# Report

## Lake Conjola Entrance Opening Review of Environmental Factors

Shoalhaven City Council

4 April 2025

### 1.1.1 Document Status

| Version | Doc type | Reviewed by | Approved by | Date issued |
|---|---|---|---|---|
| 1.0 | Report | Shireen Baguley, Christopher Beadle | Christopher Beadle | 04/12/2024 |
| 2.0 | Report | Shireen Baguley | Christopher Beadle | 02/01/2025 |
| 3.0 | Report | Shoalhaven Council, Christopher Beadle | Christopher Beadle | 29/01/2025 |
| 4.0 | Report | Christopher Beadle Georgina Barron | Christopher Beadle | 03/04/2025 |
| 5.0 | Report | Christopher Beadle | Christopher Beadle | 04/04/2025 |

### 1.1.2 Project Details

| | |
|---|---|
| **Project Name** | Lake Conjola Entrance Opening Review of Environmental Factors |
| **Client** | Shoalhaven City Council |
| **Client Project Manager** | Simon Slater |
| **Water Technology Project Manager** | Lilian De Torres |
| **Water Technology Project Director** | Steven Molino |
| **Authors** | Lilian De Torres, Caroline Weller and Courtney Smith |
| **Document Number** | 25050051_Lake Conjola Entrance Opening Review of Environmental Factors_Final_V5 |



Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150
Telephone (02) 9354 0300
ACN 093 377 283
ABN 60 093 377 283


Acknowledgement of Country
Walawaani (welcome),
Shoalhaven City Council recognises the First Peoples of the Shoalhaven and their ongoing connection to culture and country. We acknowledge Aboriginal people as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living culture and pay respects to their Elders past, present and emerging.
Walawaani njindiwan (safe journey to you all)
This acknowledgment includes Dhurga language. We recognise and understand that there are many diverse languages spoken within the Shoalhaven.

# CONTENTS

1 INTRODUCTION 7
1.1 Background 7
1.2 Purpose of this Review of Environmental Factors 7
1.3 Project Location 8
1.3.1 Site Location 8
1.4 Proposed Activities 12
1.4.1 Excavation of a pilot channel 13
1.4.2 Mechanical berm lowering 14
1.4.3 Maintenance of a dry notch 14
1.4.4 Reuse of excavated and dredged sand 15
1.5 Project Justification and Options 15
1.5.1 Lake Conjola CMP 17

2 EXISTING ENVIRONMENT 19
2.1 Estuary Profile 19
2.2 Community Values 19
2.3 Entrance Morphodynamics 20
2.3.1 ICOLL Processes 20
2.3.2 Lake Conjola Entrance Behaviour 20
2.4 Biodiversity 21
2.5 Cultural Heritage 22

3 LEGISLATIVE AND PLANNING CONTEXT 23
3.1 NSW Legislation 23
3.1.1 Environmental Planning and Assessment Act 1979 23
3.1.2 Coastal Management Act 2016 23
3.1.3 State Environmental Planning Policy (Transport & Infrastructure) 2021 23
3.1.4 State Environmental Planning Policy (Resilience and Hazards) 2021 24
3.1.5 Crown Land Management Act 2016 25
3.1.6 Water Management Act 2000 25
3.1.7 Biodiversity Conservation Act 2016 25
3.1.8 Fisheries Management Act 1994 26
3.1.9 Heritage Act 1977 26
3.1.10 National Parks and Wildlife Act 1974 26
3.1.11 Protection of the Environment Operations Act 1997 27
3.1.12 Aboriginal Land Rights Act 1983 27
3.1.13 Shoalhaven Local Environmental Plan 2014 27
3.1.14 NSW Local Government Act 1993 27
3.2 Commonwealth Legislation 27
3.2.1 Environment Protection and Biodiversity Conservation Act 1999 27
3.2.2 Native Title Act 1993 28

4 CONSULTATION 29
4.1 Agency Consultations 29
4.2 Community Consultation 30
5 ASSESSMENT OF ENVIRONMENTAL FACTORS 31
6 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES 37
6.1 Topography, Geology and Soils 37
6.1.1 Acid Sulfate Soils and Erosions 37
6.1.2 Impact Assessment 37
6.1.3 Mitigation Measures 38
6.2 Hydrology and Water Quality 39
6.2.1 Estuarine Water Quality 39
6.2.2 Flooding 41
6.2.3 Surface Water 41
6.2.4 Groundwater 41
6.2.5 Impact Assessment 42
6.2.6 Mitigation Measures 42
6.3 Coastal Processes 43
6.3.1 Entrance Berm Behaviour 43
6.3.2 Water Level Impacts 45
6.3.3 Sand Nourishment 45
6.3.4 Overall Coastal Process Impacts 45
6.4 Biodiversity 46
6.4.1 Field Assessment 46
6.4.2 Terrestrial Flora 48
6.4.3 Aquatic Flora 50
6.4.4 Terrestrial Fauna 50
6.4.5 Habitat 51
6.4.6 Aquatic Fauna 54
6.4.7 Results 54
6.5 Heritage 63
6.5.1 Impact Assessment 67
6.5.2 Mitigation Measures 67
6.6 Noise and Vibration 68
6.6.1 Impact Assessment 68
6.6.2 Mitigation Measures 69
6.7 Air Quality 69
6.7.1 Impact Assessment 69
6.7.2 Mitigation Measures 70
6.8 Waste and Hazardous Materials 70
6.8.1 Impact Assessment 70
6.8.2 Mitigation Measures 71
6.9 Traffic and Access 71
6.9.1 Impact Assessment 72

6.9.2 Mitigation Measures 72
6.10 Visual Amenity 73
6.10.1 Impact Assessment 73
6.10.2 Mitigation Measures 73
6.11 Socio Economic 74
6.11.1 Impact Assessment 74
6.11.2 Mitigation Measures 74

7 DETERMINATION AND RECOMMENDATIONS 75
7.1 Summary of Findings 75
7.2 Entrance Management Policy (EMP) 76
7.3 Coastal Management Program (CMP) 76
7.4 Determination 77

REFERENCES 78

## APPENDICES

Appendix A Site photos
Appendix B Likelihood Of Occurrence
Appendix C Agency Consultation
Appendix D Protected Matters Search
Appendix E Test of Significance BC Act
Appendix F Test Of Significance Fisheries Act

## LIST OF FIGURES

Figure 1-1 Site location with indicative zones of proposed activities (Map 1 of 2) 9
Figure 1-2 Site location with indicative zones of proposed activities (Map 2 of 2) 10
Figure 1-3 Land zoning map 11
Figure 1-4 Lake Conjola Entrance Management Policy (2025 Decision Making Flow Chart (Draft EMP) 13
Figure 1-5 Dry notch configuration 15
Figure 6-1 Beach Profiles 44
Figure 6-2 Biodiversity values within Lake Conjola 47
Figure 6-3 Threatened Species Map within Lake Conjola 53
Figure 6-4 Plant community type within Lake Conjola 58
Figure 6-5 Bitou Bush WONS weed amongst acacias 58
Figure 6-6 Sooty Oystercatcher observed on site 59
Figure 6-7 Example of a smaller fenced off nesting zone with ideal cover for the baby chicks 59
Figure 6-8 Pilot channel to be developed in close proximity to the fenced off nesting zones in the background as seen by the white signage dots 60
Figure 6-9 AHIMS search at Lot 7022 DP 1031073 with the buffer of 50 metres 64
Figure 6-10 AHIMS search at Lot 7006 DP 1031131 with the buffer of 50 metres 65
Figure 6-11 Cultural heritage map 66

# LIST OF TABLES

Table 1-1 Site location and potential activities 12
Table 2-1 Estuary Profile 19
Table 5-1 Assessment of section 171 (EP&A Regulation) environmental factors 31
Table 6-1 Impact assessment checklist for topography, geology and soils 37
Table 6-2 Mitigation measures for topography, geology and soils 38
Table 6-3 Lake Conjola Ecosystem Health Water Quality Ratings 40
Table 6-4 Impact assessment checklist for water quality and hydrology 42
Table 6-5 Mitigation measures for water quality and hydrology 42
Table 6-6 Maximum berm height for each profile (mAHD). Green shading indicates a higher berm level, whilst red shading indicates a lower berm level. 44
Table 6-7 Impact assessment checklist for coastal processes 45
Table 6-8 Mitigation measures for coastal processes 46
Table 6-9 Native Flora List 49
Table 6-10 Exotic Flora List 50
Table 6-11 Comprehensive Fauna List 50
Table 6-12 Habitat and/or Potential Habitat List 52
Table 6-13 Impact assessment checklist for biodiversity 60
Table 6-14 Mitigation measures associated with biodiversity 61
Table 6-15 Heritage items and heritage conservation areas listed within Shoalhaven LEP 2014 65
Table 6-16 Impact assessment checklist for heritage 67
Table 6-17 Mitigation measures for heritage 67
Table 6-18 Impact assessment checklist for noise and vibration 68
Table 6-19 Mitigation measures for noise and vibration 69
Table 6-20 Impact assessment checklist for air quality 69
Table 6-21 Mitigation measures for air quality 70
Table 6-22 Impact assessment checklist for waste and hazardous materials 70
Table 6-23 Mitigation measures for waste and hazardous materials 71
Table 6-24- Impact assessment checklist for traffic and access 72
Table 6-25 Mitigation measures for traffic and transport 72
Table 6-26 Mitigation measures for visual amenity 73
Table 6-27 Impact assessment checklist for Socio- economic factors 74
Table 6-28 Mitigation measures for socio-economic factors 74

# 1 INTRODUCTION

## 1.1 Background

The Lake Conjola entrance, within the Shoalhaven Local Government Area (LGA), is considered to be the entrance of an intermittently closed and open lake and lagoon (ICOLL). The entrance intermittently closes due to an interplay of lake, tide, and coastal processes and opens naturally during rainfall events. Mechanical opening of the entrance is also occasionally required to assist in reducing the frequency and magnitude of nuisance flooding impacts on low lying areas. Shoalhaven City Council (Council) currently manages the entrance in accordance with the *Lake Conjola Interim Entrance Management Policy (2013)* and *Crown Land Licence* (2021). However, through the development of the Lake Conjola Coastal Management Program (CMP), a revised Draft Lake Conjola Entrance Management Policy 2025 (EMP) has been developed to reflect best practice entrance management approaches, improved understanding of lake dynamics and statutory guidance and requirements for entrance management. This Review of Environmental Factors (REF) is a requirement of Part 5 of the *Environmental Planning and Assessment Act 1979 (*EP&A Act) and supports the revised draft EMP towards the application for a new NSW Crown Lands licence. This REF will be reviewed by the Department of Planning Housing and Infrastructure (DPHI) Crown Lands to assess the impacts to Crown lands and the effectiveness of mitigation strategies which will inform special conditions that may be included into the new Crown Land licence.

The Lake Conjola entrance area is of high environmental significance, being an important site for migratory wading birds and nesting shorebirds. The area also provides significant cultural, aesthetic, commercial (such as oyster farming and tourism), cultural, and recreational values for residents and visitors. Entrance management activities need to consider these values and sensitivities and assess impacts on these through this REF. This document serves as the REF which outlines the potential impacts of implementing the revised Draft EMP (2025) on the estuary environments and details the mitigation measures to be adopted to minimise potential impacts in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act), Part 5 when performing entrance management activities.

As the entrance is located on NSW Crown Lands, Council is only currently permitted to mechanically open the lake entrance in accordance with the levels and conditions contained within the 2013 EMP and the current Crown Land Licence (2021). Council applies for a licence under the *Crown Lands Management Act 2016* every five to ten years to undertake entrance management actions in accordance with Council's adopted EMP. This REF will assess the entrance management activities proposed in the updated draft EMP.

Council's Draft EMP (2025) reflects an entrance management approach that involves maintenance of a dry notch, mechanical berm lowering, excavation of a pilot channel when water level triggers levels are met, and reuse of excavated and dredged sand (where practicable). The primary objective of the Draft EMP (2025) is to reduce nuisance flooding impacts on low lying areas within the catchment, especially within the Lake Conjola township.

## 1.2 Purpose of this Review of Environmental Factors

The primary purpose of this project is to conduct a review of environmental factors of the entrance management activities proposed in the Draft Lake Conjola EMP (2025), to satisfy the requirements under part 5 of the EP&A Act and consider the impacts of these activities under current relevant legislation and policies including the *Coastal Management Act 2016*, along with the Lake Conjola CMP.

This REF includes entrance management activities such as dry notch maintenance, mechanical berm lowering, pilot channel excavation, and the storage and reuse of excavated sand for beach nourishment purposes throughout the year. This comprehensive approach aims to achieve the strategic reuse of sand excavated contributing beneficially to the resilience of the estuarine foreshore and dune system.

Additionally, this REF supports the Council's application for a NSW Crown Lands' licence, which will replace the 2020 REF and Crown Lands' licence (2021) that is limited to entrance openings.

The following general management principles are below (Draft EMP, 2025):

- Open the entrance when water level triggers (refer Section 8.3 and Section 8.5) are reached or predicted to be reached due to rain falling or forecast heavy rainfall.
- Implementation of the EMP is a short-term to medium-term flood mitigation measure, as recommended in the Lake Conjola Floodplain Risk Management Plan (2013).
- Implementation of long-term flood mitigation measures, as identified in the Lake Conjola Floodplain Risk Management Plan (2013), to negate the need for mechanical intervention to restore a more natural opening regime over time.
- Incorporate provisions for increasing water level triggers commensurate with sea level rise and in accordance with Council's Sea Level Rise Framework. This would need to be undertaken in conjunction with the implementation of long-term flood mitigation measures investigated through a Floodplain Risk Management Study and Plan to ensure that existing low-lying dwellings and assets are raised over time and new development is appropriately located.

Water Technology has been engaged to prepare the REF under Division 5.1 of the EP&A Act to assess any environmental impacts from the proposed works. Council has an obligation to consider all possible environmental impacts which may result from these works and determine whether these impacts are likely to be significant or not. This REF has been prepared in accordance with Clause 171 of the *Environmental Planning and Act Regulation 2021*.

## 1.3 Project Location

### 1.3.1 Site Location

Lake Conjola is located on the New South Wales south coast, within the Shoalhaven LGA. The entrance is located between the towns of Nowra and Ulladulla, approximately 210 km south of Sydney.

The Licence area where entrance management activities will be conducted is shown in Figure 1-1 and Figure 1-2. The land is zoned as RE1-Public Recreation (Figure 1-3) under the Shoalhaven Local Environment Plan 2014 (LEP). The REF applies to lands located at the entrance to Lake Conjola, including those lands where excavation of sand would be carried out as part of the entrance management works, and those lands where excavated sand may be beneficially placed. In the latter case, such lands could include the sand spit north and south of the entrance, Conjola Beach, Manyana Beach and lake foreshore along the northern bank, up to approximately 250m west of Cunjurong boat ramp. These locations are all within the same tertiary sediment compartment for this stretch of coastline as described in the Lake Conjola CMP. Table 1-1 describes the activities that may occur at each location. The shorebird nesting area is approximate, and will change year-to-year depending on sand shoal extent, amongst other factors.

The entire site except for Lot 822 DP 247285 is Crown land managed by the NSW Department of Planning Housing and Infrastructure Crown lands and Public Spaces (DPHI Crown lands). A Crown land licence will be required to undertake the works as discussed in Section 3.1.5.

Access for machinery will be through the Cunjurong Point Boat Ramp, with an alternative route via Manyana Beach.


**Figure 1-1 Site location with indicative zones of proposed activities (Map 1 of 2)**

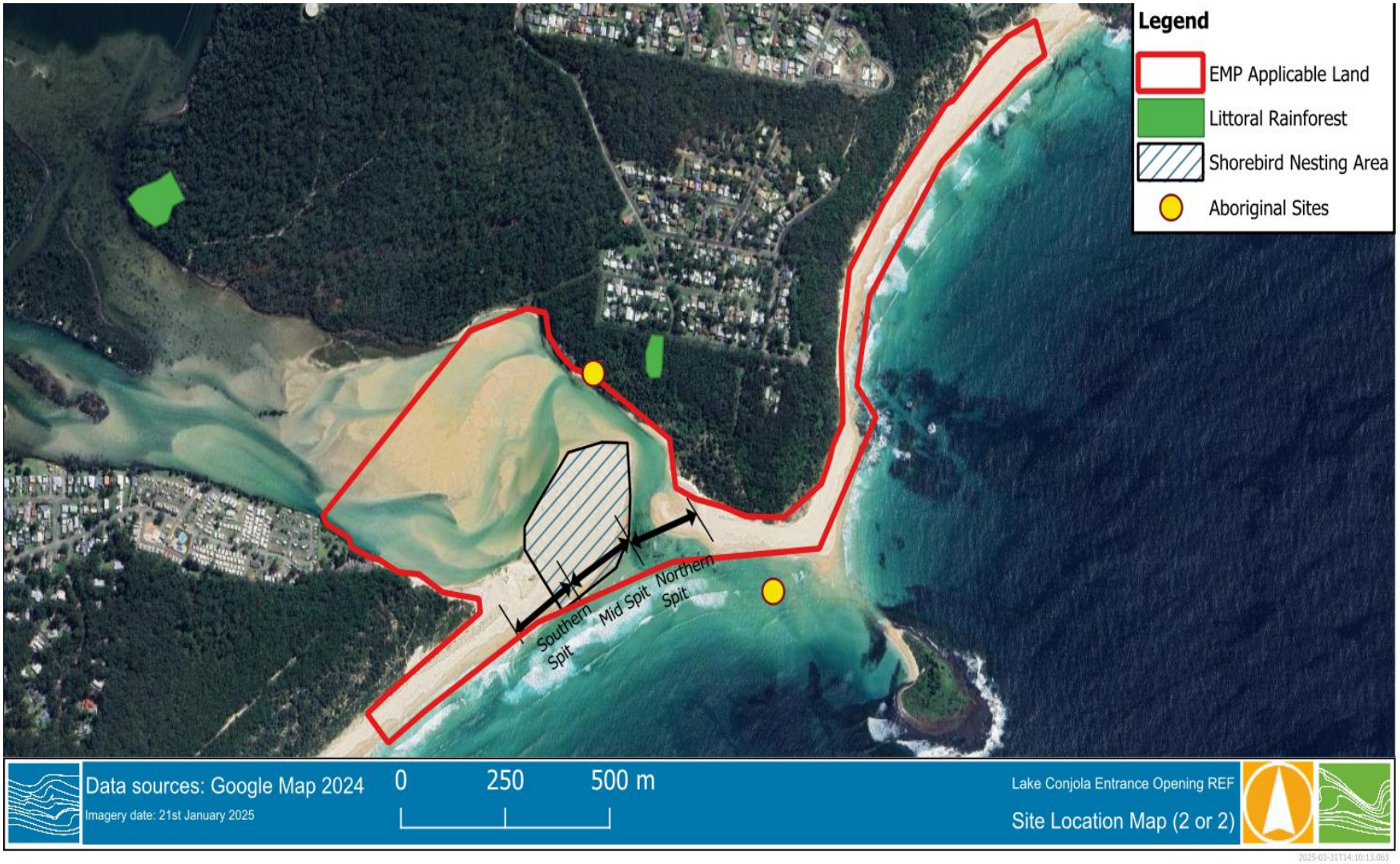



**Figure 1-2 Site location with indicative zones of proposed activities (Map 2 of 2)**

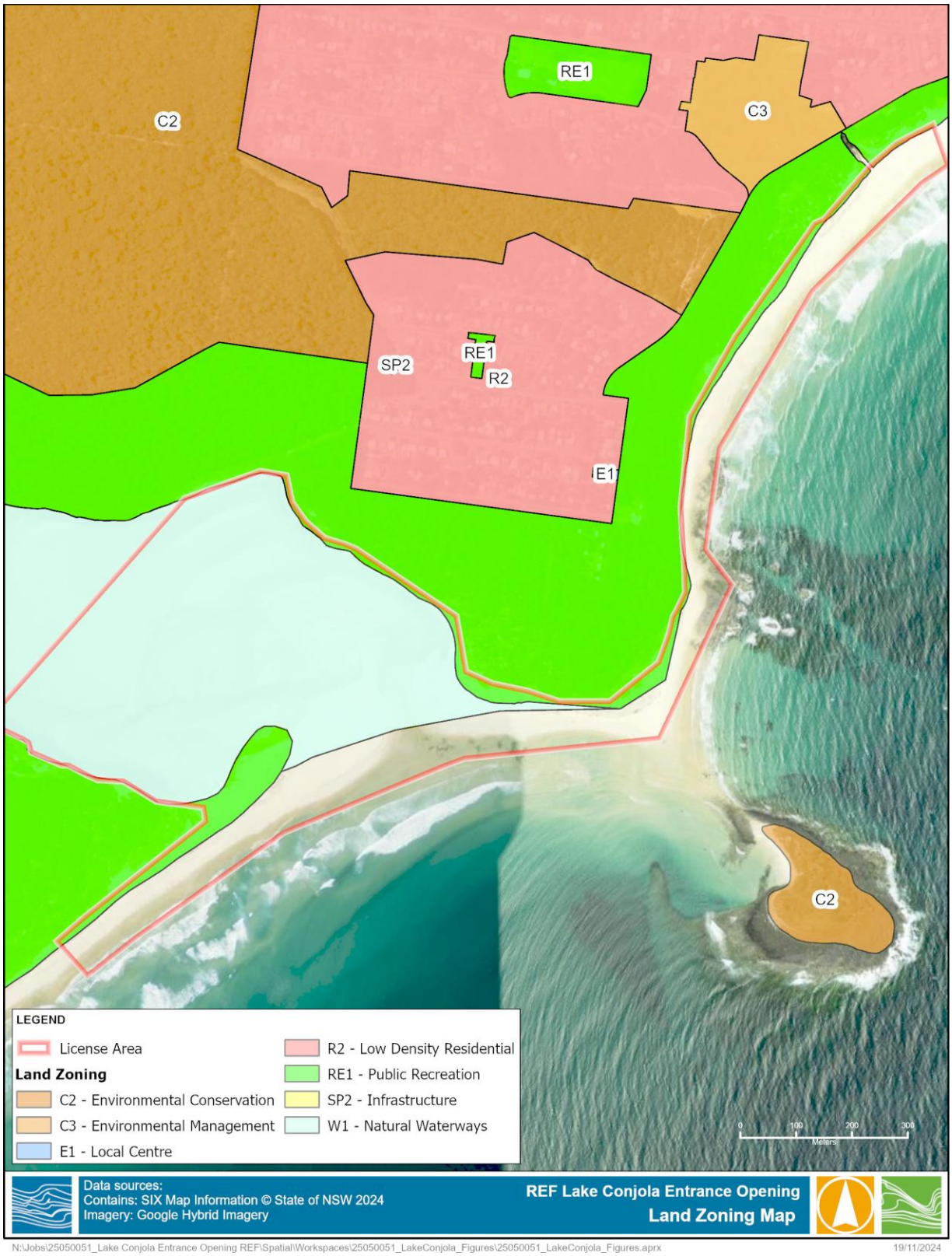



**Figure 1-3 Land zoning map**

**Table 1-1 Site location and potential activities**

| Location | Potential Activities | Pertinent information |
|---|---|---|
| Lake Conjola Entrance | Excavation to construct a pilot channel, dry notch maintenance, and berm lowering works<br>Reuse of excavated material if the other disposal areas exceed capacity.<br>Conveyance of plant and equipment | Crown Land – works subject to Crown Land Licence |
| Conjola Beach | Reuse of excavated material. | Crown Land – works subject to Crown Land Licence |
| Cunjurong Beach | Reuse of excavated material.<br>Conveyance of plant and equipment. | Crown Land – works subject to Crown Land Licence |
| Manyana Beach | Reuse of excavated material.<br>Conveyance of plant and equipment (Alternative). | Crown Land – works subject to Crown Land Licence |
| Lot 7048 DP 1094554 Lake Conjola Entrance Road, Lake Conjola | Excavation to construct a pilot channel.<br>Reuse of excavated material.<br>Conveyance of plant and equipment | Crown Land Reserve R1011528 – works subject to Crown Land Licence |
| Lot 487 DP 861543 Lake Conjola Entrance Road, Lake Conjola | Excavation to construct a pilot channel and dry notch maintenance.<br>Reuse of excavated material.<br>Conveyance of plant and equipment. | Crown Land Reserve R62146 to which Council is Crown Land Manager.<br>Proposed works would still require Crown Land Licence. |
| Lot 7022 DP 1031073 Ottawa Street, Cunjurong Point | Conveyance of plant and equipment.<br>Reuse of excavated material | Crown Land Reserve (Cunjurong Reserve R81601) to which Council is Crown Land Manager. |
| Lot 7006 DP 1031131 Ottawa Street, Cunjurong Point | Reuse of excavated material.<br>Conveyance of plant and equipment. | Crown Land Reserve R81601 to which Council is Crown Land Manager.<br>Disposal would still require Crown Land Licence. |
| Lot 7023 DP 1031073 Alaska Street Cunjurong Point | Unlikely to be utilised except potential alternative route for conveyance of plant and equipment and minor reuse of excavated material. | Crown Land Reserve R81601 to which Council is Crown Land Manager.<br>Disposal would still require Crown Land Licence. |
| Lot 822 DP 247285 Sunset Strip, Manyana | Unlikely to be utilised except potential alternative route for conveyance of plant and equipment. | Council Freehold land. |

Note: These activities are described in detail in Section 1.4 of this REF and Section 8 of the draft *Lake Conjola EMP (2025)*.

## 1.4 Proposed Activities

The following entrance management activities are proposed to mitigate and minimise the impacts of flooding on the low-lying communities surrounding Lake Conjola throughout the year:

- Excavation of a pilot channel
- Mechanical berm lowering
- Maintenance of a dry notch
- Reuse of excavated sand.

For a mechanical opening to be as effective as possible the opening should be initiated at as high a lake level as feasible without impacting adversely on flood risk. Planning and preparation for an opening can take place at lower lake levels in line with the trigger levels prescribed in the Draft Lake Conjola EMP (2025), which can be supported by the implementation of a Total Flood Warning System (TFWS). It is noted that the TFWS is yet to be implemented subject to funding.

A decision flow chart for management of the entrance to Lake Conjola with consideration given to water level triggers is shown in Figure 1-4.

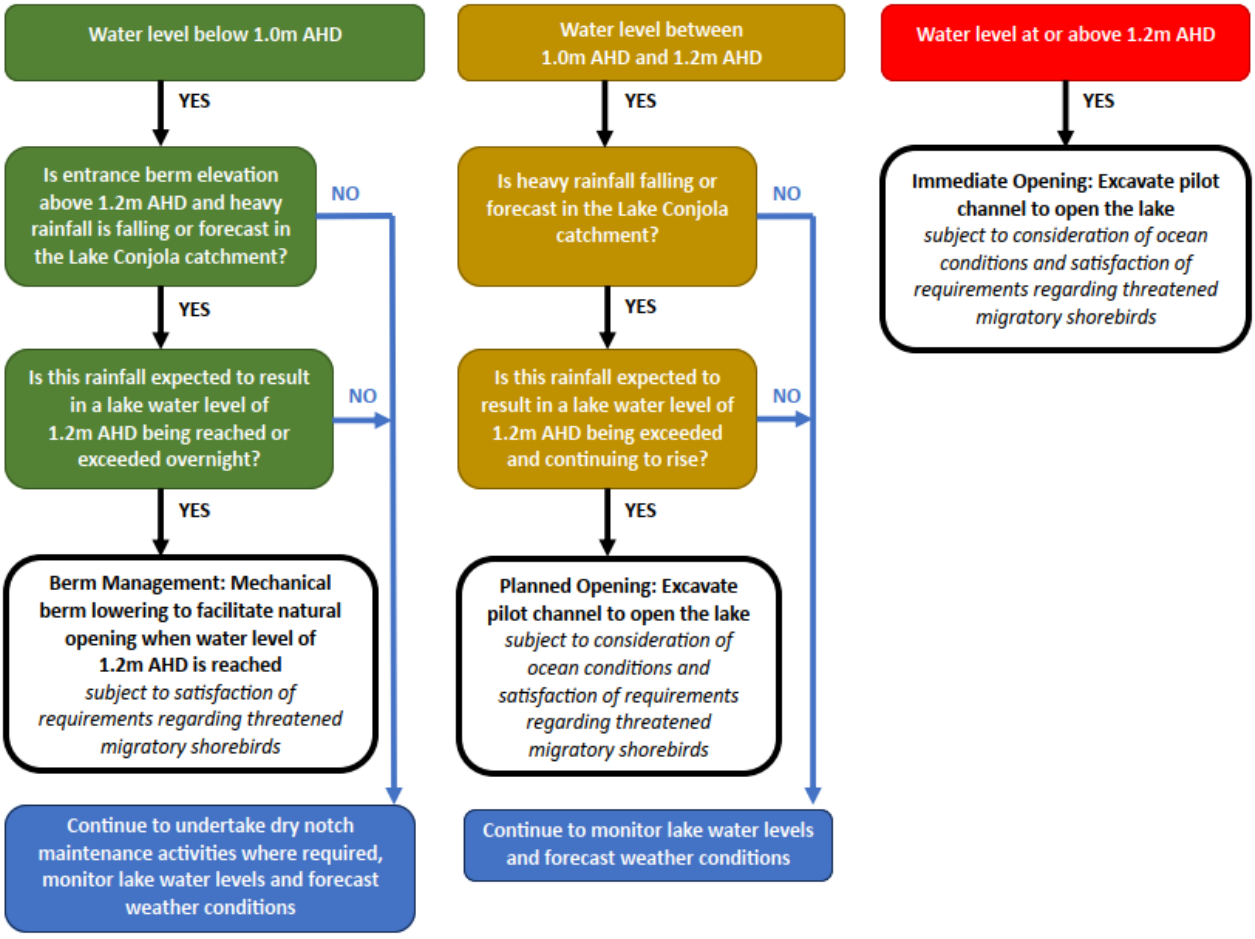



**Figure 1-4 Lake Conjola Entrance Management Policy (2025 Decision Making Flow Chart (Draft EMP)**

### 1.4.1 Excavation of a pilot channel

A pilot channel is excavated to enable the opening of the Lake at the designated trigger level during periods of closure, to mitigate the effects of flooding upstream. The excavation aims to manage the timing, level, and location of the Lake opening, aligning it with favourable weather conditions to maximise the potential for scouring and ensure an effective opening. This process also seeks to minimise impacts on shorebirds and prevent erosion of the southern dunes. Ideally, pilot channel excavation works would be planned under

conditions that will support an effective opening, which is primarily determined by the hydraulic gradient (the difference in water levels across a distance) between the Lake and the ocean.

The pilot channel would be excavated within the dry notch area, usually maintained in the northern spit zone, with a base level around 0m AHD. The channel base can be either flat or graded towards the sea, with its relative effectiveness to be evaluated over time through reviewing lake opening records. The location of the pilot channel will vary based on the entrance berm and shoal configuration at the time of opening and the presence of threatened migratory shorebirds.

The nominal width of the pilot channel along its length would be 2m but it would be widened at its upstream end where it connects to the lake, if practicable, by a factor of at least two to three times. This adjustment aims to increase the initial outflow from the lake and enhance the natural scour of the breakout channel. Access for the excavation of the pilot channel would be from the north, preferably from Cunjurong Point boat ramp, however, depending on the prevailing access conditions, access from Manyana Beach. The exact dimensions of the pilot channel may be adjusted based on operational requirements and local site factors present at the time.

### 1.4.2 Mechanical berm lowering

Mechanical berm lowering involves pre-emptively lowering sand berms during closed entrance conditions before a predicted flood. It requires excavating sand over the dry notch footprint and the sand plug at the beach face. This would be conducted in daylight hours to promote natural opening when peak flooding is expected to occur overnight, as further mechanical intervention may be unsafe.

Wave conditions may affect the duration of the berm lowering, and sand accumulation could occur again before the Lake opening is achieved. Therefore, it is important to plan berm lowering considering oceanic conditions and the expected timing for the trigger level being met (i.e., the day prior). Details on intervention trigger conditions for mechanical berm lowering are detailed in the draft EMP.

### 1.4.3 Maintenance of a dry notch

Dry notch maintenance involves periodically lowering the ‘dry notch’ area under closed entrance conditions as a preparatory measure to reduce the amount of sand that needs to be removed during a mechanical entrance opening. This activity is an integral part of ongoing management strategies for the Lake entrance to mitigate flood risk. The excavation and upkeep of a dry notch can enhance mechanical interventions, such as pilot channel excavation and berm lowering, by reducing the required pilot channel length (thereby increasing scour potential) and decreasing the volume of sand to be excavated during mechanical operations, which facilitates a quicker opening.

