Review of Environmental Factors (REF) - Swan Lake Entrance Management Policy Update

Swan Lake

Assessment and approvals overview

Item	Details
Assessment Type	Division 5.1 *Environmental Planning and Assessment Act 1979* (NSW) - REF
Proponent	Shoalhaven City Council
Prepared by	Worley Consulting Pty Ltd on behalf of Shoalhaven City Council
Determining authority / authorities	Shoalhaven City Council
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Required publication	This REF will be published on Shoalhaven City Council's website (as the determining authority), in accordance with Section 171(4) *Environmental Planning and Assessment Regulation 2021* (as a matter of public interest).

Document Review			
	Name	Signature	Date
Original Author	Worley Consulting Pty Ltd		19 November 2024
Updated by	Shoalhaven City Council		20 December 2024
Reviewer	Shoalhaven City Council		10 January 2025
Approver	Shoalhaven City Council		26 February 2025

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Acronyms and Abbreviations

Acronym/abbreviation	Definition
AHD	Australian Height Datum, approximately Mean Sea Level
AHIMS	Aboriginal Heritage Information Management System
AOBV	Areas of Outstanding Biodiversity Value
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CMP	Coastal Management Program
CM Act	*Coastal Management Act 2016* (NSW)
Council	Shoalhaven City Council
CLM Act	*Crown Land Management Act 2016* (NSW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly Department of Planning and Environment NSW)
DPE	Department of Planning and Environment (NSW), now DCCEEW
DPIRD	Department of Primary Industries and Regional Development (NSW), formerly DPI (Department of Primary Industries)
EECs	Endangered Ecological Communities
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FM Act	*Fisheries Management Act 1994* (NSW)
KFH	Key Fish Habitat
LEP	*Shoalhaven Local Environmental Plan 2014*
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	National Parks and Wildlife Service
NT Act	*Native Title Act 1993* (Commonwealth)
PCT	Plant community types
Policy	Swan Lake Entrance Management Policy
REF	Review of Environmental Factors
RH SEPP	*State Environmental Planning Policy (Resilience and Hazards) 2021*
TI SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
WM Act	*Water Management Act 2000* (NSW)

1 Introduction

1.1 Background

Worley Consulting (previously Advisian) has been commissioned by Shoalhaven City Council (Council) to prepare a Review of Environmental Factors (REF) which would accompany proposed updates (the proposal) to the Swan Lake Entrance Management Policy (EMP). The EMP was first adopted by Council in 2004 and last reviewed in 2008.

The EMP provides a framework that assists in the management of the entrance to Swan Lake. The aim of the EMP is to provide Council, State Government and the local community with a detailed procedure for the short- and long-term management of the Swan Lake Entrance. It describes:

- the procedures to be followed by Council for artificial openings of Swan Lake entrance, should this course of action be necessary.
- the conditions that should be satisfied prior to an artificial opening.
- the responses that may be requested of state agencies in response to artificial or natural opening events.
- a course of actions to approach totally natural entrance behaviour.

The EMP aims to:

- Minimise risk to life and risk to public and private property and assets due to catchment flooding.
- Establish clear triggers for initiating mechanical intervention in the natural processes of the entrance.
- Minimise interference with natural entrance behaviour and allow mechanical entrance openings to mimic a natural ICOLL opening regime as closely as possible.
- Accommodate future climate considerations, in particular sea level rise.
- Conserve or enhance the ecological diversity and flora and fauna communities of the lake system, including surrounding wetlands.
- Conserve or enhance the recreational activities within the lake and its foreshores.
- Determine key responsibilities for management of the entrance.
- Detail the procedures for monitoring the entrance.

Council is responsible for managing the Swan Lake entrance for the purpose of flood mitigation for low-lying properties and assets in accordance with authorisations from the NSW Government. The mechanical opening of the Swan Lake entrance will not prevent flooding of properties within the entirety of the catchment. Accordingly, the EMP aims to reduce, not eliminate, the impacts of flooding.

1.2 Purpose of the Review of Environmental Factors

This REF has been prepared by Worley Consulting to enable Council to assess the environmental impacts of the proposal. For the purposes of the activity, Council is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this REF is to describe the proposal and assess the likely impact(s), having regard to the provisions of Section 5.5 of the EP&A Act, including the identification of suitable mitigation measures to reduce the likely impact(s), if any, of the proposal. Section 171 of the *Environmental*

Planning and Assessment Regulation 2021 (EP&A Regulation) and the factors in *Guidelines for Division 5.1 assessments* (Department of Planning and Environment (DPE), 2022) have also been considered in preparing this REF.

This assessment has also considered the relevant provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), other relevant NSW environmental legislation and environmental planning instruments.

1.3 Proposed Activity

The proposed activity comprises the prevention of the flooding of assets through long-term modification of some infrastructure, while reducing the need for artificial entrance intervention to improve the resilience of the Lake and its infrastructure to inundation events.

The EMP for the present-day is to open the Lake entrance once the trigger level is reached. This EMP establishes the use of a trigger level of 2.5 m AHD, with water levels allowed to stay between 2.3m AHD and 2.5m AHD for three months, to allow sufficient inundation of the coastal wetland area at the northern end of the lake to occur. The procedure for opening the Lake entrance is discussed in detail in Section 4.

Further, the proposed activity includes monitoring of the entrance, and minor works to enable the raising of intervention levels in the future, with the long-term aim of restoring the lake to a natural hydrologic regime.

Figure 1 and Figure 2 provide a geographical overview of Swan Lake, with views of the entrance in Figure 3 and Figure 4. The impact assessment of the proposed activity includes the entire Lake and foreshore affected by the Proposal as shown in Figure 5, and encompasses the Coastal Environment Area, Coastal Use Area, Coastal Wetlands and Coastal Wetland Proximity areas as defined by the *State Environmental Planning Policy (Resilience and Hazards) 2021* (RH SEPP). The subject site includes the Lake entrance area and immediate surrounding land, as indicated in Figure 6. For the purposes of assessing environmental impact and database searches, a 5-kilometre radius centred on the lake of the study area was considered.

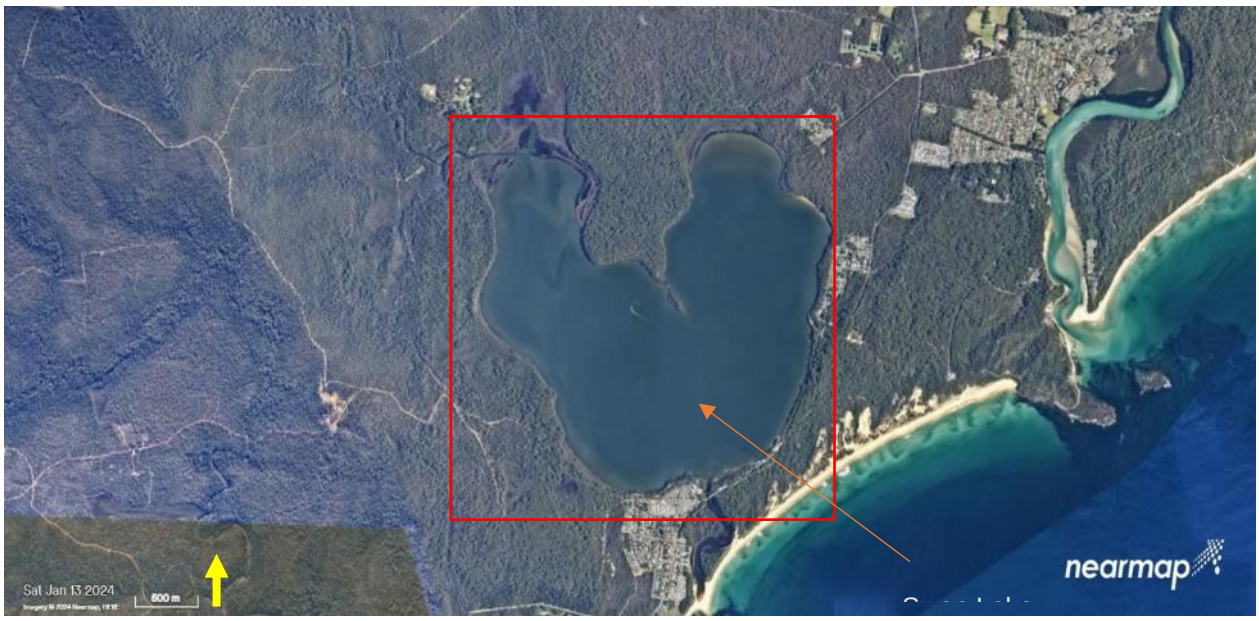

Figure 1 Site overview of Swan Lake (Nearmap 2024)

Figure 2 Zoom in extent of Swan Lake entrance (Nearmap 2024)

Figure 3 Aerial view of Swan Lake entrance (Advisian 2022)

Figure 4 View looking north of the Swan Lake entrance (Advisian 2022)

Figure 5 Study Area

Figure 6 Subject Site Area

1.4 Sources of information

This REF has been informed by:

- Database searches
  - Protected Matters Report under the EPBC Act on 27 March 2024.
  - NSW BioNet Atlas on 27 March 2024.
  - Aboriginal Heritage Information Management System (AHIMS) (accessed on 22 March 2024).
  - iNaturalist data (October 2024) – 5 kilometres radius around the centre point of the lake.
- Council supplied reports, records and archives.
- Previous REF and Entrance Management Policy.
- CMP documentation.
- Key Fish Habitat (KFH) as identified by NSW Department of Primary Industries and Regional Development (DPIRD).
- Occurrence of protected aquatic vegetation under the FM Act (e.g. mangroves, saltmarsh and seagrass as mapped by NSW DPIRD).
- Location of Coastal Wetlands and Littoral Rainforest (RH SEPP).
- Occurrence of State and Federal Listed threatened and protected flora and fauna.
- Occurrence of any areas of declared Critical Habitat (under the FM Act and EPBC Act) and AOBV (under the BC Act).
- Invasive pest species including WeedWise search for priority listed weeds under the NSW *Biosecurity Regulation 2017*.

In addition to the above, a site visit to Swan Lake was undertaken by Worley Consulting in 2021 as part of the preparation of the CMP to ground truth existing data and obtain images of key items of significance/risk. Information from this site visit has been used for the REF.

Likelihood of occurrence was assessed for threatened flora and fauna listed under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and EPBC Act that have been recorded within 5 kilometres of the subject site (hereafter referred to as the 'locality').

Based on the nature of the subject site and proposed activity, it was considered that the above listed habitat assessment, literature review and database searches were appropriate means for assessing the potential impact on environmental factors in accordance with section 171 of the EP&A Regulation.

2 Location and historical context

2.1 Location

Swan Lake is a large brackish coastal lake that is intermittently connected to the sea. It has a surface area of about 4.5 to 5 square kilometres (km^2) and consists of a broad, shallow basin and a narrow, sinuous inlet about one kilometre long that occasionally opens to the sea.

Swan Lake is a naturally variable and dynamic environment. Swan Lake is typical of many south coast lagoons in that it is usually closed to the sea by a sand bar and the condition of the lake's entrance plays an important part in the state of the estuarine ecosystem. The biological, chemical and physical character of the lake may stay relatively stable for months or years and then change dramatically within a short period if the entrance opens. The lake then functions as a tidal waterway for some time.

2.2 Land Ownership and Management

Swan Lake is situated within Shoalhaven City Council local government area (LGA) and falls under the *Shoalhaven Local Environment Plan 2014* (the LEP). Land zoning of Swan Lake and surrounding areas are detailed in Table 1 and a map of the zoning is found in Figure 7.

The area surrounding the Lake to the west, north and north-east is part of the Conjola National Park and is managed by NSW National Parks and Wildlife Service (NPWS). The waterway area of the Lake is zoned W1 Natural Waterways, with the entrance channel zoned as W2 Recreational Waterways. The area surrounding the Lake Entrance where entrance management activities would be carried out under this proposal is part of Crown Reserve R78638 managed by Council.

Table 1 List of Land Zones and Objectives

Zone	Location	Objectives of Zone
W1 – Natural Waterways	Proposal site	To protect the ecological and scenic values of natural waterways. To prevent development that would have an adverse effect on the natural values of waterways in this zone. To provide for sustainable fishing industries and recreational fishing.
W2 – Recreational Waterways	Proposal site	To protect the ecological, scenic and recreational values of recreational waterways. To allow for water-based recreation and related uses. To provide for sustainable fishing industries and recreational fishing.
C1 – National Parks and Nature Reserves	Adjacent to proposal site	To enable the management and appropriate use of land that is reserved under the *National Parks and Wildlife Act 1974* or that is acquired under Part 11 of that Act. To enable uses authorised under the *National Parks and Wildlife Act 1974*.

Zone	Location	Objectives of Zone
		To identify land that is to be reserved under the *National Parks and Wildlife Act 1974* and to protect the environmental significance of that land.
C2 – Environmental Conservation	Adjacent to proposal site	To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. To prevent development that could destroy, damage or otherwise have an adverse effect on those values. To protect water quality and the ecological integrity of water supply catchments and other catchments and natural waterways. To protect the scenic, ecological, educational and recreational values of wetlands, rainforests, escarpment areas and fauna habitat linkages. To conserve and, where appropriate, restore vegetation in order to protect the erosion and slippage of steep slopes.
RE1 – Public Recreation	Adjacent to proposal site	To enable land to be used for public open space or recreational purposes. To provide a range of recreational settings and activities and compatible land uses. To protect and enhance the natural environment for recreational purposes.
R2 – Low Density Residential	Adjacent to proposal site	To provide for the housing needs of the community within a low-density residential environment. To enable other land uses that provide facilities or services to meet the day to day needs of residents. To provide an environment primarily for detached housing and to ensure that other development is compatible with that environment.
SP3 - Tourist	Adjacent to proposal site	To provide for a variety of tourist-oriented development and related uses. To enable compatible residential and recreational uses.

Figure 7 Land Zones of proposal area (NSW Planning Portal 2024)

2.3 Historical Context

When water levels are high within Swan Lake it can result in nuisance inundation to some infrastructure and amenity including, roads, pathways and properties that surround the lake. The EMP adopts a protocol for intervention at the Lake entrance. The historical entrance management protocol can be seen below in Figure 8. The previous Entrance Management Policy was supported by an REF by Peter Spurway & Associates, dated August 2003.

The previous entrance management regime for initiating a lake opening based on lake level is summarised as follows:

i) When the lake level reaches 2.2 metres (m) Australian Height Datum (AHD):

- If water levels in the lake reach 2.2 m AHD, the berm and lake levels are closely monitored, and a period of three months is allowed to elapse before a lake opening is initiated. The three month period can be reduced in consultation with National Parks and Wildlife Service (NPWS) if it is considered advantageous for the lake to be opened in May or June, in the lead-up to a shorebird breeding season.
- Initiate Green and Golden Bell Frog survey during or within 24 hours of rainfall (under the existing Policy, Council is responsible for undertaking the survey).
- Observe lake level on Collier Drive Bridge gauge to check against water level recorder.
- Observe beach berm at lake entrance to judge if lake can rise to 2.5m AHD or if it is likely to open naturally prior to this level being attained.
- Notify NPWS for its determination on the likelihood or confirmed presence of nesting shorebirds on the beach in the entrance area.

- Advise state agencies that opening could eventuate if rain was to continue and the lake was to rise to 2.5m AHD, and seek their input.
- Advise Council works staff responsible for the opening works that a lake opening could eventuate if rain was to continue and the lake was to rise to 2.5m AHD.

ii) When the lake level reaches 2.5 m AHD:

- Council to notify agencies and open lake at first opportunity, noting agency advice.

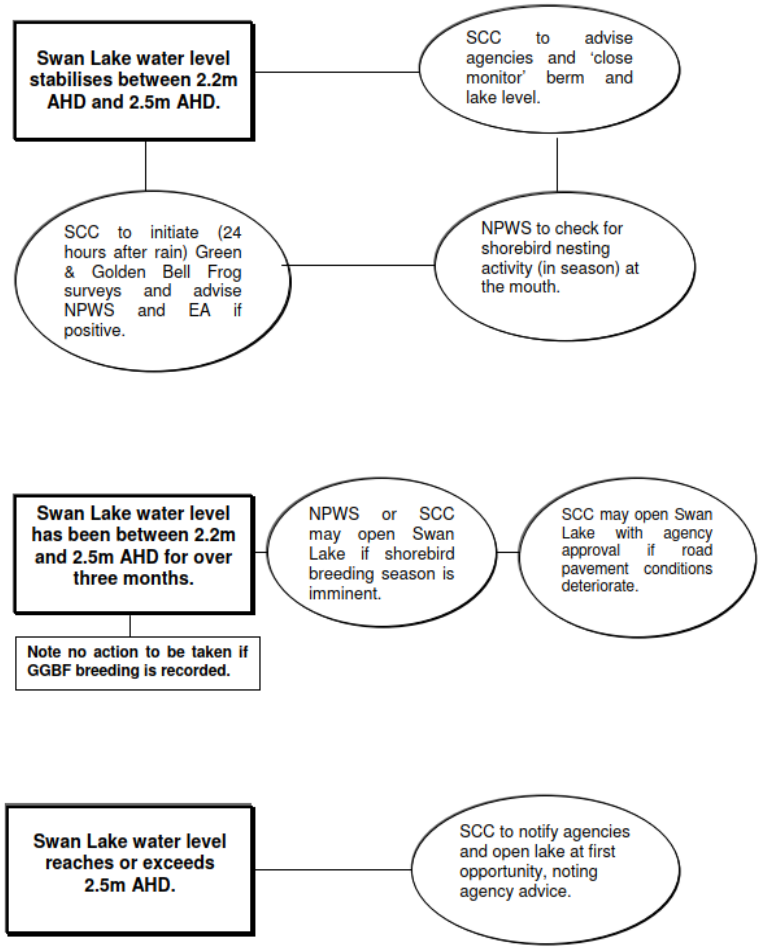

Figure 8 Previous Swan Lake Entrance Management Regime (Shoalhaven City Council 2008)

2.3.1 Previous Lake Openings and Procedure

The previous EMP notes four locations where potential openings could or have occurred in the past:

- Location A – south across reef.
- Location B1 – across sand spit immediately north of reef.
- Location B2 – further north near sand dunes.
- Location C – "The Gap" (no recorded openings).

The previous EMP specifies that the opening should take place within 10 m of the reef at the

entrance to the lake at Cudmirrah Beach, either across the sand spit to the north side of the reef or across the reef to the south. The opening location is to be determined by the relative height of the incipient dune at each location. The EMP states that this naturally random process should be allowed to continue, rather than force the lake to open at one side of the reef. The excavation is specified to be 2 m wide and is to be made in the area with the lowest incipient dune height as determined on site prior to works commencing. The four locations are indicated in Figure 9.

If intervention is required by Council to open Swan Lake, then the Swan Lake inlet would be excavated by mechanical equipment (dozer). This would go through unvegetated sand barriers and adjacent shallow shoals within 10m of the rocky reef on Cudmirrah Beach. The construction equipment would access the site as much as possible via established roads and unvegetated areas and is to avoid recorded Aboriginal sites. The excavated sand would be pushed to the side of the excavated channel and is not to be removed from site.

Figure 9 Locations where lake openings are possible. Locations A and B1 are specified as acceptable for artificial openings by the EMP (Advisian 2022)

3 Proposal Justification and Options

3.1 Strategic Need for the Proposal

The review of the existing EMP for Swan Lake (Advisian 2022) formed part of a series of studies for the development of the St Georges Basin, Sussex Inlet, Swan Lake and Berrara Creek Coastal Management Program (CMP) being undertaken by Council. The review used additional data collected since the EMP was first formulated in 2002 to address knowledge gaps identified in the EMP, and to assess the appropriateness of the existing EMP with respect to intervention at the Lake entrance. Advisian (2022) found that the existing management regime for the Lake is sound and that the assumptions used to formulate the EMP are largely correct based on additional data collection.

However, there have been several documented instances where the Swan Lake entrance berm has been breached artificially, or the breaching has been assisted by members of the public, outside of the protocol specified in the EMP. Community engagement throughout the development of the CMP, including various submissions from community members, identified impacts when lake levels are high for extended periods within Swan Lake (Advisian 2022):

- A loss of recreational amenity, with the sandy foreshores at Swanhaven, The Springs Road “Ski Beach” and at Errol Bond Reserve being inundated at lake levels above 2 m AHD. These sandy foreshores are valued by the public for their recreational amenity.
- Nuisance inundation for extended periods impacting on recreational amenity.
- There is a perception that water quality is reduced when the lake entrance is closed for extended periods, due to a lack of tidal exchange within the lake. However, this perception is not supported by evidence from water quality monitoring, which shows that water quality within the lake is not dependent on entrance conditions.
- When water levels are higher than 2 m AHD, there is an impact to some fringing vegetation around the southern foreshore of the lake, and an increased risk of bank erosion.

In response to the above, practical measures have been proposed as part of this REF to reduce the need to intervene with the natural system, including minor works to improve flood resilience of infrastructure and measures to improve recreational amenity, reducing impact of long-term nuisance inundation on the local community when the entrance is closed and lake levels are high. The long-term aim is to minimise the need for any intervention at all.

3.2 Options Considered

3.2.1 Option 1: Do Nothing

The do-nothing approach would retain the existing Policy and its management regime. This option would lead to the continuation of intervention at the entrance when water levels reach above 2.3m AHD, this would result in the continuation of inundation of local infrastructure.

3.2.2 Option 2: Update the Entrance Management Policy

Updating the EMP based on the recommendations as per review (Advisian, 2022) would result in a long-term aim of being able to minimise the need for intervention as stated in Section 3.1. Further, the proposed changes would aim to progressively reduce the risk to

infrastructure, which is below the trigger level, by raising it or moving it to higher ground.

A more in-depth description of the updates to the EMP can be found in Section 4.

3.2.3 Option Chosen and Justification

The preferred option is Option 2 as it lowers the need for intervention and lessens risk to local infrastructure from flood issues stemming from management of the Swan Lake inlet. In raising the trigger level, the aim is to progressively reduce the risk to infrastructure, which is below the trigger level, by raising it or moving it to higher ground. Further to changing the trigger level, another intervention involves preventing the lake from breaking out at a location known as “The Gap”, which is a narrow point in the beach a few hundred metres north from the existing lake entrance. Prevention would involve beach scraping to be carried out as an emergency measure if needed to prevent the lake breaking out here, as a breakout could cause erosion of the banks of the entrance channel and could lead to long term changes in the lake channel morphology.

4 Description of the Proposal

A description of the proposed updates to the EMP is provided below which is based on the “Swan Lake and Berrara Creek Entrance Management Review” report written in 2022 by Worley Consulting (formerly Advisian). Overall, the purpose of the revised management regime is to prevent the flooding of assets. Details of the existing artificial entrance intervention work methodology is provided in Section 2.3.1.

4.1 Entrance Management Strategic Framework

Overall, the purpose of the revised management regime is to prevent the flooding of assets through the long-term modification of some infrastructure, while reducing the need for artificial entrance intervention to improve the resilience of the Lake and its infrastructure to inundation events. This will allow the Lake to more closely resemble a completely natural system to improve the estuary’s health.

The overall strategy for future management of the Swan Lake entrance is outlined in Figure 10, with the long-term aim being to restore the lake to a completely natural opening regime.

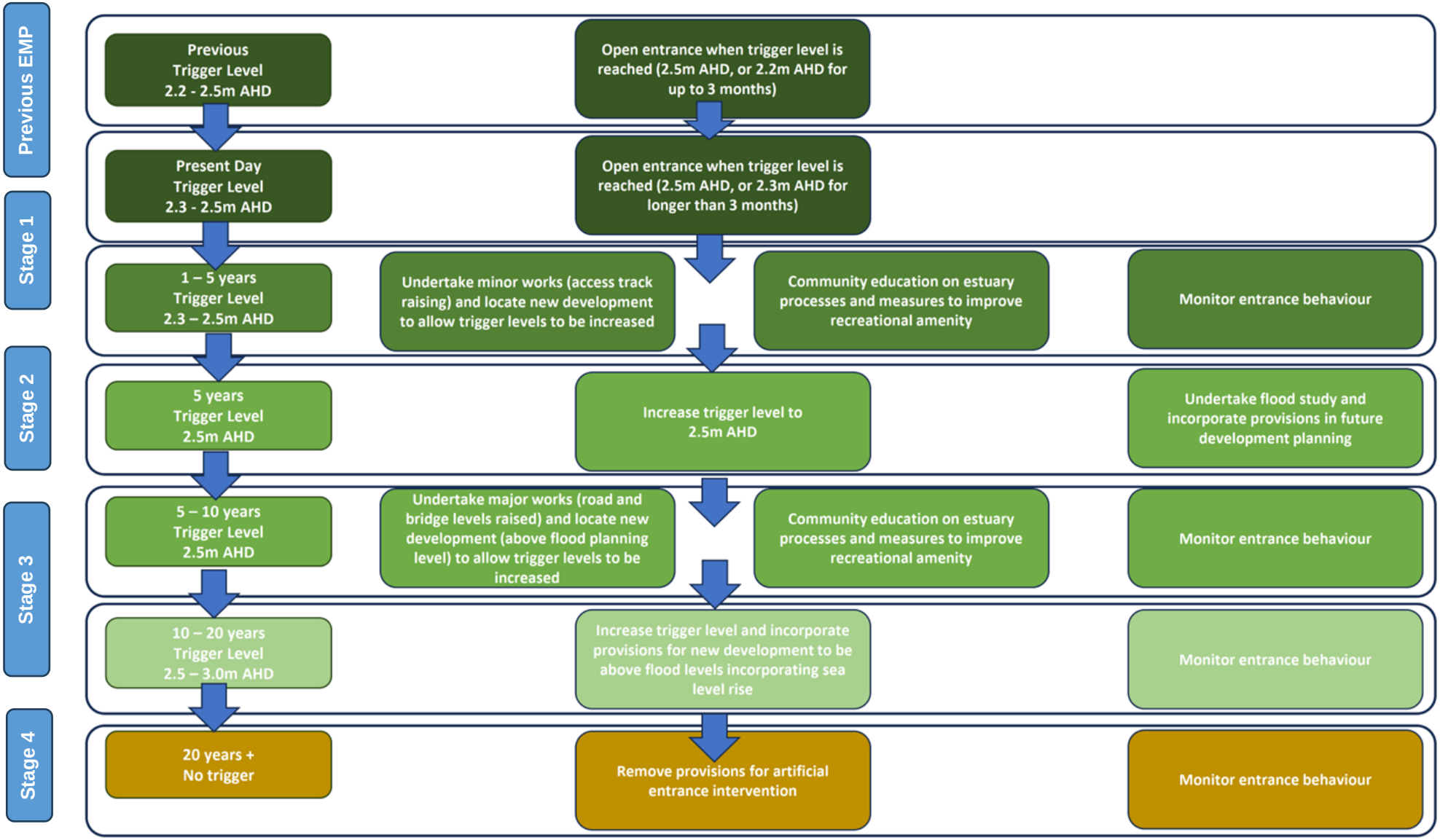

Figure 10 Entrance Management Strategic Framework

4.2 Management Rationale and Assets

The key rationale for the establishment of water level triggers to determine levels at which the Lake may be mechanically opened is to manage the inundation of assets and the protection of the environment. The rationale for selecting the location of the lake opening being dependent on the rate of outflow, depth of scour at the opening channel and ultimate water level achieved within the lake following an opening.

There are some areas of low-lying development around Swan Lake at Swanhaven and Cudmirrah that experience inundation when the lake level exceeds 2.03 m AHD, with these areas identified in the EMP. The key low-lying assets and the lake elevation (in m AHD) at which they experience inundation are listed in Table 2.

Table 2 Key asset inundation levels (Peter Spurway & Associates 2002)

Asset	Asset Lake Level (m AHD)
Swan Haven	
'The Springs' Lakeside Cabins access track low Point	2.03
'The Springs' Sewage holding tank cover	2.70
Pumping Station 13 access track low point	2.93
'The Springs' lowest cabin (No 4) floor level	3.37
Public toilets floor level	3.46
Slab at Pumping Station No. 13 (Lake Drive Reserve)	3.62
Cudmirrah	
Collier Drive – Lowest point south of bridge	2.47
Swan Lake Tourist Park lowest ground level	2.47
The Springs Road north of Collier Drive bridge	2.60
Collier Drive at bridge deck	3.17
Swan Lake Tourist Park office floor level	3.25
Switchgear building Pumping Station No. 1 Goonawarra Drive	3.41
Public toilets floor level	3.60

4.3 Intervention Levels – Present-day (Stage 1)

The EMP for the present-day, in accordance with Stage 1 of the framework presented in Figure 10, is to open the entrance once the trigger level is reached. The proposed EMP establishes the use of a trigger level of 2.5 m AHD, with water levels allowed to stay between 2.3m AHD and 2.5m AHD for three months, to allow sufficient inundation of the coastal wetland area at the northern end of the lake to occur.

The proposed EMP and procedures for the present day are outlined in Figure 11. Key aspects of the EMP include:

- Monitor lake water levels weekly at **https://mhl.nsw.gov.au/Station-216425**, or daily if rainfall greater than 10 mm within 24 hours is occurring or forecast in the catchment area. It is noted that Council currently receives text and email alerts from MHL (Swan Lake gauge) when predetermined lake water level thresholds have been met. These alerts provide early

warning of lake level rises and notify Council when key EMP water level thresholds have been met.

- Apply a 2.5 m AHD intervention level for opening the lake at the earliest opportunity but with consultation with NPWS and DCCEEW-BCS subject to consideration of ocean conditions and requirements regarding threatened migratory shorebirds
- If water levels are between 2.3 m AHD and 2.5 m AHD, undertake consultation with National Parks and Wildlife Service (NPWS) to determine the presence of nesting shorebirds prior to initiating an opening. Shorebird nesting season is from August to March. It is assumed that Green and Golden Bell Frogs could be present based on historical surveys in the Swan Lake area and *The Green and Golden Bell Frog Key Population at Sussex Inlet – Swan Lake Management Plan* (DECC, 2007). Lake levels should be allowed to remain at between 2.3 m and 2.5 m AHD for a minimum of three months prior to initiating an opening of the entrance to primarily allow inundation of the Coastal wetland at the northern end of the lake. This will also help to provide fresh or lightly brackish water which may also be of benefit to the endangered Green and Golden Bell Frog to allow for their successful breeding if present. If shorebirds are present, further consultation with NPWS and DCCEEW-BCS is required to determine the appropriateness of opening the entrance if the lake continues to rise.
- If a planned opening is required, follow the procedure below in Section 4.3.1 for opening the lake regarding location, entrance channel excavation width and opening times with respect to tidal levels and ocean conditions.

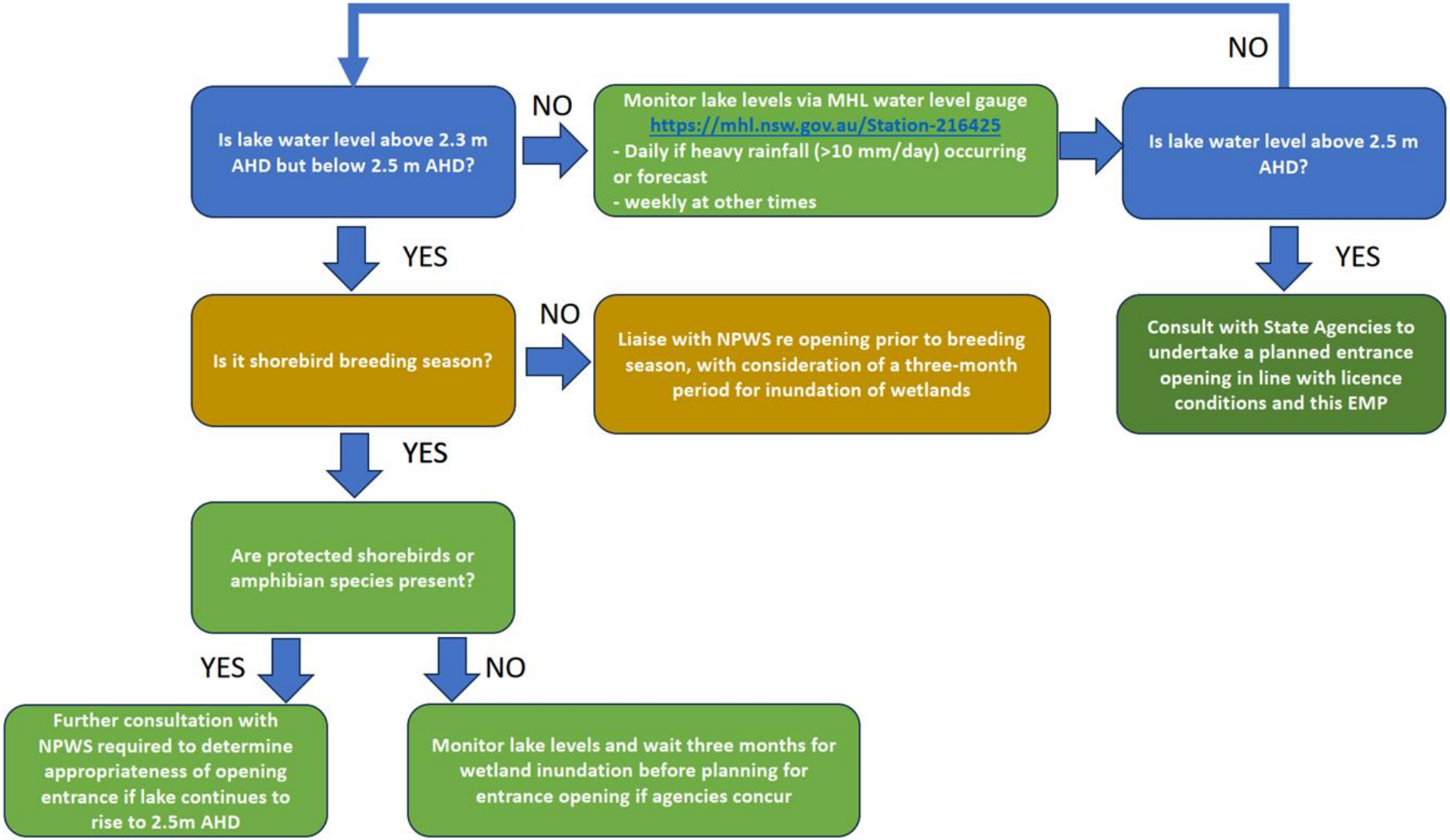

Figure 11 Present Day Entrance Management Protocol

4.3.1 Lake Opening Location

Locations where an entrance opening is permissible are illustrated in Figure 12 with these being:

- Location 1 – across sand spit immediately north of reef (preferred)
- Location 2 – south across reef (alternative)

The reasons for these locations being selected in the EMP include:

- the presence of the rocky reef limits the level of scour that can occur at the opening, which prevents the water level within the lake falling too low and too quickly. The slow rate of water level drop when the lake entrance opens is a natural feature of Swan Lake that an opening policy should strive to maintain (Peter Spurway & Associates 2002)
- the locations near the reef are areas where the Lake tends to open naturally, as the entrance berm levels are generally the lowest
- the natural process for this estuary is for only limited tidal exchange to occur when the entrance is open, therefore, the opening location is selected to limit the tidal exchange and thus emulate the natural process.

If the water level falls too low too quickly, this can cause:

- water quality and odour issues with exposure of sand flats
- water with low oxygen levels reaching the surface
- scour and erosion of the banks of the channel due to high outflow velocities, leading to possible impacts on infrastructure; *e.g*. scour at the abutments of the Swan Lake Bridge
- impacts on recreational amenity (*e.g*. the boat ramp at The Springs Road becoming unusable).

