Royal HaskoningDHV
Enhancing Society Together

REPORT

The Entrance Dredging Program

Review of Environmental Factors

Client: Central Coast Council

Reference: PA2377MARP2008181227
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1 Introduction

1.1 Overview

This document comprises a Review of Environmental Factors (REF) for the proposed dredging program for The Entrance Channel, Tuggerah Lake. It is a written statement prepared for Central Coast Council (Council) that considers the impact of the proposed dredging on the natural and built environment, and the proposed methods of mitigating or ameliorating any adverse effects.

This 2020 REF provides an update to the 2009 REF (WorleyParsons 2009), to account for several changes including an overhaul of the dredge program methodology, changes to legislation and licencing changes. The proposed dredging operations will however be largely consistent that assessed and outlined in the 2009 REF.

1.2 Background

Tuggerah Lakes estuary is located on the Central Coast of NSW between Newcastle and Sydney. The estuary comprises three shallow lakes (Lake Munmorah, Budgewoi Lake and Tuggerah Lake) which exit to the ocean from Tuggerah Lake via a single opening, The Entrance channel (refer **Figure 1**).

The estuary has a surface area of 80 km^2 and drains a much larger catchment of approximately 710 km^2 (CCC, 2019). The estuary provides valuable resources to the community in terms of recreation, tourism and fisheries. The entrance to the estuary has closed through the accumulation of sand in The Entrance Channel at least 13 times in the past 100 years and can remain closed for several months (WSC, 2004).

The natural shoaling of sands within The Entrance Channel causes the intermittent closing of the channel. This shoaling has necessitated the management of the channel through maintenance dredging, this approach is supported in the Tuggerah Lakes Estuary Management Plan.

The maintenance dredging was first undertaken by Council in 1993 as part of the Tuggerah Lakes Restoration Project. Maintenance dredging has been carried out on an “as needs” basis, approximately yearly until the 2009 REF (WorleyParsons 2009) recommended that dredging operations be undertaken less frequently with more material dredged during each campaign. Since that time, dredging operations have been undertaken every two to three years on average, with the most recent campaign removing approximately 45,000 m^3 of material in 2018. Recent dredging campaigns typically required around 800 to 1,000 hours of dredging which were completed over a period of around six months (GHD 2019).

The proposed works that are the subject of this 2020 REF involve:

- a relatively small campaign in 2020, likely constrained to less than 30,000 m^3 from a footprint immediately downstream and upstream of the Central Coast Highway bridge, and reuse of the sand on North Entrance Beach.
- more substantial dredging campaigns when triggers (currently being developed) are met. It is anticipated this may involve the annual or biennial dredging campaigns with removal of approximately 30,000 m^3 to 80,000 m^3 (up to 100,000 m^3) of sediments from a footprint extending from The Entrance Channel sand spit westward to Picnic Point and northward to the northern end of the Terilbah Channel.

1.3 Structure of this Document

This REF has been prepared to support the planning approval for these dredging works. The dredging and sand placement does not require development consent and falls under Part 5 of the of the *Environmental Planning & Assessment Act, 1979 (*EP&A Act*).*

In summary this REF details:

- The introduction and background to the project (Section 1)
- A description of the project proposal and any consideration of alternatives (Section 2)
- A review of the environmental planning framework (Section 3)
- An assessment of the environmental effects (Section 4)
- Identification of the proposed mitigation and control measures that should be employed (Section 5)
- A summary of the REF and its findings (Section 6) and
- Conclusion (Section 7).

1.4 Site Description

The site is located at the entrance of the Tuggerah Lakes estuary. Relevant areas are depicted in **Figure 1**.

The Entrance Channel is located between the two urbanised areas of The Entrance and The Entrance North. These areas are connected via The Central Coast Highway bridge.

The proposed area of dredging spans from the northern end of Terilbah Channel, downstream to The Entrance sand spit extending from Karagi Point (also known as Dunleith Point). Dredging to the west of the bridge to the vicinity of Picnic Point is also proposed. One sand island is located adjacent to the proposed dredge footprint, being Terilbah Island to the west of Terilbah Channel.

Beaches within the study area considered for beach nourishment purposes include: the Karagi foreshore Park and Dunleith Tourist Park foreshore (termed the Estuary Eastern beach), and North Entrance Beach on the open coastline immediately to the north of The Entrance Channel respectively. Other areas within The Entrance sand system may also be nourished from time to time, if required for beneficial purposes, following subsequent assessment.

Figure 1: Study Area (NearMaps 31 August 2020)

2 Project Proposal

2.1 General

The objectives for the Entrance Channel dredging program are to:

- Dredge channel areas that will help to:
  (i) extend the duration of the open/well-flushed entrance conditions,
  (ii) reduce the threat of channel scour/sedimentation to foreshore assets; and
  (iii) improve recreational boating access and amenity;
- Reuse dredged material for beneficial purposes (coastal protection, foreshore amenity, training of tidal flows) and manage dredge materials in a way that is practical for Council;
- Undertake dredging when trigger conditions are met;
- Ensure dredge planning and operations limit potential impacts to significant environmental values, including Little Tern habitat, marine vegetation and water quality

As noted in **Section 1**, maintenance dredging was first undertaken by Council in 1993 as part of the Tuggerah Lakes Restoration Project and was then carried out on an "as needs" basis, approximately yearly until the 2009 REF (WorleyParsons 2009) recommended that dredging operations be undertaken less frequently with more material dredged during each campaign. Since that time, dredging operations have been undertaken every two to three years on average, with the most recent campaigns removing approximately 35,000 m^3 of material in 2015 and 45,000 m^3 of material in 2018. A summary of dredging campaigns since 1993 is included in **Table 1**.

Table 1 History of Dredging

Start Date	Finish Date	Location	Duration of dredging (approx. months)	Frequency of Dredging (months since last completed)
1/04/1993	8/05/1993	The Entrance Channel	1	-
10/09/1993	30/11/1993	The Entrance Channel	3	4
28/01/1994	14/02/1994	South Channel	<1	-
6/06/1994	16/06/1994	Terilbah Channel	<1	-
16/06/1994	20/09/1994	The Entrance Channel	3	6
21/09/1994	5/10/1994	Terilbah Channel	<1	3
15/10/1994	10/11/1994	The Entrance Channel	1	<1
16/08/1995	23/11/1995	The Entrance Channel	3	9
16/04/1996	22/05/1996	The Entrance Channel	1	5
21/10/1996	13/11/1996	The Entrance Channel	1	5
14/04/1997	1/08/1997	The Entrance Channel	4	5
9/03/1998	20/04/1998	The Entrance Channel	1	7
6/08/1999	26/11/1999	The Entrance Channel	4	16
5/07/2000	26/09/2000	The Entrance Channel	3	7
3/09/2001	2/11/2001	The Entrance Channel	2	11
12/08/2002	18/11/2002	The Entrance Channel	3	9
1/05/2004	1/10/2004	The Entrance Channel	5	17
7/12/2005	20/12/2005	The Entrance Channel	<1	14
6/02/2006	16/05/2006	The Entrance Channel	3	2
25/09/2006	29/11/2006	The Entrance Channel	2	4
5/02/2008	18/04/2008	The Entrance Channel	2	14
19/04/2008	13/05/2008	Terilbah Channel	1	164
New REF in 2009				
3/05/2010	29/06/2010	The Entrance Channel	2	24
1/09/2012	5/12/2012	The Entrance Channel	3	27
29/06/2015	5/12/2015	The Entrance Channel	5	31
12/04/2018	5/11/2018	The Entrance Channel	7	29

Source: GHD (2019)

2.2 Proposed Dredging Works

2.2.1 Campaign in 2020

The relatively small campaign in 2020 would involve dredging up to 30,000 m^3 in two stages:

- Stage 1 would involve dredging downstream and upstream of the highway bridge, pumping to a dewatering/re-handling area adjacent to Karagi carpark and tracking to North Entrance Beach for beach nourishment via an existing beach access track located within Karagi carpark, to address recent beach erosion. Particular consideration has been given to an adaptative dredging campaign due to the expected presence of the migratory Little Tern (*Sternula albifrons*) (refer **Section 4.4.2** for further discussion).
- Stage 2 would involve dredging downstream and upstream of the highway bridge and pumping to an area along the estuary eastern beach to reinstate foreshore access and stabilise the steep erosion escarpment.

Silt curtains would be employed around the dewatering/re-handling area and during reinstatement and stabilisation of the estuary eastern foreshore.

Dredging would be undertaken by means of a submersible pump fitted with side cutters to the end of an excavator boom. The excavator would be mounted on a barge. The barge would be restrained in position while dredging by means of spuds lowered to the seabed.

The excavator would swing the boom/pump and dredge an arc. Once the extent of dredging from a set-up of the barge was completed, the spuds would be raised and the barge would be moved to the next position, with the assistance of a work boat. The process would then be repeated.

The dredged material (sand) would be pumped to the shore via a floating pipeline, approximately 250-300 mm in diameter. The depth of dredging below the existing seabed would not exceed approximately 2 m, or a level of -2.5 m AHD[1].

The Stage 1 and Stage 2 dredging concept are shown in **Figure 2** and **Figure 3** respectively.

Photo 1 shows a view of the submersible pump and associated cutters on the end of the excavator boom resting on the deck of the barge. **Photo 2** shows the excavator and barge arrangement, including the spuds (in this photo the excavator is driving a pile rather than dredging).

[1] *AHD = Australian Height Datum, which is approximately mean sea level.*

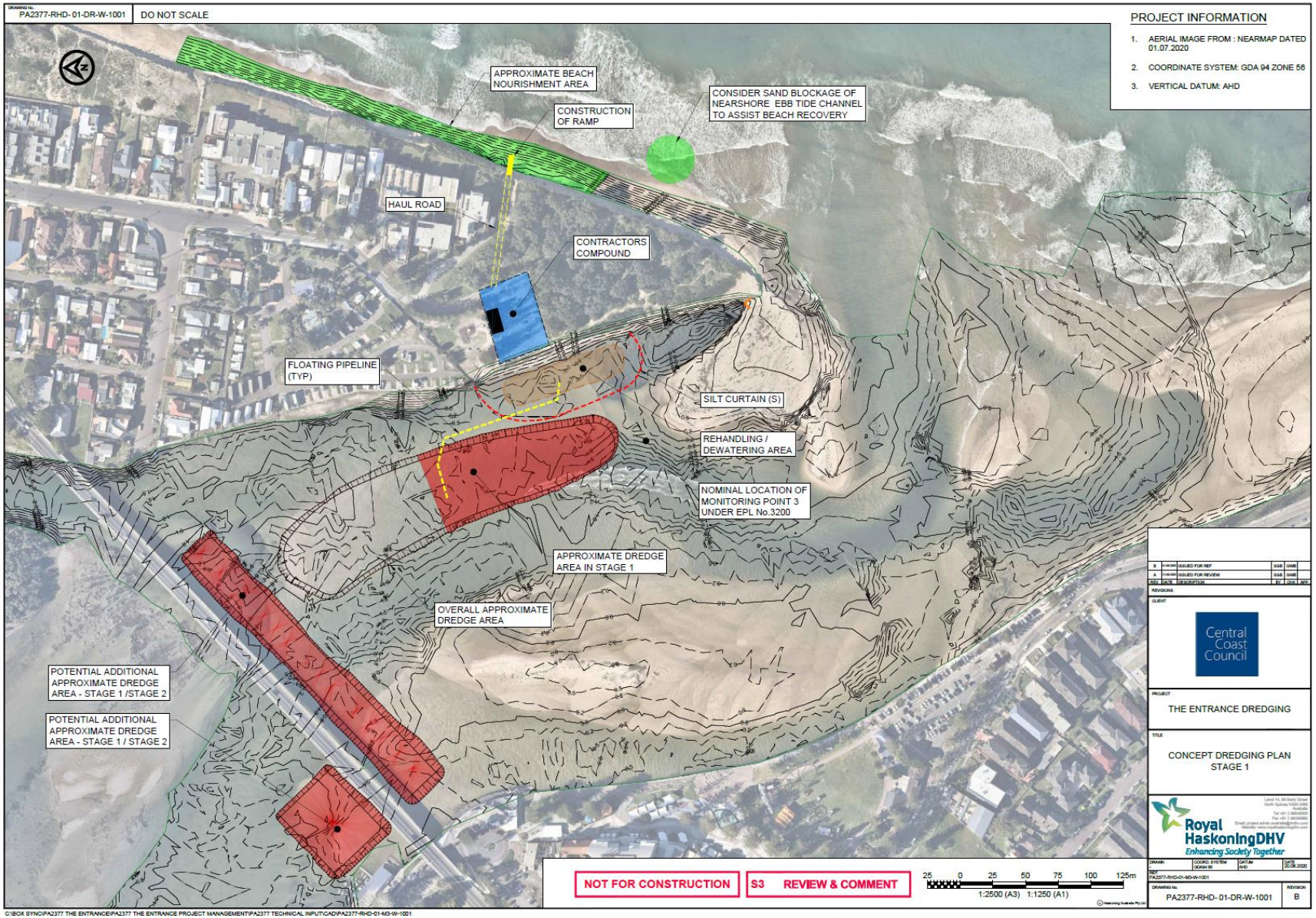

Figure 2: Stage 1 dredging concept

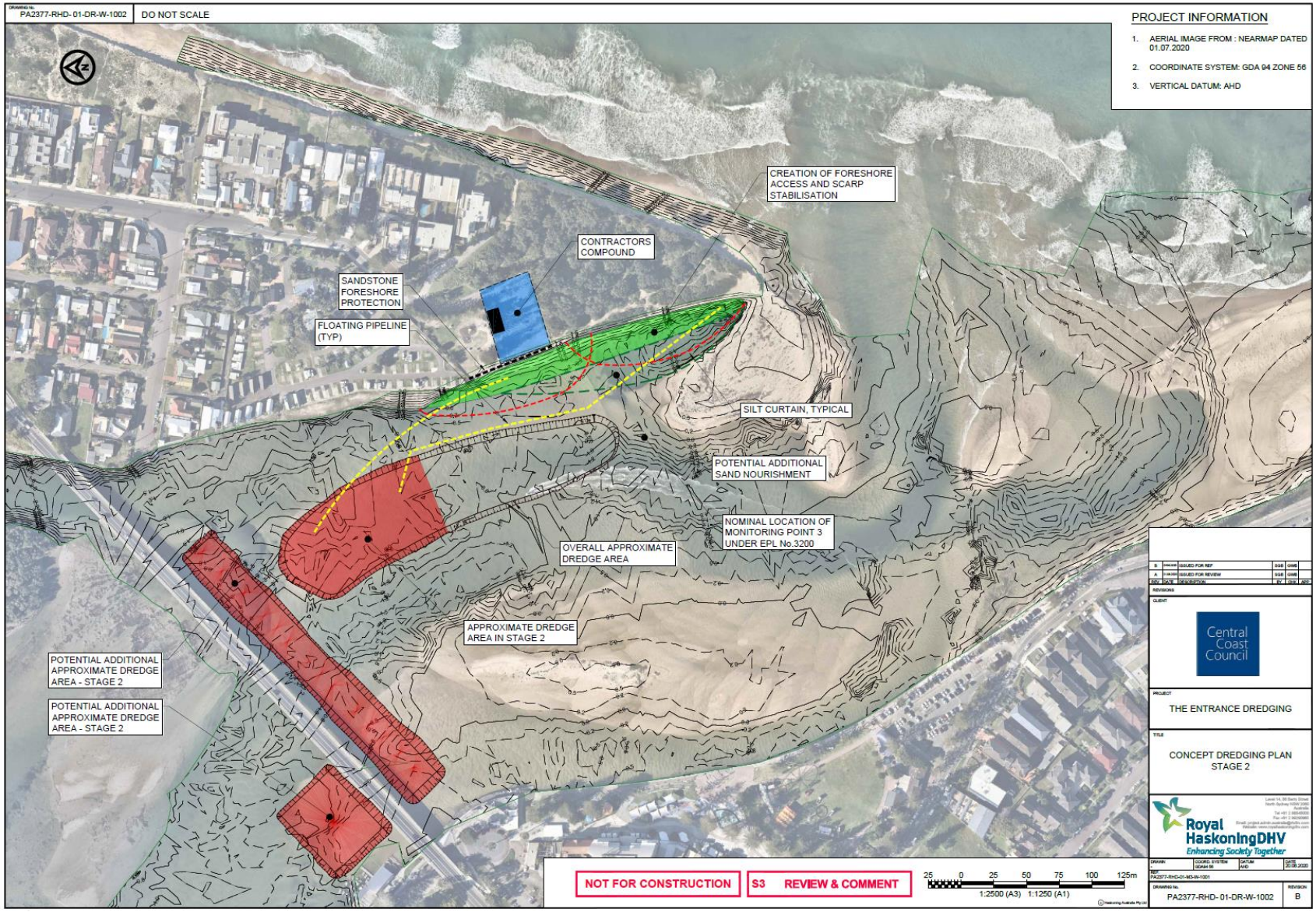

Figure 3: Stage 2 dredging concept

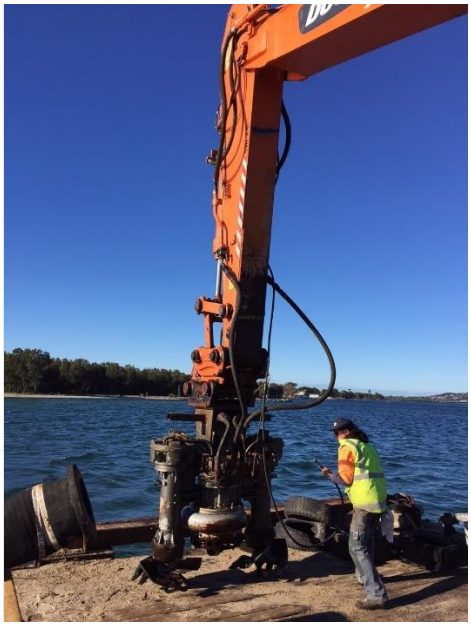

Photo 1 Submersible pump and associated cutters

Photo 2 Excavator and barge arrangement

2.2.2 Proposed dredging works generally (beyond 2020 campaign)

The dredging would generally be undertaken as per previous dredging campaigns of The Entrance Channel and is predominantly designed to enhance the ebb tide flow (out flow) from the estuary. The dredge strategy was developed following trial dredging investigations in 1991 and has been refined following annual maintenance dredging that has been carried out in The Entrance Channel since 1993. The previous strategy involved staged dredging by Council using a Council-owned small (10/8) cutter suction dredger (CSD)[2], but will now use dewatering areas in accordance with EPA requirements. The typical arrangement of the dredge footprint covers approximately 2.5 km's of channels and sumps within The Entrance System as shown in **Figure 2** and **Photo 3**.

[2] *The Council owned CSD has now been decommissioned. Future dredging would be undertaken by a similar CSD or by a submersible pump and excavator arrangement.*

Photo 3 The Entrance System

Dredging commences from the upstream end of the channels such that the ebb flows contribute to the dredging efforts. The channels are typically dredged to a width of 50 m and to a level of 2.0 m below water level except as noted below. Water level in the lake is approximately 0.06 m above AHD in the vicinity of The Entrance.

Dredging is generally undertaken as follows:

- creation of a sediment trap (sump) across the main entrance parallel and adjacent to the eastern side of the road bridge. The low velocity environment created by the dredged sediment trap causes deposition of sands migrating upstream with the flood tide, prolonging the timeframe required between maintenance dredging episodes and reducing the need to dredge channels upstream of the bridge.
- dredging the main channel to the east of the road bridge on an approximately yearly basis, but may be undertaken less frequently based on current conditions.
- dredging the ebb dominant northern channel (between the road bridge and the caravan park). This section of channel is dredged on a less frequent basis.
- dredging the ebb dominant northern channel from the caravan park, downstream through the middle of the flood tide shoal to the mouth of the estuary. This channel is dredged to a width of approximately 80 m. The southern tip of the sand spit is also dredged.

Additional dredging is also undertaken on an ‘as required’ basis:

- dredging of Terilbah Channel, from the northern end of Terilbah Island, approximately parallel to Stewart St, downstream to the road bridge. Terilbah Channel has been dredged three times since dredging began in 1993 and was last dredged in 2008.
- occasional dredging of a sump, perpendicular to and south of the main channel, just to the west of the sand spit.
- dredging of the main channel to the west of the road bridge to a width of approximately 80 m. This area was significantly dredged in 1993 and was last dredged in 1995. The area has progressively shallowed and is likely to require future dredging to allow flushing of the ebb tide into The Entrance Channel.

- dredging of a flood dominant southern channel (to 1.0 m below water level) along the southern foreshore of The Entrance Channel.

2.2.3 Production Rates and Quantities

Council's dredge was built to specification based on dredging trials undertaken in March/April 1991. The trials indicated that effective maintenance of The Entrance Channel would require a dredge capable of removing 60,000 m^3 of material over a 12 week period (PBP, 2004). This equates to approximately 5,000 m^3 per week, or approximately 100 m^3 per hour on average. Production rates from recent dredging programs indicate that these targets have not been met.

Dredging production rates of approximately 45 m^3/hr to 105 m^3/hr (170 t/hr) were achieved by the CSD. Slower rates can apply during dredging of the sump and in the vicinity of the ebb tide channel between the bridge and the caravan park due to the presence of old bridge supports and old Telecom cables within the channel. Similarly, dredging of the main channel downstream of the caravan park is often slowed due to the presence of fishermen and anchored boats within the channel.

The 2020 campaign would involve a quantity up to 30,000 m^3 as noted previously.

2.3 Proposed Beach Nourishment

Dredged sand is beneficially reused to nourish areas where, through visual inspection, it is determined that maximum environmental benefit to the dune system and beach amenity would result. Council aims to nourish beaches and foreshores to:

- renourish and protect dunes and foreshore areas and subsequently the ecosystems of these areas;
- protect the recreational value of the beaches as areas of public recreation; and
- retain sand as mobile beach sand circulating within The Entrance sand system and prevent a net reduction of sand from the system over time. This is necessary to maintain the sand spit, The Entrance sand bar and flood tide shoals which are the natural control on lake levels, and which provide natural protection of upstream areas from ocean storms.

North Entrance Beach is typically nourished during each dredging campaign. The beach profile experiences erosion during significant storm events which can undermine the vegetated dunes and private property as shown in **Photos 4** and **5**.

Placement to the south of a "null point" in the general vicinity of Hargraves Street ensures that the sand is reworked back towards The Entrance Channel, thereby retaining sand within The Entrance sand system. The 2020 campaign seeks to extend approximately 40 m north of Hargraves Street to nourish recent rock toe protection works. If required, dredged sand for nourishment purposes may be temporarily stockpiled nearby to the Entrance Channel sand system (e.g. vicinity of the North Entrance Surf Life Saving Club beach accessway), for later placement south of the "null point".

The estuary eastern beach is renourished on a regular basis. Recently, a small sand spur was also placed in the vicinity of the boundary of Karagi Foreshore Park and the Dunleith Tourist Park foreshore. **Photos 6** and **7** show the effects of erosion in this area.

Photo 4: Erosion of The Entrance North, looking south, 19 July 2020

Photo 5: Erosion of The Entrance North, looking south, 19 July 2020

Photo 6: Estuary Eastern beaches view east from Karagi Foreshore Park towards the sand spit, 31 July 2020

Photo 7: Estuary Eastern beaches view west from Karagi Foreshore Park towards Dunleith Tourist Park, 31 July 2020

The Entrance Beach is renourished on a less frequent basis. Nourishment has been undertaken approximately every five years (1994, 1999, and 2004). Approximately 30,000 m^3 of dredged sand was placed on The Entrance Beach in 2004. Nourishment generally takes place only following representations from the Surf Club. Council considers that the area is too dynamic for sand to remain in place for any considerable length of time. The nourishment process is often slower than that of adjacent beaches as a result of regular disruption to the floating discharge pipeline during strong flood tides through the throat[3] of The Entrance Channel or due to wave action across the rock platform to the north of The Entrance Beach.

Dredged sand is pumped to the nourishment areas along a temporary submerged discharge pipeline. A permanent pipeline is also buried within the dune system and exits onto North Entrance Beach, however this pipe is no longer fit for purpose due to deterioration. The maximum pumping distance to any nourishment area is typically 1000 m. No booster pump is used. Sand dredged from upstream of the road bridge is therefore limited to placement on the Estuary Eastern beach. Dredged sand from the sump and from the ebb tide channel between the bridge and the caravan park is deposited on the Estuary Eastern beach, in the general area on Karagi Foreshore Park and Dunleith Tourist Park foreshore, whereas sand dredged further downstream, from the main channel and from the flood dominant southern channel is pumped to North Entrance Beach or occasionally, The Entrance Beach.

A groyne was constructed on the southern side of The Entrance in 2017, designed to trap sand on The Entrance Beach to the south, as shown in **Photo 8**. Sand from the 2018 dredging works was pumped to The Entrance Beach, which is currently relatively well nourished. Sand from the 2020 dredging campaign is not proposed to be pumped to The Entrance Beach.

[3] *The throat is that section of the channel near the southern tip of the sand spit having minimum cross-section dimensions*

Photo 8: The Entrance South beach and constructed groyne, May 2020

To minimise localised erosion at the discharge location, the dredged sand is sprayed upwards to dissipate energy using a deflector plate as shown in **Photo 9**. This is undertaken from an elevated pipeline outlet onto the subaerial (above water) profile of the beach, below the edge of the erosion scarp where possible.

Photo 9: Dredged sand deposition showing energy dissipation via deflector plate

2.4 Consideration of Alternatives

2.4.1 Dredging Alternatives

Alternatives to the regular maintenance dredging of The Entrance Channel have previously been discussed in technical papers prepared by the NSW Public Works Department and Patterson Britton and Partners (refer PWD, 1988; PBP, 1994; PBP, 2004) in The Tuggerah Lakes Estuary Management Study (Roberts and Dickinson, 2005), by the Longshore Sand Transport and Tidal Inlet Stability Study for The Entrance and The Entrance North (SMEC, 2011), the Tuggerah Lakes – The Entrance Morphodynamic Modelling (Cardno, 2013), and in The Entrance Channel Dredging Operations Feasibility Review (GHD, 2019).

Options considered included:

- fixed jet pumping system with geotextile tubes stabilising the entrance channel;
- construction of entrance training walls and breakwaters;
- creating a second entrance to the lakes; and
- creating a connection to Lake Macquarie.

These options were considered unfeasible based on cost (high capital and maintenance costs) and/or to have major environmental impacts.

2.4.2 Alternative Placement Options

To minimise costs, potential nourishment areas are limited to within the typical maximum pumping distance of the dredge without boosters, i.e. approximately 800 m.

Placement on Town Beach
Town Beach is an informal beach area which forms transiently on the southern foreshore of The Entrance Channel. While nourishment of this area has been undertaken in the past, it is not an ideal location for beach nourishment for several reasons. This is a highly dynamic area and is often occupied by the flood tide channel, which could be dredged to enhance the flood tide flows. In addition when the beach is present the flood tide channel is diverted across The Entrance Channel, causing additional scour along the estuary eastern beach. Council has also expressed safety concerns in relation to encouraging swimming within The Entrance Channel in this location.

Nourishment of Islands within the Estuary
Nourishment of the foreshores of islands within the estuary such as Terilbah Island using dredged material was considered unsuitable as placement would likely result in the smothering of seagrasses and intertidal habitat utilised by wading birds for feeding and nesting. The creation of sandy islands below the highway bridge to manage tidal flows is a potential means of beneficial re-use of dredged material, however will require further investigation and appropriate assessment.

2.4.3 Do Nothing Option / Entrance Adjustment Trial

The do-nothing alternative (i.e. to not undertake dredging and beach nourishment) would result in maintenance cost savings however it is not currently the endorsed approach. GHD proposed that an entrance adjustment trial could be developed under which dredging works would be placed on hold and The Entrance allowed to adopt its natural profile according to climatic conditions. During this period, detailed monitoring of water levels, berm height of the Karagi sand spit, water quality and associated

environmental parameters could be undertaken (GHD, 2019). Based on current information, doing nothing / entrance adjustment trial may result in the following possible outcomes:

- intermittent closing of The Entrance Channel;
- reduction/prevention of tidal flushing of entrance waters with the ocean waters potential deterioration in water quality in the immediate entrance area;
- potential changes to wetland and aquatic biodiversity, due to changes in water chemistry, increased water level variations around the estuary margins and reduced passage of aquatic fauna between the lakes and ocean.
- potential changes in flooding behaviour of the estuary; and
- potential loss of amenity in areas that benefit from beach nourishment with dredged sand.

2.5 Preferred Proposal

As the do-nothing option is not the currently endorsed approach and would potentially result poorer amenity conditions for foreshore and beach areas that are nourished with dredged material, an option is required to dredge The Entrance Channel from time to time.

As has previously been determined, maintenance dredging of The Entrance Channel is a viable option to achieve water quality and amenity outcomes within the immediate Entrance Channel area, at a reasonable cost and with limited adverse social, economic or environmental impacts. The practices are flexible and allow for the selection of dredging and beach nourishment locations to achieve maximum benefit depending on antecedent conditions.

The dredging would facilitate:

- tidal exchange of lake waters with the ocean thereby reducing sediment loads, and pollutant and contaminant concentrations within the immediate Entrance Channel area;
- preservation of the existing diversity and abundance of flora and fauna in the estuary which have adapted to the dredging regime; and
- preservation of amenity at The Entrance and surrounding beach and foreshore areas.

Any small beds of seagrass (Z.capricorni) that have colonised since previous dredging campaigns would be removed during the dredging process in accordance with a Fisheries Permit. These areas are not considered significant relative to the overall abundance of Z. capricorni in the estuary. The removal of these areas is considered an acceptable consequence in the management of the channel for the purposes stated previously.

The preferred locations for beach nourishment (i.e. the Estuary Eastern beach, North Entrance Beach and The Entrance Beach) and the method of beach nourishment used (i.e. pumping of material via a pipeline and/or stockpiling and trucking of sand to the desired location) allows for the beneficial reuse of the proposed dredged sand to protect the existing dunes and enhance beach amenity while retaining sand within The Entrance sand system. This option also minimises costs associated with transportation and access to nourishment areas.

If sand was to be placed in areas outside of The Entrance sand system (such as north of the null point on North Entrance Beach), the erosion problem along North Entrance Beach (i.e. south of the null point) would most likely be exacerbated as a result of a reduction in supply of material. If nourishment of the preferred locations is not undertaken, continued erosion of the existing dune systems and foreshore vegetation and associated impacts may result.

2.6 Construction Materials, Plant and Equipment

The following plant and equipment would generally be used in the dredging and beach nourishment activities:

- Small (cutter suction dredger) CSD or excavator with submersible pump mounted on a barge;
- A work boat;
- Floating or sunken discharge pipeline;
- Excavator/s;
- Dozer/s; and
- Trucks.

Safety and Signage
Several safety measures are implemented during dredging and at the beach nourishment sites during discharge of dredged material and reshaping of the beach profile including:

- fitting the dredge with navigation “obstruction signage”
- inform RMS to issue a marine notice regarding dredging operations;
- marking the discharge pipeline with floats spaced every 30 to 40 m within the channel;
- fencing off the outlet of the discharge pipe and erecting signs along the fence with either symbols indicating No Surfing/ No Walking or “Reclamation/ Keep Out”; and
- continual monitoring of the discharge area during operational hours.

Refuelling
The dredge or excavator is typically refuelled every two days during the dredging operation. A fuel truck (with capacity to carry 2500L of distillate) is parked at the western end of Hargraves St (refer **Figure 1**) to refuel a workboat. The workboat is used to shuttle and pump fuel to the dredge.

The dredge is supplied with a spill kit containing booms, pads and absorbent material. In the event of a spill, all operations will follow procedures in accordance with the relevant Pollution Incident Response Management Plan (PIRMP), and these are in place to control the cause, contain the spill, notify the Works Supervisor and NSW Fire & Rescue, and to clean-up the spill.

Service and Maintenance
Routine maintenance is occasionally undertaken on the water to keep plant and equipment in operation.

2.7 Project Timing and Duration

As noted in **Section 2.1**, the objectives for the Entrance Channel dredging program are to:

1. Dredge channel areas that will help to:
   (i) extend the duration of the open/well-flushed entrance conditions,
   (ii) reduce the threat of channel scour/sedimentation to foreshore assets; and
   (iii) improve recreational boating access and amenity;

2. Reuse dredged material for beneficial purposes (coastal protection, foreshore amenity, training of tidal flows) and manage dredge materials in a way that is practical for Council;

3. Undertake dredging when trigger conditions are met, noting the aim is to commence dredging operations this year (2020);

4. Ensure dredge planning and operations limit potential impacts to significant environmental values, including Little Tern habitat, marine vegetation and water quality;

5. Be cost effective and affordable to Council (by ensuring that dredge planning, design and operations can be achieved within available budgets); and

6. Ensure that expert dredging consultancy advice for the immediate dredging campaign adds value to Council's knowledge base and information resources, that can be drawn upon for future use.

While dredging campaigns are predominantly timed to prevent the closure of the estuary mouth, several other objectives are also considered.

Dredging and beach nourishment during peak tourism periods is generally avoided for both aesthetic and safety reasons. To ensure a more appealing appearance of The Entrance area during the summer holiday period, completion of dredging generally occurs prior to the commencement of the December school break.

Beach nourishment of North Entrance Beach is typically not undertaken during the spring-summer breeding times of the threatened species, the Little Tern (*Sternula albifrons*) (refer **Section 4.4.2** for further discussion) which is known to breed on The Entrance sand spit. However, dredging has on occasion extended into October, November and December, without significant impact to the Little Terns.

Consideration has previously been given to the timing of dredging to benefit marine fauna passage between the ocean and the lakes following ocean spawning. However, advice from NSW Fisheries during the Tuggerah Lakes Restoration Project in the early 1990's indicated that no particular timing for the dredging is beneficial. Feedback from commercial fishers indicates a preference for dredging not to be undertaken during the prawning season which generally ends by March each year.

For the above noted reasons, dredging is generally undertaken in the period from April to September. A typical dredging campaign is approximately 3-4 months in duration with approximately 800 hours of dredging undertaken.

