirements	Response
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).	
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).	See KFH Type map (Figure 6-13; Figure 6-16). Site 1378 includes 0.0328 ha. Includes >500 river mangroves and approximately 10 grey mangroves (some seedlings could have been greys but it's very hard to tell at current age). No other macrophyte species present. It is estimated that the length of disturbance area contains approximately 3-4 mangroves per sqm over the length of the impact area. Site 1375 includes 0.0068 ha. Includes 26 medium sized river mangroves and seven river mangrove seedlings. Fisheries portal data suggests presence of Zostera just outside the western edge of the disturbance area. It is estimated that the length of disturbance area contains approximately 3-4 mangroves per sqm over the length of the impact area. Field survey inconclusive due to turbidity, though thorough attempts were made at both high tide and low tide on 12 February 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
Recent clear colour photographs of the site at low tide. If marine vegetation is present, then these should be 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 Figure 6-14 and Figure 6-15.
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 6.3.3
Details of mitigation measures proposed to minimise impacts on the aquatic environment.	See Section 0
Consideration of threatened and protected species as listed under the *Fisheries Management Act 1994* that may	See Section 6.3.2.1

DPI Requirements	Response
be affected by the Proposed Works. Please see the DPI website for current listings – these are updatedregularly: 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.

6.3.5. Mitigation Measures

Table 6-7: Aquatic Biodiversity Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
AB1	Fish Passage - maintain and/or enhance	• Replacement banks should be designed and constructed in accordance with the national guidelines entitled 'Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings' (Fairfull and Witheridge 2003). Gaps between rocks must not be filled. Sedimentation buoys must be removed as soon as practicable. • Works should be constructed perpendicular to the flow of the water. • Works should not increase stream velocity or lead to significant reductions in water depth. • Minimise bank erosion control measures that reduce aquatic habitat values or prevent the growth of vegetation on the banks. • The timing of works should coincide with low flow periods, if possible.
AB2	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 along the waterway. Install a floating boom with a silt curtain to capture fine material. • Stabilise exposed banks and earthworks to prevent erosion before rock or vegetation is established. This will include placing geofabric on bare soil beneath rock and may include jute matting on proposed planting areas. • Avoid using contaminated fill and waste material (tyres, building rubble, etc) near waterways.
AB3	Direct impacts on aquatic fauna – dewatering	• If dewatering of area is required, engage a qualified aquatic ecologist to relocate fish and other aquatic fauna upstream.

Reference	Environmental Aspect	Mitigation Measures
AB4	Impacts on aquatic flora and fauna – general measures	• No extraction of water from the river for dust suppression or construction purposes. • All temporary works, in-stream sediment control barriers must be removed as soon as practicable and in a manner that does not promote future channel erosion. • Install silt curtain in a way that does not drag across or impact seagrass beds. • Time works for clam weather and manageable tides. • Ensure machinery does not transport weed to the site.
AB4	Offsetting impacts	• Overall there would be little direct or indirect impact to biodiversity caused by construction machinery if best practice environmental management procedures are in place and effective. In accordance with compensation calculations mangrove vegetation will be compensated at $102 per m^2 of disturbance.

6.4. Hydrology and Water Quality

6.4.1. Existing Environment

The Proposed Works interferes with one watercourse identified on the 1:25,000 topographic mapping (Figure 6-13 above); the Bellinger River, a 7th order Strahler stream (Strahler, 1957).

6.4.1.1. Water Quality

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 10m and 20m 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 proposed works have the potential to occur during the construction phase within the subject sites 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.
- 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 and potential ASS exposure.

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 Proposed Works 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 Proposed Works 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 Proposed Works are likely to have a beneficial impact on water quality.

The Proposed Works 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 6-8: 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.

Reference	Environmental Aspect	Mitigation Measures
		• 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 Placement of geofabric on exposed banks before vegetation is established (and beneath rock) o Jute matting on proposed planting areas 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 during construction	• A Flood Contingency Plan would be developed to manage the potential impacts of flooding on the construction site.
HWQ4	Loss of construction and domestic waste	• General solid waste to be collected and disposed of at Council Waste Transfer facilities. • Onsite portable toilets to be maintained and waste collected and properly disposed of by licensed contractor.
HWQ5	General	• Ensure chemically inert rock used for bank stabilisation are keyed into the channel bed and stable areas of the bank to prevent future erosion. • The acid sulphate soils management plan, must include adequate controls to manage the site during all types of rain events. • 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 as set out in 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).

This due diligence process 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)
- 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 6-9).
- 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.
- 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 Sites are located with the Coffs Harbour and District Local Aboriginal Land Council area.