4.3.2 Lake Opening Procedure

The following procedures are to be applied to opening the lake under the EMP:

- The opening should take place within 10 metres of the reef at the entrance to the lake at Cudmirrah Beach, either across the sand spit to the north side of the reef (Location 1) or across the reef to the south (Location 2). The opening location is to be determined by the relative height of the beach berm at each location as determined on site prior to works commencing (i.e. using RTK survey methods to determine the relative berm elevation).
- Monitor ocean conditions including water levels and offshore wave conditions at the Port Kembla Waverider Buoy (https://mhl.nsw.gov.au/Station-PTKMOW) prior to opening, and only carry out the opening if it is safe to do so (i.e. significant wave height Hs <3 m at Port Kembla Waverider Buoy).
- The opening should be sufficient for scour flow to develop. The preferred size is 2m wide with the bed graded to the ocean. Either an excavator or a dozer will cut the channel, pushing the excavated sand as far as is feasible from the cut face. Normally a sand plug will be left at the lake end of the entrance channel until the remainder of the channel is established.
- Access for construction vehicles is to be via the existing access track through the reserve at the corner of Second Avenue and Koolyn Drive, as per Figure 12. Alternative vehicle access is available if required via the beach access track at Sussex Inlet Surf Lifesaving Club and along the beach, approximately 3 km north of the lake entrance.

- The procedure is to be planned so that where possible the actual opening of the lake occurs shortly after the tide turns from high to low, for the lower tide of the day. Care must be taken to ensure construction vehicle access is maintained following the opening.
- The volume of sand to be excavated is expected to be small. This sand will be retained on the beach and may be washed into the channel as it expands laterally. Excavated sand is not to be removed from the beach area.
- Possible water quality impacts to adjacent surf beaches should be considered while the lake is emptying, for at least the first 7 days. Appropriate action should be taken to protect public health and safety at the site while excavation equipment is operating.

Figure 12 Locations where lake openings are possible. Locations 1 and 2 are specified as acceptable for artificial openings by the Entrance Management Policy.

4.4 Raising of Intervention Levels (Stages 2, 3 and 4)

It is considered feasible to raise the intervention levels for the lake entrance progressively over time to 3.0 m AHD with the following key activities to be undertaken over time (in accordance with the timing indicated in the EMP framework in Figure 10)

- **Activity 1 -** undertake minor works to raise the access track to The Springs Cabins by 0.5 m to 2.7 m AHD or higher. Once complete, this would remove the need for any entrance

intervention measures when the lake is below 2.5 m AHD. The proposed intervention procedure when lake levels of 2.5 m AHD are reached is outlined in Figure 13. Any works undertaken as part of this Activity would be undertaken by Council under separate planning approval processes.

- **Activity 2 –** investigate and provide measures to improve recreational amenity when lake levels are high e.g. education, signage and enforcement measures to deter unauthorised lake openings. Enhance community education on water quality e.g. interpretive signage, publicising water quality results that demonstrate that water quality is acceptable in the lake regardless of whether the lake is open or closed. Installation of a rain gauge in the Swan Lake catchment would inform a future flood study and potential flood warning system for Swan Lake, to assess in more detail the inundation risk as per Action WQ02 in the Swan Lake CMP. Collected data should form part of Shoalhaven City Council's Environmental Monitoring Program (EMP) and link to the on-line environmental monitoring dashboard.
- **Activity 3 –**Investigate the feasibility of raising the Springs Road to 3.0m AHD and investigate raising of Collier Drive to 3.0m AHD as well as minor works to reduce inundation impacts on the cabins at Holiday Haven caravan park. The feasibility of raising of roads would be dependent on engineering assessments regarding tying in with the proposed Swan Lake bridge upgrade, and factors such as allowing for sufficient longitudinal and cross-drainage during flood events. Once enacted, raise the “three months” minimum intervention level to 2.5m AHD and raise the opening level to 3.0 m AHD as per Figure 14. Any road raising would need to be investigated in a Floodplain Risk Management Study and Plan or Flood Impact and Risk Assessment after a Flood Study has been completed. Ideally a Flood Study and Floodplain Risk Management Study and Plan would be undertaken at the same time. Any works undertaken as part of this Activity would be undertaken by Council under separate planning approval processes.
- **Activity 4 –** Following ongoing monitoring of entrance behaviour, the long-term goal would be to remove the need for entrance intervention completely, with the lake reverting to a natural hydrologic regime. The ability to remove triggers for opening would be dependent on the outcome of a flood study for the Lake identifying infrastructure at risk from flooding, future sea level rise and ongoing monitoring of lake levels and entrance processes to assess the upper limit of lake levels that lead to natural openings. Management Action E03 in the Swan Lake CMP includes monitoring of the risk of breakout of Swan Lake at The Gap, assessing the implications should a break-out occur and undertaking of sand scraping and dune revegetation to build up the dune. An assessment of the implications of a breakout on the morphology of the lake entrance and hydrodynamics of the lake is recommended to assess whether the beach scraping at The Gap discussed in Section 4.5 should continue, or whether the lake should be allowed to break out naturally at this location.

Changes to the trigger level adopted for the EMP will result in the review and update of the EMP and associated REF (as required) in accordance with the applicable legislation and statutory guidance, and Council Policies. Any future works as part of Activities 1 and 3 above would be undertaken by Council under separate planning approval processes.

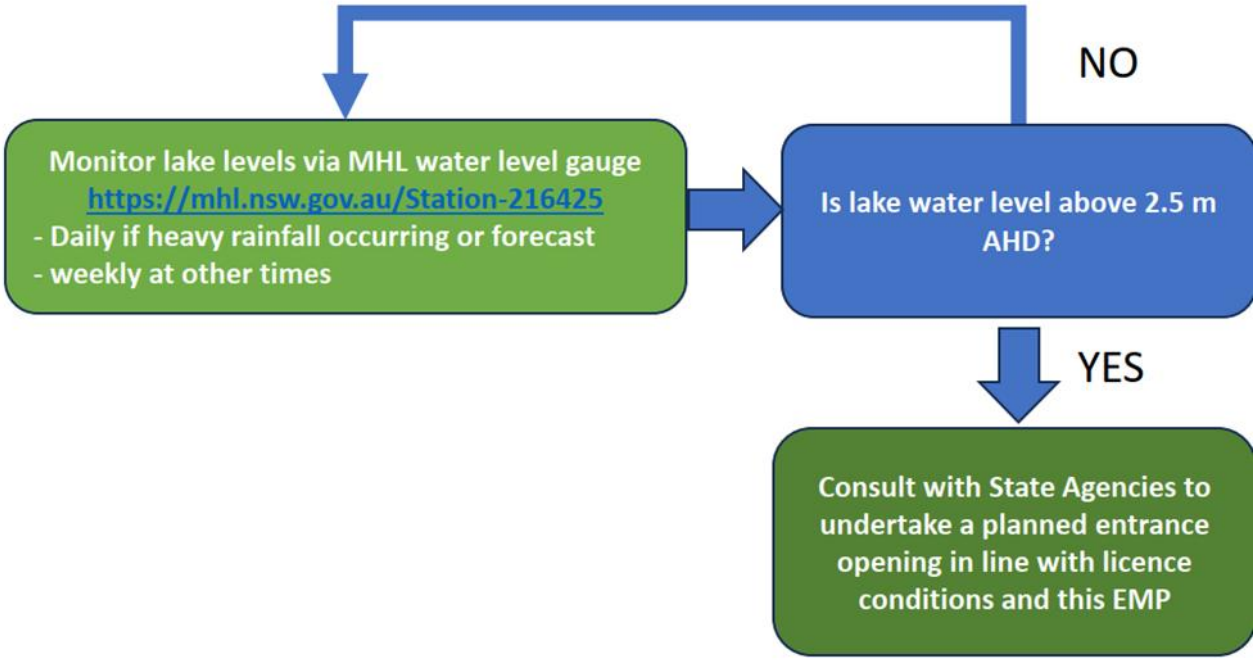

Figure 13 Proposed entrance management protocol for raising trigger level to 2.5m AHD

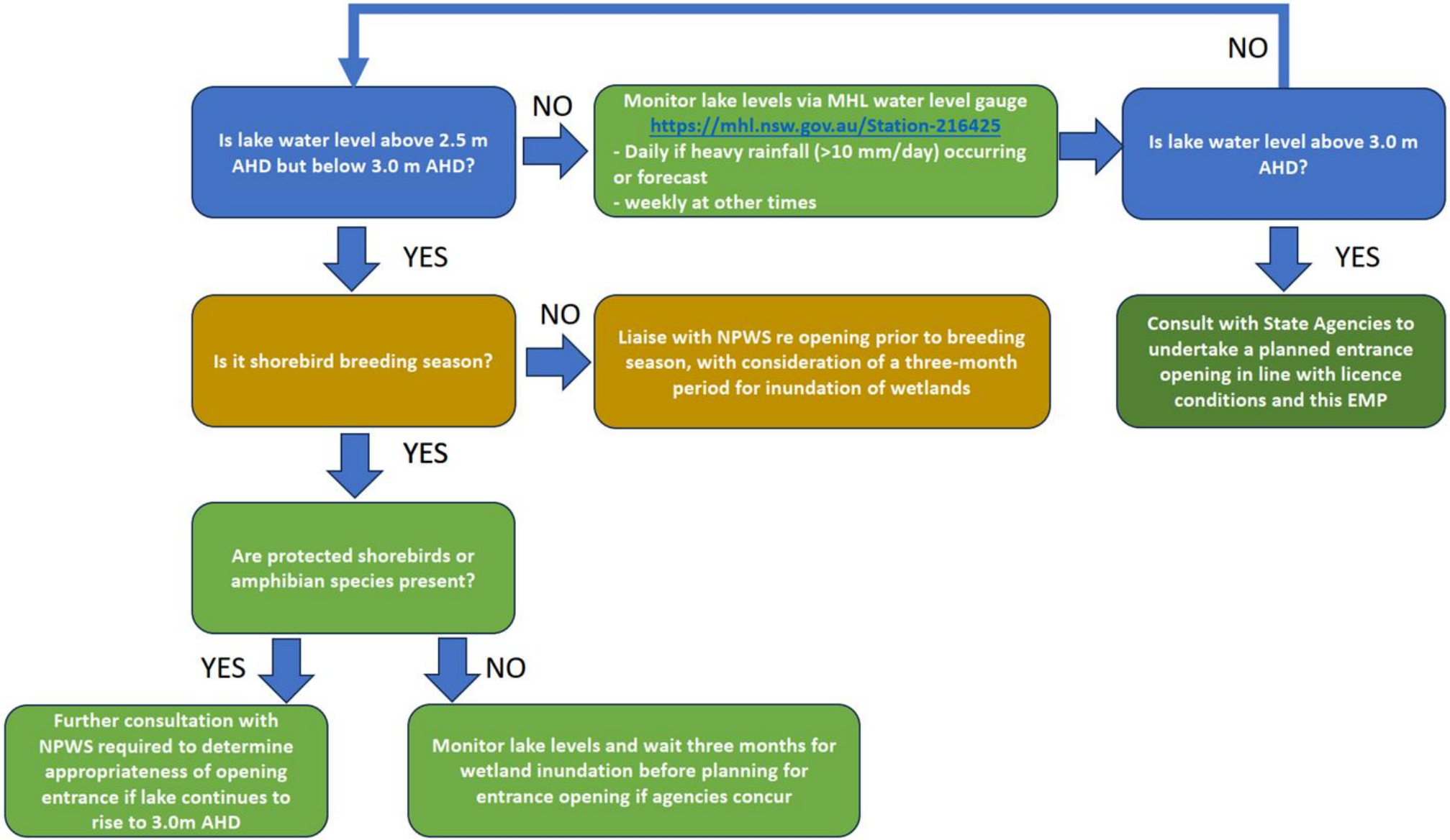

Figure 14 Proposed entrance management protocol for raising trigger level to 3.0m AHD

4.5 Monitoring

The following ongoing monitoring is to be undertaken under the EMP:

- Monitor lake water levels weekly, or daily if rainfall exceeds or is forecast to exceed 10 mm/24 hours. Realtime lake levels are available at **https://mhl.nsw.gov.au/Station-216425.** It is noted that Council currently receives text and email alerts from MHL (Swan Lake gauge) when predetermined lake water level thresholds have been met. These alerts provide early warning of lake level rises and notify Council when key EMP water level thresholds have been met.
- Monitor ocean conditions including water levels and offshore wave conditions at the Port Kembla Waverider Buoy (https://mhl.nsw.gov.au/Station-PTKMOW) on a regular basis (recommended fortnightly in conjunction with entrance berm monitoring).
- Monitor entrance berm levels on both sides of the reef on a regular basis. Where resources allow fortnightly monitoring is recommended following an opening event for first three months. Monthly entrance berm surveys should be undertaken during periods of Lake entrance closure. The purpose of this is to develop an understanding of how the berm level grows after a lake opening and the ultimate berm level likely to be reached. Council to undertake survey using in-house personnel and RTK GPS survey equipment.
- Monitor berm levels at “The Gap” regularly to assess risk of lake breach here in line with monthly monitoring (refer to location in and survey transect in Figure 15). Beach scraping may be needed to prevent an opening from occurring here and prevent impacts such as major erosion of the surrounding dunes and a very rapid drawdown of the lake level leading to swift currents in the channel and risks including bridge abutment scour, loss of wetland vegetation and erosion of the channel banks. Surveys are recommended monthly when lake water levels are above 2.0 m AHD.
- If the regular survey shows that the berm level at “The Gap” falls below 2.5 m AHD, it is recommended that beach scraping be initiated to increase the level to at least 3.0 m AHD. The recommended survey transect location and indicative location for beach scraping to achieve a berm level of 3.0 m AHD is shown in Figure 15.
- Maintain record keeping of openings using a specially developed recording sheet to be provided in the EMP.

Figure 15 Recommended survey transect location through "The Gap" to assess berm levels and the potential for a breach. Beach scraping recommended to achieve berm level of 3.0m AHD or above within hatched area.

5 Existing Environment

5.1 Lake Ecology

Swan Lake is a large brackish coastal lake located south of St Georges Basin and Jervis Bay. Swan Lake has an estuary area of ~4.7 km^2, a catchment area of 26.4 km^2, estuary volume of >10,000 ML and an average depth of 2.4 m (DPE 2022). *Ruppia* seagrass is the only aquatic vegetation mapped by the NSW DPIRD within this waterway (NSW DPI 2022). Seagrass areas provide important habitat and nursery areas for a variety of marine life. Swan Lake and its foreshore areas are used for a range of recreational activities including passive recreation, fishing, boating, kayaking, cycling, swimming, walking and birdwatching. This region has important cultural and spiritual significance to the local Aboriginal people (NSW NPWS 2012).

Swan Lake is an Intermittently Closed and Open Lake and Lagoon (ICOLL) that is closed to the ocean the majority of the time by a natural sand bar. The behaviour of the entrance significantly affects the lake's characteristics such as its estuarine ecosystem, water quality and flooding patterns.

5.1.1 Background Review

This section provides a synthesis of relevant environmental and ecological background to identify the following environmental attributes:

- MNES (environmental) listed under the EPBC Act.
- Key Fish Habitat (KFH) as identified by NSW Department of Primary Industries (DPIRD).
- Occurrence of protected aquatic vegetation under the FM Act (e.g. mangroves, saltmarsh and seagrass as mapped by NSW DPIRD).
- Location of Coastal Wetlands and Littoral Rainforest (RH SEPP).
- Occurrence of State and Federal Listed threatened and protected flora and fauna.
- Occurrence of any areas of declared Critical Habitat (under the FM Act and EPBC Act) and AOBV (under the BC Act).
- Invasive pest species including WeedWise search for priority listed weeds under the NSW *Biosecurity Regulation 2017*.

In addition to the above, a site visit to Swan Lake was undertaken by Advisian in 2021 as part of the preparation of the CMP to ground truth existing data and obtain images of key items of significance/risk. Information from this site visit has been used for the REF.

5.1.2 Matters of National Environmental Significance (MNES)

MNES occurring within 5 km of the study area (Swan Lake) were identified in a Protected Matters Report which was generated on 27 March 2024 (refer to Appendix A).

Environmental/ecological MNES recorded within this area are as follows:

- No World Heritage Properties occur within 5 km of the study area.
- No National Heritage Properties occur with 5 km of the study area.
- No Wetland of International Significance occur within 5 km of the study area.

- Six (6) Listed Threatened Ecological Communities (TECs) occur within the study area. One of these communities is aquatic/marine: “Subtropical and Temperate Coastal Saltmarsh”. The other communities which occur in the region are: “Coastal Swamp Oak (Casuarina glauca)”, “Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland”, “Illawarra and south coast lowland forest and woodland ecological community”, “Littoral Rainforest and Coastal Vine Thickets of Eastern Australia”, and “River-flat eucalypt forest on coastal floodplains”.
- Ninety-three (93) Listed Threatened Species occur within the study area.
- Fifty-six (56) Listed Migratory Species occur within the study area.

“Other Protected Matters” listed under the EPBC Act (relating to marine habitats) include:

- Eighty (80) Listed Marine Species occur within 5 km of the study area.
- Twelve (12) Whales and Other Cetaceans occur within 5 km of the study area.
- No Critical Habitats occur within 5 km of the study area.
- No Australian Marine Parks occur within 5 km of the study area.
- No Nationally Important Wetlands occur within 5 km of the study area.
- No Key Ecological Marine features occur within 5 km of the study area.

5.1.3 Key Fish Habitat

One of the objectives of the FM Act is to 'conserve key fish habitats'. To achieve the objectives of the FM Act, DPIRD Fisheries has identified KFH as “*those aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally, and the survival and recovery of threatened aquatic species*”.

A policy definition of the term KFH was developed to guide the compilation of maps. KFH was defined to include all marine and estuarine habitats up to highest astronomical tide level (that reached by 'king' tides) and most permanent and semi-permanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank.

KFH in the study area was mapped using the NSW DPIRD Fisheries Spatial Data Portal. The entire Swan Lake is classed as KFH.

5.1.4 Waterway and Fish habitat Classification

Under the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI 2013) (Table 2 of the Policy), the waterways of Swan Lake would be considered as a CLASS 1 – Major Key Fish Habitat, i.e. “a marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected species or ‘critical habitat’”.

Considering the specific attributes of estuarine habitat in the general study area and in accordance with Table 1 of the Policy, the habitat within the vicinity of Swan Lake would be considered as TYPE 1 – Highly Sensitive Key Fish Habitat as *Ruppia* seagrass beds are >5 m^2 and it has a natural opening and closing regime (NSW DPI 2013).

5.1.5 Marine and Estuarine Vegetation

All marine vegetation is protected under the FM Act. Marine vegetation, such as saltmarsh, mangroves, seagrasses, and macroalgae (seaweeds), provides shelter and nursery areas for

aquatic animals and is an essential component of the food chain in estuarine and coastal environments. It also stabilises sediments and shorelines and protects water quality in estuaries for recreational users. NSW DPIRD administers legislation which protects mangroves, seagrasses and seaweeds on public water land and foreshores. Harming or removal of marine vegetation is generally only permissible by permit.

NSW DPIRD undertakes macrophyte mapping of most estuarine habitats within NSW using methods developed over decades. Mapping for Swan Lake was last undertaken in 2004. Estuarine macrophyte mapping is available via the Estuarine Habitat Dashboard (NSW DPI 2022) which includes the ability to view mapping and undertake a change analysis comparing the percentage mapped macrophyte area between mapping times.

Estuarine macrophyte habitat mapping undertaken by NSW DPIRD in 2004 (no updates since that year) is presented in Figure 16. Only *Ruppia* seagrass has been mapped by NSW DPIRD in Swan Lake. The 2004 estuarine mapping shows that the inlet of Swan Lake and most of the eastern and northeastern sides of the lake are lined with Ruppia seagrass.

Recent observations have reported that Charophytes (dense beds of estuarine algae) have largely disappeared from Swan Lake within the past five years. This is thought to be potentially related to the drought in 2019 – 2020. Charophytes are a major food source for Swans, which have also been observed to have decreased in Swan Lake in recent years. This is a similar pattern to what has been observed in other NSW estuaries due to droughts (e.g. Nadgee Lagoon) where Charophyte abundance declined because of a drop in water levels exposing beds or elevated nutrients (Scanes et al. 2020).

The previous REF (Peter Spurway & Associates 2003) noted the presence of the BC Act protected plant species, *Wilsonia rotundifolia* (Endangered) and *Wilsonia backhousei* (Vulnerable). In coastal areas, *Wilsonia rotundifolia* is only known to occur in four coastal populations, at Lake Wollumboola, Swan Lake, Meringo Lagoon and Coila Lake. These saltmarsh species occur on low rocky foreshores around Swan Lake. Both species were found to be actively growing on the lake foreshore following rains in March and April 2003, after a long period of dry weather and low lake levels. *Wilsonia rotundifolia* is interspersed with some *Wilsonia backhousei* plants growing on the lake shore on the long rocky point extending into the lake on its northern shore. Another small patch of *Wilsonia backhousei* is also growing adjacent to the informal boat ramp near the shop in Cudmirrah.

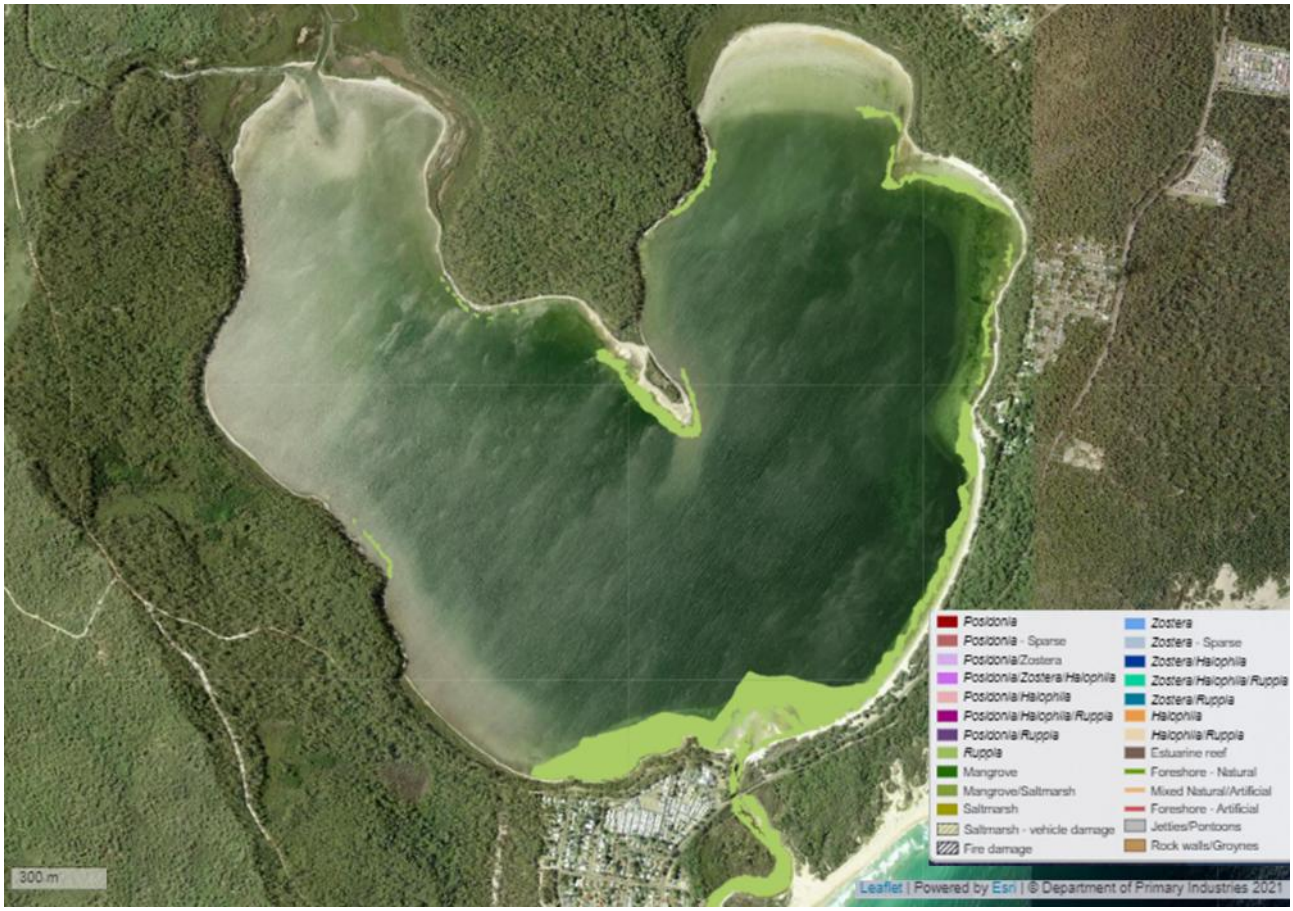

Figure 16 NSW DPIRD estuarine macrophyte mapping of Ruppia in Swan Lake in 2004 (NSW DPI 2004)

5.1.6 Terrestrial Vegetation

The vegetation of the area is associated with the sandstone soils, the coastline and the waterways. Woodlands are common, and there are some significant areas of forest and freshwater wetland. Much of this vegetation is also mapped on the LEP's Terrestrial Biodiversity Map. The State Vegetation Map as shown from SEED in Figure 17 classifies vegetation in the following plant community types (PCT) on the foreshores of the lake inlet and entrance:

- PCT 3546 Coastal Sands Littoral Scrub-Forest.
- PCT 3638 South Coast Sands Bangalay Forest.
- PCT 3662 South Coast Lowland Blackbutt Forest.
- PCT 3986 Coastal Sands Swamp Mahogany Rush Forest.
- PCT 3922 Sydney Coastal Sand Swamp Scrub.
- PCT 4040 South Coast Selliera-Sea Rush Swamp Oak Saltmarsh.
- PCT 4091 Grey Mangrove-River Mangrove Forest.

Figure 17 Vegetation classification at Swan Lake inlet and entrance (SEED 2024)

Ecoplanning (2023) ground-truthed the PCTs around the Swan Lake tidal inundation area to validate existing vegetation mapping (Figure 18). It was identified by Ecoplanning (2023) in Section 4.3 of their report that vegetation is representative of the:

- Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions (endangered) EEC listed under the BC Act.
- Swamp Oak Floodplain Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (endangered) EEC listed under the BC Act and as the Coastal Swamp (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (endangered) EEC listed under the EPBC Act.
- Coastal Saltmarsh in the NSW North Coast Sydney Basin and South East Corner Bioregions (endangered) EEC listed under the BC Act and as the Subtropical and Temperate Coastal Saltmarsh (vulnerable) EEC listed under the EPBC Act.

No significant impacts to the terrestrial EECs or any recorded threatened flora species are expected.


BASIN
SUSSEX IN
CONJOLA
National Park
Department of Customer
SL2
SL1
G-15
SL4
SL5
SL6
SL3
© Department of Customer Service 2023
Legend
Swan lake study sites
Rapid Management Assessment Point
BAM Plot start
Date produced: 7 June 2023
Projection: GDA 2020 MGA Zone 56
Validated vegetation (EP 2023)
Bangalay Sand Forest
Bangalay Sand Forest, Underscrubbed
Swamp Oak Floodplain Forest
Saltmarsh
0 120 240
Metres
ecoplanning
ecology | planning | offsets

Figure 18 Swan Lake validated vegetation mapping (Ecoplanning 2023)

5.1.7 Protected Areas

Conjola National Park covers an area of 11,060 ha and adjoins Swan Lake, as shown in Figure 5. The national park contains 18 different vegetation communities, including four endangered ecological communities: Coastal Saltmarsh, Swamp Sclerophyll Forest, Swamp Oak Floodplain Forest, and Bangalay Sand Forest. It also contains five threatened plant species and twenty-five species of threatened fauna (NPWS 2009). The national park is also a significant area for threatened fauna species. Five endangered and twenty vulnerable species have been recorded in and around the parks. The local fauna include wombats, echidnas, possums, cockatoos, parrots, and herons.

Conjola National Park is a popular tourist location with the park offering a range of recreational and tourism facilities. Popular activities include birdwatching and wildlife encounters, walking cycling, and fishing.

Swan Lake is not identified as Nationally Important Wetlands. Refer to Section 6.1.2 regarding mapped Coastal Wetlands and Littoral Rainforests under the RH SEPP.

5.1.8 Critical Habitat / Areas of Outstanding Biodiversity Value

There are no areas of Critical Habitat in the vicinity of Swan Lake for species listed under the EPBC Act. There are no AOBVs listed under the BC Act near the study area.

Biologically important areas are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. These have the potential for flow on impacts from coastal management decisions.

Regionally Significant Marine Species adjacent to the sites (under the Commonwealth EPBC Act 1999) have been identified for the following species:

- Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*) – Breeding
- Grey Nurse Shark (*Carcharias taurus*) – Foraging
- Humpback Whale (*Megaptera novaeangliae*) – Foraging
- Wedge-tailed Shearwater (*Ardenna pacifica*) – Foraging
- Short-tailed Shearwater (*Ardenna tenuirostris*) – Foraging
- White-faced Storm-petrel (*Pelagodromaa marina*) – Breeding

Key Ecological Marine Features are parts of the marine ecosystem that are important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area. No marine Key Ecological Marine Features occur within a 5 km radius of the study area.

5.1.9 Threatened and Protected Fauna

5.1.9.1 Environment Protection and Biodiversity Conservation Act (EPBC Act) 1999 (Cth) and Biodiversity Conservation (BC Act)2016

Online database searches for threatened and protected species listed under the Commonwealth EPBC Act (via the Protected Matters Search Tool in Appendix A) and the NSW BC Act (via the BioNet Atlas of NSW Wildlife) (refer to Appendix B) were undertaken in March 2024. Species have also been recorded on the iNaturalist data for Swan Lake and surrounding areas (refer to Appendix

C). A list of the threatened and protected marine species listed under these Acts is provided in Table 3 covering Swan Lake.

Table 3 Threatened and protected marine species listed under the EPBC Act and BC Act with the potential to occur within Swan Lake

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Birds				
Regent Honeyeater	*Anthochaera phrygia*	E4A	CE	Species or species habitat known to occur within area
Sooty Shearwater	*Ardenna grisea*	-	V	Species or species habitat likely to occur within area
Australasian Bittern	*Botaurus poiciloptilus*	-	E	Species or species habitat known to occur within area
Sharp-tailed Sandpiper	*Calidrus acuminata*	-	V	Species or species habitat known to occur within area
Red Knot	*Calidris canutus*	-	E	Species or species habitat known to occur within area
Curlew Sandpiper	*Calidris ferruginea*	-	CE	Species or species habitat may occur in area
Greater Sand Plover, Large Sand Plover	*Charadrius leschenaultii*	-	V	Species or species habitat likely to occur in area*
Eastern Bristlebird	*Dasyornis brachypterus*	E1	E	Species or species habitat known to occur in area
Antipodean Albatross	*Diomedea antipodensis*	-	V	Foraging, feeding or related behaviour likely to occur within area
Gibson's Albatross	*Diomedea antipodensis gibsoni*	-	V	Foraging, feeding or related behaviour likely to occur within area
Southern Royal Albatross	*Diomedea epomophora*	-	V	Foraging, feeding or related behaviour likely to occur within area
Wandering Albatross	*Diomedea exulans*	-	V	Foraging, feeding or related behaviour likely to occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Northern Royal Albatross	*Diomedea sanfordi*	-	E	Foraging, feeding or related behaviour likely to occur within area
Latham's Snipe	*Gallinago hardwickii*	-	V	Species or species habitat likely to occur within area
Grey Falcon	*Falco hypoleucos*		V	Species or species habitat may occur in area
White-bellied Storm Petrel	*Fregetta grallaria grallaria*	-	V	Species or species habitat may occur in area
Painted Honeyeater	*Grantiella picta*	-	V	Species or species habitat likely to occur in area
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	2 records in study area
Sooty Oystercatcher	*Haematopus fuliginosus*	V	-	9 records in study area
Pied Oystercatcher	*Haematopus longirostris*	E1	-	10 records in study area
White-throated Needletail	*Hirundapus caudacutus*	-	V	Species or species habitat known to occur in area
Swift Parrot	*Lathamus discolor*	-	CE	Species or species habitat known to occur in area
Nunivak Bar-tailed Godwit	*Limosa lapponica baueri*	-	V	Species or species habitat known to occur in area
Southern Giant-Petrel	*Macronectes giganteus*	E1	E	Species or species habitat may occur in area. 1 record in the study area.
Northern Giant Petrel	*Macronectes halli*	V	V	Species or species habitat may occur in area. 3 records in the study area.
Orange-bellied Parrot	*Neophema chrysogaster*	-	CE	Species or species habitat may occur in area
Blue-winged Parrot	*Neophema chrysostoma*	-	V	Species or species habitat may occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Eastern Curlew	*Numenius madagascariensis*	-	CE	Species or species habitat known to occur in area
Sooty Tern	*Onychoprion fuscata*	V	-	1 record in study area
Fairy Prion (southern)	*Pachyptila turtur subantarctica*	-	V	Species or species habitat known to occur in area
Eastern Osprey	*Pandion cristatus*	V	-	3 records in study area
Sooty Albatross	*Phoebetria fusca*	-	V	Species or species habitat may occur in area
Gould's Petrel	*Pterodroma leucoptera leucoptera*	-	E	Species or species habitat may occur in area
Kermadec Petrel	*Pterodroma neglecta neglecta*	-	V	Species or species habitat may occur in area
Australian Painted Snipe	*Rostratula australis*	-	E	Species or species habitat known to occur in area
Australian Fairy Tern	*Sternula nereis nereis*	-	V	Species or species habitat known to occur in area
Little Tern	*Sternula albifrons*	E1	-	1 record in study area
Buller's Albatross	*Thalassarche bulleri*	-	V	Species or species habitat may occur in area
Northern Buller's Albatross	*Thalassarche bulleri platei*	-	V	Species or species habitat may occur in area
Indian, Yellow-nosed Albatross	*Thalassarche carteri*	-	V	Species or species habitat likely to occur in area
Shy Albatross	*Thalassarche cauta*	V	E	Foraging, feeding or related behaviour likely to occur within area
Chatham Albatross	*Thalassarche eremita*	-	E	Foraging, feeding or related behaviour likely to occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Campbell Albatross	*Thalassarche impavida*	-	V	Species or species habitat may occur in area
Black-browed Albatross	*Thalassarche melanophris*	-	V	Species or species habitat may occur in area
Salvin's Albatross	*Thalassarche salvini*	-	V	Foraging, feeding or related behaviour likely to occur within area
White-capped Albatros	*Thalassarche steadi*	-	V	Foraging, feeding or related behaviour likely to occur within area
Eastern Hooded Plover or Dotterel	*Thinornis cucullatus cucullatus*	E4A	V	Species or species habitat known to occur in area. 16 records in the study area.
Common Greenshank	*Tringa nebularia*	-	V	Species or species habitat known to occur within area
Black Bittern	*Ixobrychus flavicollis*	V	-	No information available
Bats				
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	-	5 records in study area
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	3 records in study area
Southern Myotis	*Myotis macropus*	V	-	2 records in study area
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	4 records in study area
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	5 records in study area
Large-eared Pied Bat	*Chalinobus dwyeri*	-	V	Species or species habitat likely to occur within area
Fish and Syngnathids				
Australian Grayling	*Prototroctes maraena*	-	V	Species or species habitat likely to occur within area
Black Rockcod	*Epinephelus daemelii*	-	V	Species or species habitat likely to occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
White's Seahorse	*Hippocampus whitei*	-	E	Species or species habitat known to occur within area
Grey Nurse Shark	*Carcharias taurus*	-	CE	Species or species habitat likely to occur within area
Great White Shark	*Carcharodon carcharias*	-	V, M	Species or species habitat known to occur within area
Oceanic Whitetip Shark	*Carcharhinus longimanus*	-	M	Species or species habitat may occur within area
Porbeagle	*Lamna nasus*	-	M	Species or species habitat likely to occur within area
Whale Shark	*Rhincodon typus*	-	V, M	Species or species habitat may occur within area
Giant Manta Ray	*Mobula birostris*	-	M	Species or species habitat may occur within area*
Frogs				
Giant Burrowing Frog	*Heleioporus australiacus*	-	V	Species or species habitat known to occur within area
Green and Golden Bell Frog	*Litoria aurea*	E1	V	Species or species habitat known to occur within area. 24 records in the study area.
Stuttering Frog	*Mixophyes balbus*	-	V	Species or species habitat may occur in area
Reptiles				
Loggerhead Turtle	*Caretta caretta*	-	E, M, L	Breeding likely to occur within area
Green Turtle	*Chelonia mydas*	-	V, M, L	Breeding likely to occur within area
Leatherback Turtle	*Dermochelys coriacea*	-	E, M, L	Breeding likely to occur within area
Hawksbill Turtle	*Eretmochelys imbricata*	-	V, M, L	Breeding likely to occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Flatback Turtle	*Natator depressus*	-	V, M	Breeding likely to occur within area
Marine Mammals				
Minke Whale	*Balaenoptera acutorostrata*	-	W	Species or species habitat may occur within offshore marine area
Blue Whale	*Balaenoptera musculus*	-	E, M, W	Species or species habitat may occur within offshore marine area
Southern Right Whale	*Eubalaena australis*	E1	E, M, W	Species or species habitat known to occur within offshore marine area
Humpback Whale	*Megaptera novaeangliae*	V	V, M, W	Species or species habitat known to occur within offshore marine area
Killer Whale	*Orcinus orca*	-	W, M	Species or species habitat likely to occur within offshore marine area
Bryde's Whale	*Balaenoptera edeni*	-	M, W	Species or species habitat may occur within offshore marine area
Pygmy Right Whale	*Caperea marginata*	-	M, W	Foraging, feeding or related behaviour may occur within offshore marine area
Indian Ocean Bottlenose Dolphin	*Tursiops aduncus*	-	W	Species or species habitat likely to occur within area
Bottlenose Dolphin	*Tursiops truncatus s. str.*	-	W	Species or species habitat may occur within area
Common Dolphin	*Delphinus delphis*	P	W	Species or species habitat may occur within area
Risso's Dolphin	*Grampus griseus*	-	W	Species or species habitat may occur within area

Common Name	Species Name	NSW BC Act	Commonwealth EPBC Act	Likelihood of Occurrence*
Dusky Dolphin	*Lagenorhynchus obscurus*	-	M, W	Species or species habitat may occur within area
Dugong	*Dugong dugon*	-	M	Species or species habitat may occur within area
New Zealand Fur Seal	*Arctocephalus forsteri*	-	L	Species or species habitat may occur within area*
Australian Fur Seal	*Arctocephalus pusillus*	-	L	Species or species habitat may occur within area
Leopard Seal	*Hydrurga leptonyx*	P	-	Known to occur within area

* "Likelihood of occurrence" is determined by the EPBC Act Protected Matters Search Tool. Species listed in the *BC Act* database but not in the *EPBC Act* Protected Matters Search Tool do not have any specific information regarding their likelihood of occurrence in the study area, only number of records noted.