2.8 Working Hours

The following working hours are proposed:

- Monday to Friday 6am to 6pm
- Saturday 6am to 1pm
- No work on Sunday or Public Holidays

Owing to the nature of the site, being located in a waterway and on the beach and potentially exposed to wave action, tidal action, and erosion, it is possible the Contractor may seek to carry out work outside the above normal working hours to take advantage of particular weather and tidal conditions. In such cases it would be necessary for the Contractor to make application to Council for approval to extend the hours and for due consideration to be given to issues such as noise generation, traffic impact and the like.

2.9 Rehabilitation of Work Areas

Following placement at predetermined locations, the sand would be shaped into a natural pre-eroded beach profile by bulldozer and other earthmoving machinery and left unvegetated as mobile beach sand.

The desired cross-shore and alongshore profile would be determined through land survey or photogrammetric data of the natural profiles under “beach full” or accreted conditions. In the absence of such survey information, re-shaping would aim to:

- match the crest level of the emplaced material with the existing dune crest level;
- achieve a stable seaward gradient of the foredune of not more than 1 in 5 (1 vertical : 5 horizontal); and
- achieve a beach berm gradient of 1 in 20 to 1 in 30.

Any areas temporarily utilised for servicing, access etc. would be rehabilitated by the Dredge Master or contractor to the satisfaction of Council. The terrestrial works area will be rehabilitated so as to minimise the impact of closure of Karagi Reserve on recreational amenity, tourism and other relevant stakeholders.

3 Planning and Legislative Requirements

3.1 Land use and ownership

The proposed works would be located on land both above and below the Mean High Water Mark (MHWM).

Land below the MHWM is Crown Land under the direct management of the Department of Planning, Industry and Environment – Crown Lands. Elements of the proposed works that are below the MHWM (dredging) will need to be licenced via Crown Lands (see **Section 3.2.4**). The footprint of the proposed maintenance dredging within The Entrance Channel is zoned as a Recreational Waterway (W2).

Significant areas of the adjacent foreshores are zoned RE1 (Public Recreation) and are Crown Reserves under the care, control and management of Council. This includes Terilbah Reserve, Karagi Foreshore Park (including the estuary eastern beach), Picnic Point Reserve, and the southern foreshore of the estuary behind the seawall in the vicinity of Marine Parade.

The land above MHWM in the immediate vicinity of the works is Crown Land (Lot 7313/-/DP1147369 and Lot 7314/-/DP1147369) under the management of Council (refer **Figure 4**). It is classified Public Recreation (RE1) under the Wyong Local Environmental Plan 2013. The proposed beach nourishment along North Entrance Beach falls on Lot 7314/-/DP1147369 and a seaward parcel of land zoned RE1 with no lot number.

Figure 4 Land zoning in the region of the proposed works

Terilbah Island is zoned (E1) (National Parks) and is part of “Protected Area” of Wyrrabalong National Park, gazetted in 1991, and is under the control of the NSW Department of Planning, Industry and Environment (DPIE).

3.2 NSW planning and approvals process

The NSW environmental planning legislative framework provides for the classification of developments, and the assessment of impacts from developments and activities. This framework comprises:

- Environmental Planning and Assessment Act (EP&A Act) 1979;
- Environmental Planning and Assessment Regulation (EP&A Regulation) 2000;
- Environmental Planning Instruments (EPIs) made under the EP&A Act (i.e. State Environmental Planning Policies (SEPPs), Regional Environmental Plans (REPs), and Local Environmental Plans (LEPs)); and
- Other planning codes, policies, guidelines and strategies that relate to any proposed development of a particular site including Development Control Plans (DCPs) and Council codes and policies.

As noted in **Section 1**, the works (dredging and sand placement) do not require development consent and fall under Part 5 of the EP&A Act. The planning pathway is discussed in more detail below.

3.2.1 Local government planning and policy

The EP&A Act is the governing legislation for planning and controlling land uses and development within NSW. Central Coast Council's planning provisions as enabled by this Act include the Wyong Local Environmental Plan 2013.

The Wyong Local Environmental Plan 2013 has been developed in accordance with NSW Planning Industry and Environment (DPIE) requirements to control development via land zonings and other relevant planning provisions.

3.2.2 State Environmental Planning Policy (Coastal Management) 2018

State Environment Planning Policies (SEPPs) are drafted by the NSW State Government and apply to issues and developments of state significance. The SEPP relevant to proposed erosion protection works is SEPP (Coastal Management) 2018. SEPP (Coastal Management) 2018 updates and consolidates into one integrated policy SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed.

The SEPP (Coastal Management) 2018 gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. Coastal protection works are defined to be beach nourishment activities or works, and activities or works to reduce the impacts of coastal hazards on land adjacent to tidal waters including, but not limited to, seawalls, revetments and groynes.

Under Clause 19(2) of SEPP (Coastal Management) 2018, a public authority may carry out coastal protection works without development consent if the works are:

(i) identified in the relevant certified coastal management program, or
(ii) beach nourishment, or
(iii) the placing of sandbags for a period of not more than 90 days, or
(iv) routine maintenance works or repairs to any existing coastal protection works

The proposed beach nourishment can therefore be undertaken without development consent (i.e. approval under Part 5 of the EP&A Act requiring the preparation of an REF). In accordance with Clause 5.1 under Part 5 of the EP&A Act, a determining authority is defined as:

…a Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.

For the proposed beach nourishment works, Central Coast Council is considered to be a determining authority as the activity is to be carried out by Council. The following agencies are also determining authorities as permits and licenses will also be required for the works from:

- NSW Department of Planning, Industry and Environment (DPIE) – Crown Lands Licence
- Department of Primary Industries (DPI) – Fisheries Permit
- DPIE, Environment, Energy and Science (EES) Group, NSW EPA – Environment Protection Licence

These additional permits and licenses are discussed in more detail in **Section 3.2.4**.

Clause 19(2) of SEPP (Coastal Management) 2018 prevails over SEPP (Infrastructure) 2007 for the beach nourishment works. The dredging component of the works is discussed below.

3.2.3 State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 aims to facilitate the effective delivery of infrastructure within NSW by public authorities. It does this by prescribing the infrastructure related works that may be undertaken without development consent, although the public authority may still be required to obtain an approval, licence or permit under another Act, such as the Fisheries Management Act 1994.

Under Clause 129, Division 25 of *State Environmental Planning Policy (SEPP) Infrastructure 2007*, waterway or foreshore management activities (including instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes) undertaken by a public authority are permissible without consent.

The proposed dredging works can therefore be undertaken without development consent (i.e. approval under Part 5 of the EP&A Act requiring the preparation of an REF). As noted above, SEPP (Coastal Management) 2018 prevails over SEPP (Infrastructure) 2007 for the proposed beach nourishment works.

3.2.4 Other State legislative and policy requirements

Relevant additional State Legislation that applies to the activity and any licences or permits required for the works include the following:

- *Protection of the Environment Operations Act 1997* (POEO Act) - Activities should be carried out in a manner which does not result in the pollution of waters. Clause 19(1) of Schedule 1 of POEO Act was amended in 2019 to clarify that an Environment Protection Licence (EPL) under Section 43 is required for dredging when extraction of more than 30,000t of material occurs in one year, which is above the maximum annual volumes extracted under the current dredging program. Accordingly an EPL for extractive activities is no longer required, however Central Coast Council opted to retain the EPL under the category of miscellaneous discharge

to waters as a way to ensure compliance with regard to the discharge of dredge spoil in and around waterways, which has the potential to cause localised sedimentation.

The material to be extracted is clean, marine sand, see **Section 4.2.** Under the *POEO Act*, Virgin Excavated Natural Material (VEMN) is defined as natural material (such as clay, gravel, sand, soil or rock fines):

- that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- that does not contain any sulfidic ores or soils or any other waste.

An EPL for disposal of dredged material is not required as the dredged material is VENM and will be used for foreshore and dune works. In the event that future analysis of sand to be removed in ongoing maintenance dredging campaigns was classified as Excavated Natural Material (ENM) (e.g. contained some acid sulphate soils), beneficial reuse of this material would fall under the General Resource Recovery Exemption for ENM under Clause 51 of the *POEO (Waste) Regulation 2005* for waste disposal (application to land).

- *National Parks and Wildlife Act 1974* (NPW Act) and *Amendment 2010* – Provides for protection of Aboriginal cultural heritage in NSW. DPIE administers the NPW Act and requires Aboriginal consultation to be undertaken in accordance with statutory requirements. Harm is permissible under an approved Aboriginal Heritage Impact Permit (AHIP). An AHIP is not required for the works as no potential harm to Aboriginal sites has been identified.
- *Crown Lands Management Act 2016* – To undertake dredging and beach nourishment activities below the MHWM, a licence is required from the NSW Department of Planning, Industry and Environment (DPIE).
- *Biodiversity Conservation Act 2017* -The potential impact of the proposal on threatened species has been assessed. The assessment for this EA determined that there is not likely to be a significant effect on threatened species, or ecological communities listed in the *NSW Fisheries Management Act* or *NSW Biodiversity Conservation Act*, or their habitats from the proposed activities as long as mitigation measures are followed (see **Section 5**). Therefore, a species impact statement is not required (refer **Appendix 1**).
- *Fisheries Management Act 1994* (FM Act) - Permits under Part 7 of the Act for dredging and reclamation, temporarily or permanently obstructing fish passage, and harming marine vegetation. A permit is required for harm to marine vegetation. A permit will not be required for the dredging as this will be licenced under a Crown Lands licence negating the need for a permit from DPI (Section 200 (2) (FM Act)).
- *Marine Estate Management Act 2014* and *Marine Estate Management Regulation 1999* – The Act Declares and manages NSW marine parks. The Regulation outlines requirements for protection of various zones within marine parks. As the works are outside any Marine Park, no approvals are required.
- *Water Management Act 2000* – Under the Water Act, approval is required to undertake controlled activities on waterfront land. However, the Water Management Regulation 2011 outlines a number of exemptions for controlled activities. Where a public authority is carrying out the controlled activity on or in waterfront land, approval from the Office of Water is not required.
- *Coastal Management Act 2016* - The *Coastal Management Act 2016* replaced the *Coastal Protection Act 1979* and establishes a new strategic framework and objectives for managing

coastal issues in NSW. The Act defines the coastal zone as comprising four coastal management areas. SEPP (Coastal Management) 2018 gives effect to the objectives of the Act from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. The four coastal management areas are:

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

The proposed works fall within the coastal environment area and coastal use area. The objectives of the coastal environment area are:

- to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons
- enhance natural character, scenic value, biological diversity and ecosystem integrity
- to reduce threats to, and improve the resilience of, coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change
- to maintain and improve water quality and estuary health
- to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons
- to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system
- to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.

The objectives of the coastal use area are:

- to protect and enhance the scenic, social and cultural values of the coast by ensuring that—
  (i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and
  (ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and
  (iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and
  (iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and
  (v) the use of the surf zone is considered,
- to accommodate both urbanised and natural stretches of coastline.

It is considered that the proposed dredging and beach nourishment meet the objectives of the coastal use and coastal environment area.

It is also noted, that the proposed dredging is consistent with the Tuggerah Lakes Estuary Management Plan (2006) - which is a gazetted document and has the status of a certified Coastal

Zone Management Plan (under the transitional provisions outlined in the Coastal Management Act 2016).

3.2.5 Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires that proposals for development or "actions" that have, will have, or are likely to have, a significant impact on any matter of national environmental significance are to be referred to the Commonwealth Environment Minister for consideration and approval.

The EPBC Act identifies the following matters of national environmental significance:

- World heritage;
- National heritage;
- Wetlands of international importance;
- Listed threatened species and communities;
- Listed migratory species;
- Protection of the environment from nuclear actions; and
- Marine environment.

An assessment of significance has also been undertaken in accordance with the EPBC Act. The proposed works would not have a significant impact on any of the above, therefore, referral to the Federal Minister for approval is not required.

3.3 Consultation

Council undertook significant consultation with the community and stakeholders during development of the 2009 REF, and incorporated appropriate amendments based on these considerations in the final REF. The majority of these stakeholders are still relevant, and a number have been contacted during preparation of this REF.

Due to the regular dredging campaigns that have been undertaken over the past decades, the community have developed an expectation that dredging works will be undertaken, and have made representations to Council to that effect. Council will undertake additional community consultation immediately prior to commencement of the dredging program, via social media and other methods.

A number of meetings have been undertaken between Council and key agencies including NSW Department of Planning, Industry and Environment (DPIE), NSW Department of Primary Industries (DPI Fisheries), and the NSW Environment Protection Authority (EPA). It should also be noted that Council consulted with the EPA in July and August 2020 with regard to incorporating turbidity monitoring into the Environmental Protection Licence, and is currently developing a methodology that will be provided to the EPA seeking approval for inclusion within the 2020 dredging program.

Part 2, Clauses 13 to 16 of SEPP (Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. As Clauses 13 to 15 apply to consultation with councils and Council is the proponent for this proposal, the consultation requirements of these clauses do not apply. An assessment of Clause 16, relating to consultation with public authorities other than councils, is provided in **Table 2** below and demonstrates that statutory consultation is required with NPWS in accordance with Clause 16 if dredging occurs upstream of the Central Coast Highway Bridge.

Table 2 Assessment of SEPP (Infrastructure) consultation requirements

Item	Requirement
a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act—the Office of Environment and Heritage	If dredging occurs upstream of the Central Coast Highway Bridge it will be adjacent to a National Park.
b) development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone—the Office of Environment and Heritage	The proposal is not on land in Zone E1 National Parks and Nature Reserves
c) development adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*—the Department of Industry	The proposal is not adjacent to an aquatic reserve or a marine park
d) development in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*—the Sydney Harbour Foreshore Authority	The proposal is not in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998*
e) development comprising a fixed or floating structure in or over navigable waters—Roads and Maritime Services,	The proposal does not comprise a fixed or floating structure in or over navigable waters
f) development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act)—the NSW Rural Fire Service	The proposal does not comprise development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land
g) development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map—the Director of the Observatory	The proposal does not comprise development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map
h) development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence	The proposal does not comprise development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence
i) development on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*—the Mine Subsidence Board	The proposal does not comprise development on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*

4 Environmental Assessment

This section considers the existing site conditions and the potential impacts for those environmental sensitivities considered relevant at the site. Mitigation and control measures are provided for both construction and operational phases in **Section 5** and **Table 3**.

4.1 Estuarine and Coastal Processes

4.1.1 Site Conditions

Sediment Dynamics

Tuggerah Lakes estuary is classified as a barrier estuary formed during the last post glacial marine transgression which ended approximately 6000 years ago. The estuary is characterised by a shallow flat bottomed bed with a sandy barrier (the entrance sand spit), migratory tidal channels, and mobile sand shoals which prograde into the estuary. Wave energy and flood tide currents constricted by the narrow estuary mouth carry coarse marine quartzose sands into the flood tide dominant southern channel where they are deposited on the flood tide shoal. The flood tide shoal generally extends westward up until the Central Coast Highway Bridge although high tidal velocities can carry the sands further into the estuary.

The ebb tide moves sand from the flood tide shoal and channels back out through the estuary mouth where it is deposited on The Entrance sand bar. The lower velocity ebb tide predominantly flows in the area of least deposition along the northern channel. As the ebb tide is ineffective at removing the same volume of sand transported into The Entrance Channel by the flood tide, a build-up of sand in the form of a fan shaped flood tide shoal eventually causes closure of the estuary mouth.

Flooding can restore tidal flows to the estuary by scouring the surface of the flood tide shoals and scouring a wide channel (of up to several hundred metres in width on occasions) through The Entrance sand spit. However, following flooding, the significantly increased tidal flows encourage rapid migration of sand westward through the mouth of the estuary, and the reduction of tidal exchange is recommenced (PBP, 1994).

Hydraulics

The main tributaries that flow into the Tuggerah Lakes estuary include the Wyong River, Ourimbah Creek and Wallarah Creek. These tributaries, along with numerous stormwater drains located within the catchment input significant volumes of freshwater to the estuary. The narrow entrance channel, which is approximately 23 – 35 m wide and 2 m deep at mid-tide (PBP, 1994), provides the only ocean exit for catchment inputs. The majority of fluvial and stormwater (catchment) derived material are deposited within the estuarine basins and within the nearshore zones fringing the upper estuary.

Freshwater inputs to the estuary significantly exceed tidal inputs (Ryan et al., 2003). This is as a result of high freshwater inputs from the estuary's tributaries and drains, the narrow width of the estuary mouth, and the large volume of water in the Tuggerah Lakes. A small tidal range is experienced under average conditions and is typically limited to the immediate entrance area. This is in the order of a few centimetres around the elevated average water level of The Entrance Channel, which is approximately 0.06 m AHD.

While tidal flows are strong when the estuary mouth is open, the tidal exchange is limited to within 1 km of The Entrance Channel. Therefore numerous tidal cycles are required for full tidal exchange of the estuary waters to occur (Roberts and Dickinson, 2005),with modelling showing that average retention times of 220 days for Tuggerah Lakes, 460 days for Budgewoi Lake and 520 days for Lake Munmorah (OEH 2013). By nature of its geomorphology and hydrodynamics, the estuary has a limited capacity to assimilate nutrients, contaminants and sediment inputs from the catchment. For these reasons, the majority of actions

identified in the Tuggerah Lakes Estuary Management Plan relate to catchment management practices. This capacity is further reduced when The Entrance Channel becomes constricted. Tidal exchange is reduced resulting in degrading water quality and increased flood risks (WMA Water, 2014).

The peak discharges of major floods affecting the estuary are in the order of forty times greater than peak ebb tide discharges under average entrance conditions. When The Entrance Channel is initially restricted or closed, thousands of low-lying properties along the foreshore of the estuary (particularly within the upper estuary) are at increased risk of flooding (WMA Water, 2014).

4.1.2 Potential Impacts

Bank Erosion

Dredging of The Entrance Channel would prevent excessive build-up of sand across the mouth of the estuary thereby resulting in the maintenance of average conditions of The Entrance sand spit, The Entrance Channel and the flood tide shoals. No significant impact is expected to coastal processes as the dredged sand would be retained within The Entrance sand system.

No impact is expected to the general characteristics of The Entrance sand bar offshore of the mouth of the estuary or to either The Entrance Beach or North Entrance Beach as a result of the dredging. The mouth of the estuary would remain largely unnavigable.

The dredge footprint has been designed to minimise erosion impacts on adjacent foreshores within The Entrance Channel. Community concern has been raised over the angle of the main channel. It is assumed that the ebb tide flow within the main channel is causing the erosion which is evident along the southern corner of Dunleith Tourist Park and the Karagi Foreshore Park (i.e. the estuary eastern beach).

Observation of the tidal movements within the existing channel indicates that the build-up of sand at Town Beach is causing the floodtide flow (which naturally flows along the southern foreshore) to deflect across the sandy delta directly towards the area of erosion. It is considered that dredging of the flood dominant southern channel along the southern foreshore of The Entrance Channel in the vicinity of Town Beach to approximately 1 m in depth would minimise the erosion of the northern foreshore.

Concern has been expressed that dredging has the potential to cause erosion to Terilbah Island within and adjacent to the dredge footprint respectively. This issue is summarised below.

Terilbah Island

Terilbah Channel, adjacent to Terilbah Island, has been dredged approximately every five years since the commencement of maintenance dredging in 1993 with the last occasion of dredging undertaken in 2008. The extent of dredging (depth, width, distance upstream) has been aimed at simply re-establishing the natural channel cross-section and thereby has not altered the hydrodynamic and sediment transport behaviour within the channel beyond the natural tidal regime conditions.

There has been no evidence of erosion of the foreshores of Terilbah Island over the years of maintenance dredging. Providing future dredging within Terilbah Channel remains consistent with past dredging practices, erosion issues along Terilbah Island would not be anticipated. Visual monitoring of the Island foreshore by Council staff for any signs of erosion should continue.

Bridge Foundations

The dredging proposed would be undertaken within the natural hydraulic limits of the system. The hydrodynamics and sediment transport behaviour would not change either directly or indirectly beyond that which could be achieved under natural conditions. As such, no scour to the bridge foundations is

expected beyond that which may occur under natural conditions. It is also noted that Crown license conditions restrict dredging within 15m of any bridge pylons and 10m of any wharf or jetty structure.

Dune System

The sediment within the proposed dredge footprint predominantly consists of marine sand which has been eroded from beaches within The Entrance Channel or reworked through the mouth of The Entrance Channel from the offshore shoal and adjacent beaches. Some finer alluvial sediment, interbedded within the marine sands is also present, and when exposed appears as darker sand. Sediment with similar characteristics has been dredged from the footprint and used for beach nourishment over many years of maintenance dredging.

The potential presence of dead kelp and seagrasses in the dredged sand and the darker sands would result in the temporary discolouration within emplacement areas. This has previously been shown to be a temporary impact which is relatively quickly reduced through oxidation and bleaching of the sand and breakdown of the plant material. Water quality at the emplacement areas would be monitored to comply with the EPL. Following pumping of dredged material the sand may be relocated and or shaped by bulldozers and earthmoving machinery consistent with a naturally accreted beach state.

The beach nourishment activities aim to beneficially reuse the dredged material to rehabilitate the existing dune system and protect the dunes against erosion from currents and wave action, particularly during storm events. Consequently, the dune ecosystem would also receive some protection and the value of amenity and recreational value of the beaches would be maintained.

Hydrodynamics/Flooding

Dredging aims to re-establish the channels which may form within the system under the natural tidal regime such that under typical average tidal conditions, the entrance is open more often than it is closed. The dredging would not alter the hydrodynamics and sediment transport behaviour within the channel beyond naturally occurring conditions.

As a result of the channels and shoals being maintained in average condition, the average water levels in the lake would also be maintained. Maintenance of an opening at The Entrance Channel by dredging would provide for more effective discharge of flood waters than might initially be expected in comparison to natural pre-flood conditions, in which The Entrance Channel may be partially or fully closed. This would be expected to facilitate initial flood scour, though it is not likely to significantly impact peak flood levels in the lake (PBP, 2004).

4.2 Sediments

4.2.1 Site Conditions

A sediment sampling and testing program was undertaken to characterise the physical and geochemical characteristics of the proposed dredge material in order to determine the suitability of reusing the material for beach nourishment. The investigation was completed on 12 August 2020. Piston coring was undertaken to 0.5 m beyond the proposed depth of dredging (where feasible) at ten locations within the dredge footprint (refer **Figure 5**). Analysis undertaken included:

- particle size grading;
- testing for a suite of heavy metals;
- testing for BTEX, Polynuclear Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), organochlorine pesticides (OC Pesticides) and total organic carbon (TOC); and
- acid sulfate soil field screening and Chromium Reducible Sulfur testing.

Lab reports for the investigation are provided in **Appendix 2**. Key findings are summarised below.

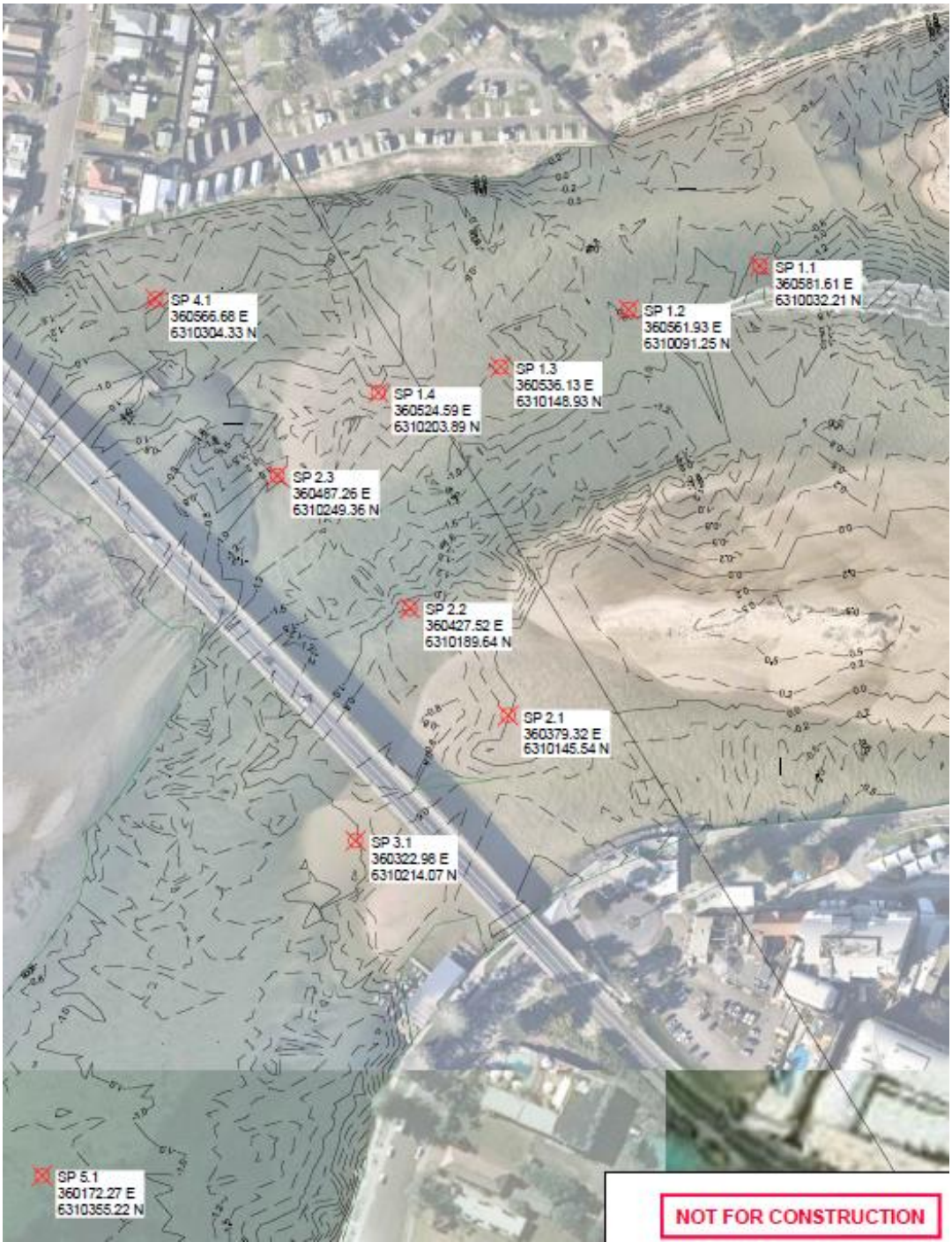

Figure 5: Sediment coring locations

Physical Properties

The sediments within the dredge footprint were typically fine to medium grained sands. The fines content was typically very low, less than 1% and up to 2% for samples with depth at locations SP3.1 and SP4.1 (both samples more than 1m below bed level). Gravel content was typically 1-2% and up to 9% for the

sample with depth at location SP2.2 (sample more than 1.5m below bed level in the 'sump'). Particle size distribution (PSD) curves are shown below in **Figure 6**.

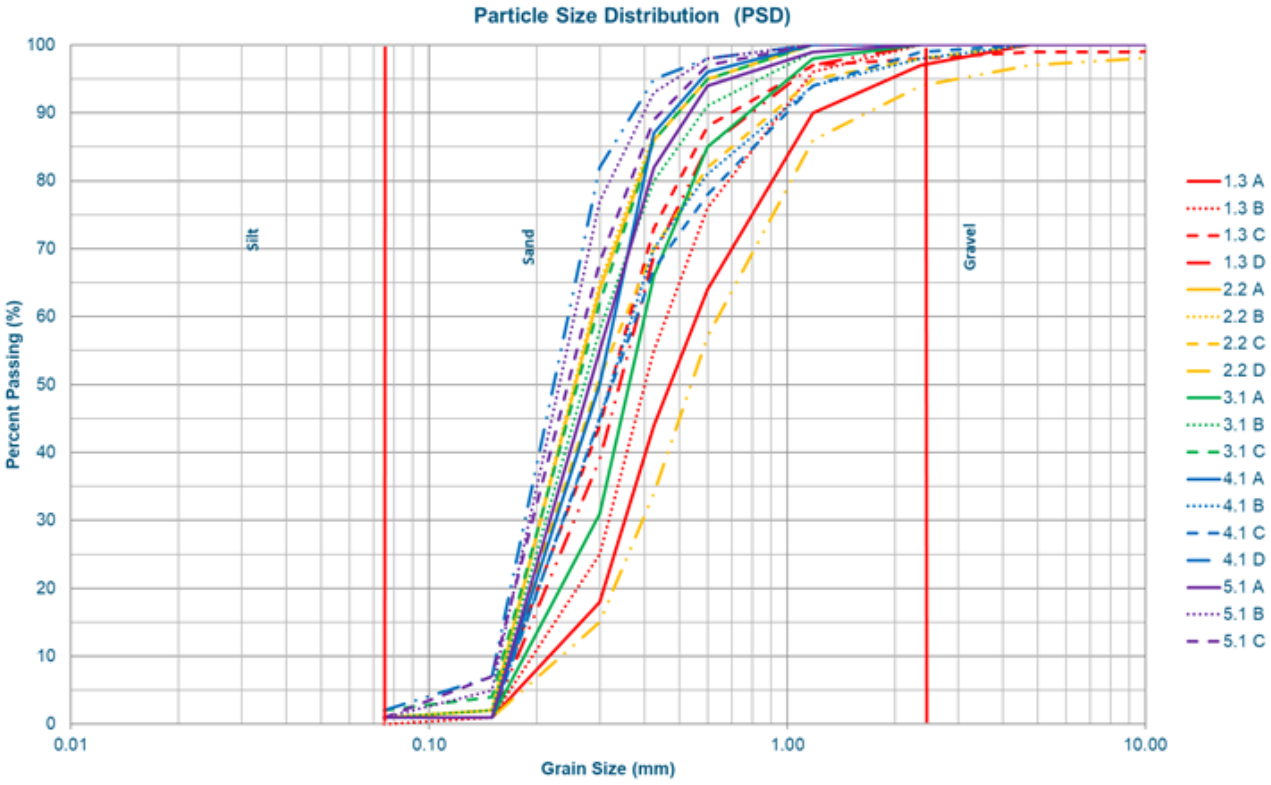

Figure 6: Particle size distribution curves

Sediment Contamination

Results of the geochemical analysis were compared to the Screening Levels provided in the National Assessment Guidelines for Dredging (NAGD) (Commonwealth of Australia, 2009). These guidelines are far more stringent than the human use Health Investigation Levels (HILS) provided in the National Environment Protection (Assessment of Site Contamination Measure) Measure (NEPM Guidelines) and NSW EPA Waste Classification Guidelines. Where contaminant concentrations are below the NAGD Screening Levels, adverse impacts to both humans and marine organisms are considered unlikely.

All sediment results were below the NAGD Screening Levels, HILS and general solid waste guidelines. Concentrations of BTEX, Organophosphorus Pesticides, Organochlorine Pesticides, PAHs and PCBs were all below laboratory detection levels.

Acid Sulfate Soils

Sediment and soil containing iron sulphide are known as acid sulfate soils (ASS) due to their ability to generate sulfuric acid when exposed to air. Acid Sulfate Soils planning maps show a high probability of the presence of acid sulfate soils materials in the estuarine bottom sediments of the dredge footprint.

While acid sulfate soil material would likely be encountered upstream of the influence of marine sands, the proposed dredge footprint is expected to contain little sulfidic material due to the marine nature of the sands. Nevertheless, acid sulfate soil testing comprising field screening and Chromium Reducible Sulfur testing was undertaken to support this assumption and is discussed below.

The results of the acid sulfate soil field screen testing indicated that no actual acid sulfate soils are present but that potential acid sulfate soils may be present. Accordingly, Chromium Reducible Sulfur testing was undertaken on nine selected samples to identify any risk of sulfidic activity from unoxidized inorganic sulphur (as opposed to organic sources such as decomposing seagrass and vegetation).

The results indicated that each sample had significant potential sulfidic acidity levels which were greater than the "action criteria" specified in the Acid Sulfate Soils Manual guidelines (ASSMAC, 1998). However, sediments had sufficient acid neutralising capacity (ANC) to maintain a pH above 5.5 upon oxidation. Consequently, no acid sulfate soil management plan is required for the removal, handling and placement of the proposed dredge sediments.

4.2.2 Potential Impacts

The sand that will be disturbed during the dredging is uncontaminated and a natural material. The dredged sand will be reused in beach nourishment activities. Testing has shown the proposed dredge material does not comprise actual ASS or potential ASS.

It is considered that the dredged sand is suitable for use as beach nourishment material at North Entrance Beach as it is compatible with the native beach sand being derived from the parent source. It's placement on a beach would not pose any public health or environmental risk from introduction of contaminated material or acid sulfate soils.

The likelihood of any unexpected material or areas of contamination is considered low. However, adoption of mitigation and control measures if this were to eventuate would still be advisable and these have been identified and presented in **Table 3**.

4.3 Water Quality

4.3.1 Site Conditions

A water quality investigation undertaken for the Tuggerah Lakes Estuary Process Study (Roberts, 2001) indicated that lower levels of total nitrogen, oxidisable nitrogen and total phosphorus were found within The Entrance channels in comparison to the open waters of Tuggerah Lake. More recent investigations throughout the estuary (Tuggerah Lakes Waterway Monitoring, Evaluation and Reporting Program 2011-20) have indicated similar results noting that water quality in most closely linked to immediate catchment condition and inputs rather than to circulation or flushing patterns (OEH, 2013).

In Tuggerah Lakes, turbidity is a major driver of perceived poor water quality. The bed of the estuary has a high fraction of fine material, which is easily resuspended by wind or wave action. This results in cloudy water in high energy areas and is extremely common throughout the lake basins where wind wave energy can penetrate to the bed level (average depth 1.7m) and hold the fine material in suspension for long periods of time. This is less prevalent in the entrance channel compartment, where the bed material is dominated by heavier marine sand with significantly less fine fraction. Sand particles readily settle to the bottom, and do not create the visible turbidity plumes associated with perceived poor water quality.