6.5.1. Existing Environment

A 'Basic Search' of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken by ELA Archaeologist Matt Elsley on 1/12/21 for the Proposed Works region with a 5 km buffer (Search ID #643776) (Figure 6-20). 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 sites (Table 6-9).

Table 6-9: AHIMS Heritage sites within 5km of Keevers Damage Sites

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%**

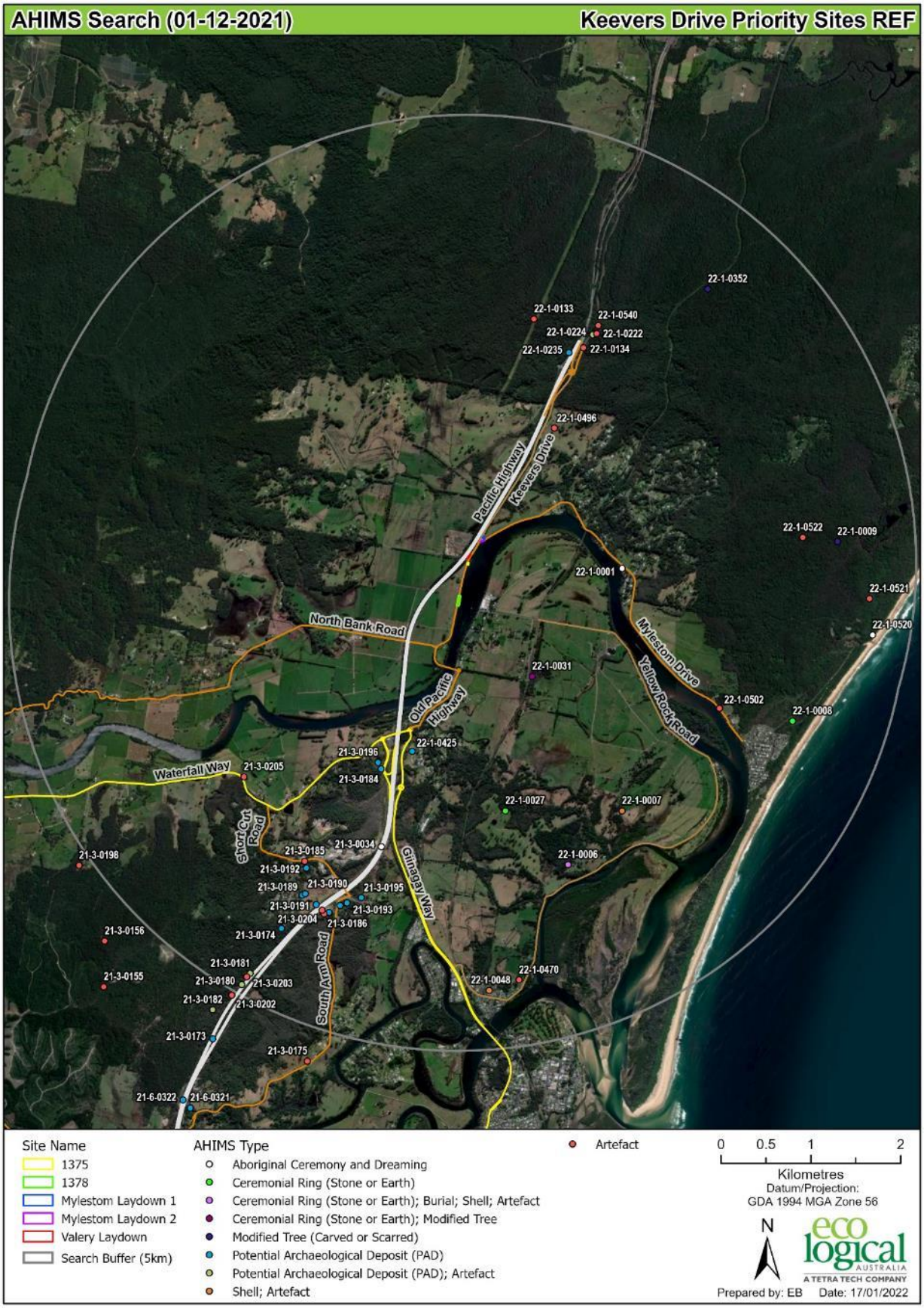

Figure 6-20: AHIMS Sites within 5km (Search ID #643776)

The following heritage registers were accessed on 19 November 2021 for Indigenous and non-indigenous historic places within the Bellingen LGA:

- **The State Heritage Register (NSW Heritage Office):** Contains no places within 5 km of the sites.
- **Bellingen LEP:** No Aboriginal Heritage sites are identified (EPI Geodatabase).
- **The World Heritage List:** Nil within 5 km of Keevers Drive sites.
- **Commonwealth Heritage List (Australian Heritage Council):** Nil related to Aboriginal heritage.
- **The National Heritage List (Australian Heritage Council**): Nil related to Aboriginal heritage.