BC Act Status – V = vulnerable, E1 = endangered, E4A = critically endangered, E4 = presumed extinct

EPBC Act Status – V = vulnerable, E = endangered, CE = critically endangered, W = whales and other cetaceans, M = migratory, L = listed marine species

Bird species commonly using the entrance area include shorebirds and migratory waders. The previous REF (Peter Spurway & Associates 2003) identified four bird species of relevance to this location:

- Osprey (*Pandion haliaetus*) - vulnerable
- Sooty Oystercatcher (*Haematopus fuliginosus*) - vulnerable
- Pied Oystercatcher (*Haematopus longirostris*) - vulnerable
- Hooded Plover (*Thinornis rubricollis*) - Endangered

Swan Lake is recognised by NPWS as a particularly important locality for the Hooded Plover (Peter Spurway & Associates 2003). As specific survey work was not carried out for the previous or this current REF, it is assumed that the protected bird species previously recorded at Swan Lake may potentially be present at the time of lake opening.

The upper reaches of Swan Lake's tributary creeks and fringes provide habitat for amphibian species. The Green and Golden Bell Frog (*Litoria aurea*) was identified by Peter Spurway & Associates (2003) as a significant species for consideration, being listed as an Endangered species under the BC Act and as Vulnerable under the EPBC Act. The Green and Golden Bell Frog has been detected breeding in the Sussex Inlet STP overflow ponds (Peter Spurway & Associates 2003), approximately 1 km north-east of Swan Lake. Swan Lake at times of high rainfall and high lake levels is potentially able to offer suitable habitat.

An eight-part test of significance was applied by Peter Spurway & Associates (2003) to the Large-footed Myotis, Osprey, Pied Oystercatcher, Sooty Oystercatcher, Hooded Plover, Little Tern and Green and Golden Bell Frog as these species were either detected on the dune system to the east

of the lake, or based on habitat preference are likely to utilise the waters of Swan Lake on occasions. These tests of significance remain relevant to the proposal.

An Assessment of Significance was undertaken for a number of threatened species listed under the Commonwealth EPBC Act and NSW BC Act which are considered to have a high potential based on habitat preference (i.e. beach and dune system and lake waters) to occur within the subject site and potentially be impacted by the proposal. Assessments under each Act are provided separately in Appendix D.

5.1.9.2 Fisheries Management Act (FM Act) 1994

Threatened and protected marine species listed under Schedules 4 to 5 of the NSW FM Act were reviewed in order to satisfy requirements of the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI 2013).

Marine species, populations and ecological communities currently listed as endangered, critically endangered and/or vulnerable (i.e. Schedule 4, 4A and 5) under the NSW FM Act with the potential to occur in the region surrounding the Study Area are listed below.

Schedule 4: Endangered Species, Populations and Ecological Communities

- White's seahorse (*Hippocampus whitei*) – endangered species
- Eastern freshwater cod (*Maccullochella ikei*) – endangered species
- Trout cod (*Maccullochella macquariensis*) – endangered species
- Macquarie perch (*Macquaria australasica*) – endangered species
- Southern purplespotted gudgon (*Mogurnda adspersa*) – endangered species
- Southern pygmy perch (*Nannoperca australis*) – endangered species
- Oxleyan pygmy perch (*Nannoperca oxleyana*) – endangered species
- Australian grayling (*Prototroctes maraena*) – endangered species
- Scalloped hammerhead shark (*Sphyrna lewini*) - endangered species
- Southern bluefin tuna (*Thunnus maccoyii*) - endangered species

Schedule 4A: Critically Endangered Species and Ecological Communities

- Grey nurse shark (*Carcharius taurus*) - critically endangered species
- Murray hardyhead (*Craterocephalus fluviatilis*) – critically endangered species
- Fitzroy falls spiny crayfish (*Euastacus dharawalus*) – critically endangered species
- Stocky galaxias (*Galaxias tantangara*) – critically endangered species
- Hanley's river snail (*Notopala hanleyi*) – critically endangered species
- Darling river snail (*Notopala sublineata*) – critically endangered species
- Marine slug (*Smeagol hilaris*) - critically endangered species

Schedule 5: Vulnerable Species and Ecological Communities

- Silver perch (*Bidyanus bidyanus*) – vulnerable species
- Buchanans fairy shrimp (*Branchinella buchananensis*) – vulnerable species

- Great white shark (*Carcharodon carcharias*) - vulnerable species
- Black cod (*Epinephelus daemelii*) - vulnerable species
- Murry crayfish (*Euastacus armatus*) – vulnerable species
- Bousfieds marsh-hopper (*Microrchestia bousfieldi*) – vulnerable species
- Great hammerhead shark (*Sphyrna mokarran*) – vulnerable species

Protected Species

- All species of the families 'Syngnathidae', 'Solenostomidae' and 'Pegasidae' (i.e. seahorses, sea dragons, pipefishes, pipehorses)
- Ballina angelfish, *Chaetodontoplus ballinae*
- Bluefish, *Girella cyanea*
- Eastern blue devil fish, *Paraplesiops bleekeri*
- Elegant wrasse, *Anampses elegans*
- Estuary cod, *Epinephelus coioides*
- Giant Queensland groper, *Epinephelus lanceolatus*
- Herbsts nurse shark, *Odontaspis ferox*

Considering the estuarine nature of the site, habitats present in the study area and the required habitat and conservation status of each of the species listed under the FM Act, none of the species are likely to occur within the study area.

5.1.10 Invasive Pests

Invasive pests are animals or weeds that can have significant impacts on local wildlife, natural bushland or livestock. All stakeholders have a responsibility to manage invasive species on land that they own or manage. Council manages weeds throughout the LGA on council managed land as outlined in the Commonwealth *Biosecurity Act 2015* and the NSW Biosecurity Regulation 2017. Within the waterways, NSW DPIRD is responsible for management of marine pests.

A search of the NSW DPIRD WeedWise database for aquatic and terrestrial invasive weeds on the South East Coast was made on 28 March 2024. For each state level priority weed, there are defined management objectives and requirement including either a Prohibited Matter, Biosecurity Zones, Control Orders and Mandatory Measures. A control order is in place from 19 June 2017 for the weed *Chrysanthemoides monilifera* subspecies *monilifera* (Boneseed).

There are Priority Weed Management Plans in place within Shoalhaven LGA (Shoalhaven City Council 2022), for the following weed species:

- Alligator weed
- Bitou bush
- Blackberry
- Boneseed
- Coolatai grass
- Fireweed

- Giant Parramatta grass
- Lantana
- Salvinia
- Water hyacinth

Council has identified some key plant species that spread easily into neighbouring bush land include: Privet; Cotoneaster; Hawthorn; Olives; Broom; Agapanthus; Cootamundra Wattle; Lavender; Freesia; Watsonia; Arum Lily; Blue Periwinkle; Cassia or Senna and Genist.

There are 106 weeds that are listed as priority for the South East region. Of these, there are 22 listed aquatic weeds although most of these are freshwater species and would not be present within the partially saline estuarine waters. Not all of these weeds would be present within the Shoalhaven LGA.

In addition, garden weeds are identified as an issue for gardens that border onto native bushlands. Garden weeds can spread from suburban gardens by water, wind, birds, bikes, cars, earth-moving equipment, illegal tracks or dumped garden waste (Shoalhaven City Council 2022).

Ecoplanning (2023) undertook an assessment of endangered ecological communities in coastal hazard areas. They identified at Swan Lake woody weeds observed included *Senna pendula* and *Ochna serrulata. Asparagus aethiopicus* is highly prevalent.

Marine pests are non-native marine plants or animals that harm, or have the potential to harm Australia's marine environment, social amenity or industries that use the marine environment (DPI 2022). If introduced, they have the potential to prey on native species or compete with them for food, severely impacting the environment. In Australia there are an estimated 250 introduced marine species introduced to the waters in various ways including in ballast waters or attached to the hulls of ships. There have been over 100 introduced marine species reported in Australian waters, with the majority unintentionally introduced via mariculture and shipping (Hewitt and Martin 1996).

To protect NSW waters, the Australian Government have implemented the national Marine Pest Plan 2018 – 2023 which aims to prevent the introduction and translocation of introduced marine species, strengthen the national marine pest surveillance system, provide a national emergency preparedness and response for outbreaks, support national research and development and engagement with marine stakeholders (DAWE 2018). NSW DPIRD also has an advisory program to raise awareness of marine pests including how to identify and prevent the spread of them.

5.2 Hydrology

The catchment of the lake is about 32 km^2 of mostly forested land and is described in the Swan Lake and Berrara Creek Natural Resources Management Strategy (Shoalhaven City Council 2002). Two streams, Mondayong Creek and Teatree Creek drain into the north-west of the lake basin. These creeks are brackish for about one kilometre upstream of where they join the lake. Otherwise, only minor drainage lines exist around the lake. In the deepest part of the lake, the bed is about 3.8 m below AHD. The actual water depth at that point varies as the lake rises and falls and would be over 6 m when the lake rises to its maximum height before opening to the sea.

The condition of the lake's entrance is controlled by tides, waves, currents, sediment movement, creek flows, floods and human intervention. The interaction and ever-changing nature of these factors may cause the entrance to migrate along the coastline, to close or re-open. A bedrock

outcrop (reef) to the south confines the entrance. To the north, dunes behind Cudmirrah Beach form a sand barrier, which extends southward as a spit to the lake inlet. A low point is present in the dune at a point where a meander in the inlet comes close to the back of the dune. This is known locally as 'The Gap'.

The EMP provides a list of assets that are low-lying and are at risk from inundation when lake levels are between 2 m AHD and 3 m AHD, with suggested works that could be carried out to improve their resilience.

The lowest-lying asset at risk from inundation is the access track at The Springs Cabins at Swanhaven (with a level of 2.17 m AHD, refer Figure 19). Another asset that has been recently constructed is the footbridge at Errol Bond Reserve (Figure 20), where the soffit of the bridge is impacted by inundation at a lake level of 2.28 m AHD. Other assets identified include the shared path at The Springs Road, and low-lying sections of the Lake Haven caravan park. The crest level of The Springs Road at Cudmirrah is at 2.47 m AHD and could be inundated at water levels above this, although this has not been experienced since prior to 1999 when the water level recorder was installed.

Predicted inundation extents and depths for a lake level of 2.4 m AHD are provided in Figure 21, and at 2.7 m AHD in Figure 22. From these figures, it can be seen that (Advisian 2022):

- At a lake level of 2.4 m AHD, the access road to The Springs cabins is cut, minor inundation occurs at Errol Bond Reserve but that other impacts accord with the observations from site photographs taken in July 2022 (when lake levels were 2.28 m AHD).
- At a lake level of 2.7 m AHD, the access road to Berrara at Collier Drive is cut and there is minor inundation of The Holiday Haven caravan park, and minor inundation at The Springs Road north of the Swan Lake Bridge.

Figure 19 Access track at "The Springs" Cabins, Swanhaven. Top: 1 December 2021 (water level = 1.54 m AHD). Bottom: access cut, 19 July 2022 (water level = 2.28 m AHD) (Advisian 2022)

Figure 20 Newly-built footbridge at Errol Bond Reserve, 19 July 2022 (Lake water level = 2.28 m AHD) (Advisian 2022)

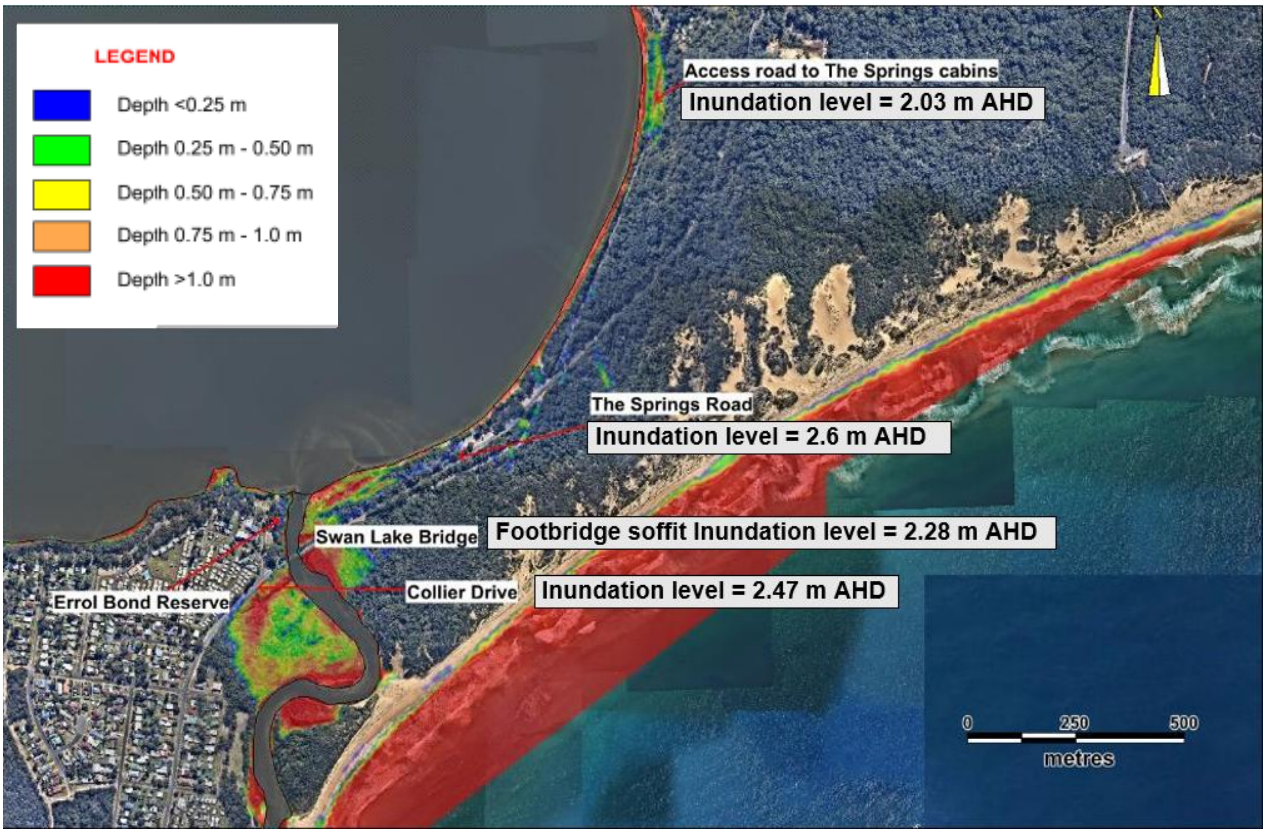

Figure 21 Predicted inundation depth of key assets at lake level = 2.4 m AHD (Advisian 2022)

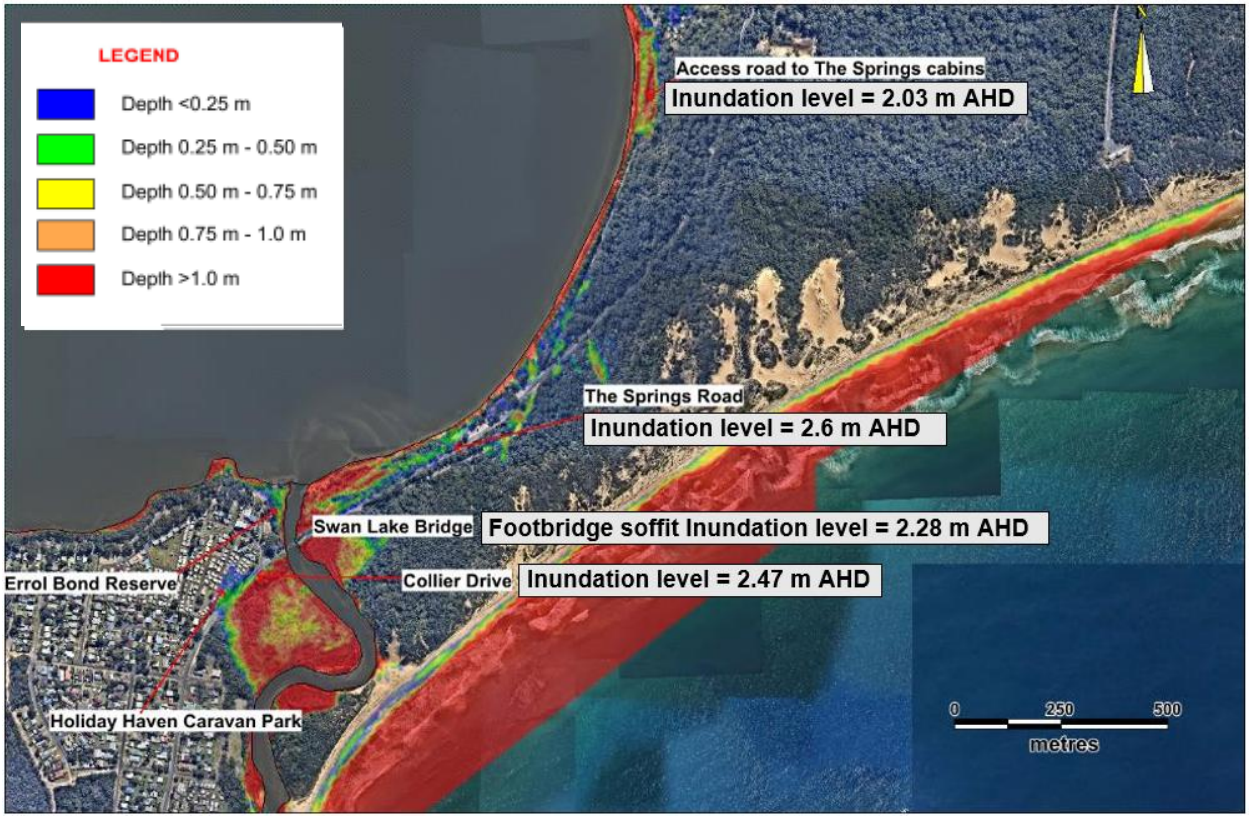

Figure 22 Predicted inundation depth of key assets at lake level = 2.7 m AHD (Advisian 2022)

Information has been obtained since the development of the existing Policy that can be used to address information gaps (Advisian 2022), including:

- Fieldwork and ground survey of the fringing wetlands at the northern end of the lake was undertaken in July 2022 when the lake water level was just under 2.3 m AHD.
- Continuous 15-minute time-series of water level records have been obtained and analysed at Swan Lake, spanning from 1999 to August 2022.
- A tidal and coastal inundation study of Swan Lake has been undertaken as part of the CMP (Advisian 2022), including spatial mapping of tidal and coastal inundation in the area surrounding the Lake.

Based on the fieldwork, site survey and numerical modelling of inundation carried out for the CMP project, it is considered that a minimum lake level of 2.3 m AHD would be needed to provide inundation of most of the mapped coastal wetland areas within Swan Lake and at least 2.5 m AHD for complete inundation.

Continuous water level records for Swan Lake dating from 1999 were obtained from Manly Hydraulics Laboratory. The NSW DCCEEW has also provided a record of opening events, including the water level at which the lake was opened, whether the opening was natural, artificially opened by Council or assisted by the public. Openings of Swan Lake have been recorded since November 1982, however prior to 1993 the lake level at which these openings occurred was not known. Openings prior to 2002 were recorded in the EMP. Since the release of the EMP, there have been 11 recorded lake openings, with three of these occurring between January and July 2022 and a further opening in May 2024. Documented openings of Swan Lake are provided in Table 4.

Table 4 Documented openings of Swan Lake

Closure date	Natural/ Artificial	Duration	Remark	Opening Level (m AHD)
11/82	A	?		?
7/11/1983	N	121 days	Flood; other sources suggest opening date of 17th Nov. with a duration of ~150 days.	?
23/04/1984	Unknown	7 days		?
28/07/1984	N	21 days	Flood; other sources suggest opening date of 4th Aug. with a duration of 11 days.	?
15/10/1985	N	148 days	Flood.	?
20/10/1987	A	43 days	Council; Other sources suggest a duration of 36 days.	?
1/04/1989	A	61 days	How Opened: 'hand'	?
3/06/1989	Unknown	42 days		?
12/2/1990 - 14/2/1990	Unknown	90-92 days	How Opened: 'hand' [Artificial] or 'flood' [Natural] (depending on source).	?
1/08/1990	N	26 days	Flood.	?

Closure date	Natural/ Artificial	Duration	Remark	Opening Level (m AHD)
15/09/1990	Unknown	26 days	Other sources suggest opening date of 4th Oct. with a duration of 19 days.	?
10/06/1991	Unknown	32 days		?
10/02/1992	N	40 days	Flood.	?
16/05/1993	A	18 days	Council.	1.48
14/11/1995	Unknown	92 days	How Opened: 'hand' [Artificial] or 'flood' [Natural] (depending on source).	~2.00
6/7/1997 - 7/7/1997	A	28 days	How Opened: 'hand'	~2.50
19/08/1998	N	64 days	Possible assistance from 'public'.	2.47
15/04/2002	A	44 days	How Opened: 'public'	2.12
17/06/2007	N	23 days	Council discussed with community reps who confirmed it was a natural breach	~1.58 (note MHL reports 1.88m)
21/08/2011	A	12 days	Inferred from water level records	2.15
23/06/2013	N	90 days	beach berm completed Jan 2013 confirming 1.9m crest	2.2
27/06/2015	?	21 days		2.084
25/08/2015	?	30 days		2.013
8/07/2016	?	59 days		2.177
28/07/2020	Suspected Artificial	29 days	Swan Lake is reported to have been opened (not by Council) rather than naturally breaching. It didn't appear to be dropping as quickly as it would with inflow to boost the scour	2.1
12/01/2022	Assisted by public	23 days	Assisted by children digging channel. Entrance berm was not high so may have potentially opened naturally without this interference	2.132
6/03/2022	Assisted by public	76 days		2.08
20/07/2022	N – with possible assistance from the public	149 days	A channel was dug by the public a few days before it opened. There was then some additional rainfall and lake level rises of a few centimetres which lead to its actual opening. Lake entrance closed on 16/12/2022.	2.304
05/05/2024	N	43	Flood event caused opening at Location A (refer to Figure 9). Lake closed again on 17/6/2024.	2.11

Time series plot of water levels shows that (Advisian 2022):

- Tidal range within the lake is generally small when the lake is open, with a maximum range of around 0.2 m.
- The lake level generally stabilises at around 0.5 m AHD following an opening event.
- Lake opening events are generally preceded by a rapid rise in lake level that occurs over a period of hours to days, following which a rapid decline in water level occurs once there is a breach in the lake entrance berm.
- On average, the lake has opened once every two years. However, several openings can occur in a single year (e.g., three openings in six months in 2022, a La Niña year), and several years may elapse without an opening occurring (e.g., four years between openings in 2016 to 2020, a relatively dry period).

Modelling of coastal and tidal inundation was undertaken in Advisian (2023a) for a range of scenarios for sea level rise, ocean boundary conditions (including the 1% and 5% Annual Exceedance Probability (AEP) ocean boundary conditions), entrance berm conditions and wind speeds, for a total of 18 model scenarios for coastal inundation, and seven for tidal inundation. At Swan Lake, tidal inundation is expected to have relatively minor impacts. However, under 1% AEP coastal inundation conditions with future sea level rise projections, there is potential for the main access to Berrara and Cudmirrah to be cut off at Collier Drive, and inundation for several hours up to 0.25 m depth to occur at low lying parts of the Holiday Haven Swan Lake caravan park.

Mapping of the potential migration areas which may be suitable for mangrove and saltmarsh habitat under future sea level rise was also undertaken as part of the coastal inundation study (Advisian 2023a). For Swan Lake, there is potential for saltmarsh to expand into the coastal wetland areas in the north of the Lake, and some limited potential for expansion around the Lake foreshores.

5.3 Water Quality

Swan Lake is classified as a back dune lagoon. Back dune lagoons have been described as simple rounded estuaries that are relatively shallow (below 6 m depth) and have an intermittent entrance (Scanes et al. 2014). Typically, they have a small catchment, and it is expected that groundwater is a large component of the freshwater input. Compared to other lagoons, they naturally have relatively high dissolved nitrogen and occasional natural algal blooms. Swan Lake is among only eight estuaries within NSW that is known to support extensive Charophyte beds. The presence of these beds is thought to be unrelated to the relatively undisturbed nature of the catchment (Roper et al. 2011). However, it has been noticed that following the droughts and the subsequent 2019-20 bushfires that these charophyte beds appear to have significantly reduced. As charophytes are also a key food source for the Black Swans, it is thought that the loss of charophytes may also be impacting their numbers within the lake, with community members reporting that they have significantly declined.

The lake has opened on average once every two years since 2002, through either natural rainfall events or artificially. Artificial openings by Council are undertaken to mitigate flooding in low lying areas around the lake according to the EMP.

There is a history of the public illegally opening the Swan Lake entrance prematurely when water levels are high enough to allow for manual digging of an entrance channel. This has often occurred

below the trigger levels specified within the lakes entrance management policy (Shoalhaven City Council 2008). These illegal openings seem to occur due to public perception and preference of where the estuary will open to avoid disturbing surf spots and to improve water clarity within the lake.

However, when the lake has previously been opened in the absence of associated catchment inflows, tidal flushing occurs at a slow rate and is insufficient to fully flush the estuary, resulting in mostly brackish waters which are influenced by freshwater inputs (Shoalhaven City Council 2008). Further, if the lake is opened in the absence of catchment inflows, surface water can be decanted from the system with hypoxic water being exposed, increasing the risk of fish kills (DPIE 2021).

Swan Lake has a small ratio of catchment runoff to estuary volume resulting in high dilution of runoff (which is supported by historical monitoring), and the catchment is moderately pristine (~70% is located within Conjola National Park) (DPE 2022).

An up-to-date assessment of estuarine water quality and health was carried out for Swan Lake to inform the scope and nature of coastal management actions during the future stages of Council's CMP development and implementation. The assessment is documented in the Water Quality and Estuary Health report (Advisian 2023b).

A review of routine water quality monitoring data collected by Council from the past decade (2010 – 2021) was undertaken and found that water quality within Swan Lake over the past decade has generally been good. Overall, recreational water quality within Swan Lake continues to be highly ranked as "Good" for swimming and other water-based activities based on the NHMRC (2008) Guidelines. An estuary health assessment for Swan Lake had an overall rating of Good (B), and on most occasions there was low algae (chlorophyll-a) and clear water clarity (turbidity). This was a slight decrease in estuary health in comparison to the previous estuary health assessments undertaken by NSW DCCEEW between 2014-2015 and 2008–2009, which received overall ratings of Excellent (A). More recent data (2022-23) from Council showed "Fair" estuary health results, these may be related to above-average rainfall during 2022-23 following a series of East Coast Lows (March/April 2022 and July 2022).

The findings of the Water Quality and Estuary Health Study (Advisian 2023b) are consistent with previous reports by Council and other relevant agencies (including NSW DCCEEW). The main issues identified in the study for Swan Lake include limited availability of water quality data, impacts on water quality associated with catchment inputs (urban stormwater runoff, sewage overflows and natural events), a possible decline in swans and associated Charophytes as food source (thought to be related to 2019/20 drought). Other threats to estuary health identified include invasive weeds, introduced animals, artificial entrance openings, perceived decline in fish stocks, littering and dumping along foreshore, clearing of foreshore vegetation, foreshore erosion, climate change and sea level rises.

Recommendations were made for an ongoing monitoring program for water quality in terms of sampling sites, frequency, parameters, sampling methodology, limits of reporting and applicable trigger values (Advisian 2023b). This is to ensure that the ongoing water quality monitoring program can track improvements towards meeting current water quality objectives.

There is no licensed aquaculture activity in Swan Lake.

5.4 Soils and Erosion

The Swan Lake entrance is situated at the southern end of Cudmirrah Beach. The entrance area itself is characterised by an expanse of unvegetated sand. The substrate in the entrance area is completely dominated by unconsolidated and unsorted sand with varying amounts of broken shell and drying algae, such as kelp, which has been washed ashore.

Swan Lake lies within the southern part of the Sydney Basin, a large sedimentary basin formed around 270 to 250 million years ago. The dominant geological unit is sandstone. The underlying geology of the areas is mainly composed of the Permian Conjola formation, a series of sandstone and shale units. This is overlain by large areas of Wandrawandian Siltstone around Swan Lake.

The area has a complex array of surface deposits formed during the past six thousand years. Many of these features are still actively changing. The Cudmirrah dunes form the Swan Lake sand barrier and are of high scientific value. They are the best-developed and highest dune system on the South Coast (Shoalhaven City Council, 2002). Further unconsolidated sediments occur along the creek systems. These comprise alluvial, lagoonal and estuarine clays, silts and sands.

Groundwater levels within the dunes east of Swan Lake vary in depth from about 18 m below the ground surface in the north to about 1.4 m below ground near the lake (Shoalhaven City Council, 2002).

There is a high risk that potential acid sulfate soils would occur in some low-lying areas around the northern foreshores of Swan Lake as shown on Figure 23. The inlet and entrance have a low probability of acid sulfate soils.

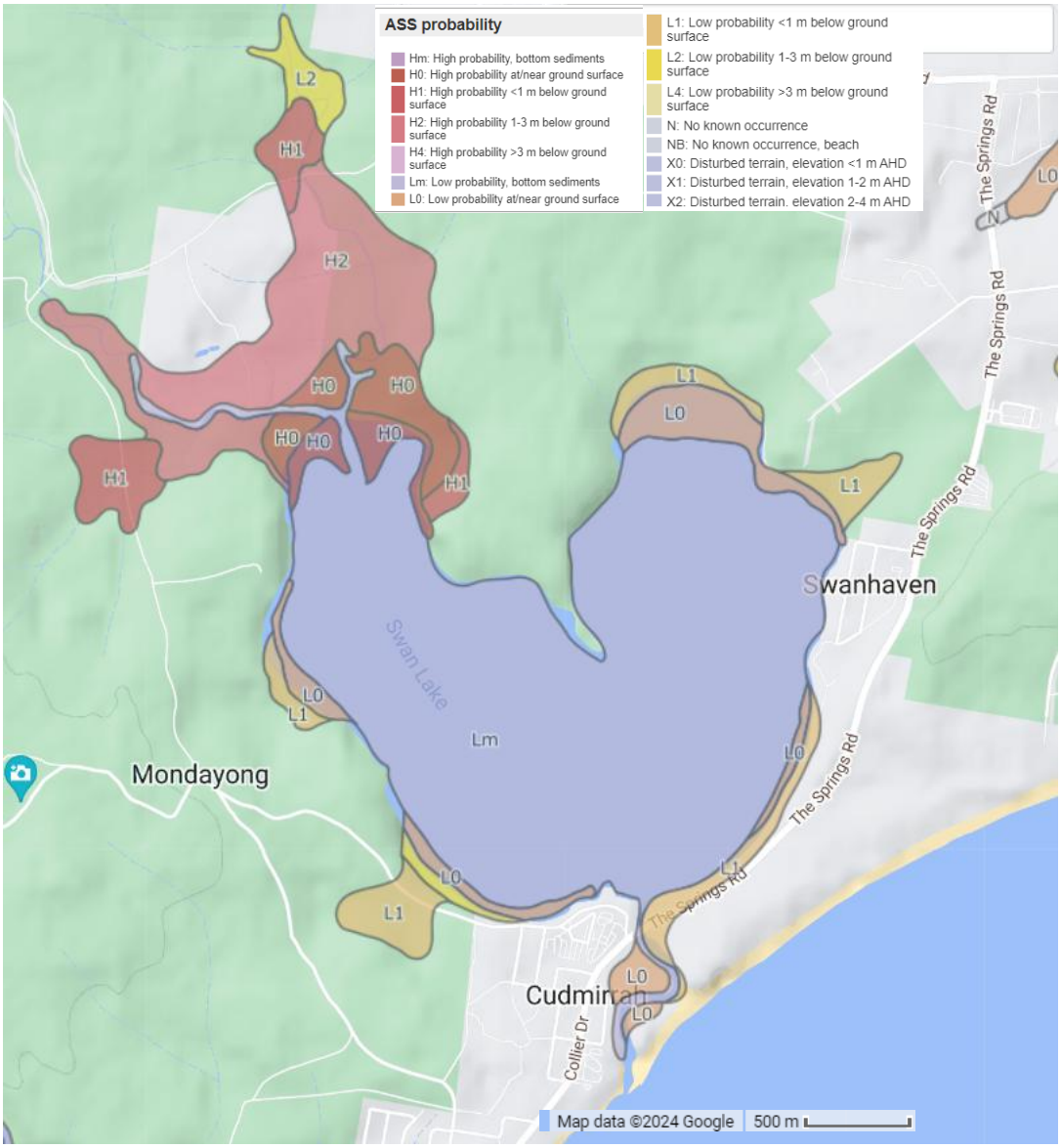

Figure 23 Acid Sulfate Soils Risk Mapping (SEED 2024)

A detailed field-based assessment of erosion and foreshore issues affecting the estuary health of St Georges Basin, Sussex Inlet, Swan Lake and Berrara Creek has been carried out, and documented in the Stage 2 CMP Foreshore Erosion Assessment Report (Advisian 2023c). The shoreline was inspected in detail, including from the water by boat and from land by foot, and features indicative of the coastal processes occurring at the various sites within the study area have been documented.

Mapping undertaken as part of the foreshore erosion assessment is provided in Figure 24. Ongoing erosion was observed along inside of bend in the Swan Lake inlet channel. This erosion is likely to occur when entrance openings are initiated when the tide is low (for example, if the entrance is opened artificially outside of the protocol specified in the EMP), resulting in rapid draw-down of lake levels and high outflow velocities through the entrance channel. Initiating openings when the tide is high can help to minimise this impact.