Under natural conditions, freshwater and marine inputs of water to the estuary have the potential to dilute and flush accumulated nutrients and contaminants, with reduced efficacy as you move further away from the source. However, due to the significantly increased loads of catchment derive pollution under current development conditions (loads between 150% and 400% of background levels (OEH, 2013)), this flushing has minimal impact on overall water quality throughout the estuary. Typically, improved water quality and importantly from an aesthetic perspective, water clarity, is restricted to the immediate entrance area. The

value of clear water to the community is a key driver of the program, however it is important to note that the effect of dredging on water quality or clarity throughout the broader estuary is limited and likely insignificant.

Reduced water quality and/or sediment quality in the broader Tuggerah Lakes area cannot be solved by dredging. Instead, ongoing attention to catchment controls, remediation and sensitive landuse management is required to stabilise and continue to improve water quality throughout the estuary. Recent trend analysis indicated that measurable improvements have been achieved throughout the estuary as a result of long-term efforts to improve the catchment (OEH, 2018). It is expected that these improvements will continue incrementally with consistent effort to better manage pollution hotspots and support key ecological processes.

Salinity levels can affect species composition of macrophytes in the estuary. For example, brackish waters are favoured by the seagrass *Ruppia megacarpa* (stackweed) which has experienced prolific growth and die-back cycles, whereas saline conditions are preferable for the growth of the seagrass *Zostera capricorni* (Scott, 1999). Both species offer habitat and food for aquatic fauna and neither is more desirable than the other. Seagrass abundance and distribution throughout the estuary has fluctuated as a result of both natural cyclical patterns and human disturbance. Seagrass is a critical habitat for fish and other aquatic species, supports benthic sediment stability and provides significant carbon storage capacity. Seagrass depth range is used as part of the ongoing ecological health monitoring program to help measure longer-term changes in the estuary conditions.

Recreational water quality of ocean water at The Entrance is considered to be good, with no obvious trends of microbial contamination. It is noted that swimming sites at North Entrance Beach and The Entrance Beach were graded as "good" in the most recent State of the Beaches 2018-2019 report and have been for multiple preceding years. This is defined in relation to public health and set out as:

Location has generally good microbial water quality and water is considered suitable for swimming most of the time. Swimming should be avoided during and for up to one day following heavy rain at ocean beaches and up to three days at estuarine sites.

4.3.2 Potential Impacts

During works

Short term impacts to water quality around the dredge and discharge areas would be expected from the continuation of the existing dredging and beach nourishment practices as discussed below.

Based on past experience with the dredging of The Entrance Channel, temporary and localised turbidity is likely within and adjacent to the proposed dredging footprint as a result of the suspension of any fines (silts and clays) and finer sands. Given the typically clean, sandy nature of the dredge material (refer Section 4.2), this sediment has been shown to settle rapidly following disturbance.

Turbidity in dredging projects is often managed through the use of a turbidity curtain surrounding the dredge area. However, the high velocity currents experienced within The Entrance Channel prevent the practical implementation of such measures.

Dewatering of the material pumped sub-aerially to the foreshore near the carpark for dewatering and stockpiling (re-handling) or directly onto beach nourishment areas has the potential to result in some turbidity of the adjacent waterways. Use of a silt curtain(s) in the waterway adjacent to the dewatering/re-handling area at the lake foreshore would be adopted. However, the installation of a turbidity curtain in the surf zone of the beaches on the open coast is not feasible. For the 2020 dredging campaign sand

would be trucked to the beach from the dewatering/re-handling area to mitigate the water quality risk. If direct pumping to the beach nourishment areas is undertaken during the 2020 program or at a future time, placement of the sand would be facilitated by the construction of sand bunds (using existing beach sand) that run alongshore and provide a pathway for the dredged slurry to flow and settle out and fine sediment before clean return water is discharged around the end of the bund to the ocean. In such cases water quality would be monitored to comply with the EPL.

Turbidity within The Entrance Channel and nearshore beach zone is also a natural consequence of catchment runoff into the lakes system and wave breaking. During times when receiving or oceanic waters are very turbid because of flooding or other weather conditions, and dredging needs to continue, the EPL provides for the EPA to approve alternative water quality limits for a defined period while turbid conditions prevail.

Sediment quality investigations undertaken for this assessment (refer **Appendix 2**) indicated that sufficient acid neutralising capacity is available in the sediments to neutralise any acidity produced during the proposed activities. Consequently, no changes to soil or water pH either within The Entrance Channel or the adjacent beach nourishment areas are expected from the proposed works.

All potential water quality impacts would be localised and temporary, and confined to the work period. It is anticipated that impacts could be satisfactorily mitigated or avoided through prior sediment sampling and testing, compliance with EPL thresholds, standard work site good practice, and a water quality monitoring program as detailed in **Table 3**. As such, potential impacts on water quality during the works have been assessed as being low risk.

4.4 Coastal Ecology

4.4.1 Site Conditions

A desktop study was undertaken of available information and included searches of several online databases:

- Estuarine vegetation mapping (NSW DPI)
- Waterway and fish habitat classification (NSW DPI)
- Protected areas (marine and terrestrial)
- Matters of National Environmental Significance (MNES)
- Coastal wetlands
- Declared Critical Habitat / Areas of Outstanding Biodiversity Value
- Threatened and protected marine and coastal fauna (EPBC Act 1999 Protected Matters Search, *Biodiversity Conservation Act 2016* & *Fisheries Management Act 1994* database search for threatened and protected species)

The Entrance sand spit is a known habitat for Little Terns. Ambrose Ecological Services were engaged by Royal HaskoningDHV to undertake a specific assessment of the potential impact to the Little Tern and other shorebirds.

Estuarine vegetation mapping
All aquatic vegetation (including mangroves, saltmarsh, seagrass and seaweeds) on public water, land and foreshores is protected under the *NSW Fisheries Management Act 1994* (FM Act). Harming or removal of marine vegetation is generally only permissible by permit. Mapping of estuarine aquatic vegetation undertaken by NSW DPI was referred to, specifically Tuggerah Lake (Map 33b)

(https://www.dpi.nsw.gov.au/content/research/areas/aquatic-ecosystems/estuarine-habitats-maps) (NSW DPI 2020).

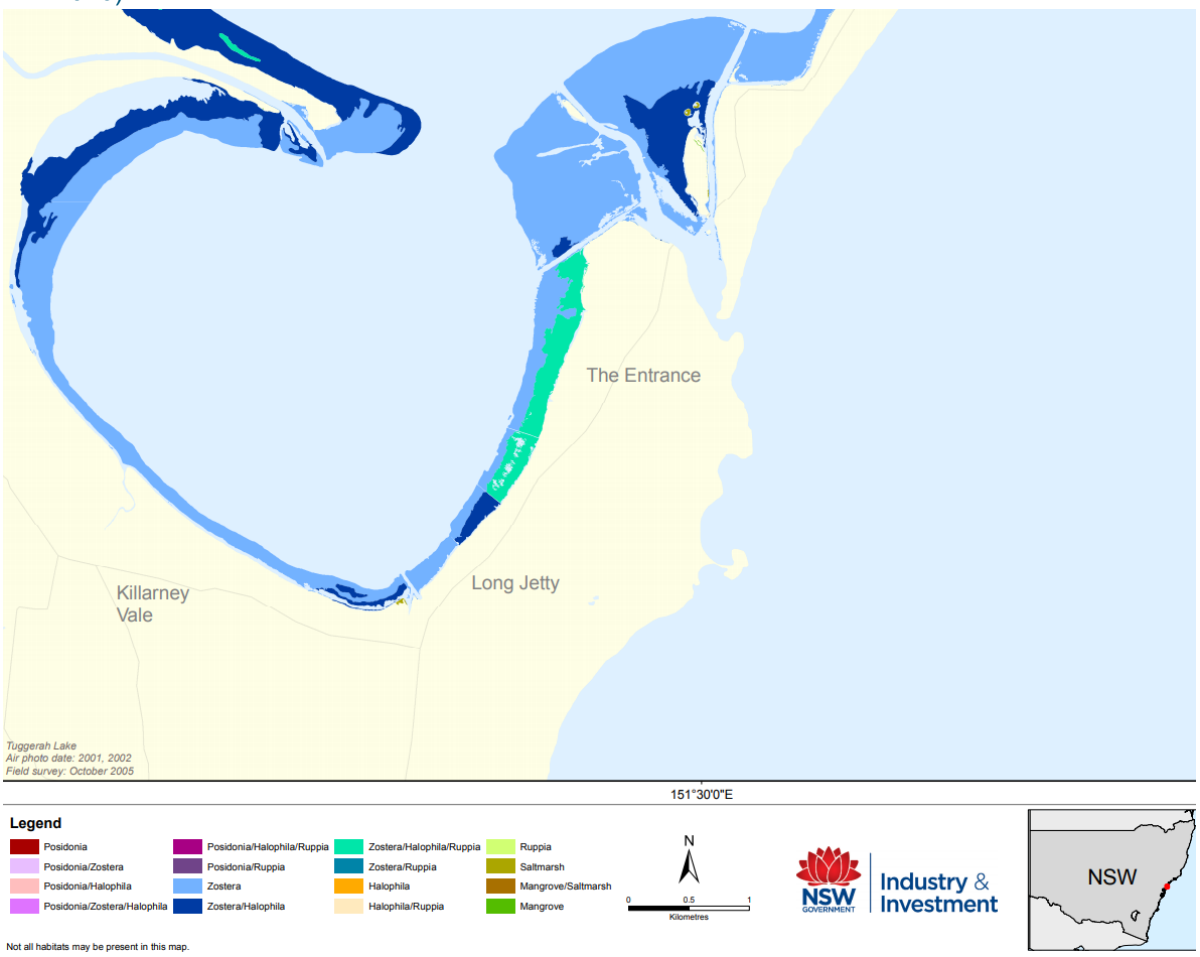

Figure 7: Aquatic Vegetation Mapping

This map is based on aerial photography from 2001, 2002 which was ground truthed in 2005. An excerpt showing the location of aquatic vegetation within the general study area is provided in **Figure 7**. Seagrass species have been recorded within the estuary including *Halophila ovalis* (paddleweed), *Ruppia megacarpa* (Sea Wrack) and *Zostera capricorni* (ribbonweed or eelgrass). The mapping indicated that meadows of these species cover approximately 17.7 km^2, with mangroves and saltmarsh covering approximately 0.001 km^2 and 0.108 km^2 respectively (Williams *et. al.,* 2006). The mapping indicated that within the proposed dredge footprint, seagrasses are present along:

- both banks of the Terilbah Channel,
- the eastern shoreline of the main channel downstream to the vicinity of the caravan park.

A field survey undertaken in 2009 to support the previous REF (WorleyParsons 2009), showed that immediately downstream of the bridge a seagrass bed is present in the channel adjacent to Yellawa Island, with another outside the dredge footprint on the northern side of Yellawa Island. These beds were heavily fouled with epiphytes (organisms that grow on another plant for support). Further downstream, a discontinuous narrow bed of dense *Z. capricorni* with moderate epiphyte fouling was present along the eastern shoreline of the northern channel. It should be noted that the majority of Yellawa Island has been scoured away by natural processes and its presence above MHW has been greatly reduced.

The southern shoreline of the channel downstream of the bridge (i.e. in the vicinity of Town Beach) comprised five distinct beds up to 3 metres wide and three smaller patches of *Z. capricorni* were recorded in a gutter running adjacent to the seawall.

Numerous areas of wrack (i.e. decaying seagrasses and macroalgae) were observed, predominantly within deeper sections of the "sump" (hole previously dredged to act as a sediment trap) adjacent to the bridge, within the northern channel and also along the shoreline of the northern channel.

No other aquatic vegetation including saltmarsh or mangroves have been mapped within the proposed works area including the proposed dredge or beach nourishment areas. However, a field survey (WorleyParsons 2009) identified saltmarsh along the eastern shoreline of Terilbah Island.

In addition, the 2009 field survey (WorleyParsons 2009) identified a bed of live marine macroalgae in the sump adjacent to the bridge. Species included *Ecklonia radiatae*, *Sagassum* spp., and various other red and brown algae. Typically, macroalgae species are associated with subtidal rocky shores and reefs to which they attach via a holdfast. The macroalgae recorded were detached from the substrate and are likely to have entered the estuary from offshore reefs during the flood tide.

Adjacent to the channel, much of the area comprises residential or urban development and open space areas with little remaining vegetation.

Terilbah Island, part of Wyrrabalong National Park, is densely vegetated with vegetation communities comprising Teatree swamp, which is dominated by Broadleaf Paperbarks (*Melaleuca quinquenervia*), and Casuarina swamp, which is dominated by Swamp Oak (*Casuarina glauca*) (Commonwealth of Australia, 2009a). The relatively stable water level within the lakes has allowed terrestrial vegetation to establish close to the shoreline. Some littoral rainforest species such as tuckeroo have also been recorded on the island (NSW NPWS, 1995).

Terilbah Reserve, on the opposite bank of the Terilbah Channel, is a grassed recreational area which contains three stormwater treatment zones aimed at reducing sediment and nutrient loads entering the lake from urban runoff. Species present include Norfolk Island Pines (*Araucaria heterophylla*) *Phragmites* spp (which fringes the eastern shoreline of much of the reserve), *Casuarina* spp. And *Melaleuca* spp.

Immediately adjacent to the proposed beach nourishment area, the dunes that back North Entrance Beach are predominantly vegetated with groundcover such as Spinifex grass (*Spinifex sericeus*) and the introduced Pennywort (*Hydrocotyle bonariensis*). The more stabilised area at the crest of the dunes is vegetated with low shrubs including Coastal Wattle (*Acacia sophorae*), Coastal Banksia (*Banksia integrifolia*), and She-oaks (*Casuarina Spp.*)

Waterway and Fish Habitat Classification

Under the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI 2013), Tuggerah Lake and the immediate study area 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 the marine habitats in the immediate study area, and in accordance with Table 1 of the Policy, the proposed works areas contain TYPE 1 - Highly sensitive key fish habitat (as they contain Zostera) and also TYPE 2 – Moderately Sensitive Key Fish Habitat (as they contain marine macroalgae and stable intertidal sand/mud flats) (NSW DPI 2013).

Marine Protected areas

Protected areas, which are set aside for conservation under the NP&W Act 1974, are managed by the National Parks and Wildlife Service (NPWS). An important component of the State's reserve system are marine protected areas. These include many National Parks and Nature Reserves with marine or estuarine components, as well as Aquatic Reserves and Marine Parks managed by the Marine Estate Management Authority (OEH 2018).

Marine protected areas are parts of the NSW marine estate that are managed to conserve marine biodiversity and support marine science, recreation and education. The NSW system of marine protected areas includes:

- Aquatic reserves – 12 aquatic reserves cover around 2,000 hectares of the NSW marine estate.
- Marine parks – six multiple use marine parks cover around one third (approximately 345,000 hectares) of the NSW marine estate.
- National parks and nature reserves – include around 20,000 hectares of estuarine and oceanic habitats (NSW DPI 2019).

The closest marine protected area to the study site is Barrenjoey Head Aquatic Reserve which lies a more than 30 kilometres south of the study area. This will not be impacted by the proposed works.

No National Parks or Nature Reserves occur directly within the proposed works areas (dredge area or beach nourishment area). Terilbah Island, located to the west of the Central Coast Highway Bridge, is part of Wyrrabalong National Park. Wyrrabalong National Park is 620 hectares in area and is comprised of North Wyrrabalong (more than 4 km north of The Entrance), South Wyrrabalong (more than 5 km south of The Entrance) and four islands within Tuggerah Lake (Pelican Island, Terilbah Island and two unnamed islands known locally as Bird Islands).

Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) associated with marine and coastal habitats include Wetlands of International Importance, the Great Barrier Reef Marine Park, Commonwealth Marine Areas, Listed Threatened Ecological Communities, Listed Threatened Species and Listed Migratory Species. A Protected Matters Search under the EPBC Act 1999 was undertaken to determine whether any MNES would be affected by the proposal (search results are provided in **Appendix 3**). The following information is applicable to the proposal:

- No Wetlands of International Importance occur within a 1 km radius of the study site, therefore will not be impacted by the proposal.
- The Great Barrier Reef Marine Park does not occur within a 1 km radius of the study site, therefore will not be impacted by the proposal.
- The Commonwealth Marine Area is not located within a 1 km radius of the study site and will not be impacted by the proposal.
- One (1) listed threatened ecological communities occur within 1 km of the study site:
  - Coastal Swamp Oak *(Casuarina glauca)* Forest of New South Wales and South East Queensland ecological community (Endangered Community likely to occur within area) – Not observed.
- 95 Listed Threatened Species (including marine and terrestrial species)
- 73 Listed Migratory Species (including marine and terrestrial species

Other Matters listed under the EPBC Act 1999 relevant to the proposal include:

- 89 Listed Marine Species
- 14 Whales and Other Cetaceans
- No Critical Habitats
- No Commonwealth Reserves (Terrestrial)
- No Australian Marine Parks

Coastal Wetlands

The *Coastal Management Act 2016* replaced the *Coastal Protection Act 1979* and established a new strategic framework and objectives for managing coastal issues in NSW. The Act defines the coastal zone as comprising four coastal management areas including coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26.

State Environmental Planning Policy (Coastal Management) 2018 updates and consolidates into one integrated policy SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed (DPIE 2019).

Coastal Wetlands in the vicinity of the study area were mapped using the DPIE Interactive Mapping Tool (DPIE, 2020). The closest Coastal Wetlands to the study site at are Chittaway point, more than 3 km to the west of the site. No coastal wetlands occur within the dredge area or proposed beach nourishment locations.

Tuggerah Lake is also listed as a Nationally Important Wetland under the Directory of Important Wetlands.

Threatened and Protected Fauna

The marine and coastal dune habitats at The Entrance, and nearby coastal marine waters, provide shelter, foraging, breeding and nursery areas for a wide range of fauna including bony fishes (including Syngnathids), sharks and rays, marine mammals (i.e. whales, dolphins and seals), marine reptiles (e.g. turtles) and marine/migratory birds. Coastal dune and sandy beach habitats may provide roosting, nesting or foraging habitat for a range of terrestrial fauna including marine and migratory birds, small mammals, marsupials and reptiles (e.g. lizards and snakes).

Many of these species are also listed as threatened or protected under State and/or Commonwealth legislation including the NSW FM Act 1994, NSW BC Act 2016 and Commonwealth EPBC Act 1999. Database searches for species listed under these Acts with the potential to occur in the study area were undertaken with a summary of results outlined below. Search results are provided in **Appendix 3** (EPBC Act), **Appendix 4** (FM Act 1994) and **Appendix 5** (BC Act 2016).

<u>Fisheries Management Act</u>

Threatened and protected marine species listed under Schedules 4 to 5 of the FM Act 1994 (see **Appendix 4**) were reviewed 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 listed as endangered, critically endangered and/or vulnerable (i.e. Schedule 4, 4A and 5) under the NSW FM Act 1994 with the potential to occur at The Entrance Channel and/or nearby coastal waters are listed below.

Schedule 4: Endangered Species, Populations and Ecological Communities

- Scalloped hammerhead shark (Sphyrna lewini) - endangered species
- Southern bluefin tuna (Thunnus maccoyii) - endangered species

- Marine worm (Hadrachaeta aspeta) - species presumed extinct
- Green sawfish (Pristis zijsron) - species presumed extinct
- Bennetts seaweed (Vanvoorstia bennettiana) - species presumed extinct

Schedule 4A: Critically Endangered Species and Ecological Communities

- Grey nurse shark (Carcharius taurus) - critically endangered species
- Marine slug (Smeagol hilaris) - critically endangered species
- Marine brown algae (Nereia lophocladia) - critically endangered species

Schedule 5: Vulnerable Species and Ecological Communities

- Great white shark (Carcharodon carcharias) - vulnerable species
- Black cod (Epinephelus daemelii) - 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

Biodiversity Conservation Act 2016

An online database search for threatened and protected species listed under the NSW BC Act 2016 recorded within a 10 km radium of the study site (using the BioNet Atlas of NSW Wildlife) was undertaken on 11 March 2020. The full Atlas of NSW Wildlife search results are provided in **Appendix 5**. The proposed dredging works have the potential to impact directly or indirectly on marine fauna. The search listed 23 threatened marine species which have been recorded within the study area including one unidentified sea turtles, one unidentified whale and two unidentified seals. **Appendix 5** also lists many terrestrial reptiles and mammals and birds (coastal/marine/migratory) which are expected to use the beach and coastal dune habitat along North Entrance Beach for roosting, nesting and foraging, most notably the Little Tern. These are not listed below considering the nature of the proposed land works and relatively low potential for harm. A discussion of potential impacts to bird species is provided in **Section 4.4.2**.

Threatened and protected marine species listed under the BC Act 2016 with the potential to occur in the study area.

- Loggerhead Turtle, Caretta Endangered, Protected
- Green Turtle, Chelonia mydas Vulnerable, Protected
- Hawksbill Turtle, Eretmochelys imbricate Protected
- Flatback Turtle, Natator depressus Protected
- Unidentified Sea Turtle, Cheloniidae sp. Protected
- Little Penguin, Eudyptula minor Protected
- Dugong, Dugong dugon Endangered, Protected
- Australian Fur-seal, Arctocephalus pusillus doriferus Vulnerable, Protected

- New Zealand Fur-seal, Arctocephalus forsteri Vulnerable, Protected
- Subantarctic Fur-seal, Arctocephalus tropicalis Protected
- Unidentified Fur-Seal, Arctocephalus sp. Protected
- Australian Sea-lion, Neophoca cinerea Protected
- Leopard Seal, Hydrurga leptonyx Protected
- Unidentified Seal, Seal sp. Protected
- Southern Right Whale, Eubalaena australis Endangered, Protected
- Humpback Whale, Megaptera novaeangliae Vulnerable, Protected
- Sperm Whale, Physeter macrocephalus Vulnerable, Protected
- Pygmy Sperm, Whale Kogia breviceps Protected
- Common Dolphin, Delphinus delphis Protected
- Bottlenose Dolphin, Tursiops truncates Protected
- Long-beaked Bottlenose Dolphin, Tursiops aduncus Protected
- Striped Dolphin, Stenella coeruleoalba Protected
- Unidentified Dolphin, Dolphin sp. Protected

EPBC Act 1999

An online database search for species listed under the EPBC Act 1999 with the potential to occur in the study area (within a 10 km radius of the site) was made using the EPBC Act Protected Matters Search Tool. Full search results are provided in **Appendix3**.

In summary, the EPBC Act 1999 search lists 95 threatened species (marine and terrestrial) and 73 listed migratory species (marine and terrestrial), 89 listed marine species and 14 whales and other cetaceans, with the potential to occur within a 1 km radius of the study site. The threatened and protected marine species under the EPBC Act 1999 are listed below (EPBC Act Status – L = listed marine species, V = vulnerable, E = endangered, CE = critically endangered, W = whales and other cetaceans, M = migratory.).

The likelihood of occurrence of these species (as determined by the database) in the study area is also provided. A large number of marine/wetland/migratory birds with the potential to use the site were also identified in the Protected Matters Search (see **Appendix 3**). These are not listed below considering the nature of the proposed land works and relatively low potential for harm. A discussion of potential impacts to bird species is provided in **Section 4.4.2**.

- Black Cod, Epinephelus daemelii V, Species or species habitat likely to occur within area
- Yellow Bellied Seasnake, Pelamis platurus L, Species or species habitat may occur within area
- Loggerhead Turtle, Caretta E, M, L, Foraging, feeding or related behaviour known to occur within area
- Green Turtle, Chelonia mydas V, M, L, Foraging, feeding or related behavior known to occur within area
- Leatherback Turtle, Dermochelys coriacea E, M, L, Foraging, feeding or related behavior known to occur within area
- Hawksbill Turtle, Eretmochelys imbricate V, M, L, Species or species habitat known to occur within area
- Flatback Turtle, Natador depressus V, M, L, Foraging, feeding or related behavior known to occur within area
- Grey Nurse Shark, (east coast pop'n) 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

- Whale Shark, Rhincodon typus V, M, Species or species habitat may occur within area
- Porbeagle, Lamna nasus M, Species or species habitat likely to occur within area
- Reef Manta Ray, Manta alfredi M, Species or species habitat may occur within area
- Giant Manta Ray ,Manta birostris M, Species or species habitat may occur within area
- Blue Whale, Balaenoptera musculus E, M, W, Species or species habitat may occur within area
- Southern Right Whale, Eubalaena australis E, M, W, Species or species habitat likely to occur within area
- Pygmy Right Whale, Caperea marginata M, W, Foraging, feeding or related behavior may occur within area
- Humpback Whale, Megaptera novaeangliae V, M, W, Species or species habitat known to occur within area
- Killer Whale, Orcinus orca M, Species or species habitat may occur within area
- Bryde's Whale, Balaenoptera edeni M, W, Species or species habitat may occur within area
- Minke Whale, Balaenoptera acutorostrata W, Species or species habitat may occur within area
- Indo Pacific Humpback Dolphin, Sousa chinensis M, W Species or species habitat likely to occur within area
- Whale Shark, Rhincodon typus V, M Species or species habitat may occur within 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 W Species or species habitat may occur within area
- Risso's Dolphin, Grampus griseus W Species or species habitat may occur within area
- Spotted Dolphin, Stenella attenuata W Species or species habitat may occur within area
- Dusky Dolphin, Lagenorhynchus obscurus M, W Species or species habitat may occur within area
- New Zealand, Furseal 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
- Dugong, Dugong dugon M, L Species or species habitat may occur within area
- Syngnathids, 21 sp. L Species or species habitat may occur within area

4.4.2 Potential Impacts

Potential direct and indirect impacts on marine and coastal habitats associated with the proposed works generally include short term noise impacts, potential for pollution/waste and associated impacts on habitats and fauna, impacts on water quality (in particular, increased turbidity levels), direct and indirect impacts on coastal dune, intertidal and subtidal marine habitats, including aquatic vegetation and impacts on fauna. While some direct impacts on marine habitats and coastal dune habitats will be unavoidable due to the nature of the propose works (e.g. physical disturbance via dredging, sand placement), most impacts can be managed and/or mitigated effectively. Overall, with the adoption of appropriate mitigation and management during the proposed activities, these works are expected to be able to be undertaken without causing any significant harm to the local marine or coastal environment.

Dredging of The Entrance Channel allows for the preservation of the existing biological assemblages that have adapted to average water levels in the lake over the past 30 years. Noting that estuaries are highly dynamic by nature, and greater diversity of natural conditions (water level, salinity, temperature, chemistry) typically supports greater biodiversity of flora and fauna and greater resilience to change (Haines, 2008).

Dredging and beach nourishment activities have the potential to adversely impact the ecology of the estuarine and marine environments as discussed below.

Flora

Seagrasses

Comparison of the seagrass beds within and adjacent to the dredge footprint changed significantly between the DPI mapping undertaken in 2005/2006 and the field surveys undertaken by WorleyParsons (2009). The changes included both loss of previously mapped seagrass beds and growth of new seagrass beds.

Seagrass growth is dependent on depth, water clarity and sediment stability (McComb *et. al.*, 1981) all of which may be affected by the dredging process. However the resulting changes may also be attributable to any, or a combination of the following:

- damage/removal due to anchor drag or propeller wash;
- increased turbidity or smothering due to boating activities; and
- increased turbidity or smothering due to natural flooding and persistent wind patterns.

The proposed works are expected to require the removal of small, discontinuous beds of *Z. capricorni* in areas that have not been dredged for a number of years and where recolonisation since past dredging campaigns has occurred. Z. capricorni is a highly transient species, which will readily recolonise an area where conditions are suitable.

Seagrass beds adjacent to the dredge footprint, including fringing seagrass beds may experience minor and temporary impacts as a result of turbidity during dredging. However, due to the predominantly sandy nature of the dredge material turbidity impacts would not be expected to be widespread or long-lasting.

Some of the remaining seagrass beds within 50 m of the proposed dredge footprint may also be impacted by increases in channel velocity due to the restoration of tidal flows or from the instability of the rhizomes (plant roots) along the leading edge of any seagrass beds directly adjacent to the dredge batter slope. Due to the narrow nature of Terilbah Channel impacts to seagrasses in this area is unavoidable.

Dredging within the proposed dredge footprint and removal of seagrass areas is considered necessary to achieve the required depth profile to ensure sufficient tidal flushing within the channel and may reduce flood risk. The area of existing seagrass within the dredge footprint that would require removal has previously been conservatively estimated to be less than 300 m^2 (WorleyParsons 2009). This area is very small in comparison to the 17.7 km^2 of seagrass meadow present within the estuary. In addition, the expected water quality benefits are considered to outweigh seagrass losses. As noted earlier, *Z. Capricorni* has been found to recolonise previously dredged areas.

Macroalgae

Macroalgae growth (including floating, epiphytic and attached species) are not expected to be impacted by the proposed works unless through direct damage within the dredge footprint. No significant impact on macroalgal abundance or distribution throughout the broader estuary is expected as a result of the dredge program.

Saltmarsh

No direct removal of saltmarsh or placement of dredged material on saltmarsh areas is proposed.

Terrestrial Vegetation

The existing foreshore vegetation has adapted to the water level fluctuations and groundwater salinity levels maintained by the existing dredging practices. Dredging is not expected to further affect foreshore vegetation.

Placement of sand onto the eroded foredune is not expected to impact on terrestrial vegetation but would offer some protection to the vegetated dunes behind the placement areas. In time the foredune may be colonised by dune species such as Spinifex Spp.

Fauna

Marine and estuarine fauna

Potential adverse impacts to aquatic fauna may result from:

- removal of seagrass which provides habitat for a diversity of fish, pipehorses and invertebrates;
- turbidity increases (to the point where feeding is impaired);
- suffocation or abrasion to mucous membranes (particularly of the fish) from suspended sediment particles in the water;
- smothering of eggs or larvae from excessive siltation in the water; and
- reduction of habitat and/or food availability.

Although some limited areas of seagrass, conservatively estimated to be less than 300 m^2 would be removed during the proposed dredging works, the Tuggerah Lakes have the third largest area of seagrass meadow in NSW. Therefore the removal of small areas of seagrass is not expected to significantly impact on the availability of habitat for species in the lakes.

Benthic fauna within The Entrance Channel are likely to have adapted to the constant flux of the shoaling sands within the channel. In addition, the depth of any fine sediment which resettles following disturbance by dredging is likely to be much less than 0.5 m thick. Burial to a depth of 0.5 m or more has been shown in previous studies as the depth from which benthic fauna are unlikely to recover (Maurer et al, 1980; 1981; 1982). Larger bottom-dwelling animals and small bottom-dwelling fish may be able to escape any areas of turbidity or sediment falling out of a turbid water column.

Impacts to species which are mobile in the water column are expected to the minor due to the relatively coarse nature of the sediment to be dredged, the temporary turbidity expected, and the ability of the animals to escape such impacts.

Species which inhabit the estuary for at least part of their life cycle are expected to benefit from the continuation of current dredging practices as it allows for:

- the necessary lifecycle movements of some species between marine and estuarine environments;
- maintenance of salinity levels necessary for marine and estuarine species to inhabit the estuary; and
- improved water quality and flow-on habitat benefits, such as healthy seagrass meadows.

Marine, Wetland and Migratory Birds

The intertidal flats, sand shoals and exposed seagrass beds in the vicinity of The Entrance Channel are part of several areas in the estuary which provide feeding habitat for shorebirds. Migratory waders also breed on Terilbah Island and the nearby Pelican Island which are within Wyrrabalong National Park.

The Entrance sand spit provides breeding and nesting habitat known to be utilised by the Little Tern which is listed as endangered under the BC Act. Six other waders and one marine bird listed under the BC Act have been recorded in the vicinity of The Entrance Channel and beach nourishment areas. Three of these species, including the Little Tern and the Lesser Sandplover are also included in the 19 threatened or migratory marine and wetland bird species listed under the EPBC Act.

There are two sensitive periods for the Little Tern (Ambrose 2020 pers. comm.):

(1) The time of arrival of Little Terns to The Entrance to select a nesting area; and
(2) when parent birds are foraging to feed chicks.

If there are significant disturbances (e.g. noise from dredging, increased human activity in the estuary) when the birds return to The Entrance to breed, this could deter the Little Terns from nesting there. It is therefore proposed that the small dredging campaign in 2020 would cease with the arrival of the Little Tern to allow establishment of nests and breeding. Once the Little Terns have established nests and have bred, if, in the written opinion of a suitably qualified expert, there will be no significant impact on this population of Little Terns, dredging may be able to recommence. Subsequent campaigns in the following years may be scheduled to avoid the Little Tern breeding season (see **Section 5** for mitigation actions).

Other bird species include migratory wader species (approximately 20 species in all, which also migrate to Australia from the northern Hemisphere), and Sooty Oystercatchers and Pied Oystercatchers (both of these species are resident in Australia all year round). Unlike Little Terns, migratory waders do not breed in Australia. These species usually arrive at the end of August/early September and depart in March. A threat to migratory waders in Australia is disruption to their foraging and roosting, because they need enough food and energy to complete their post-migration feather moult and build up fat reserves over the spring/summer so that they can migrate to the northern hemisphere and breed.

Significant disruption to feeding and roosting can delay the departure of migratory waders from Australia at the end of summer and some individuals are known to be incapable of completing their migratory journey (Ambrose 2020 pers. comm.). Migratory waders forage for marine invertebrates on sand shoals, especially at low tide and are likely to occur at The Entrance in relatively large numbers because of the availability of suitable habitat. Exposed intertidal sandflats at flood tide times will be used by migratory waders for roosting.

Sooty Oystercatchers and Pied Oystercatchers nest in or at the base of sand dunes at the same time as the Little Terns and forage for marine invertebrates at the tide line along beaches and on and among intertidal rocks. It is considered that they are unlikely to currently use the beach immediately north of The Entrance because of the current extent of coastal erosion, but they may occur along the beach south of the rocky groyne, south of The Entrance (Ambrose 2020 pers. comm.). Individuals may occasionally venture into estuarine areas of The Entrance and use the sand shoals at times of king tides flooding the beach and/or stormy seas.

The intertidal flats adjacent to Terilbah Island would not be impacted during the dredging of channels however some of the mobile sand shoals towards the mouth of The Entrance Channel would be removed. Sufficient similar foraging habitat for wading birds in surrounding areas would remain. No significant impacts are expected to any marine bird species or to wading birds or their foraging habitats as a result of the proposed dredging works.