The subject sites are 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" (see Section 6.1 above). Significant areas of relatively undisturbed vegetation, making up Bongil National Park, are present to the north and west of the subject sites, though are approximately 2 km away at the closest point. While the Subject Sites are 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 sites are 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 sites it is likely that if a large archaeological site was present the sites 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.

6.5.2. 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 sites are located.

It is unlikely that the works proposed within the subject sites 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 Subject site, then:

Table 6-10: 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 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.

Although it is unlikely that Aboriginal Human Remains will be located at any stage during earthworks within the Subject site, 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 (Urunga), the Coffs Harbour and District 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.

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)
- 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.
- 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 Sites.

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

6.6.2. Impact Assessment

The Proposed Works do 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 Subject Site at the Valery Road intersection. However, the farm is only partially visible from Keevers Road and the Proposed Works 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 Butterfactory. 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.

Figure 6-21: Historic Heritage 500m buffer

6.6.3. Mitigation Measures

Table 6-11: 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 both sites. Existing noise sources in the general vicinity include current vehicle movements on Keevers Drive, the Pacific Highway, the busy Bellinger River estuary, 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 Proposed Works 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 Road are likely to be the closest sensitive receivers during the proposed works. The closest residential property is located about 700 m from the subject site. 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 proposed works.

The NSW 'Interim Construction Noise Guideline' (ICNG, Department of Environment and Climate Change, 2009) sets out the Noise Management Level (NML) for residences (**Table 6-12**). 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 6-12: 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 Proposed Works 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:

1. Excavators / graders
2. Compactors
3. Vibratory rollers
4. Truck traffic.

The above equipment would generally operate no closer than about 100 m from the closest receiver during work, Keevers Drive (also receiver is within 115m of the Pacific Highway). 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 6-13: 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 impact area is in located in a rural area. While the air quality in the locality would be generally expected to be of good quality, some industrial and 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.

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
- Aeolian 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 local residents is low given the short-term duration of the Proposed Works and the proximity of the closest receivers. Proposed mitigation measures to reduce this impact further are set out in Section 5.8.3.

6.8.2.2. Operation

The Proposed Works 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 6-14: Air Quality and Odour Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
AQO1	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.
AQO2	Erosion and sedimentation from exposed soils	• Refer to relevant measures is Section 7.1.4.
AQO3	Greenhouse Gas Emissions	• Equipment will be switched off when not required • Vehicles and equipment will be properly maintained • No matter of any kind is to be burnt.

6.9. Traffic and Safety

6.9.1. Existing Environment

The road network near the subject site Keevers Drive which connects Raleigh in the south and Repton in the north. Keevers Drive is Council controlled and is used predominantly by local rural residents, commuters and holiday makers. Presently, heavy 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 Proposed Works on community safety will be positive. The proposed works will enhance the road network, improving road safety and allowing heavy vehicles currently restricted in using the road.

Community safety gains associated with the Proposed Works relate primarily to the upgrading of the road as well as a reduction in the risk associated with failure of existing banks at the waterway edges.

More specifically, the works will provide safer road shoulder and protection to road infrastructure during flood events.

6.9.3. Mitigation Measures

Table 6-15: 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 Proposed Works. • Ensure all workers adhere to relevant OH&S standards and provide workers compensation insurance. • Construction traffic movements associated with the Proposed Works will be kept to the minimum necessary to efficiently and safely implement the Proposed Works. • Traffic impacts in association with the Proposed Works 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 and water (Bellinger River) landscape with scenic values typical for much of the Raleigh/Repton area and other adjacent rural areas. Much of the vegetation in the wider landscape has been cleared and exotic vegetation species associated with agriculture and pastoral cultivation have been introduced. The subject site itself is characterised by the existing sealed Keevers Drive and adjacent road reserves of the Pacific Highway.

6.10.2. Impact Assessment

6.10.2.1. Construction

Proposed works have the potential to result in a minor decline in visual amenity of the subject site 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.

6.10.2.2. Operational

Proposed works 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 river 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 within rock armour and upper bank protection.

6.10.3. Mitigation Measures

Table 6-16: Visual Amenity and Landscape Mitigation Measures

Reference	Environmental Aspect	Mitigation Measures
VAL1	Construction stage decline in 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.
VAL2	Operational decline in visual amenity	• Design should incorporate soft approaches to rehabilitation of construction footprint as follows: • Removal of rubbish, debris, old fencing in watercourses. • Revegetation of roadside batters depending on slope and rock placement. • Native revegetation of disturbed banks and areas exposed around new infrastructure.