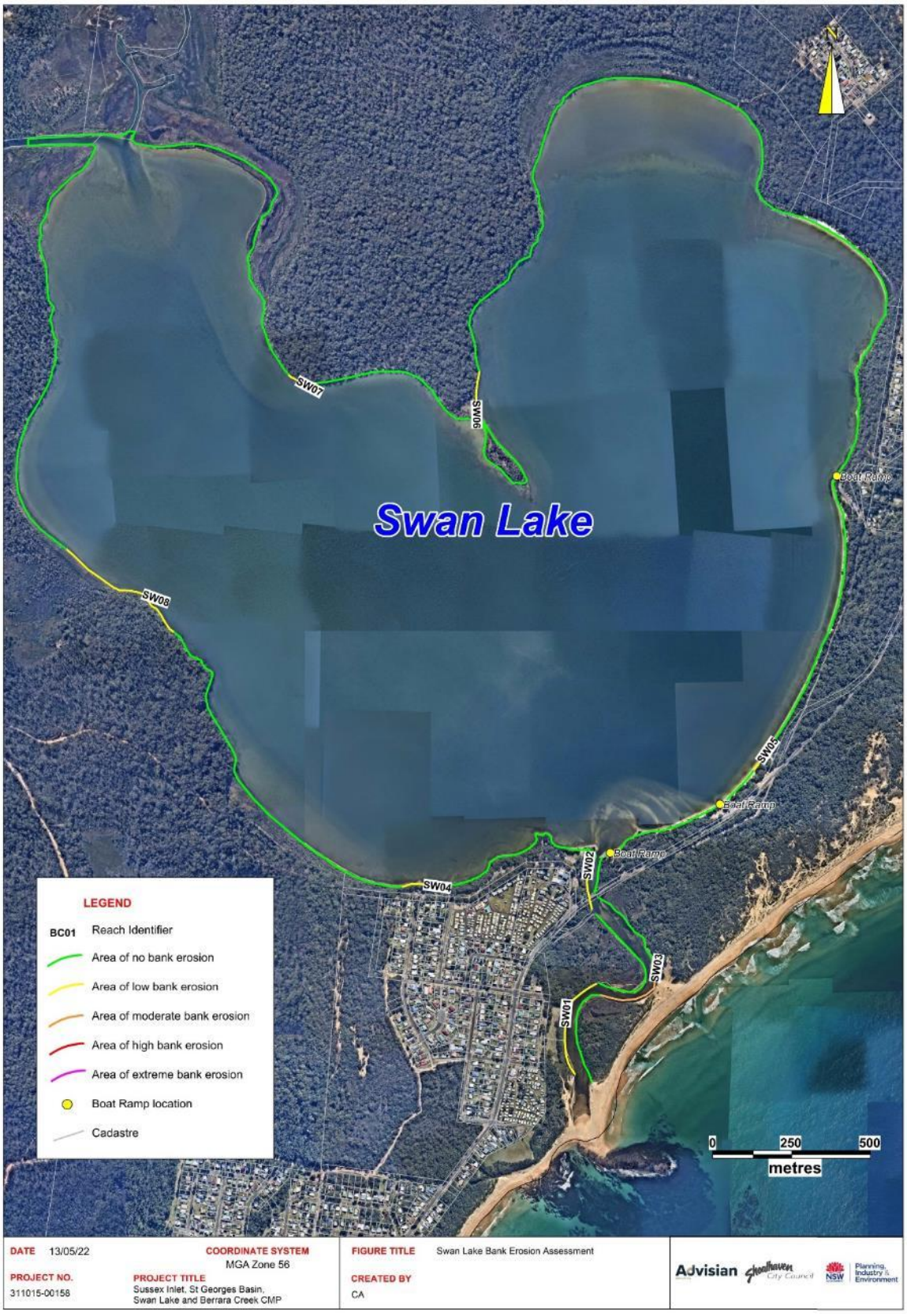

Figure 24 Erosion Assessment Map for Swan Lake (Advisian 2023c)

5.5 Heritage

5.5.1 Existing Aboriginal Heritage

Aboriginal people have continuously utilised the resources of the South Coast region for at least 20,000 years (NPWS 2009). The Jerrinja People are the traditional owners of the Shoalhaven region. They fish and meet socially as a tribe and also undertake spiritual hunting and fishing ceremonies (P. Rowe, personal communication, 30 March 2022). Owing to the productive nature of the land and its proximity to the sea (which provides important food sources), there are many sites with significant Aboriginal heritage value across the Shoalhaven LGA. Along the coast this includes middens, burial sites, artefacts, rock shelters and ceremonial areas.

A basic search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on 22 March 2024. The search identified at least thirteen Aboriginal sites recorded in and around Swan Lake. There is one Aboriginal site located near the lake entrance on the eastern side of the inlet (Figure 25). There are no declared Aboriginal places.

The Cudmirrah Berrara Swanhaven Progress Association Inc. (undated) describe the discovery of an Aboriginal burial site in 2006 along the edge of Swan Lake in Errol Bond Reserve Cudmirrah. They also noted that when water levels are low in Swan Lake, some grinding stones and the remains of a series of fish traps are also visible. The Conjola National Park Plan of Management (NSW NPWS 2009) provides a number of strategies regarding management of protection of Aboriginal sites and values through consultation with and involvement by Aboriginal community organisations and representations.

A site inspection was carried out by Advisian in collaboration with the Local Aboriginal stakeholders, representing the Jerrinja Tribal Group, on 15 March 2022 as part of the CMP development. In summary, the local Aboriginal community have a very strong connection to the land and local Aboriginal cultural heritage and land values are considered to be ‘highly sensitive’ and have ‘high significance’.

Figure 25 Location of recorded Aboriginal sites near the lake entrance (Heritage NSW 2024)

5.5.2 Existing Non-Aboriginal Heritage

Searches of the Australian Heritage Database, NSW State Heritage Inventory and the LEP in March 2024 identified the following listed heritage items at or in the vicinity of Swan Lake (Table 5 and Figure 26).

Table 5 Listed non-Aboriginal heritage items for Swan Lake

Item name	Address	Listing(s)	Significance	Distance to Foreshore
Errol Bond Memorial	Goonawarra Drive, Cudmirrah	LEP (Item No. 183)	Local	0m
"The Springs"— Holiday Cabins	1A Yarroma Avenue, Swanhaven	LEP (Item No. 461)	Local	75m
Swan Lake / Cudmirrah Area	About 3,800ha	Register of the National Estate (non-statutory)	N/A	0m / Variable

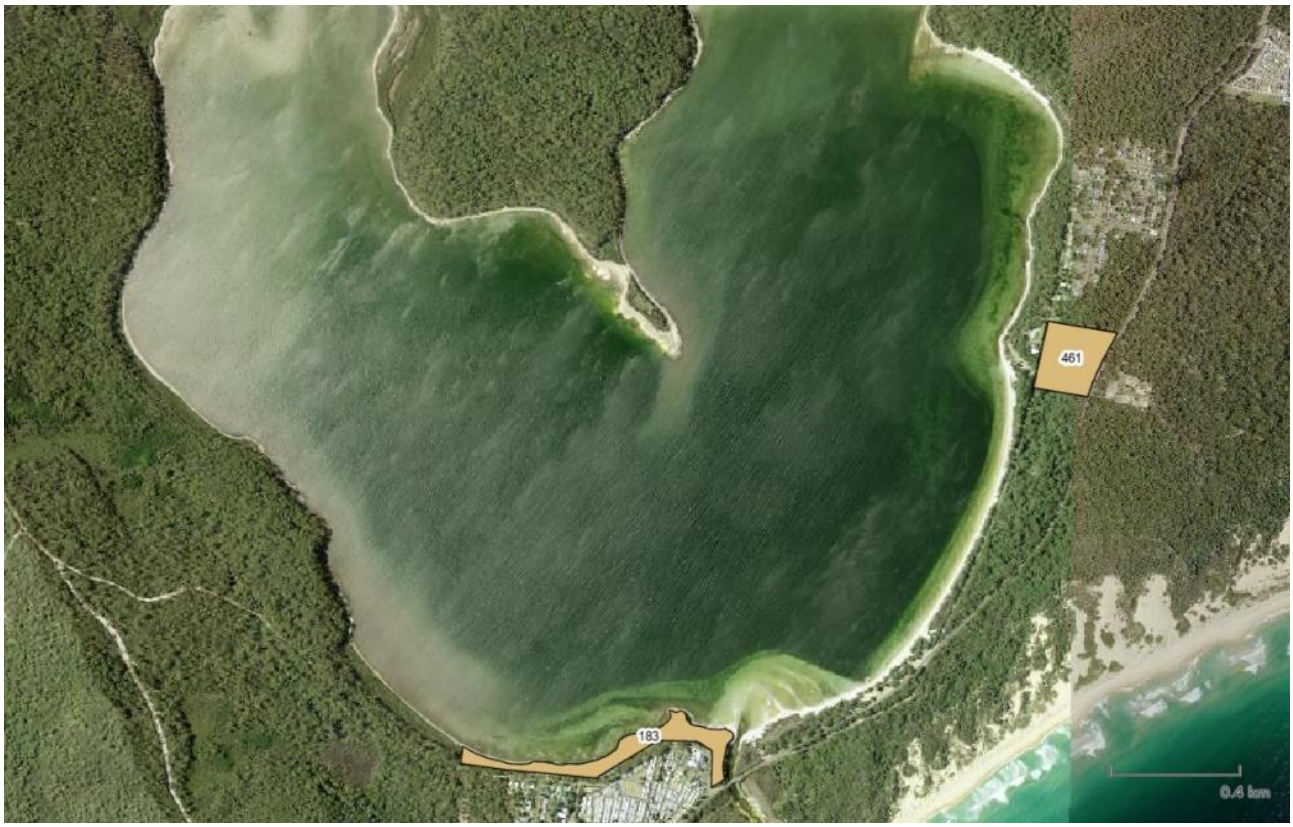

Figure 26 LEP listed non-aboriginal heritage items for Swan Lake (NSW Planning Portal 2024)

The Conjola National Park Plan of Management (NPWS, 2009, p. 15) notes that "Old Berrara Road was the original road to the coastal villages of Cudmirrah and Berrara until the present road across the Swan Lake entrance was constructed in the late 1960s. There is anecdotal evidence that the road formerly extended along the coast past the mouth of Berrara Lagoon and presumably further

south, and that modifications to the shoreline still exist". NPWS (2009) notes for historic heritage within the National Park that historic places are to be conserved in accordance with The Burra Charter and that other known historic features are to be recorded with research into their history.

5.6 Boat Navigation

Swan Lake features two boat ramps and no jetties. The larger slipway is located from Springs Road at Cudmirrah (Ramp A), whilst a smaller slipway is located in Swanhaven at the end of Yarroma Ave (Ramp B) these are shown below in Figure 27. Overall, Swan Lake is a popular spot for boating, fishing, canoeing/kayaking and other water based recreational activities.

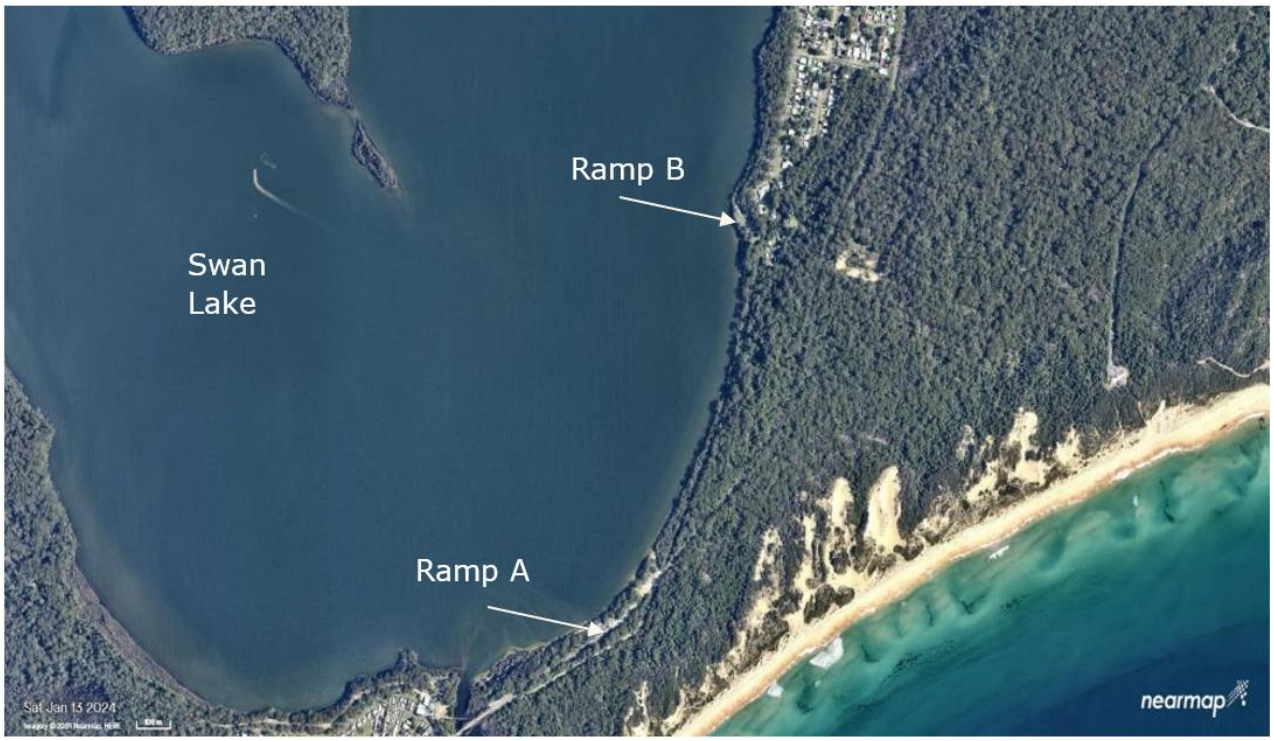

Figure 27 Boat Ramp entrances Swan Lake (Nearmap 2024)

A study on boating facilities and an assessment of navigation conditions within Sussex Inlet and St Georges Basin, as well as Swan Lake and Berrara Creek has been carried out, to determine whether there is sufficient capacity for vessels and whether there is a need to improve existing facilities or reduce the impact of boating on the environment (Advisian 2023d).

For Swan Lake, Advisian (2023d) found that the existing level of recreational boating is appropriate and that the single launching location for motorised craft be maintained, with monitoring and enforcement of existing restrictions regarding separation of swimmers and low-speed areas for the protection of shorebirds. It was noted at Yarroma Avenue (Ramp B in Figure 27) that when lake levels are high there is no longer a beach to pull up boats onto and for recreational activities – this appears to be a factor contributing to the continued illegal opening of the lake entrance by the public to reduce water levels.

5.7 Socio-Economic

Section 3.4 of the Stage 1 Scoping Study (Advisian 2020) included a community profile for the LGA which noted the population is primarily concentrated along the coast in major centres and numerous small centres. Sussex Inlet and the St Georges Basin District are identified as major centres. Cudmirrah, Berrara and Swanhaven are small centres located to the south of Sussex Inlet. Total population is forecasted to grow across the LGA from 103,012 persons in 2019 to 126,255 in 2041. The Sussex Inlet – Swanhaven – Berrara – Cudmirrah areas in particular are forecast to grow at an average of 1% p.a. over that period, outpacing the average forecast population growth rate of the LGA as a whole.

A review and comparison of the available Australian Bureau of Statistics (ABS) (2024) Census data (QuickStats) was undertaken from 2016 and 2021 (refer Table 6 and Table 7) for Cudmirrah and Swanhaven to understand the key social and economic characteristics of the local population for the towns surrounding Swan Lake.

Table 6 2016 and 2021 Census social statistics for Cudmirrah and Swanhaven

Statistic	2016		2021	
	Cudmirrah	Swanhaven	Cudmirrah	Swanhaven
Total population	275 persons	193 persons	284 persons	196 persons
Median age	52 years	59 years	56 years	65 years
Aboriginal and Torres Strait Islander	3.7% of total population	0% of total population	5.3% of total population	2% of total population
Children aged 0-14 years	11.1% of total population	13.2% of total population	13% of total population	8% of total population
People aged 65 years and over	30.2% of total population	39.0% of total population	33.8% of total population	49.7% of total population
People born overseas	13.2% of total population	23.4% of total population	21.5% of total population	25.5% of total population
Total private dwellings	229 with 51.5% occupied	136 with 58.1% occupied	226 with 53.5% occupied	150 with 61.2% occupied
Private dwellings structure	80.5% separate houses, 19.5% other dwellings	53.2% separate houses, 46.8% other dwellings	84.4% separate houses, 12.3% other dwellings	52.7% separate houses, 53.8% other dwellings
Tenure	58.0% of private dwellings owned outright, 25.0% owned with a mortgage and 17.0% rented	63.9% of private dwellings owned outright, 21.7% owned with a mortgage and 10.8% rented	54.1% of private dwellings owned outright, 29.5% owned with a mortgage and 12.3% rented	79.6% of private dwellings owned outright, 15.1% owned with a mortgage and 5.4% rented
Household size	Average 2.2 persons per household	Average 2 persons per household	Average 2.2 persons per household	Average 1.8 persons per household

Statistic	2016		2021	
	Cudmirrah	Swanhaven	Cudmirrah	Swanhaven
Number of registered motor vehicles	43.9% of occupied private dwellings had one vehicle garaged, 40.4% two vehicles and 10.5% had three or more vehicles	54.5% of occupied private dwellings had one vehicle garaged, 29.9% two vehicles and 11.7% had three or more vehicles	42.6% of occupied private dwellings had one vehicle garaged, 27.8% two vehicles and 24.3% had three or more vehicles	61.5% of occupied private dwellings had one vehicle garaged, 28.1% two vehicles and 10.4% had three or more vehicles

Table 7 2016 and 2021 Census economic statistics for Cudmirrah and Swanhaven

Statistic	2016		2021	
	Cudmirrah	Swanhaven	Cudmirrah	Swanhaven
Occupation (top 5 responses)	Technicians and Trades Workers (34.4%), Clerical and Administrative Workers (18.3%), Professionals (12.9%), Labourers (12.9%), Community and Personal Service Workers (8.6%)	Community and Personal Service Workers (22.0%), Professionals (18.0%), Technicians and Trades Workers (18.0%), Machinery Operators and Drivers (14.0%), Labourers (10.0%),	Technicians and Trades Workers (23.1%), Community and Personal Service Workers (20.4%), Professionals, (19.4%), Clerical and Administrative Workers (13%), Managers (7.4%),	Technicians and Trades Workers (22.4%), Labourers (22.4%), Community and Personal Service Workers (18.4%), Managers (16.3), Professionals (8.2%)
Industry of employment (top responses)	Accounting Services (12.1%), Accommodation (8.6%), Carpentry Services (5.2%), Pharmaceutical, Cosmetic and Toiletry Goods Retailing (5.2%), Engineering Design and Engineering Consulting Services (5.2%)	Gardening Services (22.2%), Clubs (Hospitality) (11.1%), Computer System Design and Related Services (11.1%), Building and Other Industrial Cleaning Services (11.1%), Local Government Administration (11.1%)	Local Government Administration (8.3%), Aged Care Residential Services (6.5%), Carpentry Services (3.7%), Cafes and Restaurants (3.7%), Legal Services (3.7%)	Radio Broadcasting (12.2%, Computer System Design and Related Services (10.2%), Other Social Assistance Services (10.2%), House Construction (8.2%), Plumbing Services (6.1%)
Labour Force	99 persons	52 persons	113 persons	55 persons
Unemployed	11.1%	9.6%	3.5%	5.5%
Median weekly personal income	$517	$428	$654	$462
Travel to work	Car, as driver (64.6%), Car, as passenger (9.4%), Worked at home (7.3%), Bicycle	Car, as driver (64.6%), Car, as passenger (9.4%), Worked at home (7.3%), Bicycle	Car, as driver (66.1%), Car, as passenger (5.6%), Worked at home	Car, as driver (63.3%), Car, as passenger (8.2%), Worked at home

Statistic	2016		2021	
	Cudmirrah	Swanhaven	Cudmirrah	Swanhaven
	(3.1%), Walked only (3.1%),	(3.1%), Walked only (3.1%),	(21.3%), Walked only (4.6%),	(12.2%), Did not go to work (6.1%)

At Cudmirrah and Swanhaven, there was a substantial increase in the median age and the percentage of people aged 65 years and over. The age of people in the region is generally high as retirees settle permanently and young adults leave for employment or education. There was a substantial reduction in the unemployment percentage of the labour force with a notable increase in medial weekly personal income for Cudmirrah residents, reflecting the changes of the industry of employment responses between 2016 and 2021.

Strategy 11.5 of the Illawarra-Shoalhaven Regional Plan 2041 identifies the estuaries of St Georges Basin, Swan Lake and Berrara Creek as sensitive estuaries that need to be protected by implementing the NSW Government's Risk-Based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions.

Residents and visitors to Cudmirrah and Swanhaven participate recreationally in swimming, diving, surfing, boating, water skiing, fishing, bush walking, picnics, art and photography, conservation activities, sightseeing and car touring. High social and cultural value is associated with individual, family and community experiences with the natural landscape including around Swan Lake, Conjola National Park and nearby beaches.

5.8 Noise

Noise sensitive receivers are properties such as residences, schools, churches and hospitals. The nearest noise sensitive receivers are shown in Figure 28. The noise sensitive receiver is the small coastal town of Cudmirrah. Four points had been measured between the inlet and Cudmirrah in order to determine the proximity of the noise sensitive receiver to different zones of the inlet.

- Point A is measured at approximately 60m.
- Point B is measured at approximately 360m.
- Point C is measured at approximately 70m.
- Point D is measured at approximately 132m.

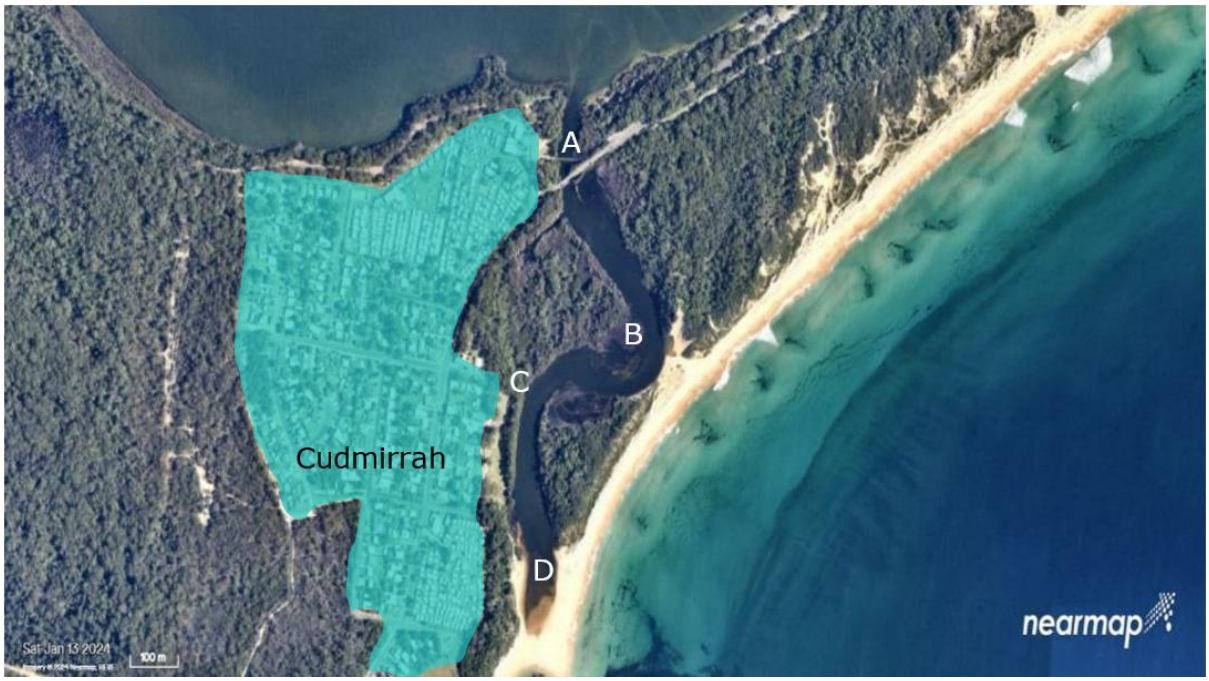

Figure 28 Closest noise sensitive receiver in proximity to Swan Lake Inlet (Nearmap 2024)

5.9 Visual Amenity

Swan Lake is surrounded by Conjola National Park to the north, west and south, and by the small towns of Swanhaven and Cudmirrah to the east. A scenic cycling path through Conjola National Park has occasional views of Swan Lake, whilst Dyball Reserve, Swanhaven, offers picnic and BBQ facilities where users have a direct view of Swan Lake.

The Springs Road is the only route into Swanhaven and Cudmirrah, where a small number of houses, holiday parks and other dwellings along Lake Drive and Goonawarra Drive line bushland adjacent to Swan Lake and have a viewpoint towards the lagoon. The Springs Road itself has a handful of viewpoints of Swan Lake where visitors may stop to view the waterway.

5.10 Waste

Waste may be produced, this includes general waste, which is produced from any construction works, construction materials and liquid wastes from cleaning/maintaining construction equipment associated with an artificial opening.

6 Statutory and Planning Framework and Permissibility

6.1 Planning Instruments

6.1.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TI SEPP) aims to facilitate the effective delivery of infrastructure across the State.

Section 2.56 of the TI SEPP permits development for the purpose of flood mitigation work, to be carried out by or on behalf of a public authority without consent on any land. In addition, Section 2.165 of the TI SEPP permits development for the purpose of waterway or foreshore management activities, including coastal management[1], to be carried out by or on behalf of a public authority without consent on any land.

As the proposal is characterised as development for either the purposes of flood mitigation work or waterway or foreshore management activities, and is to be carried out by Council, it can be assessed under Division 5.1 of the EP&A Act. Development consent from Council is not required. Sections 2.56(3) and 2.165(3) permits construction works, and environmental management works when in connection with the above development purposes.

The proposal does not require development consent or approval under *State Environmental Planning Policy (Planning Systems) 2021*.

Part 2.2 of the TI SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by TI SEPP (where applicable), is discussed in Section 8 of this REF.

6.1.2 State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 2 of the RH SEPP aims to manage development in the coastal zone. The RH SEPP contains provisions relating to the four coastal management areas that comprise the NSW coastal zone.

The proposal is located partly within the coastal use area and within the mapped coastal environment area. Coastal wetlands and proximity area for coastal wetlands are mapped along the northern and eastern foreshores of Swan Lake (Figure 29). The lake is not located within any mapped littoral rainforest area.

As the proposal is being assessed under Division 5.1 of the EP&A Act, consideration of the RH SEPP Part 2.2 provisions is not required. No works are proposed to the coastal wetlands and proximity area for coastal wetlands. The increase in entrance management trigger levels over time under the new Policy will result in an increase in inundation durations and extents within the mapped coastal wetland areas to the north of Swan Lake, as discussed in Section 5.2.

[1] *Waterway or foreshore management activities* include coastal management, and dredging undertaken for aquatic habitat, restoration of environmental flows or ecological purposes.

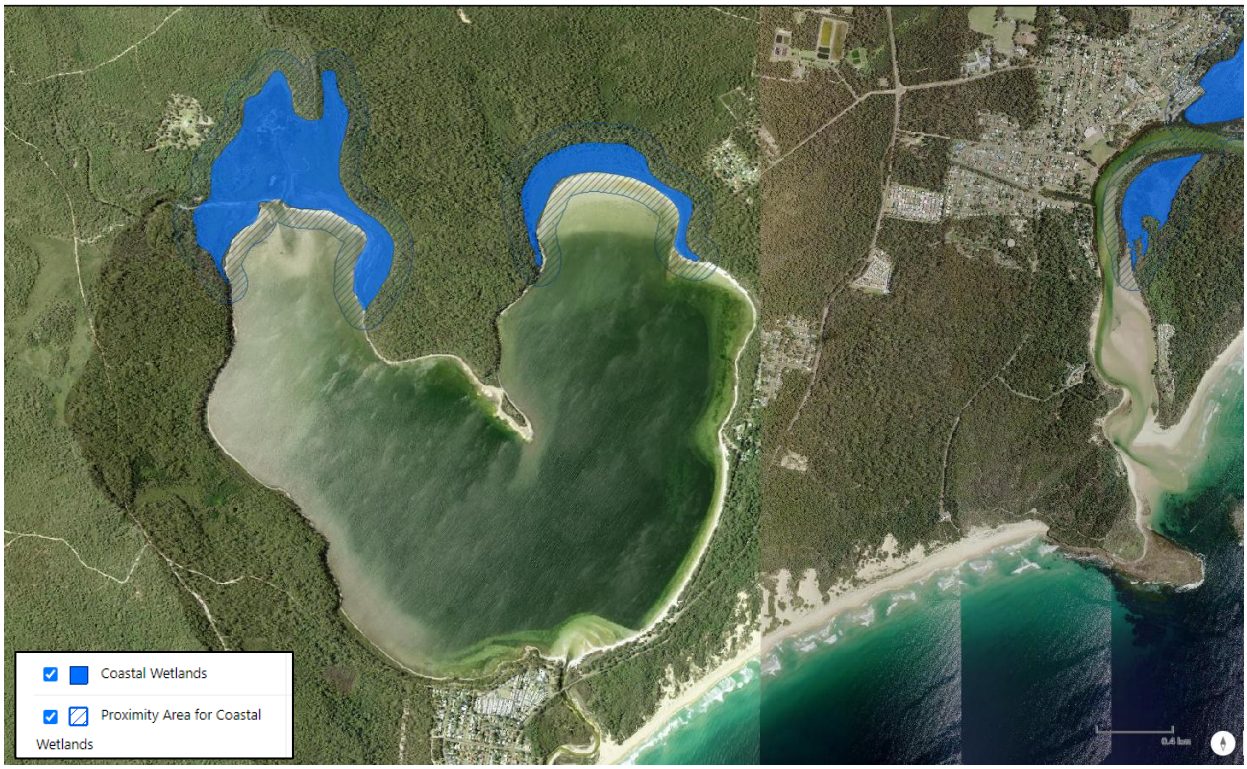

Figure 29 Location of coastal wetlands in Swan Lake (NSW Planning Portal 2024)

6.1.3 Shoalhaven Local Environment Plan 2014

Swan Lake is situated within Shoalhaven City Council local government area (LGA) and falls under the *Shoalhaven Local Environment Plan 2014* (the LEP). Land zoning of Swan Lake and surrounding areas are detailed in Table 8 and a map of the zoning is found in Figure 30. The proposal is consistent with the relevant zone objectives. The proposal is permitted without consent pursuant to the provisions of the TI SEPP and is to be assessed under Division 5.1 of the EP&A Act, therefore development consent is not required.

Table 8 List of Land Zones and Objectives

Zone	Location	Objectives of Zone
W1 – Natural Waterways	Proposal site	To protect the ecological and scenic values of natural waterways. To prevent development that would have an adverse effect on the natural values of waterways in this zone. To provide for sustainable fishing industries and recreational fishing.
W2 – Recreational Waterways	Proposal site	To protect the ecological, scenic and recreational values of recreational waterways. To allow for water-based recreation and related uses. To provide for sustainable fishing industries and recreational fishing.

Zone	Location	Objectives of Zone
C1 – National Parks and Nature Reserves	Adjacent to proposal site	To enable the management and appropriate use of land that is reserved under the *National Parks and Wildlife Act 1974* or that is acquired under Part 11 of that Act. To enable uses authorised under the *National Parks and Wildlife Act 1974*. To identify land that is to be reserved under the *National Parks and Wildlife Act 1974* and to protect the environmental significance of that land.
C2 – Environmental Conservation	Adjacent to proposal site	To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. To prevent development that could destroy, damage or otherwise have an adverse effect on those values. To protect water quality and the ecological integrity of water supply catchments and other catchments and natural waterways. To protect the scenic, ecological, educational and recreational values of wetlands, rainforests, escarpment areas and fauna habitat linkages. To conserve and, where appropriate, restore vegetation in order to protect the erosion and slippage of steep slopes.
RE1 – Public Recreation	Adjacent to proposal site	To enable land to be used for public open space or recreational purposes. To provide a range of recreational settings and activities and compatible land uses. To protect and enhance the natural environment for recreational purposes.
R2 – Low Density Residential	Adjacent to proposal site	To provide for the housing needs of the community within a low-density residential environment. To enable other land uses that provide facilities or services to meet the day to day needs of residents. To provide an environment primarily for detached housing and to ensure that other development is compatible with that environment.
SP3 - Tourist	Adjacent to proposal site	To provide for a variety of tourist-oriented development and related uses. To enable compatible residential and recreational uses.

Figure 30 Land Zones of proposal area (NSW Planning Portal 2024)

6.2 NSW Legislation

6.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by or on behalf of public authorities such as Council which are permissible without development consent under the TI SEPP.

6.2.2 Environmental Planning and Assessment Regulation 2021

Section 171 of the EP&A Regulation defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has, or is likely to have, a significant impact on the environment. Section 9 of this REF provides an environmental impact assessment of the proposal in accordance with Section 171, with a summary of the assessment included in Section 9.

6.2.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) seeks to conserve biological diversity at bioregional and State scales; to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations; to assess the extinction risk of species and ecological communities and identify key threatening processes through an independent and rigorous scientific process; and to establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity.

Under Section 7.2 of the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat which are likely to occur and be impacted by the proposed development. A significant impact also occurs if the activity is carried out in an area of outstanding biodiversity value or if the impact exceeds thresholds under the biodiversity offset scheme.

A BioNet atlas search for species threatened and protected under the BC Act was carried out within a 10 km search radius of the study area. The proposal is not expected to have a direct or indirect adverse impact on any threatened species, populations or ecological communities.

A number of marine, wetland and migratory bird species listed under the BC Act are also known to occur within the search area. These species may utilise nearby wetlands, subtidal lands and intertidal foreshores for foraging, nesting or roosting. No direct impacts on bird species are expected.

No Areas of Outstanding Biodiversity Value (AOBV) declared under the BC Act occur within the search area and would not be impacted by the proposal.

Part 7 of the BC Act contains the biodiversity assessment and provisions for approvals against which proposed activities or developments are to be assessed. There are not expected to be any significant impacts on any threatened fauna (refer to the Assessments of Significance in Appendix D) or endangered ecological communities (EECs) listed under the BC Act. Therefore, preparation of a Species Impact Statement would not be necessary and entry into the Biodiversity Offsets Scheme under the BC Act would not be required.

6.2.4 Fisheries Management Act 1994

Section 1.7 of the EP&A Act stipulates that the application of Part 7A of the *Fisheries Management Act 1994* (FM Act) applies to the proposal. The objectives of the FM Act are to conserve, develop and share the fishery resource of NSW for the benefit of present and future generations.

The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for:

- The listing of threatened species, populations and ecological communities or key threatening processes.
- The declaration of critical habitat.
- Consideration and assessment of threatened species impacts in the development assessment process.

If the proposal potentially affects any listed threatened species or populations listed in Schedule 4, 4A and 5 of the FM Act, an assessment of significance under Section 220 of the FM Act is required. However, the proposal is unlikely to impact these species', particularly once the mitigation measures described in Section 10 have been implemented. Therefore, no further assessments are required.

To assist in ensuring compliance with the legislation, policies and guidelines as they relate to fish habitat conservation and management, NSW DPIRD Fisheries has released the *Policy and guidelines for fish habitat conservation and management* (NSW DPI 2013). The Policy provides an overview of the legislation and what activities require a permit from NSW DPIRD. These include dredging or reclamation works as discussed below, (i.e. any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land that disturbs, moves or harms these in-stream habitats).

6.2.4.1 Dredging and reclamation

The proposal involves dredging works. However, Section 200(2) of the FM Act provides that there are two circumstances where a permit is not required. A permit is not required where the works are authorised under the *Crown Land Management Act 2016* (CLM Act). Accordingly, as the works would be the subject of a special purpose licence under the CLM Act, it would not be necessary for Council to also obtain a permit under Section 200 of the FM Act.

6.2.4.2 Protection of mangroves and certain other marine vegetation

The proposal does not involve direct impacts to marine vegetation (i.e. mangroves, saltmarsh, seagrass or macroalgae), therefore, no permit is required under Section 205 of the FM Act.