Typically, the dry notch would be maintained in the northern spit zone (Figure 1-1) during closed entrance conditions to minimise impacts on threatened migratory shorebirds, particularly during their nesting season (September to March inclusive). Plant access for maintaining the dry notch would be from the north, via Cunjurong Point Boat Ramp.

The base level of the dry notch would be approximately 1.0m AHD to support mechanical openings as necessitated by possible flooding conditions. The dry notch would generally have a width of around 50m, though this can vary as needed, with a short sand ‘plug’ retained at the beach face (Figure 1-5).

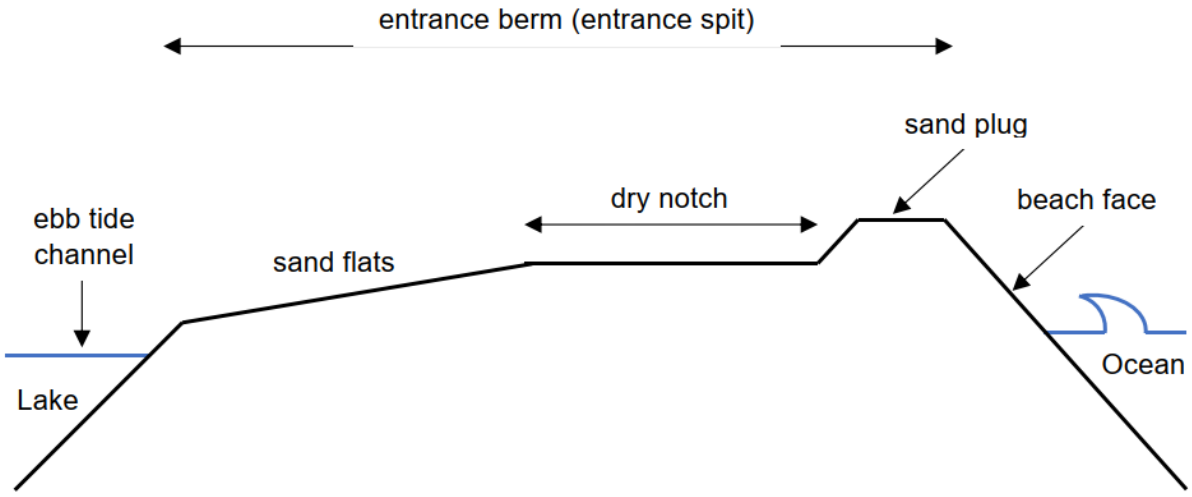



**Figure 1-5 Dry notch configuration**

The location and the width of the dry notch may vary based on experience but must not impact adversely on threatened migratory shorebirds. Due to the variability of entrance conditions, Council is considering a large dry notch area to work within to allow operational flexibility when undertaking this maintenance. This is to allow for the selection of the most suitable dry notch location whilst mitigating potential impacts on foraging and nesting shorebirds.

### 1.4.4 Reuse of excavated and dredged sand

Sand excavated for the purposes of maintaining the dry notch, lowering of the berm and creating a pilot channel is planned to be used beneficially in several ways. Sand from the maintenance of the dry notch and berm lowering would ideally be placed on the spit south of the entrance to increase its height and mitigate storm washover, but is subject to the migratory shorebird nesting season. Alternatively, this sand may be used for beach nourishment to the north or for the restoration of erosion areas along the surrounding lake foreshore. Any stockpiles should be placed in cleared sites without tree or shrub cover. Additionally, all sand will be placed above the Mean High Water Mark.

Sand excavated from the pilot channel would be deposited on the spit north of the pilot channel, considering that the excavation would occur from the north side, making disposal to the south impractical. The sand would be placed as far as possible from the edge of the pilot channel within the reach of the excavator to reduce the likelihood of the stockpiled sand falling back into the channel before it is opened.

Sand placed on the southern spit to increase the dune's height would be stabilised with vegetation where feasible to prevent wind action from transporting it back into the entrance. Sufficient width would be maintained north of any vegetated dune to accommodate flood flows through the entrance.

The placement of excavated or dredged sand would consider potential impacts on threatened migratory shorebirds, as outlined in Section 6.4, along with the conditions and guidelines to mitigate these potential impacts.

## 1.5 Project Justification and Options

The purpose of entrance management works for flood mitigation is to assist Council in facilitating an expedient and swift mechanical intervention in a flood event, mimicking as far as practical a natural entrance breakout, and create a path for floodwaters to escape and potentially reduce the impact of flooding on low lying communities surrounding Lake Conjola. The entrance management activities also aim to maintain responsible environmental management of the entrance berm and shorebird habitat, coastal wetlands and the protection

of the structural integrity of the coastal dune system. The Lake Conjola CMP outlined the entrance management options for consideration and Stage 3 of the CMP process assessed these options.

### Option 1 - Do Nothing

Doing nothing would entail allowing the entrance to open and close on a natural cycle. Consequently, the water levels within the estuary could potentially reach higher levels than if the entrance is opened at a certain trigger level. In certain flood events, if the entrance of Lake Conjola were to remain closed, water levels can be higher for longer in some parts of the lake's floodplain. This would result in potentially greater impacts in certain flood events on the Lake Conjola community, especially at the southern section of the lake, in terms of inundation of houses, caravan park and other property, cutting off access roads and possibly increased injury or loss of life.

### Option 2 – Continue with the Current Opening Regimes

By continuing the current lake entrance opening regime as approved under the Crown land licence 2021 the flood levels within the estuary can be sufficiently managed. However, the current management regime has some drawbacks, primarily the lack of pre-emptive entrance management works and operational flexibility. As the entrance area is of high environmental significance, being an important site for migratory wading birds and nesting shorebirds, entrance management activities need to consider these values and sensitivities.

### Option 3 – Maintenance of Dry Notch Area, Berm Lowering, Excavation of Pilot Channel and Beneficial Re-use of Excavated and Dredged Sand (Preferred)

A wider dry notch area would allow for efficient entrance openings during a flood event, as the opening can be done in the location where the water naturally would overtop. The optimal location for the dry notch may change depending on the current prevailing natural processes and can be difficult to predict.

The excavation of a pilot channel will control the timing, level and location of the Lake opening to coincide with favourable conditions and maximise scour potential to allow an effective opening, while also limiting impacts on shorebirds and possible erosion of the southern dunes.

Mechanical berm lowering is an effective management strategy in the following situation:

- A low lake level prior to a forecast rainfall event;
- Surveyed berm elevation is above the planned immediate opening level; and,
- Heavy rainfall (forecast or actual) would result in the trigger level for an immediate opening potentially being reached overnight.

Mechanical berm lowering in this situation allows the lake level to rise and then naturally open at the planned opening level, reducing the risk of flooding and allowing the lake opening to better mimic natural ICOLL processes. In the event that the lake level does not reach the level of the lowered berm, the lake would not open. This therefore avoids ineffective entrance openings at a low level.

The excavated and dredged sand can help restore the erosion prone areas on the surrounding lake foreshore and coastal dunes. Sand nourishment brings back sand where natural processes erode it, allowing it to be beneficially used for both the amenity and infrastructure in the proposed locations. Sand nourishment can currently be undertaken under separate approvals, however streamlining the approvals process would streamline the works, reduce the complexity of entrance management and the sand could be directly transported to the nearby sites.

For the reasons outlined, Option 3 is the recommended approach in accordance with the draft EMP for managing the opening of Lake Conjola's entrance going forward. The Council plans to conduct these activities

throughout the year to maintain operational flexibility during critical periods. Implementing this option will require approval from NSW DPHI – Crown Land.

### 1.5.1 Lake Conjola CMP

Coastal processes relating to entrance management have been assessed through Stages 2 and 3 of the Lake Conjola CMP. The Stage 2 CMP Report "Entrance Processes and Entrance Management Options" (RHDHV, 2023) provides a detailed overview of the local coastal processes and entrance dynamics, past and current entrance management practices, as well as consideration of potential options for management of the entrance into the future.

The Stage 3 CMP Report (RHDHV, 2024) details potential management options to address the risks and threats identified in Stages 1 and 2, including an assessment of entrance management options.

The following four management options were considered, organised into the following categories involving progressively greater levels of mechanical intervention at the lake entrance:

- Category 1: The entrance area is allowed to behave naturally. Mechanical opening of the entrance in the form of excavation of a pilot channel is carried out in response to lake water level triggers;
- Category 2: The entrance area is managed by way of a dry notch approach whereby the sand levels in the entrance area (above water level) are regularly mechanically groomed to facilitate an easier mechanical opening (excavation of a pilot channel), when lake water level triggers are met;
- Category 3: The entrance area is managed by way of occasional dredging following a severe storm washover event, whereby a channel is sustained in the position of the natural ebb tide channel to avoid the need to excavate an overly long pilot channel to achieve a mechanical opening following a severe storm washover event, when lake water level triggers are met. This management approach could also be combined with maintenance of a dry notch; and,
- Category 4: Engineering works are constructed in the entrance area, such as entrance breakwaters, to create a permanently open entrance, in which case mechanical opening would not be required.

The CMP Stage 3 report recommended that Category (Option) 2 (dry notch and pilot channel) is the core option for the management of the Lake Conjola entrance berm over the forward 10-year planning horizon. The CMP also states that in addition to the recommended option 2, *"it is recommended that the occasional dredging component of Option 3 be included within the CMP as a contingency measure (only) in conjunction with Option 2, with implementation of dredging subject to obtaining the necessary approvals."* Note that the occasional dredging of the ebb tide channel has not been assessed in this REF. If dredging of the ebb tide channel will be considered in the future, this is subject to a separate REF and approval process.

The management option relevant to this REF as recommended through the CMP is worded accordingly:

**Option EM1: Implement revised Entrance Management Policy:**

*"Implement the updated Entrance Management Policy (EMP) in accordance with the associated Review of Environmental Factors (REF), both of which are being drafted and updated concurrently and separate to the CMP. A REF will need to be prepared to support the implementation of the EMP prior to final agency sign-off and approval of the EMP.*

*The primary driver for entrance management is reducing the risk associated with flooding. The EMP will be implemented in accordance with the principles and procedures set out within that document which reflect Council's responsibility for managing the Lake Conjola entrance for flood mitigation purposes. The key activities to be undertaken in implementing the EMP will include the mechanical excavation of a pilot channel, mechanical berm lowering and maintenance of a dry notch based on the relevant triggers and decision framework within the EMP.*

*This action and associated EMP does not include the implementation of any coastal protection works or contingency dredging of the ebb tide channel as described in Action EM2."*

The Stage 3 CMP report notes that *"A draft Entrance Management Policy will be prepared based on the adoption of Option 2."* (RHDHV, 2024).

# 2 EXISTING ENVIRONMENT

## 2.1 Estuary Profile

Lake Conjola is classified as a wave dominated barrier estuary with steep valley sides, and a central basin that formed when the sea level rose and drowned the river valley. It is an immature estuary that has an extensive flood-tide delta (GHD, 2012).

Key estuary parameters and values are provided in Table 2-1. The main lake water body has a surface area of 6.7 $km^2$ and drains a catchment of approximately 140 $km^2$. Lake Conjola is connected to the Tasman Sea through a tidal inlet channel of some 3.5 km in length.

The major tributaries are Luncheon, Conjola, Gooloo and Bunnair Creeks which principally drain the large western section of the lake's catchment. Land use within the catchment area is predominantly agricultural grazing and forest, with smaller urban settlements around the Lake foreshore area.

The catchment of Lake Conjola is relatively undisturbed, with 85% remaining as forest, including areas of Conjola and Morton National Parks. Urban and rural residential areas associated with Fishermans Paradise, Conjola Park, Lake Conjola and Yatte Yattah occupy about 10% of the catchment (DCCEEW, 2024).

**Table 2-1 Estuary Profile**

| Parameter | Value |
|---|---|
| Catchment Area | 139.1 $km^2$ |
| Estuary Area | 6.7 $km^2$ |
| Estuary Volume | 27,000 ML |
| Average Depth | 4 m |
| Local Tide Range (when open) | ~0.6-0.7 m |
| Tidal Exchange | ~1500 ML |

## 2.2 Community Values

The entrance area of Lake Conjola has significant environmental, recreational and scenic values. The relatively natural coastal landscape with broad expanses of beach, sand dunes, ocean and river provide opportunities for appreciation by walkers, fishers, swimmers, boaters and other users of the area.

Community values include

- Aesthetics – passive recreation undertaken to appreciate the aesthetic appeal;
- Cultural and spiritual values – water is particularly important for indigenous people;
- Aquatic ecosystems – respect for the health or integrity of the waterway's ecosystems;
- Economic values – tourism and oyster aquaculture activities; and
- Exercise and active recreation - activities including walking, swimming, surfing, boating, paddle boarding, kayaking, snorkelling, and fishing.

The estuary and lake foreshore in the proposed sand nourishment location has recreational facilities in the form of boat ramp.

## 2.3 Entrance Morphodynamics

### 2.3.1 ICOLL Processes

Lake Conjola is classified as an ICOLL (Intermittently Closed and Open Lakes and Lagoons). ICOLLs are separated from the ocean by a sand beach barrier or berm. ICOLLs open and close to the ocean naturally in a constant but irregular cycle. When there is a sufficient inflow of water into the lake or lagoon from the catchment area, typically following significant rainfall, water levels in the ICOLL will increase. The water levels in ICOLLs can rise rapidly, often within hours or days, depending on the size of the catchment area, as a response to heavy rain events. Overtime, the water in the ICOLL will continue to rise with rainfall and eventually overtop the entrance berm, causing an entrance breakout, allowing water to drain to the ocean. The force of the accumulated water creates an entrance channel through the beach. Once open, ICOLLs become tidal, with seawater moving in and out of the estuary according to the daily tidal cycle.

ICOLLs close when ocean waves and tides move sand from offshore into the entrance, gradually closing the entrance channel. Without further significant freshwater inflows from the catchment, the ICOLL will remain closed to the sea. When ICOLLs are closed, they do not exchange water with the ocean, and water levels within them fluctuate based on rainfall, catchment inflows, and evaporation.

Certain ICOLLs have been, and continue to be, manually or artificially opened to the ocean by various authorities including local Councils.

The Lake Conjola entrance, when closed, is characterised by an expanse of unvegetated sand with a sparsely vegetated dune at its southern end. The substrate in the entrance area is completely dominated by unconsolidated and poorly sorted sand with varying amounts of broken shell and drying macroalgae.

### 2.3.2 Lake Conjola Entrance Behaviour

Based on analysis of Council records over the period 1916 to 2019, undertaken during Stage 2 of the Lake Conjola CMP, it is estimated that the Lake Conjola entrance is open approximately 88% of the time and closed around 12% of the time (RHDHV, 2024). This open and closing regime is the result of the relatively large size of the Lake Conjola catchment relative to its estuary volume (see Table 2-1). The longest continuous period of static open entrance conditions was the period from 1971 to 1986, a period of 15 years. Furthermore, the lake was open to sea between 1998 to 2010, a period of 12 years (GHD, 2013).

Entrance berm morpho dynamics assessed during Stage 2 of the CMP found that entrance condition was strongly related to rainfall, storm frequency, and the influence of large-scale climatic drivers, primarily as the El Niño Southern Oscillation (ENSO). In general:

- ENSO periods that tend towards La Niña result in above-average rainfall along the NSW coastline. It also impacts on beach rotation processes, and results in a narrower entrance berm at the northern end of Conjola Beach (RHDHV, 2024). These factors combine to result in a higher frequency of open entrance conditions.
- Conversely, ENSO periods that tends towards El Niño results in below average rainfall and beach rotation processes that produce a wider berm at the northern end of Conjola Beach These factors combine to result in a lower frequency of open entrance conditions.

Mechanical opening of the Lake has been reported to have occurred at least 20 times over the period 1937 - 2020 (RHDHV, 2023). Dredging within the entrance area is known to have taken place on two occasions, November 1999 and May to September 2016 (RHDHV, 2023). Lake Conjola was open to the sea during the site assessment undertaken to inform this REF on 14 November 2024.

## 2.4 Biodiversity

Background research and database searches undertaken for the REF include the EPBC Protected Matters Search Tool, the BioNet Atlas of NSW Wildlife, Bionet Vegetation Classification, NSW OEH Threatened Species Profiles, the NSW DCCEEW Biodiversity Values Map and Threshold Tool, and NSW SEED Map.

The Lake Conjola estuary and entrance location on the foreshore is mapped as containing Biodiversity Values (BV) mapping under the *Biodiversity Conservation Act 2016* (NSW BC Act). There is a small patch of mapped BV adjoining Ottawa street which lies slightly northeast off the York Street boat ramp. The patch is located approximately 290m from the indicative pilot channel, however, will not be affected due to being located within dense bushland away from the machinery access point. Another small patch of BV can be seen northeast off Chinamans Island, which is approximately 1.2km from the indicative pilot channel. Both BV patches have been classified as having "Biodiversity Values under the Coastal Management Act - Littoral Rainforest.

The largest significant BV patch in proximity to the entrance canal relates to Pattemore's Lagoon located southwest of the site.

The Plant Type Communities (PCTs) mapped adjacent to the site include (Figure 6-4):

- PCT 3410 - Spinifex Strandline Grassland
- PCT 3788 - Coastal Foredune Wattle Scrub
- PCT 3638 - South Coast Sands Bangalay Forest
- PCT 3805 - Southern Sandplain Heath
- PCT 4097 – Samphire Saltmarsh

PCT 3638 is associated with the Threatened Ecological Communities Bangalay Sand Forest of the Sydney Basin and Southeast Corner bioregions and Kurnell Dune Forest in the Sutherland Shire and City of Rockdale. Both communities are listed as Endangered under the BC Act. PCT 3805 and have associations with the Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion which is listed as Critically Endangered under the NSW BC Act. PCT 4097 PCT is associated with Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions which is listed as Endangered under the NSW BC Act.

PCT 4097 Samphire Saltmarsh is also an intertidal community which requires periodic inundation of saline water. Therefore, consistently opening the entrance at lower levels will reduce the hydrology of the fringing wetlands that may impact the health of PCTs such as the Samphire Saltmarsh. The subject site is an ICOLL and will remain as such, therefore maintaining the range of current beneficial uses such as periodic inundation. The entrance management works will only occur only when the trigger levels have been met, and the planned works will be beneficial to the natural environment,

A field survey on 14 November 2024 was undertaken of the site to identify any flora species that may be impacted by the proposed works (Appendix A). The majority of the vegetation found on site likely to be affected by the plant traffic used as part of the proposed works were coastal groundcovers such as Spiny-headed Mat-rush (*Lomandra longifolia*), Coastal Spinifex (*Spinifex sericeus*) and Strand Sedge (*Carex pumila*). These species are very hardy and are not likely to suffer long term impacts after being driven upon. Shrub layers nearby within the proposed work areas include Coastal Wattle (*Acacia sophorae*), Tree Broom-heath (*Monotoca elliptica*) and Tea Tree (*Leptospermum sp*). There were limited canopy trees recorded in the proposed plant access route, however, the Coastal Banksia (*Banksia integrifolia subsp. integrifolia*) and Swamp Oak (*Casuarina glauca*) were observed. These were identified as being located away from areas potentially affected by machinery that would be required for the proposed works.

A BioNet Atlas search was also completed to identify threatened species sighted within 10km of the site in the last 30 years. Based on the outcomes of this search as well as locations of species sightings mapping and consideration of potential habitat on site, a Likelihood of Occurrence table was prepared and is included in Appendix B. Threatened species sightings in close proximity to the site are shown in Figure 6-3.

In terms of the NSW coast, the Lake Conjola estuary is a high priority site for shorebird conservation. More than 40 species of shorebirds have been observed in the Lake Conjola estuary, some of which are threatened species protected by NSW and Commonwealth legislation, of which, many are protected under international agreements. Commonly recorded threatened species in the study area include Little Tern (*Sternula albifrons*), Pied Oystercatcher (*Haematopus longirostris*), Eastern Curlew (*Numenius madagascariensis*) (NSW Bionet, 2024). The entrance area at Lake Conjola can be important for shorebirds as a beach nesting site, an intertidal feeding area and a high tide roost area.

The Environment Protection and Biodiversity Conservation (EPBC) Protected Matters Search Tool was used to identify any Matters of National Environmental Significance (MNES) within the area. The MNES report is included in Appendix D. MNES recorded within 10km of the site include two state and territory reserves, four Threatened Ecological Communities (TECs), 86 threatened species, 79 listed marine species, 12 whales and other cetaceans and 53 migratory species.

## 2.5 Cultural Heritage

Under Section 86 of the NSW National Parks and Wildlife Act 1974 (NPW Act) it is an offence to disturb, damage, destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm and object without an AHIP (Section 87(2) of the Act). To effect this, the NSW Department of Environment, Climate Change and Water have prepared the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (hereafter referred to as the 'Due Diligence Guidelines') to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for an AHIP.

In accordance with Step 1 of the Due Diligence Guidelines (DECCW 2010), An extensive AHIMS search was conducted on 19 November 2024 and indicated that there were two recorded Aboriginal heritage sites within the estuary in the vicinity of the subject site. Both records are for a shell midden in the northern part of the lake entrance, away from the proposed works. The actual extent of the midden below the surface is likely to be larger than that shown. Regardless, the works can easily avoid the midden as it is on the vegetated dune which vehicles and equipment would be prevented from accessing/impacting.

# 3 LEGISLATIVE AND PLANNING CONTEXT

## 3.1 NSW Legislation

### 3.1.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation* 2021 (EP&A Regulation) provide the framework for development and environmental assessment in NSW.

The proposed works are "development without consent" under clause 2.56 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP), as stated "*2.56 (1) Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*" Where works do not require development consent but require approval by a government agency under any legislation then they are defined as an activity under Part 5 of the EP&A Act. Division 5.1 and Section 5.7 of the EP&A Act requires any such Government body to determine whether or not the impacts of the activity are likely to be significant. This REF serves to document that determination.

This REF is intended to address Council's compliance with the EP&A Act including Division 5.1 Section 5.7, and the requirements of Clause 171 *Review of Environmental Factors* of the EP&A Regulation 2021.

Under the EP&A Act a determining authority means the public authority or authorities by or on whose behalf the activity is or is to be carried out, or any public authority whose approval is required in order to enable the activity to be carried out. The entrance management activities are carried out by Council and requires approval from NSW Department of Planning, Housing and Infrastructure (DPHI) - Crown Land. Therefore, both public authorities are determining authorities for the proposed works.

### 3.1.2 Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act) establishes the framework and sets forth the objectives for coastal management in New South Wales. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The CM Act defines the coastal zone, comprising four coastal management areas:

- Coastal wetlands and littoral rainforests;
- Coastal vulnerability area;
- Coastal environment area; and
- Coastal use area.

The CM Act establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

The proposed works are located within the coastal use area and the coastal environment area and there is a littoral rainforest nearby. The works may also affect coastal wetlands due to change in the lake water levels (Section 6.3.2). Therefore, the development controls for each of these areas apply to the site.

### 3.1.3 State Environmental Planning Policy (Transport & Infrastructure) 2021

The TISEPP aims to facilitate the delivery of infrastructure across NSW by identifying whether certain types of infrastructure require consent, can be carried out without consent or are exempt development.

As per Division 7, clause 2.56, development for the purpose of 'flood mitigation' may be carried out by or on behalf of a public authority without consent on any land. According to clause 2.165 (3) "*a reference in this section to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities*

*(a) construction works,*

*(b) routine maintenance works,*

*(c) environmental management works*".

The proposed works would be defined as 'routine maintenance works' under this clause of the TISEPP. Therefore, these works can be undertaken on the land without consent. However, it is still a requirement to be assessed under Part 5 of the EP&A Act.

### 3.1.4 State Environmental Planning Policy (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) streamlines coastal development assessment requirements, identifies development controls for consent authorities to apply to each coastal management area to achieve the objectives of the CM Act, and establishes the approval pathway for coastal protection works.

State-wide mapping that accompanies the RH SEPP is available for the coastal wetlands and littoral rainforest area, the coastal environment area, and the coastal use area.

As per the RH SEPP the following impacts must be considered for developments within the coastal environment area:

a. the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment such as the coastal saltmarshes that require periodic inundation even if the works are mapped outside the mapped wetland or proximity areas;

b. coastal environmental values and natural coastal processes;

c. the water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014)*;

d. marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms;

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;

f. Aboriginal cultural heritage, practices and places; and

g. the use of the surf zone.

Impacts to assess within the coastal use area as per the RH SEPP include:

a. existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability;

b. overshadowing, wind funnelling and the loss of views from public places to foreshores;

c. the visual amenity and scenic qualities of the coast, including coastal headlands;

d. Aboriginal cultural heritage, practices and places; and

e. cultural and built environment heritage.

The impacts on each of the above is included in the environmental impact assessment in Section 6.

### 3.1.5 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (CLM Act) outlines the ownership, use, legislative requirements and management of Crown Land in NSW. The lake entrance, the waterways of the lake, sand stockpile and proposed sand nourishment areas are on Crown land managed by DPHI Crown Lands. The CLM Act requires that occupation and use of Crown Land must be authorised under the act. The usual form of authorisation is a licence issued by DPHI Crown Lands.

Council must obtain a licence from DPHI Crown Land before undertaking the works. Referral to DPIRD Fisheries in accordance with Section 199 of the *Fisheries Management Act 1994 (FM ACT)* would be made by DPHI Crown Lands as part of the licence assessment process thereby replacing the need for council to obtain a separate permit for dredging under the *FM Act*.

### 3.1.6 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The WM Act defines principles of water management, sets out water licensing laws and environmental water provisions.

Section 91 (2) states that: *A controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land*. In accordance with Clause 41 of the *Water Management (General) Regulation 2018,* this project is being carried out by or on behalf of Council and therefore exempt from requiring a Controlled Activity Approval in accordance with the Act.

Groundwater is not anticipated to be encountered during the proposed entrance management activities, therefore additional licensing from Water NSW will not be required.

### 3.1.7 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) includes the Biodiversity Offsets Scheme (BOS) that governs how biodiversity offsets will be used to ensure they offset the loss due to development and deliver conservation outcomes. The Act and Regulations also govern the Biodiversity Assessment Method (BAM) as a scientific method that assesses biodiversity losses from impacts at development sites and gains from conserving land at stewardship sites.

Authorities such as Council seeking to undertake an activity under Part 5 of the EP&A Act can voluntarily opt-in to the BOS and BAM scheme,or alternatively can elect to undertake a Test of Significance (ToS) and proceed with a Part 5 approval. Council will be required to:

- take serious and irreversible impacts into consideration; and
- determine if there are any additional and appropriate measures that will minimise the impact if the activity is to be carried out or approved.

Potential ecological impacts and mitigation measures are discussed in Section 6.4 of this REF. While Biodiversity Values were mapped on the site, it is concluded that the proposed works are not likely to have a significant impact on any BC Act listed threatened species or threatened ecological communities, provided all mitigation measures are strictly adhered to. Therefore, any further assessments such as Tests of Significance, Species Impact. Statements or assessment of Significant Impact Criteria for EPBC listed threatened species are not required at this stage.

A licence to harm under the National Parks and Wildlife Act 1974 (NPW Act) will be required if nesting threatened shorebirds need to be disturbed (e.g. nest relocated) to undertake the entrance opening. This is discussed further in Section 6.4 of this REF.

### 3.1.8 Fisheries Management Act 1994

The provisions of the *Fisheries Management Act 1994* (FM Act) relate to conserving fish stocks and the key fish habitats upon which they depend. It contains separate measures to protect aquatic habitat and conserve aquatic threatened species listed under the FM Act. The FM Act also addresses the sustainable management of commercial, recreational and Aboriginal cultural fishing and aquaculture in NSW.

The potential ecological impacts on aquatic environments from the proposal are discussed in Section 6.4 of this REF report, and consultation with DPI Fisheries is discussed in Section 4 of this REF. It is concluded that the proposal is not likely to have a significant impact on any threatened aquatic species.

DPIRD Fisheries seeks no net loss of key fish habitat by regulating the following activities under Part 7 of the FM Act – dredging and reclamation, harm of marine vegetation and blockage of fish passage. The entrance management works will require dredging and reclamation activity. In this instance, as authorisation under the CLM Act is required, Council will not be required to obtain a s.200 Permit under Part 7 of the FM Act. However, in accordance with s.199 of the FM Act, Crown Lands will need to formally notify and consider comments from DPIRD Fisheries prior to issuing any authorisation for these works. The works will not result in any harm of marine vegetation and blockage of fish passage.

### 3.1.9 Heritage Act 1977

The *Heritage Act 1977* provides for the protection of non-Aboriginal heritage in NSW.

Items listed on the State Heritage Register, including archaeological heritage, require consent of the Heritage Council to undertake work or development which alters, moves, despoils or damages any part of the heritage item, place, precinct, land, its relics or any vegetation.

The potential heritage impacts of the proposal are discussed in Section 6.5 of this REF. It is concluded that the proposal is not likely to have a significant impact on any heritage features.

### 3.1.10 National Parks and Wildlife Act 1974

This Act provides, amongst other things, for the protection and conservation of Aboriginal Places and Objects. All Aboriginal Places and Aboriginal objects are protected under Part 6 of the National Parks and Wildlife Act 1974 (NPW Act).

Under Section 90 of the NPW Act, an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW is required for works that may harm or desecrate an Aboriginal object or Aboriginal Place. The Act requires that reasonable precautions and due diligence must be taken to avoid harm to Aboriginal objects which includes:

- identifying whether there are, or likely to be any listed Aboriginal objects present in the area;
- determining whether the proposed activities are likely to harm Aboriginal objects (if present); and
- determining whether an Aboriginal Heritage Impact Permit (AHIP) is required.

If an AHIP is required, then consultation must be undertaken with Aboriginal stakeholder groups in accordance with the requirements in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

The potential Aboriginal heritage impacts of the proposal are discussed in Section 6.5.1 of this REF. It is concluded that the proposal will not require an AHIP as the proposed works will not likely to have a significant impact on any Aboriginal heritage.

### 3.1.11 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is the primary piece of legislation regulating pollution control and waste disposal in NSW and is administered by the Environment Protection Authority (EPA).

The proposed works will be carried out with appropriate mitigation measures in place so that air, water, and noise pollution will be minimal.

Scheduled activities (as defined in Schedule 1 of the Act) require an Environment Protection License (EPL), as does development which is proposed to be carried out which would enable scheduled activities to occur. The proposed works are not considered scheduled activities and therefore do not require an EPL.

### 3.1.12 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) was enacted to return land to Aboriginal people through a process of lodging claims for certain Crown lands and the establishment of Aboriginal Land Councils.

This legislation would be relevant where an Aboriginal land claim has been made which affects submerged Crown Land or areas of Crown Land that may be proposed for processing, storage or use of dredged material. The *Commonwealth Native Title Act 1993* may also be relevant in this regard.

There is an undetermined Aboriginal land claim on Lot 7048 DP 1094554, which is within the dry notch area, mid-spit. There are separate undetermined claims along most of the northern foreshore. An assessment of Native Title Future Acts will be facilitated by Council. It is noted that Council has previously conducted this assessment in 2023, under the current Crown Land Licence – Lake Conjola Entrance Management (2021). It was found that as the works are classified as Subdivision L (Low Impact Future Acts) under the federal Native Title Act 1993 as the works involves "excavation or clearing that is reasonably necessary for the protection of public health or public safety". There are no procedural requirements. The above act will not extinguish Native Title – the non-extinguishment principle applies. As this REF is of the same nature, it is not anticipated that this outcome will change. Additionally, Council will notify the applicable LALC prior to exhibition. Further consultation will be undertaken by Crown Lands when applying for a Crown Land License to undertake the works.

### 3.1.13 Shoalhaven Local Environmental Plan 2014

The *Shoalhaven Local Environmental Plan 2014* (SLEP) outlines the circumstances for when development consent is required for an activity. The provisions of TISEPP prevail over the SLEP and since the activity is permitted without consent under the TISEPP, development consent under the SLEP is not required.

### 3.1.14 NSW Local Government Act 1993

The *NSW Local Government Act 1993* (LG Act) provides the legal framework for the system of local government for NSW. This legislation sets out the responsibilities and power of councils, councillor, other persons and bodies that constitute the system of local government. The provisions of the LG Act support Council to facilitate engagement with the local community and other bodies that constitute the system of local government.