Reference	Environmental Aspect	Mitigation Measures
		• Where soft approaches are not adequate in providing stabilisation, it is recommended that a combined approach be considered i.e., pocket planting within rock armouring. • Adopting the recommendations of the Aquatic and Terrestrial Biodiversity sections will naturally result in improved visual amenity.

6.11. Socio Economic

6.11.1. Existing Environment

Whilst the population of the rural area between Raleigh and Repton 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. It is also known that Keevers Drive is used intermittently by holiday makers travelling to and from the coast, with traffic volume increasing during the summer peak and during holiday periods. Furthermore, whilst the road has the potential to provide a useful freight link, freight users are currently restricted due to the current condition of the road, using alternative routes.

6.11.2. Impact Assessment

6.11.2.1. Construction

The proposed road upgrade 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 as well as ad hoc visitation to local businesses by Proposed Works employees and site personnel.

6.11.2.2. Operational

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 Council and ratepayers – the existing pavement is un-safe, and banks of the Bellinger River are near collapse and therefore, current maintenance costs are high.

6.11.3. Mitigation Measures

Table 6-17: Socio-economic

Reference	Environmental Aspect	Mitigation Measures
SE1	Traffic delays	• The proposed works should be undertaken outside of the peak summer season and holiday periods. • Undertake early community engagement, early notification / advertisement of construction period through both local and regional channels. • Development of a Traffic Management Plan.

6.12. Energy and Climate Change

6.12.1. 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.

6.12.2. Mitigation Measures

Table 6-18: 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.

6.13. Waste Management and Resource Use

6.13.1. Existing Environment

No significant sources of waste are present within the impact area. Some wastes may exist in the surrounding area associated with industrial activities. Water may also have been lost due to seepage from the existing pipelines where they have degraded.

6.13.2. Impact assessment

6.13.2.1. Construction

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

- Existing road surface (i.e., asphalt)
- Existing drainage infrastructure (i.e., concrete)
- Construction packaging materials
- Domestic waste
- Excess spoil from earthworks

- Vegetation waste form clearing of vegetation
- 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.

6.13.2.2. Operation

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. Maintenance activities and appropriate design considerations will minimise the risk of stormwater drain failure.

The heavy vehicle rest area may result in an increase in domestic waste that can be mitigated by the presence of and regular emptying of waste bins and servicing of facilities.

6.13.3. Mitigation Measures

Table 6-19: 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. • 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 the amenities waste bins. • Regular emptying of the amenities waste bins. • Implementation of waste management strategy documented within the CEMP.

6.14. Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the following Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the Proposed Works should be referred to the Australian Government Department of the Environment. Table 6-20 addresses the MNES for the Proposed Works.

Table 6-20: Consideration of Matters of National Environmental Significance

MNES	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 (refer to Section 6.2)
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

6.15. Clause 228 of the *Environmental Planning and Assessment Regulation*

Clause 228 of the EP&A Regulation 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 6-21 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 6-21: Infrastructure SEPP consultation requirements

Clause 228 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. Council 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 proposed works involve 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 Proposed Works include minor vegetation removal, predominantly exotic vegetation. Impacts on local terrestrial ecosystems are expected

Clause 228 Factors		Impact
		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 Proposed Works 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.
(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 sulphate soils and proposed excavation works. An acid sulphate soils management plan should be developed to reduce this environmental risk. Long-term, the result of the Proposed Works 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.

Clause 228 Factors		Impact
(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 sulphate soils management plan would address potential pollution through the exposure of acid sulphate 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 Proposed Works 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 Proposed Works 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, see Section 0 for further details.

7. Summary of Environmental Mitigation

General environmental mitigation measures for the Proposed Works 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 Proposed Works 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 Council'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 Proposed Works 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.

	Reasons	Safeguards/Mitigation Measures
		• 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 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 Proposed Works 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 Council and/or EPA. • Develop and implement an Acid Sulphate Management Plan (ASSMP). • Acid sulphate soils uncovered during works must be treated in accordance with an Acid Sulphate Management Plan (ASSMP). • Keep soil wet during excavation to avoid unintended exposure of acid sulphate soils. • All soils should be removed from the site and disposed of at a licenced waste facility and not re-used on-site.
GS3	Soil contamination resulting from accidental spills	• A site-specific emergency spill plan will be developed.
GS4	Rehabilitation of disturbed areas	• A rehabilitation plan would be prepared for all areas disturbed by Proposed Works construction and would include the following: o 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. o Include monitoring to meet clear targets, regarding vegetation establishment and stabilisation of bare areas of soil.