6.2.4.3 Protection of spawning of salmon, trout and certain other fish

The proposal would not cause damage to gravel beds where salmon or trout spawn or are likely to spawn, as defined in Section 206 of the FM Act.

6.2.4.4 Fish Passage

The passage of fish along Swan Lake Inlet would not be blocked as a result of the proposed changes, therefore, no permit is required under Section 219 of the FM Act. Longitudinal connectivity between upstream and downstream areas of the Lake, and the ocean, will be maintained as the Lake entrance will still be subject to intermittent opening and closing, allowing passage of fish between the ocean and Lake.

6.2.5 Coastal Management Act 2016

The objectives of *Coastal Management Act 2016* (CM Act) are for the management of the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State.

The RH SEPP gives effect to the objectives of the CM Act from a land use planning perspective, by defining the four coastal management areas of the 'coastal zone' listed in the CM Act:

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

The application of the RH SEPP to Swan Lake is discussed in Section 6.1.2.

Section 23 of the CM Act requires that a public authority is to have regard to the relevant Coastal Management Program (CMP) and coastal management manual. It is noted that Council is currently preparing a CMP and that the proposal would be consistent with future relevant CMP actions.

Potential impacts on the four coastal management areas that comprise the NSW coastal zone have been considered in the development of the proposal.

6.2.6 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (CLM Act) aims to provide for the ownership, use and management of the Crown land of NSW. The waterway of Swan Lake is Crown land administered by the Crown with the adjacent land being Crown Reserve R78638 which is managed by Council for the purpose of Public Recreation.

Whilst, Council has care and control of the entrance area above mean high water mark, excavation to date have been below this level and affects Crown Land. It is understood that Council does not currently hold an existing licence from NSW Crown Lands under the CLM Act to carry out excavation across the beach at Swan Lake entrance. A new licence would be required from NSW Crown Lands for Council to implement a revised EMP.

6.2.7 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the primary statute for management of Aboriginal cultural heritage in NSW. Items of Aboriginal heritage (Aboriginal objects) or Aboriginal places (declared under section 84) are protected and regulated under the NPW Act.

Aboriginal objects are protected under Section 86 of the NPW Act. It is an offence to harm or desecrate an Aboriginal object, either knowingly (Section 86(1)) or unknowingly Section 86(2)). There are offences and penalties relating to the harm to, or desecration of, an Aboriginal object or declared Aboriginal place. Harm includes to destroy, deface, damage or move. Where direct impact is proposed, an Aboriginal Heritage Impact Permit (AHIP) is required from Heritage NSW.

The proposal would not have a direct impact on known Aboriginal sites. Therefore, an AHIP would not be required where harm is avoided to these sites. For further detail, refer to the due diligence assessment in Section 7.5.1 of this REF.

6.2.8 Heritage Act 1977

The *Heritage Act 1977* aims to provide for the identification, registration and conservation of items of State heritage significance. The *Heritage Act 1977* contains provisions for listing sites or places on the State Heritage Register SHR, applying interim heritage orders and the protection of relics.

A search of the NSW State Heritage Inventory was completed on 22 March 2024 and did not identify any State heritage items listed within or adjacent to the proposal. There are no known relics at the site.

The proposal would not have a direct impact on non-Aboriginal heritage. For further detail, refer to Section 7.5.2 of this REF.

6.2.9 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* is administered by the NSW Environment Protection Authority (EPA) and requires licences for environmental protection, including waste, air, water and noise pollution control for certain scheduled activities. Schedule 1 of this Act identifies scheduled activities for which an environment protection licence is required. The proposal is not classified as a scheduled activity.

6.2.10 Contaminated Land Management Act 1994

A search of the NSW EPA's contaminated land record was conducted on the 13 March 2024. Table 9 below shows records of contaminated land results within the LGA.

Table 9 Contaminated Land Records Search Results

Suburb	Address	Site Name	Notices related to this site
Bomaderry	320 Princess Highway	Commercial Land	1 current and 4 former
Nowra	Lamonds Lane	Former Gasworks	1 current and 6 former
Nowra East	Lot 3 Kalandar Street	Mobil Service Station	6 former

From Table 9 above, Lot 3 Kalandar Street is the closest location to Swan Lake at roughly 45km. Given the distance of the three locations from the site, it is unlikely that any contamination related issues would be encountered.

6.2.11 Water Management Act 2000

The objects of the *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Section 91 of the WM Act sets out requirements relating to approvals required to undertake controlled activities on waterfront land. Public authorities (of which Council would be one) are exempt from the need to obtain a controlled activities approval under the WM Act.

6.3 Commonwealth Legislation

6.3.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to be submitted to the federal Department of Climate Change, Energy, the Environment and Water for actions that have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment where: A) actions proposed are on, or would affect Commonwealth land and the environment, or B) Commonwealth agencies are proposing to take an action.

The nine MNES protected under the EPC Act are:

- World heritage properties.
- National Heritage places.
- Wetlands of international importance (Listed under the Ramsar Convention).
- Listed threatened species and ecological communities.
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear Actions (including uranium mines).
- A water resource, in relation to coal seam gas development and large coal mining development.

An ‘action’ defined to include a project, development, undertaking, activity or series of activities. An approval for such an action may be required from the Australian Minister for the Environment and Water. Given that this proposal pertains to the update of an entrance management policy for Swan

Lake, it is unlikely that any activity should occur that would have a significant impact on MNES or Commonwealth land.

An Assessment of Significance for the MNES has been undertaken in accordance with the Commonwealth *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Commonwealth of Australia, 2013). The Assessment of Significance is detailed in 0.

6.3.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) recognises and protects Native Title. The NT Act covers actions affecting Native Title and the processes for determining whether Native Title exists and compensation for actions affective Native Title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the NT Act, a future act includes proposed public infrastructure on land or waters that affects Native Title rights or interest.

A search of the Native Tribunal Native Title Vision website was undertaken on 13 March 2024 and found one registered claim to the site which is detailed below.

Application Name: South Coast People

Tribunal File no.: NC2017/003

Federal Court file no.: NSD1331/2017

Application Type: Claimant

Date Filed: 03/08/2017

State or Territory: NSW

Approximate area size (sq km): 16807.5125

The proposal would not extinguish Native Title interests in the land and waters affected as the non-extinguishment principle would apply.

6.4 Permissibility

The proposed activity is permissible under all relevant legislation outlined in the above sections subject to the implementation of spatial limitations and recommended mitigation measures in Section 10.

7 Detailed Environmental Assessment

7.1 Lake Ecology

7.1.1 Impact Assessment

The impact of the proposal, including raising the minimum lake opening trigger height by 0.1 m initially then eventually to 2.5 m AHD, would largely be positive on the lake ecology. The proposal would allow for sufficient inundation of the Coastal wetland area at the northern end of the lake to occur for up to three months as per the existing Policy (refer Figure 31). Inundation of the Coastal wetland would offer areas of fresh or lightly brackish water which the endangered Green and Golden Bell Frog rely upon for successful breeding.

Multiple bird species are known to nest in the vicinity of the lake entrance (Hooded Plover, Pied Oystercatcher) and are at risk of losing breeding and nesting habitat due to excavation and increased water flow through the inlet. Raising of the intervention level would reduce the frequency of necessary excavation, and thus reduce the risk of impacting shorebird nesting in the area. Existing controls would remain in place to protect breeding birds, their eggs and fledglings. The proposal would not result in any substantial modification, disruption or isolation to areas of important habitat of migratory bird species.

Due to the reduced frequency of intervention under the proposal, there are no significant impacts to environmental MNES, threatened species, populations or ecological communities, KFH and marine vegetation.

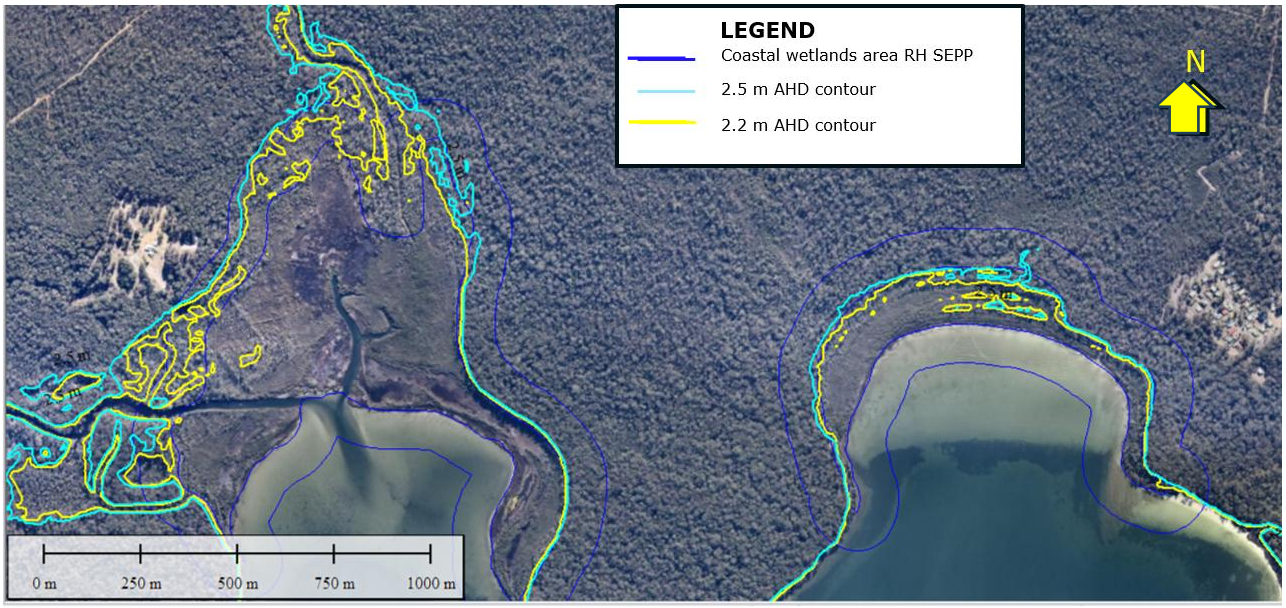

Figure 31: Area inundated at 2.2 m AHD (yellow), 2.5 m AHD (cyan) vs Coastal Wetland Area and Coastal Wetland Proximity Area under RH SEPP

7.2 Hydrology

7.2.1 Impact Assessment

The proposal has the potential to have indirect impacts to lake hydrology. The hydrology of the lake, in particular the water level and the frequency and extent of its fluctuations, is one of the main

determinants of the flora communities occupying the bed and banks of the lake. The existing regime and updates to the EMP are designed to continue to mimic natural hydrologic regimes as much as possible. The proposal would have negligible impacts for Swan Lake as it is operating at or near to its natural limits of behaviour, with the increase in trigger levels bringing the lake even closer to a natural hydrologic regime.

7.3 Water Quality

7.3.1 Impact Assessment

Water quality within Swan Lake within the past decade has been found to be generally good. The reasons for artificial opening of Swan Lake do not relate to water quality. Rather, the major historical issue is the management of infrastructure and property assets around the lake foreshores, which could flood if the entrance was not breached. It is considered that the proposal would have minimal long-term impact on estuarine water quality and health.

7.4 Soils and Erosion

7.4.1 Impact Assessment

It is considered that the proposal would have minimal long-term impact on the quality of existing soils and erosion (including areas of known bank erosion). The reduced frequency of artificial opening events would reduce the frequency of high velocity flows through the channel and would therefore have a positive impact on bank erosion.

7.5 Heritage

7.5.1 Aboriginal Heritage Impact Assessment

A due diligence assessment has been prepared according to the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (NSW Department of Environment, Climate Change and Water, 2010) (Code of Practice). The Code of Practice provides a series of questions to assist a proponent in determining whether the proposed activities are likely to harm Aboriginal objects and would therefore require an AHIP application under Section 90 of the NPW Act. The following relevant questions from the Code of Practice are applied to the proposal in Table 10.

Table 10 Code of Practice questions

Code of Practice Question	Response	
Is the activity a low impact activity for which there is a defence in the NPW Regulation?	No	The NPW Regulation removes the need to follow the due diligence process if the proponent is carrying out a specifically defined low impact activity. Low impact activities are listed in Section 58 of the National Parks and Wildlife Regulation 2019 (NPW Regulation). A review of Section 58 indicates that the proposal does not comprise low impact activities as defined by the NPW Regulation. Accordingly, the due diligence process has been adhered to herein.
Will the activity disturb the ground surface or any culturally modified trees?	Yes	The proposal involves ground disturbance to the Swan Lake inlet from excavation by mechanical equipment (dozer) when intervention is required. This would go through unvegetated sand barriers and adjacent shallow shoals within 10m of the rocky reef on Cudmirrah Beach. The construction equipment would access the site as much as possible via established roads and unvegetated areas and is to avoid recorded Aboriginal sites. The proposal is not expected to involve the removal of trees.
Are there any relevant confirmed site records or other associated landscape feature information in AHIMS?	Yes	A search of the AHIMS database on 22 March 2024 returned at least thirteen Aboriginal sites recorded in and around Swan Lake, including stone tool sites and axe grinding grooves. There is one Aboriginal site located near the lake entrance on the eastern side of the inlet, but this is well outside of the zone that would be affected by ground disturbance when entrance intervention is required.
Are there any landscape features that are likely to indicate a presence of Aboriginal objects?	Yes	Under the definitions given in the Code of Practice, the proposal is within an area that exhibits landscape features that are likely to indicate a presence of Aboriginal objects. The following are criteria used in the code of practice to define a landscape which is likely to indicate a presence of Aboriginal objects, relevant to the proposal: Located within 200m of waters[2], and' Located within 200m below or above a cliff face[3]. Although the proposal meets the abovementioned criteria, the Code of Practice states that this must occur in conjunction with the proposal occurring on land that is not disturbed land. Given the extremely dynamic nature of the entrance area, and the proposed Policy updates are intended to continue mimicking natural lake openings, there are unlikely to be any direct impacts on Aboriginal objects or cultural sites caused by artificial entrance openings. In addition, construction equipment is to access the site as

[2] 'Waters' means the whole or any part of: any river, stream, lake lagoon, swamp, wetlands, natural watercourse, tidal waters (including the sea).

[3] It is noted that the proposal does not involve any works to the adjacent cliff face. This criteria has been included as a precautionary measure.

Code of Practice Question	Response	
		much as possible via established roads and unvegetated areas and is to avoid recorded Aboriginal sites.
Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?	No	The desktop assessment and previous visual inspections of Swan Lake, which has informed this assessment, indicates that while there is a possibility that Aboriginal objects may be present in areas *in the vicinity of* the site, it is unlikely that previously undisturbed Aboriginal artefacts, items or burials are present below the ground surface *within* the site due to the disturbed nature of the land in which work would take place upon.

Based on the findings of the above due diligence assessment, an AHIP is not considered to be necessary for the proposal provided that the mitigation measures in Section 10 are followed.

7.5.2 Non-Aboriginal Heritage Impact Assessment

The proposal would contribute to the conservation of heritage items by progressively reducing the risk to infrastructure from inundation which would have a positive impact. The non-aboriginal heritage items are outside of the area that would be impacted by increased water levels under a raised entrance intervention trigger level and would therefore not be impacted by the proposal.

7.6 Boat Navigation

7.6.1 Impact Assessment

There are no impacts expected to boat navigation and safety as a result of the proposal.

7.7 Socio-Economic

7.7.1 Impact Assessment

There would be no significant adverse socio-economic impacts upon communities including Cudmirrah and Swanhaven. The proposal would have positive cumulative socio-economic and environmental effects by progressively reducing the risks to infrastructure, including other future activities under Stages 1 to 3.

7.8 Noise

7.8.1 Impact Assessment

The proposal would include a short-term increase in noise to nearby sensitive receivers from excavation works associated with artificial openings which may occur outside standard construction hours from:

- Hand tools
- Machinery
- Generators

Long-term noise impacts are not expected to occur as a result of the proposal, and the frequency of short-term impacts would be reduced due to the reduced frequency of machinery and excavation vehicles in the area with a reduced frequency of intervention.

7.9 Visual Amenity

7.9.1 Impact Assessment

There would be negligible impact on the visual amenity of Swan Lake, as the proposal would not increase the frequency of excavation vehicles and machinery in the area, allowing residents and visitors to enjoy uninterrupted views of the Lake.

7.10 Waste

7.10.1 Impact Assessment

The proposal would generate minimal waste impacts. Waste on site during artificial openings would be minimal and appropriately stored and bunded where necessary to limit and potential for pollutants to enter the waterways.

8 Consultation

8.1 Community Consultation

Stakeholder consultation will be undertaken for this REF and the Entrance Management Policy. The EMP is to be placed on public exhibition, in conjunction with the CMP for Swan Lake and Berrara Creek. This REF will be published on Shoalhaven City Council's website (as the determining authority), in accordance with Section 171(4) *Environmental Planning and Assessment Regulation 2021* (as a matter of public interest).

8.2 Agency Consultation

Agency consultation will be carried out for this REF and the EMP. This section of the REF will be updated once Agency consultation has been carried out.

Existing stakeholder consultation processes are outlined in the EMP (i.e. consultation with NPWS and other agencies) and would be carried forward into the updated Policy.

9 Assessment of environmental factors

Table 11 Section 171 of EP&A Regulations considerations

Factor	Assessment of Impact	Reason
(a) the environmental impact on the community,	Negligible	There would be no significant adverse environmental impact from the proposal upon communities surrounding Swan Lake including Cudmirrah and Swanhaven.
(b) the transformation of the locality,	Negligible	The locality would not be transformed in any significant manner. The aim of the proposal is to progressively reduce the risk to infrastructure which would have a positive impact.
(c) the environmental impact on the ecosystems of the locality,	Positive impact	There would be no significant adverse environmental impacts of the proposal on ecosystems. By raising the minimum intervention in the existing Policy to 2.3 m AHD this would allow sufficient inundation of the Coastal wetland area at the northern end of the lake to occur for up to three months as per the existing Policy.
(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality,	None	The proposal is unlikely to lead to a reduction in the aesthetic, recreational, scientific quality or value of the locality.
(e) the effects on any locality, place or building that has i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or ii) other special value for present or future generations,	None	The proposal would not have any direct impacts to Aboriginal cultural heritage or non-Aboriginal cultural heritage in the locality.
(f) the impact on the habitat of protected animals, within the meaning of the *Biodiversity Conservation Act 2016*,	Negligible	The previous REF (Peter Spurway & Associates 2003) identified that there are species of birds (including Hooded Plover), and one frog (Green and Golden Bell Frog) recorded from Swan Lake which use the lake's habitats and entrance area that are classified as vulnerable or endangered. It is proposed to retain the existing consultation arrangements with NPWS under the EMP to determine the presence of nesting shorebirds or Green and Golden Bell Frogs prior to initiating an opening when water levels are between 2.3 m AHD and 2.5 m AHD. No adverse impacts to habitats are expected.

Factor	Assessment of Impact	Reason
(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air,	None	The proposal is unlikely to endanger any species of animal, plant or other life form.
(h) long-term effects on the environment,	Positive impact	The proposal is unlikely to have any adverse long-term effects on the environment. The aim of the proposal is to progressively reduce the risk to infrastructure which would have a positive impact. In addition, the raising of the trigger level for entrance intervention would have a positive impact in allowing the coastal wetlands at the northern end of Swan Lake to be inundated for longer periods and return to a more natural regime.
(i) degradation of the quality of the environment,	None	The proposal would not contribute to a degradation of the quality of the environment.
(j) risk to the safety of the environment,	None	The proposal would not create adverse risks to the safety of the environment.
(k) reduction in the range of beneficial uses of the environment,	None	The proposal would not reduce the range of beneficial uses of the environment.
(l) pollution of the environment,	None	No impact.
(m) environmental problems associated with the disposal of waste,	None	No impact.
(n) increased demands on natural or other resources that are, or are likely to become, in short supply,	None	No impact.
(o) the cumulative environmental effect with other existing or likely future activities,	Positive impact	The proposal would have positive cumulative environmental effects by progressively reducing the risks to infrastructure, including other future activities under Stages 2 and 3 (refer Section 4). In addition, the raising of the trigger level for entrance intervention would have a positive impact in allowing the coastal wetlands at the northern end of Swan Lake to be inundated for longer periods and return to a more natural regime.
(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions,	Negligible	Swan Lake has been artificially opened at various intervals for a number of decades. The proposal has considered the impact on coastal processes and coastal hazards. As part of reducing impacts on the coastal environment, it is proposed to prevent the lake from breaking out at “The Gap”. Prevention would involve beach scraping to be carried out as an emergency measure if needed to prevent the lake breaking out here, as a breakout could cause

Factor	Assessment of Impact	Reason
		erosion of the banks of the entrance channel and could lead to long term changes in the lake channel morphology. In addition, the raising of the trigger level for entrance intervention would have a positive impact in allowing the coastal wetlands at the northern end of Swan Lake to be inundated for longer periods and return to a more natural regime. Raising of the trigger level also allows the estuary to adapt to sea level rise due to climate change, as the frequency of intervention would otherwise increase in the future if trigger levels were not raised.
(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1,	None	No impact.
(r) other relevant environmental factors.	None	No impact.

10 Environmental Management and Impact Mitigation

It is recommended that mitigation strategies in line with relevant licence and permit conditions are implemented by Council and/or contractors who would undertake work in relation to the management of the Swan Lake entrance and be incorporated into a Construction Environmental Management Plan (CEMP) or similar management document. This plan or document is to outline and describe how identified environmental risks will be minimised and achieve environmental outcomes by providing a structured approach to ensure appropriate mitigation measures and controls will be implemented during construction works and who would be responsible for their implementation. The CEMP must also reflect licence conditions for the operation of the EMP.

The CEMP or similar management document is to include the following mitigation measures:

- Access for construction vehicles is to be via the existing access track through the reserve at the corner of Second Avenue and Koolyn Drive. Alternative vehicle access is available & if required via the beach access track at Sussex Inlet Surf Lifesaving Club and along the beach, approximately 3 km north of the lake entrance.
- Parking of vehicles and storage of plant/equipment will only occur on existing paved or unvegetated areas. Where this is not possible, vehicles and plant/equipment will be kept away from environmentally sensitive areas and outside the dripline of trees.
- All construction equipment will be inspected by qualified personnel prior to the commencement of work to reduce the risk of hydrocarbon spills or leaks. Vehicles, and plant must be properly maintained and regularly inspected for fluid leaks.
- Construction personnel must take all necessary actions to avoid any adverse interactions of equipment with marine and coastal flora and fauna including ceasing excavation works, if required.
- Visual monitoring of local water quality (i.e., turbidity, hydrocarbon spills/slicks) will be undertaken during construction to identify any potential spills or deficient erosion and sediment controls that have been deployed.
- All waste is to be appropriately stored and bunded where necessary to limit and potential for pollutants to enter the waterways.
- All land and ground disturbance activities must avoid the location of AHIMS recorded Aboriginal sites.
- Should a suspected Aboriginal site be identified at any point during construction, the following standard procedures are to be adopted:
    - All works in the area must cease immediately to prevent any further impacts to the site.
    - Council's Project Manager must be notified immediately.
    - A suitably qualified archaeologist is to be engaged immediately to determine the nature, extent and significance of the find and provide the appropriate management advice to Council for review and approval prior to implementation.
    - Archaeologist is to prepare and submit an AHIMS site card for the site.

11 Determination

This REF has been prepared in accordance with the provisions of Section 5.5 of the EP&A Act, taking into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposed activity.

The proposed activity comprises the:

- Prevention of the flooding of assets through long-term modification of some infrastructure, while reducing the need for artificial entrance intervention to improve the resilience of the Lake and its infrastructure to inundation events.
- Monitoring of the entrance, and minor works to enable the raising of intervention levels in the future, with the long-term aim of restoring the lake to a natural hydrologic regime.

Based on the environmental assessment carried out in Section 7 of the REF, the impacts of the proposed activity are considered to be minor. The potential impacts identified can be reasonably mitigated and managed through adoption of best practices and adherence to accepted industry guidelines and standards.

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 mitigation measures identified in the REF (Section 10) 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. The proposed activity is not likely to significantly affect threatened species or ecological communities, or their habitats for the purposes of the NSW *Biodiversity Conservation Act 2016*, and entry into the Biodiversity Offset Scheme or preparation of a Species Impact Statement is not required.
4. The proposed activity is not a 'controlled action' for the purposes of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* and referral to the Commonwealth Minister for the Environment and Water is not required.

Acting Manager, Environmental Services

Shoalhaven City Council Date: 26/02/2025

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Appendix A EPBC Act Protected Matters Report

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: 27-Mar-2024

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:	6
Listed Threatened Species:	93
Listed Migratory Species:	56

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:	3
Commonwealth Heritage Places:	2
Listed Marine Species:	80
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	1
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:	1
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	7
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	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area	In feature area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area	In feature area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In buffer area only
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia			
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area	In feature area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In buffer area only
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In buffer area only
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thinornis cucullatus cucullatus			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area
FISH			
Epinephelus daemelii			
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Hippocampus whitei			
White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Prototroctes maraena			
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
FROG			
Heleioporus australiacus			
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Litoria aurea			
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
Litoria watsoni			
Southern Heath Frog, Watson's Tree Frog [91509]	Endangered	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Chalinolobus dwyeri			
Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat likely to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only
Isoodon obesulus obesulus			
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus trisulcatus			
Long-nosed Potoroo (southern mainland) [86367]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pseudomys novaehollandiae](#) New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
[Caladenia tessellata](#) Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Calochilus pulchellus](#) Pretty Beard Orchid, Pretty Beard-orchid [84677]	Endangered	Species or species habitat may occur within area	In buffer area only
[Corunastylis vernalis listed as Genoplesium vernale](#) East Lynne Midge-orchid [78699]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Cryptostylis hunteriana](#) Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Cynanchum elegans](#) White-flowered Wax Plant [12533]	Endangered	Species or species habitat may occur within area	In buffer area only
[Genoplesium baueri](#) Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat may occur within area	In feature area
[Melaleuca biconvexa](#) Biconvex Paperbark [5583]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Persicaria elatior](#) Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In feature area
[Prasophyllum affine](#) Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area	In feature area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
Triplarina nowraensis Nowra Heath-myrtle [64544]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Hoplocephalus bungaroides Broad-headed Snake [1182]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
SHARK			
Carcharias taurus (east coast population)			
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita			
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Caperea marginata			
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Telstra Corporation Limited		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Australian Telecommunications Commission [12025]	NSW	In buffer area only
Defence		
Defence - SUSSEX INLET - DEFENCE RESERVE [11233]	NSW	In buffer area only
Environment and Heritage		
Commonwealth Land - Booderee National Park [91002]	JBT	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Christians Minde Settlement	ACT	Listed place	In buffer area only
Indigenous			
Jervis Bay Territory	ACT	Listed place	In buffer area only

Listed Marine Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat may occur within area	In buffer area only
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Diomedea antipodensis gibsoni as Diomedea gibsoni](#) Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Stercorarius antarcticus as Catharacta skua			
Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata			
White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons			
Little Tern [82849]		Species or species habitat may occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus			
Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In buffer area only
Thalassarche bulleri			
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche bulleri platei as Thalassarche sp. nov.			
Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita			
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura tentaculata			
Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In buffer area only
Cosmocampus howensis			
Lord Howe Pipefish [66208]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna			
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In buffer area only
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In buffer area only
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In buffer area only
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In buffer area only
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
[Vanacampus phillipi](#) Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Mammal			
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
[Arctocephalus pusillus](#) Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In buffer area only
Reptile			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Commonwealth Reserves Terrestrial			[Resource Information]
Name	State	Type	Buffer Status
Booderee	JBT	National Park (Commonwealth)	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Conjola	National Park	NSW	In feature area
Jervis Bay	Marine Park	NSW	In buffer area only

Regional Forest Agreements		[Resource Information]
RFA Name	State	Buffer Status
Southern RFA	New South Wales	In feature area

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.

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
St Georges Basin	NSW	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV,	2015/7522	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
sthrn two thirds of Australia				
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
Breeding program for Grey Nurse Sharks	2007/3245	Referral Decision	Completed	In buffer area only

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In buffer area only
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Known to occur	In buffer area only
Seabirds			
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging	Likely to occur	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Likely to occur	In buffer area only
Pelagodroma marina White-faced Storm-petrel [1016]	Breeding	Known to occur	In buffer area only
Sharks			
Carcharias taurus Grey Nurse Shark [64469]	Foraging	Known to occur	In buffer area only
Whales			
Megaptera novaeangliae Humpback Whale [38]	Foraging	Known to occur	In buffer area only

Bioregional Assessments [Resource Information]

SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	BA website	In feature area

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

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

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Appendix B BioNet Atlas Data

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -35.14 West: 150.51 East: 150.61 South: -35.24] returned a total of 6,317 records of 838 species.

Report generated on 27/03/2024 10:59 AM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Myobatrachidae	3134	*Crinia signifera*		Common Eastern Froglet	P		50	
Animalia	Amphibia	Myobatrachidae	3103	*Paracrinia haswelli*		Haswell's Froglet	P		13	
Animalia	Amphibia	Myobatrachidae	3117	*Pseudophryne bibronii*		Bibron's Toadlet	P		10	
Animalia	Amphibia	Myobatrachidae	3302	*Uperoleia tyleri*		Tyler's Toadlet	P		5	
Animalia	Amphibia	Limnodynastidae	3058	*Limnodynastes dumerilii*		Eastern Banjo Frog	P		6	
Animalia	Amphibia	Limnodynastidae	3061	*Limnodynastes peronii*		Brown-striped Frog	P		23	
Animalia	Amphibia	Hylidae	3166	*Litoria aurea*		Green and Golden Bell Frog	E1,P	V	24	
Animalia	Amphibia	Hylidae	3180	*Litoria dentata*		Bleating Tree Frog	P		6	
Animalia	Amphibia	Hylidae	3183	*Litoria fallax*		Eastern Dwarf Tree Frog	P		2	
Animalia	Amphibia	Hylidae	3184	*Litoria freycineti*		Freycinet's Frog	P		2	
Animalia	Amphibia	Hylidae	3190	*Litoria jervisiensis*		Jervis Bay Tree Frog	P		7	
Animalia	Amphibia	Hylidae	3204	*Litoria peronii*		Peron's Tree Frog	P		15	
Animalia	Amphibia	Hylidae	3214	*Litoria tyleri*		Tyler's Tree Frog	P		3	
Animalia	Amphibia	Hylidae	3215	*Litoria verreauxii*		Verreaux's Frog	P		11	
Animalia	Reptilia	Cheloniidae	2006	*Natator depressus*		Flatback Turtle	P		2	
Animalia	Reptilia	Chelidae	2017	*Chelodina longicollis*		Eastern Snake-necked Turtle	P		1	
Animalia	Reptilia	Pygopodidae	2174	*Pygopus lepidopodus*		Common Scaly-foot	P		1	
Animalia	Reptilia	Scincidae	2557	*Eulamprus quoyii*		Eastern Water-skink	P		2	
Animalia	Reptilia	Scincidae	2450	*Lampropholis delicata*		Dark-flecked Garden Sunskink	P		14	
Animalia	Reptilia	Scincidae	2451	*Lampropholis guichenoti*		Pale-flecked Garden Sunskink	P		1	
Animalia	Reptilia	Scincidae	2580	*Tiliqua scincoides*		Eastern Blue-tongue	P		9	
Animalia	Reptilia	Scincidae	5056	*Tiliqua scincoides scincoides*			P		1	
Animalia	Reptilia	Agamidae	2194	*Amphibolurus muricatus*		Jacky Lizard	P		2	
Animalia	Reptilia	Agamidae	2252	*Intellagama lesueurii*		Eastern Water Dragon	P		3	
Animalia	Reptilia	Varanidae	9056	*Varanus sp.*		Unidentified Goanna	P		1	
Animalia	Reptilia	Varanidae	2283	*Varanus varius*		Lace Monitor	P		3	
Animalia	Reptilia	Pythonidae	2625	*Morelia spilota*		Carpet & Diamond Pythons	P		3	
Animalia	Reptilia	Pythonidae	5096	*Morelia spilota spilota*		Diamond Python	P		13	
Animalia	Reptilia	Elapidae	2640	*Acanthophis antarcticus*		Common Death Adder	P		3	
Animalia	Reptilia	Elapidae	5136	*Cryptophis nigrescens*		Eastern Small-eyed Snake	P		4	
Animalia	Reptilia	Elapidae	2770	*Hydrophis platurus*		Yellow-bellied Seasnake	P		1	
Animalia	Reptilia	Elapidae	2693	*Pseudechis porphyriacus*		Red-bellied Black Snake	P		30	
Animalia	Reptilia	Elapidae	2699	*Pseudonaja textilis*		Eastern Brown Snake	P		2	
Animalia	Aves	Anatidae	0210	*Anas castanea*		Chestnut Teal	P		3	
Animalia	Aves	Anatidae	0948	*Anas platyrhynchos*	*	Mallard			1	
Animalia	Aves	Anatidae	0208	*Anas superciliosa*		Pacific Black Duck	P		19	
Animalia	Aves	Anatidae	0202	*Chenonetta jubata*		Australian Wood Duck	P		37	
Animalia	Aves	Anatidae	0203	*Cygnus atratus*		Black Swan	P		13	
Animalia	Aves	Columbidae	0028	*Columba leucomela*		White-headed Pigeon	P		1	
Animalia	Aves	Columbidae	0044	*Leucosarcia melanoleuca*		Wonga Pigeon	P		1	
Animalia	Aves	Columbidae	0029	*Macropygia phasianella*		Brown Cuckoo-Dove	P		1	
Animalia	Aves	Columbidae	0043	*Ocyphaps lophotes*		Crested Pigeon	P		12	
Animalia	Aves	Columbidae	0034	*Phaps chalcoptera*		Common Bronzewing	P		3	
Animalia	Aves	Columbidae	0989	*Spilopelia chinensis*	*	Spotted Turtle-Dove			2	
Animalia	Aves	Podargidae	0313	*Podargus strigoides*		Tawny Frogmouth	P		9	
Animalia	Aves	Aegothelidae	0317	*Aegotheles cristatus*		Australian Owlet-nightjar	P		5	
Animalia	Aves	Apodidae	0334	*Hirundapus caudacutus*		White-throated Needletail	P	V,C,J,K	5	
Animalia	Aves	Procellariidae	0069	*Ardenna pacifica*		Wedge-tailed Shearwater	P	J	5	
Animalia	Aves	Procellariidae	0071	*Ardenna tenuirostris*		Short-tailed Shearwater	P	C,J,K	8	
Animalia	Aves	Procellariidae	0929	*Macronectes giganteus*		Southern Giant Petrel	E1,P	E	1	
Animalia	Aves	Procellariidae	0937	*Macronectes halli*		Northern Giant-Petrel	V,P	V	3	
Animalia	Aves	Procellariidae	0077	*Pterodroma lessonii*		White-headed Petrel	P		1	
Animalia	Aves	Spheniscidae	0005	*Eudyptula minor*		Little Penguin	P		6	
Animalia	Aves	Sulidae	0104	*Morus serrator*		Australasian Gannet	P		5	
Animalia	Aves	Phalacrocoracidae	0100	*Microcarbo melanoleucos*		Little Pied Cormorant	P		3	
Animalia	Aves	Phalacrocoracidae	T021	*Phalacrocorax sp.*		Unidentified Cormorant	P		1	
Animalia	Aves	Phalacrocoracidae	0097	*Phalacrocorax sulcirostris*		Little Black Cormorant	P		2	