## 3.2 Commonwealth Legislation

### 3.2.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Commonwealth approval is required for certain actions. This includes actions which may have, or are likely to

have a significant impact on Matters of National Environmental Significance (MNES). MNES include nationally threatened species or endangered ecological communities. Under the EPBC Act, an assessment of the impact of a proposal on a MNES must be undertaken to determine whether there is likely to be a significant impact. If the assessment concludes there is a significant impact, then it will become a controlled action under the EPBC Act, and the proposal must be referred to the Commonwealth. Approval from the relevant Federal Minister is also required for any actions that may have a significant impact on matters of National Environmental Significance, except in circumstances which are set out in the EPBC Act.

Approval from the Commonwealth is in addition to any approvals under NSW legislation.

The potential ecological impacts of the proposed works are discussed in Section 6.4 of this REF. It is concluded that the proposed works will minimise the significant impacts on any EPBC Act listed threatened species, populations or communities and will only need to use the biodiversity conservation licence to breach the 200m protection buffer zone when conducting maintenance works for flood risk reduction during the shorebird nesting season. Only in immanent entrance opening scenarios would there be the potential need to move the shorebirds and/or nest to safety. Ideally works would occur out of the shorebird nesting season and not require referral to the Commonwealth under the EPBC Act.

### 3.2.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides a national system for the recognition and protection of native title and for its co-existence with the national land management system. Works would occur in Crown managed waterway land, wherein the South Coast Native Title claim will apply.

Regardless, the 'future act' can be valid through Subdivision L – Low Impact Future Acts as the works do not extinguish native title and the excavation is undertaken for public health and safety. There are no procedural requirements.

# 4 CONSULTATION

Stakeholder consultation was undertaken as per Division 1 of the TISEPP. Consultation outcomes for agency consultations are outlined below.

## 4.1 Agency Consultations

Consultation letters were sent out by Water Technology to the following agencies:

- Department of Climate Change Energy Environment and Water (DCCEEW) – Conservation Programs, Heritage and Regulation Group (CPHR);
- DCCEEW – National Parks & Wildlife Service (NPWS);
- DPIRD Fisheries;
- NSW DPHI – Crown Lands; and
- Transport for NSW (TfNSW) – Maritime.

The consultation responses are included in Appendix C.

The response received from DPIRD Fisheries requested the requirements under Section 3.3 of the *Policy and Guidelines for fish habitat conservation and management* (NSW DPIE, 2013) be adhered to and consideration should be given to Section 6.4 of the Policy regarding DPIRD Fisheries policy and guidelines for managing ICOLLs. This REF meets both Section 3.3 and 6.4 requirements.

As the proposed activities would be authorised by licence under the CLM Act a separate Fisheries Permit for dredging is not required. Harm of marine vegetation from these works should be avoided. Should this be required, then it would need to be minimised, and the works would trigger a permit to harm marine vegetation under s.205 of the FM Act. DPIRD Fisheries also required that consideration should be given to the potential for fish kills from the proposed entrance opening regime. The water quality in Lake Conjola is known to have long periods of stratification. There could be some potential for fish kills from release of the upper oxygenated layer on entrance opening. Monitoring of fish kill events to determine causes should be undertaken to inform future revisions of the EMP.

The response received form DCCEEW - NPWS highlighted the following considerations, specifically relating to the presence of endangered shorebirds around the lake entrance:

- The draft EMP identifies threatened migratory shorebirds as a key consideration in work planning however there are additional endangered non-migratory shorebird species (Pied Oystercatcher and Hooded Plover). These species at times utilise the beach and dune system surrounding the entrance and may be impacted by the excavation and storage of sand, particularly sand placement area immediately to the south-east of the entrance (Figure 1-1) would need to take this into consideration.
- The draft EMP identifies the spit south of the entrance as the preferred placement area for sand excavated from dry notch maintenance subject to migratory shorebird nesting. The natural profile of the sandspit as a relatively flat, open expanse is a key factor in the selection of the site by nesting migratory birds and therefore consideration should be given to how the storage of sand on the southern spit outside of the nesting season could impact the overall suitability of the site.
- The extent of use of the site by endangered shorebirds is variable year to year based on environmental conditions and so communication with NPWS staff, particularly the shorebird ranger, is critical to minimising issues with entrance management works.
- If during the assessment impacts to the national park are detected. NPWS will require consideration of the NPW Act in the context of the objects of the Act under section 2A, how the activity will influence the management principles set for a national park under section 30E and for the nature reserve Section 30J of

the NPW Act. The statutory plans of management below will also apply, and any impact considered against the actions listed:

- Conjola National Park Plan of Management | NSW Environment and Heritage (DECC, 2009), and
- Narrawallee Creek Nature Reserve Plan of Management | NSW Environment and Heritage (DEC, 2006)

- TECs likely at risk from the proposed works are the areas of coastal saltmarsh and swamp sclerophyll forest. The increased movement of sediment during works has the potential to smother areas of saltmarsh within the parks, and with variation of inundation and salinity changes has the potential to impact on floodplain systems.

The following feedback was received from the TfNSW consultation:

- Due to the natural shallow bathymetry of the waterway area surrounding the entrance opening, impacts to navigation would be considered minimal.
- The waterway area from the entrance opening back to the western extent of Chinamans Island is wholly contained within an existing 4 knot powered vessel speed restriction zone, which means that vessels must travel at 4 knots (7km/h) or less at all times.
- Sand of marine origin may migrate up the channel at varying rates under incoming tides whenever the entrance is open. This will require ongoing monitoring and inspection of the placed aids to navigation used to mark the navigable channel. Thus, these aids to navigation, such as port and starboard lateral marks, will need to be reviewed as required.
- TNSW – Maritime can publish a Marine Notice for vessel operators providing safety advice about potential hazards, special events and waterway closures. These navigation warnings alert people to hazardous conditions on NSW waterways and warn vessel operators of dangerous changed circumstances, or potential hazards.
- TNSW – Maritime may prohibit or regulate the operation of vessels pursuant to section 12 of the Marine Safety Act 1998, if a special event in any particular waters may affect the safety of navigation.

## 4.2 Community Consultation

The Council will put this REF on public exhibition for community information upon completion as per clause 171 of the *Environmental Planning and Assessment Regulation (2021)*. Consultation with LALC and local indigenous community is recommended for Native Title Claims and/or sensitive cultural sites existing across the entrance area.

# 5 ASSESSMENT OF ENVIRONMENTAL FACTORS

Section 171 of the EP&A Regulation lists the environmental factors to be investigated when considering the likely impact of an activity on the environment under Part 5 of the EP&A Act. An assessment of the proposed activity against these environmental factors has been undertaken (Table 5-1).

**Table 5-1 Assessment of section 171 (EP&A Regulation) environmental factors**

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 1. The environmental impact on the community | Negligible/Positive | The subject site is located within Crown land and is frequently used by the public for social and recreational activities.<br><br>Minimal negative impact is expected while the works are undertaken. Positive impact is expected in the form of flood mitigation and from the sand nourishment aiming to strengthen the foreshore to coastal hazards.<br><br>Section 6 provides a full assessment of potential impacts on community. |
| 2. The transformation of the locality | Negligible/Positive | The subject site is an ICOLL and will remain as such, maintaining the range of current beneficial uses. There will be transformation of the locality from the beneficial reuse of excavated sand creating a more resilient coastal area through sustainable engineering techniques. |
| 3. The environmental impact on the ecosystems of the locality | Negligible/Negative | The ecosystems in the locality range from aquatic, intertidal and terrestrial. Impacts to flora and fauna can result from all aspects of the works.<br><br>As the works are proposed to be conducted throughout the year, impacts on threatened shorebirds and habitats may occur. A biodiversity conservation licence to harm for the works is required if Council seek to conduct works within the designated buffer zones.<br><br>In other instances, analysis indicates the impact on these ecosystems is considered minimal given the assessments carried out and with the implementation of mitigation controls. Refer to Section 6.4 for further information on this analysis. |

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 4. Reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality | Negligible/Negative | There would be minimal impact on the aesthetic, recreational, scientific or other environmental qualities or value of the locality as per above and as detailed in Section 6.10.<br><br>During the works there will be impacts from machinery and plant (noise, access restrictions etc.), but it is expected to be very infrequently and for short periods of time (up to one day). |
| 5. The effects on any locality, place or building that has –<br><br>(i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or<br><br>(ii) other special value for present or future generations | Negligible | The subject site has no significant aesthetic, architectural, cultural, historical, scientific or social values likely to be impacted on by these activities. The site is highly disturbed due to its location at the lake entrance. |
| 6. The impact on the habitat of protected animals, within the meaning of the *Biodiversity Conservation Act 2016*) | Negligible/Negative | Threatened shorebird habitat will likely be impacted by the proposed works. A biodiversity conservation licence to harm from DCCEEW Biodiversity Conservation Science is required for habitat disturbance. Without the licence, the 200m (from the temporary fence or a nest if it is located outside the fence) and 50m (from any bird) buffers need to be maintained also in flood events unless the nesting bird can be relocated by a suitably qualified person.<br><br>Other habitat of protected species that occur in the Shoalhaven LGA, will not be significantly impacted by the proposed activities.<br><br>Refer to Section 6.4 for details. |

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 7. The endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air? | Negligible/Negative | The impact on threatened flora and fauna that have been recorded within the locality have been considered in association with the proposed activities.<br><br>The entrance, where the main impact will occur, contains limited animal, plant, or other form of life habitat. The main risk lies within the disturbance of threatened shorebirds and habitat during works. This would be mitigated through a licence to harm from NPWS for when impact cannot be avoided. Without the licence, the 200m (from the temporary fence or a nest if it is located outside the fence) and 50m (from any bird) buffers need to be maintained<br><br>Other impacts can be suitable managed through the mitigation measures recommended in Section 6.4. |
| 8. Long term effects on the environment | Negligible | The site is highly dynamic and subject to major influences from natural processes. The lake entrance is generally heavily disturbed by water flows and sand movements. The trigger level is within the natural opening regime, and excavation works will occur within the natural bounds of the entrance berm levels.<br><br>Minimal sand accumulation may occur at the entrance berm, if the hydraulic gradient between estuary and ocean level is not sufficient to fully scour the entrance during a breakout. However, this will be of minimal impact.<br><br>The proposal is not expected to alter these processes in a significant way or beyond the natural regime, with therefore a negligible long-term impact on the environment. |

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 9. Degradation of the quality of the environment | Negligible/Positive | No degradation of the quality of the environment is expected.<br><br>Sand movement within the area occurs naturally, with the proposal aiming to control sand movement for asset protection and flood mitigation works. The beneficial reuse of excavated/dredged sand will increase the resiliency of the foreshore areas to coastal hazards.<br><br>No detrimental impact to flora and fauna is expected, with the potential exception of shorebirds. Long-term or long-lasting impact on aquatic ecosystems inclusive of microfauna and mesofauna such as invertebrates through the input of sediments or nutrients into the ecosystem is unlikely.<br><br>The proposed activity is unlikely to introduce weeds or pests to the area or contaminate the substrate within the subject site.<br><br>The mitigation measures in Section 6.4.4.2 will minimise any potential impacts. |
| 10. Risk to the safety of the environment | Negligible/Positive | The proposed activities would not increase the levels of risks to the safety of the environment that may occur in response to hazardous wastes, bushfire, flood, landslip or coastal hazard. The proposed works would reduce the impacts of a flood event. |
| 11. Reduction in the range of beneficial uses of the environment | Positive | The subject site has a variety of beach and ocean related recreational values. In general, the beneficial uses of the area will not be impacted. However, sand nourishment would improve the useability by mitigating the foreshore and dune erosion. |

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 12. Pollution of the environment | Negligible | There is the possibility of degradation of water quality from the proposed works, however with the implementation of mitigation measures the impacts will be negligible. It is unlikely that the activity (with the implementation of mitigation measures) would result in noise, or air pollution, spillages, dust, odours, vibration or radiation.<br><br>The proposed activities are not expected to result in the oxidation of acid sulfate soils and subsequent leaching back into the waterways. |
| 13. Environmental problems associated with the disposal of waste | Negligible | The proposed activities would not result in the generation of trackable waste, hazardous waste, liquid waste, or restricted solid waste as described in the POEO Act. |
| 14. Increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply | Negligible | No natural or other resources that are, or are likely to become, in short supply will have increasing demands in response to the proposed activities. |
| 15. The cumulative environmental effect with other existing or likely future activities | Negligible | The site is not subject to any other activities except public recreational use.<br><br>The works will not have a long-term detrimental effect on available options for future use of the public land and any cumulative impacts of the proposed activities will be negligible. |

| In accordance with Section 171(2) of the EP&A Regulation, Council has considered the following environmental factors: | Assessment of impact | Reasoning |
|---|---|---|
| 16. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions | Positive/Neutral | The main purpose of the proposed activities is to mitigate flooding within the estuary as per the revised Draft *Lake Conjola EMP (2025),* with the estuary forming part of the coastal zone. Positive impacts on coastal hazards are therefore anticipated.<br><br>Sand nourishment would be carried out to mitigate the effects of coastal erosion and will therefore also have a general positive impact on the coastal zone.<br><br>The excavation works would occur within the natural bounds of the estuary opening and closing regime, resulting in no impacts to coastal processes themselves beyond those naturally occurring. |
| 17. Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1 | Negligible | The proposed activities are consistent with *Shoalhaven 2040 Our Strategic Land-use Planning Statement* (Shoalhaven City Council, 2020) and the outcomes of these activities are consistent with Objective 12 of the Illawarra Shoalhaven Regional Plan 2041 (NSW DPE, 2021). |
| 18. Other relevant environmental factors | Negligible | There are no other relevant environmental factors pertaining to the proposed activities. |

*Note – the 'locality' in this context is as per the EP&A Regulation and refers to the subject site and study area within this REF.*

# 6 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

## 6.1 Topography, Geology and Soils

Lake Conjola's catchment is bordered to the west by the Eastern Highlands, a steep escarpment parallel to the coastline. The coast near Lake Conjola features a narrow (<50 km) and deep (approx. 200 m) continental shelf (Roy et al., 1980). According to the NSW Coastal Quaternary Geology Maps (Troedson, A. et al., 2004), Lake Conjola consists of alluvial and estuarine deposits atop sedimentary bedrock. The lake is dominated by Quaternary alluvial sediments like sands, silts, clays, and gravels. The underlying sedimentary bedrock is the Snapper Point Formation from the Cisuralian age (approx. 290.1 - 283.5 million years ago), comprising sandstones, siltstones, pebbly sandstone, and polymictic pebble conglomerate.

The Lake Conjola entrance, when closed, is characterised by an expanse of unvegetated sand with a sparsely vegetated dune at its southern end. The substrate in the entrance area is completely dominated by unconsolidated and unsorted sand with varying amounts of broken shell and drying macroalgae.

### 6.1.1 Acid Sulfate Soils and Erosions

Despite Lake Conjola's entrance identified as potentially containing acid sulfate soils (ASS), including Class 1 ASS, the proposed activities are unlikely to result in the exposure of any such soils. The entrance to Lake Conjola is a highly dynamic area predominantly composed of aeolian and marine sands. It is improbable that ASS is present in the area where the entrance maintenance works will be conducted. Additionally, excavation depths will remain within the levels created by natural openings, noting that historical lake opening activities have not exhibited impacts typically associated with the disturbance of ASS.

### 6.1.2 Impact Assessment

**Table 6-1 Impact assessment checklist for topography, geology and soils**

| Impacts on topography, geology and soils | |
|---|---|
| Will the proposed works impact on erosion prone areas? | Yes ✓ No ☐ |
| Will the proposed works impact on areas containing acid sulphate soils? | Yes ☐ No ✓ |
| Will the proposed works impact on areas with contaminated soil? | Yes ☐ No ✓ |
| Does the project involve the disturbance of large areas (>2ha) for earthworks? | Yes ✓ No ☐ |
| Does the site have constraints for erosion and sedimentation controls such as steep gradients, narrow corridors or is located on private property? | Yes ☐ No ✓ |
| Are there any sensitive receiving environments that are located in or nearby the likely project footprint or that would likely receive stormwater discharge from the project?<br>Sensitive receiving environments include (but are not limited to) wetlands, state forests, national parks, nature reserves, rainforests, drinking water catchments. | Yes ✓ No ☐ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | Yes ✓ No ☐ |

| Impacts on topography, geology and soils |
|---|
| *If yes to any of the above, detail impact:*<br>The excavation works are directly in an erosion-prone area and are designed to induce the temporary erosion (scouring) of Lake Conjola entrance channel to release flood waters. However, the works are designed to mimic natural opening events and as such, will not result in adverse impacts to the estuary. The area of works may be >2 ha, however this area is already disturbed, frequently opening and closing to the ocean. The excavation works will occur within the natural bounds of the estuary opening and closing regime, resulting in no impacts beyond those naturally occurring. The sand nourishment areas are in a frequently disturbed location and are within the dynamic nearshore coastal zone. |

### 6.1.3 Mitigation Measures

**Table 6-2 Mitigation measures for topography, geology and soils**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Contaminated land** | Cease work and contact Project Supervisor immediately if suspected contaminated soil and/or ASS is uncovered. | During activity |
| **Sand stabilisation and restoration** | Dredged/excavated sand shall not be deposited on the vegetated dunes. | During activity |
| | Prior to any dredging activities occurring, the spoil disposal location shall be chosen in consultation with the Council's Lead – Coastal Management and NPWS. This is to minimise impacts to foraging habitat for shorebirds. | Pre-activity |
| | Sand from the dry notch maintenance and berm lowering works may be placed on the spit to the south of the entrance to increase the height of the spit and mitigate storm wash over. Alternatively, sand can be used for beach nourishment to the north, and/or be used for restoration of erosion areas on the surrounding lake foreshore (refer to Figure 1-1). All sand is to be placed above the Mean High Water Mark (MHWM).<br>Consultation with NPWS should be undertaken to choose the best spot based on site conditions. This will include an assessment to either the north or south side, aiming to avoid potential impacts to threatened shorebird species such as Little Terns and Hooded Plovers that prefer to nest in low lying sands spit areas. | During activity |
| | Sand should not be placed below the Mean High Water Mark (MHWM) to avoid undetermined potential impacts on subtidal habitats. | During activity |
| | Sand from the pilot channel excavation should be placed on the spit to the north of the pilot channel, and as far away as practicable from the edge of the pilot channel (i.e. within the reach of the excavator) to reduce the likelihood of the stockpiled sand falling back into the pilot channel prior to opening. | During activity |

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| | Sand placed on the spit to the south of the entrance to increase the height of the spit (dune) should be stabilised with vegetation where possible to reduce transport back into the entrance by wind action. Sufficient width should be retained north of any vegetated dune to accommodate flood flows through the entrance. | Post-activity |

## 6.2 Hydrology and Water Quality

The frequency and duration of an entrance opening is a determinant of the hydraulic character of the Lake, that is, the frequency and magnitude of water level fluctuations. When the entrance is open, water levels are relatively stable, varying across the tidal range; attenuated by relatively shallow entrance (Spurway 2013).

Water levels vary to a much greater extent over a scale of months in response to the combined impacts of rainfall, catchment runoff and evaporation. In the extreme, the water level could potentially rise up to two metres above mean sea level during severe floods (Spurway 2013).

Lake Conjola is classified as a predominantly open lake and historically has remained open for approximately 88% of the time and closed around 12% of the time (RHDHV, 2024).

On average over the past 20 years the entrance has largely been classified as open. The longest continuous period of open entrance conditions was the period from 1971 to 1986, a period of 15 years – which was a period of above average rainfall and increased storm frequency. Furthermore, the lake was open to sea between 1998 to 2010, a period of 12 years. These static entrance conditions were characterised by calmer sea conditions (as well as the occurrence of a number of minor to moderate rainfall events in between these periods). Historical fluctuations in the lake have occurred and the system is likely adaptable to varying conditions.

### 6.2.1 Estuarine Water Quality

The physical and chemical water quality parameters within ICOLLs can be highly variable due to the combined effects of catchment runoff (and any entrained contaminants), entrance dynamics, a tendency to stratify under certain conditions, and the influence of groundwater inputs from surrounding low-lying catchments. While these conditions can vary relative to permanently open tidal systems, in many cases this variation should be considered natural and an integral part of the greater coastal ecosystem (DPIE, 2021).

Council and the NSW State Government (DCCEEW-CPHR) have been undertaking water quality monitoring and assessment against a range of parameters for a number of years. Implementation of the NSW Natural Resources Monitoring Evaluation and Reporting (MER) Strategy 2010-2015 provided the drive for many councils to consolidate their previous programmes into the standardised MER format. The MER program identified trigger values to indicate estuarine conditions which are not desirable for estuarine ecosystem health and should trigger investigation. The CMP stated the parameters to be sampled and the trigger values for each parameter.

The ecosystem health of Lake Conjola has been assessed across a number of different field campaigns since 2008-2009 as summarised in Table 6-3, with the most recent assessment occurring over the 2019–2020 summer, as part of state-wide impact assessment due to the significant NSW bushfires.

**Table 6-3 Lake Conjola Ecosystem Health Water Quality Ratings**

| Year | Chlorophyll a/ Algal Abundance Grade | Turbidity/ Water Clarity Grade | Overall Grade | Data source |
|---|---|---|---|---|
| 2008-2009 | A | A | A | DCCEW * |
| 2010-2011 | B | B | B | Council** |
| 2011-2012 | A | D | B | Wiecek et al.*** |
| 2017-2018 | A | A | A | DCCEEW* |
| 2019-2020 | A | C | B | DCCEEW**** |
| Source: Adopted table from CMP Stage 2 Report B | | | | |

*DCCEEWE online reporting Health of our estuaries/Conjola Lake

**Shoalhaven City Council, Lake Conjola Estuary Ecosystem Health Report Card 2010-2011

***Wiecek et al., 2012 "Monitoring the Ecosystem Health of Estuaries on the NSW South Coast", Coastal Conference Paper

****DPE – Water Quality assessment data sheets – supplied 2021 and

https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw/conjola-lake

A recreational water quality monitoring and assessment program has also been conducted by Council and Shoalhaven Water since 1989 which is publicly accessible at 'Aquadata' website. The majority of sites have only been sampled since 2003. As such, the analysis has been focused on the period 2003-2021 as having the most available data. Key parameters focused on were:

- The presence/absence and concentration of enterococci;
- The presence/absence, relative dates, and volume of rainfall; and,
- Whether the entrance to Lake Conjola was open or closed.

The collated, evaluated and contrasted results were then assessed across the:

- Temporal distribution to ascertain whether there were particular periods of time that were impacted by poor water quality; and,
- Spatial distribution across the waterbody of Lake Conjola to determine if there were particular "hot spots" of poor water quality.

The analysis results were detailed in the CMP Stage 2 Report B (Royal Haskoning DHV, 2023) which indicates that water quality in Lake Conjola is generally is generally very good from an ecological health and recreational amenity perspective – and that this water quality state is generally independent of the entrance condition (whether the entrance is open or closed). Over the last 19 years, a minimum of 85% of all sample results from all locations (single point sampling of sites across the Lake) achieved a Very Good or Good grade. There is low concern for recreational water quality within Lake Conjola, with temporarily lower water quality grades generally associated with rainfall events (indicating catchment-based source(s) as opposed to the entrance condition.

Many residents and tourists prefer the appearance of clear ocean water when the entrance is open and often consider this clarity indicative of a waterway suitable for recreation and human contact. An assessment of recreational health water quality results shows that Lake Conjola is generally a healthy and safe recreational waterbody, regardless of whether the entrance is open or closed.

Concerns related to intermittently closed lakes/lagoons like Lake Conjola (e.g., poor water quality) can be better managed by increasing public awareness of ICOLL environments, addressing public perception, promoting individual and collective behaviour change (e.g., reducing over-fertilization of residential and rural properties), and resolving broader catchment issues (e.g., reducing polluting inputs, relocating or raising assets and infrastructure).

During entrance breakout events, estuaries with Lake Conjola's physical configuration (a long shallow creek and a deeper central basin) can experience a process whereby it is predominantly the surface water layer that drains, leaving behind hypoxic water trapped in deeper parts of the central basin. This process is referred to as 'decanting' (Wiecek, 2001). Furthermore, the drawdown, or rush of water out of the estuary may cause a rapid decrease in oxygen in the water, by drawing the stagnant water out of the upper reaches of the estuary creeks and into the main basin. These processes result in a risk of fish kill events occurring, even in natural breakout situations.

In general, the occurrence of fish kills is highly unpredictable, however a significant mitigating factor is the size of the rainfall event (and hence the quantity of oxygenated freshwater inputs) that initiates breakout. Larger events will tend to cause greater flushing of hypoxic waters with overland runoff and will also result in greater channel scour allowing fish easier passage to the ocean (DPIE, 2021).

Management approaches to reduce the likelihood of fish kills include:

- Supporting of "natural openings" by lowering the beach berm prior to heavy rainfall; and
- Ensuring opening events coincide with rainfall (where possible) – as opposed to undertaking mechanical openings during prolonged dry weather conditions.

It should be noted that the revised draft EMP for Lake Conjola include both of the aforementioned management approaches. Therefore, it is considered unlikely that the proposed entrance management approach would significantly increase the likelihood of 'decanting' and fish kill events relative to the natural baseline condition of the estuary. This is supported by Council's records which have not indicated any historical fish kill events related to artificial entrance opening.

### 6.2.2 Flooding

The extent, duration and depth of flooding at Lake Conjola can be impacted by the entrance opening condition, with a closed condition resulting in increased nuisance flooding. Dry notch maintenance, mechanical berm lowering and pilot channel excavation are strategies presented in the Draft Lake Conjola EMP (2025), aiming to manage and mitigate flood risk for low lying communities surrounding Lake Conjola. Whilst the positive impacts on nuisance flooding are relatively minor (analysis during Stage 2 of the CMP indicated that even a permanently open entrance does not eliminate the flood risk), it can be confidently stated that the proposed works will not *adversely* affect flood risk.

### 6.2.3 Surface Water

The surface water in the immediate vicinity of the entrance (on the estuary side) will be impacted by pilot channel excavation and resultant entrance openings. The entrance opening will cause an increase in salinity and exchange with the ocean and increased tidal modulation. However, entrance opening is a natural process. The pilot channel excavation, berm lowering and maintaining the dry notch will not result in surface water impacts beyond what occurs naturally.

### 6.2.4 Groundwater

Groundwater will not be impacted by dry notch or pilot channel excavation or sand nourishment activities. The excavation will typically not be greater than 1 m in depth and will not reach groundwater or aquifers. The sand

nourishment only involves placing sediment on top of existing foreshore areas and does not require excavation below surface level. Therefore, there will be no adverse impacts to groundwater.

### 6.2.5 Impact Assessment

**Table 6-4 Impact assessment checklist for water quality and hydrology**

| Impacts on water quality and hydrology | |
|---|---|
| Will the proposed works be located within 40 m of any watercourse, lake, lagoon, or wetland. If yes, DCCEEW – Water should be notified, and specific controls and assessments will be required to mitigate any potential impacts. | Yes ✓ No ☐ |
| Will the proposed works involve excavating near a gutter, storm water channel, drain or inlet (within 40 m up stream) | Yes ☐ No ✓ |
| Will the proposed works be undertaken on a bridge? | Yes ☐ No ✓ |
| Is the area flood prone? | Yes ✓ No ☐ |
| Are the works likely to require the extraction of water from a local watercourse or the groundwater? | Yes ☐ No ✓ |
| Will any water discharges be required for the works i.e. from sediment basins, or groundwater dewatering? | Yes ☐ No ✓ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | Yes ✓ No ☐ |
| *If yes to any of the above detail impact:*<br>The proposed works will be located within 40 m of Lake Conjola. DPIRD Fisheries and DCCEEW – CPHR will be notified and specific controls will be adhered to, to mitigate any potential negative impacts.<br>The area is flood prone, and the works are designed to minimise the effects of flooding and reduce risk. The works will not exacerbate flood risk and therefore have a positive impact. | |

### 6.2.6 Mitigation Measures

The proposed activities have potential to impact on the surrounding waterways via runoff. This risk can be minimised through implementation of the following safeguards.

**Table 6-5 Mitigation measures for water quality and hydrology**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Flooding** | Adhere to the framework and procedures in the Draft Lake Conjola EMP (2025) to minimise risk to life, private property and assets due to flooding. | At all times |
| | Follow weather forecasts and flood warnings closely. | At all times |
| | The site should be evacuated and works halted if unsafe conditions occur. This includes extreme wave wash over the berm, or if the estuarine flood waters are expected to naturally overtop the berm, causing unsafe working conditions. | At all times |
| | Do not leave machinery or vehicles parked on the floodplain/entrance berm if unsafe conditions occur. This includes extreme waves wash over the berm, or if estuarine flood waters are expected to naturally overtop the berm, causing unsafe working conditions. | At all times |

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Water Quality** | Water quality of the Lake should continue to be regularly monitored. In circumstances where levels of these analytes exceed guidelines for *recreation water and aesthetics* as described in Chapter 5 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality Guidelines* (ANZECC and ARMCANZ 2000), the Director City Development may consider initiation of activity in consultation with City Development environmental staff. The water quality guidelines and trigger values used by DCCEEW-CPHR should also be considered. | At all times |

## 6.3 Coastal Processes

### 6.3.1 Entrance Berm Behaviour

As with all ICOLLs, the height of the entrance berm is dynamic and variable and results from prevailing coastal processes (Hanslow, Davis, You, & Zastawny, 2000). The NSW Beach Profile Database provides a long-term historical record of entrance dynamics. The database for the Lake Conjola entrance has data spanning from 1945-2024 and therefore is an excellent resource to assess long-term entrance dynamics. The location and extent of each profile is provided in Figure 6-1.

The maximum berm level reached for select profiles, for each survey, is provided in Table 6-6. Green shading indicates a higher berm level, whilst red shading indicates a lower berm level. This shows that profiles towards the southern end of the study area (P2 – P6) typically have a higher berm level compared to other profiles towards the central and northern end of the study area (P7 – P13), and this has remained consistent over the 79-year period.

Table 6-6 further demonstrates that when the entrance is closed, the historical “saddle point” (notch saddle point, NSP) has typically ranged between 1.0 to 2.5 m AHD. Statistical analysis of this saddle point data indicates that the 95% confidence range for the natural saddle point lies between 0.7 and 2.8 m AHD, hence this corresponds to the natural breakout range for the estuary. This analysis is in agreement with the assessments detailed in the CMP Stage 2 Report C (RHDHV, 2023). This indicates that the dry notch maintenance level (1.0 m AHD) and the Pilot Channel Mechanical Intervention trigger (1.2 m AHD) are both within the ‘natural breakout range’ of the estuary. Therefore, the proposed works are unlikely to significantly alter the natural entrance morphodynamics – and this is demonstrated by the infrequent requirement for mechanical openings over the last 20 years.