	Reasons	Safeguards/Mitigation Measures
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. • The removal of hollow-bearing trees is to be supervised by a suitably qualified and vaccinated person for the purpose of rescuing any displaced fauna and placing in care any fauna injured in the removal operations. Where possible, hollows should be inspected prior to removal to determine if they are occupied and determine the best practicable way to minimise any impacts to any fauna present. • Nest boxes are to replace the loss of hollows at a ratio of at least 2:1 (two (2) nest boxes installed for each hollow removed). • 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 Council 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	Fish Passage - maintain and/or enhance	• Replacement banks should be designed and constructed in accordance with the national guidelines entitled 'Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings' (Fairfull and Witheridge 2003). Gaps between rocks must not be filled. Sedimentation buoys must be removed as soon as practicable.

	Reasons	Safeguards/Mitigation Measures
		• Works should be constructed perpendicular to the flow of the water. • Works should not increase stream velocity or lead to significant reductions in water depth. • Minimise bank erosion control measures that reduce aquatic habitat values or prevent the growth of vegetation on the banks. • The timing of works should coincide with low flow periods, if possible.
AB2	• 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 along the waterway. Install a floating boom with a silt curtain to capture fine material. • Stabilise exposed banks and earthworks to prevent erosion before rock or vegetation is established. This will include placing geofabric on bare soil beneath rock and may include jute matting on proposed planting areas. • Avoid using contaminated fill and waste material (tyres, building rubble, etc) near waterways.
AB3	• Direct impacts on aquatic fauna – dewatering	• If dewatering of area is required, engage a qualified aquatic ecologist to relocate fish and other aquatic fauna upstream.
AB4	• Impacts on aquatic flora and fauna – general measures	• No extraction of water from the river for dust suppression or construction purposes. • All temporary works, in-stream sediment control barriers must be removed as soon as practicable and in a manner that does not promote future channel erosion. • Install silt curtain in a way that does not drag across or impact seagrass beds. • Time works for clam weather and manageable tides. • Ensure machinery does not transport weed to the site.
AB4	• Offsetting impacts	• Overall there would be little direct or indirect impact to biodiversity caused by construction machinery if best practice environmental management procedures are in place and effective. In accordance with compensation calculations mangrove vegetation will be compensated at $102 per m^2 of disturbance.
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:

	Reasons	Safeguards/Mitigation Measures
		○ Placement of geofabric on exposed banks before vegetation is established (and beneath rock) ○ Jute matting on proposed planting areas ○ 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 ○ 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 during construction	• A Flood Contingency Plan would be developed to manage the potential impacts of flooding on the construction site.
HWQ4	Loss of construction and domestic waste	• General solid waste to be collected and disposed of at Council Waste Transfer facilities. • Onsite portable toilets to be maintained and waste collected and properly disposed of by licensed contractor.
HWQ5	General	• Ensure chemically inert rock used for bank stabilisation are keyed into the channel bed and stable areas of the bank to prevent future erosion. • The acid sulphate soils management plan, must include adequate controls to manage the site during all types of rain events. • Cease work and stabilise the site when there is a medium/high rainfall event expected.
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

	Reasons	Safeguards/Mitigation Measures
		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		
AQO1	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.
AQO2	Erosion and sedimentation from exposed soils	• Refer to relevant measures is Section 7.1.4.

	Reasons	Safeguards/Mitigation Measures
AQO3	Greenhouse Gas Emissions	• Equipment will be switched off when not required • Vehicles and equipment will be properly maintained • No 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 Proposed Works. • Ensure all workers adhere to relevant OH&S standards and provide workers compensation insurance. • Construction traffic movements associated with the Proposed Works will be kept to the minimum necessary to efficiently and safely implement the Proposed Works. • Traffic impacts in association with the Proposed Works 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 decline in 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.
VAL2	Operational decline in visual amenity	• Design should incorporate soft approaches to rehabilitation of construction footprint as follows: • Removal of rubbish, debris, old fencing in watercourses • Revegetation of roadside batters depending on slope and rock placement • Native revegetation of disturbed banks and areas exposed around new infrastructure • Where soft approaches are not adequate in providing stabilisation, it is recommended that a combined approach be considered i.e., pocket planting within rock armouring. • Adopting the recommendations of the Aquatic and Terrestrial Biodiversity sections will naturally result in improved visual amenity.
Socio Economic		
SE1	Traffic delays	• The Proposed Works should be undertaken outside of the peak summer season and holiday periods. • Undertake early community engagement, early notification / advertisement of construction period through both local and regional channels. • Development of a Traffic Management Plan.
Energy and Climate Change		

	Reasons	Safeguards/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.
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 the amenities waste bins. • Regular emptying of the amenities waste bins. • Implementation of waste management strategy documented within the CEMP.