Animalia	Aves	Phalacrocoracidae	0099	*Phalacrocorax varius*	Pied Cormorant	P		1	
Animalia	Aves	Pelecanidae	0106	*Pelecanus conspicillatus*	Australian Pelican	P		41	
Animalia	Aves	Ardeidae	0977	*Bubulcus ibis*	Cattle Egret	P		1	
Animalia	Aves	Ardeidae	0188	*Egretta novaehollandiae*	White-faced Heron	P		3	
Animalia	Aves	Accipitridae	0222	*Accipiter cirrocephalus*	Collared Sparrowhawk	P		7	
Animalia	Aves	Accipitridae	0220	*Accipiter novaehollandiae*	Grey Goshawk	P		1	
Animalia	Aves	Accipitridae	0224	*Aquila audax*	Wedge-tailed Eagle	P		1	
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		2	
Animalia	Aves	Accipitridae	0228	*Haliastur sphenurus*	Whistling Kite	P		1	
Animalia	Aves	Accipitridae	8739	*^^Pandion cristatus*	Eastern Osprey	V,P,3		3	
Animalia	Aves	Falconidae	0239	*Falco berigora*	Brown Falcon	P		1	
Animalia	Aves	Rallidae	0056	*Gallinula tenebrosa*	Dusky Moorhen	P		1	
Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		9	
Animalia	Aves	Haematopodidae	0130	*Haematopus longirostris*	Pied Oystercatcher	E1,P		10	
Animalia	Aves	Charadriidae	0143	*Charadrius ruficapillus*	Red-capped Plover	P		1	
Animalia	Aves	Charadriidae	0144	*Elseyornis melanops*	Black-fronted Dotterel	P		1	
Animalia	Aves	Charadriidae	T453	*Thinornis cucullatus cucullatus*	Eastern Hooded Dotterel	E4A	V	16	
Animalia	Aves	Charadriidae	0133	*Vanellus miles*	Masked Lapwing	P		30	
Animalia	Aves	Laridae	0125	*Chroicocephalus novaehollandiae*	Silver Gull	P		12	
Animalia	Aves	Laridae	0120	*Onychoprion fuscata*	Sooty Tern	V,P		1	
Animalia	Aves	Laridae	0117	*Sternula albifrons*	Little Tern	E1,P	C,J,K	1	
Animalia	Aves	Laridae	0115	*Thalasseus bergii*	Crested Tern	P	J	4	
Animalia	Aves	Cacatuidae	0269	*Cacatua galerita*	Sulphur-crested Cockatoo	P		5	
Animalia	Aves	Cacatuidae	T187	*Cacatua sp.*		P		1	
Animalia	Aves	Cacatuidae	0268	*^^Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3	E	11	
Animalia	Aves	Cacatuidae	8862	*^Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V,P,2	V	30	
Animalia	Aves	Cacatuidae	0273	*Eolophus roseicapilla*	Galah	P		23	
Animalia	Aves	Cacatuidae	0267	*Zanda funereus*	Yellow-tailed Black-Cockatoo	P		15	
Animalia	Aves	Psittacidae	0281	*Alisterus scapularis*	Australian King-Parrot	P		21	
Animalia	Aves	Psittacidae	0258	*Glossopsitta concinna*	Musk Lorikeet	P		6	
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*	Little Lorikeet	V,P		4	
Animalia	Aves	Psittacidae	0302	*^^Neophema pulchella*	Turquoise Parrot	V,P,3		1	
Animalia	Aves	Psittacidae	0282	*Platycercus elegans*	Crimson Rosella	P		40	
Animalia	Aves	Psittacidae	0288	*Platycercus eximius*	Eastern Rosella	P		4	
Animalia	Aves	Psittacidae	T039	*Platycercus sp.*	Unidentified Rosella	P		12	
Animalia	Aves	Psittacidae	9947	*Trichoglossus haematodus*	Rainbow Lorikeet	P		101	
Animalia	Aves	Cuculidae	0338	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	P		1	
Animalia	Aves	Cuculidae	0347	*Eudynamys orientalis*	Eastern Koel	P		8	
Animalia	Aves	Cuculidae	0337	*Heteroscenes pallidus*	Pallid Cuckoo	P		3	
Animalia	Aves	Cuculidae	0348	*Scythrops novaehollandiae*	Channel-billed Cuckoo	P		4	
Animalia	Aves	Strigidae	9922	*Ninox novaeseelandiae*	Southern Boobook	P		17	
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*	Powerful Owl	V,P,3		12	
Animalia	Aves	Tytonidae	9923	*Tyto javanica*	Eastern Barn Owl	P		1	
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		7	
Animalia	Aves	Tytonidae	9924	*^^Tyto tenebricosa*	Sooty Owl	V,P,3		1	
Animalia	Aves	Alcedinidae	0319	*Ceyx azureus*	Azure Kingfisher	P		5	
Animalia	Aves	Alcedinidae	0322	*Dacelo novaeguineae*	Laughing Kookaburra	P		48	
Animalia	Aves	Alcedinidae	0326	*Todiramphus sanctus*	Sacred Kingfisher	P		9	
Animalia	Aves	Coraciidae	0318	*Eurystomus orientalis*	Dollarbird	P		3	
Animalia	Aves	Menuridae	0350	*Menura novaehollandiae*	Superb Lyrebird	P		1	
Animalia	Aves	Climacteridae	0560	*Climacteris erythrops*	Red-browed Treecreeper	P		4	
Animalia	Aves	Climacteridae	0558	*Cormobates leucophaea*	White-throated Treecreeper	P		10	
Animalia	Aves	Ptilonorhynchidae	0679	*Ptilonorhynchus violaceus*	Satin Bowerbird	P		13	
Animalia	Aves	Maluridae	0529	*Malurus cyaneus*	Superb Fairy-wren	P		11	
Animalia	Aves	Maluridae	0536	*Malurus lamberti*	Variegated Fairy-wren	P		6	
Animalia	Aves	Maluridae	0526	*Stipiturus malachurus*	Southern Emu-wren	P		3	
Animalia	Aves	Dasyornithidae	0519	*^Dasyornis brachypterus*	Eastern Bristlebird	E1,P,2	E	2	
Animalia	Aves	Acanthizidae	0470	*Acanthiza lineata*	Striated Thornbill	P		9	
Animalia	Aves	Acanthizidae	0475	*Acanthiza pusilla*	Brown Thornbill	P		13	
Animalia	Aves	Acanthizidae	0460	*Gerygone levigaster*	Mangrove Gerygone	P		1	
Animalia	Aves	Acanthizidae	0454	*Gerygone mouki*	Brown Gerygone	P		3	
Animalia	Aves	Acanthizidae	0488	*Sericornis frontalis*	White-browed Scrubwren	P		6	
Animalia	Aves	Pardalotidae	0565	*Pardalotus punctatus*	Spotted Pardalote	P		12	
Animalia	Aves	Pardalotidae	0976	*Pardalotus striatus*	Striated Pardalote	P		3	
Animalia	Aves	Meliphagidae	0591	*Acanthorhynchus tenuirostris*	Eastern Spinebill	P		15	

Animalia	Aves	Meliphagidae	0638	*Anthochaera carunculata*		Red Wattlebird	P		21
Animalia	Aves	Meliphagidae	0710	*Anthochaera chrysoptera*		Little Wattlebird	P		6
Animalia	Aves	Meliphagidae	0603	*^Anthochaera phrygia*		Regent Honeyeater	E4A,P,2	CE	1
Animalia	Aves	Meliphagidae	T210	*Anthochaera sp.*		Unidentified Wattlebird	P		6
Animalia	Aves	Meliphagidae	0614	*Caligavis chrysops*		Yellow-faced Honeyeater	P		12
Animalia	Aves	Meliphagidae	0634	*Manorina melanocephala*		Noisy Miner	P		2
Animalia	Aves	Meliphagidae	0633	*Manorina melanophrys*		Bell Miner	P		2
Animalia	Aves	Meliphagidae	0605	*Meliphaga lewinii*		Lewin's Honeyeater	P		4
Animalia	Aves	Meliphagidae	0578	*Melithreptus lunatus*		White-naped Honeyeater	P		2
Animalia	Aves	Meliphagidae	0586	*Myzomela sanguinolenta*		Scarlet Honeyeater	P		5
Animalia	Aves	Meliphagidae	0645	*Philemon corniculatus*		Noisy Friarbird	P		11
Animalia	Aves	Meliphagidae	T908	*Philemon sp.*			P		1
Animalia	Aves	Meliphagidae	0632	*Phylidonyris niger*		White-cheeked Honeyeater	P		1
Animalia	Aves	Meliphagidae	0631	*Phylidonyris novaehollandiae*		New Holland Honeyeater	P		9
Animalia	Aves	Cinclosomatidae	0436	*Cinclosoma punctatum*		Spotted Quail-thrush	P		1
Animalia	Aves	Falcunculidae	0416	*Falcunculus frontatus frontatus*		Eastern Shrike-tit	P		2
Animalia	Aves	Psophodidae	0421	*Psophodes olivaceus*		Eastern Whipbird	P		14
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*		Varied Sittella	V,P		4
Animalia	Aves	Campephagidae	0424	*Coracina novaehollandiae*		Black-faced Cuckoo-shrike	P		8
Animalia	Aves	Pachycephalidae	0408	*Colluricincla harmonica*		Grey Shrike-thrush	P		10
Animalia	Aves	Pachycephalidae	0398	*Pachycephala pectoralis*		Golden Whistler	P		4
Animalia	Aves	Pachycephalidae	0401	*Pachycephala rufiventris*		Rufous Whistler	P		6
Animalia	Aves	Artamidae	T022	*Cracticus sp.*		Unidentified Butcherbird	P		1
Animalia	Aves	Artamidae	0702	*Cracticus torquatus*		Grey Butcherbird	P		10
Animalia	Aves	Artamidae	0705	*Gymnorhina tibicen*		Australian Magpie	P		36
Animalia	Aves	Artamidae	0694	*Strepera graculina*		Pied Currawong	P		13
Animalia	Aves	Artamidae	0697	*Strepera versicolor*		Grey Currawong	P		1
Animalia	Aves	Rhipiduridae	0361	*Rhipidura albiscapa*		Grey Fantail	P		16
Animalia	Aves	Rhipiduridae	0364	*Rhipidura leucophrys*		Willie Wagtail	P		6
Animalia	Aves	Rhipiduridae	0362	*Rhipidura rufifrons*		Rufous Fantail	P		21
Animalia	Aves	Corvidae	0930	*Corvus coronoides*		Australian Raven	P		13
Animalia	Aves	Monarchidae	0415	*Grallina cyanoleuca*		Magpie-lark	P		20
Animalia	Aves	Monarchidae	0366	*Myiagra cyanoleuca*		Satin Flycatcher	P		1
Animalia	Aves	Petroicidae	0392	*Eopsaltria australis*		Eastern Yellow Robin	P		17
Animalia	Aves	Petroicidae	0377	*Microeca fascinans*		Jacky Winter	P		1
Animalia	Aves	Petroicidae	0384	*Petroica rosea*		Rose Robin	P		1
Animalia	Aves	Hirundinidae	0357	*Hirundo neoxena*		Welcome Swallow	P		2
Animalia	Aves	Hirundinidae	0359	*Petrochelidon nigricans*		Tree Martin	P		4
Animalia	Aves	Turdidae	0991	*Turdus merula*	*	Eurasian Blackbird			1
Animalia	Aves	Sturnidae	0998	*Acridotheres tristis*	*	Common Myna			2
Animalia	Aves	Zosteropidae	0574	*Zosterops lateralis*		Silvereye	P		3
Animalia	Aves	Dicaeidae	0564	*Dicaeum hirundinaceum*		Mistletoebird	P		1
Animalia	Aves	Estrildidae	0662	*Neochmia temporalis*		Red-browed Finch	P		2
Animalia	Mammalia	Ornithorhynchidae	1001	*Ornithorhynchus anatinus*		Platypus	P		1
Animalia	Mammalia	Tachyglossidae	1003	*Tachyglossus aculeatus*		Short-beaked Echidna	P		29
Animalia	Mammalia	Dasyuridae	1956	*Antechinus mimetes*		Mainland Dusky Antechinus	P		2
Animalia	Mammalia	Dasyuridae	T093	*Antechinus sp.*		Unidentified Antechinus	P		3
Animalia	Mammalia	Dasyuridae	1674	*Antechinus stuartii*		Brown Antechinus	P		30
Animalia	Mammalia	Dasyuridae	T105	*Dasyuridae sp.*		unidentified dasyurid	P		18
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*		Spotted-tailed Quoll	V,P	E	2
Animalia	Mammalia	Dasyuridae	1069	*Sminthopsis leucopus*		White-footed Dunnart	V,P		1
Animalia	Mammalia	Peramelidae	T081	*Isoodon/Perameles sp.*		unidentified Bandicoot	P		1
Animalia	Mammalia	Peramelidae	1097	*Perameles nasuta*		Long-nosed Bandicoot	P		47
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	E1,P	E	1
Animalia	Mammalia	Vombatidae	1165	*Vombatus ursinus*		Bare-nosed Wombat	P		48
Animalia	Mammalia	Burramyidae	1150	*Cercartetus nanus*		Eastern Pygmy-possum	V,P		2
Animalia	Mammalia	Petauridae	1136	*Petaurus australis*		Yellow-bellied Glider	V,P	V	17
Animalia	Mammalia	Petauridae	1138	*Petaurus breviceps*		Sugar Glider	P		53
Animalia	Mammalia	Petauridae	1751	*Petaurus breviceps breviceps*			P		2
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider	V,P		1
Animalia	Mammalia	Pseudocheiridae	1133	*Petauroides volans*		Southern Greater Glider	E1,P	E	18
Animalia	Mammalia	Pseudocheiridae	1129	*Pseudocheirus peregrinus*		Common Ringtail Possum	P		45
Animalia	Mammalia	Acrobatidae	1147	*Acrobates pygmaeus*		Feathertail Glider	P		5

Animalia	Mammalia	Phalangeridae	T082	*Trichosurus sp.*		brushtail possum	P	21	
Animalia	Mammalia	Phalangeridae	1113	*Trichosurus vulpecula*		Common Brushtail Possum	P	77	
Animalia	Mammalia	Macropodidae	T108	*Macropod sp.*		unidentified macropod	P	1	
Animalia	Mammalia	Macropodidae	1265	*Macropus giganteus*		Eastern Grey Kangaroo	P	271	
Animalia	Mammalia	Macropodidae	T085	*Macropus sp.*		kangaroo / wallaby	P	115	
Animalia	Mammalia	Macropodidae	1261	*Notamacropus rufogriseus*		Red-necked Wallaby	P	2	
Animalia	Mammalia	Macropodidae	1789	*Notamacropus rufogriseus banksianus*			P	1	
Animalia	Mammalia	Macropodidae	1242	*Wallabia bicolor*		Swamp Wallaby	P	1299	
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V 30	
Animalia	Mammalia	Pteropodidae	T087	*Pteropus sp.*		Flying-fox	P	2	
Animalia	Mammalia	Rhinolophidae	1303	*Rhinolophus megaphyllus*		Eastern Horseshoe-bat	P	1	
Animalia	Mammalia	Molossidae	1324	*Austronomus australis*		White-striped Freetail-bat	P	4	
Animalia	Mammalia	Molossidae	1329	*Micronomus norfolkensis*		Eastern Coastal Free-tailed Bat	V,P	5	
Animalia	Mammalia	Molossidae	1938	*Ozimops ridei*		Eastern Free-tailed Bat	P	2	
Animalia	Mammalia	Vespertilionidae	1349	*Chalinolobus gouldii*		Gould's Wattled Bat	P	7	
Animalia	Mammalia	Vespertilionidae	1351	*Chalinolobus morio*		Chocolate Wattled Bat	P	34	
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*		Eastern False Pipistrelle	V,P	3	
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*		Southern Myotis	V,P	2	
Animalia	Mammalia	Vespertilionidae	1335	*Nyctophilus geoffroyi*		Lesser Long-eared Bat	P	1	
Animalia	Mammalia	Vespertilionidae	1334	*Nyctophilus gouldi*		Gould's Long-eared Bat	P	9	
Animalia	Mammalia	Vespertilionidae	T092	*Nyctophilus sp.*		long-eared bat	P	2	
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*		Greater Broad-nosed Bat	V,P	4	
Animalia	Mammalia	Vespertilionidae	1365	*Scotorepens orion*		Eastern Broad-nosed Bat	P	1	
Animalia	Mammalia	Vespertilionidae	1022	*Vespadelus darlingtoni*		Large Forest Bat	P	11	
Animalia	Mammalia	Vespertilionidae	1378	*Vespadelus regulus*		Southern Forest Bat	P	2	
Animalia	Mammalia	Vespertilionidae	1379	*Vespadelus vulturnus*		Little Forest Bat	P	61	
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*		Large Bent-winged Bat	V,P	5	
Animalia	Mammalia	Muridae	1395	*Rattus fuscipes*		Bush Rat	P	33	
Animalia	Mammalia	Muridae	1398	*Rattus lutreolus*		Swamp Rat	P	2	
Animalia	Mammalia	Muridae	T094	*Rattus sp.*		rat	P	89	
Animalia	Mammalia	Otariidae	T099	*Arctocephalus sp.*		Unidentified Fur-seal	P	4	
Animalia	Mammalia	Otariidae	9040	*Seal sp.*		Unidentified Seal	P	11	
Animalia	Mammalia	Canidae	1905	*Canis familiaris*	*	Dog		2	
Animalia	Mammalia	Canidae	1532	*Vulpes vulpes*	*	Fox		15	
Animalia	Mammalia	Felidae	1536	*Felis catus*	*	Cat		17	
Animalia	Mammalia	Leporidae	1510	*Oryctolagus cuniculus*	*	Rabbit		3	
Animalia	Mammalia	Equidae	1512	*Equus caballus*	*	Horse		1	
Animalia	Mammalia	Balaenidae	1561	*Eubalaena australis*		Southern Right Whale	E1,P	E 1	
Animalia	Mammalia	Balaenopteridae	1575	*Megaptera novaeangliae*		Humpback Whale	P	1	
Animalia	Mammalia	Delphinidae	1616	*Delphinus delphis*		Common Dolphin	P	3	
Animalia	Mammalia	Delphinidae	9039	*Dolphin sp.*		Unidentified Dolphin	P	2	
Animalia	Unknown	Unknown Fauna	T350	*Fauna sp.*		Unidentified Fauna		17	
Animalia	Unknown	Unknown Fauna	9114	*Insect sp.*		Insect Remains		1	
Plantae	Flora	Acanthaceae	10427	*Avicennia marina subsp. australasica*		Grey Mangrove		5	
Plantae	Flora	Acanthaceae	1004	*Brunoniella pumilio*		Dwarf Blue Trumpet		9	
Plantae	Flora	Acanthaceae	1010	*Pseuderanthemum variabile*		Pastel Flower		3	
Plantae	Flora	Aizoaceae	1025	*Carpobrotus glaucescens*		Pigface		2	
Plantae	Flora	Aizoaceae	11185	*Tetragonia tetragonioides*		New Zealand Spinach		2	
Plantae	Flora	Amaryllidaceae	3539	*Crinum pedunculatum*		Swamp Lily		1	
Plantae	Flora	Anthericaceae	3535	*Caesia parviflora*		Pale Grass-lily		1	
Plantae	Flora	Anthericaceae	7183	*Caesia parviflora var. parviflora*				2	
Plantae	Flora	Anthericaceae	3572	*Thysanotus juncifolius*				2	
Plantae	Flora	Anthericaceae	3574	*Thysanotus tuberosus*		Common Fringe-lily		1	
Plantae	Flora	Anthericaceae	6427	*Thysanotus tuberosus subsp. tuberosus*				2	
Plantae	Flora	Aphanopetalaceae	2266	*Aphanopetalum resinosum*		Gum Vine		1	
Plantae	Flora	Apiaceae	1094	*Actinotus helianthi*		Flannel Flower	P	1	

Plantae	Flora	Apiaceae	1095	*Actinotus minor*		Lesser Flannel Flower		10
Plantae	Flora	Apiaceae	1104	*Apium prostratum*		Sea Celery		1
Plantae	Flora	Apiaceae	11824	*Apium prostratum var. prostratum*				1
Plantae	Flora	Apiaceae	1106	*Centella asiatica*		Indian Pennywort		2
Plantae	Flora	Apiaceae	1108	*Daucus carota*	*	Wild Carrot		1
Plantae	Flora	Apiaceae	1123	*Hydrocotyle bonariensis*	*			7
Plantae	Flora	Apiaceae	1126	*Hydrocotyle geraniifolia*		Forest Pennywort		4
Plantae	Flora	Apiaceae	1128	*Hydrocotyle laxiflora*		Stinking Pennywort		4
Plantae	Flora	Apiaceae	7961	*Hydrocotyle sibthorpioides*				4
Plantae	Flora	Apiaceae	1144	*Platysace lanceolata*		Shrubby Platysace		7
Plantae	Flora	Apiaceae	1162	*Xanthosia pilosa*		Woolly Xanthosia		3
Plantae	Flora	Apiaceae	1163	*Xanthosia tridentata*		Rock Xanthosia		8
Plantae	Flora	Apocynaceae	1234	*Marsdenia rostrata*		Milk Vine		15
Plantae	Flora	Apocynaceae	1235	*Marsdenia suaveolens*		Scented Marsdenia		1
Plantae	Flora	Apocynaceae	1185	*Parsonsia straminea*		Common Silkpod		6
Plantae	Flora	Apocynaceae	1240	*Tylophora barbata*		Bearded Tylophora		4
Plantae	Flora	Araceae	1195	*Gymnostachys anceps*		Settler's Twine		1
Plantae	Flora	Araliaceae	1202	*Astrotricha latifolia*				2
Plantae	Flora	Araliaceae	1204	*Astrotricha linearis*				1
Plantae	Flora	Araliaceae	12476	*Astrotricha sp. B*				2
Plantae	Flora	Araliaceae	1211	*Polyscias sambucifolia*		Elderberry Panax		1
Plantae	Flora	Araliaceae	7794	*Trachymene composita*				1
Plantae	Flora	Arecaceae	1221	*Livistona australis*		Cabbage Palm	P	6
Plantae	Flora	Asparagaceae	11784	*Asparagus aethiopicus*	*	Asparagus Fern		6
Plantae	Flora	Asparagaceae	11785	*Asparagus plumosus*	*	Climbing Asparagus Fern		1
Plantae	Flora	Asphodelaceae	3540	*Dianella caerulea*		Blue Flax-lily		7
Plantae	Flora	Asphodelaceae	6811	*Dianella caerulea var. assera*				3
Plantae	Flora	Asphodelaceae	6700	*Dianella caerulea var. caerulea*				9
Plantae	Flora	Asphodelaceae	7337	*Dianella caerulea var. producta*				4
Plantae	Flora	Asphodelaceae	7865	*Dianella crinoides*				1
Plantae	Flora	Asphodelaceae	3542	*Dianella revoluta*		Blueberry Lily		1
Plantae	Flora	Asteraceae	13920	*Actites megalocarpus*		Dune Thistle		1
Plantae	Flora	Asteraceae	1258	*Ageratum houstonianum*	*			1
Plantae	Flora	Asteraceae	1283	*Bidens pilosa*	*	Cobbler's Pegs		3
Plantae	Flora	Asteraceae	7348	*Brachyscome angustifolia*				1
Plantae	Flora	Asteraceae	6891	*Brachyscome graminea*				1
Plantae	Flora	Asteraceae	14360	*Centipeda minima subsp. minima*		spreading sneezeweed		1
Plantae	Flora	Asteraceae	1392	*Chrysanthemoides monilifera*	*			1
Plantae	Flora	Asteraceae	9400	*Chrysanthemoides monilifera subsp. monilifera*	*	Boneseed		6
Plantae	Flora	Asteraceae	8686	*Chrysanthemoides monilifera subsp. rotundata*	*	Bitou Bush		2
Plantae	Flora	Asteraceae	1400	*Cirsium vulgare*	*	Spear Thistle		2
Plantae	Flora	Asteraceae	1404	*Conyza bonariensis*	*	Flaxleaf Fleabane		5
Plantae	Flora	Asteraceae	CONY	*Conyza spp.*	*			2
Plantae	Flora	Asteraceae	10442	*Conyza sumatrensis*	*	Tall fleabane		1
Plantae	Flora	Asteraceae	13745	*Coronidium elatum*				2
Plantae	Flora	Asteraceae	13959	*Coronidium elatum subsp. elatum*				1
Plantae	Flora	Asteraceae	15365	*Cyanthillium cinereum var. cinereum*	*			1
Plantae	Flora	Asteraceae	EUCH	*Euchiton spp.*				1
Plantae	Flora	Asteraceae	12748	*Gamochaeta purpurea*	*	Purple Cudweed		1
Plantae	Flora	Asteraceae	11722	*Gamochaeta spp.*	*			1
Plantae	Flora	Asteraceae	1540	*Hypochaeris glabra*	*	Smooth Catsear		1
Plantae	Flora	Asteraceae	8788	*Hypochaeris radicata*	*	Catsear		7
Plantae	Flora	Asteraceae	1551	*Lagenifera stipitata*		Blue Bottle-daisy		2
Plantae	Flora	Asteraceae	11959	*Lagenophora gracilis*		Slender Lagenophora		4
Plantae	Flora	Asteraceae	11960	*Lagenophora stipitata*		Common Lagenophora		1
Plantae	Flora	Asteraceae	1582	*Olearia axillaris*		Coast Daisy-bush		2
Plantae	Flora	Asteraceae	10178	*Onopordum illyricum subsp. illyricum*	*	Illyrian Thistle		1
Plantae	Flora	Asteraceae	8557	*Ozothamnus diosmifolius*		White Dogwood		2
Plantae	Flora	Asteraceae	1667	*Senecio linearifolius*		Fireweed Groundsel		2
Plantae	Flora	Asteraceae	12804	*Senecio linearifolius var. arachnoideus*				1
Plantae	Flora	Asteraceae	6465	*Senecio madagascariensis*	*	Fireweed		1

Plantae	Flora	Asteraceae	12811	*Senecio pinnatifolius var. pinnatifolius*					4
Plantae	Flora	Asteraceae	8789	*Sigesbeckia orientalis subsp. orientalis*			Indian Weed		1
Plantae	Flora	Asteraceae	1689	*Sonchus asper*	*		Prickly Sowthistle		1
Plantae	Flora	Asteraceae	1690	*Sonchus oleraceus*	*		Common Sowthistle		3
Plantae	Flora	Asteraceae	1698	*Taraxacum officinale*	*		Dandelion		4
Plantae	Flora	Basellaceae	1733	*Anredera cordifolia*	*		Madeira Vine		1
Plantae	Flora	Bignoniaceae	1740	*Pandorea pandorana*			Wonga Wonga Vine		1
Plantae	Flora	Blandfordiaceae	3529	*Blandfordia nobilis*			Christmas Bells	P	1
Plantae	Flora	Blechnaceae	8052	*Blechnum cartilagineum*			Gristle Fern		2
Plantae	Flora	Blechnaceae	14900	*Blechnum neohollandicum*					2
Plantae	Flora	Blechnaceae	8058	*Blechnum nudum*			Fishbone Water Fern		1
Plantae	Flora	Brassicaceae	1791	*Cakile edentula*	*		American Sea Rocket		1
Plantae	Flora	Campanulaceae	10465	*Lobelia anceps*					7
Plantae	Flora	Campanulaceae	7072	*Lobelia dentata*					1
Plantae	Flora	Campanulaceae	14415	*Lobelia purpurascens*			whiteroot		5
Plantae	Flora	Campanulaceae	LOBE	*Lobelia spp.*					1
Plantae	Flora	Campanulaceae	1934	*Wahlenbergia gracilis*			Sprawling Bluebell		3
Plantae	Flora	Campanulaceae	WAHL	*Wahlenbergia spp.*			Bluebell		1
Plantae	Flora	Caprifoliaceae	1952	*Lonicera japonica*	*		Japanese Honeysuckle		1
Plantae	Flora	Casuarinaceae	2012	*Allocasuarina littoralis*			Black She-Oak		18
Plantae	Flora	Casuarinaceae	2015	*Allocasuarina paludosa*					3
Plantae	Flora	Casuarinaceae	2022	*Casuarina glauca*			Swamp Oak		12
Plantae	Flora	Celastraceae	12523	*Elaeodendron australe var. australe*					4
Plantae	Flora	Chenopodiaceae	2046	*Atriplex australasica*					2
Plantae	Flora	Chenopodiaceae	1000	*Atriplex cinerea*			Grey Saltbush		1
Plantae	Flora	Chenopodiaceae	9614	*Atriplex prostrata*	*				2
Plantae	Flora	Chenopodiaceae	2110	*Einadia hastata*			Berry Saltbush		1
Plantae	Flora	Chenopodiaceae	7808	*Rhagodia candolleana subsp. candolleana*					1
Plantae	Flora	Chenopodiaceae	9423	*Sarcocornia quinqueflora subsp. quinqueflora*					2
Plantae	Flora	Chenopodiaceae	2200	*Suaeda australis*					2
Plantae	Flora	Clusiaceae	7240	*Hypericum gramineum*			Small St John's Wort		2
Plantae	Flora	Clusiaceae	2203	*Hypericum japonicum*					1
Plantae	Flora	Colchicaceae	3533	*Burchardia umbellata*			Milkmaids		4
Plantae	Flora	Commelinaceae	2209	*Commelina cyanea*			Native Wandering Jew		6
Plantae	Flora	Commelinaceae	10508	*Tradescantia fluminensis*	*		Wandering Jew		1
Plantae	Flora	Convolvulaceae	12231	*Calystegia sepium subsp. roseata*					1
Plantae	Flora	Convolvulaceae	2220	*Convolvulus erubescens*			Pink Bindweed		2
Plantae	Flora	Convolvulaceae	2222	*Dichondra repens*			Kidney Weed		9
Plantae	Flora	Convolvulaceae	2231	*Polymeria calycina*					2
Plantae	Flora	Convolvulaceae	2234	*Wilsonia backhousei*			Narrow-leafed Wilsonia	V	3
Plantae	Flora	Crassulaceae	8813	*Bryophyllum delagoense*	*		Mother of millions		1
Plantae	Flora	Cunoniaceae	2268	*Bauera rubioides*			River Rose		5
Plantae	Flora	Cunoniaceae	2270	*Callicoma serratifolia*			Black Wattle		2
Plantae	Flora	Cunoniaceae	2272	*Ceratopetalum gummiferum*			Christmas Bush		1
Plantae	Flora	Cyatheaceae	8074	*Cyathea australis*			Rough Treefern	P	1
Plantae	Flora	Cyperaceae	2335	*Carex pumila*					1
Plantae	Flora	Cyperaceae	CARE	*Carex spp.*					1
Plantae	Flora	Cyperaceae	2341	*Caustis flexuosa*			Curly Wig	P	15
Plantae	Flora	Cyperaceae	2345	*Chorizandra sphaerocephala*			Roundhead Bristle-sedge		1
Plantae	Flora	Cyperaceae	2347	*Cyathochaeta diandra*					7
Plantae	Flora	Cyperaceae	2353	*Cyperus brevifolius*	*				2
Plantae	Flora	Cyperaceae	2358	*Cyperus congestus*	*				1
Plantae	Flora	Cyperaceae	9144	*Cyperus eglobosus*					3
Plantae	Flora	Cyperaceae	2379	*Cyperus laevigatus*					1
Plantae	Flora	Cyperaceae	8483	*Cyperus polystachyos*					1
Plantae	Flora	Cyperaceae	2395	*Cyperus sanguinolentus*					1
Plantae	Flora	Cyperaceae	2403	*Cyperus tetraphyllus*					1
Plantae	Flora	Cyperaceae	2408	*Eleocharis acuta*					1

Plantae	Flora	Cyperaceae	2413	*Eleocharis equisetina*				1
Plantae	Flora	Cyperaceae	12416	*Ficinia nodosa*		Knobby Club-rush		5
Plantae	Flora	Cyperaceae	2431	*Gahnia aspera*		Rough Saw-sedge		1
Plantae	Flora	Cyperaceae	2432	*Gahnia clarkei*		Tall Saw-sedge		9
Plantae	Flora	Cyperaceae	2439	*Gahnia melanocarpa*		Black Fruit Saw-sedge		3
Plantae	Flora	Cyperaceae	2441	*Gahnia radula*				2
Plantae	Flora	Cyperaceae	2442	*Gahnia sieberiana*		Red-fruit Saw-sedge	P	5
Plantae	Flora	Cyperaceae	GAHN	*Gahnia spp.*				1
Plantae	Flora	Cyperaceae	2448	*Isolepis cernua*		Nodding Club-rush		1
Plantae	Flora	Cyperaceae	8380	*Lepidosperma concavum*				2
Plantae	Flora	Cyperaceae	2465	*Lepidosperma filiforme*				2
Plantae	Flora	Cyperaceae	8749	*Lepidosperma gunnii*				1
Plantae	Flora	Cyperaceae	6402	*Lepidosperma laterale*		Variable Sword-sedge		18
Plantae	Flora	Cyperaceae	2469	*Lepidosperma limicola*				1
Plantae	Flora	Cyperaceae	2471	*Lepidosperma neesii*				3
Plantae	Flora	Cyperaceae	2472	*Lepidosperma quadrangulatum*				2
Plantae	Flora	Cyperaceae	LEPD	*Lepidosperma spp.*				2
Plantae	Flora	Cyperaceae	2475	*Lepidosperma urophorum*				1
Plantae	Flora	Cyperaceae	15320	*Machaerina articulata*		Jointed Twig-rush		1
Plantae	Flora	Cyperaceae	15323	*Machaerina juncea*		Bare Twig-rush		9
Plantae	Flora	Cyperaceae	15327	*Machaerina rubiginosa*				3
Plantae	Flora	Cyperaceae	15329	*Machaerina tetragona*				1
Plantae	Flora	Cyperaceae	8956	*Ptilothrix deusta*				6
Plantae	Flora	Cyperaceae	11946	*Schoenoplectus subulatus*				1
Plantae	Flora	Cyperaceae	2491	*Schoenus apogon*		Fluke Bogrush		3
Plantae	Flora	Cyperaceae	2492	*Schoenus brevifolius*				2
Plantae	Flora	Cyperaceae	9057	*Schoenus lepidosperma subsp. pachylepis*				1
Plantae	Flora	Cyperaceae	2500	*Schoenus melanostachys*				2
Plantae	Flora	Cyperaceae	2502	*Schoenus nitens*				1
Plantae	Flora	Cyperaceae	SCHN	*Schoenus spp.*				1
Plantae	Flora	Cyperaceae	2518	*Tricostularia pauciflora*				1
Plantae	Flora	Dennstaedtiaceae	7385	*Hypolepis glandulifera*		Downy Ground Fern		1
Plantae	Flora	Dennstaedtiaceae	7749	*Hypolepis muelleri*		Harsh Ground Fern		2
Plantae	Flora	Dennstaedtiaceae	6403	*Pteridium esculentum*		Bracken		31
Plantae	Flora	Dicksoniaceae	8341	*Calochlaena dubia*		Rainbow Fern		6
Plantae	Flora	Dilleniaceae	2527	*Hibbertia aspera*		Rough Guinea Flower		7
Plantae	Flora	Dilleniaceae	2532	*Hibbertia dentata*		Twining Guinea Flower		5
Plantae	Flora	Dilleniaceae	10863	*Hibbertia empetrifolia subsp. empetrifolia*				3
Plantae	Flora	Dilleniaceae	2539	*Hibbertia linearis*				10
Plantae	Flora	Dilleniaceae	2545	*Hibbertia riparia*				11
Plantae	Flora	Dilleniaceae	2548	*Hibbertia scandens*		Climbing Guinea Flower		14
Plantae	Flora	Droseraceae	2556	*Drosera auriculata*				1
Plantae	Flora	Droseraceae	2559	*Drosera peltata*				3
Plantae	Flora	Droseraceae	2561	*Drosera spatulata*				2
Plantae	Flora	Dryopteridaceae	11102	*Lastreopsis microsora subsp. microsora*		Creeping Shield Fern		1
Plantae	Flora	Elaeocarpaceae	2574	*Elaeocarpus reticulatus*		Blueberry Ash		9
Plantae	Flora	Elaeocarpaceae	6214	*Tetratheca thymifolia*		Black-eyed Susan		4
Plantae	Flora	Ericaceae	2581	*Acrotriche divaricata*				1
Plantae	Flora	Ericaceae	2599	*Epacris microphylla*		Coral Heath		5
Plantae	Flora	Ericaceae	2602	*Epacris obtusifolia*		Blunt-leaf Heath		2
Plantae	Flora	Ericaceae	2605	*Epacris pulchella*		Wallum Heath		15
Plantae	Flora	Ericaceae	2616	*Leucopogon ericoides*		Pink Beard-heath		3
Plantae	Flora	Ericaceae	2617	*Leucopogon esquamatus*				3
Plantae	Flora	Ericaceae	2623	*Leucopogon juniperinus*		Prickly Beard-heath		2
Plantae	Flora	Ericaceae	2624	*Leucopogon lanceolatus*				2
Plantae	Flora	Ericaceae	6425	*Leucopogon lanceolatus var. lanceolatus*				3
Plantae	Flora	Ericaceae	2632	*Leucopogon parviflorus*		Coastal Beard-heath		8
Plantae	Flora	Ericaceae	2647	*Monotoca elliptica*		Tree Broom-heath		10
Plantae	Flora	Ericaceae	2649	*Monotoca scoparia*				1
Plantae	Flora	Ericaceae	2654	*Sprengelia incarnata*		Pink Swamp Heath	P	4
Plantae	Flora	Ericaceae	12951	*Styphelia triflora subsp. group A*				1
Plantae	Flora	Euphorbiaceae	2677	*Amperea xiphoclada*				1
Plantae	Flora	Euphorbiaceae	9713	*Amperea xiphoclada var. xiphoclada*				4
Plantae	Flora	Euphorbiaceae	2698	*Claoxylon australe*		Brittlewood		4
Plantae	Flora	Euphorbiaceae	9899	*Euphorbia paralias*	*	Sea Spurge		2