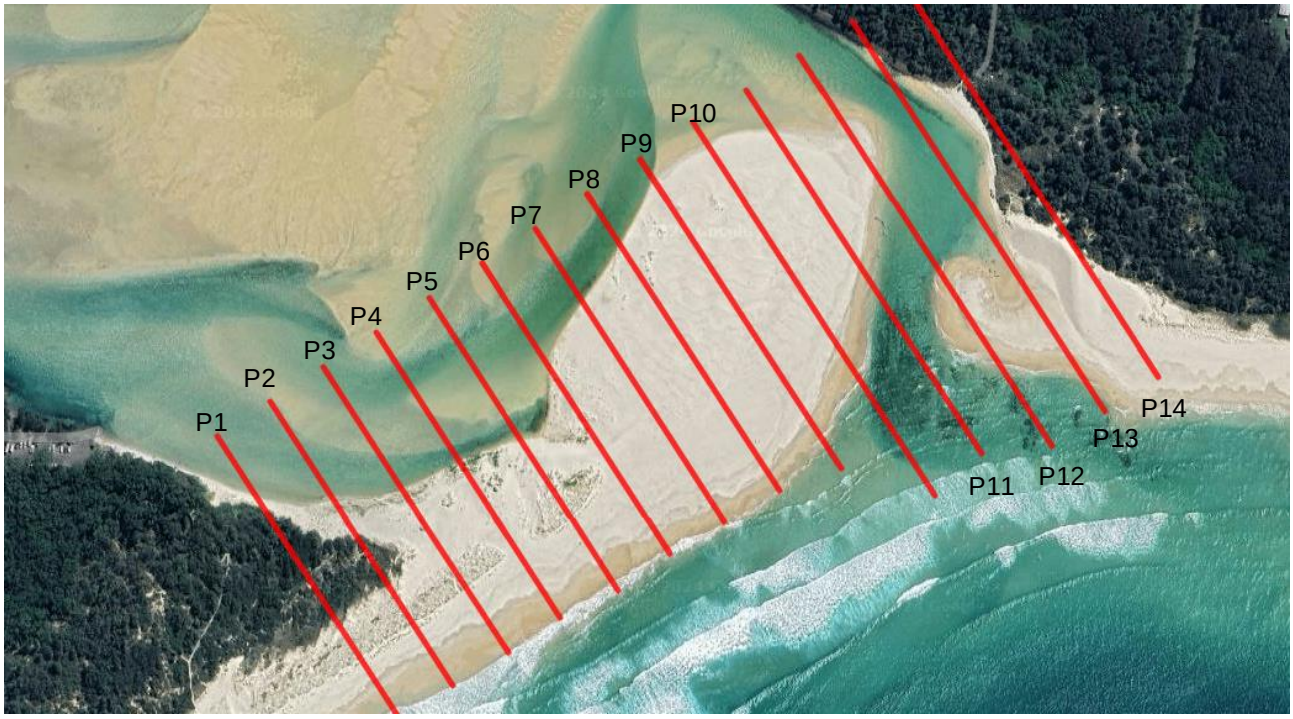



**Figure 6-1 Beach Profiles**

**Table 6-6 Maximum berm height for each profile (mAHD). Green shading indicates a higher berm level, whilst red shading indicates a lower berm level.**

| Year | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | NSP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30/03/1945 | | 8.6 | 5.6 | 3.6 | 3.3 | 2.5 | 2.8 | 2.8 | 4.9 | 3.9 | 4.0 | 3.8 | 2.5 |
| 1/04/1964 | 6.6 | 6.7 | 6.3 | 3.2 | 3.8 | 2.8 | 2.2 | 1.6 | 1.9 | 2.1 | 1.6 | 1.7 | 1.6 |
| 28/06/1981 | 7.2 | 7.3 | 6.0 | 5.3 | 3.7 | 3.1 | 4.0 | 3.8 | 3.5 | 2.7 | 1.7 | 2.4 | 1.7 |
| 14/05/1993 | 6.4 | 7.5 | 6.9 | 5.4 | 1.9 | 2.1 | 1.9 | 2.3 | 1.8 | 1.2 | 1.2 | 1.9 | 1.2 |
| 1/03/1997 | 6.7 | 7.6 | 7.2 | 6.1 | 2.8 | 3.0 | 3.5 | 2.6 | 3.0 | 1.9 | 1.7 | 2.1 | 1.7 |
| 27/11/2014 | 6.6 | 8.3 | 5.6 | 6.9 | 5.5 | 1.5 | 1.8 | 1.6 | 1.0 | 1.4 | 1.9 | 2.2 | 1.0 |
| 20/11/2017 | 7.1 | 7.4 | 6.2 | 7.0 | 5.7 | 3.1 | 2.1 | 2.0 | 2.7 | 3.4 | 4.2 | 5.0 | 2.0 |
| 15/09/2018 | 6.9 | 7.1 | 6.0 | 7.3 | 5.7 | 3.2 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 |
| 16/07/2019 | 7.2 | 7.4 | 5.5 | 7.5 | 5.8 | 3.0 | 2.5 | 2.4 | 3.8 | 5.2 | 6.5 | 6.5 | 2.4 |
| 19/06/2020 | 7.2 | 7.5 | 5.5 | 7.7 | 6.0 | 1.8 | 1.6 | 1.8 | 3.0 | 4.3 | 5.5 | 3.5 | 1.6 |
| 5/12/2021 | 7.3 | 7.8 | 5.8 | 7.0 | 6.8 | 2.4 | 2.2 | 1.9 | 1.7 | 1.5 | 1.2 | 1.9 | 1.2 |
| 10/10/2022 | 7.7 | 8.1 | 6.1 | 6.9 | 6.9 | 2.3 | 3.0 | 3.2 | 2.6 | 3.1 | 2.6 | 3.7 | 2.3 |
| 28/10/2023 | 7.2 | 8.1 | 6.0 | 7.3 | 6.8 | 4.6 | 3.3 | 2.4 | 2.3 | 2.1 | 1.5 | 1.7 | 1.5 |
| 16/11/2024 | 7.5 | 8.1 | 6.0 | 6.9 | 6.9 | 3.0 | 2.4 | 2.5 | 2.5 | 2.1 | 1.3 | 1.7 | 1.3 |
| Max | 7.7 | 8.6 | 7.2 | 7.7 | 6.9 | 4.6 | 4.0 | 3.8 | 4.9 | 5.2 | 6.5 | 6.5 | 2.5 |

| Year | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | NSP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | 6.4 | 6.7 | 5.5 | 3.2 | 1.9 | 1.5 | 1.6 | 1.6 | 1.0 | 1.2 | 1.2 | 1.7 | 1.0 |
| Median | 7.2 | 7.6 | 6.0 | 6.9 | 5.7 | 2.9 | 2.4 | 2.4 | 2.5 | 2.2 | 1.8 | 2.3 | 1.7 |
| Mean | 7.1 | 7.7 | 6.0 | 6.3 | 5.1 | 2.7 | 2.6 | 2.4 | 2.7 | 2.6 | 2.7 | 2.9 | 1.7 |

### 6.3.2 Water Level Impacts

The main purpose of entrance management for Lake Conjola is to facilitate a more timely and effective response to a potential flood event to reduce upstream water levels. However, in an open condition, tide, storm surge and ocean waves can propagate upstream and increase the risk of inundation in low lying areas. It is noted that this impact has been assessed and considered to not be significant for the present-day conditions, and not outweigh the benefits provided by mechanical entrance opening. The shoaled entrance, even if open, would attenuate ocean water ingress and minimise the inundation impacts (RHDHV, 2023). With increased coastal water levels as a result of sea level rise, it is expected the frequency of inundation of low-lying land will also increase. In particular, tidal inundation during open entrance conditions will increasingly become an issue, particularly for the 50-100-year planning period. However, tidal inundation modelling of numerous sea level rise scenarios in Stage 2 of the Lake Conjola CMP determined that entrance management will not resolve this impact (RHDHV, 2023).

Therefore, historical water level fluctuations in the lake have occurred and the system is likely adaptable to varying entrance conditions that would result from the mechanical opening of the entrance.

### 6.3.3 Sand Nourishment

Lake Conjola (including both the entrance and lake foreshore) is part of the Conjola North sediment compartment, which extends from Red Head (Bendalong) to Warden Head. The entrance consists of marine sands, with marine sands forming the large flood tide delta inside the estuary. Therefore, any sand from the entrance berm will be utilised within the same sediment compartment, and will be of similar grain size, colour and composition as local foreshore sands. Therefore, there will be no adverse impacts as a result of using incompatible sands.

Sand sourced from dry notch maintenance will be utilised to raise the height of the spit, as beach nourishment to the north of the entrance, or at key erosion areas around the Lake foreshore. This will result in a more resilient estuarine foreshore and dune system. Nourishment will also only occur above the Mean High Water Mark. This complies with Section 5.2.3 of the DPIRD Fisheries *Policy and Guidelines for Fish Habitat Conservation and Management (2013).* As the volume of sand sourced from dry notch maintenance is expected to be small, safety or visual impacts as a result of sand placement would be minimal.

### 6.3.4 Overall Coastal Process Impacts

The overall impacts on coastal processes are assessed and presented in Table 6-7.

**Table 6-7 Impact assessment checklist for coastal processes**

| Impact | Assessment |
|---|---|
| Will the works avoid or minimises exposure to immediate coastal risks (within the immediate hazard area or floodway)? | Yes ✓ No ☐ |
| Will the works provide for the safety of residents, workers or other occupants onsite from risks associated with coastal processes? | Yes ✓ No ☐ |

| Impact | Assessment |
|---|---|
| Are the proposed works likely to adversely affect the safety of the public offsite from a change in coastal risks? | Yes ☐ No ✓ |
| Are the proposed works likely to increase coastal risks to properties adjoining or within the locality of the site? | Yes ☐ No ✓ |
| Will infrastructure, services and utilities onsite maintain their function and achieve their intended design performance as a result of the works? | Yes ✓ No ☐ |
| Will the proposed works accommodate natural coastal processes including those associated with projected sea level rise? | Yes ☐ No ✓ |
| Will coastal ecosystems be protected from the proposed works? | Yes ✓ No ☐ |
| Will the existing public beach, foreshore or waterfront access and amenities be maintained as a result of the proposed works? | Yes ✓ No ☐ |
| *If impacts are identified, detail impact:*<br><br>(See Table 6-7) | |

**Table 6-8 Mitigation measures for coastal processes**

| Impact | Why | Mitigation Method |
|---|---|---|
| Accommodation of natural coastal processes including those associated with projected sea level rise. | The current level of dry notch maintenance (maintain to 1 m AHD) has not incorporated a sea level rise component in the determination of the dry notch level. | Council's draft *Lake Conjola EMP (2014)* is intended to be used as a short to medium term measure. Council is required to apply for a licence under the Crown Lands Act every five – ten years to undertake entrance management actions in accordance with the EMP. The EMP and REF will need to be reviewed prior to each new application. Future Crown Licence applications and REFs should incorporate an assessment to ascertain if sea level rise should be included in determining dry notch level.<br><br>Additionally, sand will only be deposited above the MHWM. |

## 6.4 Biodiversity

### 6.4.1 Field Assessment

A biodiversity assessment was undertaken for this REF to assess impacts on terrestrial and aquatic biodiversity on and adjacent to the site. The assessment included desktop assessments for both terrestrial and aquatic species, and a field assessment for terrestrial species.

There is a small patch of mapped BV adjoining Ottawa street, located northeast off the York Street boat ramp. The patch is located approximately 290m from the entrance canal in which the works will operate but will not be affected due to being in the dense bushland away from the machinery access point. Furthermore, a small patch can be seen northeast off Chinamans Island, approximately 1.2km from the entrance canal. Both of

these BV patches has been classified as having "Biodiversity Values" under the Coastal Management Act-Littoral Rainforest (Figure 6-2). Sand from excavation and dredging will not be placed in the littoral rainforest. It will be carefully managed in designated areas to preserve the natural state of the rainforest.

The largest significant BV patch in relation to the entrance canal would be the Pattimores Lagoon located southwest of the site.

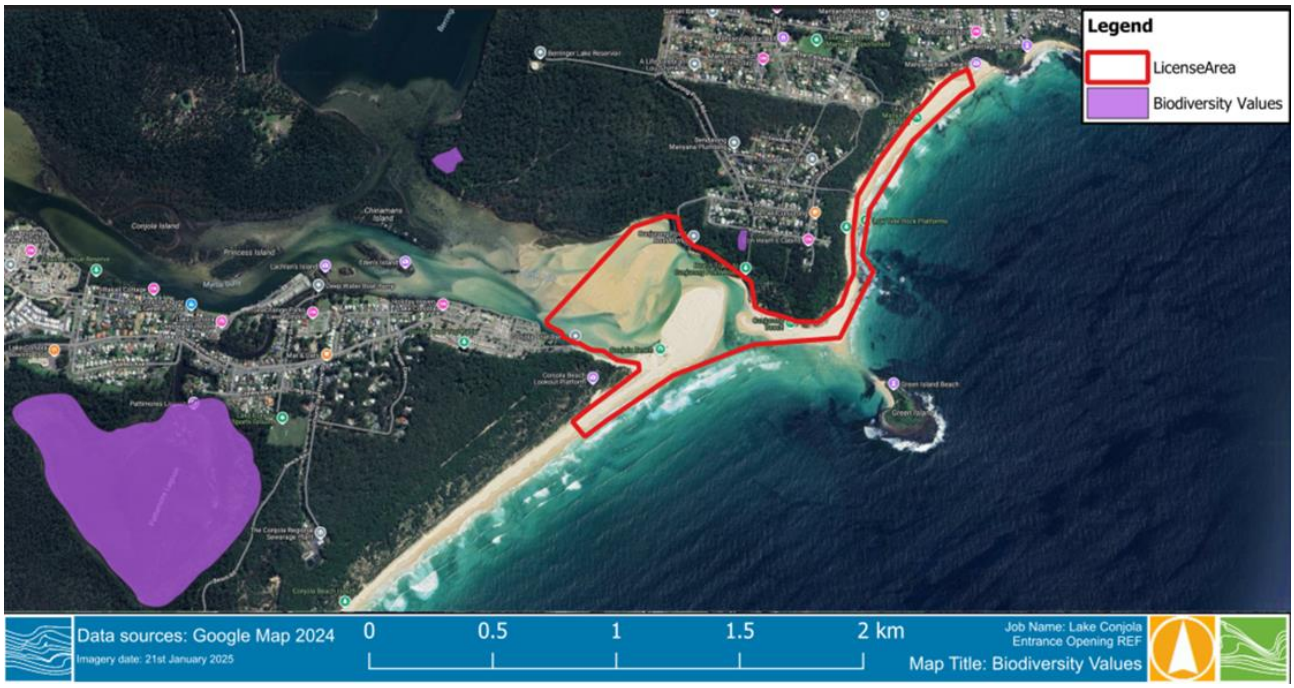



**Figure 6-2 Biodiversity values within Lake Conjola**

A site assessment was carried out on Thursday 14 November by Water Technology ecologist Caroline Weller, environmental consultant Lillian De Torres and Shoalhaven City Council representatives. The conditions were a clear sunny day with a temperature of 21.3°C, with 0 mm of rain recorded in the previous 72 hours. The majority of the assessment was taken by a random meander throughout the edges of the site focusing on the foreshore areas where the excavation and nourishment works will occur as well as all possible access points.

The Plant Type Communities (PCTs) mapped adjacent to the site include (Figure 6-4):

- PCT 3410 - Spinifex Strandline Grassland
- PCT 3788 - Coastal Foredune Wattle Scrub
- PCT 3638 - South Coast Sands Bangalay Forest
- PCT 3805 - Southern Sandplain Heath
- PCT 4097 – Samphire Saltmarsh

Some of the above PCT's are listed as Threatened Ecological Communities (TECs). As these are adjoining the works area; they would be areas requiring to be ground-truthed to confirm PCT presence. Areas that had threatened species mapped onsite were assessed with a rapid targeted assessment. Potential habitat features were also assessed and habitat for threatened species were focused on. In this case the assessment was focused on the shorebird nesting zones which was fenced off for protection measures.

### 6.4.2 Terrestrial Flora

There are multiple PCTs found in the assessment area including:

*PCT 3638 - South Coast Sands Bangalay Forest*. This PCT is associated with Bangalay Sand Forest of the Sydney Basin and Southeast Corner bioregions and the Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which are listed as Endangered under the NSW BC Act.

*PCT 3805 - Southern Sandplain Heath*. This PCT has associations with the Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion which is listed as Critically Endangered under the NSW BC Act. It also has associations with the Eastern Suburbs Banksia Scrub of the Sydney Region which is listed as Critically Endangered under the federal EPBC Act.

*PCT 3922 - Sydney Coastal Sand Swamp Scrub*. This PCT is associated with the Sydney Freshwater Wetlands in the Sydney Basin Bioregion which is listed as Endangered under the NSW BC Act.

*PCT 4097 - Samphire Saltmarsh*. This PCT is associated with the Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions and the Shorebird Community occurring on the relict tidal delta sands at Taren Point which are both listed as Endangered under the NSW BC Act. This PCT is also associated with the Subtropical and Temperate Coastal Saltmarsh which is listed as Vulnerable under the federal EPBC Act.

PCT 4027 - Estuarine Swamp Oak-Mangrove Forest. This PCT is associated with Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions which is listed as Endangered under the NSW BC Act. It also has associations with Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and Southeast Queensland ecological community which is listed as Endangered under the federal EPBC Act.

PCT 3788 - Coastal Foredune Wattle Scrub. This PCT is not associated with any TECs.

PCT 3273 - South Coast Lowland Shrub-Grass Forest. This PCT is not associated with any TECs.

PCT 3410 - Shoalhaven Lowland Wet Gully Forest. This PCT is not associated with any TECs.

PCT 3654 - Shoalhaven Lowland Bloodwood Shrub Forest. This PCT is not associated with any TECs.

The majority of the vegetation found on site that is likely to be affected by machinery used as part of the proposed works were coastal groundcovers such as Spiny-headed Mat-rush (*Lomandra longifolia*), Coastal Spinifex (*Spinifex sericeus*) and Strand Sedge (*Carex pumila*). These species are very hardy and are not likely to suffer long term impacts after being driven upon. Shrub layers nearby that may also be affected by the proposed works include Coastal Wattle (*Acacia sophorae*), Tree Broom-heath (*Monotoca elliptica*) and Tea Tree (*Leptospermum sp*). There were a few canopy trees recorded from the carpark to the beach including the Coastal Banksia (*Banksia integrifolia* subsp. *integrifolia*) and Swamp Oak (*Casuarina glauca*). These are unlikely to be affected by the machinery movement that would be required for the works.

A significant portion of the species found on site were indicative species from the multiple PCTs mapped therefore it is difficult to differentiate PCT boundaries for accurate ground truthing. It would be safe to assume that the PCT mapping is correct from the type of dominant species found on site.

Native vegetation found on site was dominated by species such as Coastal Banksia, Coastal Wattle, Coastal Spinifex and Spiny-headed Mat-rush. Exotic species found include American Sea-rocket (*Cakile endentula*) and Bitou Bush (*Chrysanthemoides monilifera* subsp. rotundata). Bitou Bush was the only Weed of National significance (WONS) found; however, it is unlikely to be spread by machinery used as part of the proposed work, due to it being located within proximity of the secondary access point and away from machinery access routes. Overall, site is in good condition with minimal weed incursion.

It is expected that the only vegetation to be affected would be the coastal groundcovers which are generally hardy and likely to withstand being driven on by machinery. Nevertheless, care should still be taken to avoid the vegetated areas to minimise vegetation impact and the spread of weeds as much as possible.

A list of species identified on site is presented in Table 6-9 Native Flora List and Table 6-10 Exotic Flora List. Vegetation likely to be affected around the main access point and the secondary access point can be seen in Figure 6-4. A picture of the Bitou Bush amongst acacias can be seen in Figure 6-5.

**Table 6-9 Native Flora List**

| NATIVE SPECIES | |
|---|---|
| Scientific Name | Common Name |
| **Canopy species** | |
| *Banksia integrifolia subsp. integrifolia* | Coast Banksia |
| *Casuarina glauca* | Swamp Oak, Guman (Cadigal) |
| *Eucalyptus botryoides* | Southern Mahogany, Bangalay |
| *Notelaea sp* | Mock-olive |
| **Midstorey species** | |
| *Acacia sophorae* | Coastal Wattle |
| *Correa alba* | White Correa |
| *Leptospermum sp.* | Tea Tree |
| *Monotoca elliptica* | Tree Broom-heath |
| *Myoporum sp* | Boobialla |
| **Climbers/Scramblers** | |
| *Cissus antarctica* | Kangaroo Vine |
| **Groundcover species** | |
| *Atriplex sp* | Saltbush |
| *Carex pumila.* | Strand Sedge |
| *Carpobrotus glaucescens* | Pigface |
| *Dianella caerulea* | Blue Flax-lily |
| *Geranium solanderi* | Native Geranium |
| *Hydrocotyle sp.* | Pennywort |
| *Juncus sp* | Rush |
| *Lomandra longifolia* | Spiny-headed Mat-rush |
| *Spinifex sericeus* | Coastal Spinifex |
| *Tetragonia tetragonioides* | NZ Spinach, Warrigal Greens |

Table 6-10 Exotic Flora List

| WEED SPECIES | | |
|---|---|---|
| Scientific Name | Common Name | WONS WEED (*) |
| **Canopy species** | | |
| N/A | | |
| **Midstorey species** | | |
| *Chrysanthemoides monilifera* subsp. *rotundata* | Bitou Bush | * |
| **Climbers/Scramblers** | | |
| *Asparagus aethiopicus* | Ground Asparagus | * |
| **Groundcover species** | | |
| *Cakile endentula* | American Sea-rocket | |
| *Cynodon dactylon* | Couch | |
| *Crinum asiaticum* | Mangrove Lily | |
| *Lagurus ovatus* | Hare's-tail Grass | |
| *Salicornia europaea* | Common Glasswort | |

### 6.4.3 Aquatic Flora

There have been past recordings of aquatic flora in Lake Conjola, including seagrasses such as Eelgrass (*Zostera spp.*) and Paddle Weed (*Halophila sp.*) No aquatic flora, such as sea grasses, were observed during the site assessment, however, it should be noted that the survey method primary consisted of a terrestrial walkthrough. No aquatic specific survey methods were involved (i.e. use of waders and boat) thus reducing the chances of finding detailed aquatic flora specimens. However, as populations of these species can spread into new areas, a pre-works survey prior to any excavation of the pilot channel must occur. Harm of marine vegetation from these works should be avoided. Should this be required, then it would need to be minimised, and the works would trigger a permit to harm marine vegetation under s.205 of the FM Act.

### 6.4.4 Terrestrial Fauna

Most fauna found onsite primarily consisted of coastal birdlife. Other non-migratory species found in the area include the Black Bittern (*Ixobrychus flavicollis*) which is listed as Vulnerable under the NSW BC Act.

A full list of the fauna observed during the site inspection can be seen in Table 6-10. An example of a shorebird observed onsite, the Sooty Oystercatcher, can be seen in Figure 6-6.

Table 6-11 Comprehensive Fauna List

| Scientific Name | Common Name | Identification method |
|---|---|---|
| *Zanda funerea* | Yellow-tailed Black Cockatoo | Observed, Heard Call |
| *Eolophus roseicapilla* | Galah | Observed |
| *Chroicocephalus novaehollandiae* | Silver Seagull | Observed |

| | | |
|---|---|---|
| *Pelecanus conspicillatus* | Pelican | Observed |
| *Puffinus tenuirostris* | Mutton Bird, Short-tailed Shearwater (decease 50+) | Observed |
| *Physalia physalis* | Blue bottle | Observed |
| *Egretta novaehollandiae* | White-faced Heron | Observed |
| *Haematopus fuliginosus* | Sooty Oystercatcher | Observed |

**Shorebirds**

Of particular importance for the fauna found on site, was the large fenced off area for shorebirds protection during the nesting period (September through to March). These threatened shorebirds are recorded as protected species and include species such as:

- Eastern Hooded Plover (*Thinornis cucullatus cucullatus*), which is listed as Critically Endangered under the NSW BC Act and Vulnerable under the federal EPBC Act.
- Little Tern (*Sternula albifrons*), which is listed as Endangered under the NSW BC Act.
- Pied Oystercatcher (*Haematopus longirostris*), which is listed as Endangered under the NSW BC Act
- Sooty Oystercatcher (*Haematopus fuliginosus*). which is listed as Vulnerable under the NSW BC Act

Best practice guidelines suggest utilising the "start distance" of a shorebird as a guide to determining buffer zones. This refers to the distance they will allow a threat to approach before the bird will take some form of action (Managing Threatened Beach-nesting Shorebirds, 2008).

A buffer zone of 200 m is expected to be maintained from exclusion zones. Nests may not always be within a fenced off area, and a thorough inspection of the area should be conducted prior to any disturbance by appropriately skilled and knowledgeable person (usually the NPWS Shorebird Ranger, unless otherwise approved). The area utilised by nesting shorebirds will vary - with monitoring and site investigation occur prior to works commencing each day. The preference is buffering to avoid direct harm - 200m is recommended as the preferred greater buffer on the nests, allowing minimal disturbance / adverse outcomes by allowing adults to return to nests/young. Encroaching closer may cause abandonment of nests, displacement of young leaving them open to predation. Refer to the Test of Significance for a detailed evaluation of the proposed works' impacts on the shorebird species.

Another method to determine the correct buffer distance is to rely on the bird's reactionary behaviour. All birds have a 'start distance' (flight initiation distance). This refers to the distance they will allow a threat to approach before the bird takes some form of action, such as flying away, attacking, or just getting up and slowly walking away in hope of leading the threat away from a nest (State of NSW and Department of Environment and Climate Change NSW- Best Practice Guidelines November 2008).

### 6.4.5 Habitat

Potential habitats can be found typically in the form of nests, hollows, cracks and crevices in trees and abandoned buildings, large logs, and drainage pits.

Examples of habitat found on site included the three protected shorebird nesting sites that have been fenced off. These three sites are within the southern spit. The fenced off zone is approximately 50 m from the main works area for the pilot channel and approximately 200 m to the edge of the vegetated zone on the northern

side of the channel, however, this will vary year to year. Without a licence/permit to harm from DCCEEW, the 200 m (from the temporary fence or a nest if it is located outside the fence) and 50m (from any bird) buffers need to be maintained the nesting bird can be relocated by a suitably qualified person. Council is to apply for a licence/permit to harm from DCCEEW for when works are likely to negatively impact threatened fauna habitat.

A full list of the habitat or potential habitat with the nearest coordinates can be found in Table 6-12. Examples of the protected shorebird nesting habitat found on site can be seen in Figure 6-7 and the close proximity of the channel to the fenced off zone can be seen in Figure 6-8.

**Table 6-12 Habitat and/or Potential Habitat List**

| Habitat Form | Coordinates |
|---|---|
| Shorebird nesting zone 1-3 | -35.269561, 150.505704 |


**Figure 6-3 Threatened Species Map within Lake Conjola**

It is expected that mechanical maintenance works may be undertaken all year round, including during the nesting period for maintenance and emergency flood risk reduction. The impacts of the proposed works will be discussed in further detail in Section 7.4.7 below. If any protected fauna is detected in the vicinity of the works or machinery access/egress, works and/or machinery movement will stop immediately and not resume until the animal(s) has vacated the site of its own accord. In the event that a nest or nesting birds are detected, works will cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection. A licence to harm will supersede the mitigation measure in relation to shorebird.

It was noted during the site assessment that a mass tidal washup of over 50+ deceased Mutton birds was observed. This bird, also known as the Short-tailed Shearwater (*Puffinus tenuirostris*), is a migratory bird from the Artic. These birds have been observed to travel up to 15,000 km one-way for its nesting season in Australia. Given the long distance required to travel, it can be expected that some of these birds will not survive this trip. A recent factsheet from Wildlife Health Australia indicated the exertion required as the potential reason for the mass 'wreck' washing ashore this season (Wildlife Health Australia, Nov 2024).

### 6.4.6 Aquatic Fauna

Aquatic threatened species listed under the FM Act that may also be affected by the proposed works due to water level and oxygen changes in the water include:

- Grey Nurse Shark (*Carcharias taurus*) which is listed as Critically Endangered under both the NSW BC Act and federal EPBC Act
- Great White Shark (*Carcharodon carcharia*) which is listed as Vulnerable under both the NSW BC Act and the federal EPBC Act
- Black Rock-cod (*Epinephalus daemelii*) which is listed as Vulnerable under both the NSW BC Act and the federal EPBC Act.

Refer to Appendix F- Assessment of Significance Fisheries FM Act for a detailed impact list to the species.

It should also be considered the potential for fish kills from the proposed entrance opening regime. The water quality in Lake Conjola is known to have long periods of stratification. There could be some potential for fish kills from release of the upper oxygenated layer on entrance opening. Monitoring of fish kill events to determine causes should be undertaken to inform future revisions of the EMP.

### 6.4.7 Results

Impacts on shorebirds is a determining factor for the activities assessed in this REF. Birds that nest only on beaches can easily be subject to disturbance, severely reducing their breeding success. Additionally, intertidal feeding grounds are important for migratory birds, as well as local wading birds, because the availability of an adequate food supply is likely to be a critical factor for their survival. Furthermore, if the birds are disturbed when attempting to rest at roost sites, such as the Lake Conjola entrance, it is energy-consuming and is likely to have a deleterious effect on survival rates.

Potential impacts to threatened shorebirds from the proposed activities can be:

- Direct: disruption during nesting season or when using the habitat potentially causing abandonment of nest, destruction of nest, or death of hatched chicks, juveniles or even adult birds.
- Indirect: deterrence from using the area as a nesting site.

The current Crown land licence stipulates the following buffers to any nesting sites are to be maintained at all times:

- April-September: 50m from any individual migratory shorebirds using habitat, including all plant, personnel and equipment
- October-March: 255m from any nesting shorebirds, including all plant, personnel and equipment.

If a bird is discovered within the relevant buffer from the works or ancillary activities, the works must halt and NPWS be contacted for instruction or to give clearance.

A licence to harm threatened fauna, had not been obtained at the time of writing, meaning that the buffers need to be maintained at all times. This licence can be obtained following issue of a Crown Land licence for the EMP and can become a condition of the Crown Land licence. Guidance for this REF and future works is that the October-March buffer will be 200m.

### Survey works

The survey works may impose temporary disturbance on the shorebirds using habitat or nesting if survey work is undertaken in their presence. Depending on the size of the nesting area, Council may need to collect limited data within the nesting site to ensure it has sufficient data to support the entrance opening decision making process. The duration would be for a few minutes and survey points could be chosen to avoid active nesting sites. The survey should always occur on foot so as to lower the impact and with the intention to spot any potential nests in time to avoid accidental impact. A suitably qualified shorebird expert can attend and supervise the survey and provide advice and exclusion zones.

Alternatively, survey during nesting season could be undertaken using UAV (drones) in order to avoid any potential impacts.

### Pilot channel excavation impact / mitigation.

The exact location of the dry notch, berm lowering and pilot channel excavations will be specific to each entrance opening due to the dynamic nature and changes in topography and the presence of migratory shorebirds. The nominal width should be 2m in length but ideally should be wider upstream where it connects to the lake to increase the initial out flow from the lake and create a natural scour of the breakout channel.

The intertidal feeding grounds are important for long distance migrants and the availability of an adequate food supply is likely to be a critical factor in their ecology. Most wader species in estuaries congregate at high tide in specific roosting sites, such as sand bars, spits, and beaches. There are usually only a limited number of roosting sites for each estuary. Disturbance of birds when they are attempting to rest at roost sites is energy-consuming and is likely to have a deleterious effect on survival rates. Therefore, to mitigate this risk it is best to leave the shorebirds alone as much as reasonably practicable and only disturb the species as a last resort.

The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). The October-March buffer has been revised to 200m for this REF and renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtain at the time of writing this REF, meaning that the buffers need to be maintained at all times.

If shorebirds are present, then works should be stopped immediately to allow the bird to move away on its own accord and if nesting then the works should be reassessed by the Council's Environmental Operations/Assessment Officer and the NPWS Shorebird Recovery Coordinator to find an alternate method to carry out the works with a last resort to rely on the biodiversity conservation licence to relocate the shorebird or nest.

If birds are observed to fly into the site in front of the machinery area of operation, then works should halt immediately to protect the species. Once the bird has flown off on its own accord, then works are able to be continued.

All heavy vehicle mechanical access would ideally drive on non-vegetated areas to get to the pilot channel site, but there under certain conditions it can be expected that the heavy machinery will need to drive over native grassland on the edge of the bushland. These grasses were found to be mostly exotic species with a few native *Lomandra sp* which are likely to experience minimal long term impacts. Therefore, the biodiversity impacts from the heavy machinery are minimal.

Works are usually conducted in times of poor visibility during heavy rain or in the dark which can potentially lead to accidental fatalities for species or nests outside the protective fencing. However, it should also be noted that during times of natural environmental disturbances such as flooding and strong winds, it can have natural impacts to the nesting shorebirds by rapid rises in coastal rivers or lagoons and windblown sand covering eggs and newly hatched chicks, forcing adults to abandon them anyway.

A licence to harm will supersede mitigation measures in relation to shorebirds. The licence may not apply to other threatened fauna.

#### Mechanical berm lowering impact /mitigation

Wave conditions may affect the duration of the berm lowering, and sand accumulation could occur before the Lake opening is achieved. Therefore, it is important to plan berm lowering considering oceanic conditions and the expected timing for the trigger level being met (i.e. the day prior). Details on intervention trigger conditions for mechanical berm lowering are detailed in the draft EMP.

All heavy vehicle mechanical access would ideally drive on non-vegetated areas to get to the pilot channel site, however under certain conditions, it can be expected that the heavy machinery will need to drive over native grassland on the edge of the bushland. These grasses were found to be mostly exotic species with a few native *Lomandra sp* which are likely to experience minimal long term impacts. Therefore, the biodiversity impacts from the heavy machinery are minimal.