8. Conclusion

This REF has identified and assessed the potential impacts of the Proposed Works to reconstruct two sections of Keevers Drive and banks of the Bellinger River. The long-term operational impacts of the Proposed Works are 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 Proposed Works 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.

Key Fish Habitat is mapped within the subject site, specific recommendations have been provided in relation to the protection of aquatic biodiversity and fish passage and habitat through appropriate design of infrastructure. An application to the DPI for a permit under Part 7 of the FMA will be required.

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 Proposed Works 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. An Acid Sulphate Management Plan will also be prepared and implemented for the Proposed Works.

9. Certification, Review and Decision

This Review of Environmental Factors provides a true and fair review of the Proposed Works 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 as a result of the Proposed Works. It identifies the likely impacts of the Proposed Works on the environment and details the environmental safeguards/mitigation measures and mitigation measures to be implemented to minimise the potential impact to the environment. Considering the above assessment of the Proposed Works, 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.

Proposed Works Name	Keevers Drive and Bellinger Riverbank Upgrade
Project Manager Konrad Grinlaubs Eco Logical Australia Newcastle NSW	
Project Director Andrew Walsh Eco Logical Australia Coffs Harbour NSW	

9.1. Determiner Declaration and Approval

I have reviewed the document and consider that the Proposed Works (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.

Proposed Works Name	Keevers Drive and Bellinger Riverbank Upgrade
Role: Name: Company: Address: Phone Number:	
Role: Name: Company: Address: Phone Number:	

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Appendix A – Species List – Terrestrial Flora

Scientific Name	Common Name	Exotic (*) & Weed of National Significance (WoNS)
	SITE 1375	
Cinnamomum camphora	Camphor Laurel	*
Erythrina crista-galli	Cockspur Coral Tree	*
Senna pendula	Easter Cassia	*
Chloris gayana	Rhodes Grass	*
Phragmites australis	Common Reed	
	SITE 1378	
Casuarina glauca	Swamp Oak	
Cinnamomum camphora	Camphor Laurel	
Chloris gayana	Rhodes Grass	*
Guioa semiglauca	Guioa	
Lantana camara	Lantana	* WoNS
Phragmites australis	Common Reed	
Pittosporum undulatum	Sweet Pittosporum	
Solanum mauritianum	Tobacco Bush	*

Appendix B – 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 10-1: Likelihood of occurrence table for threatened ecological communities

Ecological Community	BC Status	EPBC Status	Description	Likelihood of Occurrence	Impact Assessment Required
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.	No – this community does not occur within the subject site.	No
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 10-2: Likelihood of occurrence table for threatened fauna within 5km of impact area