Other Fauna

Terrestrial fauna including terrestrial bird species, bats, quolls, flying-fox, and amphibians are unlikely to be impacted by the proposed works as no disturbance to their likely habitat, being Terilbah Island and the vegetated dunes adjacent to beach nourishment areas, is expected. The works would not affect any wildlife corridors for terrestrial species, other than to preserve the corridor offered by dune vegetation at North Entrance Beach.

Threatened Species Assessment
Considering the overall significance of potential impacts, it has been concluded that:

- There will be no significant impacts on marine fauna or flora listed under the FM Act 1994, so further assessment via a Species Impact Statement (SIS) will not be required. However, any harm or damage to aquatic vegetation requires a Part 7 Permit to Harm Marine Vegetation under The FM Act 1994. This permit will need to be obtained prior to any works being undertaken.
- There are not expected to be any significant impacts on any threatened fauna or Endangered Ecological Communities (EECs) listed under the BC Act 2016, therefore, a Species Impact Statement (SIS) will not be necessary and entry into the Biodiversity Offsets Scheme (BOS) under the BC Act 2016 will not be required (refer **Appendix 1**).
- No significant impacts on any fauna or EECs listed under the EPBC Act 1999 are expected to occur, therefore, no additional assessment in the form of an Environmental Impact Statement (EIS) or referral to the Commonwealth Environment Minister for consideration and approval is considered to be required (refer **Appendix 1**).

4.5 Noise

4.5.1 Site Conditions

The acoustic environment within The Entrance Channel is predominantly influenced by residential traffic movements in surrounding residential streets and along, the Central Coast Highway, which crosses from The Entrance to The Entrance North via a bridge spanning The Entrance Channel. Minor noise inputs from recreational users in the vicinity and by occasional boat traffic are also present. Background noise levels at The Entrance Beach and North Entrance Beach are influenced by the surf zone and by adjacent residential areas.

Overall, given that the site is surrounded by urban areas but with a strong coastal recreational basis (i.e. beach and boat users), the background noise levels are considered to be moderate.

4.5.2 Potential Impacts

Construction activity on site would be undertaken during the following working hours to comply with EPA requirements:

- Monday to Friday 6am to 6pm
- Saturday 6am to 1pm
- No work on Sunday or Public Holidays

Any variation to the above hours would require the approval of Council, which would only be considered having regard to any potential for noise impacts on the surrounding residential amenity.

Minor operational noise impacts are expected from the use of the dredge and associated workboat, the refuelling of the dredge, and the trucks, excavators and dozers employed for sand placement. Reversing beepers would operate to comply with safety requirements. Broadband reversing alarms or similar (and if available) would be used as an alternative to a traditional beeper reversing alarm for vehicles permanently on site to minimise potential noise impacts.

Operational noise would have most impact on the nearest residential receivers (which would vary over time as the dredge and bulldozers would not be located in the same location over the period of works).

These include residences at Dunleith Street, the western end of Hargraves Street, and at the southern end of Hutton Road. Any impacts would be temporary over the period of each dredging campaign. The noise is expected to have little impact on the local community and no noise complaints have been recorded for the dredging, refuelling and beach nourishment activities undertaken over the past 26 years.

Potential operational impacts of noise on fauna may include disruption to foraging and nesting. This is particularly relevant for the Little Tern Colony at Karagi Point. The dredging contractor has indicated that noise levels from the proposed plant and equipment are moderate with workers readily able to have a conversation during the dredging activities. The contractor estimated only limited noise would be heard in the order of 150 m from the dredging. Noise level on the vessel do not require works to wear noise protection such as earmuffs.

Whilst there is no avoiding noise impacts at work sites, there are standard construction good practice noise safeguards and mitigation measures that would be expected on site, as outlined in **Section 5** and **Table 3**. With those measures in place it is anticipated that noise impacts during this the works would be acceptable to local receptors given their temporary nature and the necessary requirements for the works.

4.6 Air Quality

4.6.1 Site Conditions

Existing air quality at the site is presumed to have low levels of pollutants, such as particulate matter and oxides, owing to its location away from major industrial and/or commercial areas. A Regional Air Quality Index is calculated by DPIE at Wyong and is generally rated as either ‘Good’ or ‘Very ‘Good’.

The main source of air pollution in the Central Coast Council LGA comes from the use of vehicles and some industrial pollution. Other sources of pollution which affect air quality include, house wood-fires (in winter) and bush fires (in summer). There are no major sources of local air pollution surrounding the proposed works. The most likely sources of pollution are from passing road vehicles and powered watercraft.

4.6.2 Potential Impacts

The proposed works would have a minimal effect upon air quality, which would be limited to the duration of the works. The main pollutants emitted will be those associated with the operation of equipment such as the dredge, excavators, dozers and trucks. Truck movements may also result in dust generation across the site. This would be mitigated by use of water carts if required.

At North Entrance Beach, it is possible emissions of hydrogen sulfide could occur, as have occurred in the past, from the disturbance of sediment which contains layers of decaying organic matter. As a result, odours may be detected at nearby receptors from time to time. However this is not considered a significant issue in comparison to the benefits offered by the proposed works.

It is expected that any potential air quality impacts would be effectively mitigated through the control measures listed in **Table 3**.

4.7 Landscape and Visual Character

4.7.1 Site Conditions

The site is dominated by expansive open views across The Entrance Channel to Tuggerah Lake in the west and out to the Pacific Ocean in the east (refer **Photos 9 to 13**). The land surrounding The Entrance Channel is primarily zoned either for residential/commercial or recreational purposes.

Photo 9 Looking west to Tuggerah Lake, May 2020

Photo 10 Looking east to Pacific Ocean, May 2020

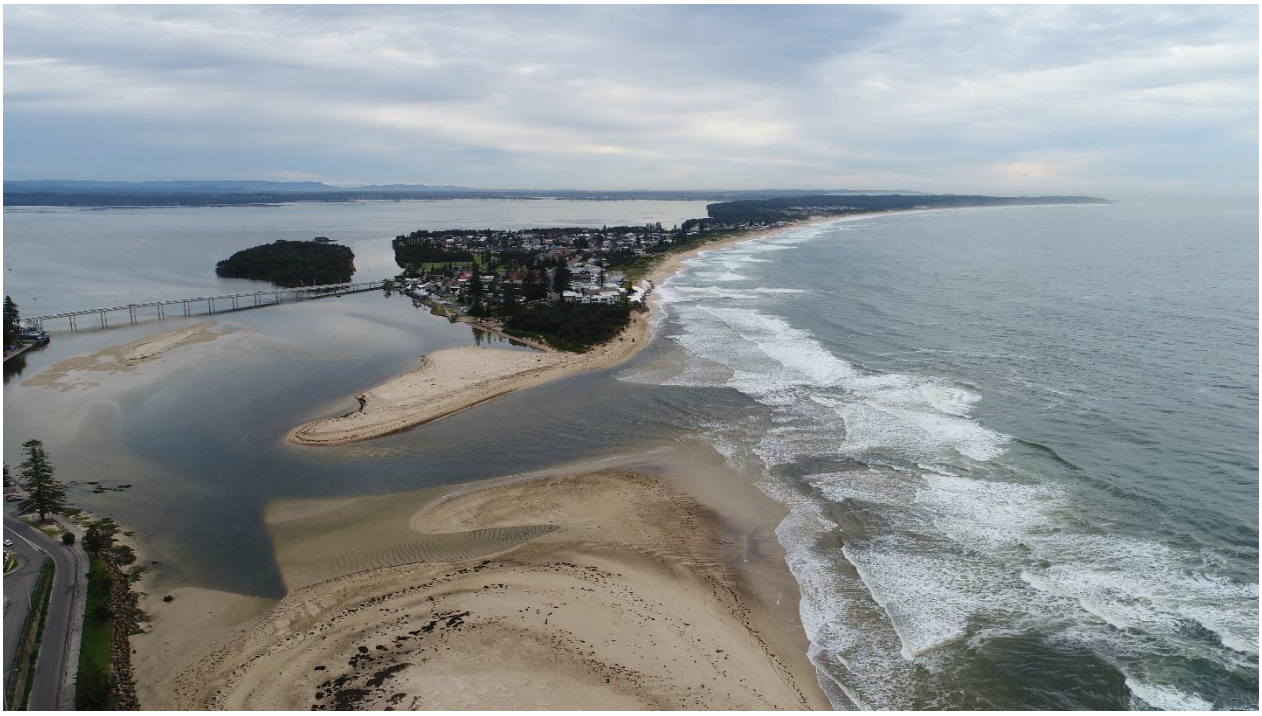

Photo 11 Looking North along North Entrance Beach, 13 August 2020

Photo 12 Looking South along North Entrance Beach, 13 August 2020

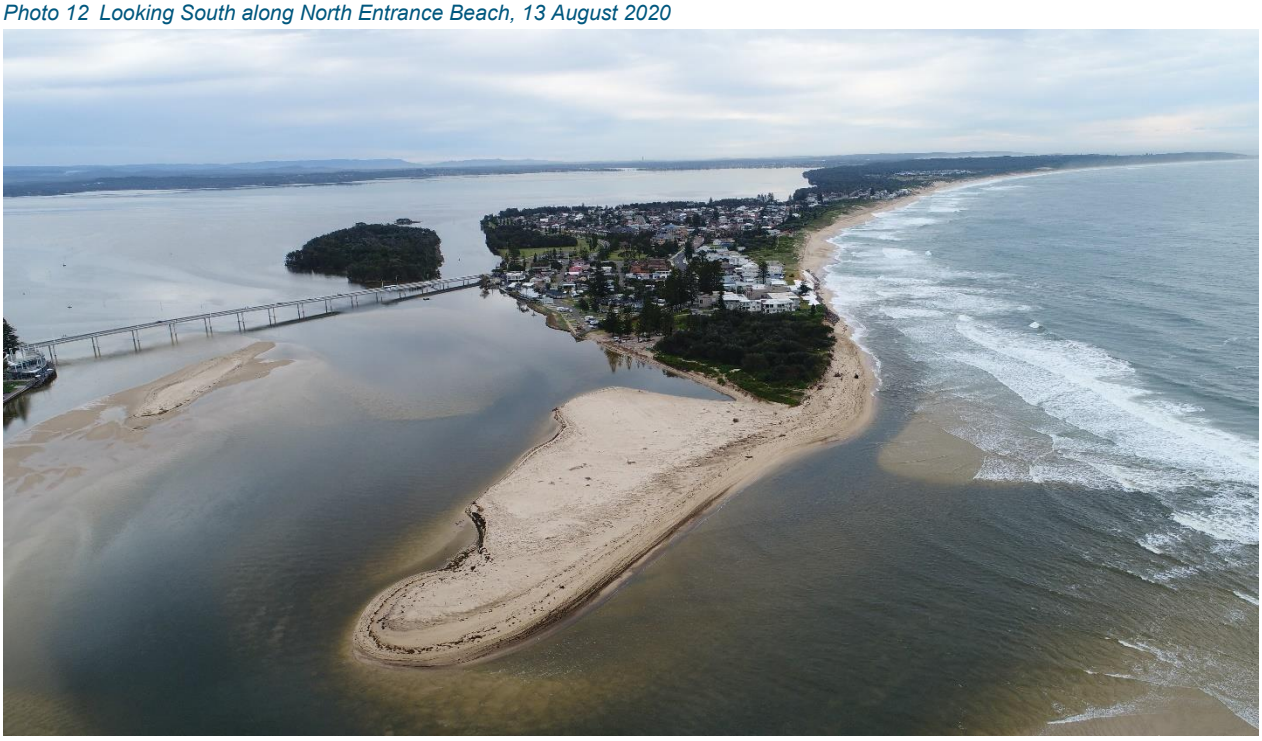

Photo 13 Proposed works area at The Entrance, 13 August 2020

4.7.2 Potential Impacts

Impacts to landscape are expected during the construction phase with the presence of workers, plant and associated works infrastructure (as required). This is a time limited impact which would occur during the works. After each dredging campaign, the site would be returned to pre-activity landscape conditions.

Visual impact associated with dredging would be minor and temporary. Maintenance dredging is a common occurrence within the channel. Minor impacts are expected as a result of the following:

- presence of the dredge, pipelines and buoys;
- presence of the discharge pipeline outlet, fencing, signage and plant/equipment;
- mounded sand within the beach nourishment areas;
- slight turbidity of waters surrounding the dredge and within silt curtains (refer **Section 4.3**); and
- temporary discolouration of sand within the beach nourishment areas due to placement of sands containing organic matter and anoxic sands which are generally a darker grey than beach sands.

These impacts would be temporary in nature and are necessary for works that enhance the long-term visual amenity and recreational value of The Entrance Channel and surrounding beaches.

Appropriate mitigation and control measures have been put forward for use during the construction phase in **Table 3**.

4.8 Waste Management

4.8.1 Site Conditions

Waste inputs in this area would most likely be confined to that left by recreational users of the beach, boat users, storm water discharges and waste deposited on incoming tides / waves. Garbage bins were identified at a number of points in the area and would be emptied as part of Council's waste collection services.

Overall, the site is considered to have relatively low levels of garbage or waste present.

4.8.2 Potential Impacts

The use of the proposed dredge material for beach nourishment is considered a beneficial reuse of a natural resource and therefore no impacts would be associated with the disposal of this material.

The proposed works may generate the following waste during construction:

- General garbage produced by workers, and
- Waste items found within dredge footprint.

Anthropogenic waste materials such as plastic bottles, glass, fishing line, tyres, beds and machinery may occasionally be removed from the dredge footprint or from nourishment areas during the dredging and beach nourishment. This would be disposed of at an appropriately licensed waste management facility.

The removal of general construction waste and garbage from site is a normal construction contract requirement, progressively and at completion. It is recommended that standard construction site good practice is adhered to, as detailed in **Table 3**.

4.9 Existing Users, Access and Safety

4.9.1 Site Conditions

The majority of use of the site is recreational. This includes recreational boat users, beach users (i.e. swimming, sunbathing, fishing etc.) and picnicking. Boat users can access the waterway from multiple

boat ramps within Tuggerah Lake. People can access the beach at multiple points along the beach frontage and can make their way along the beach and egress at, similarly, multiple points.

Given the presence of a shallow rock bar and highly dynamic nature of sediment transport in the vicinity of The Entrance bar, navigation has been historically undertaken on an opportunistic basis and has been considered a high risk activity (GHD 2019). An assessment was undertaken by Captain Charles Weston in April 2013, which concluded that the depth of water over the existing rock bar is the primary constraint to vessel navigation and that a widened entrance channel would have limited use by boaters unless the depth over the rock bar was increased (Weston 2013).

4.9.2 Potential Impacts

The presence of the dredge and pipeline in the navigation channel will impact on vessel passage during dredging operations. Small recreational vessels may be able to pass the dredge but larger vessels may need to wait while the dredge moves from the navigation channel. This will be a short term impact.

Public safety may be an issue during dredging (increased water depths) and the placement of sand in beach nourishment areas (stockpiled sand). However, the sides of the dredge area would be sloped to an appropriate angle to prevent bank collapse and to provide a gradual transition in existing water depths. Sand pumped or trucked to the beach would initially find its own stable angle of repose and the public would be temporarily excluded from areas of emplaced sand until work has been undertaken to regrade these areas to a natural stable slope as per the methodology detailed in Section 3.3.

Recreational fishing would be prohibited in the immediate vicinity of the dredge and at the discharge area on the open beach during operation. Numerous other locations within walking distance would remain unaffected. In addition, the dredging campaigns would be planned to avoid peak tourist seasons which would see an influx of recreational fishing use of The Entrance Channel. In addition, dredging would avoid the prawning season which is generally over by March each year and is predominantly carried out during the summer holiday period in which dredging is avoided in order to minimise impacts during the tourist high season and to nesting habitat for the Little Tern.

It is considered that the proposed dredging and beach nourishment activities would have no adverse impact on recreational and commercial fishing. It is expected that normal recreational activities would be possible during the dredging and beach nourishment activities in areas outside of the immediate influence of the dredge and discharge pipeline.

No removal or relocation of existing navigation aids within The Entrance Channel is required for the proposed dredging works.

To some effect, the proposed works may improve public safety through the removal of risks associated with:

- the instability of eroded foredunes;
- navigational hazards to boating within the channels; and
- high velocities experienced within channels adjacent to the Karagi Foreshore Park as have previously been experienced prior to channel re-alignment.

The dredge would use a combination of floating and sunken pipeline. The floating pipeline section would have high visibility floats attached to it and yellow warning buoys at intervals so it is visible to waterway users. The sunken line would be on the seabed but could be marked with yellow warning buoys if located in a busy waterway area or in a shallow water depth. A Notice to Mariners will be issued by RMS to advise waterway users of the dredging activities.

Appropriate safety precautions would be taken during the construction of the works, such as incorporation of security fencing and construction barrier fencing, to ensure public and worker safety. It would be a requirement of the construction contract that the Contractor employ persons to control vehicular and pedestrian movements on adjacent roads, within car park areas and on the beach, as required to ensure safety.

In summary, while there may be some temporary inconvenience to waterway and beach users during the construction period, such inconvenience is considered acceptable to attain the longer term benefits of the erosion protection works.

4.10 Heritage

4.10.1 Site Conditions

Indigenous Heritage

Traditionally the Tuggerah Lakes region has been inhabited by the Awabagal and Kuringai tribes. There are no Aboriginal places near the site declared under Section 84 of the NP&W Act. There are no identified Aboriginal Land Claims over the bed of the entrance channel where dredging is proposed nor in the areas of beach nourishment.

A search of the NPWS Aboriginal Heritage Information Management System (AHIMS) in August 2020 indicated there are no known Aboriginal places or object in the immediate proximity to the proposed works. If any suspected Aboriginal Heritage places or objects are found during dredging operations, works will cease immediately and the Council Project Manager will be contacted.

Non-Indigenous Heritage

The EPBC Act Protected Matters Search Tool identified no Commonwealth Heritage Places or National Heritage Places.

A search of the State Heritage Inventory, which contains items listed by the Heritage Council, and State and Local Government agencies confirms the nearest listed site is The Entrance Beach Surf Club building on Marine Parade. This structure would potentially benefit from beach nourishment at The Entrance.

A search of the Maritime Heritage database show no listings for The Entrance Channel.

4.10.2 Potential Impacts

It is unlikely that there are any unrecorded indigenous or non-indigenous artefacts or items of maritime heritage (wrecks) within the dredge footprint as the site has previously been disturbed for past dredging campaigns. Nevertheless, the control measures listed in **Table 3** are recommended to ensure that no heritage impacts occur due to the proposed dredging works.

The renourishment activities are proposed along pre-eroded beach profiles which are unlikely to contain unrecorded artefacts.

4.11 Traffic and Parking

4.11.1 Site Conditions

Hutton Road is a single lane each way local road accessed from the Central Coast Highway via Roberts Road. Hutton Road ends with a carpark with room for approximately 30 cars.

4.11.2 Potential Impacts

During the works the car park at the end of Hutton Road would be used by the contractors for their work compound. During the works, this area would become inaccessible to the public and other users of the area. Use of this area would reduce the number of parking spaces and would cause a minor impact on visitors during this time.

As the dredging is water based it will not have any noticeable impact on other than some increased traffic into the area to accommodate dredge operators and sand placement workers arriving and leaving from the site. This is considered a negligible impact on traffic and parking.

Once the sand has been pumped to the foreshore near the carpark for dewatering and stockpiling (re-handling) it would be trucked to the beach via a haul road along an existing track. Earth moving equipment for the sand placement will be operating on the beach hence these activities will have no impact on road traffic.

5 Recommended Mitigation and Control Measures

The following **Table 3** identifies the recommended mitigation and control measures that should be put in place to avoid or ameliorate the potential impacts of the replacement works, as discussed in **Section 4**.

Table 3 Proposed Environmental Safeguards and Mitigation Measures

Environmental Safeguard and/or Mitigation Measure
Landscape and Visual
1. Impacted areas (i.e. for access, storage and site works) should be returned to pre-construction conditions where possible.
2. Revegetate where possible to reinstate visual aesthetics in line with surrounding and pre-construction landscape.
3. The construction site should be kept tidy and in an orderly fashion at all times to minimise visual impacts to local residents.
Coastal Ecology
4. All construction works must be undertaken by suitably qualified and experienced Contractor(s) to reduce the risk of error and accidental environmental damage.
5. Workers shall be informed of their obligations and possible offences under the NSW National Parks and Wildlife Act and Australian Environmental Protection and Biodiversity Conservation Act with respect to threatened and migratory species.
6. The Works shall minimise the destruction of flora and interference with fauna. It is proposed that the small dredging campaign proposed for 2020 would cease with the arrival of the Little Tern to allow establishment of nests and breeding. Once the Little Terns have established nests and have bred, if, in the opinion of a suitably qualified expert, there will be no significant impact on this population of Little Terns, dredging may be able to recommence.
7. Water quality shall be monitored to comply with the EPL.
8. A program of sediment sampling and testing shall be undertaken within the dredge footprint as a minimum every 5 years to ensure current sediment quality data is available.
9. Removal of trees identified by the Contractor to be within the area to be disturbed by construction activity shall require prior written approval from the Council Public Tree Assessment Officer.
10. Contractor to cease work activities and notify the Council Project Manager if fauna species of concern (excluding e.g. cormorants) are observed to persistently occupy areas in the immediate vicinity of work zones.
11. If native fauna is injured, immediate contact should be made with a wildlife rescue service or a veterinary surgeon.
12. If revegetating of the site after the works have been completed is deemed appropriate, then only local native plant species should be used, preferably grown from local stock. If possible, plants that are in areas that are to be excavated or accessed should be carefully dug up and appropriately stored for replanting after construction work.

Environmental Safeguard and/or Mitigation Measure
13. When revegetating sites, the following plants shall not be used and should be controlled in according to a weed management plan for the sites: a) Plant species listed as weeds by NSW Department of Primary Industries (http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles) b) Plant species listed as part of key threatening processes (http://www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm).
Water and Sediment Quality
14. A construction management plan should be prepared by Council and/or the contractor that addresses ways in which pollution of the site by fuel and oil will be avoided. This should include protocols for equipment maintenance, storage of fuel and other chemicals and materials, and refuelling procedures.
15. Water quality shall be monitored to comply with the EPL.
16. Refuelling should be done off site. However, if refuelling on site is required, due care shall be taken to avoid spilling fuel and a tray should be used to catch any accidentally spilt fuel. Plant refuelling/servicing activities to be completed on-land and away from waterway areas.
17. Industry standards and pollution prevention regulations shall be adhered to during refuelling, transfer, storage and handling of hazardous materials.
18. A Pollution Incident Response Management Plan (PIRMP) should be prepared for the works.
19. Contractor to ensure that all plant is maintained in good working order with regular servicing.
20. Spill response kits to be maintained onsite for use as required by trained Contractor personnel.
21. No major maintenance of equipment shall be undertaken on-site.
22. Timing of works should be planned to avoid, where possible, periods of high rainfall or during storm/wind warnings. Where this is not possible, preparation and tidying should occur around the worksite to reduce the potential for contamination of the waterway from stormwater runoff.
23. Weather and tide forecasts need to be checked regularly during construction. Where flooding or inundation is forecast to any work area, all equipment and materials need to be removed from the landside construction zone or appropriately secured above expected flood levels in the area.
24. Local stormwater runoff from undisturbed areas upstream of the site should be diverted away from the site and discharged to existing drains. Minimise any alteration of existing drainage patterns in undisturbed areas, and stabilise to protect against erosion as required.
25. Stockpiles shall be located on flat ground at least 5 metres away from areas subject to run-off and away from established flow paths (e.g. drains, gutters, etc.). The height of the stockpiles shall not exceed 2 metres, unless stockpiles are suitably protected from wind erosion. The Contractor shall protect temporary stockpiles with diversion drains, silt fences and straw bales to prevent sediment loss where required.
26. Tracking of sediment from the construction site via construction equipment onto the road shall be minimised. The Contractor shall be required to clean any machinery in a designated washdown area to prevent tracking of sediment off site.

Environmental Safeguard and/or Mitigation Measure
27. Washout of trucks and cleaning of construction equipment and/or vehicles shall not be undertaken in locations that permit flow of untreated wastewater directly to the open drainage system or beach.
28. Stormwater from the stockpile areas shall be collected and treated via sediment control structures prior to discharge off site.
29. The design of any sediment control structures by the Contractor shall minimise obstruction to freshwater runoff.
30. The contractor should maintain a water cart on site to wet down working areas and haul routes as required.
31. The lowest level of hydrocarbons (oil, grease, petrol, diesel) practicable will be stored on site.
32. A silt curtain(s) should be used in the waterway adjacent to the dewatering/re-handling area .
33. If storage on-site of hazardous substances is required, then effective bunding should be used in construction areas.
34. Sleeves should be fitted over hydraulic hoses on equipment operating on or near the waterway to capture any hydraulic fluid that may be spilt from a ruptured hose or an alternative mitigation measure in lieu of sleeving that achieves the same water quality management intent such as use of biodegradable hydraulic oil, regular pre-start hose/pump inspections, or other suitable measures.
35. Any worn or damaged hoses, joints or connections identified during inspections need to be replaced prior to their use.
36. Appropriate site and project inductions/training detailing potential water quality impacts and relevant construction measures and spill and emergency response procedures should be used.
Noise and Vibration
37. Works should be undertaken during the standard construction hours where practicable (i.e. 6.00 am to 6.00 pm Monday to Friday and 6.00 am to 1.00 pm Saturdays, with no work to be undertaken on Sundays and Public Holidays). However, on occasion works may be required outside of the standard hours to meet the tide conditions and to allow for the works to be delivered on time. Where works are required outside of the standard hours, notification will need to be provided to local residents by Council.
38. Works should be undertaken in the non-peak visitor and recreation periods if possible (i.e. during winter months).
39. Plant to be turned off when not in use (e.g. not left idling).
40. Instructions should be issued to the Contractor that appropriate silencers are to be fitted on all plant and equipment where possible.
41. Noisy plant and equipment is to be oriented away from sensitive receivers where possible.
42. Broadband reversing alarms or similar (and if available) are to be used as an alternative to a traditional beeper reversing alarm for vehicles permanently on site.
43. The use of horns and alarms are to be minimised.
Traffic Management

Environmental Safeguard and/or Mitigation Measure
44. The Contractor shall take all precautions to ensure that the carpark, roads and thoroughfares used by it are not damaged as a result of the Works. In the event of any damage, in the opinion of the Superintendent, the Contractor shall take all necessary and immediate steps to repair the damage. Any damage to local streets shall be rectified by the Contractor.
45. The Contractor is to provide a Road and Pedestrian Management Plan for Council approval prior to commencement of works.
Public Access and Safety
46. Prior to commencement of works, boundaries of the construction and access areas need to be marked with temporary barrier fencing. The fencing shall be monitored daily by the site supervisor and immediately repaired or replaced if necessary and shall be removed when construction is completed.
47. Machinery shall only access the defined work sites via clearly defined routes.
48. Pedestrian access near to or within the works area shall not be permitted over the duration of the Works. Where fencing cannot be practically used (i.e. on the beach) then clear and obvious signage should be employed.
49. Beach users and surrounding residences and businesses should be notified of the proposed works and hours of operation.
50. A Council contact should be provided for the works in the event of any complaints.
51. Workers and plant drivers to maintain awareness of beach users at all times.
52. Limit speed of plant whilst working in the area.
Waste Management
53. Waste material shall be contained within the land-based workers compound during the works and then removed to an authorised waste disposal facility. No material shall be placed in any location or in any manner that would allow it to enter the waterway or escape from the site.
54. No material shall be disposed of into the sea at any time.
55. Washout of trucks and cleaning of equipment and/or vehicles used during the works shall not be undertaken in locations that permit flow of untreated wastewater directly to the open drainage system.
56. Portable toilets to be emptied on a regular basis and human waste disposed of to a local sewage treatment plant.
57. The Contractor shall prepare an Emergency Response Plan and train employees in the use of equipment, chemicals, and protective clothing and the application of the Emergency Response Plan.
Heritage
58. All relevant staff and contractors are to be trained regarding their statutory obligations and responsibilities under the *Heritage Act 1977* and best practice outlined in The Burra Charter 2013, through the site induction and toolbox talks in the event suspected historical cultural material is uncovered.

Environmental Safeguard and/or Mitigation Measure
59. In the event that any potential archaeological finds / items are uncovered during construction works, the contractor must notify the Council Project Manager immediately and cease works until further instruction.

6 Summary of Environmental Factors

6.1 Consideration of Factors in Clause 228 of the EP&A Regulation

Clause 228 of the EP&A Regulation 2000 provides a list of factors that must be considered in determining the likely impacts of an activity on the environment.

Following review of the Clause 228 factors outlined below in **Table 4**, the proposed works are not considered to result in significant detrimental environmental impacts. Therefore, it is concluded that an EIS is not required and this REF is considered an appropriate environmental assessment.

Table 4 Factors in determining the likely impacts of an activity on the environment

Clause 228 Factor	Significant impact
a. Any environmental impact on a community?	No
b. Any transformation of a locality?	No
c. Any environmental impact on the ecosystems of the locality?	No
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	No
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	No
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?	No
g. Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?	No
h. Any long-term effects on the environment?	No
i. Any degradation of the quality of the environment?	No
j. Any risk to the safety of the environment?	No
k. Any reduction in the range of beneficial uses of the environment?	No
l. Any pollution of the environment?	No
m. Any environmental problems associated with the disposal of waste?	No
n. Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?	No
o. Any cumulative environmental effect with other existing or likely future activities?	No
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	No

6.2 Consideration of Matters of National Environmental Significance

Matters of national environmental significance must be considered under the environmental assessment provisions of the *EPBC Act*. No matters of national environmental significance would be impacted by the proposed works, as set out below in **Table 5**.

Table 5 Matters of national environmental significance that must be considered

Matter of National Environmental Significance	Significantly Impacted?
a. Any environmental impact on a world heritage property?	No
b. Any Environmental Impact on a National Heritage place?	No
c. Any Environmental Impact on Ramsar Wetlands of international importance?	No
d. Any environmental impact on Commonwealth listed threatened species and ecological communities?	No
e. Any environmental impact on Commonwealth listed migratory species?	No
f. Does any part of the project involve a nuclear action?	No
g. Any environmental impact on the Commonwealth marine environment?	No
h. Any impact on Commonwealth land?	No

7 Conclusions

This REF has been prepared for Central Coast Council for the proposed dredging program for The Entrance Channel, Tuggerah Lakes. It is a written statement that considers the impact of the proposed works (dredging and sand placement) on the natural and built environment, and the proposed methods of mitigating or ameliorating any adverse effects.

The works do not require development consent and fall under Part 5 of the EP&A Act.

For the proposed dredging and beach nourishment works, Central Coast Council is considered to be a determining authority as the activity is to be carried out by Council. Other determining authorities and required approvals include:

- DPIE – Crown Lands Licence
- DPI – Fisheries Permit harm to marine vegetation
- NSW EPA – Environment Protection Licence for dredging

Potential impacts of the project primarily relate to coastal ecology and amenity and have been addressed by this REF. The 2020 REF aligns with previous dredging programs (REF 2009) and the Tuggerah Lakes Estuary Management Plan, but has been updated to account for methodology, legislation and licencing changes. In general, given the localised, temporary and recurrent nature of the works, it is expected that the project would have few adverse impacts on the surrounding environment, typically of a low to negligible level. Where potential environmental impacts have been identified, control measures have been recommended.

8 References

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Appendix 1 – Threatened Species Assessment

BIODIVERSITY CONSERVATION ACT 2016

A Test of Significance under the Biodiversity Conservation (BC) Act 2016 has been undertaken in order to determine if the proposed works are likely to significantly affect threatened species or ecological communities, or their habitats. 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).

If the works are likely to have a significant impact or will be carried out in a declared Area of Outstanding Biodiversity Value, the proponent must either apply the Biodiversity Offset Scheme (BOS) or prepare a species impact statement (SIS). The test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats requires the assessing of the proposal against five criteria.

The Entrance sand spit provides breeding and nesting habitat known to be utilised by the migratory shore bird, the Little Tern (Sternula albifrons). This species is listed as endangered under the BC Act 2016 and protected as a migratory species under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Little Terns migrate from Asia to Australian arriving from approx. late Sep to mid October each year to breed. The local population at the Entrance generally nest on the Karagi Point Sand Spit which is located is close proximity to the Stage 1 dredging dewatering area.

Central Coast Council has engaged a specialist to prepare a threatened species assessment for all bird species that could potentially be impacted by the dredging operations. This test of significance has been prepared as an interim measure whilst the dredging operations commence, and the threatened species assessment is being finalised by the specialist. This assessment is to cover the impact of dredging prior to the arrival of the Little Terns in the area. .

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.

Assessed Impact - It is not expected that the works will have an adverse effect on the life cycle of the Little Tern or any species listed such that a viable local population of the species is likely to be placed at risk of extinction. It is proposed that the dredging would cease immediately with the arrival of the Little Tern to allow establishment of nests and breeding. A suitably qualified expert would monitor daily for the arrival of the Little Tern which may be from late September though to November.

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.

Assessed Impact - NA

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.

Assessed Impact – All work activities would be excluded from the nesting area of the Little Tern. Dredging would be undertaken by means of a submersible pump fitted to the end of an excavator. The excavator would be mounted on a barge. The barge would be stationary while dredging in a particular area is taking place. The sand would be pumped as a slurry to the foreshore near the Karagi carpark via a floating pipeline. The sand spit (breeding area for the Little Terns) would be fenced as an exclusion zone. In area terms, the size of the barge would represent a very small percentage of the total area of the waterway and available foraging area for the Little Tern i.e. approximately 0.1% (one tenth of one percent) of the waterway area of the lake measured from the bridge to the ocean.

It is therefore not expected that any habitat of the Little Tern or a threatened species or ecological community would become significantly removed, modified, fragmented or isolated from other areas of habitat in the locality or that this would impact on the long-term survival of the species or ecological community in the locality.