The intertidal feeding grounds are important for long distance migrants and the availability of an adequate food supply is likely to be a critical factor in their ecology. Most wader species in estuaries congregate at high tide in specific roosting sites, such as sand bars, spits, and beaches. There are usually only a limited number of roosting sites for each estuary. Disturbance of birds when they are attempting to rest at roost sites is energy-consuming and is likely to have a deleterious effect on survival rates. Therefore, to mitigate this risk it is best to leave the shorebirds alone as much as reasonably practicable and only disturb the species as a last resort.

The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). The October-March buffer has been revised to 200m for this REF and renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtain at the time of writing this REF, meaning that the buffers need to be maintained at all times.

If birds are observed to fly into the site in front of the machinery area of operation, then works should halt immediately to protect the species. Once the bird has flown off on its own accord then works are able to be continued. It is expected this is unlikely due to the noise and vibration will keep the fauna species away until works have completed.

### Maintenance of a dry-notch impact /mitigation

Access for maintaining the dry notch would be from the north, via Cunjurong Point Boat Ramp or Manyana Beach. The location and the width of the dry notch may vary based on local site conditions but must not impact adversely on threatened shorebirds. Council is considering a large dry notch area to work within, to allow operation flexibility and mitigate potential impacts on foraging and nesting shorebirds. Ideally, heavy vehicles would drive on the intermittent rocky outcrop to gain access to the site.

The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). The October-March buffer has been revised to 200m for this REF and renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtain at the time of writing this REF, meaning that the buffers need to be maintained at all times. The intertidal feeding grounds are important for long distance migrants and the availability of an adequate food supply is likely to be a critical factor in their ecology. Most wader species in estuaries congregate at high tide in specific roosting sites, such as sand bars, spits, and beaches. There are usually only a limited number of roosting sites for each estuary. Disturbance of birds when they are attempting to rest at roost sites is energy-consuming and is likely to have a deleterious effect on survival rates. Therefore, to mitigate this risk it is best to not disturb the shorebirds as much as reasonably practicable and only disturb the species as a last resort.

In line with NPWS response to consultation regarding shorebird habitat protection, dry notch maintenance carried out in line with the Crown Land licence buffer areas (50m from any bird outside nesting season) will suitably minimise impacts on shorebirds. Dry notch maintenance should be scheduled for August or September to remove any buildup prior to the commencement of the shorebird nesting season. Sand removal work, including dry notch maintenance, should avoid all vegetated areas (not including individual plants) to minimise disturbance of shorebird nesting habitat. This includes dune grasses, shrubs and other foreshore vegetation. A buffer of 20m around the vegetation should also be left untouched by the sand removal works to not disturb the edge of the vegetation, causing it to retreat and impacting on available habitat for fauna, including shorebirds. If birds are observed to fly into the site in front of the machinery area of operation, then works should halt immediately to protect the species. Once the bird has flown off on its own accord then works are able to be continued. It is expected this is unlikely due to the noise and vibration will keep the fauna species away until works have completed.

A licence to harm will supersede the mitigation measure in relation to shorebird. The licence may not apply to other threatened fauna.

### Disposal of excavated & dredged sand impact mitigation

The dredged/excavated sand will be relocated to another place on site. Prior to works occurring, consultation with NPWS should be undertaken to choose the disposal location on either the north or south side to avoid potential impacts to threatened shorebird species such as Little Terns and Hooded Plovers that prefer to nest in low lying sands spit areas. All operators of plant and vehicles and all personnel on site shall be briefed on relevant actions to reduce environmental impacts and include information on threatened shorebirds birds that are known to be onsite, that may arrive on site, and how to alert a supervisor should a threatened bird be sighted.

Sand spoil mounds should be inspected for beach-nesting bird nests, with a focus on little terns, as they have been known to occupy sand spoil mounds. If any detection of nests is made, spoil movement and placement may require the alternate northern bank access way which has historically been free of nesting shorebirds, but

an assessment by a DECCEEW or council Biodiversity Officer will still be required to conduct to ensure that no threatened birds are within this zone either.

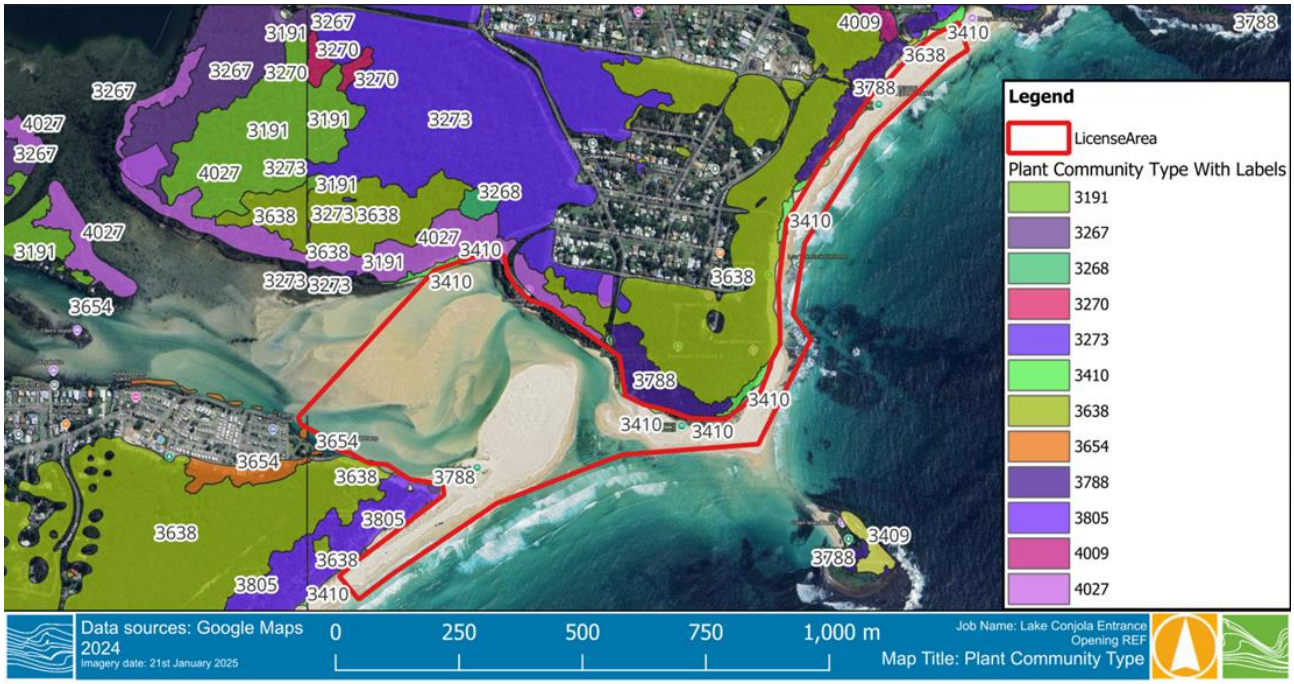



**Figure 6-4 Plant community type within Lake Conjola**

**Figure 6-5 Bitou Bush WONS weed amongst acacias**

**Figure 6-6 Sooty Oystercatcher observed on site**

**Figure 6-7 Example of a smaller fenced off nesting zone with ideal cover for the baby chicks**

**Figure 6-8 Pilot channel to be developed in close proximity to the fenced off nesting zones in the background as seen by the white signage dots**

### Impact Assessment

**Table 6-13 Impact assessment checklist for biodiversity**

| Impacts on biodiversity | |
|---|---|
| Will the works require any vegetation clearing, removal and/or trimming? | Yes ☐ **No** ✓ |
| Do the trees form part of a heritage listing or have other heritage value? | Yes ☐ **No** ✓ |
| Will the proposed works involve the removal or disturbance to fauna habitat (e.g. tree hollows, logs, timber bridges, bush rock, snags)? | **Yes** ✓ No ☐ |
| Are there any known Areas of Outstanding Biodiversity Value or Directory of Important Wetlands in Australia within the vicinity of the proposed works? | **Yes** ✓ No ☐ |
| Are there any endangered ecological communities, populations, threatened flora and/or threatened or protected fauna within the vicinity of the proposed works? | **Yes** ✓ No ☐ |
| Are there any significant weeds present? | **Yes** ✓ No ☐ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | **Yes** ✓ No ☐ |

| Impacts on biodiversity | |
|---|---|
| *If yes detail impact:*<br>There are areas mapped as biodiversity values within the site area but not within the proposed works.<br>There is a known migratory shorebird nesting zone in close proximity to the area proposed for entrance management works. However, this will vary in location year-to-year. Additionally, breeding season occurs during October-March, which means that these shorebirds will not always be present. The majority of the machinery works will occur on the northern spit zone of the pilot channel away from the protected zones.<br>The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). The October-March buffer has been revised to 200m for this REF and renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtained at the time of writing this REF, meaning that the buffers need to be maintained at all times. It should be noted that the nesting sites for one year would be different to the next; therefore, a survey of the nesting sites will need to reoccur at the beginning of each nesting season to minimise the accidental breach of unmarked nests hidden in the area.<br>There was one WONS weed sighted in the form of Bitou Bush amongst some native acacias. This WONS species was found outside the main works zone.<br>Sensitive receiving environments are within the immediate vicinity of the project area. A survey of seagrass beds was undertaken on 20 March 2020. The survey found that there were no seagrass beds in the proposed location of the dredging activities. Similarly, there were no beds in the proposed disposal areas. The closest seagrass beds are within the channel either side of the Cunjurong Point Boat Ramp which are not expected to be impacted. | |

### Mitigation Measures

**Table 6-14 Mitigation measures associated with biodiversity**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Flora and fauna - general** | As part of the site induction process, provide all site personnel with information on the biodiversity values of the study area, including threatened species, Tree Protection Zones (TPZs), no-go areas and responsibilities under relevant environmental legislation. | Pre-activity |
| | If possible, all existing trees should be retained. | Pre- activity |
| | If any protected fauna is detected in the vicinity of the works or machinery access/egress, works and/or machinery movement will stop immediately and not resume until the animal(s) has vacated the site of its own accord. In the event that a nest or nesting birds are detected, works will cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.<br>A licence to harm will supersede the mitigation measure in relation to shorebird. The licence may not apply to other threatened fauna. | Pre-activity |
| | Confine vehicle movements and avoid movement on undisturbed areas. Avoid storing or parking equipment and materials on vegetation or under or close to trees. | During activity |
| | At completion of works, block off and rehabilitate/revegetate any potential access tracks or marks from stockpiles of site compounds made during the works. | Post activity |

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Clearing of vegetation: pre-clearing** | All vegetation to be retained is to be clearly marked out to ensure that no vegetation clearing is taking place within those areas. | During activity |
| | If any damage occurs to vegetation outside of the boundaries of the work site as a result of the implementation of the proposal, the Project Manager will be notified and will establish strategies for mitigation of impacts and site restoration. | During activity |
| **Loss of threatened species and their habitats** | Minimise removal of native vegetation and disturbance of fauna habitat. | During activity |
| | If any protected fauna are detected in the vicinity of the works or machinery access/egress, works and/or machinery movement will stop immediately and not resume until the animal(s) has vacated the site of its own accord. In the event that a nest or nesting birds are detected, works will cease and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.<br>A licence to harm will supersede the mitigation measure in relation to shorebird. The licence may not apply to other threatened fauna. | Pre- activity |
| | Works are not to create a barrier to fauna movement | During activity |
| | The extent of use of the site by endangered shorebirds is variable year to year based on environmental conditions. Consultation with NPWS should be undertaken prior to accessing the site to minimise issues with entrance management works.<br>Council is to establish exclusion zones and buffer areas in consultation with NPWS. | During activity |
| | A suitably qualified shorebird expert can attend and supervise the survey works and provide advice and exclusion zones.<br>A DCCEEW or other approved suitably qualified person shall undertake preclearance surveys for fauna presence prior to works commencing each day and prior to machinery access and egress from site. | Pre-activity |
| **Aquatic habitats and Riparian zones** | Minimise sediment disturbance, erosion and runoff to minimise impact on the littoral rainforest located near the entrance. and aquatic habitats. | During activity |
| | Works should, where possible, be carried out in periods of low rainfall to minimise impacts on threatened aquatic species and TECs on or downstream of the site. | Pre activity |
| | Harm of marine vegetation from these works should be avoided. Should this be required, then it will need to be minimised, and the works will trigger a permit to harm marine vegetation under s.205 of the FM Act. | During activity |
| | A visual inspection of the waterway (ocean and lake in the vicinity of the opening) for dead or distressed fish (including fish gasping at the water surface) shall be undertaken periodically whilst the lake is opened. | As required |

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| | If a Grey Nurse Shark is seen near the machinery when it is operating, excavation/dredging shall cease until the shark leaves the area. If the shark shows no intention of leaving the area, it may be 'encouraged' to do so by striking the surface of the water near the shark with a flat object such as an oar. Under no circumstances shall direct contact (such as hitting or prodding) be made with a shark. | During activity |
| | If Grey Nurse Sharks enter the lake as a result of a mechanical opening and become trapped, their movement, behaviour and health shall be monitored and, if considered necessary, DPI shall be contacted for capture and release of the shark/s. | During activity |
| | Monitoring of fish kill events should be undertaken. | During activity |
| | Work equipment should be washed prior to entering and leaving site to ensure weed material and diseases are not transported and spread. | Pre and Post activity |
| | Weed-infested material should not be stockpiled on land which has native vegetation populations. | During activity |
| **Stockpiling** | Only place stockpiles in cleared sites without tree or shrub cover, as specified above in consultation with NPWS. | During activity |
| | Use existing stockpiles before creating new ones. | During activity |
| | Impacts to seagrass will be minimised by ensuring a minimum 5 m buffer zone from sand nourishment activities, and only nourishing areas above MHWM. This will minimise burial of seagrass from the additional sand or increases in turbidity. | During activity |
| **Site restoration and revegetation** | Revegetation with local native species should occur once the works are finished. Groundcover should be established across the site to prevent erosion. | Post activity |
| | The rehabilitation of disturbed areas will be carried out progressively as works are completed. | Post activity |

## 6.5 Heritage

Under Section 86 of the NPW Act it is an offence to disturb, damage, destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm and object without an AHIP (Section 87(2) of the Act). The DCCEEW created the Due Diligence Guidelines to help individuals and organisations exercise due diligence and determine if they need an AHIP when their activities may harm Aboriginal objects in New South Wales.

In accordance with the Due Diligence Guidelines (DECCW 2010), searches on the Aboriginal Heritage Information Management System (AHIMS), NSW State Heritage Inventory and the Australian Heritage Database have been undertaken. The AHIMS indicated that there are two recorded Aboriginal sites within the vicinity of the proposed works. Both sites are exposed shell middens located at Lot 7022 DP 1031073 and Lot 7006 DP 1031131 (Figure 6-9 and Figure 6-10). The actual extent of the middens below the surface is likely to be larger than that shown.

Regardless, the works can easily avoid the midden located at Lot 7022 DP 1031073 as it is within the vegetated dune, as such vehicles and equipment would be prevented from accessing/impacting. The second midden at

Lot 7006 DP1031131 is submerged in water (Figure 1-1 and Figure 6-10). Due to the high level of disturbance from water flows within the estuary, it is considered likely that any Aboriginal artefact within the entrance area would have been washed away.

The site of the proposed activities is classified as "disturbed land" due to continuous disturbance from natural and dynamic watercourse and coastal processes. Further assessment is not required, as no impacts to recorded Aboriginal heritage sites are expected due to the proposed works. An AHIP will not be needed for the works.

There is an undetermined Aboriginal land claim on Lot 7048 DP 1094554, which is within the dry notch area, mid-spit. There are separate undetermined claims along most of the northern foreshore. An assessment of Native Title Future Acts will be facilitated by Council. It is noted that Council has previously conducted this assessment in 2023, under the current Crown Land Licence – Lake Conjola Entrance Management (2021). It was found that as the works is classified as Subdivision L (Low Impact Future Acts) *under the federal Native Title Act 1993* as the works involves "excavation or clearing that is reasonably necessary for the protection of public health or public safety". There are no procedural requirements. The above act will not extinguish Native Title – the non-extinguishment principle applies. As this REF is of the same nature, it is not anticipated that this outcome will change. Additionally, Council will notify the applicable LALC prior to exhibition. Further consultation will be undertaken by Crown Lands when applying for a Crown Land License to undertake the works.


**Figure 6-9 AHIMS search at Lot 7022 DP 1031073 with the buffer of 50 metres**

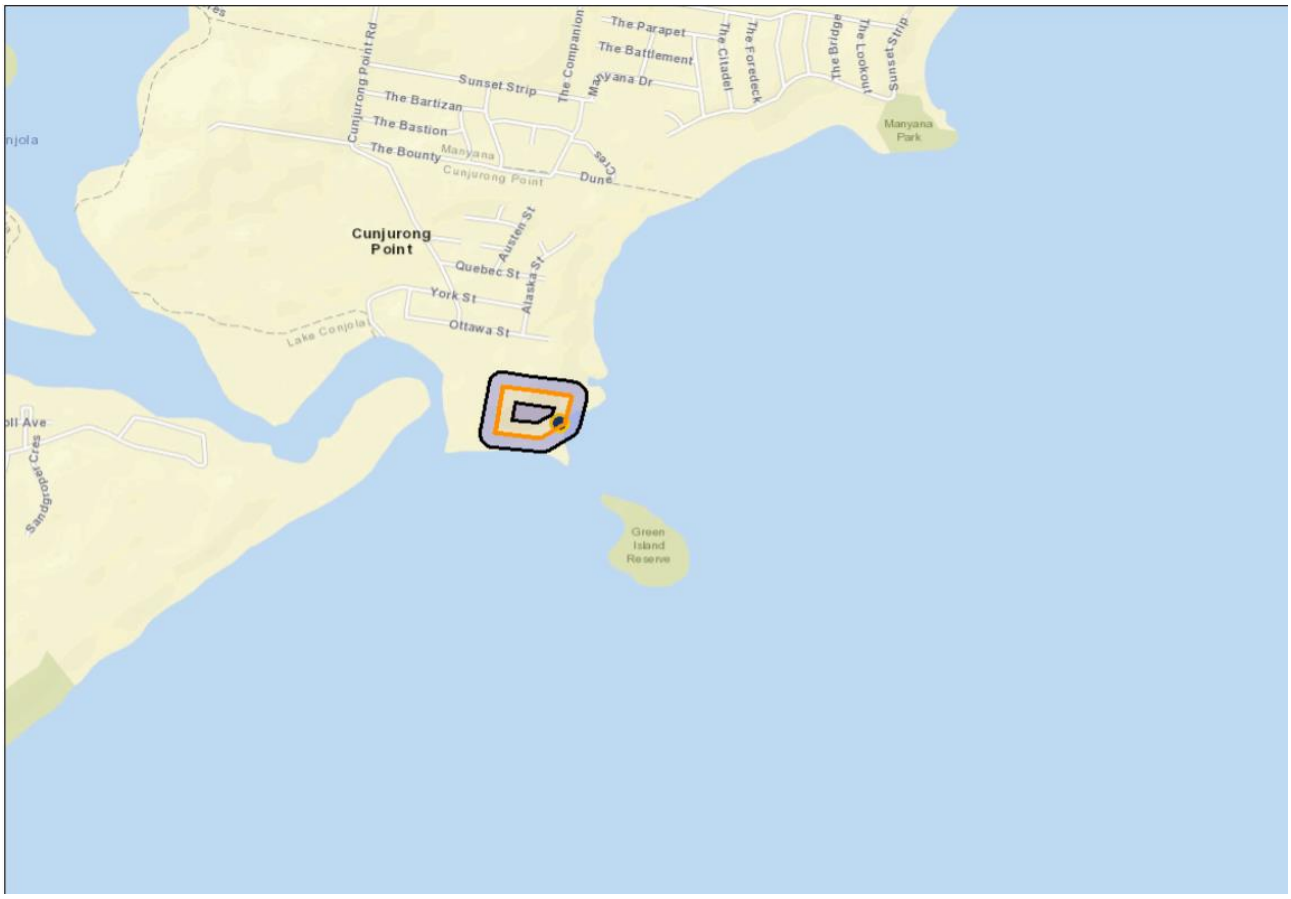



**Figure 6-10 AHIMS search at Lot 7006 DP 1031131 with the buffer of 50 metres**

There are 15 heritage items and heritage conservation areas within the greater Lake Conjola area, reflecting a number of post-colonisation locations and items. These are listed within the Shoalhaven LEP 2014 Schedule 5 - Environmental Heritage and are shown in Table 6-15. None of the heritage items are in the vicinity of the proposed activities and will not be impacted by the works.

**Table 6-15 Heritage items and heritage conservation areas listed within Shoalhaven LEP 2014**

| Suburb | Description | Location |
|---|---|---|
| Lake Conjola | Whitaker's Island View Resort (former) | 2 Aney Street |
| Conjola | Conjola timber trestle bridge | Murrays Road |
| Conjola | Murray Family Cemetery | 40 Murrays Road |
| Conjola | Conjola Cemetery | Princes Highway |
| Yatte Yattah | The Sheaffe Family Cemetery | Pointer Road |
| Yatte Yattah | Roman Catholic Church (former) and cemetery (former) | Princes Highway |
| Yatte Yattah | Yatte Yattah Nature Reserve and 2 Waterfalls | Princes Highway and 67B Skye Farm Lane |

| Suburb | Description | Location |
|---|---|---|
| Yatte Yattah | “Woppindally”—early Victorian Georgian farmhouse and dairy farm complex | E280 Princes Highway |
| Yatte Yattah | “Kendall Dale”—dairy farm complex including homestead and garden | E379A Princes Highway |
| Yatte Yattah | Quercus robur (English Oak trees - 2) on driveway entrance | E379A Princes Highway |
| Yatte Yattah | “Kirmington”—Mid-Victorian Georgian farmhouse, dairy farm complex and Henry Kendall monolith | E379B Princes Highway |
| Yatte Yattah | Industrial building (former Yatte Yattah cheese factory) | E380 Princes Highway |
| Yatte Yattah | “Boolgatta”—Victorian residence, dairy farm complex and barn | E402D Princes Highway |
| Yatte Yattah | Former Yatte Yattah Public School and schoolmaster’s residence | 8A Tierney Road |
| Yatte Yattah | “Hillview” Private Cemetery | 8B Tierney Road |

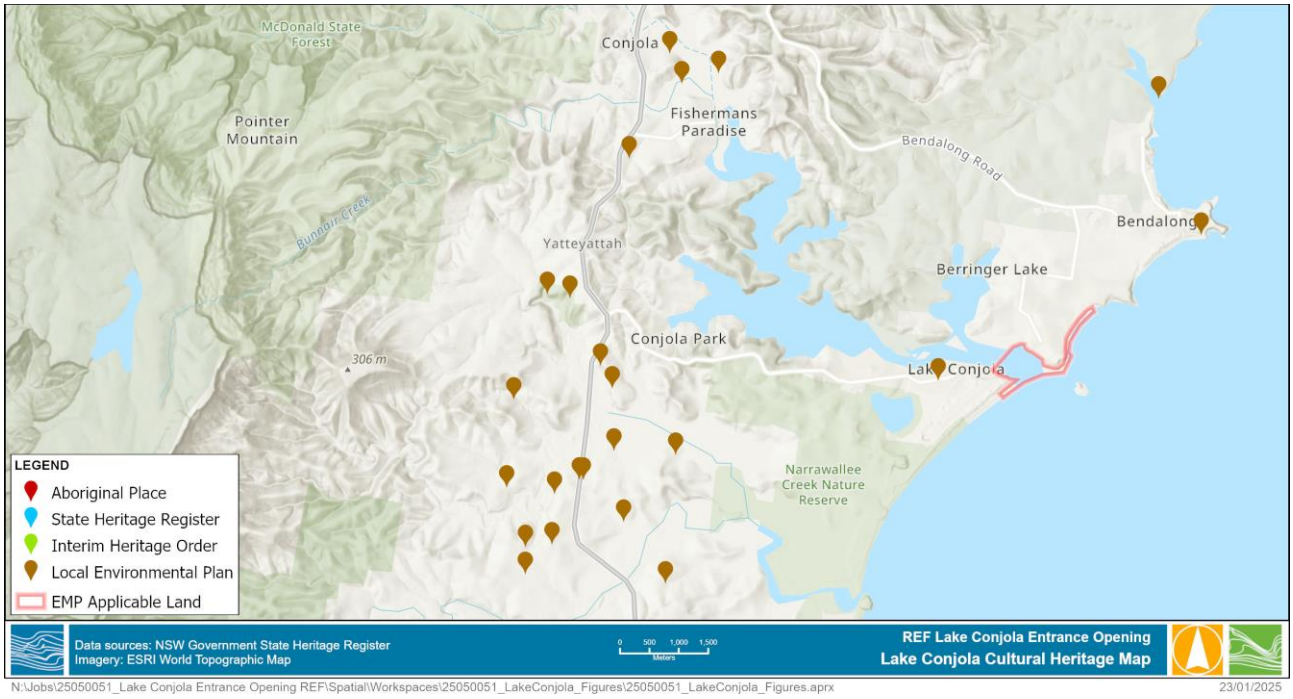



**Figure 6-11 Cultural heritage map**

### 6.5.1 Impact Assessment

The proposed works have the potential to impact the two recorded Aboriginal sites at Lot 7022 DP 1031073 and Lot 7006 DP 1031131. This risk can be minimised through the implementation of the mitigation measures in Table 6-16.

**Table 6-16 Impact assessment checklist for heritage**

| Impacts on heritage | |
|---|---|
| Does the project pose any potential risk to any identified Aboriginal heritage? | Yes ✓ No ☐ |
| Will the project excavate large areas of undisturbed (virgin) land? | Yes ☐ No ✓ |
| Will the works remove large stands of vegetation which could potentially contain scar trees. | Yes ☐ No ✓ |
| Will the works be located within or in the vicinity of waterways? | Yes ✓ No ☐ |
| Has an Aboriginal Due Diligence Assessment been completed? | Yes ☐ No ✓ |
| Does the project pose any potential risk to any identified non-Aboriginal heritage? | Yes ☐ No ✓ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | Yes ✓ No ☐ |
| Are there any items of non-Aboriginal heritage located within the vicinity of the proposed works? | Yes ☐ No ✓ |
| Does the project pose any potential risk to non-Aboriginal heritage? | Yes ☐ No ✓ |
| *If yes detail impact:*<br>The works are undertaken along the Lake Conjola entrance. Two Aboriginal sites are registered in the vicinity of the work area. The nearby local heritage items will not be impacted by the proposed works, however, any potential impacts to Aboriginal heritage can be minimised by the mitigation measures below (Table 6-17). | |

### 6.5.2 Mitigation Measures

**Table 6-17 Mitigation measures for heritage**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Aboriginal Heritage** | Access to Aboriginal site locations must be restricted for vehicles and equipment to minimise impact. Activities such as storing dredged sand should be avoided in these areas to preserve their integrity. | At all times |
| | All contractors / Council staff employed in the project shall be made aware of the presence of the midden on the northern bank and told to avoid disturbance by ensuring all plant movements should avoid the midden, in accordance with the Environmental Management Plan. | Pre-activity |
| **Heritage - unexpected finds** | If any items defined as relics or archaeological remains under the NSW *Heritage Act 1977* are uncovered during the works, all works must cease in the vicinity of the finds and Council's Environmental Officer contacted immediately. Council should then inform the relevant Local Aboriginal Land Council and DCCEEW of this finding. | During activity |

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Aboriginal heritage - unexpected finds** | Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol.* | Pre-activity |
| | If, during the proposed works, any Aboriginal objects or evidence of Aboriginal occupation are uncovered, all work must cease in the vicinity of the suspected Aboriginal objects or evidence of occupation, and further advice should be sought from a qualified and experienced archaeologist, in accordance with the unexpected finds protocol. | During activity |
| | Monitoring of the dunes shall occur to document any indirect impact the opening may have on recorded and unrecorded Aboriginal heritage sites (e.g. additional scouring). | During activity |

## 6.6 Noise and Vibration

Heavy machinery such as an excavator and dump trucks will be used for works and is likely to generate minimal noise during works. The duration of the works for each mechanical excavation activity will last for a short period of time for each occurrence, thereby minimising noise duration and impact. The disposal of excavated sand will also generate minimal noise. For these reasons, the overall impacts from noise and vibration will be minimal.

The main sensitive receivers would be the nesting shorebirds and aquatic species. These shorebirds and aquatic species may be impacted by noise from the works, but the expected disturbance from this is expected to be minimal.

Noise may travel further over water, increasing the potential impact area. These noise impacts are not expected to be significant.

### 6.6.1 Impact Assessment

**Table 6-18 Impact assessment checklist for noise and vibration**

| Impacts on noise and vibration | |
|---|---|
| Will the works involve use of high noise generating plant/equipment such as pile drivers, hydraulic hammers, machine-mounted rock breakers, sand blasters, steam cleaners, mole borers or similar equipment in an urban area. | Yes ☐ No ✓ |
| Are there any noise sensitive areas near the location of the proposed works that may be affected by the works? (e.g. church, school, hospital, residences)? | Yes ☐ No ✓ |
| Would operation of the proposal alter the noise environment for sensitive receiver's long term? This might include changing traffic flow, increasing traffic speeds by more than 10km/hr or installing audio-tactile line markings. | Yes ☐ No ✓ |
| Will any vibration intensive plant and equipment be used in the vicinity of structures including bridges, buildings or other structures? | Yes ☐ No ✓ |

| Impacts on noise and vibration | |
|---|---|
| Are the proposed works going to be undertaken outside of standard working hours?<br>Standard working hours:<br>Monday – Friday 7:00am to 6:00pm<br>Saturday 7:00am to 1:00pm<br>Sunday and Public Holidays No work | Yes ✓ No ☐ |
| *If yes detail impact:*<br>Equipment for works will typically consist of an bulldozer of approximately CATD6/D7 size and 2/3 x6WD dump trucks for the transportation and deposition of sand. The equipment mentioned are not specifically any of the noise generating equipment listed above. Minimal noise is expected from the excavation and dredging of sand.<br>The primary sensitive receptors are expected to be beachgoers, nesting shorebirds and aquatic species in proximity to the work site. The impact from these activities will be temporary, occurring only during limited daytime hours. | |

### 6.6.2 Mitigation Measures

**Table 6-19 Mitigation measures for noise and vibration**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Noise and vibration – hours** | Works are preferred to be carried out during daylight to minimise impacts on fauna and residents. | During activity |
| **Noise and vibration** | Plant operators are to operate equipment in a manner that does not generate unnecessary noise, such as by avoiding excessive revving and minimising impacts with solid objects where possible. | During activity |
| | Machines/equipment are to be turned off when not in use, or throttle-down to a minimum | Post-activity |
| | All plant will be maintained in good condition, with all reasonable and feasible acoustic treatments (i.e. residential mufflers and plant enclosures) installed and maintained | At all times |
| | Noise complaints and impacts are to be monitored and to be passed onto the Council Work Supervisor | During activity |

## 6.7 Air Quality

Air quality impacts are anticipated to be minimal and confined to the work site. The primary sources of air pollution will include vehicle exhaust emissions and sand dust generated during works. Due to sand exposure, increased levels of sand dust may occur in the vicinity on windy days.

### 6.7.1 Impact Assessment

**Table 6-20 Impact assessment checklist for air quality**

| Impacts on air quality | |
|---|---|
| Are the proposed works likely to result in large areas (>2ha) of exposed soils? | Yes ✓ No ☐ |

| Impacts on air quality | |
|---|---|
| Are there any dust sensitive receivers located within the vicinity of the proposed works during the construction period (i.e. church, school, hospital, residences)? | Yes ✓ No ☐ |
| Is there likely to be any dust, smoke, steam or vehicle emissions? | Yes ✓ No ☐ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | Yes ✓ No ☐ |
| *If yes detail impact:*<br>The proposed activities at the Lake Conjola entrance will result in sand exposure across the site. Windblown sand from the works may affect nesting birds and beachgoers; however, the works are not anticipated to produce significant dust, and it can be easily controlled by watering the relevant area. Vehicle emissions can be minimised by using appropriate fuel and conducting regular machinery maintenance. | |

### 6.7.2 Mitigation Measures

**Table 6-21 Mitigation measures for air quality**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Air quality** | Works are not to be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely, when possible. | During activity |
| | Vegetation or other materials are not to be burnt on site. | At all times |
| | Vehicles and equipment are to be maintained in good working order and regularly serviced. | At all times |
| | Monitor work areas and stockpiles for dust generation and seed/cover/spray to suppress. | During activity |
| | Do not leave vehicles idling. | At all times |
| | Trucks travelling over exposed areas will travel at reduced speed. | At all times |
| | Sand placed on the spits should be stabilised with vegetation where possible to reduce transport back into the entrance by wind action. | During activity |

## 6.8 Waste and Hazardous Materials

No waste or hazardous materials are expected to be generated as a result of this proposal.