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
Aves									
Actitis hypoleucos	Common Sandpiper		M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland.	Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	Unlikely	No suitable habitat is present within Impact Area.	No
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).	0	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.	0	Unlikely	No suitable habitat is present within Impact Area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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).	0	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 and east Lower Western Regions.	Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	0	No	No suitable habitat is present within Impact Area.	No
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.	0	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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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 small population in the Riverina.	Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	92	Unlikely	Likely to utilise vegetation nearby the impact area, no suitable habitat within the impact area.	No
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.	0	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.	0	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	4	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.	26	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.	0	Unlikely	No suitable habitat within the impact area.	No
Esacus magnirostris	Beach Stone-curlew	E		Across northern and north-eastern Australia, south to the Manning River in north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria.	Exclusively along the coast, on beaches, islands, reefs and in estuaries, and edges of or near mangroves.	0	Unlikely	Thin line of mangroves is present along riverbank, low quality habitat.	No
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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	9	Unlikely	Known to be within the area and may utilise nearby roadside vegetation. No Eucalypt foraging habitat within subject sites.	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.	0	No	No suitable habitat within the impact area.	No
Grus rubicunda	Brolga	V		Sparsely distributed across the southern part of its range, which includes central NSW to western Victoria.	Open wetlands, grassy plains, coastal mudflats and irrigated croplands and, on the coast, mangrove-studded creeks and estuaries.	1	Unlikely	Thin line of mangroves is present along riverbank, low quality habitat.	No
Haematopus fuliginosus	Sooty Oystercatcher	V		Distributed along the entire NSW coast.	Rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	0	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.	0	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	2	Potential	Known to utilise nearby habitat and river mouth. No nests present in the subject sites or nearby. Species unlikely to rely on habitat within subject sites.	No
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.	0	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.	4	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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
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.	1	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
Limosa lapponica	Bar-tailed Godwit		M	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also, numerous scattered inland records.	Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, 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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
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.	3	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.	0	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No
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.	13	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.	0	Unlikely	Small mud flat with mangroves along edge of riverbank, not suitable habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	Unlikely	No suitable habitat within the impact area.	No
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.	3	Potential	Known to utilise nearby habitat and river mouth. No nests present in the subject sites or nearby. Species unlikely to rely on habitat within subject sites.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	31	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.	12	Unlikely	No suitable habitat within the impact area.	No
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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	Unlikely	No suitable habitat within the impact area.	No
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.	0	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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).	0	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.	0	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.	9	Unlikely	No suitable habitat within the impact area, know to utilise nearby habitat.	No
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.	15	Unlikely	No suitable habitat within the impact area, known to utilise nearby habitat.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	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.	2	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	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.	9	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	21	Unlikely	No suitable habitat within the impact area.	No
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.	11	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.	1	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.	1	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.	0	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	2	Unlikely	No suitable habitat within the impact area.	No
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.	13	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.	0	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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	9	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 several sites on the southern tablelands.	Eucalypt woodlands and forests.	147	Unlikely	No suitable habitat within the impact area. Roadside vegetation may act as a connection between nearby core koala habitat fragments.	No
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.	3	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.	1	Unlikely	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
Pseudomys novaehollandiae	New Holland Mouse		V	Fragmented distribution across eastern NSW.	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	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.	17	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 widespread on the New England Tablelands.	Woodland, moist and dry eucalypt forest and rainforest.	0	No	No suitable habitat within the impact area.	No
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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	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.	0	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.	0	No	No suitable habitat within the impact area.	No
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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EPBC Status	Distribution	Habitat	BioNet Records	Likelihood of occurrence	Justification	Impact Assessment Required
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.	0	No	No suitable subtropical rainforest habitat within the impact area.	No
Fish									
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.	0	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.	Modelled to occur in the search area	No	Requires freshwater. The site is estuarine.	No

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

Table 10-3: Likelihood of occurrence table for threatened flora within 5 km of subject site

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	BioNet Records	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.	125	Unlikely	No rainforest present within or nearby the impact area.	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.	0	No	No rainforest present within or nearby the impact area.	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.	0	Unlikely	No suitable habitat is present in Impact Area. No population confirmed to be within NSW.	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.	0	No	No rainforest or wet eucalypt forest present within or nearby the impact area.	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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	BioNet Records	Likelihood of Occurrence	Justification	Impact Assessment Required
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.	0	No	No suitable rainforest habitat within the impact area.	No
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.	436	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.	0	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.	0	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.	0	No	No suitable rainforest habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	BioNet Records	Likelihood of Occurrence	Justification	Impact Assessment Required
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.	61	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.	74	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.	55	No	No suitable rainforest habitat within the impact area.	No
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.	0	No	Disturbed habitat located within the impact area, no known populations within the region.	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.	0	No	No suitable habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	BioNet Records	Likelihood of Occurrence	Justification	Impact Assessment Required
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.	0	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.	108	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.	3	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.	0	No	No suitable rainforest habitat within the impact area.	No
Senna acclinis	Rainforest Cassia	E		Coastal districts and adjacent tablelands of NSW from the Illawarra in NSW to Qld.	Subtropical and dry rainforest.	1	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.	0	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.	0	No	No suitable grassland habitat within the impact area.	No

Scientific Name	Common Name	BC Status	EBPC Status	Distribution	Habitat	BioNet Records	Likelihood of Occurrence	Justification	Impact Assessment Required
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.	0	No	No suitable habitat within the impact area.	No

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

Appendix C – 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 B). The following threatened species are assessed below:

- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) – Vulnerable
- Eastern Osprey (*Pandion cristatus*) – Vulnerable

TESTS OF SIGNIFICANCE

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.

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 sites and therefore the Proposed 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

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.	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 0.1261 ha of riparian vegetation. This removal is considered minimal given the larger areas of habitat retained adjacent to the subject sites 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.
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 26/07/21).
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 D – 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

Appendix E – Geotechnical Assessment

Appendix F – Inter-agency consultation

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Biggs, Eliza

From: Annette Comerford <annette.comerford@dpi.nsw.gov.au>
Sent: Tuesday, 21 December 2021 3:46 PM
To: Biggs, Eliza
Subject: C21/796 RE: Enquiry on Fisheries Permits - Bellinger River

Hi Eliza,

We spoke briefly on the morning of 16 December 2021 on applying for a joint permit under s200 and s205 for dredging and reclamation works and harm to marine vegetation, but I wanted to bring to your attention our offsetting requirements for impacts to marine vegetation.