Criteria 4 - Whether the proposed development or activity is likely to have an adverse effect on any declared Area of Outstanding Biodiversity Value (AOBV) (either directly or indirectly).

Assessed Impact - No AOBVs listed under the BC Act 2016 are located near to the study area so will not be impacted by the proposal.

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

Assessed Impact - Of the listed KTP's under the BC Act the only one with the potential to apply to the works is "Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments". This could occur through the incorrect disposal of construction or general waste at the site, as well as through accidental releases of waste into the waterway. Appropriate waste management mitigation measures have been proposed for the works. In addition, unplanned spills and leaks will be addressed in detail in the CEMP/PIRMP with strict criteria and auditing.

Overall Assessment of Significance - As there are not expected to be any significant impacts on any threatened fauna or on any EEC listed under the BC Act 2016 as a result of the works, a SIS or entry into the BOS under the BC Act 2016 will not be required. The works can proceed with caution in accordance with the Review of Environmental Factors (a.k.a. Part 5 Environmental Assessment) and the control measures outlined within this threatened species assessment.

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act 1999 Significant Impact Guidelines for threatened species and for endangered ecological communities were reviewed and the works assessed in relation to these below (http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf).

Little Tern is listed as a migratory and marine bird species under the EPBC Act.

Significant Impact Guidelines – Threatened, Migratory and Listed Marine Species

An action is likely to have a significant impact on a critically endangered, endangered or vulnerable species if there is a real chance or possibility that it will trigger one or more of the following nine impacts:

Impact 1. Lead to a long-term decrease in the size of a population or of an important population of a species.

Result - The works are not expected to lead to a long-term decrease in the size of a population, or of an important population of a species, listed under the EPBC Act 1999. It is proposed that the dredging would cease with the arrival of the Little Tern to allow establishment of nests and breeding.

Impact 2. Reduce the area of occupancy of the species or of an important population.

Result - The sand spit (breeding area for the Little Terns) would be fenced as an exclusion zone. The proposal will therefore not reduce the area of occupancy for the Little Tern as its nesting area will not be modified and sufficient nearby foraging area is available. In area terms, the size of the barge would represent a very small percentage of the total area of the waterway and available foraging area for the Little Tern i.e. approximately 0.1% (one tenth of one percent) of the waterway area of the lake measured from the bridge to the ocean. It is proposed that the dredging would cease with the arrival of the Little Tern to allow establishment of nests and breeding

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

Result - All work activities would be excluded from the nesting area of the Little Tern. The works will not fragment any population into two or more populations. It is proposed that dredging would cease immediately with the arrival of the Little Tern to allow establishment of nests and breeding. A suitably qualified expert would monitor daily for the arrival of the Little Tern which may be from late September though to November.

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

Result – The sand spit on the northern side of The Entrance channel is a known nesting site as noted in the NSW National Parks and Wildlife Service (2003) Little Tern (Sterna albifrons) Recovery Plan. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Recovery-plans/little-tern-sterna-albifrons-recovery-plan.pdf. The sand spit (breeding area for the Little Terns) would be fenced as an exclusion zone. It is proposed that dredging would cease immediately with the arrival of the Little Tern to allow establishment of nests and breeding. A suitably qualified expert would monitor daily for the arrival of the Little Tern which may be from late September though to November. No Critical Habitat listed under the EPBC Act 1999 occurs in the study area, so this will not be impacted.

Impact 5. Disrupt the breeding cycle of a population or of an important population.

Result - The works are not likely to disrupt the breeding cycle of a population or important population. It is proposed that the dredging would cease with the arrival of the Little Tern to allow establishment of nests and breeding.

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

Result - The habitat at the site will not be destroyed, removed, isolated or decreased in quality to the extent that any species is likely to decline. The sand spit (breeding area for the Little Terns) would be fenced as an exclusion zone. It is proposed that dredging would cease immediately with the arrival of the Little Tern to allow establishment of nests and breeding. A suitably qualified expert would monitor daily for the arrival of the Little Tern which may be from late September though to November.

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

Result - The works will not result in the direct introduction of any invasive species.

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

Result - The works will not result in the introduction of disease that may cause species to decline.

Impact 9. Interfere or interfere substantially (for vulnerable species) with the recovery of the species.

Result – The NSW National Parks and Wildlife Service (2003) Little Tern (Sterna albifrons) Recovery Plan has been reviewed and it is considered the works will not interfere with the recovery of the Little Tern or any threatened species.

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

Appendix 2 – Sediment Testing

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	1.1	**EASTING**	360574
EQUIPMENT	Piston Corer	**NORTHING**	6310026
DATE/TIME	12/08/2020 10:20 AM	**BATHYMETRY (m AHD)**	-0.5
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-2.0	SAND trace gravel, cream/buff, medium to coarse grained sand, abundant shell content, rounded coarse sand/fine gravel ~2mm diameter with varying colour, opaque, beige, brown, grey and white. From 0.3m, light grey. From 1.0, becoming coarser, flat gravel/shell up to ~15mm diameter. From 1.7m, grey.	ESTUARINE/MARINE DEPOSIT	1.1A 0.0-0.5m bgl 1.1B 0.5-1.0m bgl 1.1C 1.0-1.5m bgl 1.1D 1.5-2.0m bgl
2	EOH, full core barrel.		
Comments	Duplicate core 2.0m long, similar profile.		

Top

Bottom

Duplicate Core
Top

Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	1.2	**EASTING**	360565
EQUIPMENT	Piston Corer	**NORTHING**	6310093
DATE/TIME	12/08/2020 11:00 AM	**BATHYMETRY (m AHD)**	-0.7
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-0.2	SAND, cream/buff, medium grained sand, shell fragments.	ESTUARINE/MARINE DEPOSIT	1.2A 0.0-0.5m bgl
0.2-0.7	SAND trace gravel, light grey, coarse grained sand, rounded coarse sand/fine gravel ~3mm diameter with varying colour, opaque, beige, brown, grey, black and white, shell fragments.	ESTUARINE/MARINE DEPOSIT	1.2B 0.5-1.0m bgl 1.2E 0.5-1.0m bgl
0.7-1.4	SAND, grey, medium grained sand, shell fragments.	ESTUARINE/MARINE DEPOSIT	1.2C 1.0-1.80m bgl
1.4-1.5	SAND, dark grey, medium grained sand, shell fragments.	ESTUARINE/MARINE DEPOSIT	
1.5	EOH, refusal.		
Comments	Duplicate core ~1.8m. Slightly darker below 0.7m.		

Duplicate Core
Top

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Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	1.3	**EASTING**	360537
EQUIPMENT	Piston Corer	**NORTHING**	6310152
DATE/TIME	12/08/2020 11:45 AM	**BATHYMETRY (m AHD)**	-0.5
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-0.25	SAND, cream/buff, medium to coarse grained, shell fragments.	ESTUARINE/MARINE DEPOSIT	1.3A 0.0-0.5m bgl
0.25-0.7	SAND trace gravel, light grey medium grained, rounded coarse sand/fine gravel ~3mm diameter with varying colour, opaque, beige, brown, grey, black and white, shell fragments.	ESTUARINE/MARINE DEPOSIT	1.3B 0.5-1.0m bgl
0.7-2.0	SAND, grey, medium grained, shell fragments. At 1.0-1.2m, dark grey, decomposing organics (seaweed).	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	1.3C 1.0-1.5m bgl 1.3D 1.5-2.0m bgl
2	EOH, full core barrel.		
Comments	Duplicate core 1.9m long, similar profile.		

Duplicate Core
Top

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	1.4	**EASTING**	360524
EQUIPMENT	Piston Corer	**NORTHING**	6310207
DATE/TIME	12/08/2020 12:20 PM	**BATHYMETRY (m AHD)**	-0.2
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-1.8	SAND, cream/buff, medium grained sand. From 0.2m, light grey. At ~0.3m, dense layer of sand. From 1.0, grey. At 1.0-1.3, cotton thread in core.	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	1.4A 0.0-0.5m bgl 1.4B 0.5-1.0m bgl 1.4C 1.0-1.5m bgl 1.4D 1.5-1.8m bgl
1.8	EOH, refusal.		
Comments	Duplicate core 1.8m long, similar profile. Location on edge of sand shoal.		

Top

Bottom

Duplicate Core
Top

Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	2.1	**EASTING**	360390
EQUIPMENT	Piston Corer	**NORTHING**	6310150
DATE/TIME	12/08/2020 4:00 PM	**BATHYMETRY (m AHD)**	0
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-0.3	SAND trace gravel, cream/buff, coarse grained sand, abundant shell content, rounded coarse sand/fine gravel 2-3mm diameter with varying colour, opaque, beige, brown, grey and white.	ESTUARINE/MARINE DEPOSIT	2.1A 0.0-0.5m bgl
0.3-1.2	SAND, light grey, medium grained sand, shell fragments. From 1.1, grey, organic matter (seaweed).	ESTUARINE/MARINE DEPOSIT	2.1B 0.5-1.0m bgl
1.2-1.9	SAND, light grey, coarse sand, subangular grains, shell fragments.	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	2.1C 1.0-1.5m bgl 2.1D 1.5-2.0m bgl
1.9-2.0	SAND, fine grained, dark grey.	ESTUARINE/MARINE DEPOSIT	
2	EOH, refusal.		
Comments	Duplicate core 2.4m long, similar profile, full core barrel. Cores obtained by foot. Insufficient water depth to navigate to core location.		

Top

Bottom

Duplicate Core

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Bottom

CORE LOG

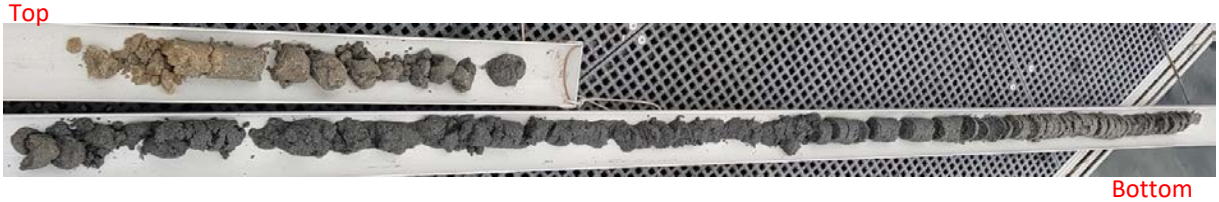
CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		
CORE ID	2.2	**EASTING**	360416
EQUIPMENT	Piston Corer	**NORTHING**	6310198
DATE/TIME	12/08/2020 2:00 PM	**BATHYMETRY (m AHD)**	-0.9
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-1.4	SAND, cream/buff, medium grained sand, shell fragments. From 0.2, light grey.	ESTUARINE/MARINE DEPOSIT	2.2A 0.0-0.5m bgl 2.2B 0.5-1.0m bgl 2.2C 1.0-1.5m bgl
1.4-2.2	SAND trace gravel, light grey, coarse grained sand, rounded coarse sand/fine gravel 2-3mm diameter with varying colour, beige, grey, black and white, abundant shell up to 15mm.	ESTUARINE/MARINE DEPOSIT	2.2D 1.5-2.0m bgl
2.2	EOH, refusal.		
Comments	Duplicate core 2.2m long, similar profile.		

Top

Bottom

Duplicate Core

Top



Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	2.3	**EASTING**	360475
EQUIPMENT	Piston Corer	**NORTHING**	6310250
DATE/TIME	12/08/2020 1:20 AM	**BATHYMETRY (m AHD)**	-0.2
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-2.3	SAND, grey, medium grained, shell fragments. From 0.4, light grey.	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	2.3A 0.0-0.5m bgl 2.3B 0.5-1.0m bgl 2.3C 1.0-1.5m bgl 2.3D 1.5-2.4m bgl
2.3-2.4	SAND, grey, medium grained sand, abundant shell to 15mm diameter.	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	
2.4	EOH, full core barrel.		
Comments	Duplicate core 2.4m long, similar profile. Seaweed on the bed. Relatively uniform throughout and no gravel.		

Bottom

Duplicate Core

Top

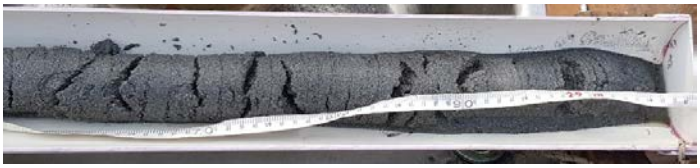
Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	3.1	**EASTING**	360571
EQUIPMENT	Piston Corer	**NORTHING**	6310306
DATE/TIME	12/08/2020 3:30 PM	**BATHYMETRY (m AHD)**	-0.5
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-1.8	SAND, cream/buff, 'medium grained sand, shell fragments. From 0.8m, grey.	ESTUARINE/MARINE DEPOSIT	3.1A 0.0-0.5m bgl 3.1B 0.5-1.0m bgl 3.1C 1.0-1.8m bgl 3.1E 1.0-1.8m bgl
1.8	EOH, refusal.		
Comments	Duplicate core 1.8m long. Similar profile.		

Top



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Duplicate Core

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CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

CORE ID	4.1	**EASTING**	360279
EQUIPMENT	Piston Corer	**NORTHING**	6310215
DATE/TIME	12/08/2020 9:15 AM	**BATHYMETRY (m AHD)**	0.05
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-0.8	SAND, cream/buff, medium to coarse grained sand, shell fragments.	ESTUARINE/MARINE DEPOSIT	4.1A 0.0-0.5m bgl 4.1B 0.5-1.0m bgl
0.8-1.6	SAND, cream/light grey, coarse grained sand, shell fragments.	ESTUARINE/MARINE DEPOSIT	4.1C 1.0-1.6m bgl
1.6-1.9	SAND, dark grey/black, medium grained sand, seaweed/organics.	ESTUARINE/MARINE DEPOSIT Hydrogen Sulphide Odour	4.1D 1.6-1.9m bgl
1.9	EOH, full core barrel.		
Comments	Duplicate core 1.9m long, similar profile. Location on edge of sand shoal.		

Top

Bottom

Duplicate Core
Top

Bottom

CORE LOG

CLIENT	Central Coast Council	**JOB No.**	PA2377
PROJECT	The Entrance Dredging Investigation	**LOGGED BY**	R Plain
LOCATION	The Entrance	**DATUM**	MGA56
CONTRACTOR	Geochemical Assessments		

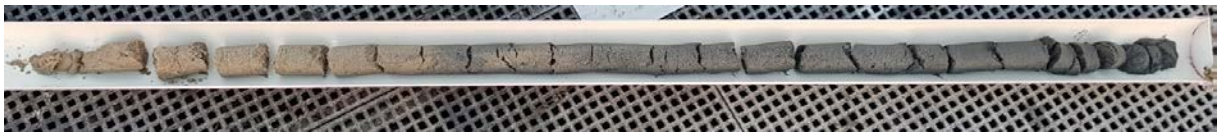
CORE ID	5.1	**EASTING**	360170
EQUIPMENT	Piston Corer	**NORTHING**	6310350
DATE/TIME	12/08/2020 4:55 PM	**BATHYMETRY (m AHD)**	-0.5
Depth Below Bed Level (m)	**Material Description**	**Field Observations**	**Sample ID / Test**
0.0-1.7	SAND, cream/buff, medium to coarse grained sand. From 0.5, light grey. From 1.0, fine-medium grained sand.	ESTUARINE/MARINE DEPOSIT	5.1A 0.0-0.5m bgl 5.1B 0.5-1.0m bgl 5.1C 1.0-1.7m bgl 5.1D 1.0-1.7m bgl
1.7	EOH, refusal.		
Comments	Duplicate core 1.7m long, similar profile.		

Top

Bottom

Duplicate Core

Top



Bottom

CORE LOG

Photograph of composite sample for each Core ID and Sample ID.

Appendix 3 – EPBC Act Protected Matters Search

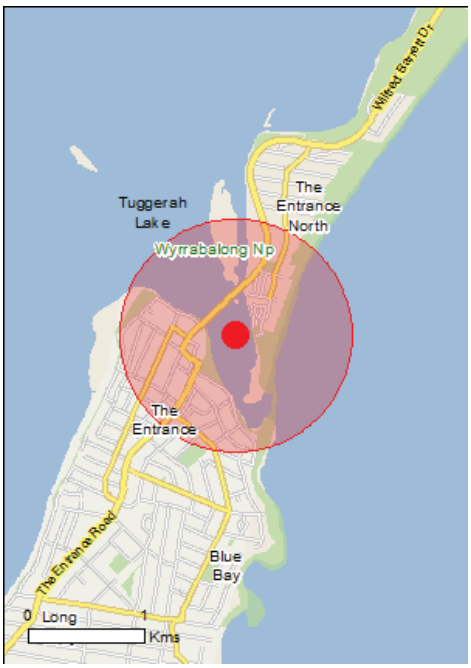
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

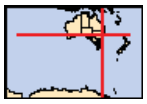
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 31/08/20 09:37:21



Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	69
Listed Migratory Species:	73

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 http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	95
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	48
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	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.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within 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
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Diuris praecox Newcastle Doubletail [55086]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known

Name	Status	Type of Presence
		to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish,		Species or species

Name	Threatened	Type of Presence
[66183]		habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area

Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Wyrrabalong	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Tuggerah Lake	NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-33.33966 151.50127

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 4 – FM Act Listings

NSW GOVERNMENT | NSW legislation

Fisheries Management Act 1994 No 38

Current version for 14 May 2020 to date (accessed 2 September 2020 at 6:33)

Schedule 4

Schedule 4 Endangered species, populations and ecological communities

(Section 220C)

Part 1 Endangered species

Fish

Archaeophya adamsi Fraser, 1959	Adam's Emerald Dragonfly
Austrocordulia leonardi	Sydney Hawk Dragonfly
Hippocampus whitei (Bleeker, 1855)	White's Seahorse
**Maccullochella ikei* Rowland	Eastern Freshwater Cod
**Maccullochella macquariensis* (Cuvier)	Trout Cod
**Macquaria australasica* (Cuvier, 1830)	Macquarie Perch
Mogurnda adspersa (Castelnau, 1878)	Southern Purplespotted Gudgeon, Purple Spotted Gudgeon
Nannoperca australis Günther, 1861	Southern Pygmy Perch
**Nannoperca oxleyana* Whitley	Oxleyan Pygmy Perch
**Prototroctes maraena* (Günther, 1864)	Australian Grayling
Sphyrna lewini (Griffith & Smith, 1834)	Scalloped Hammerhead Shark
Thunnus maccoyii	Southern Bluefin Tuna

Marine vegetation

Part 2 Endangered populations

Fish

Ambassis agassizii Steindachner, 1866, Agassiz's glassfish, olive perchlet, western New South Wales population

Craterocephalus amniculus (Crowley and Ivanstoff, 1990), Darling River Hardyhead, Hunter River population

Gadopsis marmoratus, river blackfish, Snowy River population

Tandanus tandanus (Mitchell, 1838), freshwater catfish, eel tailed catfish, Murray-Darling Basin population

Marine vegetation

**Posidonia australis* Hook.*f.* (1858), seagrass, Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie populations

Part 3 Endangered ecological communities

Aquatic ecological community in the natural drainage system of the lower Murray River catchment (as described in the recommendation of the Fisheries Scientific Committee to list the ecological community)Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River (described in the recommendation of the Fisheries Scientific Committee to list that aquatic ecological community, as the area covered by that recommendation)Aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River (described in the recommendation of the Fisheries Scientific Committee to list that aquatic ecological community, as the area covered by that recommendation)Aquatic ecological community in the catchment of the Snowy River in NSW (as described in the final determination of the Fisheries Scientific Committee to list that aquatic ecological community)

Part 4 Species presumed extinct

Fish

Hadrachaeta aspeta Hutchings, 1977	Marine Worm
**Pristis zijsron* Bleeker, 1851	Green Sawfish
Metaprotella haswelliana Mayer, 1882	Haswells Caprellid

Marine vegetation

**Vanvoorstia bennettiana* (Harvey) Papenfuss (1956)	Bennetts Seaweed

NSW GOVERNMENT | NSW legislation

Fisheries Management Act 1994 No 38

Current version for 14 May 2020 to date (accessed 2 September 2020 at 6:33)

Schedule 4A

Schedule 4A Critically endangered species and ecological communities

(Section 220C)

Part 1 Critically endangered species

Fish

**Carcharias taurus* Rafinesque, 1810	Greynurse Shark
**Craterocephalus fluviatilis* (McCulloch, 1913)	Murray Hardyhead
Euastacus dharawalus (Morgan, 1997)	Fitzroy Falls Spiny Crayfish
Galaxias rostratus	Flathead Galaxias
Galaxias tantangara (Raadik, 2014)	Stocky Galaxias
Notopala hanleyi (Frauenfeld, 1864)	Hanley's River Snail
Notopala sublineata (Conrad, 1850)	Darling River Snail
Smeagol hilaris Tillier & Ponder, 1992	Marine Slug

Marine vegetation

Nereia lophocladia J. Agardh (1897)	Marine Brown Alga

Part 2 Critically endangered ecological communities

NSW GOVERNMENT | NSW legislation

Fisheries Management Act 1994 No 38

Current version for 14 May 2020 to date (accessed 2 September 2020 at 6:33)

Schedule 5

Schedule 5 Vulnerable species and ecological communities

(Section 220C)

Part 1 Vulnerable species

Fish

Austropetalia tonyana (Theischinger, 1995)	Alpine Redspot Dragonfly
Bidyanus bidyanus (Mitchell, 1838)	Silver Perch
Branchinella buchananensis Geddes, 1981	Buchanans Fairy Shrimp
**Carcharodon carcharias* (Linnaeus, 1758)	White Shark, Great White Shark
Epinephelus daemelii (Günther, 1876)	Black Rockcod, Black Cod
Euastacus armatus (von Martens 1866)	Murray Crayfish
Microrchestia bousfieldi Lowry & Peart, 2010	Bousfields Marsh-hopper
Sphyrna mokarran Ruppell, 1837	Great Hammerhead Shark

Marine vegetation

Part 2 Vulnerable ecological communities

NSW GOVERNMENT | NSW legislation

Fisheries Management Act 1994 No 38

Current version for 14 May 2020 to date (accessed 2 September 2020 at 6:33)

Schedule 6

Schedule 6 Key threatening processes

(Section 220C)

Degradation of native riparian vegetation along New South Wales water courses

Hook and line fishing in areas important for the survival of threatened fish species

Human-caused climate change

Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams

Introduction of fish to waters within a river catchment outside their natural range

Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales

Removal of large woody debris from New South Wales rivers and streams

The current shark meshing program in New South Wales waters

Appendix 5 –BC Act Search

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. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -33.29 West: 151.45 East: 151.55 South: -33.39] returned a total of 13,434 records of 1,128 species.

Report generated on 1/09/2020 10:32 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		17	
Animalia	Amphibia	Myobatrachidae	3137	*Crinia tinnula*		Wallum Froglet	V,P		1	
Animalia	Amphibia	Myobatrachidae	3902	*Limnodynastes dumerilii*			P		10	
Animalia	Amphibia	Myobatrachidae	3061	*Limnodynastes peronii*		Brown-striped Frog	P		80	
Animalia	Amphibia	Myobatrachidae	3035	*Uperoleia fusca*		Dusky Toadlet	P		2	
Animalia	Amphibia	Myobatrachidae	3932	*Uperoleia mahonyi*		Mahony's Toadlet	E1,P		3	
Animalia	Amphibia	Hylidae	3183	*Litoria fallax*		Eastern Dwarf Tree Frog	P		2	
Animalia	Amphibia	Hylidae	3184	*Litoria freycineti*		Freycinet's Frog	P		1	
Animalia	Amphibia	Hylidae	3191	*Litoria latopalmata*		Broad-palmed Frog	P		1	
Animalia	Amphibia	Hylidae	3204	*Litoria peronii*		Peron's Tree Frog	P		3	
Animalia	Amphibia	Hylidae	3215	*Litoria verreauxii*		Verreaux's Frog	P		1	
Animalia	Amphibia	Bufonidae	3269	*Rhinella marina*	*	Cane Toad			2	
Animalia	Reptilia	Cheloniidae	2004	*Caretta caretta*		Loggerhead Turtle	E1,P	E	3	
Animalia	Reptilia	Cheloniidae	2007	*Chelonia mydas*		Green Turtle	V,P	V	5	
Animalia	Reptilia	Cheloniidae	T110	*Cheloniidae sp.*		unidentified sea turtle	P		10	
Animalia	Reptilia	Cheloniidae	2006	*Natator depressus*		Flatback Turtle	P		2	
Animalia	Reptilia	Chelidae	2017	*Chelodina longicollis*		Eastern Snake-necked Turtle	P		9	
Animalia	Reptilia	Chelidae	2951	*Emydura macquarii*		Macquarie River Turtle	P		1	
Animalia	Reptilia	Pygopodidae	2174	*Pygopus lepidopodus*		Common Scaly-foot	P		2	
Animalia	Reptilia	Scincidae	2417	*Bellatorias major*		Land Mullet	P		3	
Animalia	Reptilia	Scincidae	2375	*Ctenotus robustus*		Robust Ctenotus	P		5	
Animalia	Reptilia	Scincidae	2866	*Cyclodomorphus michaeli*		Mainland She-oak Skink	P		2	
Animalia	Reptilia	Scincidae	2408	*Egernia cunninghami*		Cunningham's Skink	P		1	
Animalia	Reptilia	Scincidae	2557	*Eulamprus quoyii*		Eastern Water-skink	P		1	
Animalia	Reptilia	Scincidae	2450	*Lampropholis delicata*		Dark-flecked Garden Sunskink	P		52	
Animalia	Reptilia	Scincidae	2451	*Lampropholis guichenoti*		Pale-flecked Garden Sunskink	P		8	
Animalia	Reptilia	Scincidae	2542	*Saiphos equalis*		Three-toed Skink	P		33	
Animalia	Reptilia	Scincidae	2452	*Saproscincus mustelinus*		Weasel Skink	P		3	
Animalia	Reptilia	Scincidae	2580	*Tiliqua scincoides*		Eastern Blue-tongue	P		142	
Animalia	Reptilia	Agamidae	2194	*Amphibolurus muricatus*		Jacky Lizard	P		9	
Animalia	Reptilia	Agamidae	2252	*Intellagama lesueurii*		Eastern Water Dragon	P		12	
Animalia	Reptilia	Agamidae	2177	*Pogona barbata*		Bearded Dragon	P		4	
Animalia	Reptilia	Varanidae	2283	*Varanus varius*		Lace Monitor	P		4	
Animalia	Reptilia	Pythonidae	2625	*Morelia spilota*		Carpet & Diamond Pythons	P		3	
Animalia	Reptilia	Pythonidae	5096	*Morelia spilota spilota*		Diamond Python	P		26	
Animalia	Reptilia	Colubridae	2630	*Boiga irregularis*		Brown Tree Snake	P		1	
Animalia	Reptilia	Colubridae	2633	*Dendrelaphis punctulatus*		Common Tree Snake	P		21	
Animalia	Reptilia	Elapidae	2640	*Acanthophis antarcticus*		Common Death Adder	P		1	
Animalia	Reptilia	Elapidae	2646	*Cacophis krefftii*		Southern Dwarf Crowned	P		4	
Animalia	Reptilia	Elapidae	2647	*Cacophis squamulosus*		Golden-crowned Snake	P		1	
Animalia	Reptilia	Elapidae	5136	*Cryptophis nigrescens*		Eastern Small-eyed Snake	P		2	
Animalia	Reptilia	Elapidae	2674	*Hemiaspis signata*		Black-bellied Swamp Snake	P		6	
Animalia	Reptilia	Elapidae	2770	*Pelamis platurus*		Yellow-bellied Seasnake	P		3	
Animalia	Reptilia	Elapidae	2693	*Pseudechis porphyriacus*		Red-bellied Black Snake	P		89	
Animalia	Reptilia	Elapidae	2699	*Pseudonaja textilis*		Eastern Brown Snake	P		11	
Animalia	Aves	Megapodiidae	0008	*Alectura lathami*		Australian Brush-turkey	P		54	
Animalia	Aves	Phasianidae	0011	*Coturnix ypsilophora*		Brown Quail	P		8	
Animalia	Aves	Phasianidae	0012	*Excalfactoria chinensis*		King Quail	P		1	
Animalia	Aves	Anatidae	0210	*Anas castanea*		Chestnut Teal	P		57	
Animalia	Aves	Anatidae	0211	*Anas gracilis*		Grey Teal	P		34	
Animalia	Aves	Anatidae	0948	*Anas platyrhynchos*	*	Mallard			6	
Animalia	Aves	Anatidae	0212	*Anas rhynchotis*		Australasian Shoveler	P		2	
Animalia	Aves	Anatidae	0208	*Anas superciliosa*		Pacific Black Duck	P		34	
Animalia	Aves	Anatidae	0215	*Aythya australis*		Hardhead	P		1	
Animalia	Aves	Anatidae	0202	*Chenonetta jubata*		Australian Wood Duck	P		23	
Animalia	Aves	Anatidae	0203	*Cygnus atratus*		Black Swan	P		55	
Animalia	Aves	Anatidae	0213	*Malacorhynchus*		Pink-eared Duck	P		2	
Animalia	Aves	Podicipedidae	0061	*Tachybaptus*		Australasian Grebe	P		2	
Animalia	Aves	Columbidae	0033	*Chalcophaps indica*		Emerald Dove	P		3	
Animalia	Aves	Columbidae	0957	*Columba livia*	*	Rock Dove			11	
Animalia	Aves	Columbidae	0032	*Geopelia humeralis*		Bar-shouldered Dove	P		8	
Animalia	Aves	Columbidae	9931	*Geopelia striata*		Peaceful Dove	P		12	
Animalia	Aves	Columbidae	0027	*Lopholaimus antarcticus*		Topknot Pigeon	P		10	
Animalia	Aves	Columbidae	0029	*Macropygia amboinensis*		Brown Cuckoo-Dove	P		3	
Animalia	Aves	Columbidae	0043	*Ocyphaps lophotes*		Crested Pigeon	P		79	
Animalia	Aves	Columbidae	0034	*Phaps chalcoptera*		Common Bronzewing	P		2	
Animalia	Aves	Columbidae	0035	*Phaps elegans*		Brush Bronzewing	P		5	
Animalia	Aves	Columbidae	0023	*Ptilinopus superbus*		Superb Fruit-Dove	V,P		2	
Animalia	Aves	Columbidae	0989	*Streptopelia chinensis*	*	Spotted Turtle-Dove			33	
Animalia	Aves	Podargidae	0313	*Podargus strigoides*		Tawny Frogmouth	P		182	
Animalia	Aves	Aegothelidae	0317	*Aegotheles cristatus*		Australian Owlet-nightjar	P		5	
Animalia	Aves	Apodidae	0335	*Apus pacificus*		Fork-tailed Swift	P	C,J,K	2	
Animalia	Aves	Apodidae	0334	*Hirundapus caudacutus*		White-throated Needletail	P	V,C,J,K	5	
Animalia	Aves	Diomedeidae	0086	*Diomedea exulans*		Wandering Albatross	E1,P	E	2	
Animalia	Aves	Diomedeidae	0089	*Thalassarche chlororhynchos*		Yellow-nosed Albatross	P		1	
Animalia	Aves	Diomedeidae	0088	*Thalassarche melanophris*		Black-browed Albatross	V,P	V	4	