The sand removed from the site will be reused within the same local area and no significant impact is expected.

### 6.8.1 Impact Assessment

**Table 6-22 Impact assessment checklist for waste and hazardous materials**

| Impacts on waste and chemical management | |
|---|---|
| Are the proposed works likely to generate large (>200 tonnes) amounts of waste material? | Yes ☐ No ✓ |
| Are the proposed works likely to require a licence from EPA/DCCEEW? | Yes ☐ No ✓ |

| Impacts on waste and chemical management | |
|---|---|
| Does the project pose any potential risk to the surrounding environment as a result of waste generated? | Yes ☐ No ✓ |
| Will the works require the removal of spoil/soil from site? | Yes ☐ No ✓ |
| Will the works require the importation of material in large quantities e.g. topsoil, road base/DGB, sand, general fill? | Yes ☐ No ✓ |
| Is there likely to be any transport or disposal of contaminated waste? | Yes ☐ No ✓ |
| Will there be any ongoing/maintenance/operational impacts associated with the project? | Yes ✓ No ☐ |
| Will the works require the storage of large quantities of chemicals or fuels? | Yes ☐ No ✓ |
| *If yes detail impact:*<br>The proposed activity would not result in the generation of trackable waste, hazardous waste, liquid waste, or restricted solid waste as described in the PoEO Act. Sand excavated would be beneficially reused in the local area. | |

### 6.8.2 Mitigation Measures

**Table 6-23 Mitigation measures for waste and hazardous materials**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| | Any waste oils or contaminated soils will be properly disposed of, according to NSW EPA Waste Classifications Guidelines (2014). | During activity |
| | Working areas are to be maintained, kept free of rubbish (including cigarette butts) and cleaned up at the end of each working day. | During activity |
| | Waste must be stored in appropriate waste receptacles | During activity |
| | Bins must have lids which can be closed during windy or wet periods. | During activity |
| | Liquid waste must be stored in suitable waste receptacles which cannot leak and within a bunded and enclosed area. | During activity |
| | Work areas must be kept generally clean and tidy and free of litter. | During activity |
| **Waste disposal** | Waste must be classified in accordance with the NSW EPA Waste Classification Guidelines. | During activity |
| **Litter management** | Waste and litter management are to form part of the entrance management plan for the works. | Operation |

## 6.9 Traffic and Access

Access for work vehicles to the site will be via Cunjurong Point boat ramp, with an alternative access via Manyana Beach. York Street and Ottawa Street have no traffic lights and are not noted as trafficable routes. Therefore, it is safe for construction vehicles to access the site via these roads.

Due to the natural shallow bathymetry of the waterway area surrounding the entrance opening, impacts to navigation would be considered minimal. Transport for NSW – Maritime can publish a Marine Notice for vessel

operators providing safety advice about potential hazards, special events and waterway closures. These navigation warnings alert people to hazardous conditions on NSW waterways and warn vessel operators of dangerous changed circumstances, or potential hazards. Transport for NSW – Maritime may prohibit or regulate the operation of vessels pursuant to section 12 of the Marine Safety Act 1998, if a special event in any waters may affect the safety of navigation.

### 6.9.1 Impact Assessment

**Table 6-24- Impact assessment checklist for traffic and access**

| Impacts on traffic and access | |
|---|---|
| Are the works located in on or near major transport corridors (e.g. highways, railways, airports)? | Yes ☐ No ✓ |
| Are the works located in on or near major pedestrian routes (e.g. walking tracks, near sporting venues etc.)? | Yes ☐ No ✓ |
| Are the proposed works likely to result in detours, disruptions or delays to traffic flow (vehicular, cycle and pedestrian)? | Yes ☐ No ✓ |
| Are the proposed works likely to impact access to properties or businesses? | Yes ☐ No ✓ |
| *If yes detail impact:*<br><br>No impact on the traffic flow on York Street and Ottawa Street is anticipated as truck movements will be minimal and roads are not located in a trafficable area.<br><br>Due to the natural shallow bathymetry of the waterway area surrounding the entrance opening, impacts to navigation would be considered minimal. | |

### 6.9.2 Mitigation Measures

**Table 6-25 Mitigation measures for traffic and transport**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Traffic and transport** | Where possible, current traffic movements and property access are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary traffic delays. | During activity |
| | Signage will be used to advise pedestrians and motorists of the worksite. Appropriate measures would be implemented to direct people around and through the work site, when relevant. | Pre-activity |
| | Comply with Council requirements regarding traffic control, access and road/ pedestrian access. | During activity |
| | Erect signs regarding proposed works, temporary road closures, diversions etc. | During activity |
| | All work vehicles and machinery when not in actual use for the proposed activity will be stored off road. | During activity |
| | Operators to drive to conditions. | During activity |
| | Council should coordinate with Transport for NSW-Maritime in the publication of a Marine Notice for vessel operators. This notice will alert people to hazardous conditions on NSW waterways and warn vessel operators of dangerous changed circumstances, or potential hazards. | At all times |

## 6.10 Visual Amenity

The works are designed to blend in with the natural environment and is the preferred option to minimise flooding impacts at Lake Conjola.

Some visual impacts are to be expected during works, such as when transferring and storing the excavated and dredged sand for beach nourishment; however, these are temporary. In the long term the visual amenity is expected to improve as the views towards the lake entrance opening improve.

No street lighting is proposed to be disconnected for the duration of works and no new lighting is proposed, therefore no anticipated lighting impacts are expected.

### 6.10.1 Impact Assessment

| Impacts on lighting and visual amenity | |
|---|---|
| Are the works located in an area of high aesthetic or scenic value? | Yes ✓ No ☐ |
| Do the proposed works have the potential to permanently impact or change visual amenity of the area? | Yes ✓ No ☐ |
| Will the works involve the removal of large trees in a public place? | Yes ☐ No ✓ |
| Will the works involve the erection or installation of structures in a public place? | Yes ☐ No ✓ |
| Will the works require the storage of large quantities of chemicals or fuels? | Yes ☐ No ✓ |
| *If yes detail impact:*<br>The mechanical lake opening and associated works will be conducted along the Lake Conjola entrance which will change its appearance; however, it will be designed to enhance the natural environment. As the works are being conducted to minimise flooding impacts to the Lake Conjola community, this will positively impact the safety and visual amenity of the area. Beach nourishment activities will enhance the scenic value of the site. | |

### 6.10.2 Mitigation Measures

**Table 6-26 Mitigation measures for visual amenity**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Visual** | Contain all work within the boundaries designated on the site plan. | During activity |
| | Restore work sites to as close to their original condition as possible. | Post-activity |
| | Complaints and impacts are to be monitored and to be passed on to the Works Supervisor and Council. | During activity |
| | The works area is to be kept free from rubbish and the site managed to reduce dust. | During activity |
| **Design** | Ensure the works are designed to complement the existing landscape by using natural materials and finishes. | Pre-activity |

## 6.11 Socio Economic

Lake Conjola has a heavy reliance on tourism for the community livelihood. It is readily apparent that tourist visitors travel to Lake Conjola because of the beaches and waterways, and that a large number of residents and visitors to Lake Conjola are boating enthusiasts.

TfNSW Maritime considered that a reasonably high level of regulation on Lake Conjola existed, more than other coastal lakes and estuaries. While identifying and addressing boating safety and carrying capacity of Lake Conjola, much of this regulation is related to protection of environmentally sensitive areas, including a focus on protection of eroding estuary foreshores and flooding. Due to the natural shallow bathymetry of the waterway area surrounding the entrance opening, impacts to navigation including boating due to the works would be considered minimal.

Beyond boating, the recreational use of the waterway attracts tourists and locals alike, fostering a thriving tourism industry. This includes activities like fishing, kayaking, paddleboarding, and birdwatching, all of which contribute to local businesses such as rental shops, restaurants, and accommodations.

The long-term disturbance to the Lake Conjola entrance due to the works is expected to be minimal. Managing the entrance opening by creating a pilot channel, maintaining a wider dry notch area, lowering the berm and beneficial reuse of excavated sand for beach nourishment will provide economic benefits to the Lake Conjola community in terms of minimising the current risks to life, public safety, properties and assets due to flooding.

### 6.11.1 Impact Assessment

**Table 6-27 Impact assessment checklist for Socio- economic factors**

| Impacts on socio-economic factors | |
|---|---|
| Are the proposed works likely to impact on local business? | Yes ☐ No ✓ |
| Are the proposed works likely to require any property acquisition? | Yes ☐ No ✓ |
| Are the proposed works likely to alter any on-street parking arrangements (either temporarily or permanently)? | Yes ☐ No ✓ |
| Are the proposed works likely to impact on any items or places of social value to the community (either temporarily or permanently)? | Yes ✓ No ☐ |
| *If yes detail impact:*<br>Short term impacts of minimal noise disturbance and minor changes to visual amenity are expected to affect local residents and nesting shorebirds during the works. For each entrance management activity that is completed, there will be a positive due to improved views over the lake and improved safety to the community due to minimisation of flooding impacts. | |

### 6.11.2 Mitigation Measures

**Table 6-28 Mitigation measures for socio-economic factors**

| Type of Impact | Mitigation Measure | Timing |
|---|---|---|
| **Social and visual** | Carry out community and stakeholder consultation before works start. | Pre-activity |
| | All personnel will exercise courtesy in dealing with the community. | During activity |

# 7 DETERMINATION AND RECOMMENDATIONS

## 7.1 Summary of Findings

The REF has been prepared in accordance with all the relevant legislative requirements and regulations. The REF has ensured that Council has examined and considered to the fullest extent possible, all matters that have the potential to affect or are likely to affect the existing environment as a result of the project.

The extent, duration and depth of flooding at Lake Conjola can be related to the entrance condition, with a closed condition resulting in increasing nuisance flooding. Dry notch maintenance, mechanical berm lowering and pilot channel excavation are the preferred strategies of the Lake Conjola EMP to manage and mitigate this flood risk for the low-lying communities surrounding Lake Conjola. These works have been demonstrated to positively impact flood behaviour and flood duration and will not adversely affect flood risk.

Surface water will be impacted by the entrance management works and resultant entrance openings. The entrance opening may cause a local and temporary increase in tidal exchange with the ocean. However, entrance opening is a frequent and natural process, with the trigger levels within the natural breakout range. The pilot channel excavation will not result in surface water impacts outside of what is naturally occurring .

Analysis of the performance of mechanical openings carried out over recent years by Council and the results of numerical modelling carried out as part of development of the CMP, have shown the benefit of opening the lake at water levels as high as practicable. The proposed trigger water levels were also informed by the lowest habitable floor level of 1.79 m AHD determined from the Shoalhaven LGA Floor Level Survey for Flood Planning (2024) and the lowest level for evacuation along Lake Conjola Entrance Rd of approximately 1.2 mAHD (Draft EMP, 2025). Intervention trigger conditions for entrance opening and the decision flow chart for entrance management is shown in Figure 1-4. The proposed works will allow Council to control the timing and location of an opening to mitigate any adverse impacts.

Groundwater will not be impacted by dry notch or pilot channel excavation or sand nourishment activities. The excavation will typically not be greater than 1 m in depth and will not reach groundwater or aquifers.

There are areas mapped as Biodiversity Values within the site area, but not within the proposed works. There is a small patch of mapped BV adjoining Ottawa street which is located slightly northeast off the York Street boat ramp. The patch is located approximately 290 m from the entrance canal in which the works will operate but will not be affected due to being in the dense bushland away from the machinery access point. Another small patch can be seen northeast off Chinamans Island which is approximately 1.2 km from and is also not to be impacted the entrance canal. Both of these BV patches have been classified as having Biodiversity Values under the Coastal Management Act- Littoral Rainforest.

Additionally, wetland communities, such as PCT 4097- Samphire Saltmarsh, require periodic inundation to function. The proposed works would alter the frequency and duration of inundation but will maintain the natural ICOLL properties of the site, therefore maintaining the range of current beneficial uses such as periodic inundation. The entrance management works will only occur only when the trigger levels have been met and will be beneficial to the natural environment by following sustainable engineering techniques such as the reuse of excavated and dredged sand to create a more resilient coastal area.

The current Crown Land licence includes stipulations set by NSW National Parks and Wildlife Services (NPWS) regarding minimisation of disturbance to both threatened and migratory shorebird habitat during their breeding season by the use of buffer areas (50m from nesting site April-September and 255m in October-March). The October-March buffer has been revised to 200m for this REF and renewed licence. A licence to harm threatened fauna, in case of flood events, has not been obtain at the time of writing this REF, meaning that the buffers need to be maintained at all times.

Council is to apply for a licence/permit to harm from DCCEEW for when works are likely to negatively impact threatened fauna (e.g. migratory shorebirds). Without the licence, buffers will need to be maintained, unless the nesting bird can be relocated by a suitably qualified person. Council is to abide by the conditions imposed in the licence/permit to harm to mitigate impacts on threatened and migratory shorebirds. There was one WONS weed sighted in the form of Bitou Bush amongst some native acacias. This WONS species was found outside the main works zone and is not likely to be impacted by the proposed works.

Once opened, the lake will overtime close naturally. As such, Council will be required to regularly monitor and manage the entrance in accordance with Council EMP.

Heavy machinery such as an excavators and dump trucks will be used for works and is likely to generate minimal noise during works. However, the duration of the works for each pilot channel excavation, dry notch maintenance, lowering the berm and sand nourishment activity will last for a short period. For these reasons noise and vibration impacts will be minimal.

Some visual impacts are to be expected during works; however, these are temporary. Beach nourishment activities will ultimately enhance the scenic value of the site.

The works will avoid the two identified Aboriginal heritage sites registered within proximity of the works. The local heritage items will not be affected by the proposed works. The measures outlined in Section 6.5.2 of this REF are sufficient to mitigate impacts to the Aboriginal heritage sites. There is an undetermined Aboriginal land claim on Lot 7048 DP 1094554, which is within the dry notch area, mid-spit. There are separate undetermined claims along most of the northern foreshore. An assessment of Native Title Future Acts will be facilitated by Council. It is noted that Council has previously conducted this assessment in 2023, under the current Crown Land Licence – Lake Conjola Entrance Management (2021). It was found that as the works are classified as Subdivision L (Low Impact Future Acts) under the federal Native Title Act 1993 as the works involves “excavation or clearing that is reasonably necessary for the protection of public health or public safety”. There are no procedural requirements. The above act will not extinguish Native Title – the non-extinguishment principle applies. As this REF is of the same nature, it is not anticipated that this outcome will change. Additionally, Council will notify the applicable LALC prior to exhibition. Further consultation will be undertaken by Crown Lands when applying for a Crown Land License to undertake the works.

All remaining impacts of the project are expected to be low or negligible and can be managed with the mitigation measures outlined within this document.

## 7.2 Entrance Management Policy (EMP)

The Draft Lake Conjola EMP (2025) has been developed by Council, which sets out the decision-making process and procedures for the entrance management works for flood mitigation purposes at Lake Conjola. This REF supports the Draft Lake Conjola EMP (2025) and should be updated over time in line with any EMP changes and/or new legislation or information. The Draft EMP should be reviewed for suitability every entrance opening.

It is recommended that this REF be incorporated into the Crown licence conditions for the undertaking of the proposed works.

## 7.3 Coastal Management Program (CMP)

A CMP has been developed for Lake Conjola, addressing key environmental threats, current and future coastal hazards, and identifying potential opportunities for adaptation and enhancement of the coastal environment towards present and future coastal hazards. The CMP aims to provide a set of prioritised, coordinated, and cost-effective actions that, when progressively implemented, will help ensure that Lake Conjola remains ecologically healthy, resilient, attractive, and accessible for future generations. The coastal processes outlined in the CMP have been detailed in Section 6.3 of this REF.

## 7.4 Determination

An EIS has been undertaken for the proposed activities associated with the Lake Conjola entrance opening. The assessment has been undertaken under Part 5 of the EP&A Act, and in relation to the factors outlined within Section 171 of the EP&A Regulation. Mitigation measures have been provided to suitably mitigate any potential negative environmental impacts.

The findings of this assessment indicate that none of the anticipated environmental impacts will be significant, provided that the methodology for the works remains as described within this REF, and the mitigation measures outlined herein are adhered to.

Impacts on threatened/migratory shorebirds protected under the BC Act and EPBC Act may occur if sufficient care is not taken, however through consultation with NPWS, and as stipulated in the conditions of the Crown land permit, sufficient buffer areas have been accounted for to minimise the risk of harming shorebirds.

This REF will expire after five (5) years from determination and shall require revision and amendment as appropriate, along with a review of the EMP and application for a new licence.

Shoalhaven City Council has considered the potential environmental effects of the proposed activity and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined:

1. The proposed safeguards identified in the report (Section 6) shall be maintained/adopted and implemented.
2. It is unlikely that there will be any significant environmental impact from the proposed activity and an Environmental Impact Statement is not required for the proposed activity.
3. Consultation with LALC and local indigenous community is recommended for Native Title Claims and/or sensitive cultural sites existing across the entrance area.
4. The proposed activity is not likely to significantly affect threatened species or ecological communities, or their habitats for the purposes of the NSW BC Act, and entry into the Biodiversity Offset Scheme or preparation of a Species Impact Statement is not required.
5. The proposed activity is not a 'controlled action' for the purposes of the Commonwealth EPBC Act and referral to the Commonwealth Environment Minister is not required.

Shane Pickering

Acting Manager, Environmental Services

Shoalhaven City Council

Date: 07/04/2025

# REFERENCES

Conjola National Park Plan of Management | NSW Environment and Heritage (DECC, 2009)

Department of Environment and Climate Change NSW (2008). *Managing threatened beach-nesting shorebirds. Best Practice Guidelines.*

DPE – Water Quality assessment data sheets – supplied 2021 and https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw/conjola-lake

DPIE Crown Land Licence Lake Conjola Entrance Management, 27 October 2021

DPI. (2018). *Management of coastal lakes and lagoons in NSW*. Retrieved from https://www.dpi.nsw.gov.au/fishing/habitat/aquatic-habitats/wetland/coastal-wetlands/management-of-coastal-lakes-and-lagoons-in-nsw

DPIE. (2021). *Form and function of NSW intermittently closed and open lakes and lagoons: Implications for entrance management.* State of NSW and Department of Planning, Industry and Environment.

Draft Lake Conjola Entrance Management Policy, prepared for Shoalhaven City Council, 2025.

GHD. (2012). *Lake Conjola Entrance Management Discussion Paper*

GHD. (2013). *Lake Conjola Interim Entrance Management Policy.*

Hanslow, David & Davis, G & You, Bob Zai-Jin & Zastawny, J. (2000). BERM HEIGHT AT COASTAL LAGOON ENTRANCES IN NSW. 10.13140/2.1.4910.9446.

Heritage NSW Aboriginal Heritage Information Management System Accessed 17/11/2024 and 19/11/2024. Available at Aboriginal Heritage Information Management System (AHIMS) Web Services

https://wildlifehealthaustralia.com.au/Portals/0/ResourceCentre/FactSheets/Avian/Shearwater_mass_mortalities.pdf

https://www.dpi.nsw.gov.au/fishing/threatened-species/what-current

Narrawallee Creek Nature Reserve Plan of Management | NSW Environment and Heritage (DEC, 2006)

NSW DCCEEW (2024). Biodiversity Values Map [Online tool] Accessed 6/11/2024. Available at: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

NSW DCCEEW (2024). BioNet Atlas of NSW Wildlife [Online tool] Accessed 6/11/2024. Available at: https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx

NSW DCCEEW (2024). BioNet Vegetation Classification [Online tool] Accessed 6/11/2024. Available at: https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

NSW DCCEEW (2024). NSW eSpade [Online tool] Accessed 8/11/2024. Available at: https://www.environment.nsw.gov.au/eSpade2Webapp/

NSW DCCEEW (2023). State Vegetation Type Map [Online tool] Accessed 29/10/2024. Available at: https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map

NSW DCCEEW (2024). Threatened biodiversity profile search [Online tool] Accessed 6/11/2024. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/

NSW DCCEEW (2024). Threatened species list. Accessed 29/10/2024. Available at: https://www.dpi.nsw.gov.au/fishing/threatened-species/what-current

NSW DPI Fisheries (2013). Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update).

NSW DPI (2024). Key Fish Habitat Mapping [Online tool]. Available at: https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

NSW DPIH (2024). NSW Planning Portal. [Online tool] Accessed 28/10/2024. Available at: https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

NSW Sixmaps (2024). Spatial area tool [Online tool] Accessed 23/10/2024. Available at: https://maps.six.nsw.gov.au/

Review of Environmental Factors (2020), prepared by Shoalhaven Council.

Roper, T., Creese, B., Scanes, P., Stephens, K., Williams, R., Dela-Cruz, et. al. (2011). *Assessing the conditions of estuaries and coastal lake ecosystems in NSW.*

Royal Haskoning DHV (2023). *Lake Conjola CMP Stage 2: Report B – "Threats and Risk Assessment"*

Royal Haskoning DHV (2023). *Lake Conjola CMP Stage 2: Report C – Entrance Processes and Entrance Management Options*

Royal HaskoningDHV [RHDHV] (2024), Lake Conjola Coastal Management Program, prepared for

Shoalhaven City Council.

Shoalhaven City Council, Lake Conjola Estuary Ecosystem Health Report Card 2010-2011

Shoalhaven LGA Floor Level Survey for Flood Planning (2024)

Spurway. (2013). *Lake Conjola Review of Environmental Factors*

Wiecek, D. (2001). Trophic status of selected estuaries on the far south coast of New South Wales with largely cleared catchments. University of Wollongong.

Wiecek et al., 2012 "Monitoring the Ecosystem Health of Estuaries on the NSW South Coast", Coastal Conference Paper

# APPENDIX A
# SITE PHOTOS

## SITE PHOTOS

The Lake Conjola entrance view from Cunjurong Point boat ramp (north of entrance)

Migratory shorebirds nest (photo taken from Cunjurong Point boat ramp)

Close-up of the shorebirds nest

Vegetation from the main access point of Conjurong Point boat ramp

The Lake Conjola open entrance

Low lying residential areas to the south of the entrance

Vegetation upstream north of the entrance

More vegetation along north of the entrance

The opening from the lake to the ocean


Alternative access route from Manyana Beach

Alternative access path along Manyana Beach showing type of vegetation affected

View from Manyana Beach access

Birds along south of the Lake Conjola entrance

Shoreline south of the entrance

Dead mutton birds along the south shore of the entrance


Shorebirds nesting area, south of the entrance

Rain and water level gauge 1 at Lake Conjola Holiday Haven Caravan Park, south of the entrance

Rain and water level gauge 2

# APPENDIX B
# LIKELIHOOD OF OCCURRENCE

*Table-1 Likelihood of Occurrence Table*

| Recorded | The species was observed in the study area during the current survey. |
|---|---|
| **High** | It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (i.e., for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration. |
| **Moderate** | Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded. |
| **Low** | It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area, or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded. |
| **None** | Suitable habitat is absent from the study area. |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Comment | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| **Fauna** | | | | | | | | |
| **Amphibia** | Hylidae | *Litoria aurea* | Green and Golden Bell Frog | E1,P | V | 5 | Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp*.) or spikerushes (*Eleocharis spp.*). Optimum habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. | Low |
| **Reptilia** | Cheloniidae | *Chelonia mydas* | Green Turtle | V,P | V | 2 | Widely distributed in tropical and sub-tropical seas. Usually found in tropical waters around Australia but also occurs in coastal waters of NSW, where it is generally seen on the north or central coast, with occasional records from the south coast. | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Aves** | Phaethontidae | *Phaethon lepturus* | White-tailed Tropicbird | P | C,J | 1 | The white-tailed tropicbird is the smallest of three closely related seabirds of the tropical oceans and smallest member of the order *Phaethontiformes*. It is found in the tropical Atlantic, western Pacific and Indian Oceans. | Low |
| **Aves** | Apodidae | *Hirundapus caudacutus* | White-throated Needletail | P | V,C,J,K | 26 | In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. | Low |
| **Aves** | Diomedeidae | *Diomedea gibsoni* | Gibson's Albatross | V,P | V | 1 | Essentially endemic to the Auckland Islands of New Zealand. The non-breeding range is poorly known however the species probably disperses across the southern Pacific. The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green Cape and Newcastle. | Low |
| **Aves** | Procellariidae | *Ardenna pacifica* | Wedge-tailed Shearwater | P | J | 5 | In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Aves** | Procellariidae | *Ardenna tenuirostris* | Short-tailed Shearwater | P | C,J,K | 13 | The Short-tailed Shearwater is found in coastal waters. In summer months, the Short-tailed Shearwater is the most common shearwater along the south and south-east coasts of Australia. | Low |
| | Accipitridae | *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V,P | - | 30 | In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or seashore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts.' | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Nests are large structures built from sticks and lined with leaves or grass. | |
| | Accipitridae | *Hieraaetus morphnoides* | Little Eagle | V,P | - | 3 | It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. | Low |
| | Accipitridae | *Lophoictinia isura* | Square-tailed Kite | V,P,3 | - | 12 | The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species 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, arriving in September and leaving by March. | Low |
| | Accipitridae | *Pandion cristatus* | Eastern Osprey | V,P,3 | - | 5 | Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | trees, usually within one kilometre of the sea. | |
| | Burhinidae | *Esacus magnirostris* | Beach Stone-curlew | E4A,P | | 1 | In Australia, the Beach Stone-curlew occupies coastlines from about Point Cloates in Western Australia, across northern and north-eastern Australia south to north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. In NSW, the species occurs regularly to about the Manning River, and the small population of north-eastern NSW is at the limit of the normal range of the species in Australia. Surveys in 2000 put the NSW population at a minimum of 13 adult birds. Outside Australia, the species also occurs in south-eastern Asia, from the Malay Peninsula through Indonesia and southern New Guinea, east to the Solomon Islands, Vanuatu and New Caledonia. | Low |
| | Haematopodidae | *Haematopus fuliginosus* | Sooty Oystercatcher | V,P | | 15 | Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. | High (Observed on site) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Haematopodidae | *Haematopus longirostris* | Pied Oystercatcher | E1,P | | 41 | The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW, the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. 'Pied' Oystercatchers are occasionally recorded on Lord Howe Island but it is uncertain which species is involved. | High (Mapped on site) |
| **Aves** | Charadriidae | *Charadrius mongolus* | Lesser Sand-plover | V,P | E,C,J,K | 1 | The Lesser Sand-plover breeds in central and north eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast including the entire coast in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.<br>Highly gregarious, frequently seen in flocks exceeding 100 individuals; also, often seen foraging and roosting with other wader species. | Low |
| **Aves** | Charadriidae | *Thinornis cucullatus cucullatus* | Eastern Hooded Dotterel | E4A | V | 17 | The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre | High (Mapped on site) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Peninsula (South Australia). Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. | |
| **Aves** | Scolopacidae | *Actitis hypoleucos* | Common Sandpiper | P | C,J,K | 1 | The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags | Low |
| **Aves** | Scolopacidae | *Arenaria interpres* | Ruddy Turnstone | P | C,J,K | 1 | In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats | |
| | Scolopacidae | *Limosa lapponica* | Bar-tailed Godwit | P | C,J,K | 1 | Birds arrive in New South Wales between August and October and then leave between February and April, with a small number of individuals overwintering. The subspecies is most frequently recorded along major coastal river estuaries and sheltered embayments, particularly the Tweed, Richmond, Clarence, Macleay, Hastings, Hunter and Shoalhaven River estuaries, Port Stephens and Botany Bay. It is a rare visitor to wetlands away from the coast with scattered records as far west as along the Darling River and the Riverina. | Low |
| | Scolopacidae | *Numenius madagascariensis* | Eastern Curlew | P | CE,C,J,K | 2 | Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | south-east regions including Tasmania. Eastern Curlews are rarely recorded inland. In NSW, the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. | |
| | Scolopacidae | *Numenius phaeopus* | Whimbrel | P | C,J,K | 1 | The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution. There are also scattered inland records of Whimbrels in all regions. It is found in all states but is more common in the north. | Low |
| | Stercorariidae | Stercorarius parasiticus | Arctic Jaeger | P | C,J,K | 1 | Breeds on Arctic tundra; spends the rest of the year at sea. | Low |
| | Laridae | *Hydroprogne caspia* | Caspian Tern | P | J | 3 | The Caspian Tern is mostly found in sheltered coastal embankments (harbours, lagoons, inlets, bays, estuaries and river deltas), and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. | |
| | Laridae | *Sternula albifrons* | Little Tern | E1,P | C,J,K | 53 | In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. It breeds in spring and summer along the entire east coast from Tasmania to northern Queensland, and is seen until May, with only occasional birds seen in winter months. Almost exclusively coastal, preferring sheltered environments; however, may occur several kilometres from the sea in harbours, inlets and rivers | High (Mapped on site) |
| | Laridae | *Thalasseus bergii* | Crested Tern | P | J | 9 | Occurs along coasts and estuaries; very rarely further inland or on freshwater ponds/lagoons. | Low |
| | Cacatuidae | *Callocephalon fimbriatum* | Gang-gang Cockatoo | V,P,3 | E | 40 | In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora* ) woodland and occasionally in temperate rainforests. | |
| | Cacatuidae | *Calyptorhynchus lathami lathami* | South-eastern Glossy Black-Cockatoo | V,P,2 | V | 41 | Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of Sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta*, and A*. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata)*. | Low |
| | Psittacidae | *Glossopsitta pusilla* | Little Lorikeet | V,P | - | 22 | Forages primarily in the canopy of open *Eucalyptus* Forest and woodland, yet also finds food in *Angophora*, *Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | fertility and hence greater productivity. Isolated flowering trees in open country, e.g., paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards | |
| **Aves** | Psittacidae | *Lathamus discolor* | Swift Parrot | E1,P,3 | CE | 1 | On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.<br>Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*. Return to some foraging sites on a cyclic basis depending on food availability. | Low |
| **Aves** | Psittacidae | *Pezoporus wallicus wallicus* | Eastern Ground Parrot | V,P,3 | - | 1 | The Ground Parrot occurs in high rainfall coastal and near coastal low | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | heathlands and sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground. Home ranges of adult birds is typically 10 ha and overlapping with other birds, while juveniles have a significantly larger home range. | |
| | Strigidae | *Ninox strenua* | Powerful Owl | V,P,3 | - | 33 | The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ballart *Exocarpus cupressiformis* and a number of *eucalypt* species. | |
| | Tytonidae | *Tyto novaehollandiae* | Masked Owl | V,P,3 | - - | 10 | Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. | Low |
| | Tytonidae | *Tyto tenebricosa* | Sooty Owl | V,P,3 | - | 14 | Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment, and eastern tablelands. Territories are occupied permanently. | Low |
| **Aves** | Dasyornithidae | *Pycnoptilus floccosus* | Pilotbird | V,P | V | 1 | The Pilotbird a small, plump, ground-dwelling bird. Pilotbirds are terrestrial, living on the ground in dense forests with heavy undergrowth (Higgins and Peter 2002). Birds forage mostly in pairs for insects, and occasionally eat seeds and fruits. | Low |
| **Aves** | Meliphagidae | *Anthochaera phrygia* | Regent Honeyeater | E4A,P | CE | 3 | The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important | |
| | Neosittidae | *Daphoenositta chrysoptera* | Varied Sittella | V,P | - | 6 | Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, *Mallee,* and *Acacia* woodland. | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Artamidae | *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | V,P | | 2 | Primarily inhabit dry, open *Eucalypt* forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. | Low |
| | Petroicidae | *Petroica boodang* | Scarlet Robin | V,P | | 1 | The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | grasslands or grazed paddocks with scattered trees. | |
| **Aves** | Petroicidae | *Petroica rodinogaster* | Pink Robin | V,P | | 3 | Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Catches prey by the perch-and-pounce method, foraging more on the ground than the more flycatcher-like Rose Robin. Insects and spiders are the main dietary items. | Low |
| **Mammalia** | Dasyuridae | *Dasyurus maculatus* | Spotted-tailed Quoll | V,P | E | 1 | Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath, and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. | Low |
| | Peramelidae | *Isoodon obesulus obesulus* | Southern Brown Bandicoot (eastern) | E1,P | E | 5 | The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. | Low |
| | Phascolarctidae | *Phascolarctos cinereus* | Koala | E1,P | E | 1 | In New South Wales, koala populations are found on the central and north coasts, southern | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. | |
| **Mammalia** | Burramyidae | *Cercartetus nanus* | Eastern Pygmy-possum | V,P | | 1 | The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes, and Wagga Wagga on the western slopes. | Low |
| **Mammalia** | Petauridae | Petaurus australis | Yellow-bellied Glider | V,P | V | 10 | The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. | Low |
| **Mammalia** | Petauridae | *Petaurus norfolcensis* | Squirrel Glider | V,P | - | 3 | Inhabits 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. | Low |
| **Mammalia** | Pseudocheiridae | Petauroides volans | Southern Greater Glider | E1,P | E | 3 | The Southern Greater Glider occurs in eastern Australia, in eucalypt | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | forests and woodlands, where it has a broad distribution from around Proserpine in Queensland, south through NSW and the Australian Capital Territory into Victoria. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Occupy a relatively small home range with an average size of 1 to 3 ha. | |
| **Mammalia** | Potoroidae | *Potorous tridactylus tridactylus* | Northern long-nosed potoroo | V,P | V | 14 | The most northern records of occurrence are at Barren Grounds Nature Reserve and Budderoo National Park in New South Wales. The subspecies occurs in isolated habitat patches along the coastal plains of southern New South Wales and Victoria and inland to the slopes and foothills of the Great Dividing Range. One island population exists at French Island in Western Port Bay, Victoria. | Low |
| **Mammalia** | Pteropodidae | *Pteropus poliocephalus* | Grey-headed Flying-fox | V,P | V | 23 | Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Emballonuridae | *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V,P | | 1 | Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. | Low |
| | Molossidae | *Micronomus norfolkensis* | Eastern Coastal Free-tailed Bat | V,P | - | 5 | Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. | Low |
| | Vespertilionidae | *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V,P | - | 7 | Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings. | Low |
| **Mammalia** | Vespertilionidae | *Myotis macropus* | Southern Myotis | V,P | - | 9 | Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. | Low |
| **Mammalia** | Vespertilionidae | *Phoniscus papuensis* | Golden-tipped Bat | V,P | - | 2 | The Golden-tipped Bat is distributed along the east coast of Australia in | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It has recently been trapped just inside the Victorian border. | |
| **Mammalia** | Vespertilionidae | *Scoteanax rueppellii* | Greater Broad-nosed Bat | V,P | - | 5 | Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. | Low |
| | Miniopteridae | *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V,P | - | 10 | Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the treetops. | |
| | Otariidae | *Arctocephalus forsteri* | New Zealand Fur-seal | V,P | | 3 | Occurs in Australia and New Zealand. Reports of non-breeding animals along southern NSW coast particularly on Montague Island, but also at other isolated locations to north of Sydney. | Low |
| | Otariidae | *Arctocephalus pusillus doriferus* | Australian Fur-seal | V,P | | 2 | 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. | Low |
| | Balaenidae | *Eubalaena australis* | Southern Right Whale | E1,P | E | 2 | Temperate and subpolar waters of the Southern Hemisphere, with a circumpolar distribution between about 20°S and 55°S with some records further south to 63°S. | Low |
| **Flora** | | | | | | | | |
| | Convolvulaceae | *Wilsonia backhousei* | Narrow-leafed Wilsonia | V | | 1 | In NSW Narrow-leaf Wilsonia is found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney (Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Clovelly, Voyager Point, Wollongong, and Royal National Park). It grows in all southern states. | |
| | Myrtaceae | *Rhodamnia rubescens* | Scrub Turpentine | E4A | CE | 8 | Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. | Low |
| | Orchidaceae | *Cryptostylis hunteriana* | Leafless Tongue Orchid | V,P,2 | V | 12 | The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool | Low |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park. | |

NSW Status Key- P= Protected, V= Vulnerable, E1= Endangered, E4A= Critically Endangered, 2= Sensitive Class 2, 3= Sensitive Class 3

Commonwealth Status- V= Vulnerable, E=Endangered, CE= Critically Endangered, C= China Australian Migratory Bird, J= Japan Australia Migratory Bird, K= Korea Australia Migratory Bird.