The proposal should first aim to avoid impacts to fisheries resources, particularly key fish habitats. Where impacts to key fish habitats cannot be avoided, the preference is to impact less sensitive key fish habitats over more highly sensitive key fish habitats.

Section 3.3.3.2 of the DPI Fisheries *Policy and guidelines for fish habitat conservation and management (Update 2013)* (DPI Fisheries P&G) notes that DPI Fisheries enforces a 'no net loss' habitat policy as a condition of consent, requiring proponents to conduct habitat rehabilitation and/or provide environmental compensation for all unavoidable impacts to marine vegetation.

There are several requirements for offsets which are set out in the DPI Fisheries P&G. These include: 2:1 offset to impact ratio, like for like (e.g. mangrove offset for mangrove impact etc.), similar geographic location, lasting benefits (e.g. undertaken on Crown lands, not private unless a covenant is provided).

The proponent needs to provide clear details on the impacts of the project, both permanent and temporary, and all associated mitigation measures to be employed. Then they need to determine the remaining unavoidable area of impact. Then they need to come up with an offset proposal that meets the requirements of the P&G. That will allow us to:

- assess the entire proposal,
- determine if the impacts are justifiable, and that all other options of lesser impact have been considered and that their lack of uptake has been adequately justified,
- determine if the offset is acceptable based on the P&G, and
- if all of the above checks out, issue a permit for harm to x square metres of marine vegetation with a condition stating that they must offset the impacts in accordance with their offset proposal.

Should you have any questions, please give me a call.

Regards,

Annette Comerford | Fisheries Manager - Coastal Systems (North Coast)
Aboriginal Fishing and Marine and Coastal Environments
NSW Department of Primary Industries | Fisheries
1243 Bruxner Hwy | Wollongbar | Wiyabal Country (Bundjalung Nation) | NSW 2477
T: 02 6626 1395 | M: 0418 211 843 | E: annette.comerford@dpi.nsw.gov.au

PERMIT APPLICATION FORMS & FISH HABITAT POLICIES:
www.dpi.nsw.gov.au/fishing/habitat/protecting-habitats/toolkit
Submit permit applications via email to ahp.central@dpi.nsw.gov.au
NB: From date of receipt of application, please allow:
- 21 days for s199 Consultations
- 28 days for Permits, Consultations and Land Owner's Consent responses
- 40 days for Integrated Development Applications

KNOWN & EXPECTED DISTRIBUTION OF THREATENED FISH SPECIES:
www.dpi.nsw.gov.au/fishing/threatened-species/threatened-species-distributions-in-nsw

DPI Fisheries acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

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From: Biggs, Eliza <Eliza.Biggs@ecoaus.com.au>
Sent: Tuesday, 14 December 2021 6:06 PM
To: DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>
Cc: Walsh, Andrew <Andrew.Walsh@ecoaus.com.au>; Hancock, Peter <PeterH@ecoaus.com.au>; Gleeson, Joseph <Joseph.Gleeson@ecoaus.com.au>
Subject: Enquiry on Fisheries Permits - Bellinger River
Importance: High

Hello,

We are preparing an REF for urgent repairs to road damage on Keevers Drive on the Bellinger River near Mylestom on behalf of Public Works Advisory and Bellingen Shire Council as part of an early works package.

We would appreciate your prompt advice on where s200 and s205 (or other) permits would be required for the works at the locations 1375 and 1378 mapped and pictured in the attached word document. Shannon Powell informed me (via Teams on 10/12/2021) that the works are almost certain to require a s200 permit for dredging and reclamation works, and may or may not require a s205 permit for harm to marine vegetation due to the degraded nature of the sites, though she required further information to confirm. Could both these sites be processed together permit-wise as they are located so close to each other?

Bellingen Shire Council are looking to progress with either

- Option 1b – outlined in attached email (Keevers Drive Instability – modelling); or
- Option 2 – outlined in the attached RGS report (RGS32146.1).

Please note, both options have rock treatment along the river bank.

Confirmation of the proposed treatment will occur in the coming weeks.

The Portal has mapped areas of Mangroves and Zostera (see attached document). Field survey did not locate any Zostera but did note high turbidity, in addition to extensive disturbance by the crown licenced dredging operation in that part of the river. There is a line of young grey mangroves scattered along the riverbank.

Kind regards,

Eliza Biggs
Environmental Consultant
Part-time: Monday, Tuesday, Thursday, Friday

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