Animalia	Aves	Procellariidae	0072	*Ardenna carneipes*	Flesh-footed Shearwater	V,P	J,K	1
Animalia	Aves	Procellariidae	0069	*Ardenna pacifica*	Wedge-tailed Shearwater	P	J	10
Animalia	Aves	Procellariidae	0071	*Ardenna tenuirostris*	Short-tailed Shearwater	P	C,J,K	13
Animalia	Aves	Procellariidae	0068	*Puffinus gavia*	Fluttering Shearwater	P		2
Animalia	Aves	Spheniscidae	0005	*Eudyptula minor*	Little Penguin	P		9
Animalia	Aves	Sulidae	0104	*Morus serrator*	Australasian Gannet	P		16
Animalia	Aves	Anhingidae	8731	*Anhinga novaehollandiae*	Australasian Darter	P		26
Animalia	Aves	Phalacrocoracidae	0100	*Microcarbo melanoleucos*	Little Pied Cormorant	P		70
Animalia	Aves	Phalacrocoracidae	0096	*Phalacrocorax carbo*	Great Cormorant	P		50
Animalia	Aves	Phalacrocoracidae	T021	*Phalacrocorax sp.*	Unidentified Cormorant	P		38
Animalia	Aves	Phalacrocoracidae	0097	*Phalacrocorax sulcirostris*	Little Black Cormorant	P		40
Animalia	Aves	Phalacrocoracidae	0099	*Phalacrocorax varius*	Pied Cormorant	P		42
Animalia	Aves	Pelecanidae	0106	*Pelecanus conspicillatus*	Australian Pelican	P		381
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*	Black-necked Stork	E1,P		1
Animalia	Aves	Ardeidae	0186	*Ardea intermedia*	Intermediate Egret	P		12
Animalia	Aves	Ardeidae	8712	*Ardea modesta*	Eastern Great Egret	P		34
Animalia	Aves	Ardeidae	0189	*Ardea pacifica*	White-necked Heron	P		1
Animalia	Aves	Ardeidae	T179	*Ardea/Egretta sp.*	Unidentified Egret	P		1
Animalia	Aves	Ardeidae	0197	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	4
Animalia	Aves	Ardeidae	0193	*Butorides striatus*	Striated Heron	P		23
Animalia	Aves	Ardeidae	0185	*Egretta garzetta*	Little Egret	P		48
Animalia	Aves	Ardeidae	0188	*Egretta novaehollandiae*	White-faced Heron	P		57
Animalia	Aves	Ardeidae	0191	*Egretta sacra*	Eastern Reef Egret	P		2
Animalia	Aves	Ardeidae	0196	*Ixobrychus flavicollis*	Black Bittern	V,P		2
Animalia	Aves	Ardeidae	0192	*Nycticorax caledonicus*	Nankeen Night Heron	P		1
Animalia	Aves	Threskiornithidae	0181	*Platalea regia*	Royal Spoonbill	P		24
Animalia	Aves	Threskiornithidae	0178	*Plegadis falcinellus*	Glossy Ibis	P		1
Animalia	Aves	Threskiornithidae	0179	*Threskiornis molucca*	Australian White Ibis	P		25
Animalia	Aves	Threskiornithidae	0180	*Threskiornis spinicollis*	Straw-necked Ibis	P		5
Animalia	Aves	Accipitridae	0222	*Accipiter cirrocephalus*	Collared Sparrowhawk	P		2
Animalia	Aves	Accipitridae	0221	*Accipiter fasciatus*	Brown Goshawk	P		9
Animalia	Aves	Accipitridae	0224	*Aquila audax*	Wedge-tailed Eagle	P		1
Animalia	Aves	Accipitridae	0234	*Aviceda subcristata*	Pacific Baza	P		1
Animalia	Aves	Accipitridae	0219	*Circus approximans*	Swamp Harrier	P		1
Animalia	Aves	Accipitridae	0232	*Elanus axillaris*	Black-shouldered Kite	P		8
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		22
Animalia	Aves	Accipitridae	0227	*Haliastur indus*	Brahminy Kite	P		1
Animalia	Aves	Accipitridae	0228	*Haliastur sphenurus*	Whistling Kite	P		15
Animalia	Aves	Accipitridae	8739	*^^Pandion cristatus*	Eastern Osprey	V,P,3		8
Animalia	Aves	Falconidae	0240	*Falco cenchroides*	Nankeen Kestrel	P		6
Animalia	Aves	Falconidae	0235	*Falco longipennis*	Australian Hobby	P		3
Animalia	Aves	Falconidae	0237	*Falco peregrinus*	Peregrine Falcon	P		5
Animalia	Aves	Rallidae	0059	*Fulica atra*	Eurasian Coot	P		2
Animalia	Aves	Rallidae	0056	*Gallinula tenebrosa*	Dusky Moorhen	P		2
Animalia	Aves	Rallidae	0046	*Gallirallus philippensis*	Buff-banded Rail	P		5
Animalia	Aves	Rallidae	0045	*Lewinia pectoralis*	Lewin's Rail	P		2
Animalia	Aves	Rallidae	0058	*Porphyrio porphyrio*	Purple Swamphen	P		9
Animalia	Aves	Rallidae	0051	*Porzana tabuensis*	Spotless Crake	P		2
Animalia	Aves	Burhinidae	0174	*Burhinus grallarius*	Bush Stone-curlew	E1,P		3
Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		34
Animalia	Aves	Haematopodidae	0130	*Haematopus longirostris*	Pied Oystercatcher	E1,P		35
Animalia	Aves	Recurvirostridae	0147	*Cladorhynchus*	Banded Stilt	P		3
Animalia	Aves	Recurvirostridae	0146	*Himantopus himantopus*	Black-winged Stilt	P		20
Animalia	Aves	Charadriidae	0140	*Charadrius bicinctus*	Double-banded Plover	P		13
Animalia	Aves	Charadriidae	0139	*Charadrius mongolus*	Lesser Sand-plover	V,P	E,C,J,K	5
Animalia	Aves	Charadriidae	0143	*Charadrius ruficapillus*	Red-capped Plover	P		7
Animalia	Aves	Charadriidae	0142	*Charadrius veredus*	Oriental Plover	P	C,J,K	1
Animalia	Aves	Charadriidae	8006	*Pluvialis fulva*	Pacific Golden Plover	P	C,J,K	26
Animalia	Aves	Charadriidae	0136	*Pluvialis squatarola*	Grey Plover	P	C,J,K	5
Animalia	Aves	Charadriidae	0133	*Vanellus miles*	Masked Lapwing	P		113
Animalia	Aves	Charadriidae	0134	*Vanellus miles*	[Spur-winged Plover]	P		5
Animalia	Aves	Jacanidae	0171	*Irediparra gallinacea*	Comb-crested Jacana	V,P		1
Animalia	Aves	Scolopacidae	0129	*Arenaria interpres*	Ruddy Turnstone	P	C,J,K	17
Animalia	Aves	Scolopacidae	0163	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	46
Animalia	Aves	Scolopacidae	0164	*Calidris canutus*	Red Knot	P	E,C,J,K	10
Animalia	Aves	Scolopacidae	0161	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,	15
Animalia	Aves	Scolopacidae	0162	*Calidris ruficollis*	Red-necked Stint	P	C,J,K	38
Animalia	Aves	Scolopacidae	0165	*Calidris tenuirostris*	Great Knot	V,P	CE,C,J,	10
Animalia	Aves	Scolopacidae	0168	*Gallinago hardwickii*	Latham's Snipe	P	J,K	9
Animalia	Aves	Scolopacidae	0167	*Limicola falcinellus*	Broad-billed Sandpiper	V,P	C,J,K	2
Animalia	Aves	Scolopacidae	0153	*Limosa lapponica*	Bar-tailed Godwit	P	C,J,K	47
Animalia	Aves	Scolopacidae	0152	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	1
Animalia	Aves	Scolopacidae	0149	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,	18
Animalia	Aves	Scolopacidae	0150	*Numenius phaeopus*	Whimbrel	P	C,J,K	1
Animalia	Aves	Scolopacidae	0155	*Tringa brevipes*	Grey-tailed Tattler	P	C,J,K	10
Animalia	Aves	Scolopacidae	0158	*Tringa nebularia*	Common Greenshank	P	C,J,K	34
Animalia	Aves	Scolopacidae	0159	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	4
Animalia	Aves	Scolopacidae	0160	*Xenus cinereus*	Terek Sandpiper	V,P	C,J,K	4
Animalia	Aves	Turnicidae	0014	*Turnix varius*	Painted Button-quail	P		1
Animalia	Aves	Laridae	0110	*Chlidonias hybrida*	Whiskered Tern	P		1
Animalia	Aves	Laridae	0125	*Chroicocephalus*	Silver Gull	P		119
Animalia	Aves	Laridae	0111	*Gelochelidon nilotica*	Gull-billed Tern	P	C	1
Animalia	Aves	Laridae	0112	*Hydroprogne caspia*	Caspian Tern	P	J	53
Animalia	Aves	Laridae	0981	*Larus dominicanus*	Kelp Gull	P		1
Animalia	Aves	Laridae	0953	*Sterna hirundo*	Common Tern	P	C,J,K	14
Animalia	Aves	Laridae	0114	*Sterna striata*	White-fronted Tern	P		4
Animalia	Aves	Laridae	0117	*Sternula albifrons*	Little Tern	E1,P	C,J,K	36
Animalia	Aves	Laridae	0115	*Thalasseus bergii*	Crested Tern	P	J	35
Animalia	Aves	Cacatuidae	0269	*Cacatua galerita*	Sulphur-crested Cockatoo	P		26
Animalia	Aves	Cacatuidae	0271	*Cacatua sanguinea*	Little Corella	P		12

Animalia	Aves	Cacatuidae	T187	*Cacatua sp.*		P		9
Animalia	Aves	Cacatuidae	0272	*Cacatua tenuirostris*	Long-billed Corella	P		14
Animalia	Aves	Cacatuidae	0268	*^^Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		1
Animalia	Aves	Cacatuidae	0267	*Calyptorhynchus funereus*	Yellow-tailed Black-Cockatoo	P		5
Animalia	Aves	Cacatuidae	0265	*^Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		1
Animalia	Aves	Cacatuidae	0273	*Eolophus roseicapillus*	Galah	P		68
Animalia	Aves	Cacatuidae	8867	*Eolophus roseicapillus*		P		2
Animalia	Aves	Cacatuidae	0274	*Nymphicus hollandicus*	Cockatiel	P		5
Animalia	Aves	Psittacidae	0281	*Alisterus scapularis*	Australian King-Parrot	P		10
Animalia	Aves	Psittacidae	0258	*Glossopsitta concinna*	Musk Lorikeet	P		29
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*	Little Lorikeet	V,P		14
Animalia	Aves	Psittacidae	0309	*^^Lathamus discolor*	Swift Parrot	E1,P,3	CE	84
Animalia	Aves	Psittacidae	E/PH	*Platycercus adscitus adscitus*	Eastern/Pale-headed Rosella	P		1
Animalia	Aves	Psittacidae	0282	*Platycercus elegans*	Crimson Rosella	P		4
Animalia	Aves	Psittacidae	0288	*Platycercus eximius*	Eastern Rosella	P		49
Animalia	Aves	Psittacidae	T039	*Platycercus sp.*	Unidentified Rosella	P		11
Animalia	Aves	Psittacidae	0256	*Trichoglossus*	Scaly-breasted Lorikeet	P		6
Animalia	Aves	Psittacidae	9947	*Trichoglossus haematodus*	Rainbow Lorikeet	P		461
Animalia	Aves	Psittacidae	9076	*Trichoglossus/Glossopsitta*	Unidentified Lorikeet	P		1
Animalia	Aves	Centropodidae	0349	*Centropus phasianinus*	Pheasant Coucal	P		6
Animalia	Aves	Cuculidae	0338	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	P		19
Animalia	Aves	Cuculidae	0337	*Cacomantis pallidus*	Pallid Cuckoo	P		1
Animalia	Aves	Cuculidae	0339	*Cacomantis variolosus*	Brush Cuckoo	P		7
Animalia	Aves	Cuculidae	0342	*Chalcites basalis*	Horsfield's Bronze-Cuckoo	P		2
Animalia	Aves	Cuculidae	0343	*Chalcites lucidus*	Shining Bronze-Cuckoo	P		9
Animalia	Aves	Cuculidae	0347	*Eudynamys orientalis*	Eastern Koel	P		31
Animalia	Aves	Cuculidae	0348	*Scythrops novaehollandiae*	Channel-billed Cuckoo	P		11
Animalia	Aves	Strigidae	9922	*Ninox novaeseelandiae*	Southern Boobook	P		4
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*	Powerful Owl	V,P,3		13
Animalia	Aves	Tytonidae	9923	*Tyto javanica*	Eastern Barn Owl	P		13
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		3
Animalia	Aves	Alcedinidae	0319	*Ceyx azureus*	Azure Kingfisher	P		27
Animalia	Aves	Alcedinidae	0322	*Dacelo novaeguineae*	Laughing Kookaburra	P		161
Animalia	Aves	Alcedinidae	0326	*Todiramphus sanctus*	Sacred Kingfisher	P		56
Animalia	Aves	Meropidae	0329	*Merops ornatus*	Rainbow Bee-eater	P		1
Animalia	Aves	Coraciidae	0318	*Eurystomus orientalis*	Dollarbird	P		20
Animalia	Aves	Pittidae	0352	*Pitta versicolor*	Noisy Pitta	P		1
Animalia	Aves	Climacteridae	0558	*Cormobates leucophaea*	White-throated Treecreeper	P		22
Animalia	Aves	Ptilonorhynchidae	0679	*Ptilonorhynchus violaceus*	Satin Bowerbird	P		5
Animalia	Aves	Ptilonorhynchidae	0684	*Sericulus chrysocephalus*	Regent Bowerbird	P		4
Animalia	Aves	Maluridae	0529	*Malurus cyaneus*	Superb Fairy-wren	P		221
Animalia	Aves	Maluridae	0536	*Malurus lamberti*	Variegated Fairy-wren	P		65
Animalia	Aves	Maluridae	0526	*Stipiturus malachurus*	Southern Emu-wren	P		1
Animalia	Aves	Acanthizidae	0486	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	P		11
Animalia	Aves	Acanthizidae	0470	*Acanthiza lineata*	Striated Thornbill	P		79
Animalia	Aves	Acanthizidae	0471	*Acanthiza nana*	Yellow Thornbill	P		15
Animalia	Aves	Acanthizidae	0475	*Acanthiza pusilla*	Brown Thornbill	P		222
Animalia	Aves	Acanthizidae	8232	*Acanthiza pusilla pusilla*		P		1
Animalia	Aves	Acanthizidae	0454	*Gerygone mouki*	Brown Gerygone	P		46
Animalia	Aves	Acanthizidae	0493	*Sericornis citreogularis*	Yellow-throated Scrubwren	P		243
Animalia	Aves	Acanthizidae	0488	*Sericornis frontalis*	White-browed Scrubwren	P		287
Animalia	Aves	Acanthizidae	0494	*Sericornis magnirostra*	Large-billed Scrubwren	P		97
Animalia	Aves	Pardalotidae	0565	*Pardalotus punctatus*	Spotted Pardalote	P		25
Animalia	Aves	Pardalotidae	8160	*Pardalotus punctatus*		P		1
Animalia	Aves	Meliphagidae	0591	*Acanthorhynchus*	Eastern Spinebill	P		17
Animalia	Aves	Meliphagidae	0638	*Anthochaera carunculata*	Red Wattlebird	P		54
Animalia	Aves	Meliphagidae	0710	*Anthochaera chrysoptera*	Little Wattlebird	P		66
Animalia	Aves	Meliphagidae	0603	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	2
Animalia	Aves	Meliphagidae	T210	*Anthochaera sp.*	Unidentified Wattlebird	P		22
Animalia	Aves	Meliphagidae	0614	*Caligavis chrysops*	Yellow-faced Honeyeater	P		37
Animalia	Aves	Meliphagidae	0641	*Entomyzon cyanotis*	Blue-faced Honeyeater	P		1
Animalia	Aves	Meliphagidae	0634	*Manorina melanocephala*	Noisy Miner	P		131
Animalia	Aves	Meliphagidae	0633	*Manorina melanophrys*	Bell Miner	P		214
Animalia	Aves	Meliphagidae	0605	*Meliphaga lewinii*	Lewin's Honeyeater	P		53
Animalia	Aves	Meliphagidae	0578	*Melithreptus lunatus*	White-naped Honeyeater	P		11
Animalia	Aves	Meliphagidae	0586	*Myzomela sanguinolenta*	Scarlet Honeyeater	P		5
Animalia	Aves	Meliphagidae	0645	*Philemon corniculatus*	Noisy Friarbird	P		24
Animalia	Aves	Meliphagidae	0632	*Phylidonyris niger*	White-cheeked Honeyeater	P		19
Animalia	Aves	Meliphagidae	0631	*Phylidonyris*	New Holland Honeyeater	P		17
Animalia	Aves	Meliphagidae	0585	*Plectorhyncha lanceolata*	Striped Honeyeater	P		10
Animalia	Aves	Meliphagidae	0625	*Ptilotula penicillatus*	White-plumed Honeyeater	P		1
Animalia	Aves	Psophodidae	0421	*Psophodes olivaceus*	Eastern Whipbird	P		152
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*	Varied Sittella	V,P		2
Animalia	Aves	Campephagidae	0424	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	P		28
Animalia	Aves	Campephagidae	8525	*Coracina novaehollandiae*		P		1
Animalia	Aves	Pachycephalidae	0408	*Colluricincla harmonica*	Grey Shrike-thrush	P		17
Animalia	Aves	Pachycephalidae	0416	*Falcunculus frontatus*	Eastern Shrike-tit	P		6
Animalia	Aves	Pachycephalidae	0398	*Pachycephala pectoralis*	Golden Whistler	P		118
Animalia	Aves	Pachycephalidae	0401	*Pachycephala rufiventris*	Rufous Whistler	P		20
Animalia	Aves	Oriolidae	0671	*Oriolus sagittatus*	Olive-backed Oriole	P		6
Animalia	Aves	Oriolidae	0432	*Sphecotheres vieilloti*	Australasian Figbird	P		13
Animalia	Aves	Artamidae	0543	*Artamus leucorynchus*	White-breasted	P		15
Animalia	Aves	Artamidae	0545	*Artamus superciliosus*	White-browed Woodswallow	P		2
Animalia	Aves	Artamidae	0700	*Cracticus nigrogularis*	Pied Butcherbird	P		6
Animalia	Aves	Artamidae	T022	*Cracticus sp.*	Unidentified Butcherbird	P		11
Animalia	Aves	Artamidae	0705	*Cracticus tibicen*	Australian Magpie	P		325
Animalia	Aves	Artamidae	8499	*Cracticus tibicen tibicen*		P		2
Animalia	Aves	Artamidae	0702	*Cracticus torquatus*	Grey Butcherbird	P		28
Animalia	Aves	Artamidae	8489	*Cracticus torquatus*		P		1
Animalia	Aves	Artamidae	0694	*Strepera graculina*	Pied Currawong	P		48

Animalia	Aves	Artamidae	T906	*Strepera sp.*			P		3
Animalia	Aves	Dicruridae	0673	*Dicrurus bracteatus*		Spangled Drongo	P		6
Animalia	Aves	Rhipiduridae	0361	*Rhipidura albiscapa*		Grey Fantail	P		64
Animalia	Aves	Rhipiduridae	0364	*Rhipidura leucophrys*		Willie Wagtail	P		55
Animalia	Aves	Rhipiduridae	0362	*Rhipidura rufifrons*		Rufous Fantail	P		144
Animalia	Aves	Corvidae	0930	*Corvus coronoides*		Australian Raven	P		43
Animalia	Aves	Corvidae	9067	*Corvus sp.*		Unidentified Corvid	P		4
Animalia	Aves	Monarchidae	0415	*Grallina cyanoleuca*		Magpie-lark	P		78
Animalia	Aves	Monarchidae	0373	*Monarcha melanopsis*		Black-faced Monarch	P		42
Animalia	Aves	Monarchidae	0365	*Myiagra rubecula*		Leaden Flycatcher	P		5
Animalia	Aves	Monarchidae	0375	*Symposiachrus trivirgatus*		Spectacled Monarch	P		2
Animalia	Aves	Petroicidae	0392	*Eopsaltria australis*		Eastern Yellow Robin	P		230
Animalia	Aves	Petroicidae	0377	*Microeca fascinans*		Jacky Winter	P		1
Animalia	Aves	Petroicidae	0384	*Petroica rosea*		Rose Robin	P		2
Animalia	Aves	Cisticolidae	0525	*Cisticola exilis*		Golden-headed Cisticola	P		8
Animalia	Aves	Acrocephalidae	0524	*Acrocephalus australis*		Australian Reed-Warbler	P		2
Animalia	Aves	Megaluridae	0523	*Megalurus timoriensis*		Tawny Grassbird	P		10
Animalia	Aves	Timaliidae	0574	*Zosterops lateralis*		Silvereye	P		37
Animalia	Aves	Hirundinidae	0357	*Hirundo neoxena*		Welcome Swallow	P		51
Animalia	Aves	Hirundinidae	8568	*Hirundo neoxena neoxena*			P		1
Animalia	Aves	Hirundinidae	0360	*Petrochelidon ariel*		Fairy Martin	P		1
Animalia	Aves	Pycnonotidae	0990	*Pycnonotus jocosus*	*	Red-whiskered Bulbul			10
Animalia	Aves	Turdidae	0779	*Zoothera lunulata*		Bassian Thrush	P		1
Animalia	Aves	Turdidae	7000	*Zoothera sp.*		unidentified ground thrush	P		25
Animalia	Aves	Sturnidae	0998	*Sturnus tristis*	*	Common Myna			26
Animalia	Aves	Sturnidae	0999	*Sturnus vulgaris*	*	Common Starling			12
Animalia	Aves	Nectariniidae	0564	*Dicaeum hirundinaceum*		Mistletoebird	P		2
Animalia	Aves	Estrildidae	0662	*Neochmia temporalis*		Red-browed Finch	P		14
Animalia	Aves	Passeridae	0995	*Passer domesticus*	*	House Sparrow			6
Animalia	Aves	Motacillidae	0647	*Anthus novaeseelandiae*		Australian Pipit	P		5
Animalia	Aves	Fringillidae	0996	*Carduelis carduelis*	*	European Goldfinch			1
Animalia	Mammalia	Tachyglossidae	1003	*Tachyglossus aculeatus*		Short-beaked Echidna	P		36
Animalia	Mammalia	Dasyuridae	T093	*Antechinus sp.*		Unidentified Antechinus	P		1
Animalia	Mammalia	Dasyuridae	1674	*Antechinus stuartii*		Brown Antechinus	P		280
Animalia	Mammalia	Dasyuridae	T105	*Dasyuridae sp.*		unidentified dasyurid	P		2
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*		Spotted-tailed Quoll	V,P	E	2
Animalia	Mammalia	Peramelidae	1093	*Isoodon macrourus*		Northern Brown Bandicoot	P		1
Animalia	Mammalia	Peramelidae	T081	*Isoodon/Perameles sp.*		unidentified Bandicoot	P		10
Animalia	Mammalia	Peramelidae	1097	*Perameles nasuta*		Long-nosed Bandicoot	P		4
Animalia	Mammalia	Vombatidae	1165	*Vombatus ursinus*		Common Wombat	P		2
Animalia	Mammalia	Burramyidae	1150	*Cercartetus nanus*		Eastern Pygmy-possum	V,P		1
Animalia	Mammalia	Petauridae	1138	*Petaurus breviceps*		Sugar Glider	P		9
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider	V,P		5
Animalia	Mammalia	Pseudocheiridae	1129	*Pseudocheirus peregrinus*		Common Ringtail Possum	P		175
Animalia	Mammalia	Acrobatidae	1147	*Acrobates pygmaeus*		Feathertail Glider	P		7
Animalia	Mammalia	Phalangeridae	T082	*Trichosurus sp.*		brushtail possum	P		30
Animalia	Mammalia	Phalangeridae	1113	*Trichosurus vulpecula*		Common Brushtail Possum	P		124
Animalia	Mammalia	Macropodidae	T108	*Macropod sp.*		unidentified macropod	P		1
Animalia	Mammalia	Macropodidae	1265	*Macropus giganteus*		Eastern Grey Kangaroo	P		2
Animalia	Mammalia	Macropodidae	T085	*Macropus sp.*		kangaroo / wallaby	P		6
Animalia	Mammalia	Macropodidae	1242	*Wallabia bicolor*		Swamp Wallaby	P		11
Animalia	Mammalia	Pteropodidae	1282	*Pteropus alecto*		Black Flying-fox	P		1
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	44
Animalia	Mammalia	Pteropodidae	T087	*Pteropus sp.*		Flying-fox	P		40
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		1
Animalia	Mammalia	Molossidae	1324	*Austronomus australis*		White-striped Freetail-bat	P		9
Animalia	Mammalia	Molossidae	1329	*Micronomus norfolkensis*		Eastern Coastal Free-tailed	V,P		3
Animalia	Mammalia	Molossidae	1326	*Mormopterus planiceps*		Little Mastiff-bat	P		1
Animalia	Mammalia	Molossidae	1938	*Mormopterus ridei*		Eastern Free-tailed Bat	P		3
Animalia	Mammalia	Molossidae	T091	*Mormopterus sp.*		mastiff-bat	P		1
Animalia	Mammalia	Vespertilionidae	1349	*Chalinolobus gouldii*		Gould's Wattled Bat	P		32
Animalia	Mammalia	Vespertilionidae	1351	*Chalinolobus morio*		Chocolate Wattled Bat	P		4
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*		Eastern False Pipistrelle	V,P		2
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*		Southern Myotis	V,P		5
Animalia	Mammalia	Vespertilionidae	1335	*Nyctophilus geoffroyi*		Lesser Long-eared Bat	P		5
Animalia	Mammalia	Vespertilionidae	1334	*Nyctophilus gouldi*		Gould's Long-eared Bat	P		29
Animalia	Mammalia	Vespertilionidae	T092	*Nyctophilus sp.*		long-eared bat	P		2
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*		Greater Broad-nosed Bat	V,P		6
Animalia	Mammalia	Vespertilionidae	1365	*Scotorepens orion*		Eastern Broad-nosed Bat	P		5
Animalia	Mammalia	Vespertilionidae	1377	*Vespadelus pumilus*		Eastern Forest Bat	P		9
Animalia	Mammalia	Vespertilionidae	1025	*Vespadelus troughtoni*		Eastern Cave Bat	V,P		1
Animalia	Mammalia	Vespertilionidae	1379	*Vespadelus vulturnus*		Little Forest Bat	P		28
Animalia	Mammalia	Muridae	1412	*Mus musculus*	*	House Mouse			7
Animalia	Mammalia	Muridae	1455	*Pseudomys novaehollandiae*		New Holland Mouse	P	V	14
Animalia	Mammalia	Muridae	1395	*Rattus fuscipes*		Bush Rat	P		8
Animalia	Mammalia	Muridae	1398	*Rattus lutreolus*		Swamp Rat	P		28
Animalia	Mammalia	Muridae	1409	*Rattus norvegicus*	*	Brown Rat			6
Animalia	Mammalia	Muridae	1408	*Rattus rattus*	*	Black Rat			24
Animalia	Mammalia	Muridae	T094	*Rattus sp.*		rat	P		9
Animalia	Mammalia	Otariidae	1543	*Arctocephalus forsteri*		New Zealand Fur-seal	V,P		2
Animalia	Mammalia	Otariidae	1882	*Arctocephalus pusillus*		Australian Fur-seal	V,P		2
Animalia	Mammalia	Otariidae	T099	*Arctocephalus sp.*		Unidentified Fur-seal	P		1
Animalia	Mammalia	Otariidae	1013	*Arctocephalus tropicalis*		Subantarctic Fur-seal	P		1
Animalia	Mammalia	Otariidae	9040	*Seal sp.*		Unidentified Seal	P		7
Animalia	Mammalia	Phocidae	1549	*Hydrurga leptonyx*		Leopard Seal	P		3
Animalia	Mammalia	Canidae	1531	*Canis lupus*	*	Dingo, domestic dog			9
Animalia	Mammalia	Canidae	1904	*Canis lupus dingo*	*	Dingo			2
Animalia	Mammalia	Canidae	1905	*Canis lupus familiaris*	*	Dog			6
Animalia	Mammalia	Canidae	1532	*Vulpes vulpes*	*	Fox			49
Animalia	Mammalia	Felidae	1536	*Felis catus*	*	Cat			8

Animalia	Mammalia	Leporidae	1510	*Oryctolagus cuniculus*	*	Rabbit			12
Animalia	Mammalia	Equidae	1512	*Equus caballus*	*	Horse			2
Animalia	Mammalia	Bovidae	1518	*Bos taurus*	*	European cattle			1
Animalia	Mammalia	Balaenidae	1561	*Eubalaena australis*		little tern	E1,P	E	5
Animalia	Mammalia	Balaenopteridae	1575	*Megaptera novaeangliae*		Humpback Whale	V,P	V	1
Animalia	Mammalia	Balaenopteridae	9041	*Whale sp.*		Unidentified Whale	P		2
Animalia	Mammalia	Physeteridae	1578	*Physeter macrocephalus*		Sperm Whale	V,P		2
Animalia	Mammalia	Kogiidae	1581	*Kogia breviceps*		Pygmy Sperm Whale	P		4
Animalia	Mammalia	Delphinidae	1616	*Delphinus delphis*		Common Dolphin	P		2
Animalia	Mammalia	Delphinidae	1621	*Stenella attenuata*		Spotted Dolphin	P		3
Animalia	Mammalia	Delphinidae	1619	*Stenella coeruleoalba*		Striped Dolphin	P		1
Animalia	Mammalia	Delphinidae	1899	*Tursiops aduncus*		Long-beaked Bottle-nosed	P		2
Animalia	Arachnida	Hexathelidae	I018	*Atrax robustus*		Sydney funnelweb spider			3
Animalia	Insecta	Petaluridae	I007	*Petalura gigantea*		Giant Dragonfly	E1		1
Animalia	Unknown	Unknown Fauna	T350	*Fauna sp.*		Unidentified Fauna			77
Animalia	Unknown	Unknown Fauna	T202	*Microchiroptera suborder*		Unidentified Microbat			11
Plantae	Flora	Acanthaceae	1003	*Brunoniella australis*		Blue Trumpet			1
Plantae	Flora	Acanthaceae	1010	*Pseuderanthemum variabile*		Pastel Flower			1
Plantae	Flora	Adiantaceae	7997	*Adiantum aethiopicum*		Common Maidenhair	P		5
Plantae	Flora	Adiantaceae	8444	*Pellaea falcata*		Sickle Fern			17
Plantae	Flora	Aizoaceae	1025	*Carpobrotus glaucescens*		Pigface			15
Plantae	Flora	Aizoaceae	CARO	*Carpobrotus spp.*					4
Plantae	Flora	Aizoaceae	1034	*Mesembryanthemum*	*	Common Ice Plant			1
Plantae	Flora	Aizoaceae	6574	*Sesuvium portulacastrum*					12
Plantae	Flora	Aizoaceae	11185	*Tetragonia tetragonioides*		New Zealand Spinach			8
Plantae	Flora	Alismataceae	1046	*Sagittaria montevidensis*	*	Arrowhead			1
Plantae	Flora	Alismataceae	11230	*Sagittaria platyphylla*	*	Sagittaria			1
Plantae	Flora	Alliaceae	10418	*Agapanthus praecox subsp.*	*				2
Plantae	Flora	Amaranthaceae	6478	*Alternanthera denticulata*		Lesser Joyweed			7
Plantae	Flora	Amaranthaceae	AMAR	*Amaranthus spp.*		Amaranth			2
Plantae	Flora	Amaryllidaceae	3539	*Crinum pedunculatum*		Swamp Lily			1
Plantae	Flora	Anacardiaceae	7734	*Euroschinus falcatus var.*		Ribbonwood			16
Plantae	Flora	Anacardiaceae	10918	*Schinus terebinthifolius*	*	Brazilian Pepper Tree			1
Plantae	Flora	Anthericaceae	3518	*Arthropodium minus*		Small Vanilla Lily			1
Plantae	Flora	Anthericaceae	ARTR	*Arthropodium spp.*					1
Plantae	Flora	Anthericaceae	7183	*Caesia parviflora var.*					1
Plantae	Flora	Anthericaceae	3538	*Chlorophytum comosum*	*	Spider Plant			1
Plantae	Flora	Apiaceae	1094	*Actinotus helianthi*		Flannel Flower	P		8
Plantae	Flora	Apiaceae	1095	*Actinotus minor*		Lesser Flannel Flower			1
Plantae	Flora	Apiaceae	1104	*Apium prostratum*		Sea Celery			9
Plantae	Flora	Apiaceae	11824	*Apium prostratum var.*					2
Plantae	Flora	Apiaceae	1106	*Centella asiatica*		Indian Pennywort			12
Plantae	Flora	Apiaceae	8754	*Centella cordifolia*					1
Plantae	Flora	Apiaceae	11195	*Cyclospermum leptophyllum*	*	Slender Celery			12
Plantae	Flora	Apiaceae	1123	*Hydrocotyle bonariensis*	*				46
Plantae	Flora	Apiaceae	1128	*Hydrocotyle laxiflora*		Stinking Pennywort			1
Plantae	Flora	Apiaceae	7960	*Hydrocotyle pterocarpa*					1
Plantae	Flora	Apiaceae	7961	*Hydrocotyle sibthorpioides*					9
Plantae	Flora	Apiaceae	HYDR	*Hydrocotyle spp.*					7
Plantae	Flora	Apiaceae	1144	*Platysace lanceolata*		Shrubby Platysace			4
Plantae	Flora	Apiaceae	1145	*Platysace linearifolia*					1
Plantae	Flora	Apiaceae	8785	*Trachymene incisa subsp.*					2
Plantae	Flora	Apiaceae	1162	*Xanthosia pilosa*		Woolly Xanthosia			2
Plantae	Flora	Apiaceae	1163	*Xanthosia tridentata*		Rock Xanthosia			2
Plantae	Flora	Apocynaceae	11047	*Araujia sericifera*	*	Moth Vine			2
Plantae	Flora	Apocynaceae	1227	*Gomphocarpus fruticosus*	*	Narrow-leaved Cotton Bush			2
Plantae	Flora	Apocynaceae	1234	*Marsdenia rostrata*		Milk Vine			14
Plantae	Flora	Apocynaceae	1235	*Marsdenia suaveolens*		Scented Marsdenia			2
Plantae	Flora	Apocynaceae	10204	*Nerium oleander*	*	Oleander			1
Plantae	Flora	Apocynaceae	1185	*Parsonsia straminea*		Common Silkpod			20
Plantae	Flora	Araceae	8672	*Alocasia brisbanensis*		Cunjevoi			1
Plantae	Flora	Araceae	1193	*Arum italicum*	*	Italian Arum			1
Plantae	Flora	Araceae	1194	*Colocasia esculenta*	*	Taro			1
Plantae	Flora	Araceae	11289	*Monstera deliciosa*	*	Fruit Salad Plant			2
Plantae	Flora	Araceae	1198	*Zantedeschia aethiopica*	*	Arum Lily			1
Plantae	Flora	Araliaceae	1205	*Astrotricha longifolia*					2
Plantae	Flora	Araliaceae	1207	*Hedera helix*	*	English Ivy			1
Plantae	Flora	Araliaceae	1209	*Polyscias elegans*		Celery Wood			25
Plantae	Flora	Araliaceae	1211	*Polyscias sambucifolia*		Elderberry Panax			6
Plantae	Flora	Araliaceae	12373	*Polyscias sambucifolia*					1
Plantae	Flora	Araliaceae	8701	*Schefflera actinophylla*	*	Umbrella Tree			5
Plantae	Flora	Araucariaceae	1214	*Araucaria heterophylla*	*	Norfolk Island Pine			2
Plantae	Flora	Arecaceae	6458	*Archontophoenix*		Bangalow Palm	P		3
Plantae	Flora	Arecaceae	11853	*Cocos nucifera*	*	Coconut Palm			1
Plantae	Flora	Arecaceae	1221	*Livistona australis*		Cabbage Palm	P		45
Plantae	Flora	Arecaceae	11354	*Phoenix canariensis*	*	Canary Island Date Palm			3
Plantae	Flora	Arecaceae	11731	*Syagrus romanzoffiana*	*	Cocos Palm			2
Plantae	Flora	Asparagaceae	11784	*Asparagus aethiopicus*	*	Asparagus Fern			25
Plantae	Flora	Asparagaceae	3521	*Asparagus officinalis*	*	Asparagus			4
Plantae	Flora	Asteliaceae	1018	*Cordyline stricta*		Narrow-leaved Palm Lily	P		1
Plantae	Flora	Asteraceae	1255	*Ageratina adenophora*	*	Crofton Weed			13
Plantae	Flora	Asteraceae	1273	*Arctotheca calendula*	*	Capeweed			2
Plantae	Flora	Asteraceae	7391	*Arctotheca populifolia*	*	Beach Daisy			1
Plantae	Flora	Asteraceae	1280	*Aster subulatus*	*	Wild Aster			12
Plantae	Flora	Asteraceae	1283	*Bidens pilosa*	*	Cobbler's Pegs			19
Plantae	Flora	Asteraceae	CARD	*Carduus spp.*	*				1
Plantae	Flora	Asteraceae	1365	*Cassinia cunninghamii*					2
Plantae	Flora	Asteraceae	1392	*Chrysanthemoides*	*				9
Plantae	Flora	Asteraceae	9400	*Chrysanthemoides*	*	Boneseed			3
Plantae	Flora	Asteraceae	8686	*Chrysanthemoides*	*	Bitou Bush			40