Plantae	Flora	Euphorbiaceae	11947	*Homalanthus populifolius*			3
Plantae	Flora	Eupomatiaceae	2768	*Eupomatia laurina*		Bolwarra	1
Plantae	Flora	Fabaceae (Caesalpinioideae)	7377	*Senna pendula var. glabrata*	*		5
Plantae	Flora	Fabaceae (Caesalpinioideae)	10505	*Senna septemtrionalis*	*	Arsenic Bush	3
Plantae	Flora	Fabaceae (Caesalpinioideae)	SENN	*Senna spp.*			1
Plantae	Flora	Fabaceae (Faboideae)	8364	*Almaleea paludosa*			1
Plantae	Flora	Fabaceae (Faboideae)	2770	*Aotus ericoides*			2
Plantae	Flora	Fabaceae (Faboideae)	2778	*Bossiaea ensata*		Sword Bossiaea	1
Plantae	Flora	Fabaceae (Faboideae)	2780	*Bossiaea heterophylla*		Variable Bossiaea	9
Plantae	Flora	Fabaceae (Faboideae)	2784	*Bossiaea obcordata*		Spiny Bossiaea	5
Plantae	Flora	Fabaceae (Faboideae)	2786	*Bossiaea prostrata*			1
Plantae	Flora	Fabaceae (Faboideae)	2827	*Daviesia ulicifolia*		Gorse Bitter Pea	3
Plantae	Flora	Fabaceae (Faboideae)	2850	*Dillwynia retorta*			2
Plantae	Flora	Fabaceae (Faboideae)	DILL	*Dillwynia spp.*			1
Plantae	Flora	Fabaceae (Faboideae)	8689	*Erythrina x sykesii*	*	Coral tree	1
Plantae	Flora	Fabaceae (Faboideae)	2860	*Glycine clandestina*		Twining glycine	15
Plantae	Flora	Fabaceae (Faboideae)	7208	*Glycine microphylla*		Small-leaf Glycine	1
Plantae	Flora	Fabaceae (Faboideae)	2861	*Glycine tabacina*		Variable Glycine	1
Plantae	Flora	Fabaceae (Faboideae)	2864	*Gompholobium glabratum*		Dainty Wedge Pea	3
Plantae	Flora	Fabaceae (Faboideae)	2866	*Gompholobium latifolium*		Golden Glory Pea	9
Plantae	Flora	Fabaceae (Faboideae)	2868	*Gompholobium pinnatum*		Pinnate Wedge Pea	3
Plantae	Flora	Fabaceae (Faboideae)	15314	*Grona varians*			4
Plantae	Flora	Fabaceae (Faboideae)	2873	*Hardenbergia violacea*		False Sarsaparilla	13
Plantae	Flora	Fabaceae (Faboideae)	2876	*Hovea linearis*			1
Plantae	Flora	Fabaceae (Faboideae)	2882	*Indigofera australis*		Australian Indigo	3
Plantae	Flora	Fabaceae (Faboideae)	2896	*Kennedia prostrata*		Running Postman	2
Plantae	Flora	Fabaceae (Faboideae)	2898	*Kennedia rubicunda*		Dusky Coral Pea	7
Plantae	Flora	Fabaceae (Faboideae)	15369	*Maekawaea rhytidophylla*			2
Plantae	Flora	Fabaceae (Faboideae)	2938	*Mirbelia rubiifolia*		Heathy Mirbelia	11
Plantae	Flora	Fabaceae (Faboideae)	15128	*Oxytes brachypoda*		Large Tick-trefoil	1
Plantae	Flora	Fabaceae (Faboideae)	2958	*Phyllota phylicoides*		Heath Phyllota	2
Plantae	Flora	Fabaceae (Faboideae)	2961	*Platylobium formosum*			11
Plantae	Flora	Fabaceae (Faboideae)	9354	*Platylobium formosum subsp. formosum*			1
Plantae	Flora	Fabaceae (Faboideae)	14702	*Platylobium parviflorum*		Small-flowered Flat-pea	6
Plantae	Flora	Fabaceae (Faboideae)	9912	*Podolobium ilicifolium*		Prickly Shaggy Pea	6
Plantae	Flora	Fabaceae (Faboideae)	15315	*Pullenia gunnii*			4
Plantae	Flora	Fabaceae (Faboideae)	2977	*Pultenaea blakelyi*			1
Plantae	Flora	Fabaceae (Faboideae)	2983	*Pultenaea capitellata*			1
Plantae	Flora	Fabaceae (Faboideae)	2985	*Pultenaea daphnoides*		Large-leaf Bush-pea	4
Plantae	Flora	Fabaceae (Faboideae)	3002	*Pultenaea linophylla*			7
Plantae	Flora	Fabaceae (Faboideae)	3011	*Pultenaea polifolia*		Dusky Bush-pea	1
Plantae	Flora	Fabaceae (Faboideae)	3014	*Pultenaea retusa*			4

Plantae	Flora	Fabaceae (Faboideae)	3015	*Pultenaea rosmarinifolia*				3
Plantae	Flora	Fabaceae (Faboideae)	3022	*Pultenaea villifera*				2
Plantae	Flora	Fabaceae (Faboideae)	3023	*Pultenaea villosa*		Hairy Bush-pea		1
Plantae	Flora	Fabaceae (Faboideae)	9223	*Sphaerolobium minus*				1
Plantae	Flora	Fabaceae (Faboideae)	3033	*Sphaerolobium vimineum*				2
Plantae	Flora	Fabaceae (Faboideae)	3084	*Trifolium pratense*	*	Red Clover		1
Plantae	Flora	Fabaceae (Faboideae)	3085	*Trifolium repens*	*	White Clover		1
Plantae	Flora	Fabaceae (Faboideae)	3105	*Viminaria juncea*		Native Broom		1
Plantae	Flora	Fabaceae (Mimosoideae)	3710	*Acacia baileyana*		Cootamundra Wattle		1
Plantae	Flora	Fabaceae (Mimosoideae)	3716	*Acacia binervata*		Two-veined Hickory		4
Plantae	Flora	Fabaceae (Mimosoideae)	3723	*Acacia brownii*		Heath Wattle		1
Plantae	Flora	Fabaceae (Mimosoideae)	3769	*Acacia elongata*		Swamp Wattle		2
Plantae	Flora	Fabaceae (Mimosoideae)	3771	*Acacia falcata*				2
Plantae	Flora	Fabaceae (Mimosoideae)	3792	*Acacia implexa*		Hickory Wattle		4
Plantae	Flora	Fabaceae (Mimosoideae)	6472	*Acacia irrorata subsp. irrorata*		Green Wattle		2
Plantae	Flora	Fabaceae (Mimosoideae)	3814	*Acacia linifolia*		White Wattle		2
Plantae	Flora	Fabaceae (Mimosoideae)	3816	*Acacia longifolia*				25
Plantae	Flora	Fabaceae (Mimosoideae)	10790	*Acacia longifolia subsp. longifolia*		Sydney Golden Wattle		4
Plantae	Flora	Fabaceae (Mimosoideae)	10791	*Acacia longifolia subsp. sophorae*		Coastal Wattle		5
Plantae	Flora	Fabaceae (Mimosoideae)	3817	*Acacia longissima*		Long-leaf Wattle		1
Plantae	Flora	Fabaceae (Mimosoideae)	7028	*Acacia mabellae*		Mabel's Wattle		2
Plantae	Flora	Fabaceae (Mimosoideae)	3821	*Acacia maidenii*		Maiden's Wattle		9
Plantae	Flora	Fabaceae (Mimosoideae)	3823	*Acacia mearnsii*		Black Wattle		4
Plantae	Flora	Fabaceae (Mimosoideae)	3834	*Acacia myrtifolia*		Red-stemmed Wattle		7
Plantae	Flora	Fabaceae (Mimosoideae)	3839	*Acacia obtusifolia*				7
Plantae	Flora	Fabaceae (Mimosoideae)	3873	*Acacia saligna*	*	Golden Wreath Wattle		1
Plantae	Flora	Fabaceae (Mimosoideae)	ACAC	*Acacia spp.*		Wattle		1
Plantae	Flora	Fabaceae (Mimosoideae)	3880	*Acacia stricta*		Straight Wattle		2
Plantae	Flora	Fabaceae (Mimosoideae)	3881	*Acacia suaveolens*		Sweet Wattle		19
Plantae	Flora	Fabaceae (Mimosoideae)	3885	*Acacia terminalis*		Sunshine Wattle		16
Plantae	Flora	Fabaceae (Mimosoideae)	10793	*Acacia terminalis subsp. angustifolia*				1
Plantae	Flora	Fabaceae (Mimosoideae)	3893	*Acacia ulicifolia*		Prickly Moses		28
Plantae	Flora	Gentianaceae	3131	*Centaurium erythraea*	*	Common Centaury		1
Plantae	Flora	Gentianaceae	CENA	*Centaurium spp.*	*			1
Plantae	Flora	Gentianaceae	3133	*Centaurium tenuiflorum*	*	Branched Centaury, Slender centaury		2
Plantae	Flora	Geraniaceae	3148	*Geranium homeanum*				1
Plantae	Flora	Geraniaceae	7107	*Geranium potentilloides var. potentilloides*				1
Plantae	Flora	Geraniaceae	3161	*Pelargonium inodorum*				1
Plantae	Flora	Gleicheniaceae	7138	*Gleichenia dicarpa*		Pouched Coral Fern		2
Plantae	Flora	Gleicheniaceae	11175	*Sticherus flabellatus var. flabellatus*		Umbrella Fern	P	1
Plantae	Flora	Goodeniaceae	3174	*Dampiera stricta*				14
Plantae	Flora	Goodeniaceae	8711	*Goodenia bellidifolia subsp. bellidifolia*				4
Plantae	Flora	Goodeniaceae	9279	*Goodenia hederacea subsp. hederacea*				1
Plantae	Flora	Goodeniaceae	8755	*Goodenia heterophylla subsp. eglandulosa*				6
Plantae	Flora	Goodeniaceae	3192	*Goodenia ovata*		Hop Goodenia		2
Plantae	Flora	Goodeniaceae	7057	*Goodenia paniculata*				3

Plantae	Flora	Goodeniaceae	3197	*Goodenia stelligera*		Spiked Goodenia	1
Plantae	Flora	Goodeniaceae	3201	*Scaevola aemula*		Fairy Fan-flower	1
Plantae	Flora	Goodeniaceae	3203	*Scaevola calendulacea*			3
Plantae	Flora	Goodeniaceae	3208	*Scaevola ramosissima*		Purple Fan-flower	4
Plantae	Flora	Goodeniaceae	3210	*Selliera radicans*		Swamp Weed	2
Plantae	Flora	Haemodoraceae	6435	*Haemodorum corymbosum*			1
Plantae	Flora	Haemodoraceae	3236	*Haemodorum planifolium*			3
Plantae	Flora	Haloragaceae	8649	*Gonocarpus micranthus subsp. micranthus*			1
Plantae	Flora	Haloragaceae	8648	*Gonocarpus micranthus subsp. ramosissimus*			1
Plantae	Flora	Haloragaceae	3247	*Gonocarpus tetragynus*		Poverty Raspwort	4
Plantae	Flora	Haloragaceae	3248	*Gonocarpus teucrioides*		Germander Raspwort	10
Plantae	Flora	Hydrocharitaceae	3271	*Halophila ovalis*			4
Plantae	Flora	Hypoxidaceae	3553	*Hypoxis hygrometrica*		Golden Weather-grass	3
Plantae	Flora	Hypoxidaceae	7648	*Hypoxis hygrometrica var. hygrometrica*			1
Plantae	Flora	Iridaceae	10271	*Crocosmia x crocosmiiflora*	*	Montbretia	2
Plantae	Flora	Iridaceae	3288	*Gladiolus gueinzii*	*		2
Plantae	Flora	Iridaceae	3301	*Patersonia glabrata*		Leafy Purple-flag	8
Plantae	Flora	Iridaceae	3303	*Patersonia sericea*		Silky Purple-Flag	17
Plantae	Flora	Iridaceae	9237	*Watsonia meriana*	*		1
Plantae	Flora	Juncaceae	3320	*Juncus caespiticius*			2
Plantae	Flora	Juncaceae	3325	*Juncus cognatus*	*		1
Plantae	Flora	Juncaceae	7430	*Juncus kraussii subsp. australiensis*		Sea Rush	6
Plantae	Flora	Juncaceae	3350	*Juncus usitatus*			3
Plantae	Flora	Lamiaceae	6484	*Clerodendrum tomentosum*		Hairy Clerodendrum	1
Plantae	Flora	Lamiaceae	3397	*Plectranthus parviflorus*			3
Plantae	Flora	Lamiaceae	3417	*Prostanthera linearis*		Narrow-leaved Mint-bush	1
Plantae	Flora	Lauraceae	3467	*Cassytha glabella*			6
Plantae	Flora	Lauraceae	9274	*Cassytha glabella f. glabella*			10
Plantae	Flora	Lauraceae	3469	*Cassytha pubescens*		Downy Dodder-laurel	3
Plantae	Flora	Lauraceae	3483	*Cryptocarya microneura*		Murrogun	1
Plantae	Flora	Lindsaeaceae	6406	*Lindsaea linearis*		Screw Fern	8
Plantae	Flora	Loganiaceae	3588	*Logania albiflora*			1
Plantae	Flora	Loganiaceae	3595	*Mitrasacme polymorpha*			3
Plantae	Flora	Loganiaceae	15351	*Orianthera pusilla*			3
Plantae	Flora	Lomandraceae	6297	*Lomandra confertifolia*		Matrush	1
Plantae	Flora	Lomandraceae	6298	*Lomandra cylindrica*			4
Plantae	Flora	Lomandraceae	7931	*Lomandra filiformis subsp. filiformis*			3
Plantae	Flora	Lomandraceae	6304	*Lomandra glauca*		Pale Mat-rush	3
Plantae	Flora	Lomandraceae	6305	*Lomandra gracilis*			1
Plantae	Flora	Lomandraceae	6308	*Lomandra longifolia*		Spiny-headed Mat-rush	38
Plantae	Flora	Lomandraceae	8802	*Lomandra multiflora subsp. multiflora*		Many-flowered Mat-rush	6
Plantae	Flora	Lomandraceae	6312	*Lomandra obliqua*			7
Plantae	Flora	Lomandraceae	LOMA	*Lomandra spp.*		Mat-rush	1
Plantae	Flora	Loranthaceae	3599	*Amyema cambagei*		Needle-leaf Mistletoe	1
Plantae	Flora	Loranthaceae	6856	*Amyema congener subsp. congener*			3
Plantae	Flora	Loranthaceae	3619	*Muellerina celastroides*			2
Plantae	Flora	Luzuriagaceae	6015	*Eustrephus latifolius*		Wombat Berry	12
Plantae	Flora	Luzuriagaceae	6016	*Geitonoplesium cymosum*		Scrambling Lily	2
Plantae	Flora	Malvaceae	3650	*Lagunaria patersonia*		Norfolk Island Hibiscus	2
Plantae	Flora	Malvaceae	3673	*Sida rhombifolia*	*	Paddy's Lucerne	1
Plantae	Flora	Meliaceae	11178	*Synoum glandulosum subsp. glandulosum*		Scentless Rosewood	4
Plantae	Flora	Menispermaceae	3688	*Sarcopetalum harveyanum*		Pearl Vine	2
Plantae	Flora	Menispermaceae	3690	*Stephania japonica*		Snake vine	9
Plantae	Flora	Menispermaceae	8428	*Stephania japonica var. discolor*		Snake Vine	11
Plantae	Flora	Menyanthaceae	14804	*Liparophyllum exaltatum*			2
Plantae	Flora	Moraceae	7479	*Ficus coronata*		Creek Sandpaper Fig	5
Plantae	Flora	Myrtaceae	3968	*Acmena smithii*		Lilly Pilly	5
Plantae	Flora	Myrtaceae	3971	*Angophora floribunda*		Rough-barked Apple	1
Plantae	Flora	Myrtaceae	3995	*Baeckea imbricata*			1
Plantae	Flora	Myrtaceae	BAEC	*Baeckea spp.*			1

Plantae	Flora	Myrtaceae	4008	*Callistemon linearis*	Narrow-leaved Bottlebrush			4	
Plantae	Flora	Myrtaceae	9687	*Corymbia gummifera*	Red Bloodwood			46	
Plantae	Flora	Myrtaceae	9692	*Corymbia maculata*	Spotted Gum			3	
Plantae	Flora	Myrtaceae	4025	*Darwinia camptostylis*				3	
Plantae	Flora	Myrtaceae	4030	*Darwinia leptantha*				1	
Plantae	Flora	Myrtaceae	4060	*Eucalyptus botryoides*	Bangalay			27	
Plantae	Flora	Myrtaceae	4073	*Eucalyptus consideniana*	Yertchuk			1	
Plantae	Flora	Myrtaceae	4087	*Eucalyptus eugenioides*	Thin-leaved Stringybark			4	
Plantae	Flora	Myrtaceae	4097	*Eucalyptus globoidea*	White Stringybark			13	
Plantae	Flora	Myrtaceae	4118	*Eucalyptus longifolia*	Woollybutt			4	
Plantae	Flora	Myrtaceae	4149	*Eucalyptus paniculata*	Grey Ironbark			3	
Plantae	Flora	Myrtaceae	8831	*Eucalyptus paniculata subsp. paniculata*				4	
Plantae	Flora	Myrtaceae	4155	*Eucalyptus pilularis*	Blackbutt			27	
Plantae	Flora	Myrtaceae	4156	*Eucalyptus piperita*	Sydney Peppermint			18	
Plantae	Flora	Myrtaceae	4165	*Eucalyptus punctata*	Grey Gum			1	
Plantae	Flora	Myrtaceae	4177	*Eucalyptus saligna*	Sydney Blue Gum			2	
Plantae	Flora	Myrtaceae	8950	*Eucalyptus scias*	Large-fruited Red Mahogany			4	
Plantae	Flora	Myrtaceae	9954	*Eucalyptus scias subsp. callimastha*				3	
Plantae	Flora	Myrtaceae	4178	*Eucalyptus sclerophylla*	Hard-leaved Scribbly Gum			25	
Plantae	Flora	Myrtaceae	4182	*Eucalyptus sieberi*	Silvertop Ash			12	
Plantae	Flora	Myrtaceae	EUCA	*Eucalyptus spp.*				2	
Plantae	Flora	Myrtaceae	4204	*Kunzea ambigua*	Tick Bush	P		2	
Plantae	Flora	Myrtaceae	4207	*Kunzea capitata*		P		8	
Plantae	Flora	Myrtaceae	7970	*Leptospermum continentale*	Prickly Teatree			2	
Plantae	Flora	Myrtaceae	7766	*Leptospermum grandifolium*	Woolly Teatree			1	
Plantae	Flora	Myrtaceae	4221	*Leptospermum juniperinum*	Prickly Tea-tree			6	
Plantae	Flora	Myrtaceae	4222	*Leptospermum laevigatum*	Coast Teatree			14	
Plantae	Flora	Myrtaceae	4223	*Leptospermum lanigerum*	Woolly Teatree	P		1	
Plantae	Flora	Myrtaceae	8399	*Leptospermum morrisonii*				1	
Plantae	Flora	Myrtaceae	9080	*Leptospermum polyanthum*				4	
Plantae	Flora	Myrtaceae	7245	*Leptospermum polygalifolium*	Tantoon			4	
Plantae	Flora	Myrtaceae	8197	*Leptospermum polygalifolium subsp. polygalifolium*				13	
Plantae	Flora	Myrtaceae	LEPT	*Leptospermum spp.*	Tea-tree			1	
Plantae	Flora	Myrtaceae	4239	*Leptospermum squarrosum*				1	
Plantae	Flora	Myrtaceae	8486	*Leptospermum trinervium*	Slender Tea-tree			13	
Plantae	Flora	Myrtaceae	6809	*Melaleuca biconvexa*	Biconvex Paperbark	V	V	1	
Plantae	Flora	Myrtaceae	6391	*Melaleuca ericifolia*	Swamp Paperbark			6	
Plantae	Flora	Myrtaceae	4257	*Melaleuca linariifolia*	Flax-leaved Paperbark			8	
Plantae	Flora	Myrtaceae	4266	*Melaleuca thymifolia*	Thyme Honey-myrtle			3	
Plantae	Flora	Myrtaceae	4283	*Rhodamnia rubescens*	Scrub Turpentine	E4A	CE	5	
Plantae	Flora	Myrtaceae	13751	*Sannantha pluriflora*				2	
Plantae	Flora	Myrtaceae	6688	*Syncarpia glomulifera*	Turpentine			32	
Plantae	Flora	Myrtaceae	10748	*Syncarpia glomulifera subsp. glomulifera*				3	
Plantae	Flora	Myrtaceae	4296	*Tristaniopsis collina*	Mountain Water Gum			1	
Plantae	Flora	Oleaceae	4318	*Notelaea longifolia*	Large Mock-olive			8	
Plantae	Flora	Oleaceae	6423	*Notelaea longifolia f. longifolia*				6	
Plantae	Flora	Oleaceae	4322	*Notelaea venosa*	Veined Mock-olive			5	
Plantae	Flora	Orchidaceae	4353	*Acianthus fornicatus*	Pixie Caps	P		5	
Plantae	Flora	Orchidaceae	6703	*Caladenia catenata*	White Caladenia	P		1	
Plantae	Flora	Orchidaceae	CALO	*Calochilus spp.*		P		1	
Plantae	Flora	Orchidaceae	4404	*Corybas aconitiflorus*	Spurred Helmet Orchid	P		2	
Plantae	Flora	Orchidaceae	4407	*Corybas fimbriatus*	Fringed Helmet Orchid	P		1	
Plantae	Flora	Orchidaceae	4411	*Corybas undulatus*	Tailed Helmet Orchid	P		3	
Plantae	Flora	Orchidaceae	4414	*Cryptostylis erecta*	Tartan Tongue Orchid	P		2	
Plantae	Flora	Orchidaceae	4415	*^Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	15	
Plantae	Flora	Orchidaceae	CRYT	*Cryptostylis spp.*		P		5	
Plantae	Flora	Orchidaceae	4417	*Cryptostylis subulata*	Large Tongue Orchid	P		4	
Plantae	Flora	Orchidaceae	4419	*Cymbidium suave*	Snake Orchid	P		8	
Plantae	Flora	Orchidaceae	4441	*Diuris aurea*		P		1	
Plantae	Flora	Orchidaceae	4456	*Diuris sulphurea*	Tiger Orchid	P		1	
Plantae	Flora	Orchidaceae	7101	*Microtis rara*	Scented Onion Orchid	P		2	
Plantae	Flora	Orchidaceae	4491	*Prasophyllum australe*	Southern Leek Orchid	P		1	
Plantae	Flora	Orchidaceae	PRAS	*Prasophyllum spp.*		P		1	

Plantae	Flora	Orchidaceae	4554	*Pterostylis grandiflora*		Cobra Greenhood	P	2
Plantae	Flora	Orchidaceae	PTER	*Pterostylis spp.*		Greenhood	P	1
Plantae	Flora	Orchidaceae	14259	*^Pterostylis ventricosa*			E4A,P,2	14
Plantae	Flora	Orchidaceae	8968	*Thelymitra ixioides var. ixioides*		Dotted Sun Orchid	P	1
Plantae	Flora	Orchidaceae	THEL	*Thelymitra spp.*			P	2
Plantae	Flora	Oxalidaceae	4613	*Oxalis corniculata*	*	Creeping Oxalis		1
Plantae	Flora	Oxalidaceae	4615	*Oxalis exilis*				3
Plantae	Flora	Oxalidaceae	4621	*Oxalis perennans*				2
Plantae	Flora	Passifloraceae	4643	*Passiflora edulis*	*	Common Passionfruit		1
Plantae	Flora	Philydraceae	7065	*Philydrum lanuginosum*		Frogsmouth		1
Plantae	Flora	Phormiaceae	7664	*Thelionema caespitosum*		Tufted Blue-lily		1
Plantae	Flora	Phyllanthaceae	2695	*Breynia oblongifolia*		Coffee Bush		15
Plantae	Flora	Phyllanthaceae	7866	*Glochidion ferdinandi*		Cheese Tree		1
Plantae	Flora	Phyllanthaceae	9360	*Glochidion ferdinandi var. ferdinandi*		Cheese Tree		2
Plantae	Flora	Phyllanthaceae	8216	*Phyllanthus hirtellus*		Thyme Spurge		3
Plantae	Flora	Phyllanthaceae	2753	*Poranthera corymbosa*				2
Plantae	Flora	Phyllanthaceae	2754	*Poranthera ericifolia*				2
Plantae	Flora	Phyllanthaceae	7395	*Poranthera microphylla*		Small Poranthera		5
Plantae	Flora	Phytolaccaceae	4658	*Phytolacca octandra*	*	Inkweed		1
Plantae	Flora	Pittosporaceae	12179	*Billardiera mutabilis*		Climbing Apple Berry		1
Plantae	Flora	Pittosporaceae	4671	*Billardiera scandens*		Hairy Apple Berry		17
Plantae	Flora	Pittosporaceae	4683	*Pittosporum revolutum*		Rough Fruit Pittosporum		7
Plantae	Flora	Pittosporaceae	4685	*Pittosporum undulatum*		Sweet Pittosporum		12
Plantae	Flora	Pittosporaceae	8623	*Rhytidosporum procumbens*				1
Plantae	Flora	Plantaginaceae	4699	*Plantago lanceolata*	*	Lamb's Tongues		3
Plantae	Flora	Plantaginaceae	6009	*Veronica plebeia*		Trailing Speedwell		1
Plantae	Flora	Poaceae	4738	*Ammophila arenaria*	*	Marram Grass		1
Plantae	Flora	Poaceae	4748	*Andropogon virginicus*	*	Whisky Grass		3
Plantae	Flora	Poaceae	4749	*Anisopogon avenaceus*		Oat Speargrass		12
Plantae	Flora	Poaceae	4770	*Aristida ramosa*		Purple Wiregrass		1
Plantae	Flora	Poaceae	4773	*Aristida vagans*		Threeawn Speargrass		5
Plantae	Flora	Poaceae	4774	*Aristida warburgii*				1
Plantae	Flora	Poaceae	9603	*Austrostipa pubescens*				4
Plantae	Flora	Poaceae	10398	*Austrostipa rudis subsp. nervosa*				1
Plantae	Flora	Poaceae	AUSO	*Austrostipa spp.*				7
Plantae	Flora	Poaceae	4785	*Axonopus compressus*	*	Broad-leaved Carpet Grass		1
Plantae	Flora	Poaceae	11194	*Axonopus fissifolius*	*	Narrow-leafed Carpet Grass		3
Plantae	Flora	Poaceae	4800	*Briza maxima*	*	Quaking Grass		3
Plantae	Flora	Poaceae	4801	*Briza minor*	*	Shivery Grass		2
Plantae	Flora	Poaceae	14903	*Cenchrus clandestinus*	*	Kikuyu Grass		5
Plantae	Flora	Poaceae	6540	*Cynodon dactylon*		Common Couch		5
Plantae	Flora	Poaceae	4889	*Deyeuxia nudiflora*				2
Plantae	Flora	Poaceae	4891	*Deyeuxia quadriseta*				1
Plantae	Flora	Poaceae	DEYE	*Deyeuxia spp.*				1
Plantae	Flora	Poaceae	4897	*Dichelachne crinita*		Longhair Plumegrass		1
Plantae	Flora	Poaceae	4898	*Dichelachne micrantha*		Shorthair Plumegrass		3
Plantae	Flora	Poaceae	4913	*Digitaria parviflora*		Small-flowered Finger Grass		2
Plantae	Flora	Poaceae	4929	*Echinopogon caespitosus*		Bushy Hedgehog-grass		1
Plantae	Flora	Poaceae	7593	*Echinopogon caespitosus var. caespitosus*		Tufted Hedgehog Grass		1
Plantae	Flora	Poaceae	4934	*Echinopogon ovatus*		Forest Hedgehog Grass		2
Plantae	Flora	Poaceae	4937	*Ehrharta erecta*	*	Panic Veldtgrass		2
Plantae	Flora	Poaceae	4946	*Entolasia marginata*		Bordered Panic		5
Plantae	Flora	Poaceae	4947	*Entolasia stricta*		Wiry Panic		20
Plantae	Flora	Poaceae	7578	*Eragrostis benthamii*				1
Plantae	Flora	Poaceae	7921	*Eragrostis brownii*		Brown's Lovegrass		3
Plantae	Flora	Poaceae	4960	*Eragrostis leptostachya*		Paddock Lovegrass		1
Plantae	Flora	Poaceae	4967	*Eragrostis parviflora*		Weeping Lovegrass		1
Plantae	Flora	Poaceae	ERAG	*Eragrostis spp.*				1
Plantae	Flora	Poaceae	5001	*Hemarthria uncinata*		Matgrass		3
Plantae	Flora	Poaceae	7871	*Hemarthria uncinata var. uncinata*				2
Plantae	Flora	Poaceae	6803	*Imperata cylindrica*		Blady Grass		26
Plantae	Flora	Poaceae	5037	*Microlaena stipoides*		Weeping Grass		6
Plantae	Flora	Poaceae	7707	*Microlaena stipoides var. stipoides*		Weeping Grass		5
Plantae	Flora	Poaceae	5044	*Oplismenus aemulus*				4
Plantae	Flora	Poaceae	5045	*Oplismenus imbecillis*				10
Plantae	Flora	Poaceae	5063	*Panicum pygmaeum*		Pygmy Panic		2
Plantae	Flora	Poaceae	5066	*Panicum simile*		Two-colour Panic		5

Plantae	Flora	Poaceae	5086	*Paspalum dilatatum*	*	Paspalum		5
Plantae	Flora	Poaceae	5106	*Phalaris aquatica*	*	Phalaris		1
Plantae	Flora	Poaceae	5113	*Phragmites australis*		Common Reed		6
Plantae	Flora	Poaceae	5117	*Plinthanthesis paradoxa*				2
Plantae	Flora	Poaceae	11196	*Poa labillardierei var. labillardierei*		Tussock		3
Plantae	Flora	Poaceae	11143	*Poa poiformis var. poiformis*				3
Plantae	Flora	Poaceae	RYTI	*Rytidosperma spp.*				2
Plantae	Flora	Poaceae	14323	*Rytidosperma tenuius*				4
Plantae	Flora	Poaceae	13468	*Setaria parviflora*	*			2
Plantae	Flora	Poaceae	SETA	*Setaria spp.*				1
Plantae	Flora	Poaceae	7843	*Spinifex sericeus*		Hairy Spinifex		2
Plantae	Flora	Poaceae	5176	*Sporobolus africanus*	*	Parramatta Grass		2
Plantae	Flora	Poaceae	SPOR	*Sporobolus spp.*		Rat's Tail Couch		3
Plantae	Flora	Poaceae	5184	*Sporobolus virginicus*				3
Plantae	Flora	Poaceae	9224	*Sporobolus virginicus var. minor*		Marine Couch		1
Plantae	Flora	Poaceae	5185	*Stenotaphrum secundatum*	*	Buffalo Grass		5
Plantae	Flora	Poaceae	5217	*Tetrarrhena juncea*		Wiry Ricegrass		1
Plantae	Flora	Poaceae	7993	*Tetrarrhena turfosa*				1
Plantae	Flora	Poaceae	7770	*Themeda triandra*				12
Plantae	Flora	Poaceae	5243	*Zoysia macrantha*		Prickly Couch		2
Plantae	Flora	Polygalaceae	5252	*Comesperma defoliatum*				1
Plantae	Flora	Polygalaceae	5253	*Comesperma ericinum*		Pyramid Flower		1
Plantae	Flora	Polygalaceae	5256	*Comesperma sphaerocarpum*				2
Plantae	Flora	Polygonaceae	5263	*Acetosa sagittata*	*	Rambling Dock		1
Plantae	Flora	Polypodiaceae	8159	*Platycerium bifurcatum*		Elkhorn Fern	P	1
Plantae	Flora	Polypodiaceae	8163	*Pyrrosia rupestris*		Rock Felt Fern		1
Plantae	Flora	Posidoniaceae	5327	*Posidonia australis*		Seagrass		1
Plantae	Flora	Potamogetonaceae	5717	*Ruppia megacarpa*				1
Plantae	Flora	Primulaceae	7459	*Aegiceras corniculatum*		River Mangrove		3
Plantae	Flora	Primulaceae	14614	*Lysimachia arvensis*	*	Scarlet Pimpernel		3
Plantae	Flora	Primulaceae	5337	*Samolus repens*		Creeping Brookweed		3
Plantae	Flora	Proteaceae	5342	*Banksia ericifolia*		Heath-leaved Banksia		1
Plantae	Flora	Proteaceae	11049	*Banksia ericifolia subsp. ericifolia*				1
Plantae	Flora	Proteaceae	5343	*Banksia integrifolia*		Coast Banksia		8
Plantae	Flora	Proteaceae	6603	*Banksia integrifolia subsp. integrifolia*		Coastal Banksia		5
Plantae	Flora	Proteaceae	5346	*Banksia paludosa*				3
Plantae	Flora	Proteaceae	5348	*Banksia serrata*		Old-man Banksia		29
Plantae	Flora	Proteaceae	5349	*Banksia spinulosa*		Hairpin Banksia	P	6
Plantae	Flora	Proteaceae	7488	*Banksia spinulosa var. spinulosa*			P	13
Plantae	Flora	Proteaceae	9976	*Conospermum ericifolium*				2
Plantae	Flora	Proteaceae	10768	*Grevillea arenaria subsp. arenaria*		Sand Grevillea		1
Plantae	Flora	Proteaceae	5381	*Grevillea linearifolia*		Linear-leaf Grevillea		1
Plantae	Flora	Proteaceae	10977	*Grevillea patulifolia*				1
Plantae	Flora	Proteaceae	5409	*Hakea dactyloides*		Finger Hakea		8
Plantae	Flora	Proteaceae	13510	*Hakea nodosa*				1
Plantae	Flora	Proteaceae	5425	*Hakea sericea*		Needlebush		15
Plantae	Flora	Proteaceae	5427	*Hakea teretifolia*		Needlebush		13
Plantae	Flora	Proteaceae	10809	*Hakea teretifolia subsp. hirsuta*				1
Plantae	Flora	Proteaceae	5433	*Isopogon anemonifolius*		Broad-leaf Drumsticks	P	7
Plantae	Flora	Proteaceae	5440	*Lambertia formosa*		Mountain Devil		19
Plantae	Flora	Proteaceae	5443	*Lomatia ilicifolia*		Holly Lomatia		16
Plantae	Flora	Proteaceae	5445	*Lomatia silaifolia*		Crinkle Bush	P	1
Plantae	Flora	Proteaceae	5460	*Persoonia lanceolata*		Lance Leaf Geebung	P	1
Plantae	Flora	Proteaceae	5462	*Persoonia levis*		Broad-leaved Geebung	P	13
Plantae	Flora	Proteaceae	5463	*Persoonia linearis*		Narrow-leaved Geebung	P	9
Plantae	Flora	Proteaceae	5465	*Persoonia mollis*		Soft Geebung	P	3
Plantae	Flora	Proteaceae	8990	*Persoonia mollis subsp. caleyi*			P	9
Plantae	Flora	Proteaceae	9005	*Persoonia mollis subsp. leptophylla*			P	1
Plantae	Flora	Proteaceae	5478	*Petrophile pedunculata*			P	10
Plantae	Flora	Proteaceae	5479	*Petrophile pulchella*		Conesticks	P	2
Plantae	Flora	Proteaceae	5480	*Petrophile sessilis*			P	1
Plantae	Flora	Proteaceae	5488	*Telopea speciosissima*		Waratah	P	2
Plantae	Flora	Pteridaceae	7997	*Adiantum aethiopicum*		Common Maidenhair	P	2