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

# APPENDIX C
# AGENCY CONSULTATION

# RE: Consultation for Lake Conjola Entrance Opening Review of Environmental Factors

JV
Joel Vernon <joel.vernon@environment.nsw.gov.au>
To ○ Jackson Rutter; ● Lilian De Torres
Cc ○ Michael Phelan; ○ Gordon Cameron; ○ Libby Shields

Reply | Reply All | Forward | ...

Fri 29/11/2024 11:51 AM

## Statutory requirements under the NPW Act.

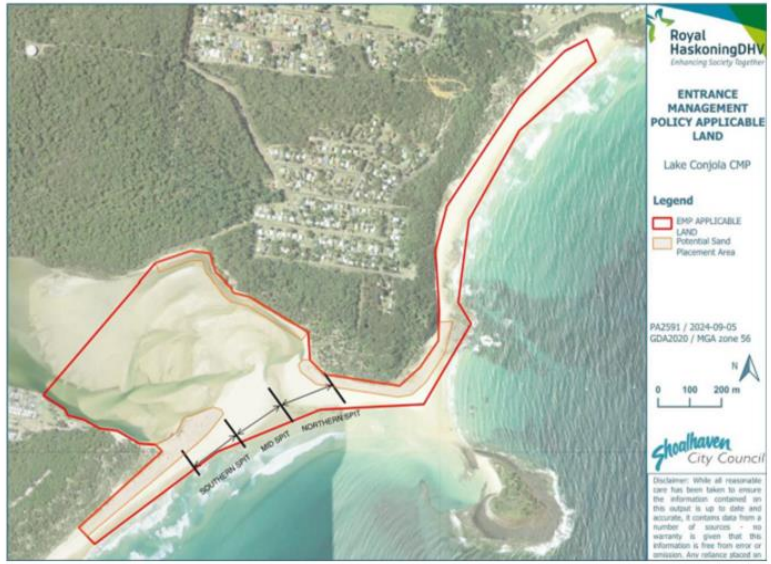
The statutory considerations cover only the application of Part 6 of the NPWS Act. In that Table 7-1 provides that the NPW Act application is directly relevant to Aboriginal cultural heritage assessment, and in seeking an Aboriginal Heritage Impact Permit (AHIP) under section 90 of the NPW Act, if required. Noting that council will need to demonstrate subject to due diligence that the risk of harm to Aboriginal objects has been considered.

## Future REF

Noting that Conjola National Park which adjoins Conjola Lake, and Narrawallee Creek Nature Reserve adjoins Conjola Beach to the south both appear some distance away from the actual EMP applicable area as shown below in red. Although I do highlight mechanical intervention, sand extraction and beach nourishment activities do affect a wider receiving environment than the actual targeted activity area. The parks are located close enough to warrant consideration under the overarching REF as prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

If during assessment impacts to the national park are detected. NPWS will require consideration of the NPW Act in the context of the objects of the Act under section 2A, how the activity will influence the management principles set for a national park under section 30E and for the nature reserve Section 30J of the NPW Act. The statutory plans of management below will also apply, and any impact considered against the actions listed:

- Conjola National Park Plan of Management | NSW Environment and Heritage (DECC, 2009), and
- Narrawallee Creek Nature Reserve Plan of Management | NSW Environment and Heritage (DEC, 2006)



## Environmental assessment requirements under the REF

The REF is the environmental assessment supporting the operational delivery of the EMP as an activity for the purposes of the EP&A Act. Ensure the REF clearly states the planning pathway applied to the activity in it, remaining under Part 5, Division 5.1 of the EP&A Act as an REF. The activity description in the REF must cover all direct and indirect intervention measures, including all mechanical works to open or close Conjola Lake and Lagoon (ICOLL)) and any ancillary access, works or monitoring required to achieve the principles of the EMP.

Conjola National Park covers Princess and Conjola Island, Nerrindillah Creek lagoon and a large portion of land surrounding Conjola, Berringer and Swan Lake. It covers the upper reaches of Berrara Creek lagoon but not the lagoon itself and an area of coastline south of Berrara. Under the adopted Conjola National Park - plan of management (PoM) the national park appears gazetted to the HWM.

Narrawallee Creek Nature Reserve covers Pattimores lagoon and a large portion of land along the coastline to the south interfacing with Conjola Beach, refer to the adopted Narrawallee Creek Nature Reserve - Plan of Management and reference the gazettal notice for its reservation.

The EMP in Section 5 and the Figure 5.1 as well as the REF must use the NSW SEED dataset NSW National Parks and Wildlife Service (NPWS) All Managed lands layer - NSW National Parks and Wildlife Service (NPWS) All Managed Land | Dataset | SEED when providing mapping of the applicable area, and its respective surrounding land tenure which is critical to the environmental assessment process, and will be relevant to the environmental safeguards and any restrictions highlighted as part of the EMP and REF.

Areas of the Conjola Lake foreshore and Pattimores Lagoon are mapped as *a* coastal wetland and littoral rainforest thus the *State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021* will apply to the activity proposed. Ensure impacts are adequately addressed as well as any implications attached to the planning pathway under the REF.

The adopted plans for Conjola National Park - plan of management and Narrawallee Creek Nature Reserve - Plan of Management sets out the recognised natural and cultural values for which the parks were reserved. Consideration of the PoMs will assist in the assessment of potential indirect impacts to natural/cultural/social values in the preparation of the REF. The parks host an extensive suite of plant community types four of which are flagged listed under the *Biodiversity Conservation Act 2016* as threatened ecological communities (TECs) and three listed under *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

TECs likely at risk from the proposed works are the areas of coastal saltmarsh and swamp sclerophyll forest. The increased movement of sediment during works has the potential to smother areas of saltmarsh within the parks, and with variation of inundation and salinity changes has the potential to impact on floodplain systems.

- BC Act - Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing | Final determination 2004 | Environment and Heritage.
- EPBC Act - Subtropical and temperate coastal saltmarsh - DCCEEW / Subtropical and Temperate Coastal Saltmarsh.
- BC Act - Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act | Final determination 2011 | Environment and Heritage
- EPBC Act - Conservation advice for the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland / Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- BC Act - Bangalay sand forest, Sydney Basin and South East Corner bioregions - endangered ecological community listing | Final determination 2005 | Environment and Heritage
- BC Act - Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act | Final determination 2011 | Environment and Heritage
- EPBC Act Coastal Swamp Oak Forest NSW and SEQ Approved Conservation Advice / Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.

Impacts to state listed TEC's will require consideration under Threatened Species Test of Significance Guidelines | NSW Environment and Heritage (OEH, 2018), commonwealth listed TECs as Matters of National Environmental Significance and thus subject to Significant Impact Guidelines 1.1 - Matters of National Environmental Significance - DCCEEW.

Kind regards,

**Joel Vernon**
Project Officer - Carbon and Restoration Programs Unit
Conservation Programs Branch
**NSW National Parks and Wildlife Service**

# RE: Consultation for Lake Conjola Entrance Opening Review of Environmental Factors

PH
Peter Hawkins <Peter.HAWKINS@transport.nsw.gov.au>
To Lilian De Torres

Reply | Reply All | Forward | ...

Mon 25/11/2024 10:46 AM



Hi Lilian,

See below comments from TfNSW in relation to the Lake Conjola Entrance Opening Review of Environmental Factors.

- Due to the natural shallow bathymetry of the waterway area surrounding the entrance opening, impacts to navigation would be considered minimal.
- The waterway area from the entrance opening back to the western extent of Chinamans Island is wholly contained within an existing 4 knot powered vessel speed restriction zone, which means that vessels must travel at 4 knots (7km/h) or less at all times.
- Sand of marine origin may migrate up the channel at varying rates under incoming tides whenever the entrance is open. This will require ongoing monitoring and inspection of the placed aids to navigation used to mark the navigable channel. Thus, these aids to navigation, such as port and starboard lateral marks, will need to be reviewed as required.
- Transport for NSW – Maritime can publish a Marine Notice for vessel operators providing safety advice about potential hazards, special events and waterway closures. These navigation warnings alert people to hazardous conditions on NSW waterways and warn vessel operators of dangerous changed circumstances, or potential hazards.
- Transport for NSW – Maritime may prohibit or regulate the operation of vessels pursuant to section 12 of the Marine Safety Act 1998, if a special event in any particular waters may affect the safety of navigation.

If you have any questions in relation to the comments above please let me know.

Peter Hawkins
Community Technical Partner – **Transport for NSW** - **M** 0429 504 605

# RE: Consultation for Lake Conjola Entrance Opening Review of Environmental Factors

CG Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
To Lilian De Torres
Cc Emily Messer

Reply | Reply All | Forward

Mon 18/11/2024 11:48 AM



Hi Lilian,

DPIRD Fisheries provides the following environmental assessment requirements for the REF being prepared on the Lake Conjola Entrance Opening.

We recommend that the REF be prepared in accordance with Fisheries general environmental assessment requirements listed in section 3.3 of DPIRD Fisheries *Policy and Guideines for Fish Habitat Conservation and Management (2013)* (hereafter referred to as the policy).

More specifically, this REF should also address the following items:

1) Provide a clear legislative pathway and aligned justification for the works. Justifications should be clear and based on quantified information.
2) Be based on the draft plan (and associated triggers) prepared under this current CMP process, including the monitoring processes documented in this plan.
3) Consider section 6.4 of the Policy – which provides DPIRD Fisheries policy and guidelines for managing ICOLLS.
4) Provide a clear description of all aspects of the entrance opening works (i.e. access, excavation, spoil disposal), including proposed mitigation measures. As per beach nourishment activities in general, please note that spoil disposal should not occur below the mean high water mark.
5) Conduct an assessment of significance regarding threatened species listed under the *Fisheries Management Act*.
6) Include an assessment of potential direct and indirect impacts of all aspects of the entrance opening on key fish habitat (identified on page 19 of the policy). This will need to include a clear description of the type and area of key fish habitat within the works area.
7) We recommend that harm of marine vegetation from these works be avoided. Should this be required, then it will need to be minimised and the works will trigger a permit to harm marine vegetation under s.205 of the *Fisheries Management Act*.
8) Provide an assessment of the impact of the entrance management regime on the opening regime of this system (e.g. sand accumulation over time).
9) Consider the potential for fish kills from this opening regime. The water quality in Lake Conjola is known to have long periods of stratification. There could be some potential for fish kills from release of the upper oxygenated layer on entrance opening. Monitoring of fish kill events should be undertaken.

Note, the dredging and reclamation aspect of these works will require Crown Lands to formally notify DPIRD Fisheries of these works prior to issuing any authorisation – in accordance with the s.199 notification process under the *Fisheries Management Act*.

If you have any questions about this, please call.

Regards,

**Carla Ganassin**
Senior Fisheries Manager, Coastal Systems
Marine Estate Management Branch, Fisheries and Forestry Division
P 0447 644 357 E carla.ganassin@dpi.nsw.gov.au
dpird.nsw.gov.au

NSW GOVERNMENT **Department of Primary Industries and Regional Development**

# RE: Consultation for Lake Conjola Entrance Opening Review of Environmental Factors

JR

Jackson Rutter <Jackson.Rutter@environment.nsw.gov.au>
To Lilian De Torres
Cc Michael Phelan

Reply | Reply All | Forward

Thu 14/11/2024 10:26 AM

Hi Lilian,

There are a few considerations I would like to highlight, specifically relating to the presence of endangered shorebirds around the Lake Conjola entrance –

- The draft EMP identifies threatened migratory shorebirds as a key consideration in work planning however there are also two other endangered non-migratory shorebird species (Pied Oystercatcher and Hooded Plover) which at times utilise the beach and dune system surrounding the entrance and may be impacted by the excavation and storage of sand. Particularly work in the dune area labelled as a potential sand placement area immediately to the south-east of the entrance in Figure 5-1 would need to take this into consideration.
- Section 8.8 of the draft EMP identifies the spit south of the entrance as the preferred placement area for sand excavated from dry notch maintenance subject to migratory shorebird nesting. The natural profile of the sandspit as a relatively flat, open expanse is a key factor in the selection of the site by nesting migratory birds and therefore consideration should be given to how the storage of sand on the southern spit outside of the nesting season could impact the overall suitability of the site.

I also think it is important to emphasise that the extent of use of the site by endangered shorebirds is variable year to year based on environmental conditions and so communication with NPWS staff, particularly the shorebird ranger, is critical to minimising issues with entrance management work.

Kind Regards

NSW GOVERNMENT

**Jackson Rutter**
Ranger (Acting), Shoalhaven Area
South Coast Branch
NSW National Parks and Wildlife Service

Lot 9 Coller Road, Ulladulla, NSW, 2539
**M** 0437 917 104
**T** 02 4454 9500
**W** nationalparks.nsw.gov.au

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

# APPENDIX D
# PROTECTED MATTERS SEARCH

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Nov-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

# Summary

## Matters of National Environment Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 4 |
| Listed Threatened Species: | 86 |
| Listed Migratory Species: | 53 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Lands: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 79 |
| Whales and Other Cetaceans: | 12 |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | 2 |
| Regional Forest Agreements: | 1 |
| Nationally Important Wetlands: | None |
| EPBC Act Referrals: | 7 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | 6 |
| Bioregional Assessments: | 1 |
| Geological and Bioregional Assessments: | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

| Community Name | Threatened Category | Presence Text |
|---|---|---|
| Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community | Endangered | Community likely to occur within area |
| Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland | Endangered | Community may occur within area |
| Illawarra and south coast lowland forest and woodland ecological community | Critically Endangered | Community may occur within area |
| River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria | Critically Endangered | Community may occur within area |

### Listed Threatened Species [ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| BIRD | | |
| Anthochaera phrygia | | |
| Regent Honeyeater [82338] | Critically Endangered | Species or species habitat known to occur within area |
| Ardenna grisea | | |
| Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area |
| Botaurus poiciloptilus | | |
| Australasian Bittern [1001] | Endangered | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat likely to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat likely to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Callocephalon fimbriatum<br>Gang-gang Cockatoo [768] | Endangered | Species or species habitat known to occur within area |
| Calyptorhynchus lathami lathami<br>South-eastern Glossy Black-Cockatoo [67036] | Vulnerable | Species or species habitat known to occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |
| Climacteris picumnus victoriae<br>Brown Treecreeper (south-eastern) [67062] | Vulnerable | Species or species habitat may occur within area |
| Dasyornis brachypterus<br>Eastern Bristlebird [533] | Endangered | Species or species habitat likely to occur within area |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea antipodensis gibsoni<br>Gibson's Albatross [82270] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat may occur within area |
| Fregetta grallaria grallaria<br>White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438] | Vulnerable | Species or species habitat likely to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat likely to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat known to occur within area |
| Limosa lapponica baueri<br>Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380] | Endangered | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Melanodryas cucullata cucullata<br>South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093] | Endangered | Species or species habitat may occur within area |
| Neophema chrysogaster<br>Orange-bellied Parrot [747] | Critically Endangered | Species or species habitat may occur within area |
| Neophema chrysostoma<br>Blue-winged Parrot [726] | Vulnerable | Species or species habitat likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pachyptila turtur subantarctica<br>Fairy Prion (southern) [64445] | Vulnerable | Species or species habitat known to occur within area |
| Phoebetria fusca<br>Sooty Albatross [1075] | Vulnerable | Species or species habitat may occur within area |
| Pterodroma leucoptera leucoptera<br>Gould's Petrel, Australian Gould's Petrel [26033] | Endangered | Species or species habitat may occur within area |
| Pterodroma neglecta neglecta<br>Kermadec Petrel (western) [64450] | Vulnerable | Foraging, feeding or related behaviour may occur within area |
| Pycnoptilus floccosus<br>Pilotbird [525] | Vulnerable | Species or species habitat likely to occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Stagonopleura guttata<br>Diamond Firetail [59398] | Vulnerable | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Sternula nereis nereis<br>Australian Fairy Tern [82950] | Vulnerable | Species or species habitat known to occur within area |
| Thalassarche bulleri<br>Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche bulleri platei<br>Northern Buller's Albatross, Pacific Albatross [82273] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche carteri<br>Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche eremita<br>Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche salvini<br>Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Thinornis cucullatus cucullatus | | |
| Eastern Hooded Plover, Eastern Hooded Plover [90381] | Vulnerable | Species or species habitat known to occur within area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area |
| FISH | | |
| Epinephelus daemelii | | |
| Black Rockcod, Black Cod, Saddled Rockcod [68449] | Vulnerable | Species or species habitat likely to occur within area |
| Hippocampus whitei | | |
| White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240] | Endangered | Species or species habitat likely to occur within area |
| Prototroctes maraena | | |
| Australian Grayling [26179] | Vulnerable | Species or species habitat likely to occur within area |
| Seriolella brama | | |
| Blue Warehou [69374] | Conservation Dependent | Species or species habitat known to occur within area |
| FROG | | |
| Heleioporus australiacus | | |
| Giant Burrowing Frog [1973] | Vulnerable | Species or species habitat likely to occur within area |
| Litoria aurea | | |
| Green and Golden Bell Frog [1870] | Vulnerable | Species or species habitat known to occur within area |
| Litoria watsoni | | |
| Southern Heath Frog, Watson's Tree Frog [91509] | Endangered | Species or species habitat likely to occur within area |
| MAMMAL | | |
| Balaenoptera musculus | | |
| Blue Whale [36] | Endangered | Species or species habitat may occur within area |
| Chalinolobus dwyeri | | |
| Large-eared Pied Bat, Large Pied Bat [183] | Endangered | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Dasyurus maculatus maculatus (SE mainland population) | | |
| Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184] | Endangered | Species or species habitat known to occur within area |
| Eubalaena australis | | |
| Southern Right Whale [40] | Endangered | Species or species habitat known to occur within area |
| Isoodon obesulus obesulus | | |
| Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050] | Endangered | Species or species habitat likely to occur within area |
| Petauroides volans | | |
| Greater Glider (southern and central) [254] | Endangered | Species or species habitat known to occur within area |
| Petaurus australis australis | | |
| Yellow-bellied Glider (south-eastern) [87600] | Vulnerable | Species or species habitat known to occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Endangered | Species or species habitat likely to occur within area |
| Pseudomys novaehollandiae | | |
| New Holland Mouse, Pookila [96] | Vulnerable | Species or species habitat likely to occur within area |
| Pteropus poliocephalus | | |
| Grey-headed Flying-fox [186] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| PLANT | | |
| Caladenia tessellata | | |
| Thick-lipped Spider-orchid, Daddy Long-legs [2119] | Vulnerable | Species or species habitat likely to occur within area |
| Calochilus pulchellus | | |
| Pretty Beard Orchid, Pretty Beard-orchid [84677] | Endangered | Species or species habitat may occur within area |
| Cryptostylis hunteriana | | |
| Leafless Tongue-orchid [19533] | Vulnerable | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Genoplesium baueri<br>Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528] | Endangered | Species or species habitat may occur within area |
| Melaleuca biconvexa<br>Biconvex Paperbark [5583] | Vulnerable | Species or species habitat may occur within area |
| Persicaria elatior<br>Knotweed, Tall Knotweed [5831] | Vulnerable | Species or species habitat may occur within area |
| Prasophyllum affine<br>Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210] | Endangered | Species or species habitat likely to occur within area |
| Pterostylis gibbosa<br>Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562] | Endangered | Species or species habitat may occur within area |
| Rhizanthella slateri<br>Eastern Underground Orchid [11768] | Endangered | Species or species habitat may occur within area |
| Rhodamnia rubescens<br>Scrub Turpentine, Brown Malletwood [15763] | Critically Endangered | Species or species habitat known to occur within area |
| Syzygium paniculatum<br>Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307] | Vulnerable | Species or species habitat likely to occur within area |
| Thesium australe<br>Austral Toadflax, Toadflax [15202] | Vulnerable | Species or species habitat may occur within area |
| REPTILE | | |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Breeding likely to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Dermochelys coriacea | | |
| Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |
| Eretmochelys imbricata | | |
| Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Hoplocephalus bungaroides | | |
| Broad-headed Snake [1182] | Endangered | Species or species habitat likely to occur within area |
| Natator depressus | | |
| Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area |
| SHARK | | |
| Carcharias taurus (east coast population) | | |
| Grey Nurse Shark (east coast population) [68751] | Critically Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Carcharodon carcharias | | |
| White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat known to occur within area |
| Rhincodon typus | | |
| Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |

## Listed Migratory Species [ Resource Information ]

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Migratory Marine Birds | | |
| Anous stolidus | | |
| Common Noddy [825] | | Species or species habitat may occur within area |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardenna carneipes | | |
| Flesh-footed Shearwater, Fleshy-footed Shearwater [82404] | | Foraging, feeding or related behaviour likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Ardenna grisea<br>Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat may occur within area |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area |
| Phoebetria fusca<br>Sooty Albatross [1075] | Vulnerable | Species or species habitat may occur within area |
| Sternula albifrons<br>Little Tern [82849] | | Breeding likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Thalassarche bulleri | | |
| Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche carteri | | |
| Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |
| Thalassarche cauta | | |
| Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche eremita | | |
| Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area |
| Thalassarche impavida | | |
| Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris | | |
| Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche salvini | | |
| Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi | | |
| White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| Migratory Marine Species | | |
| Balaenoptera edeni | | |
| Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus | | |
| Blue Whale [36] | Endangered | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| [Caperea marginata](#)<br>Pygmy Right Whale [39] | | Foraging, feeding or related behaviour may occur within area |
| [Carcharhinus longimanus](#)<br>Oceanic Whitetip Shark [84108] | | Species or species habitat may occur within area |
| [Carcharias taurus](#)<br>Grey Nurse Shark [64469] | | Foraging, feeding or related behaviour likely to occur within area |
| [Carcharodon carcharias](#)<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat known to occur within area |
| [Caretta caretta](#)<br>Loggerhead Turtle [1763] | Endangered | Breeding likely to occur within area |
| [Chelonia mydas](#)<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| [Dermochelys coriacea](#)<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |
| [Eretmochelys imbricata](#)<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| [Eubalaena australis as Balaena glacialis australis](#)<br>Southern Right Whale [40] | Endangered | Species or species habitat known to occur within area |
| [Lagenorhynchus obscurus](#)<br>Dusky Dolphin [43] | | Species or species habitat may occur within area |
| [Lamna nasus](#)<br>Porbeagle, Mackerel Shark [83288] | | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Megaptera novaeangliae<br>Humpback Whale [38] | | Species or species habitat known to occur within area |
| Mobula birostris as Manta birostris<br>Giant Manta Ray [90034] | | Species or species habitat may occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat likely to occur within area |
| Rhincodon typus<br>Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |
| **Migratory Terrestrial Species** | | |
| Cuculus optatus<br>Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat may occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat likely to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat likely to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat likely to occur within area |
| Charadrius leschenaultii | | |
| Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area |
| Limosa lapponica | | |
| Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pandion haliaetus | | |
| Osprey [952] | | Species or species habitat known to occur within area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text |
| Bird | | |
| Actitis hypoleucos | | |
| Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Anous stolidus | | |
| Common Noddy [825] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area |
| Ardenna carneipes as Puffinus carneipes<br>Flesh-footed Shearwater, Fleshy-footed Shearwater [82404] | | Foraging, feeding or related behaviour likely to occur within area |
| Ardenna grisea as Puffinus griseus<br>Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area |
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat likely to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat likely to occur within area overfly marine area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area overfly marine area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat likely to occur within area overfly marine area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat may occur within area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea antipodensis gibsoni as Diomedea gibsoni<br>Gibson's Albatross [82270] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area overfly marine area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area overfly marine area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat known to occur within area overfly marine area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area overfly marine area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area overfly marine area |
| Neophema chrysogaster<br>Orange-bellied Parrot [747] | Critically Endangered | Species or species habitat may occur within area overfly marine area |
| Neophema chrysostoma<br>Blue-winged Parrot [726] | Vulnerable | Species or species habitat likely to occur within area overfly marine area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pachyptila turtur<br>Fairy Prion [1066] | | Species or species habitat known to occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat known to occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area |
| Phoebetria fusca<br>Sooty Albatross [1075] | Vulnerable | Species or species habitat may occur within area |
| Pterodroma cervicalis<br>White-necked Petrel [59642] | | Species or species habitat may occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat known to occur within area overfly marine area |
| Rostratula australis as Rostratula benghalensis (sensu lato)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area overfly marine area |
| Sterna striata<br>White-fronted Tern [799] | | Foraging, feeding or related behaviour likely to occur within area |
| Sternula albifrons as Sterna albifrons<br>Little Tern [82849] | | Breeding likely to occur within area |
| Symposiachrus trivirgatus as Monarcha trivirgatus<br>Spectacled Monarch [83946] | | Species or species habitat may occur within area overfly marine area |
| Thalassarche bulleri<br>Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche bulleri platei as Thalassarche sp. nov.<br>Northern Buller's Albatross, Pacific Albatross [82273] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche carteri<br>Indian Yellow-nosed Albatross [64464] | Vulnerable | Species or species habitat likely to occur within area |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche eremita<br>Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area |
| Thalassarche melanophris<br>Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche salvini<br>Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area |
| Thalassarche steadi<br>White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| Thinornis cucullatus as Thinornis rubricollis<br>Hooded Plover, Hooded Dotterel [87735] | | Species or species habitat known to occur within area overfly marine area |
| Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis<br>Eastern Hooded Plover, Eastern Hooded Plover [90381] | Vulnerable | Species or species habitat known to occur within area overfly marine area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area overfly marine area |
| Fish | | |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Acentronura tentaculata<br>Shortpouch Pygmy Pipehorse [66187] | | Species or species habitat may occur within area |
| Cosmocampus howensis<br>Lord Howe Pipefish [66208] | | Species or species habitat may occur within area |
| Heraldia nocturna<br>Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227] | | Species or species habitat may occur within area |
| Hippocampus abdominalis<br>Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233] | | Species or species habitat may occur within area |
| Hippocampus breviceps<br>Short-head Seahorse, Short-snouted Seahorse [66235] | | Species or species habitat may occur within area |
| Hippocampus whitei<br>White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240] | Endangered | Species or species habitat likely to occur within area |
| Histiogamphelus briggsii<br>Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242] | | Species or species habitat may occur within area |
| Kimblaeus bassensis<br>Trawl Pipefish, Bass Strait Pipefish [66247] | | Species or species habitat may occur within area |
| Lissocampus runa<br>Javelin Pipefish [66251] | | Species or species habitat may occur within area |
| Maroubra perserrata<br>Sawtooth Pipefish [66252] | | Species or species habitat may occur within area |
| Notiocampus ruber<br>Red Pipefish [66265] | | Species or species habitat may occur within area |

| Scientific Name | Threatened Category | Presence Text |
| --- | --- | --- |
| Phyllopteryx taeniolatus<br>Common Seadragon, Weedy Seadragon [66268] | | Species or species habitat may occur within area |
| Solegnathus spinosissimus<br>Spiny Pipehorse, Australian Spiny Pipehorse [66275] | | Species or species habitat may occur within area |
| Solenostomus cyanopterus<br>Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183] | | Species or species habitat may occur within area |
| Stigmatopora argus<br>Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276] | | Species or species habitat may occur within area |
| Stigmatopora nigra<br>Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277] | | Species or species habitat may occur within area |
| Syngnathoides biaculeatus<br>Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279] | | Species or species habitat may occur within area |
| Urocampus carinirostris<br>Hairy Pipefish [66282] | | Species or species habitat may occur within area |
| Vanacampus margaritifer<br>Mother-of-pearl Pipefish [66283] | | Species or species habitat may occur within area |
| Vanacampus phillipi<br>Port Phillip Pipefish [66284] | | Species or species habitat may occur within area |
| Mammal | | |
| Arctocephalus forsteri<br>Long-nosed Fur-seal, New Zealand Fur-seal [20] | | Species or species habitat may occur within area |
| Arctocephalus pusillus<br>Australian Fur-seal, Australo-African Fur-seal [21] | | Species or species habitat may occur within area |
| Reptile | | |

| Scientific Name | Threatened Category | Presence Text |
|---|---|---|
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Breeding likely to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area |

| Whales and Other Cetaceans | | [ Resource Information ] |
|---|---|---|
| Current Scientific Name | Status | Type of Presence |
| Mammal | | |
| Balaenoptera acutorostrata<br>Minke Whale [33] | | Species or species habitat may occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat may occur within area |
| Caperea marginata<br>Pygmy Right Whale [39] | | Foraging, feeding or related behaviour may occur within area |
| Delphinus delphis<br>Common Dolphin, Short-beaked Common Dolphin [60] | | Species or species habitat may occur within area |

| Current Scientific Name | Status | Type of Presence |
|---|---|---|
| Eubalaena australis<br>Southern Right Whale [40] | Endangered | Species or species habitat known to occur within area |
| Grampus griseus<br>Risso's Dolphin, Grampus [64] | | Species or species habitat may occur within area |
| Lagenorhynchus obscurus<br>Dusky Dolphin [43] | | Species or species habitat may occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | | Species or species habitat known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat likely to occur within area |
| Tursiops aduncus<br>Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418] | | Species or species habitat likely to occur within area |
| Tursiops truncatus s. str.<br>Bottlenose Dolphin [68417] | | Species or species habitat may occur within area |

## Extra Information

### State and Territory Reserves [ Resource Information ]

| Protected Area Name | Reserve Type | State |
|---|---|---|
| Conjola | National Park | NSW |
| Narrawallee Creek | Nature Reserve | NSW |

### Regional Forest Agreements [ Resource Information ]

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

| RFA Name | State |
|---|---|
| Southern RFA | New South Wales |

### EPBC Act Referrals [ Resource Information ]

| Title of referral | Reference | Referral Outcome | Assessment Status |
|---|---|---|---|
| | | | |
| Residential Development, Lot 172 DP 755923 and Lot 823 DP 247285, Manyana, NSW | 2020/8704 | | Post-Approval |
| **Controlled action** | | | |
| North Manyana Subdivision, NSW | 2021/8948 | Controlled Action | Further Information Request |
| **Not controlled action** | | | |
| Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia | 2015/7522 | Not Controlled Action | Completed |
| INDIGO Central Submarine Telecommunications Cable | 2017/8127 | Not Controlled Action | Completed |
| wastewater collection systems and pumping stations | 2001/511 | Not Controlled Action | Completed |
| **Not controlled action (particular manner)** | | | |
| INDIGO Marine Cable Route Survey (INDIGO) | 2017/7996 | Not Controlled Action (Particular Manner) | Post-Approval |
| **Referral decision** | | | |
| Breeding program for Grey Nurse Sharks | 2007/3245 | Referral Decision | Completed |

| Biologically Important Areas | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Behaviour | Presence |
| **Dolphins** | | |
| Tursiops aduncus | | |
| Indo-Pacific/Spotted Bottlenose Dolphin [68418] | Breeding | Likely to occur |
| **Seabirds** | | |
| Ardenna tenuirostris | | |
| Short-tailed Shearwater [82652] | Foraging | Likely to occur |
| Ardenna tenuirostris | | |
| Short-tailed Shearwater [82652] | Foraging | Likely to occur |
| Pelagodroma marina | | |
| White-faced Storm-petrel [1016] | Breeding | Known to occur |
| **Sharks** | | |
| Carcharias taurus | | |
| Grey Nurse Shark [64469] | Foraging | Known to occur |
| **Whales** | | |

| Scientific Name | Behaviour | Presence |
|---|---|---|
| Megaptera novaeangliae | | |
| Humpback Whale [38] | Migration (north and south) | Known to occur |

## Bioregional Assessments [ Resource Information ]

| SubRegion | BioRegion | Website |
|---|---|---|
| Sydney | Sydney Basin | BA website |

# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

## 4 LIMITATIONS

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

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

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

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

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

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

# Acknowledgements

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

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

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

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



Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

# APPENDIX E
# TEST OF SIGNIFICANCE BC ACT

An impact assessment including an Assessment of Significance (AoS) as set out in S. 7.3 of the BC Act was undertaken for threatened species considered highly likely to occur within the project site, to determine if a species impact statement (SIS) is required.