Plantae	Flora	Asteraceae	1400	*Cirsium vulgare*	*	Spear Thistle		9
Plantae	Flora	Asteraceae	1404	*Conyza bonariensis*	*	Flaxleaf Fleabane		6
Plantae	Flora	Asteraceae	10138	*Conyza canadensis var.*	*	Canadian Fleabane		8
Plantae	Flora	Asteraceae	CONY	*Conyza spp.*	*			7
Plantae	Flora	Asteraceae	10442	*Conyza sumatrensis*	*	Tall fleabane		12
Plantae	Flora	Asteraceae	1409	*Coreopsis lanceolata*	*	Coreopsis		3
Plantae	Flora	Asteraceae	CORE	*Coreopsis spp.*	*			1
Plantae	Flora	Asteraceae	13885	*Coronidium spp.*				1
Plantae	Flora	Asteraceae	1412	*Cotula australis*		Common Cotula		1
Plantae	Flora	Asteraceae	1414	*Cotula coronopifolia*	*	Water Buttons		8
Plantae	Flora	Asteraceae	1421	*Crassocephalum crepidioides*	*	Thickhead		2
Plantae	Flora	Asteraceae	6454	*Delairea odorata*	*	Cape Ivy		3
Plantae	Flora	Asteraceae	7903	*Eclipta platyglossa*		Yellow Twin-heads		1
Plantae	Flora	Asteraceae	1439	*Erechtites valerianifolia*	*	Brazilian Fireweed		7
Plantae	Flora	Asteraceae	9904	*Euchiton involucratus*		Star Cudweed		3
Plantae	Flora	Asteraceae	12039	*Gamochaeta antillana*	*			1
Plantae	Flora	Asteraceae	10142	*Gamochaeta calviceps*	*	Cudweed		1
Plantae	Flora	Asteraceae	12748	*Gamochaeta purpurea*	*	Purple Cudweed		2
Plantae	Flora	Asteraceae	GAZA	*Gazania spp.*	*			2
Plantae	Flora	Asteraceae	HELI	*Helichrysum spp.*				1
Plantae	Flora	Asteraceae	8788	*Hypochaeris radicata*	*	Catsear		7
Plantae	Flora	Asteraceae	9203	*Leptinella longipes*				8
Plantae	Flora	Asteraceae	1575	*Montanoa bipinnatifida*	*			1
Plantae	Flora	Asteraceae	7780	*Pseudognaphalium*		Jersey Cudweed		2
Plantae	Flora	Asteraceae	6465	*Senecio madagascariensis*	*	Fireweed		19
Plantae	Flora	Asteraceae	11634	*Senecio prenanthoides*				1
Plantae	Flora	Asteraceae	SENE	*Senecio spp.*		Groundsel, Fireweed		1
Plantae	Flora	Asteraceae	11237	*Senecio vagus subsp.*				5
Plantae	Flora	Asteraceae	1681	*Senecio vulgaris*	*			1
Plantae	Flora	Asteraceae	8789	*Sigesbeckia orientalis subsp.*		Indian Weed		3
Plantae	Flora	Asteraceae	1684	*Silybum marianum*	*	Variegated Thistle		1
Plantae	Flora	Asteraceae	7851	*Soliva sessilis*	*	Bindyi		5
Plantae	Flora	Asteraceae	1690	*Sonchus oleraceus*	*	Common Sowthistle		17
Plantae	Flora	Asteraceae	1695	*Tagetes minuta*	*	Stinking Roger		2
Plantae	Flora	Asteraceae	1698	*Taraxacum officinale*	*	Dandelion		5
Plantae	Flora	Asteraceae	9254	*Vernonia cinerea var.*				2
Plantae	Flora	Balsaminaceae	9112	*Impatiens walleriana*	*			1
Plantae	Flora	Bignoniaceae	1740	*Pandorea pandorana*		Wonga Wonga Vine		22
Plantae	Flora	Bignoniaceae	10485	*Pandorea pandorana subsp.*		Wonga Wonga Vine		1
Plantae	Flora	Blechnaceae	8051	*Blechnum camfieldii*				2
Plantae	Flora	Blechnaceae	8052	*Blechnum cartilagineum*		Gristle Fern		2
Plantae	Flora	Blechnaceae	8060	*Blechnum patersonii*		Strap Water Fern		1
Plantae	Flora	Blechnaceae	14930	*Telmatoblechnum indicum*		Swamp Water Fern		3
Plantae	Flora	Brassicaceae	BRAS	*Brassica spp.*	*	Brassica		1
Plantae	Flora	Brassicaceae	1790	*Brassica tournefortii*	*	Mediterranean Turnip		3
Plantae	Flora	Brassicaceae	1791	*Cakile edentula*	*	American Sea Rocket		2
Plantae	Flora	Brassicaceae	1795	*Cardamine hirsuta*	*	Common Bittercress		1
Plantae	Flora	Brassicaceae	1818	*Lepidium campestre*	*	Field Cress		1
Plantae	Flora	Brassicaceae	14924	*Lepidium didymum*	*	Lesser Swinecress		1
Plantae	Flora	Brassicaceae	1854	*Sisymbrium officinale*	*	Hedge Mustard		1
Plantae	Flora	Cactaceae	1871	*Hylocereus undatus*	*	Night-blooming Cactus		1
Plantae	Flora	Callitrichaceae	1907	*Callitriche muelleri*				1
Plantae	Flora	Campanulaceae	10465	*Lobelia anceps*				4
Plantae	Flora	Campanulaceae	14415	*Lobelia purpurascens*		whiteroot		7
Plantae	Flora	Campanulaceae	1934	*Wahlenbergia gracilis*		Sprawling Bluebell		1
Plantae	Flora	Cannaceae	1941	*Canna indica*	*	Tous-les-mois Arrowroot		4
Plantae	Flora	Caprifoliaceae	1952	*Lonicera japonica*	*	Japanese Honeysuckle		3
Plantae	Flora	Caryophyllaceae	1960	*Cerastium glomeratum*	*	Mouse-ear Chickweed		4
Plantae	Flora	Caryophyllaceae	2000	*Spergularia marina*		Lesser Sea-spurrey		1
Plantae	Flora	Caryophyllaceae	2001	*Spergularia rubra*	*	Sandspurry		1
Plantae	Flora	Caryophyllaceae	2006	*Stellaria media*	*	Common Chickweed		4
Plantae	Flora	Casuarinaceae	2010	*Allocasuarina distyla*				1
Plantae	Flora	Casuarinaceae	2012	*Allocasuarina littoralis*		Black She-Oak		5
Plantae	Flora	Casuarinaceae	9006	*Casuarina cunninghamiana*		River Oak		1
Plantae	Flora	Casuarinaceae	2022	*Casuarina glauca*		Swamp Oak		54
Plantae	Flora	Casuarinaceae	CASU	*Casuarina spp.*				2
Plantae	Flora	Celastraceae	2029	*Elaeodendron australe*				5
Plantae	Flora	Celastraceae	12523	*Elaeodendron australe var.*				7
Plantae	Flora	Chenopodiaceae	2046	*Atriplex australasica*				12
Plantae	Flora	Chenopodiaceae	9614	*Atriplex prostrata*	*			5
Plantae	Flora	Chenopodiaceae	ATRI	*Atriplex spp.*				1
Plantae	Flora	Chenopodiaceae	2084	*Chenopodium album*	*	Fat Hen		1
Plantae	Flora	Chenopodiaceae	2094	*Chenopodium glaucum*				7
Plantae	Flora	Chenopodiaceae	CHEN	*Chenopodium spp.*		Goosefoot, Crumbweed		1
Plantae	Flora	Chenopodiaceae	2110	*Einadia hastata*		Berry Saltbush		4
Plantae	Flora	Chenopodiaceae	7808	*Rhagodia candolleana*				1
Plantae	Flora	Chenopodiaceae	9423	*Sarcocornia quinqueflora*				31
Plantae	Flora	Colchicaceae	3533	*Burchardia umbellata*		Milkmaids		1
Plantae	Flora	Commelinaceae	2209	*Commelina cyanea*		Native Wandering Jew		21
Plantae	Flora	Commelinaceae	10508	*Tradescantia fluminensis*	*	Wandering Jew		4
Plantae	Flora	Convolvulaceae	2219	*Convolvulus arvensis*	*	Field Bindweed		1
Plantae	Flora	Convolvulaceae	CUSC	*Cuscuta spp.*		Dodder		1
Plantae	Flora	Convolvulaceae	2222	*Dichondra repens*		Kidney Weed		5
Plantae	Flora	Convolvulaceae	2225	*Ipomoea cairica*	*			10
Plantae	Flora	Convolvulaceae	2227	*Ipomoea indica*	*	Morning Glory		2
Plantae	Flora	Convolvulaceae	2231	*Polymeria calycina*				2
Plantae	Flora	Cunoniaceae	2275	*Schizomeria ovata*		Crabapple		1
Plantae	Flora	Cupressaceae	2285	*Callitris rhomboidea*		Port Jackson Pine		1
Plantae	Flora	Cupressaceae	11358	*Cupressus macrocarpa*	*	Monterey Cypress		1
Plantae	Flora	Cyatheaceae	8074	*Cyathea australis*		Rough Treefern	P	2

Plantae	Flora	Cyatheaceae	8076	*Cyathea cooperi*		Straw Treefern	P	2
Plantae	Flora	Cyperaceae	2296	*Baumea articulata*		Jointed Twig-rush		6
Plantae	Flora	Cyperaceae	2299	*Baumea juncea*				14
Plantae	Flora	Cyperaceae	2302	*Baumea rubiginosa*				3
Plantae	Flora	Cyperaceae	BAUM	*Baumea spp.*				2
Plantae	Flora	Cyperaceae	2303	*Baumea teretifolia*				2
Plantae	Flora	Cyperaceae	2305	*Bolboschoenus caldwellii*				7
Plantae	Flora	Cyperaceae	2306	*Bolboschoenus fluviatilis*		Marsh Club-rush		3
Plantae	Flora	Cyperaceae	2310	*Carex appressa*		Tall Sedge		5
Plantae	Flora	Cyperaceae	2331	*Carex longebrachiata*				1
Plantae	Flora	Cyperaceae	2335	*Carex pumila*				1
Plantae	Flora	Cyperaceae	CARE	*Carex spp.*				4
Plantae	Flora	Cyperaceae	2344	*Chorizandra cymbaria*				1
Plantae	Flora	Cyperaceae	2353	*Cyperus brevifolius*	*			2
Plantae	Flora	Cyperaceae	2358	*Cyperus congestus*	*			1
Plantae	Flora	Cyperaceae	7143	*Cyperus difformis*		Dirty Dora		2
Plantae	Flora	Cyperaceae	2364	*Cyperus eragrostis*	*	Umbrella Sedge		9
Plantae	Flora	Cyperaceae	2374	*Cyperus gracilis*		Slender Flat-sedge		1
Plantae	Flora	Cyperaceae	2379	*Cyperus laevigatus*				2
Plantae	Flora	Cyperaceae	2380	*Cyperus laevis*				6
Plantae	Flora	Cyperaceae	8483	*Cyperus polystachyos*				1
Plantae	Flora	Cyperaceae	2398	*Cyperus sesquiflorus*	*			2
Plantae	Flora	Cyperaceae	CYPE	*Cyperus spp.*				5
Plantae	Flora	Cyperaceae	6988	*Eleocharis sphacelata*		Tall Spike Rush		3
Plantae	Flora	Cyperaceae	12416	*Ficinia nodosa*		Knobby Club-rush		11
Plantae	Flora	Cyperaceae	7435	*Fimbristylis dichotoma*		Common Fringe-sedge		1
Plantae	Flora	Cyperaceae	7328	*Fimbristylis ferruginea*				2
Plantae	Flora	Cyperaceae	2431	*Gahnia aspera*		Rough Saw-sedge		2
Plantae	Flora	Cyperaceae	2432	*Gahnia clarkei*		Tall Saw-sedge		32
Plantae	Flora	Cyperaceae	2442	*Gahnia sieberiana*		Red-fruit Saw-sedge	P	4
Plantae	Flora	Cyperaceae	GAHN	*Gahnia spp.*				1
Plantae	Flora	Cyperaceae	2448	*Isolepis cernua*		Nodding Club-rush		1
Plantae	Flora	Cyperaceae	2454	*Isolepis inundata*		Club-rush		5
Plantae	Flora	Cyperaceae	2460	*Isolepis prolifera*	*			4
Plantae	Flora	Cyperaceae	8380	*Lepidosperma concavum*				2
Plantae	Flora	Cyperaceae	8379	*Lepidosperma elatius*				1
Plantae	Flora	Cyperaceae	6402	*Lepidosperma laterale*		Variable Sword-sedge		10
Plantae	Flora	Cyperaceae	2472	*Lepidosperma*				1
Plantae	Flora	Cyperaceae	6707	*Schoenoplectus mucronatus*				2
Plantae	Flora	Cyperaceae	11946	*Schoenoplectus subulatus*				2
Plantae	Flora	Cyperaceae	2490	*Schoenoplectus validus*				4
Plantae	Flora	Cyperaceae	2491	*Schoenus apogon*		Fluke Bogrush		2
Plantae	Flora	Cyperaceae	2492	*Schoenus brevifolius*				4
Plantae	Flora	Cyperaceae	2495	*Schoenus ericetorum*				2
Plantae	Flora	Cyperaceae	2496	*Schoenus imberbis*				1
Plantae	Flora	Cyperaceae	2500	*Schoenus melanostachys*				1
Plantae	Flora	Cyperaceae	2502	*Schoenus nitens*				1
Plantae	Flora	Davalliaceae	8088	*Nephrolepis cordifolia*		Fishbone Fern		6
Plantae	Flora	Dennstaedtiaceae	7271	*Histiopteris incisa*		Bat's Wing Fern		1
Plantae	Flora	Dennstaedtiaceae	7749	*Hypolepis muelleri*		Harsh Ground Fern		19
Plantae	Flora	Dennstaedtiaceae	6403	*Pteridium esculentum*		Bracken		43
Plantae	Flora	Dicksoniaceae	8341	*Calochlaena dubia*		Rainbow Fern		2
Plantae	Flora	Dilleniaceae	2532	*Hibbertia dentata*		Twining Guinea Flower		2
Plantae	Flora	Dilleniaceae	2533	*Hibbertia diffusa*		Wedge Guinea Flower		1
Plantae	Flora	Dilleniaceae	2539	*Hibbertia linearis*				2
Plantae	Flora	Dilleniaceae	2540	*Hibbertia monogyna*				1
Plantae	Flora	Dilleniaceae	2542	*Hibbertia obtusifolia*		Hoary Guinea Flower		6
Plantae	Flora	Dilleniaceae	2545	*Hibbertia riparia*				2
Plantae	Flora	Dilleniaceae	7436	*Hibbertia salicifolia*				1
Plantae	Flora	Dilleniaceae	2547	*Hibbertia saligna*				1
Plantae	Flora	Dilleniaceae	2548	*Hibbertia scandens*		Climbing Guinea Flower		8
Plantae	Flora	Dilleniaceae	HIBB	*Hibbertia spp.*				1
Plantae	Flora	Doryanthaceae	1019	*Doryanthes excelsa*		Gymea Lily	P	2
Plantae	Flora	Dryopteridaceae	11102	*Lastreopsis microsora subsp.*		Creeping Shield Fern		1
Plantae	Flora	Elaeocarpaceae	2574	*Elaeocarpus reticulatus*		Blueberry Ash		13
Plantae	Flora	Elaeocarpaceae	6204	*Tetratheca ericifolia*				4
Plantae	Flora	Elaeocarpaceae	6212	*Tetratheca shiressii*				2
Plantae	Flora	Elaeocarpaceae	6214	*Tetratheca thymifolia*		Black-eyed Susan		3
Plantae	Flora	Ericaceae	2584	*Astroloma humifusum*		Native Cranberry		2
Plantae	Flora	Ericaceae	2585	*Astroloma pinifolium*		Pine Heath		1
Plantae	Flora	Ericaceae	10842	*Epacris gunnii*				1
Plantae	Flora	Ericaceae	2599	*Epacris microphylla*		Coral Heath		1
Plantae	Flora	Ericaceae	2605	*Epacris pulchella*		Wallum Heath		4
Plantae	Flora	Ericaceae	2616	*Leucopogon ericoides*		Pink Beard-heath		3
Plantae	Flora	Ericaceae	2617	*Leucopogon esquamatus*				2
Plantae	Flora	Ericaceae	2623	*Leucopogon juniperinus*		Prickly Beard-heath		6
Plantae	Flora	Ericaceae	2627	*Leucopogon margarodes*				5
Plantae	Flora	Ericaceae	2632	*Leucopogon parviflorus*		Coastal Beard-heath		6
Plantae	Flora	Ericaceae	LEUC	*Leucopogon spp.*				1
Plantae	Flora	Ericaceae	2647	*Monotoca elliptica*		Tree Broom-heath		30
Plantae	Flora	Ericaceae	2649	*Monotoca scoparia*				4
Plantae	Flora	Ericaceae	2654	*Sprengelia incarnata*		Pink Swamp Heath	P	1
Plantae	Flora	Ericaceae	12950	*Sprengelia incarnata var.*			P	1
Plantae	Flora	Ericaceae	2655	*Sprengelia sprengelioides*				2
Plantae	Flora	Ericaceae	2662	*Styphelia viridis*				2
Plantae	Flora	Ericaceae	9227	*Styphelia viridis subsp. viridis*				1
Plantae	Flora	Euphorbiaceae	ACAL	*Acalypha spp.*				1
Plantae	Flora	Euphorbiaceae	2677	*Amperea xiphoclada*				3
Plantae	Flora	Euphorbiaceae	2706	*Croton verreauxii*		Green Native Cascarilla		1
Plantae	Flora	Euphorbiaceae	2721	*Euphorbia peplus*	*	Petty Spurge		1

Plantae	Flora	Euphorbiaceae	11947	*Homalanthus populifolius*			14
Plantae	Flora	Euphorbiaceae	2738	*Monotaxis linifolia*			2
Plantae	Flora	Euphorbiaceae	2759	*Ricinocarpos pinifolius*		Wedding Bush	9
Plantae	Flora	Euphorbiaceae	2761	*Ricinus communis*	*	Castor Oil Plant	4
Plantae	Flora	Eupomatiaceae	2768	*Eupomatia laurina*		Bolwarra	6
Plantae	Flora	Fabaceae (Caesalpinioideae)	7377	*Senna pendula var. glabrata*	*		11
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	7
Plantae	Flora	Fabaceae (Faboideae)	2789	*Bossiaea scolopendria*			1
Plantae	Flora	Fabaceae (Faboideae)	2816	*Daviesia acicularis*			1
Plantae	Flora	Fabaceae (Faboideae)	DAVE	*Daviesia spp.*			1
Plantae	Flora	Fabaceae (Faboideae)	2827	*Daviesia ulicifolia*		Gorse Bitter Pea	2
Plantae	Flora	Fabaceae (Faboideae)	6621	*Desmodium gunnii*		Slender Tick-trefoil	1
Plantae	Flora	Fabaceae (Faboideae)	DESM	*Desmodium spp.*		Tick-trefoil	3
Plantae	Flora	Fabaceae (Faboideae)	2840	*Desmodium varians*		Slender Tick-trefoil	1
Plantae	Flora	Fabaceae (Faboideae)	2850	*Dillwynia retorta*			6
Plantae	Flora	Fabaceae (Faboideae)	DILL	*Dillwynia spp.*			1
Plantae	Flora	Fabaceae (Faboideae)	8689	*Erythrina x sykesii*	*	Coral tree	4
Plantae	Flora	Fabaceae (Faboideae)	2860	*Glycine clandestina*		Twining glycine	16
Plantae	Flora	Fabaceae (Faboideae)	7208	*Glycine microphylla*		Small-leaf Glycine	3
Plantae	Flora	Fabaceae (Faboideae)	2861	*Glycine tabacina*		Variable Glycine	1
Plantae	Flora	Fabaceae (Faboideae)	2873	*Hardenbergia violacea*		False Sarsaparilla	11
Plantae	Flora	Fabaceae (Faboideae)	2898	*Kennedia rubicunda*		Dusky Coral Pea	22
Plantae	Flora	Fabaceae (Faboideae)	2905	*Lotus angustissimus*	*	Slender Birds-foot Trefoil	1
Plantae	Flora	Fabaceae (Faboideae)	12079	*Lotus subbiflorus*	*	Hairy Birds-foot Trefoil	1
Plantae	Flora	Fabaceae (Faboideae)	2911	*Lupinus angustifolius*	*	Narrow-leaved Lupin	2
Plantae	Flora	Fabaceae (Faboideae)	2922	*Medicago polymorpha*	*	Burr Medic	3
Plantae	Flora	Fabaceae (Faboideae)	MEDI	*Medicago spp.*	*		1
Plantae	Flora	Fabaceae (Faboideae)	2928	*Melilotus indicus*	*	Hexham Scent	1
Plantae	Flora	Fabaceae (Faboideae)	2938	*Mirbelia rubiifolia*		Heathy Mirbelia	2
Plantae	Flora	Fabaceae (Faboideae)	2958	*Phyllota phylicoides*		Heath Phyllota	1
Plantae	Flora	Fabaceae (Faboideae)	2961	*Platylobium formosum*			1
Plantae	Flora	Fabaceae (Faboideae)	9912	*Podolobium ilicifolium*		Prickly Shaggy Pea	1
Plantae	Flora	Fabaceae (Faboideae)	2977	*Pultenaea blakelyi*			1
Plantae	Flora	Fabaceae (Faboideae)	2993	*Pultenaea flexilis*			1
Plantae	Flora	Fabaceae (Faboideae)	3005	*Pultenaea paleacea*		Chaffy Bush-pea	1
Plantae	Flora	Fabaceae (Faboideae)	3014	*Pultenaea retusa*			1
Plantae	Flora	Fabaceae (Faboideae)	3023	*Pultenaea villosa*		Hairy Bush-pea	5
Plantae	Flora	Fabaceae (Faboideae)	3077	*Trifolium fragiferum*	*	Strawberry Clover	1
Plantae	Flora	Fabaceae (Faboideae)	3084	*Trifolium pratense*	*	Red Clover	1
Plantae	Flora	Fabaceae (Faboideae)	3085	*Trifolium repens*	*	White Clover	10
Plantae	Flora	Fabaceae (Faboideae)	TRIF	*Trifolium spp.*	*		1
Plantae	Flora	Fabaceae (Faboideae)	3097	*Vicia sativa*	*	Common vetch	3
Plantae	Flora	Fabaceae (Faboideae)	8794	*Vicia sativa subsp. sativa*	*	Common Vetch	3
Plantae	Flora	Fabaceae (Faboideae)	3105	*Viminaria juncea*		Native Broom	6
Plantae	Flora	Fabaceae (Mimosoideae)	3723	*Acacia brownii*		Heath Wattle	2
Plantae	Flora	Fabaceae (Mimosoideae)	3762	*Acacia decurrens*		Black Wattle	1
Plantae	Flora	Fabaceae (Mimosoideae)	3769	*Acacia elongata*		Swamp Wattle	1
Plantae	Flora	Fabaceae (Mimosoideae)	3771	*Acacia falcata*			3
Plantae	Flora	Fabaceae (Mimosoideae)	3777	*Acacia floribunda*		White Sally	4
Plantae	Flora	Fabaceae (Mimosoideae)	3781	*Acacia genistifolia*		Early Wattle	2
Plantae	Flora	Fabaceae (Mimosoideae)	3792	*Acacia implexa*		Hickory Wattle	4
Plantae	Flora	Fabaceae (Mimosoideae)	3794	*Acacia irrorata*		Green Wattle	6
Plantae	Flora	Fabaceae (Mimosoideae)	6472	*Acacia irrorata subsp.*		Green Wattle	19
Plantae	Flora	Fabaceae (Mimosoideae)	3814	*Acacia linifolia*		White Wattle	1
Plantae	Flora	Fabaceae (Mimosoideae)	3816	*Acacia longifolia*			33
Plantae	Flora	Fabaceae (Mimosoideae)	10790	*Acacia longifolia subsp.*		Sydney Golden Wattle	8
Plantae	Flora	Fabaceae (Mimosoideae)	10791	*Acacia longifolia subsp.*		Coastal Wattle	15
Plantae	Flora	Fabaceae (Mimosoideae)	3821	*Acacia maidenii*		Maiden's Wattle	17
Plantae	Flora	Fabaceae (Mimosoideae)	3823	*Acacia mearnsii*		Black Wattle	1
Plantae	Flora	Fabaceae (Mimosoideae)	3834	*Acacia myrtifolia*		Red-stemmed Wattle	2
Plantae	Flora	Fabaceae (Mimosoideae)	3857	*Acacia prominens*		Gosford Wattle	1
Plantae	Flora	Fabaceae (Mimosoideae)	3873	*Acacia saligna*	*	Golden Wreath Wattle	6
Plantae	Flora	Fabaceae (Mimosoideae)	3881	*Acacia suaveolens*		Sweet Wattle	8
Plantae	Flora	Fabaceae (Mimosoideae)	3885	*Acacia terminalis*		Sunshine Wattle	5
Plantae	Flora	Fabaceae (Mimosoideae)	3893	*Acacia ulicifolia*		Prickly Moses	7
Plantae	Flora	Fabaceae (Mimosoideae)	8840	*Pararchidendron pruinosum*		Snow Wood	1
Plantae	Flora	Fumariaceae	9367	*Fumaria muralis subsp.*	*	Wall Fumitory	3
Plantae	Flora	Gentianaceae	3131	*Centaurium erythraea*	*	Common Centaury	5
Plantae	Flora	Gentianaceae	3133	*Centaurium tenuiflorum*	*	Branched Centaury, Slender	2
Plantae	Flora	Geraniaceae	3148	*Geranium homeanum*			1
Plantae	Flora	Geraniaceae	3156	*Geranium solanderi*		Native Geranium	2
Plantae	Flora	Geraniaceae	3157	*Pelargonium australe*		Native Storksbill	5
Plantae	Flora	Geraniaceae	PELA	*Pelargonium spp.*			3
Plantae	Flora	Gleicheniaceae	7138	*Gleichenia dicarpa*		Pouched Coral Fern	3
Plantae	Flora	Goodeniaceae	3175	*Goodenia bellidifolia*			2
Plantae	Flora	Goodeniaceae	9279	*Goodenia hederacea subsp.*			1
Plantae	Flora	Goodeniaceae	3190	*Goodenia heterophylla*			4
Plantae	Flora	Goodeniaceae	10197	*Goodenia heterophylla*			1
Plantae	Flora	Goodeniaceae	3192	*Goodenia ovata*		Hop Goodenia	2
Plantae	Flora	Goodeniaceae	7057	*Goodenia paniculata*			6
Plantae	Flora	Goodeniaceae	GOOD	*Goodenia spp.*			1
Plantae	Flora	Goodeniaceae	3197	*Goodenia stelligera*		Spiked Goodenia	2
Plantae	Flora	Goodeniaceae	3203	*Scaevola calendulacea*			13
Plantae	Flora	Goodeniaceae	3208	*Scaevola ramosissima*		Purple Fan-flower	2
Plantae	Flora	Goodeniaceae	SCAE	*Scaevola spp.*			5
Plantae	Flora	Goodeniaceae	3210	*Selliera radicans*		Swamp Weed	13
Plantae	Flora	Goodeniaceae	3219	*Velleia spathulata*			2
Plantae	Flora	Haemodoraceae	6435	*Haemodorum corymbosum*			2

Plantae	Flora	Haloragaceae	3243	*Gonocarpus micranthus*					2
Plantae	Flora	Haloragaceae	8648	*Gonocarpus micranthus*					3
Plantae	Flora	Haloragaceae	3247	*Gonocarpus tetragynus*		Poverty Raspwort			3
Plantae	Flora	Haloragaceae	3248	*Gonocarpus teucrioides*		Germander Raspwort			9
Plantae	Flora	Iridaceae	3288	*Gladiolus gueinzii*	*				2
Plantae	Flora	Iridaceae	3289	*Gladiolus undulatus*	*	Wild Gladiolus			2
Plantae	Flora	Iridaceae	3301	*Patersonia glabrata*		Leafy Purple-flag			1
Plantae	Flora	Iridaceae	7477	*Romulea rosea var. australis*	*	Onion Grass			1
Plantae	Flora	Iridaceae	9237	*Watsonia meriana*	*				8
Plantae	Flora	Juncaceae	3316	*Juncus articulatus*	*				1
Plantae	Flora	Juncaceae	3318	*Juncus bufonius*	*	Toad Rush			1
Plantae	Flora	Juncaceae	3325	*Juncus cognatus*	*				4
Plantae	Flora	Juncaceae	3326	*Juncus continuus*					2
Plantae	Flora	Juncaceae	7430	*Juncus kraussii subsp.*		Sea Rush			23
Plantae	Flora	Juncaceae	3337	*Juncus microcephalus*	*				1
Plantae	Flora	Juncaceae	8998	*Juncus mollis*					1
Plantae	Flora	Juncaceae	3340	*Juncus planifolius*					3
Plantae	Flora	Juncaceae	3341	*Juncus polyanthemus*					1
Plantae	Flora	Juncaceae	JUNC	*Juncus spp.*					1
Plantae	Flora	Juncaceae	3350	*Juncus usitatus*					9
Plantae	Flora	Juncaginaceae	15152	*Cycnogeton microtuberosum*					1
Plantae	Flora	Juncaginaceae	3368	*Triglochin procera*		Water Ribbons			1
Plantae	Flora	Juncaginaceae	3369	*Triglochin striata*		Streaked Arrowgrass			5
Plantae	Flora	Lamiaceae	6243	*Chloanthes stoechadis*					2
Plantae	Flora	Lamiaceae	6484	*Clerodendrum tomentosum*		Hairy Clerodendrum			12
Plantae	Flora	Lamiaceae	6247	*Gmelina leichhardtii*		White Beech			2
Plantae	Flora	Lamiaceae	3387	*Mentha satureioides*		Native Pennyroyal			1
Plantae	Flora	Lamiaceae	3397	*Plectranthus parviflorus*					2
Plantae	Flora	Lamiaceae	3459	*Westringia fruticosa*		Coastal Rosemary			4
Plantae	Flora	Lauraceae	3467	*Cassytha glabella*					8
Plantae	Flora	Lauraceae	9274	*Cassytha glabella f. glabella*					6
Plantae	Flora	Lauraceae	3469	*Cassytha pubescens*		Downy Dodder-laurel			12
Plantae	Flora	Lauraceae	3471	*Cinnamomum camphora*	*	Camphor Laurel			14
Plantae	Flora	Lauraceae	3483	*Cryptocarya microneura*		Murrogun			3
Plantae	Flora	Lauraceae	3495	*Endiandra sieberi*		Hard Corkwood			35
Plantae	Flora	Lauraceae	3498	*Litsea reticulata*		Bolly Gum			6
Plantae	Flora	Lemnaceae	7508	*Lemna disperma*					1
Plantae	Flora	Liliaceae	3559	*Lilium formosanum*	*	Formosan Lily			1
Plantae	Flora	Linaceae	3584	*Linum trigynum*	*	French Flax			2
Plantae	Flora	Loganiaceae	3590	*Logania pusilla*					1
Plantae	Flora	Lomandraceae	6302	*Lomandra filiformis*		Wattle Matt-rush			4
Plantae	Flora	Lomandraceae	6511	*Lomandra filiformis subsp.*		Wattle Matt-rush			1
Plantae	Flora	Lomandraceae	6304	*Lomandra glauca*		Pale Mat-rush			3
Plantae	Flora	Lomandraceae	6308	*Lomandra longifolia*		Spiny-headed Mat-rush			50
Plantae	Flora	Lomandraceae	8802	*Lomandra multiflora subsp.*		Many-flowered Mat-rush			1
Plantae	Flora	Lomandraceae	LOMA	*Lomandra spp.*		Mat-rush			2
Plantae	Flora	Loranthaceae	3619	*Muellerina celastroides*					2
Plantae	Flora	Luzuriagaceae	6015	*Eustrephus latifolius*		Wombat Berry			13
Plantae	Flora	Luzuriagaceae	6016	*Geitonoplesium cymosum*		Scrambling Lily			11
Plantae	Flora	Lythraceae	3623	*Lythrum hyssopifolia*		Hyssop Loosestrife			1
Plantae	Flora	Malaceae	5612	*Cotoneaster glaucophyllus*	*				3
Plantae	Flora	Malaceae	5614	*Cotoneaster pannosus*	*				1
Plantae	Flora	Malvaceae	6126	*Brachychiton acerifolius*		Illawarra Flame Tree			1
Plantae	Flora	Malvaceae	HIBI	*Hibiscus spp.*					1
Plantae	Flora	Malvaceae	3650	*Lagunaria patersonia*		Norfolk Island Hibiscus			5
Plantae	Flora	Malvaceae	6139	*Lasiopetalum ferrugineum*					2
Plantae	Flora	Malvaceae	9008	*Lasiopetalum ferrugineum*					1
Plantae	Flora	Malvaceae	3660	*Modiola caroliniana*	*	Red-flowered Mallow			4
Plantae	Flora	Malvaceae	3673	*Sida rhombifolia*	*	Paddy's Lucerne			10
Plantae	Flora	Meliaceae	11178	*Synoum glandulosum subsp.*		Scentless Rosewood			1
Plantae	Flora	Menispermaceae	3688	*Sarcopetalum harveyanum*		Pearl Vine			10
Plantae	Flora	Menispermaceae	3690	*Stephania japonica*		Snake vine			8
Plantae	Flora	Menispermaceae	8428	*Stephania japonica var.*		Snake Vine			16
Plantae	Flora	Menyanthaceae	14804	*Liparophyllum exaltatum*					5
Plantae	Flora	Monimiaceae	3918	*Wilkiea huegeliana*		Veiny Wilkiea			4
Plantae	Flora	Moraceae	7479	*Ficus coronata*		Creek Sandpaper Fig			3
Plantae	Flora	Moraceae	3921	*Ficus fraseri*		Sandpaper Fig			13
Plantae	Flora	Musaceae	11327	*Musa acuminata*	*	Edible banana			1
Plantae	Flora	Musaceae	MUSA	*Musa spp.*	*	Banana			1
Plantae	Flora	Myoporaceae	7906	*Myoporum acuminatum*		Boobialla			5
Plantae	Flora	Myrtaceae	3968	*Acmena smithii*		Lilly Pilly			17
Plantae	Flora	Myrtaceae	11432	*Agonis flexuosa*	*				2
Plantae	Flora	Myrtaceae	3970	*Angophora costata*		Sydney Red Gum			14
Plantae	Flora	Myrtaceae	3971	*Angophora floribunda*		Rough-barked Apple			3
Plantae	Flora	Myrtaceae	9619	*Angophora inopina*		Charmhaven Apple	V	V	1
Plantae	Flora	Myrtaceae	3984	*Backhousia myrtifolia*		Grey Myrtle			1
Plantae	Flora	Myrtaceae	4004	*Callistemon citrinus*		Crimson Bottlebrush			4
Plantae	Flora	Myrtaceae	4008	*Callistemon linearis*		Narrow-leaved Bottlebrush			2
Plantae	Flora	Myrtaceae	4013	*Callistemon pinifolius*		Pine-leaved Bottlebrush			2
Plantae	Flora	Myrtaceae	4014	*Callistemon rigidus*		Stiff Bottlebrush			5
Plantae	Flora	Myrtaceae	4015	*Callistemon salignus*		Willow Bottlebrush			8
Plantae	Flora	Myrtaceae	CALL	*Callistemon spp.*					1
Plantae	Flora	Myrtaceae	4019	*Callistemon viminalis*		Weeping Bottlebrush			1
Plantae	Flora	Myrtaceae	9687	*Corymbia gummifera*		Red Bloodwood			13
Plantae	Flora	Myrtaceae	9692	*Corymbia maculata*		Spotted Gum			3
Plantae	Flora	Myrtaceae	4060	*Eucalyptus botryoides*		Bangalay			27
Plantae	Flora	Myrtaceae	4067	*Eucalyptus camfieldii*		Camfield's Stringybark	V	V	1
Plantae	Flora	Myrtaceae	4069	*Eucalyptus capitellata*		Brown Stringybark			1
Plantae	Flora	Myrtaceae	4118	*Eucalyptus longifolia*		Woollybutt			3
Plantae	Flora	Myrtaceae	4155	*Eucalyptus pilularis*		Blackbutt			27