Plantae	Flora	Pteridaceae	8444	*Pellaea falcata*		Sickle Fern		1
Plantae	Flora	Ranunculaceae	5493	*Clematis aristata*		Old Man's Beard		3
Plantae	Flora	Ranunculaceae	5495	*Clematis glycinoides*		Headache Vine		3
Plantae	Flora	Ranunculaceae	5508	*Ranunculus lappaceus*		Common Buttercup		1
Plantae	Flora	Restionaceae	5532	*Empodisma minus*				2
Plantae	Flora	Restionaceae	10615	*Eurychorda complanata*				2
Plantae	Flora	Restionaceae	5534	*Leptocarpus tenax*				9
Plantae	Flora	Restionaceae	5535	*Lepyrodia anarthria*				1
Plantae	Flora	Restionaceae	5541	*Lepyrodia scariosa*				9
Plantae	Flora	Rhamnaceae	5556	*Cryptandra ericoides*		Heathy Cryptandra		3
Plantae	Flora	Rosaceae	11303	*Rubus fruticosus sp. agg.*	*	Blackberry complex		1
Plantae	Flora	Rosaceae	5642	*Rubus parvifolius*		Native Raspberry		3
Plantae	Flora	Rosaceae	5646	*Rubus ulmifolius*	*	Blackberry		1
Plantae	Flora	Rubiaceae	5680	*Galium australe*		Tangled Bedstraw	E1	1
Plantae	Flora	Rubiaceae	13838	*Galium leiocarpum*				1
Plantae	Flora	Rubiaceae	GALI	*Galium spp.*				1
Plantae	Flora	Rubiaceae	14922	*Gynochthodes jasminoides*		Sweet Morinda		4
Plantae	Flora	Rubiaceae	5697	*Opercularia aspera*		Coarse Stinkweed		6
Plantae	Flora	Rubiaceae	5698	*Opercularia diphylla*		Stinkweed		4
Plantae	Flora	Rubiaceae	5701	*Opercularia varia*		Variable Stinkweed		3
Plantae	Flora	Rubiaceae	5706	*Psychotria loniceroides*		Hairy Psychotria		1
Plantae	Flora	Rubiaceae	5711	*Richardia brasiliensis*	*	Mexican Clover		2
Plantae	Flora	Rutaceae	5749	*Boronia parviflora*		Swamp Boronia	P	2
Plantae	Flora	Rutaceae	5751	*Boronia polygalifolia*		Dwarf Boronia	P	1
Plantae	Flora	Rutaceae	10046	*Correa alba var. alba*		White Correa		5
Plantae	Flora	Rutaceae	8801	*Correa reflexa var. reflexa*		Native Fuschia		2
Plantae	Flora	Rutaceae	5774	*Crowea exalata*			P	1
Plantae	Flora	Rutaceae	8258	*Phebalium squamulosum subsp. argenteum*			P	5
Plantae	Flora	Rutaceae	5847	*Zieria smithii*		Sandfly Zieria		1
Plantae	Flora	Santalaceae	5860	*Exocarpos cupressiformis*		Cherry Ballart		5
Plantae	Flora	Santalaceae	5865	*Leptomeria acida*		Sour Currant Bush		6
Plantae	Flora	Sapindaceae	5911	*Dodonaea triquetra*		Large-leaf Hop-bush		6
Plantae	Flora	Schizaeaceae	8181	*Schizaea bifida*		Forked Comb Fern		1
Plantae	Flora	Scrophulariaceae	7906	*Myoporum acuminatum*		Boobialla		4
Plantae	Flora	Scrophulariaceae	9043	*Myoporum boninense subsp. australe*				1
Plantae	Flora	Selaginellaceae	8187	*Selaginella uliginosa*		Swamp Selaginella		1
Plantae	Flora	Smilacaceae	7592	*Smilax australis*		Lawyer Vine		3
Plantae	Flora	Smilacaceae	6022	*Smilax glyciphylla*		Sweet Sarsparilla		10
Plantae	Flora	Solanaceae	6036	*Duboisia myoporoides*		Corkwood		2
Plantae	Flora	Solanaceae	6090	*Solanum mauritianum*	*	Wild Tobacco Bush		1
Plantae	Flora	Solanaceae	6091	*Solanum nigrum*	*	Black-berry Nightshade		1
Plantae	Flora	Solanaceae	6100	*Solanum prinophyllum*		Forest Nightshade		2
Plantae	Flora	Solanaceae	6109	*Solanum stelligerum*		Devil's Needles		3
Plantae	Flora	Stackhousiaceae	6122	*Stackhousia nuda*				1
Plantae	Flora	Stackhousiaceae	6124	*Stackhousia spathulata*				5
Plantae	Flora	Stackhousiaceae	STAC	*Stackhousia spp.*				1
Plantae	Flora	Stackhousiaceae	6125	*Stackhousia viminea*		Slender Stackhousia		3
Plantae	Flora	Stylidiaceae	6157	*Stylidium graminifolium*		Grass Triggerplant		4
Plantae	Flora	Thymelaeaceae	6182	*Pimelea linifolia*		Slender Rice Flower		4
Plantae	Flora	Thymelaeaceae	6635	*Pimelea linifolia subsp. collina*				1
Plantae	Flora	Thymelaeaceae	6814	*Pimelea linifolia subsp. linifolia*				10
Plantae	Flora	Ulmaceae	6761	*Trema tomentosa var. aspera*		Native Peach		1
Plantae	Flora	Urticaceae	6237	*Urtica incisa*		Stinging Nettle		3
Plantae	Flora	Uvulariaceae	3566	*Schelhammera undulata*				4
Plantae	Flora	Verbenaceae	6256	*Verbena bonariensis*	*	Purpletop		2
Plantae	Flora	Violaceae	6267	*Hybanthus vernonii*				1
Plantae	Flora	Violaceae	6537	*Hybanthus vernonii subsp. vernonii*				1
Plantae	Flora	Violaceae	11863	*Viola banksii*				3
Plantae	Flora	Violaceae	6270	*Viola betonicifolia*		Native Violet		1
Plantae	Flora	Violaceae	6272	*Viola hederacea*		Ivy-leaved Violet		12
Plantae	Flora	Violaceae	11190	*Viola sieberiana*				1
Plantae	Flora	Violaceae	12580	*Viola silicestris*				1
Plantae	Flora	Vitaceae	6282	*Cissus antarctica*		Water Vine		2
Plantae	Flora	Vitaceae	6283	*Cissus hypoglauca*		Giant Water Vine		8

Plantae	Flora	Xanthorrhoeaceae	7995	*Xanthorrhoea concava*		P	3
Plantae	Flora	Xanthorrhoeaceae	6321	*Xanthorrhoea resinosa*		P	3
Plantae	Flora	Xanthorrhoeaceae	XANT	*Xanthorrhoea spp.*		P	1
Plantae	Flora	Xyridaceae	6322	*Xyris gracilis*			2
Plantae	Flora	Xyridaceae	6324	*Xyris operculata*			1
Plantae	Flora	Zamiaceae	6327	*Macrozamia communis*	Burrawang	P	1
Plantae	Flora	Zosteraceae	13649	*Zostera muelleri subsp. capricorni*			3
Animalia	Insecta	Culicidae	I616	*Anopheles annulipes*			2

Appendix C iNaturalist Data

geometry	id	observed_	latitude	longitude	scientific_name	common_name	taxon_id
X: 277724.4135, Y: 6100768.976, Z: NaN	106310952	44561	-35.211521	150.558091	Achoerodus viridis	Eastern Blue Groper	93137
X: 277201.3869, Y: 6100843.9024, Z: NaN	16013305	43337	-35.21073	150.55237	Ascarosepion apama	Australian Giant Cuttlefish	1500730
X: 277856.9668, Y: 6101949.8201, Z: NaN	56490816	44058	-35.20091221	150.5598645	Ascarosepion apama	Australian Giant Cuttlefish	1500730
X: 281939.8048, Y: 6104756.4378, Z: NaN	139938485	44859	-35.17652192	150.6054196	Callocephalon fimbriatum	Gang-gang Cockatoo	116842
X: 279863.1697, Y: 6102221.9749, Z: NaN	196819219	45052	-35.19890232	150.5819568	Callocephalon fimbriatum	Gang-gang Cockatoo	116842
X: 280182.0059, Y: 6099364.7248, Z: NaN	104565458	44568	-35.22471342	150.5846935	Calyptorhynchus lathami	Glossy Black Cockatoo	116846
X: 275869.7589, Y: 6099056.0147, Z: NaN	105901673	44592	-35.22654011	150.5372662	Calyptorhynchus lathami	Glossy Black Cockatoo	116846
X: 277444.3554, Y: 6101126.0955, Z: NaN	106310891	44561	-35.20824167	150.5551133	Carcharhinus brachyurus	Bronze Whaler	96750
X: 276036.8441, Y: 6099984.6396, Z: NaN	40274617	43910	-35.21821167	150.5393533	Charadrius cucullatus	Hooded Plover	1505599
X: 276018.4856, Y: 6100100.5534, Z: NaN	122792067	44566	-35.21716333	150.5391833	Charadrius cucullatus	Hooded Plover	1505599
X: 276786.1597, Y: 6100884.8344, Z: NaN	194798059	45285	-35.21026897	150.5478232	Charadrius cucullatus	Hooded Plover	1505599
X: 276249.5533, Y: 6100450.5538, Z: NaN	195124613	45289	-35.21406181	150.541815	Charadrius cucullatus	Hooded Plover	1505599
X: 280667.8466, Y: 6103893.2493, Z: NaN	142201075	44882	-35.18402167	150.5912333	Eucalyptus botryoides	bangalay	162745
X: 274866.4937, Y: 6099873.0475, Z: NaN	162444608	45065	-35.218955	150.526475	Eucalyptus pilularis	Blackbutt	162758
X: 280509.6656, Y: 6106528.4652, Z: NaN	44449228	40624	-35.16024597	150.5901985	Eucalyptus sturgissiana		1076372
X: 276746.4553, Y: 6100894.5267, Z: NaN	88760309	44136	-35.21017282	150.54739	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 277353.744, Y: 6101159.4027, Z: NaN	108645316	44635	-35.20792151	150.5541277	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 277883.0787, Y: 6101778.8409, Z: NaN	120756743	44720	-35.20245833	150.560105	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 277613.7828, Y: 6102100.5998, Z: NaN	131434377	44751	-35.1995	150.5572361	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 276956.6032, Y: 6100915.3898, Z: NaN	161117493	45014	-35.2100316	150.5497024	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 275625.5654, Y: 6099158.9699, Z: NaN	207104661	45395	-35.22555801	150.5346133	Haematopus fuliginosus	Sooty Oystercatcher	4847
X: 276670.9269, Y: 6101119.3308, Z: NaN	62662659	44016	-35.20813079	150.5466219	Haematopus longirostris	Pied Oystercatcher	4846
X: 277689.4198, Y: 6101870.2621, Z: NaN	99651335	44497	-35.20159185	150.5580041	Haematopus longirostris	Pied Oystercatcher	4846
X: 276749.7537, Y: 6100907.0449, Z: NaN	194722879	45284	-35.21006078	150.5474296	Haematopus longirostris	Pied Oystercatcher	4846
X: 276186.3525, Y: 6100420.2793, Z: NaN	195124676	45289	-35.21432045	150.541113	Haematopus longirostris	Pied Oystercatcher	4846
X: 276824.762, Y: 6100945.2445, Z: NaN	198469679	45327	-35.20973333	150.5482633	Haematopus longirostris	Pied Oystercatcher	4846
X: 280575.9875, Y: 6105270.7262, Z: NaN	120092416	44716	-35.17159167	150.5905917	Hemitrygon fluviorum	Estuary Stingray	623842
X: 280468.0499, Y: 6106283.4426, Z: NaN	22588148	43568	-35.16244434	150.5896768	Hippocampus whitei	White's Seahorse	102838
X: 280219.7115, Y: 6106355.7216, Z: NaN	111292591	44660	-35.1617389	150.5869716	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 280301.4487, Y: 6105116.0709, Z: NaN	122793204	44723	-35.172925	150.5875383	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 279232.4843, Y: 6103108.9627, Z: NaN	154065860	45025	-35.1907729	150.5752723	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 276589.3569, Y: 6100619.6649, Z: NaN	156399100	45023	-35.21261404	150.545591	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 279242.765, Y: 6103001.7018, Z: NaN	194652229	45283	-35.19174148	150.5753564	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 276381.2538, Y: 6100655.9895, Z: NaN	195124472	45289	-35.21224044	150.5433165	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 275606.6261, Y: 6099234.2615, Z: NaN	207104820	45395	-35.22487549	150.5344259	Icthyophaga leucogaster	White-bellied Sea-Eagle	1505653
X: 273389.3511, Y: 6102849.9885, Z: NaN	100593425	44487	-35.19180433	150.5110783	Litoria freycineti	Wallum Rocket Frog	23564
X: 273385.514, Y: 6102905.6756, Z: NaN	100594013	44506	-35.1913018	150.5110515	Litoria freycineti	Wallum Rocket Frog	23564
X: 274880.1847, Y: 6103081.5923, Z: NaN	102974314	44542	-35.19005321	150.5275021	Litoria freycineti	Wallum Rocket Frog	23564
X: 272906.3144, Y: 6103345.6404, Z: NaN	133994558	44283	-35.18723008	150.505914	Litoria freycineti	Wallum Rocket Frog	23564
X: 278155.2251, Y: 6100049.8793, Z: NaN	65989522	43034	-35.21809464	150.5626263	Lophoictinia isura	Square-tailed Kite	5286
X: 277244.8959, Y: 6101354.1732, Z: NaN	69128334	43390	-35.20614269	150.5529856	Lophoictinia isura	Square-tailed Kite	5286
X: 277745.2244, Y: 6102630.7155, Z: NaN	190897977	45243	-35.19475333	150.5588217	Oryctolagus cuniculus	European Rabbit	43151
X: 281173.6496, Y: 6106451.1026, Z: NaN	198791916	45331	-35.1610877	150.5974622	Pomatomus saltatrix	Tailor	50984
X: 281291.8058, Y: 6105705.5763, Z: NaN	110639623	44658	-35.16783005	150.5985609	Ranoidea aurea	Green-and-Golden Bell Frog	517069
X: 280397.4331, Y: 6107418.2552, Z: NaN	126317613	44757	-35.15220516	150.5892039	Ranoidea aurea	Green-and-Golden Bell Frog	517069
X: 279144.0667, Y: 6105682.2194, Z: NaN	155122575	45007	-35.1675708	150.574991	Ranoidea aurea	Green-and-Golden Bell Frog	517069
X: 279901.3193, Y: 6106541.9285, Z: NaN	199156561	45335	-35.15999167	150.5835283	Ranoidea aurea	Green-and-Golden Bell Frog	517069
X: 277239.4333, Y: 6100915.1374, Z: NaN	106310811	44561	-35.2100967	150.5528069	Trygonoptera testacea	Common Stingaree	114626
X: 281417.2957, Y: 6104451.6449, Z: NaN	195937870	45297	-35.17915433	150.5996055	Trygonoptera testacea	Common Stingaree	114626
X: 281457.8576, Y: 6104501.8883, Z: NaN	195937905	45297	-35.1787105	150.6000639	Trygonoptera testacea	Common Stingaree	114626

Appendix D Assessments of Significance under EPBC Act and BC Act

1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act 1999 1.1 Significant Impact Guidelines (Commonwealth of Australia 2013) for Listed Threatened Species and Ecological Communities (https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf) were referred to and the proposed activity was assessed in relation to significant impact criteria for a number of species listed as threatened under the EPBC Act. Information from the DCCEEW Species Profile and Threats Database has been mainly used for the assessment.

An action would require approval if the action has, would have, or is likely to have a significant impact on a species listed in any of the following categories:

- extinct in the wild
- critically endangered
- endangered, or
- vulnerable.

Following the analysis of Likelihood of Occurrence for species that have a high potential to occur within the subject site, the EPBC Act significant impact criteria were applied for the following taxa (* species that are also listed as Migratory Species):

Critically Endangered

- Eastern Curlew *

Endangered

- Australasian Bittern
- Australian Painted Snipe

Vulnerable

- Australian Fairy Tern
- Common Greenshank
- Eastern Hooded Plover
- Green and Golden Bell Frog
- Nunivak Bar-tailed Godwit *
- Red Knot
- Sharp-tailed Sandpiper *

1.1 Critically Endangered

The Eastern Curlew is listed as critically endangered, migratory and marine under the EPBC Act. The EPBC Act Protected Matters Search indicates that "species or species habitat known to occur within area". Each significant impact criteria have been addressed below:

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it would:

Impact 1. Lead to a long-term decrease in the size of a population.

The subject site does not support key source populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of these species range. Thus, the proposed activity would not lead to a long-term decrease in the size of an Eastern Curlew population.

Impact 2. Reduce the area of occupancy of the species.

The species does not typically occupy coastal lakes and forages during the non-breeding season can be found in intertidal areas often near mangroves, salt flats and in saltmarsh. Thus, the proposed activity would not reduce the area of occupancy for the Eastern Curlew.

Impact 3. Fragment an existing population into two or more populations.

The proposed activity is not expected to fragment any population of this species including to saltmarsh areas adjacent to Swan Lake.

Impact 4. Adversely affect habitat critical to the survival of a species.

The Eastern Curlew in NSW are mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, these species occur on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The proposed activity would not adversely affect habitat critical to the survival of this species.

Impact 5. Disrupt the breeding cycle of a population.

The Eastern Curlew breed in Russia, Siberia, and north-eastern China. As such, the proposed activity would not disrupt the breeding cycle of a population of this species.

Impact 6. Modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The proposed activity would not modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The mitigation measures would ensure that any potential impacts are mitigated as far as practicable.

Impact 7. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.

The proposed activity would unlikely result in the establishment of an invasive species.

Impact 8. Introduce disease that may cause the species to decline.

The proposed activity would not result in the introduction of any disease which would cause this species to decline.

Impact 9. Interfere with the recovery of the species.

There is no adopted or made Recovery Plan for this species. Considering the above factors, the proposed activity would not interfere substantially with the recovery of these species.

1.2 Endangered

The Australasian Bittern and the Australian Painted Snipe are listed as endangered under the EPBC Act. The EPBC Act Protected Matters Search indicates that "species or species habitat known to occur within area". Each significant impact criteria have been addressed below:

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it would:

Impact 1. Lead to a long-term decrease in the size of a population.

The subject site does not support key source populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of these species range. Thus, the proposed activity would not lead to a long-term decrease in the size of the Australasian Bittern and the Australian Painted Snipe populations.

Impact 2. Reduce the area of occupancy of the species.

The Australasian Bittern and Australian Painted Snipe live and forage in wetlands. Thus, the proposed activity would not reduce the area of occupancy for the Australasian Bittern and the Australian Painted Snipe.

Impact 3. Fragment an existing population into two or more populations.

The proposed activity is not expected to fragment any population of this species including to wetlands adjacent to Swan Lake.

Impact 4. Adversely affect habitat critical to the survival of a species.

The Australasian Bittern prefers permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds. The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. The proposed activity would not adversely affect habitat critical to the survival of these species.

Impact 5. Disrupt the breeding cycle of a population.

The proposed activity would not disrupt the breeding cycle of a population of these species.

Impact 6. Modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The proposed activity would not modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The mitigation measures would ensure that any potential impacts are mitigated as far as practicable.

Impact 7. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.

The proposed activity would unlikely result in the establishment of an invasive species.

Impact 8. Introduce disease that may cause the species to decline.

The proposed activity would not result in the introduction of any disease which would cause this species to decline.

Impact 9. Interfere with the recovery of the species.

Recovery plans under the EPBC Act have been adopted for both species. Considering the above factors, the proposed activity would not interfere substantially with the recovery strategies for these species.

1.3 Vulnerable

The following species are listed as vulnerable under the EPBC Act:

- Australian Fairy Tern
- Common Greenshank
- Eastern Hooded Plover
- Green and Golden Bell Frog
- Nunivak Bar-tailed Godwit
- Red Knot
- Sharp-tailed Sandpiper

Each significant impact criteria have been addressed below:

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it would:

Impact 1. Lead to a long-term decrease in the size of a population.

An important population of the Eastern Hooded Plover is known to occur at Cudmirrah Beach. The species has been recorded on the iNaturalist database. The subject site does not support other key source bird populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of these species range. With the implementation of mitigation measures, the proposed activity would not lead to a long-term decrease in the size of the bird populations.

The Green and Golden Bell Frog Key Population at Sussex Inlet – Swan Lake Management Plan (DECC, 2007) describes that the key population is currently known to centre around a breeding site within the Sussex Inlet Sewerage Treatment Plant (STP), which is managed by Shoalhaven Water. The frogs also occur on both private and public land including the foreshores of Swan Lake. There is one record of hearing their calls in a small wetland near Cudmirrah in 2005.With the implementation of mitigation measures, the proposed activity would not lead to a long-term decrease in the size of the frog population.

Impact 2. Reduce the area of occupancy of the species.

The proposed activity would not reduce the area of occupancy for these species.

Impact 3. Fragment an existing population into two or more populations.

The proposed activity is not expected to fragment any population of this species on or adjacent to Swan Lake.

Impact 4. Adversely affect habitat critical to the survival of a species.

The Australian Fairy Tern was once considered to occur in NSW, but is now not believed to usually persist in the state. It nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.

The Common Greenshank is a wader that has been recorded in most NSW coastal areas and is widespread west of the Great Dividing Range. It does not breed in Australia; however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia.

The Eastern Hooded Plover prefers sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding. The known northern limit is Jervis Bay, and an important population is known to occur at Cudmirrah Beach.

The Green and Golden Bell Frog Key Population site is located at the Sussex Inlet STP, located to the north of the subject site. The frogs are also likely to present on the foreshores of Swan Lake.

The Nunivak Bar-tailed Godwit is a is a northern hemisphere breeding wader that has been recorded in the coastal areas of all Australian state. The subject site is not one Australian sites of international importance and their populations.

The Red Knot is a northern hemisphere breeding wader that distributes widely to forage outside of breeding seasons around Australia. It is not found in significant numbers along much of the NSW coast, where wader habitat is generally scarce.

The Sharp-tailed Sandpiper a northern hemisphere breeding wader that distributes widely to forage outside of breeding seasons around Australia. It occurs in n most regions of NSW, especially in coastal areas.

The proposed activity would not adversely affect habitat critical to the survival of these species.

Impact 5. Disrupt the breeding cycle of a population.

The Common Greenshank, Nunivak Bar-tailed Godwit, Red Knot and Sharp-tailed Sandpiper do not breed in Australia. The proposed activity would not disrupt the breeding cycle of a population of the Australian Fairy Tern, Eastern Hooded Plover and Green and Golden Bell Frog species with the implementation of mitigation measures.

Impact 6. Modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The proposed activity would not modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The mitigation measures would ensure that any potential impacts are mitigated as far as practicable. This includes that where Green and Golden Bell Frogs or shorebirds are present, further consultation with NPWS and DCCEEW is required to determine the appropriateness of opening the entrance if the lake continues to rise.

Impact 7. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.

The proposed activity would unlikely result in the establishment of an invasive species.

Impact 8. Introduce disease that may cause the species to decline.

The proposed activity would not result in the introduction of any disease which would cause this species to decline.

Impact 9. Interfere with the recovery of the species.

A recovery plan under the EPBC Act has been adopted for the Australian Fairy Tern and there are Significant impact guidelines for the Green and Golden Bell Frog. Considering the above factors, the proposed activity would not interfere substantially with the recovery of these species.

1.4 Summary

Overall Assessment of Significance – No significant impact on any species listed under the EPBC Act 1999 are expected to occur (Table 1), and no additional assessment in the form of an Environmental Impact Statement (EIS) or referral to the Commonwealth Minister for consideration and approval is considered to be required.

Table 1 Summary of EPBC Act Assessment of Significance assessment findings.

Threatened species or communities	Important population*	Likely significant impact?
Australasian Bittern	N	N
Australian Fairy Tern	N	N
Australian Painted Snipe	N	N
Common Greenshank	N	N
Eastern Curlew	N	N
Eastern Hooded Plover	N	N
Green and Golden Bell Frog	N	N
Nunivak Bar-tailed Godwit	N	N
Red Knot	N	N
Sharp-tailed Sandpiper	N	N

Notes: Y = Yes (negative impact), N = No (no or positive impact), X = yes/no answer not applicable, ? = unknown impact.

*Significant Impact Guidelines 1.1 (DoE 2013)

2 Biodiversity Conservation Act 2016

The BC Act outlines several factors which need to be taken into account when considering whether a development or activity is likely to significantly affect threatened species or ecological communities, or their habits. The test of significance is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

A Test of Significance under the BC Act 2016 is undertaken in order to determine if the proposed activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme (BOS) entry requirements and for Part 5 activities under the EP&A Act. The Test of Significance is set out in s.7.3 of the BC Act 2016 (https://legislation.nsw.gov.au/#/view/act/2016/63/part7/div1/sec7.3). Information from the NSW DCCEEW Threatened Species Profile database has been mainly used for the assessment.

If the activity is likely to have a significant impact or would be carried out in a declared Area of Outstanding Biodiversity Value, the proponent must either apply the BOS or prepare a Species Impact Statement (SIS).

Following the analysis of Likelihood of Occurrence for species that have a high potential to occur within the subject site, the BC Act significant impact criteria were applied for the following taxa (* species that are also listed under the EPBC Act):

Critically Endangered

- Eastern Hooded Dotterel (or Plover) *

Endangered

- Green and Golden Bell Frog *
- Little Tern *
- Pied Oystercatcher

Vulnerable

- Eastern Osprey
- Sooty Oystercatcher
- Sooty Tern
- Southern Myotis
- White-bellied Sea-Eagle

2.1 Critically Endangered

An assessment of significance was undertaken for the Eastern Hooded Dotterel (or Plover), listed as critically endangered under the BC Act, as set out below:

Criteria 1 - 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.

The Eastern Hooded Dotterel is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW. 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. Hooded Plovers are seen singly, in pairs, family groups or small flocks, with 16 birds at Cudmirrah Beach being the largest group recorded in NSW in recent years. Surveys conducted over the past 15 years to determine the total population in NSW have made a maximum count of 64 adults. The estimated population for all of Australia is approximately 5,000 birds. The species has been recorded on the iNaturalist database.

Assessed Impact - It is not expected that the proposed activity would have an adverse effect on the life cycle of the Eastern Hooded Dotterel such that a viable local population of the species is likely to be placed at risk of extinction.

Criteria 2 - In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

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

Not applicable.

Criteria 3 - In relation to the habitat of a threatened species or ecological community:

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

(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

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

The Eastern Hooded Dotterel prefer sandy ocean beaches, but are occasionally found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh. They forage in sand at all levels of the zone of wave-wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain. At night they favour the upper zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the

season and water levels. They usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes.

Assessed Impact - The subject site contains suitable key habitat for the species which is known to occur. The opening of Swan Lake would have a minor impact on the foraging habitat for the species. If water levels are between 2.3 m AHD and 2.5 m AHD, Council should undertake consultation with NPWS to determine the presence of nesting Eastern Hooded Dotterels prior to initiating an opening. If the species is present, further consultation with NPWS and DCCEEW is required to determine the appropriateness of opening the entrance if the lake continues to rise.

Criteria 4 - 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).

Assessed Impact - No AOBVs listed under the BC Act are located near to the subject site so would not be impacted by the proposed activity.

Criteria 5 - Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Schedule 4 of the BC lists the "alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands" as a key threatening process (KTP). Three anthropogenic processes have predominantly altered flows in streams, rivers and their floodplains and wetlands in NSW. These are a) building of dams (including all dams and weirs and off-river storages); b) diversion of flows by structures or extraction and c) alteration of flows on floodplains with levees and structures (including those on wetlands to allow water storage). The proposed activity would not increase the impact of the KTP as relevant to this species.

There is also the potential for introduction and invasion of species during excavation works. This may occur during construction if plant and equipment do not adopt applicable mitigation/management measures and adhere to laws/guidelines associated with the prevention of introduction of exotic species.

2.2 Endangered

An assessment of significance was undertaken for the Green and Golden Bell Frog, Little Tern and Pied Oystercatcher, listed as endangered under the BC Act, as set out below:

The following is to be taken into account for the purpose 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,

Since 1990 there have been approximately 50 recorded locations in NSW of the Green and Golden Bell Frog, most of which are small isolated coastal populations. Populations exist in the Shoalhaven region, which includes the Sussex Inlet STP, located to the north of the subject site. The frogs are also likely to present on the foreshores of Swan Lake. The species has been recorded on the iNaturalist database.

Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts. 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.

The Pied Oystercatcher 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. The species has been recorded on the iNaturalist database.

Assessed Impact - The proposed activity is not expected to effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

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

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

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

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 or modified as a result of the proposed development or activity, and

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

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

The Green and Golden Bell Frog inhabits marshes, dams and stream-sides, particularly those containing bullrushes or spikerushes. Optimum habitat includes waterbodies that are unshaded, free of predatory fish, have a grassy area nearby and diurnal sheltering sites available. The species is active by day and usually breeds in summer when conditions are warm and wet.

The Little Tern is almost exclusively coastal, preferring sheltered environments; however, may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). The nests are in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The only two sites where the species currently nests in the Shoalhaven are Comerong Island, Lake Conjola and Lake Wollumboola.

The Pied Oystercatcher favours intertidal flats of inlets and bays, open beaches and sandbanks. It forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. Nests are mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January.

Assessed Impact - The subject site contains suitable key habitat for the species which are known to occur. The opening of Swan Lake would have a minor impact on the foraging habitat for these species. If water levels are between 2.3 m AHD and 2.5 m AHD, Council should undertake consultation with NPWS to determine the presence of nesting shorebirds (Little Tern and Pied Oystercatcher) or Green and Golden Bell Frogs prior to initiating an opening. Shorebird nesting season is from August to March. Council is to liaise with DCCEEW to access records of existing surveys of Green and Golden Bell Frogs in the Swan Lake area carried out in accordance with The Green and Golden Bell Frog Key Population at Sussex Inlet – Swan Lake Management Plan (DECC, 2007). If Green and Golden Bell Frogs or shorebirds are present, further consultation with NPWS and DCCEEW is required to determine the appropriateness of opening the entrance if the lake continues to rise.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No areas of outstanding biodiversity value under the BC Act occur in the study area so they would not be impacted by the proposed activity.

(e) whether the proposed development is likely to increase the impact of a key threatening process or is likely to increase the impact of a key threatening process.

Schedule 4 of the BC lists the "alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands" as a key threatening process (KTP). Three anthropogenic processes have predominantly altered flows in streams, rivers and their floodplains and wetlands in NSW. These are a) building of dams (including all dams and weirs and off-river storages); b) diversion of flows by structures or extraction and c) alteration of flows on floodplains with levees and structures (including those on wetlands to allow water storage). The proposed activity would not increase the impact of the KTP as relevant to these species.

There is also the potential for introduction and invasion of species during excavation works. This may occur during construction if plant and equipment do not adopt applicable mitigation/management measures and adhere to laws/guidelines associated with the prevention of introduction of exotic species.

The KTP listed as "infection of frogs by amphibian chytrid causing the disease chytridiomycosis" is relevant to the Green and Golden Bell Frog. However, the proposed activity is unlikely to impact on the spread of this disease or the species susceptibility.

2.3 Vulnerable

An assessment of significance was undertaken for the Eastern Osprey, Sooty Oystercatcher, Sooty Tern, Southern Myotis and White-bellied Sea-Eagle, which are listed as vulnerable under the BC Act, as set out below:

The following is to be taken into account for the purpose 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,

The Eastern Osprey has a global distribution with four subspecies previously recognised throughout its range. Eastern Ospreys are found right around the Australian coastline, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia.

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. The species has been recorded on the iNaturalist database.

The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones.

The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.

The White-bellied Sea-Eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In NSW, it is widespread along the east coast, and along all major inland rivers and waterways. The species has been recorded on the iNaturalist database.

Assessed Impact - The proposed activity is not expected to effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

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

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

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

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 or modified as a result of the proposed development or activity, and

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

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

The Eastern Osprey favours coastal areas, especially the mouths of large rivers, lagoons and lakes. They feed on fish over clear, open water and breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.

The Sooty Oystercatcher favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. It forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeding occurs in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.

The Sooty Tern features in large flocks that can be seen soaring, skimming and dipping but seldom plunging in offshore waters. Breeding occurs in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.

The Southern Myotis generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and in dense foliage. They forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.

The White-bellied Sea-Eagle habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. It occurs at sites near the sea or seashore 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 forest and woodland areas and typically two eggs are laid between June and September.

Assessed Impact - The subject site contains suitable key habitat for the species which is known to occur. There is no impact on vegetation around the lake edge such that the Southern Myotis habitat would be impacted. The breeding habitats of the Eastern Osprey, Sooty Tern and White-bellied Sea-Eagle would not be impacted. The opening of Swan Lake would have a minor impact on the foraging habitat for these species. If water levels are between 2.3 m AHD and 2.5 m AHD, Council should undertake consultation with NPWS to determine the presence of nesting shorebirds (Sooty Oystercatcher) prior to initiating an opening. If this species is present, further consultation with NPWS and DCCEEW is required to determine the appropriateness of opening the entrance if the lake continues to rise.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No areas of outstanding biodiversity value under the BC Act occur in the study area so they would not be impacted by the proposed activity.

(e) whether the proposed development is likely to increase the impact of a key threatening process or is likely to increase the impact of a key threatening process.

Schedule 4 of the BC lists the "alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands" as a key threatening process (KTP). Three anthropogenic processes have predominantly altered flows in streams, rivers and their floodplains and wetlands in NSW. These are a) building of dams (including all dams and weirs and off-river storages); b) diversion of flows by structures or extraction and c) alteration of flows on floodplains with levees and structures (including those on wetlands to allow water storage). The proposed activity would not increase the impact of the KTP as relevant to these species.

There is also the potential for introduction and invasion of species during excavation works. This may occur during construction if plant and equipment do not adopt applicable mitigation/management measures and adhere to laws/guidelines associated with the prevention of introduction of exotic species.

2.4 Summary

Overall, there are not expected to be any significant impacts to the identified species as a result of the proposed activity. A summary of the BC Act test of significance findings is provided in Table 2.

Table 2 Summary of BC Act Assessment of Significance findings.

	Test of significance*					
Threatened species or community	**a**	**b**	**c**	**d**	**e**	**Likely significant impact?**
Eastern Hooded Dotterel	N	X	N	X	N	N
Eastern Osprey	N	X	N	X	N	N
Green and Golden Bell Frog	N	X	N	X	N	N
Little Tern	N	X	N	X	N	N
Pied Oystercatcher	N	X	N	X	N	N
Sooty Oystercatcher	N	X	N	X	N	N
Sooty Tern	N	X	N	X	N	N
Southern Myotis	N	X	N	X	N	N
White-bellied Sea-Eagle	N	X	N	X	N	N

Notes: Y = Yes (negative impact), N = No (no or positive impact), X = yes/no answer not applicable, ? = unknown impact.

*Biodiversity Conservation Act 2016, s7.3