The following species were found to have a high likelihood of occurrence at the proposed works site:

- Eastern Hooded Plover (*Thinornis cucullatus cucullatus*).
- Little Tern (*Sternula albifrons*).
- Pied Oystercatcher (*Haematopus longirostris*).
- Sooty Oystercatcher (*Haematopus fuliginosus*). which is listed as Vulnerable under the NSW BC Act
- PCT 3638 - South Coast Sands Bangalay Forest.
- PCT 3805 - Southern Sandplain Heath.
- PCT 3922 - Sydney Coastal Sand Swamp Scrub.

| **Eastern Hooded Plover (*Thinornis cucullatus cucullatus*), which is listed as Critically Endangered under the NSW BC Act and Vulnerable under the federal EPBC Act.** |
|---|
| **Species description** |
| Eastern Hooded Dotterels are small to medium-sized, stocky shorebirds with short bills, large eyes and rounded heads. The Easter Hooded Dotterel is pale-coloured, 19 - 23 cm in length with a wingspan of 26 - 44 cm. It is unmistakable in having a prominent black hood and throat, a white collar, and a contrasting black-tipped red bill, a red eye-ring and short orange legs. In flight, the upper parts are predominantly pale brownish-grey with a black and white tail and broad white wing-barring with a black trailing-edge. The underparts are white. Sexes are alike (NSW OE&H 2022). |
| **The following 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:** |
| **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.**<br><br>Minimal vegetation removal is expected for the mechanical opening of the channel with plans of machinery to occur on the north side only and only used during the nesting periods in times of emergency flood incursions. As such there is minimal risk to the shorebird nesting site. The maintenance works will occur during off peak nesting periods and timed during the low tidal zones for easier access for the machinery.<br><br>Works during the nesting periods for locally occurring threatened shorebirds (generally September to March) would be avoided as far as practical.<br><br>A Council Environmental Officer or other suitably qualified person would undertake pre-clearance surveys prior to works commencing each day and prior to machinery entering and exiting from site. If species are found on site during work, then a 50m buffer will be adhered to. These species are highly mobile and transient and unlikely to visit or remain on site during machinery operation. If this species happens to fly into the machinery path, then work will be stopped immediately until the bird has flown away on its own accord. |

Prior to any channel opening activities occurring, the sand disposal location shall be chosen in consultation with the Council's Environmental Operations Officer and the NPWS Shorebird Recovery Coordinator in order to minimise impacts to foraging habitat for shorebirds.

In the event that a new nest or nesting birds are detected, work will immediately cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.

As such the proposed activity for the opening channel works is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

Not applicable.

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

Not applicable.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat fragmentation will result from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat removal or modification expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

**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)**

The protected nesting zones which are considered critical habitat for the Eastern Hooded Dotterels will not be breached as works will primarily occur outside the nesting season. Any emergency works that may possibly be needed during this zone will not go inside the fenced off zone.

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

N/A, the mechanical opening of the channel is conducted as part of flood mitigation strategies.

**Conclusion**

The proposal is unlikely to have a significant impact on the Eastern Hooded Dotterels given that:

- Minimal vegetation removal and habitat disturbance, including nesting areas, takes place; and
- Works are to be taken outside the nesting period and any emergency works needed during the nesting period will be taken under caution is taken when moving around the sites and no access into the fenced off zone will be needed.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Eastern Hooded Dotterels.

**Little Tern (*Sternula albifrons*), which is listed as Endangered under the NSW BC Act.**

**Species description**

The Little Tern is a small, slender, migratory or partly migratory seabird. At less than 25 cm long it is two-thirds to half the size of any other south-eastern tern. The pale grey upperparts contrast with the white chest, underbelly and the moderately long, deeply forked tail (80 - 110 mm). The Little Tern has a black cap and black outer wing-edges. During breeding the bill (26 - 32 mm) and legs change from black to yellow, and a black wedge appears from the bill to the eye. During non-breeding, the Little Tern's black cap shrinks to a black nape and its bill becomes black (NSW OE&H 2022).

**The following 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:**

**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.**

Minimal vegetation removal is expected for the mechanical opening of the channel with plans of machinery to occur on the north side only and only used during the nesting periods in times of emergency flood incursions. As such there is minimal risk to the shorebird nesting site. The maintenance works will occur during off peak nesting periods and timed during the low tidal zones for easier access for the machinery.

Works during the nesting periods for locally occurring threatened shorebirds (generally September to March) would be avoided as far as practical.

A Council Environmental Officer or other suitably qualified person would undertake pre-clearance surveys prior to works commencing each day and prior to machinery entering and exiting from site. If species are found on site during work, then a 50m buffer will be adhered to. These species are highly mobile and transient and unlikely to visit or remain on site during machinery operation. If this species happens to fly into the machinery path, then work will be stopped immediately until the bird has flown away on its own accord.

Prior to any channel opening activities occurring, the sand disposal location shall be chosen in consultation with the Council's Environmental Operations Officer and the NPWS Shorebird Recovery Coordinator in order to minimise impacts to foraging habitat for shorebirds.

In the event that a new nest or nesting birds are detected, work will immediately cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.

As such the proposed activity for the opening channel works is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

Not applicable.

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

Not applicable.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat fragmentation will result from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat removal or modification expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

**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)**

The protected nesting zones which are considered critical habitat for the Little Tern will not be breached as works will primarily occur outside the nesting season. Any emergency works that may possibly be needed during this zone will not go inside the fenced off zone

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

N/A, the mechanical opening of the channel is conducted as part of flood mitigation strategies.

**Conclusion**

The proposal is unlikely to have a significant impact on the Little Tern given that:

- Minimal vegetation removal and habitat disturbance, including mulched areas, takes place; and
- Works are to be taken outside the nesting period and any emergency works needed during the nesting period will be taken under caution is taken when moving around the sites and no access into the fenced off zone will be needed.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Little Tern.

**Pied Oystercatcher (*Haematopus longirostris*), which is listed as Endangered under the NSW BC Act**

**Species description**

The Pied Oystercatcher is an unmistakable, large, black and white wader, reaching 50 cm in length. The sexes are similar yet may be separable when together with the female having a slightly longer, slenderer bill. When not in flight, the Pied Oystercatcher appears entirely black above, with white underparts. The back, head and breast are black, and the belly, rump and tail are white. The tail is tipped black. The wings are black with a narrow white bar on the upper wing and white underwing coverts. The eye-ring, iris and bill of the Pied Oystercatcher are brilliant scarlet, and its legs are stout and coral pink. The most often heard call is a loud, sharp, high-pitched 'kurvee-kurvee-kurvee', usually given in alarm, which increases in pitch and rapidity when a nest site is approached (NSW OE&H 2022).

**The following 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:**

**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.**

Minimal vegetation removal is expected for the mechanical opening of the channel with plans of machinery to occur on the north side only and only used during the nesting periods in times of emergency flood incursions. As such there is minimal risk to the shorebird nesting site. The maintenance works will occur during off peak nesting periods and timed during the low tidal zones for easier access for the machinery.

Works during the nesting periods for locally occurring threatened shorebirds (generally September to March) would be avoided as far as practical.

A Council Environmental Officer or other suitably qualified person would undertake pre-clearance surveys prior to works commencing each day and prior to machinery entering and exiting from site. If species are found on site during work, then a 50m buffer will be adhered to. These species are highly mobile and transient and unlikely to visit or remain on site during machinery operation. If this

species happens to fly into the machinery path, then work will be stopped immediately until the bird has flown away on it own accord.

Prior to any channel opening activities occurring, the sand disposal location shall be chosen in consultation with the Council's Environmental Operations Officer and the NPWS Shorebird Recovery Coordinator in order to minimise impacts to foraging habitat for shorebirds.

In the event that a new nest or nesting birds are detected, work will immediately cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.

As such the proposed activity for the opening channel works is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

Not applicable.

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

Not applicable.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat fragmentation will result from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

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

No habitat removal or modification expected from the proposed development. The mechanical opening of the channel would mitigate the chance of the habitat from becoming flooded, no nests will be removed disposed sand will be place away from the protected nesting zone

**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)**

The protected nesting zones which are considered critical habitat for the Pied Oystercatcher will not be breached as works will primarily occur outside the nesting season. Any emergency works that may possibly be needed during this zone will not go inside the fenced off zone

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

N/A, the mechanical opening of the channel is conducted as part of flood mitigation strategies.

**Conclusion**

The proposal is unlikely to have a significant impact on the Pied Oystercatcher given that:

- Minimal vegetation removal and habitat disturbance, including mulched areas, takes place; and
- Works are to be taken outside the nesting period and any emergency works needed during the nesting period will be taken under caution is taken when moving around the sites and no access into the fenced off zone will be needed.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Pied Oystercatcher.

**Sooty Oystercatcher (*Haematopus fuliginosus*). which is listed as Vulnerable under the NSW BC Act**

**Species description**

The Sooty Oystercatcher is an unmistakable, large wader, reaching 50 cm in length. Like the Pied Oystercatcher, the Sooty Oystercatcher has a bright orange-red bill, eye-ring and iris, and coral pink legs and feet. However, the Sooty Oystercatcher has entirely black plumage. Sexes are separable when together, with the female having a longer, slenderer bill. The call is similar to the Pied Oystercatcher's, although sharper and more piercing. Gives a loud whistling call before taking flight, and a piercing call if an intruder approaches the nest. (NSW OE&H 2022).

**The following 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:**

**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.**

Minimal vegetation removal is expected for the mechanical opening of the channel with plans of machinery to occur on the north side only and only used during the nesting periods in times of emergency flood incursions. As such there is minimal risk to the shorebird nesting site. The maintenance works will occur during off peak nesting periods and timed during the low tidal zones for easier access for the machinery.

Works during the nesting periods for locally occurring threatened shorebirds (generally September to March) would be avoided as far as practical.

A Council Environmental Officer or other suitably qualified person would undertake pre-clearance surveys prior to works commencing each day and prior to machinery entering and exiting from site. If species are found on site during work, then a 50m buffer will be adhered to. These species are highly mobile and transient and unlikely to visit or remain on site during machinery operation. If this species happens to fly into the machinery path, then work will be stopped immediately until the bird has flown away on it own accord.

Prior to any channel opening activities occurring, the sand disposal location shall be chosen in consultation with the Council's Environmental Operations Officer and the NPWS Shorebird Recovery Coordinator in order to minimise impacts to foraging habitat for shorebirds.

In the event that a new nest or nesting birds are detected, work will immediately cease, and mitigation measures will be adapted in consultation with the NPWS Shorebird Recovery Coordinator, to minimise risk of disturbance to the birds and ensure their protection.

As such the proposed activity for the opening channel works is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

Not applicable.

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

Not applicable.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development.

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

No habitat fragmentation will result from the proposed development.

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

No habitat removal or modification expected from the proposed development.

**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)**

The protected nesting zones which are considered critical habitat for the Sooty Oystercatcher will not be breached as works will primarily occur outside the nesting season. Any emergency works that may possibly be needed during this zone will not go inside the fenced off zone

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

N/A, the mechanical opening of the channel is conducted as part of flood mitigation strategies.

**Conclusion**

The proposal is unlikely to have a significant impact on the Sooty Oystercatcher given that:

- Minimal vegetation removal and habitat disturbance, including mulched areas, takes place; and
- Works are to be taken outside the nesting period and any emergency works needed during the nesting period will be taken under caution is taken when moving around the sites and no access into the fenced off zone will be needed.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Sooty Oystercatcher.

**PCT 3638 - South Coast Sands Bangalay Forest which is listed as Endangered under the NSW BC Act**

**Species description**

The PCT 3638 - South Coast Sands Bangalay Forest is associated with Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions and the Kurnell Dune Forest in the Sutherland Shire and City of Rockdale

The PCT 3638 - South Coast Sands Bangalay Forest represents certain occurrences of moderately dense eucalypt forest 15-30 m tall, often with tall banksias and wattles and a well-developed, but species-poor, sclerophyllous shrub understorey. The groundcover is highly variable and may be sparse if the eucalypt canopy is particularly dense and produces copious leaf litter. Generally, however, there is a substantial cover of rhizomatous ferns, grasses and herbs, or localised clumps of sedges. Typically occurs on the coastal sand flats and low dunes south from Nowra.

The tree canopy is typically dominated by *Eucalyptus botryoides (*Bangalay*), E. pilularis (*Blackbutt*).* Other canopy species may occur in association with typical dominants and may be locally dominant at some sites. The shrub layer is dominant of *Acacia longifolia subsp. sophorae* (Coastal Wattle), *Banksia integrifolia subsp. integrifolia* (Coastal Banksia), *B. serrata* (Old Man Banksia), *Breynia oblongifolia* (Coffee Bush), *Correa alba var. alba* (White Correa). The understorey typically is dominated by the ground layer and comprises a variety of *Dianella congesta* (Blue Flax Lily), *Dichondra repens* (Kidney Weed), *Gonocarpus teucrioides* (Raspwort).

In order to meet the definition of the TEC, sites must satisfy condition criteria stipulated in the Listing Advice and/or Conservation Advice. Typically, condition is assessed by reference to patch size and vegetation structure thresholds or species composition metrics. (NSW OE&H 2022).

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

**a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Minimal vegetation removal is expected for the minimal vegetation removal is expected for the mechanical opening of the channel and as such there is no risk of habitat fragmentation. The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development.

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

No habitat fragmentation will result from the proposed development.

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

No habitat removal or modification expected from the proposed development.

**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)**

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones and the dumped sand will replenish areas of sand degraded areas on top of rhizome vegetation that will likely to survive the extra sand layer. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

N/A The mechanical opening of the channel is planned to be open areas and as such there is no risk of key threatening processes for native vegetation. The accessibility from the boat ramp may impact some groundcover vegetation which are generally hardy and likely to bounce back. The works are for flood mitigation to reduce the impact of waterlogging and erosion that could affect the shrubs and trees.

**Conclusion**

The proposal is unlikely to have a significant impact on PCT 3638 - South Coast Sands Bangalay Forest given that:

- Minimal vegetation removal takes place;
- The accessibility of machinery will only impact groundcover species that are likely to bounce back; and
- Mechanical opening works are located away from any densely vegetated areas.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the PCT 3638 - South Coast Sands Bangalay Forest. As such, a Species Impact Statement (SIS) is not required.

**PCT 3805 - Southern Sandplain Heath which is listed as Critically Endangered under the NSW BC Act and is listed as Critically Endangered under the federal EPBC Act.**

**Species description**

The PCT 3805 - Southern Sandplain Heath has associations with the Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion and is also associated with the Eastern Suburbs Banksia Scrub of the Sydney Region.

PCT 3805 - Southern Sandplain Heath represents open heath up to 2 m tall, or low open banksia or mallee woodland up to 5 m tall with a diverse sclerophyll shrub stratum and variable graminoid groundcover. Typically occurs on Dune crests and plains on deep podsolised coastal sands, either on extensive sand plains or perched aeolian dunes up to 100 m above sea level, but always within a few kilometres of the coast.

The tree canopy is typically dominated by the mallee forms of *Corymbia gummifera* (Red Bloodwood) and small tree forms of *Banksia aemula* (Wallum Banksia). The shrub stratum is dominated by *Aotus ericoides, Banksia aemula* (Wallum Banksia*), Bossiaea ensata, Dillwynia glaberrima* and *D. retorta* (Egg and Bacon Peas). The understorey typically is dominated by the ground layer and comprises a variety of *Dampiera stricta*, *Gonocarpus teucrioides* (Raspwort), *Lepidosperma concavum, Lomandra glauca* (Pale Mat-rush), *Schoenus ericetorum* (Heath Bog-rush), *Themeda triandra* (Kangaroo Grass).

In order to meet the definition of the TEC, sites must satisfy condition criteria stipulated in the Listing Advice and/or Conservation Advice. Typically, condition is assessed by reference to patch size and vegetation structure thresholds or species composition metrics. (NSW OE&H 2022).

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

**a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Minimal vegetation removal is expected for the minimal vegetation removal is expected for the mechanical opening of the channel and as such there is no risk of habitat fragmentation. The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development.

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

No habitat fragmentation will result from the proposed development.

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

No habitat removal or modification expected from the proposed development.

**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)**

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones and the dumped sand will replenish areas of sand degraded areas on top of rhizome vegetation that will likely to survive the extra sand layer. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

The mechanical opening of the channel is planned to be open areas and as such there is no risk of key threatening processes for native vegetation. The accessibility from the boat ramp may impact some groundcover vegetation which are generally hardy and likely to bounce back. The works are for flood mitigation to reduce the impact of waterlogging and erosion that could affect the shrubs and trees.

**Conclusion**

The proposal is unlikely to have a significant impact on PCT 3805 - Southern Sandplain Heath given that:

- Minimal vegetation removal takes place;
- The accessibility of machinery will only impact groundcover species that are likely to bounce back; and
- Mechanical opening works are located away from any densely vegetated areas.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the PCT 3805 - Southern Sandplain Heath. As such, a Species Impact Statement (SIS) is not required.

**PCT 3922 - Sydney Coastal Sand Swamp Scrub which is listed as Endangered under the NSW BC Act.**

**Species description**

PCT 3922 - Sydney Coastal Sand Swamp Scrub is associated with the Sydney Freshwater Wetlands in the Sydney Basin Bioregion**.** PCT 3922 - Sydney Coastal Sand Swamp Scrub represents certain occurrences of the Dense sedge land with open stratum of emergent sclerophyllous shrubs. Typically occurs in poorly drained headwater valleys and dune swales with infertile sandy peats and humic sandy loams on coastal sand sheets and coastal plateau.

The shrub layer is typically dominated by *Leptospermum liversidgei*, *L. juniperinum, L. continentale, Melaleuca squarrosa, Callistemon citrinus, Epacris paludosa*. The understorey typically is dominated by the ground layer and comprises a variety of *Empodisma minus, Leptocarpus tenax, Lepyrodia scariosa, L. interrupta, L. muelleri, Eurychorda complanatus, Schoenus brevifolius.*

In order to meet the definition of the TEC, sites must satisfy condition criteria stipulated in the Listing Advice and/or Conservation Advice. Typically, condition is assessed by reference to patch size and vegetation structure thresholds or species composition metrics. (NSW OE&H 2022).

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

**a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Minimal vegetation removal is expected for the minimal vegetation removal is expected for the mechanical opening of the channel and as such there is no risk of habitat fragmentation. The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works

**b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

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

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**c) in relation to the habitat of a threatened species or ecological community:**

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

Negligible impact on habitat is expected from the proposed development.

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

No habitat fragmentation will result from the proposed development.

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

No habitat removal or modification expected from the proposed development.

**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)**

The PCT will not be significantly impacted as the channel will be located in more open areas away from densely vegetated zones and the dumped sand will replenish areas of sand degraded areas on top of rhizome vegetation that will likely to survive the extra sand layer. There is also an abundance of higher quality habitat around the area for connectivity. Therefore, no significant impact is expected by disturbance from the construction works.

**e) The proposed development or activity is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

The mechanical opening of the channel is planned to be open areas and as such there is no risk of key threatening processes for native vegetation. The accessibility from the boat ramp may impact some groundcover vegetation which are generally hardy and likely to bounce back. The works are for flood mitigation to reduce the impact of waterlogging and erosion that could affect the shrubs and trees.

**Conclusion**

The proposal is unlikely to have a significant impact on PCT 3922 - Sydney Coastal Sand Swamp Scrub given that:

- Minimal vegetation removal takes place;
- The accessibility of machinery will only impact groundcover species that are likely to bounce back; and
- Mechanical opening works are located away from any densely vegetated areas.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the PCT 3922 - Sydney Coastal Sand Swamp Scrub. As such, a Species Impact Statement (SIS) is not required.

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

# APPENDIX F
# TEST OF SIGNIFICANCE FISHERIES ACT

An impact assessment including an Assessment of Significance (AoS) as set out in s.220ZZ of the FM Act was undertaken for threatened species considered highly likely to occur within the project site, to determine if a species impact statement (SIS) is required.

The following species were found to have a low likelihood of occurrence at the proposed works site:

- Grey Nurse Shark (*Carcharias taurus)* listed as Critically Endangered;
- Great White Shark (*Carcharodon carcharia*) listed as Vulnerable.

The Black Rockcod (*Epinephalus daemelii*) is listed as Vulnerable, and has a medium likelihood of occurrence at the proposed works site.

| **Grey Nurse Shark (*Carcharias taurus*) listed as Critically Endangered** |
|---|
| **Species description** |
| The Grey Nurse Shark, also known as the sand tiger shark or spotted ragged-tooth shark, has a large, stout body tapered at each end, a pointed snout and small eyes. The upper surface of Grey Nurse Sharks is bronze coloured, and the underside is pale white. Juveniles often have dark spots on the lower half of the body and the caudal (tail) fin. These spots fade as the shark becomes larger but sometimes persist on adults. They have two distinctive large dorsal (top) fins of similar size. The first dorsal fin is set well back from the pectoral (side) fins. The anal fin is similar in size to both dorsal fins. The mouth extends beyond the front of the eye, and has long, protruding teeth. (NSW DPI). |
| **The following factors must be taken into account in making a determination under Section 220ZZ:** |
| **a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**<br><br>Grey Nurse Sharks are found predominantly in inshore coastal waters. They have been recorded at various depths but mainly found in waters between 15 and 40 metres deep. Grey Nurse Sharks gather at several key sites along the coast of NSW and southern Queensland. These sites have gravel or sand filled gutters, rocky reefs or caves, and are called aggregation sites. Lake Conjola and the proposed opening area is not a known aggregation site and doesn't provide suitable habitat for aggregation. It should be acknowledged that individuals of the species can occasionally occur in Lake Conjola. |
| **(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**<br><br>As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect of the life cycle of the Grey Nurse Shark. |
| **c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed -**<br><br>**(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**<br><br>As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect on the Grey Nurse Shark community or place it at risk of extinction. |

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

As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect on the community composition of the Grey Nurse Shark, and will not place it at risk of extinction.

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

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

The proposed activities will not lead to the removal or modification of habitat as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not remove or modify habitat.

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

The proposed activities will not lead to an area of habitat likely to become fragmented or isolated, as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not impact upon habitat fragmentation or isolation.

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

This activity will not remove habitat, and therefore will not influence the long-term survival of this species.

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

This activity will not adversely affect habitat beyond the natural highly dynamic entrance opening regime, and therefore will not influence the long-term survival of this species.

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

The actions are consistent with the Recovery Plan for the Grey Nurse Shark (Carcharius taurus) (2014).

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

The proposed actions are not part of a key threatening process.

**Conclusion**

The proposal is unlikely to have a significant impact on the Grey Nurse Shark given that:

- Caution is taken when moving around the site during operation works. If any Grey Nurse Sharks are spotted, then work is to be stopped immediately for the species to move away on its own accord.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Grey Nurse Shark. As such, a Species Impact Statement (SIS) is not required.

**Great White Shark (*Carcharodon carcharia*) listed as Vulnerable**

**Species description**

The Great White Shark (*Carcharodon carcharia*) is a species of large mackerel shark which can be found in the coastal surface waters of all the major oceans and within estuaries. It is the only known surviving species of its genus Carcharodon. The great white shark is notable for its size, with the largest preserved female specimen measuring 5.83 m in length and around 2,000 kg in weight at maturity. However, most are smaller; males measure 3.4 to 4.0 m, and females measure 4.6 to 4.9 m on average.

**The following factors must be taken into account in making a determination under Section 220ZZ:**

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

Great White Sharks are normally found in inshore waters around rocky reefs and islands and often near seal colonies. They have been recorded at varying depths down to 1,200 metres.

As estuaries are not typical breeding grounds, the proposed actions are unlikely to have an adverse effect on the life cycle of the species, and not place the local population at risk of extinction.

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

As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect on the life cycle of the Great White Shark.

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

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

As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect on the Great White Shark community or place it at risk of extinction.

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

As Lake Conjola is not a known aggregation or breeding site, the proposed actions will not have an adverse effect on the community composition of the Great White Shark, and will not place it at risk of extinction.

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

**(ii) the extent to which habitat is likely to be removed, modified as a result of the the action proposed, and**

The proposed activities will not lead to the removal or modification of habitat as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not remove or modify habitat.

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

The proposed activities will not lead to an area of habitat likely to become fragmented or isolated, as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not impact upon habitat fragmentation or isolation.

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

This activity will not remove habitat, and therefore will not influence the long-term survival of this species.

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

This activity will not adversely affect habitat beyond the natural highly dynamic entrance opening regime, and therefore will not influence the long-term survival of this species.

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

The actions are consistent with the Recovery plan for the Great White Shark (Carcharodon carcharias) (2013).

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

The proposed actions are not part of a key threatening process.

**Conclusion**

The proposal is unlikely to have a significant impact on the White Shark given that:

- Caution is taken when moving around the site during operation works. If any Great White Sharks are spotted, then work is to be stopped immediately for the species to move away on its own accord.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Great White Shark. As such, a Species Impact Statement (SIS) is not required.

**Black Rock-cod (*Epinephalus daemelii*) listed as Vulnerable.**

**Species description**

Adult Black Rock-cod can grow to 2 m in length and at least 80 kg in weight, but it is more common to see smaller fish (up to 1m/30kg). Juveniles and sub-adults have a distinct black 'saddle' shaped spot just in front of the tail. They have five irregular grey or black stripes. These markings tend to fade as the fish grows and may be only faintly visible in adults. They have large canine teeth in both jaws. They are highly variable in colour depending on the environment. The species found in coastal reefs are usually banded and mottled in colour, while those in estuaries are uniformly dark, sometimes black (NSW DPI).

**The following factors must be taken into account in making a determination under Section 220ZZ:**

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

Black Rock-cod live in relatively shallow rocky reefs where they are usually found in caves, ledges and gutters. The site of the proposed activity does not currently provide any habitat for all these life stages. Therefore, the proposed activities will not place the local population at risk of extinction.

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

Black Rock-cod live in relatively shallow rocky reefs where they are usually found in caves, ledges and gutters. The site of the proposed activity does not currently provide any habitat for all these life stages. Therefore, the proposed activities will not place the local population at risk of extinction.

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

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

Black Rock-cod live in relatively shallow rocky reefs where they are usually found in caves, ledges and gutters. The site of the proposed activity does not currently provide any habitat for all these life stages. Therefore, the proposed activities will not place the local population at risk of extinction.

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

Black Rock-cod live in relatively shallow rocky reefs where they are usually found in caves, ledges and gutters. The site of the proposed activity does not currently provide any habitat for all these life stages. Therefore, the proposed activities will not place the local population at risk of extinction.

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

**(iii) the extent to which habitat is likely to be removed, modified as a result of the the action proposed, and**

The proposed activities will not lead to the removal or modification of habitat as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not remove or modify habitat.

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS


## Melbourne

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800

## Sydney

Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150
Telephone (02) 9354 0300

## Brisbane

Level 5, 43 Peel Street
South Brisbane QLD 4101
Telephone (07) 3105 1460

## Adelaide

1/198 Greenhill Road
Eastwood SA 5063
Telephone (08) 8378 8000

## Perth

Level 1, 21 Adelaide Street
Fremantle WA 6160
Telephone (08) 6555 0105

## New Zealand

7/3 Empire Street
Cambridge New Zealand 3434
Telephone +64 27 777 0989

## Wangaratta

First Floor, 40 Rowan Street
Wangaratta VIC 3677
Telephone (03) 5721 2650

## Geelong

51 Little Fyans Street
Geelong VIC 3220
Telephone (03) 8526 0800

## Wimmera

597 Joel South Road
Stawell VIC 3380
Telephone 0438 510 240

## Gold Coast

Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227
Telephone (07) 5676 7602

watertech.com.au

This will be ensured through only conducting beach nourishment above the Mean Low Water Mark.

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

The proposed activities will not lead to an area of habitat likely to become fragmented or isolated, as the entrance opening (pilot channel excavation) will only occur when a natural breakout is imminent, an otherwise natural process. Other proposed activities (dry notch maintenance, berm lowering, beach nourishment), will not impact upon habitat fragmentation or isolation.

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

This activity will not remove habitat, and therefore will not influence the long-term survival of this species.

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

This activity will not adversely affect habitat beyond the natural highly dynamic entrance opening regime, and therefore will not influence the long-term survival of this species.

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

The actions are consistent with the Black Rockcod Recovery Plan (2012).

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

The proposed actions are not part of a key threatening process.

**Conclusion**

The proposal is unlikely to have a significant impact on the Black Rockcod given that:

- Beach nourishment will only occur above the Mean Low Water Mark, out of potential habitat zones and will not result in smothering.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Black Rockcod. As such, a Species Impact Statement (SIS) is not required.