Plantae	Flora	Myrtaceae	4156	*Eucalyptus piperita*		Sydney Peppermint			2	
Plantae	Flora	Myrtaceae	4165	*Eucalyptus punctata*		Grey Gum			2	
Plantae	Flora	Myrtaceae	4168	*Eucalyptus racemosa*		Narrow-leaved Scribbly Gum			1	
Plantae	Flora	Myrtaceae	4170	*Eucalyptus resinifera*		Red Mahogany			2	
Plantae	Flora	Myrtaceae	9450	*Eucalyptus resinifera subsp.*					1	
Plantae	Flora	Myrtaceae	4171	*Eucalyptus robusta*		Swamp Mahogany			54	
Plantae	Flora	Myrtaceae	4177	*Eucalyptus saligna*		Sydney Blue Gum			1	
Plantae	Flora	Myrtaceae	4191	*Eucalyptus tereticornis*		Forest Red Gum			7	
Plantae	Flora	Myrtaceae	11217	*Euryomyrtus ramosissima*		Rosy Baeckea			2	
Plantae	Flora	Myrtaceae	4204	*Kunzea ambigua*		Tick Bush	P		4	
Plantae	Flora	Myrtaceae	4207	*Kunzea capitata*			P		1	
Plantae	Flora	Myrtaceae	4213	*Leptospermum arachnoides*					2	
Plantae	Flora	Myrtaceae	4221	*Leptospermum juniperinum*		Prickly Tea-tree			9	
Plantae	Flora	Myrtaceae	4222	*Leptospermum laevigatum*		Coast Teatree			26	
Plantae	Flora	Myrtaceae	7245	*Leptospermum*		Tantoon			5	
Plantae	Flora	Myrtaceae	8197	*Leptospermum*					1	
Plantae	Flora	Myrtaceae	8486	*Leptospermum trinervium*		Slender Tea-tree			4	
Plantae	Flora	Myrtaceae	4242	*Lophostemon confertus*		Brush Box			1	
Plantae	Flora	Myrtaceae	11117	*Melaleuca armillaris subsp.*		Bracelet Honey-myrtle			6	
Plantae	Flora	Myrtaceae	6809	*Melaleuca biconvexa*		Biconvex Paperbark	V	V	3	
Plantae	Flora	Myrtaceae	4249	*Melaleuca decora*					1	
Plantae	Flora	Myrtaceae	6391	*Melaleuca ericifolia*		Swamp Paperbark			21	
Plantae	Flora	Myrtaceae	4257	*Melaleuca linariifolia*		Flax-leaved Paperbark			21	
Plantae	Flora	Myrtaceae	4258	*Melaleuca nodosa*					15	
Plantae	Flora	Myrtaceae	4260	*Melaleuca quinquenervia*		Broad-leaved Paperbark			37	
Plantae	Flora	Myrtaceae	4261	*Melaleuca sieberi*					8	
Plantae	Flora	Myrtaceae	4264	*Melaleuca styphelioides*		Prickly-leaved Tea Tree			9	
Plantae	Flora	Myrtaceae	4266	*Melaleuca thymifolia*		Thyme Honey-myrtle			3	
Plantae	Flora	Myrtaceae	4283	*Rhodamnia rubescens*		Scrub Turpentine	E4A		1	
Plantae	Flora	Myrtaceae	4284	*Rhodomyrtus psidioides*		Native Guava	E4A		3	
Plantae	Flora	Myrtaceae	6688	*Syncarpia glomulifera*		Turpentine			1	
Plantae	Flora	Myrtaceae	7201	*Syzygium oleosum*		Blue Lilly Pilly			14	
Plantae	Flora	Myrtaceae	4293	*Syzygium paniculatum*		Magenta Lilly Pilly	E1	V	56	
Plantae	Flora	Nandinaceae	9645	*Nandina domestica*	*	Japanese Sacred Bamboo			1	
Plantae	Flora	Ochnaceae	4306	*Ochna serrulata*	*	Mickey Mouse Plant			11	
Plantae	Flora	Olacaceae	6407	*Olax stricta*					2	
Plantae	Flora	Oleaceae	4312	*Ligustrum lucidum*	*	Large-leaved Privet			1	
Plantae	Flora	Oleaceae	4313	*Ligustrum sinense*	*	Small-leaved Privet			9	
Plantae	Flora	Oleaceae	4318	*Notelaea longifolia*		Large Mock-olive			14	
Plantae	Flora	Oleaceae	6423	*Notelaea longifolia f.*					10	
Plantae	Flora	Oleaceae	4322	*Notelaea venosa*		Veined Mock-olive			2	
Plantae	Flora	Onagraceae	4330	*Epilobium hirtigerum*					3	
Plantae	Flora	Onagraceae	4338	*Ludwigia peruviana*	*				2	
Plantae	Flora	Onagraceae	4339	*Oenothera affinis*	*				5	
Plantae	Flora	Onagraceae	4344	*Oenothera mollissima*	*				2	
Plantae	Flora	Onagraceae	8808	*Oenothera stricta subsp.*	*				2	
Plantae	Flora	Orchidaceae	13308	*Acianthella amplexicaulis*			P		2	
Plantae	Flora	Orchidaceae	8975	*Acianthus exiguus*			P		1	
Plantae	Flora	Orchidaceae	4353	*Acianthus fornicatus*		Pixie Caps	P		1	
Plantae	Flora	Orchidaceae	9014	*Arthrochilus prolixus*			P		1	
Plantae	Flora	Orchidaceae	4373	*Caladenia carnea*		Pink Fingers	P		1	
Plantae	Flora	Orchidaceae	6703	*Caladenia catenata*		White Caladenia	P		2	
Plantae	Flora	Orchidaceae	12069	*Caladenia platichila*			P		1	
Plantae	Flora	Orchidaceae	9124	*Caladenia quadrifaria*			P		1	
Plantae	Flora	Orchidaceae	4389	*Caleana major*		Large Duck Orchid	P		2	
Plantae	Flora	Orchidaceae	CHIL	*Chiloglottis spp.*			P		1	
Plantae	Flora	Orchidaceae	4407	*Corybas fimbriatus*		Fringed Helmet Orchid	P		1	
Plantae	Flora	Orchidaceae	CORY	*Corybas spp.*			P		4	
Plantae	Flora	Orchidaceae	4417	*Cryptostylis subulata*		Large Tongue Orchid	P		4	
Plantae	Flora	Orchidaceae	11228	*Cyanicula caerulea*		Blue Caladenia	P		1	
Plantae	Flora	Orchidaceae	4419	*Cymbidium suave*		Snake Orchid	P		5	
Plantae	Flora	Orchidaceae	4432	*Dendrobium speciosum*		Rock Lily	P		1	
Plantae	Flora	Orchidaceae	4435	*Dendrobium teretifolium*		Rat's Tail Orchid	P		1	
Plantae	Flora	Orchidaceae	7888	*Dipodium variegatum*			P		1	
Plantae	Flora	Orchidaceae	9027	*^Diuris praecox*		Rough Doubletail	V,P,2	V	1	
Plantae	Flora	Orchidaceae	4465	*Glossodia major*		Waxlip Orchid	P		2	
Plantae	Flora	Orchidaceae	4466	*Glossodia minor*		Small Waxlip Orchid	P		2	
Plantae	Flora	Orchidaceae	4472	*Lyperanthus suaveolens*		Brown Beaks	P		2	
Plantae	Flora	Orchidaceae	MICO	*Microtis spp.*			P		1	
Plantae	Flora	Orchidaceae	4497	*Prasophyllum elatum*		Tall Leek Orchid	P		2	
Plantae	Flora	Orchidaceae	4545	*Pterostylis curta*		Blunt Greenhood	P		4	
Plantae	Flora	Orchidaceae	4562	*Pterostylis nutans*		Nodding Greenhood	P		1	
Plantae	Flora	Orchidaceae	4563	*Pterostylis obtusa*		Blue-tongue Greenhood	P		1	
Plantae	Flora	Orchidaceae	PTER	*Pterostylis spp.*		Greenhood	P		7	
Plantae	Flora	Oxalidaceae	4613	*Oxalis corniculata*	*	Creeping Oxalis			5	
Plantae	Flora	Oxalidaceae	9250	*Oxalis debilis var. corymbosa*	*				1	
Plantae	Flora	Oxalidaceae	OXAL	*Oxalis spp.*					1	
Plantae	Flora	Papaveraceae	7115	*Argemone ochroleuca subsp.*	*	Mexican Poppy			2	
Plantae	Flora	Papaveraceae	ARGE	*Argemone spp.*	*				1	
Plantae	Flora	Passifloraceae	6994	*Passiflora caerulea*	*	Blue Passionflower			2	
Plantae	Flora	Passifloraceae	4643	*Passiflora edulis*	*	Common Passionfruit			3	
Plantae	Flora	Passifloraceae	4649	*Passiflora suberosa*	*	Cork Passionfruit			1	
Plantae	Flora	Passifloraceae	12133	*Passiflora tarminiana*	*	Banana Passionfruit			1	
Plantae	Flora	Peperomiaceae	4664	*Peperomia tetraphylla*		Four-leaved Peperomia			1	
Plantae	Flora	Philydraceae	7065	*Philydrum lanuginosum*		Frogsmouth			3	
Plantae	Flora	Phormiaceae	3540	*Dianella caerulea*		Blue Flax-lily			17	
Plantae	Flora	Phormiaceae	6811	*Dianella caerulea var. assera*					12	
Plantae	Flora	Phormiaceae	6700	*Dianella caerulea var.*					8	
Plantae	Flora	Phormiaceae	7337	*Dianella caerulea var.*					8	
Plantae	Flora	Phormiaceae	7864	*Dianella congesta*					2	

Plantae	Flora	Phormiaceae	8725	*Dianella longifolia var.*			6
Plantae	Flora	Phormiaceae	3542	*Dianella revoluta*		Blueberry Lily	2
Plantae	Flora	Phrymaceae	14731	*Thyridia repens*		Creeping Monkey-flower	1
Plantae	Flora	Phyllanthaceae	2695	*Breynia oblongifolia*		Coffee Bush	34
Plantae	Flora	Phyllanthaceae	7866	*Glochidion ferdinandi*		Cheese Tree	22
Plantae	Flora	Phyllanthaceae	9360	*Glochidion ferdinandi var.*		Cheese Tree	13
Plantae	Flora	Phyllanthaceae	8821	*Glochidion ferdinandi var.*		Hairy Cheese Tree	4
Plantae	Flora	Phyllanthaceae	2754	*Poranthera ericifolia*			2
Plantae	Flora	Phyllanthaceae	7395	*Poranthera microphylla*		Small Poranthera	2
Plantae	Flora	Pinaceae	11138	*Pinus elliottii*	*	Slash Pine	1
Plantae	Flora	Pinaceae	4661	*Pinus radiata*	*	Radiata Pine	1
Plantae	Flora	Pittosporaceae	4671	*Billardiera scandens*		Hairy Apple Berry	16
Plantae	Flora	Pittosporaceae	4678	*Hymenosporum flavum*		Native Frangipani	1
Plantae	Flora	Pittosporaceae	4683	*Pittosporum revolutum*		Rough Fruit Pittosporum	21
Plantae	Flora	Pittosporaceae	4685	*Pittosporum undulatum*		Sweet Pittosporum	30
Plantae	Flora	Plantaginaceae	4699	*Plantago lanceolata*	*	Lamb's Tongues	12
Plantae	Flora	Plantaginaceae	PLAA	*Plantago spp.*		Plantain	1
Plantae	Flora	Poaceae	4738	*Ammophila arenaria*	*	Marram Grass	2
Plantae	Flora	Poaceae	4748	*Andropogon virginicus*	*	Whisky Grass	10
Plantae	Flora	Poaceae	ARIS	*Aristida spp.*			1
Plantae	Flora	Poaceae	4777	*Arundo donax*	*	Giant Reed	2
Plantae	Flora	Poaceae	6594	*Austrofestuca littoralis*		Beach Fescue	1
Plantae	Flora	Poaceae	AUSF	*Austrofestuca spp.*			1
Plantae	Flora	Poaceae	9603	*Austrostipa pubescens*			2
Plantae	Flora	Poaceae	AUSO	*Austrostipa spp.*			2
Plantae	Flora	Poaceae	4780	*Avena fatua*	*	Wild Oats	3
Plantae	Flora	Poaceae	11194	*Axonopus fissifolius*	*	Narrow-leafed Carpet Grass	5
Plantae	Flora	Poaceae	4790	*Bothriochloa macra*		Red Grass	2
Plantae	Flora	Poaceae	14268	*Bouteloua dactyloides*	*	Buffalo Grass	1
Plantae	Flora	Poaceae	7618	*Brachyachne convergens*		Common Native Couch	1
Plantae	Flora	Poaceae	4800	*Briza maxima*	*	Quaking Grass	7
Plantae	Flora	Poaceae	4801	*Briza minor*	*	Shivery Grass	2
Plantae	Flora	Poaceae	4802	*Briza subaristata*	*		2
Plantae	Flora	Poaceae	7270	*Bromus brevis*	*		1
Plantae	Flora	Poaceae	7813	*Bromus catharticus*	*	Praire Grass	5
Plantae	Flora	Poaceae	14903	*Cenchrus clandestinus*	*	Kikuyu Grass	15
Plantae	Flora	Poaceae	4831	*Chloris gayana*	*	Rhodes Grass	14
Plantae	Flora	Poaceae	10359	*Cortaderia jubata*	*	Pink Pampas Grass	1
Plantae	Flora	Poaceae	4839	*Cortaderia selloana*	*	Pampas Grass	5
Plantae	Flora	Poaceae	6540	*Cynodon dactylon*		Common Couch	27
Plantae	Flora	Poaceae	4891	*Deyeuxia quadriseta*			2
Plantae	Flora	Poaceae	4897	*Dichelachne crinita*		Longhair Plumegrass	2
Plantae	Flora	Poaceae	4899	*Dichelachne rara*			1
Plantae	Flora	Poaceae	4913	*Digitaria parviflora*		Small-flowered Finger Grass	2
Plantae	Flora	Poaceae	6937	*Digitaria sanguinalis*	*	Crab Grass	2
Plantae	Flora	Poaceae	4923	*Echinochloa crus-galli*	*	Barnyard Grass	1
Plantae	Flora	Poaceae	4929	*Echinopogon caespitosus*		Bushy Hedgehog-grass	2
Plantae	Flora	Poaceae	7593	*Echinopogon caespitosus*		Tufted Hedgehog Grass	1
Plantae	Flora	Poaceae	4934	*Echinopogon ovatus*		Forest Hedgehog Grass	1
Plantae	Flora	Poaceae	4937	*Ehrharta erecta*	*	Panic Veldtgrass	24
Plantae	Flora	Poaceae	7196	*Eleusine indica*	*	Crowsfoot Grass	2
Plantae	Flora	Poaceae	4946	*Entolasia marginata*		Bordered Panic	13
Plantae	Flora	Poaceae	4947	*Entolasia stricta*		Wiry Panic	7
Plantae	Flora	Poaceae	7578	*Eragrostis benthamii*			2
Plantae	Flora	Poaceae	7921	*Eragrostis brownii*		Brown's Lovegrass	3
Plantae	Flora	Poaceae	4952	*Eragrostis curvula*	*	African Lovegrass	5
Plantae	Flora	Poaceae	ERAG	*Eragrostis spp.*			1
Plantae	Flora	Poaceae	5001	*Hemarthria uncinata*		Matgrass	2
Plantae	Flora	Poaceae	7871	*Hemarthria uncinata var.*			1
Plantae	Flora	Poaceae	5016	*Hyparrhenia hirta*	*	Coolatai Grass	1
Plantae	Flora	Poaceae	6803	*Imperata cylindrica*		Blady Grass	30
Plantae	Flora	Poaceae	11394	*Lachnagrostis aemula*		Blowngrass	2
Plantae	Flora	Poaceae	11388	*Lachnagrostis filiformis*			6
Plantae	Flora	Poaceae	5022	*Lagurus ovatus*	*	Hare's Tail Grass	2
Plantae	Flora	Poaceae	5032	*Lolium perenne*	*	Perennial Ryegrass	1
Plantae	Flora	Poaceae	LOLI	*Lolium spp.*	*		2
Plantae	Flora	Poaceae	12592	*Megathyrsus maximus var.*	*		1
Plantae	Flora	Poaceae	10904	*Melinis repens*	*	Red Natal Grass	2
Plantae	Flora	Poaceae	5037	*Microlaena stipoides*		Weeping Grass	10
Plantae	Flora	Poaceae	7707	*Microlaena stipoides var.*		Weeping Grass	10
Plantae	Flora	Poaceae	5044	*Oplismenus aemulus*			4
Plantae	Flora	Poaceae	5045	*Oplismenus imbecillis*			34
Plantae	Flora	Poaceae	OPLI	*Oplismenus spp.*			13
Plantae	Flora	Poaceae	5066	*Panicum simile*		Two-colour Panic	3
Plantae	Flora	Poaceae	7172	*Paspalidium distans*			1
Plantae	Flora	Poaceae	5086	*Paspalum dilatatum*	*	Paspalum	12
Plantae	Flora	Poaceae	5087	*Paspalum distichum*		Water Couch	2
Plantae	Flora	Poaceae	5093	*Paspalum urvillei*	*	Vasey Grass	11
Plantae	Flora	Poaceae	6563	*Paspalum vaginatum*		Salt-water Couch	26
Plantae	Flora	Poaceae	5113	*Phragmites australis*		Common Reed	25
Plantae	Flora	Poaceae	PHYO	*Phyllostachys spp.*	*		1
Plantae	Flora	Poaceae	5120	*Poa affinis*			1
Plantae	Flora	Poaceae	5121	*Poa annua*	*	Winter Grass	2
Plantae	Flora	Poaceae	11196	*Poa labillardierei var.*		Tussock	2
Plantae	Flora	Poaceae	POA	*Poa spp.*			1
Plantae	Flora	Poaceae	5145	*Polypogon monspeliensis*	*	Annual Beardgrass	1
Plantae	Flora	Poaceae	5147	*Pseudoraphis paradoxa*		Slender Mudgrass	9
Plantae	Flora	Poaceae	14309	*Rytidosperma fulvum*		Wallaby Grass	3
Plantae	Flora	Poaceae	14323	*Rytidosperma tenuius*			3
Plantae	Flora	Poaceae	13468	*Setaria parviflora*	*		7

Plantae	Flora	Poaceae	SETA	*Setaria spp.*				1
Plantae	Flora	Poaceae	7843	*Spinifex sericeus*		Hairy Spinifex		9
Plantae	Flora	Poaceae	5176	*Sporobolus africanus*	*	Parramatta Grass		3
Plantae	Flora	Poaceae	5184	*Sporobolus virginicus*				12
Plantae	Flora	Poaceae	9224	*Sporobolus virginicus var.*		Marine Couch		1
Plantae	Flora	Poaceae	9336	*Sporobolus virginicus var.*	*	Sand Couch		1
Plantae	Flora	Poaceae	5185	*Stenotaphrum secundatum*	*	Buffalo Grass		35
Plantae	Flora	Poaceae	5217	*Tetrarrhena juncea*		Wiry Ricegrass		2
Plantae	Flora	Poaceae	7770	*Themeda triandra*				4
Plantae	Flora	Poaceae	14048	*Thinopyrum ponticum*	*	Tall Wheat Grass		4
Plantae	Flora	Poaceae	5239	*Vulpia bromoides*	*	Squirrel Tail Fesque		1
Plantae	Flora	Poaceae	5243	*Zoysia macrantha*		Prickly Couch		10
Plantae	Flora	Polygalaceae	5253	*Comesperma ericinum*		Pyramid Flower		3
Plantae	Flora	Polygonaceae	5263	*Acetosa sagittata*	*	Rambling Dock		6
Plantae	Flora	Polygonaceae	5278	*Persicaria capitata*	*			1
Plantae	Flora	Polygonaceae	7568	*Persicaria decipiens*		Slender Knotweed		5
Plantae	Flora	Polygonaceae	5281	*Persicaria hydropiper*		Water Pepper		2
Plantae	Flora	Polygonaceae	5282	*Persicaria lapathifolia*		Pale Knotweed		1
Plantae	Flora	Polygonaceae	PERC	*Persicaria spp.*		Knotweed		3
Plantae	Flora	Polygonaceae	5286	*Persicaria strigosa*				4
Plantae	Flora	Polygonaceae	5287	*Polygonum arenastrum*	*	Wireweed		2
Plantae	Flora	Polygonaceae	5288	*Polygonum aviculare*	*	Wireweed		1
Plantae	Flora	Polygonaceae	5297	*Rumex conglomeratus*	*	Clustered Dock		1
Plantae	Flora	Polygonaceae	5298	*Rumex crispus*	*	Curled Dock		13
Plantae	Flora	Polygonaceae	RUME	*Rumex spp.*		Dock		1
Plantae	Flora	Polygonaceae	5304	*Rumex tenax*		Shiny Dock		1
Plantae	Flora	Polypodiaceae	8159	*Platycerium bifurcatum*		Elkhorn Fern	P	7
Plantae	Flora	Polypodiaceae	8163	*Pyrrosia rupestris*		Rock Felt Fern		2
Plantae	Flora	Portulacaceae	5314	*Calandrinia pickeringii*				2
Plantae	Flora	Potamogetonaceae	5717	*Ruppia megacarpa*				2
Plantae	Flora	Primulaceae	7459	*Aegiceras corniculatum*		River Mangrove		2
Plantae	Flora	Primulaceae	14614	*Lysimachia arvensis*	*	Scarlet Pimpernel		6
Plantae	Flora	Primulaceae	11948	*Myrsine howittiana*		Brush Muttonwood		3
Plantae	Flora	Primulaceae	11953	*Myrsine variabilis*				23
Plantae	Flora	Primulaceae	5337	*Samolus repens*		Creeping Brookweed		5
Plantae	Flora	Proteaceae	5339	*Banksia aemula*		Wallum Banksia		1
Plantae	Flora	Proteaceae	5342	*Banksia ericifolia*		Heath-leaved Banksia		3
Plantae	Flora	Proteaceae	11049	*Banksia ericifolia subsp.*				1
Plantae	Flora	Proteaceae	5343	*Banksia integrifolia*		Coast Banksia		16
Plantae	Flora	Proteaceae	6603	*Banksia integrifolia subsp.*		Coastal Banksia		22
Plantae	Flora	Proteaceae	5344	*Banksia marginata*		Silver Banksia		1
Plantae	Flora	Proteaceae	5345	*Banksia oblongifolia*		Fern-leaved Banksia		4
Plantae	Flora	Proteaceae	5346	*Banksia paludosa*				1
Plantae	Flora	Proteaceae	5347	*Banksia robur*		Swamp Banksia		1
Plantae	Flora	Proteaceae	5348	*Banksia serrata*		Old-man Banksia		34
Plantae	Flora	Proteaceae	5349	*Banksia spinulosa*		Hairpin Banksia	P	3
Plantae	Flora	Proteaceae	9976	*Conospermum ericifolium*				2
Plantae	Flora	Proteaceae	5352	*Conospermum taxifolium*		Variable Smoke-bush		1
Plantae	Flora	Proteaceae	5396	*Grevillea robusta*		Silky Oak		1
Plantae	Flora	Proteaceae	5409	*Hakea dactyloides*		Finger Hakea		1
Plantae	Flora	Proteaceae	5424	*Hakea salicifolia*		Willow-leaved Hakea		1
Plantae	Flora	Proteaceae	10806	*Hakea salicifolia subsp.*				1
Plantae	Flora	Proteaceae	5427	*Hakea teretifolia*		Needlebush		4
Plantae	Flora	Proteaceae	5433	*Isopogon anemonifolius*		Broad-leaf Drumsticks	P	3
Plantae	Flora	Proteaceae	6839	*Isopogon anethifolius*		Narrow-leaf Drumsticks	P	1
Plantae	Flora	Proteaceae	5440	*Lambertia formosa*		Mountain Devil		1
Plantae	Flora	Proteaceae	5445	*Lomatia silaifolia*		Crinkle Bush	P	2
Plantae	Flora	Proteaceae	5460	*Persoonia lanceolata*		Lance Leaf Geebung	P	5
Plantae	Flora	Proteaceae	5462	*Persoonia levis*		Broad-leaved Geebung	P	3
Plantae	Flora	Proteaceae	5463	*Persoonia linearis*		Narrow-leaved Geebung	P	5
Plantae	Flora	Proteaceae	5479	*Petrophile pulchella*		Conesticks	P	3
Plantae	Flora	Proteaceae	5481	*Stenocarpus salignus*		Scrub Beefwood		2
Plantae	Flora	Proteaceae	5490	*Xylomelum pyriforme*		Woody Pear	P	2
Plantae	Flora	Ranunculaceae	5495	*Clematis glycinoides*		Headache Vine		3
Plantae	Flora	Ranunculaceae	6903	*Clematis glycinoides var.*				1
Plantae	Flora	Ranunculaceae	CLEM	*Clematis spp.*				2
Plantae	Flora	Ranunculaceae	5507	*Ranunculus inundatus*		River Buttercup		4
Plantae	Flora	Ranunculaceae	5518	*Ranunculus plebeius*		Forest Buttercup		2
Plantae	Flora	Restionaceae	10612	*Baloskion tetraphyllum*				3
Plantae	Flora	Restionaceae	10614	*Baloskion tetraphyllum*		Plume Rush		2
Plantae	Flora	Restionaceae	5532	*Empodisma minus*				1
Plantae	Flora	Restionaceae	5533	*Hypolaena fastigiata*				1
Plantae	Flora	Restionaceae	5534	*Leptocarpus tenax*				3
Plantae	Flora	Restionaceae	5540	*Lepyrodia muelleri*				1
Plantae	Flora	Restionaceae	5541	*Lepyrodia scariosa*				1
Plantae	Flora	Rhamnaceae	7686	*Alphitonia excelsa*		Red Ash		31
Plantae	Flora	Rhamnaceae	5567	*Pomaderris andromedifolia*				2
Plantae	Flora	Rhamnaceae	5577	*Pomaderris discolor*				2
Plantae	Flora	Rhamnaceae	9868	*Pomaderris elliptica subsp.*				2
Plantae	Flora	Rhamnaceae	7979	*Pomaderris intermedia*				1
Plantae	Flora	Rosaceae	PRUN	*Prunus spp.*	*			2
Plantae	Flora	Rosaceae	11733	*Rubus anglocandicans*	*	Blackberry		1
Plantae	Flora	Rosaceae	11303	*Rubus fruticosus sp. agg.*	*	Blackberry complex		10
Plantae	Flora	Rosaceae	RUBU	*Rubus spp.*				1
Plantae	Flora	Rosaceae	5646	*Rubus ulmifolius*	*	Blackberry		2
Plantae	Flora	Rubiaceae	14922	*Gynochthodes jasminoides*		Sweet Morinda		5
Plantae	Flora	Rubiaceae	5697	*Opercularia aspera*		Coarse Stinkweed		6
Plantae	Flora	Rubiaceae	5699	*Opercularia hispida*		Hairy Stinkweed		1
Plantae	Flora	Rubiaceae	OPER	*Opercularia spp.*				1
Plantae	Flora	Rubiaceae	5703	*Pomax umbellata*		Pomax		8

Plantae	Flora	Rubiaceae	5711	*Richardia brasiliensis*	*	Mexican Clover		3
Plantae	Flora	Rutaceae	5722	*Acronychia oblongifolia*		White Aspen		6
Plantae	Flora	Rutaceae	5749	*Boronia parviflora*		Swamp Boronia	P	1
Plantae	Flora	Rutaceae	5751	*Boronia polygalifolia*		Dwarf Boronia	P	2
Plantae	Flora	Rutaceae	11737	*Citrus reticulata*	*	Tangarine, Mandarin		1
Plantae	Flora	Rutaceae	10046	*Correa alba var. alba*		White Correa		9
Plantae	Flora	Rutaceae	5772	*Correa reflexa*		Native Fuschia		2
Plantae	Flora	Rutaceae	10797	*Correa reflexa var. speciosa*				1
Plantae	Flora	Rutaceae	CORR	*Correa spp.*				3
Plantae	Flora	Rutaceae	5776	*Eriostemon australasius*			P	2
Plantae	Flora	Rutaceae	5847	*Zieria smithii*		Sandfly Zieria		9
Plantae	Flora	Salicaceae	5851	*Salix babylonica*	*	Weeping Willow		2
Plantae	Flora	Santalaceae	5860	*Exocarpos cupressiformis*		Cherry Ballart		15
Plantae	Flora	Sapindaceae	5882	*Cardiospermum*	*	Balloon Vine		2
Plantae	Flora	Sapindaceae	5884	*Cupaniopsis anacardioides*		Tuckeroo		32
Plantae	Flora	Sapindaceae	7432	*Diploglottis australis*		Native Tamarind		2
Plantae	Flora	Sapindaceae	5911	*Dodonaea triquetra*		Large-leaf Hop-bush		21
Plantae	Flora	Sapindaceae	5913	*Dodonaea viscosa*		Sticky Hop-bush		2
Plantae	Flora	Sapindaceae	5917	*Guioa semiglauca*		Guioa		30
Plantae	Flora	Schizaeaceae	8182	*Schizaea dichotoma*		Branched Comb Fern		1
Plantae	Flora	Scrophulariaceae	5945	*Bacopa monnieri*		Bacopa		2
Plantae	Flora	Scrophulariaceae	5967	*Gratiola pubescens*		Hairy Brooklime		1
Plantae	Flora	Selaginellaceae	8187	*Selaginella uliginosa*		Swamp Selaginella		1
Plantae	Flora	Smilacaceae	7592	*Smilax australis*		Lawyer Vine		33
Plantae	Flora	Smilacaceae	6022	*Smilax glyciphylla*		Sweet Sarsparilla		26
Plantae	Flora	Solanaceae	6027	*Cestrum parqui*	*	Green Cestrum		1
Plantae	Flora	Solanaceae	6036	*Duboisia myoporoides*		Corkwood		6
Plantae	Flora	Solanaceae	6041	*Lycopersicon esculentum*	*	Tomato		1
Plantae	Flora	Solanaceae	6058	*Physalis peruviana*	*	Cape Gooseberry		5
Plantae	Flora	Solanaceae	7043	*Solanum americanum*		Glossy Nightshade		7
Plantae	Flora	Solanaceae	6090	*Solanum mauritianum*	*	Wild Tobacco Bush		2
Plantae	Flora	Solanaceae	6091	*Solanum nigrum*	*	Black-berry Nightshade		11
Plantae	Flora	Solanaceae	6109	*Solanum stelligerum*		Devil's Needles		1
Plantae	Flora	Stackhousiaceae	6125	*Stackhousia viminea*		Slender Stackhousia		2
Plantae	Flora	Stylidiaceae	6157	*Stylidium graminifolium*		Grass Triggerplant		2
Plantae	Flora	Thelypteridaceae	14610	*Cyclosorus dentatus*		Binung		1
Plantae	Flora	Thymelaeaceae	6814	*Pimelea linifolia subsp.*				6
Plantae	Flora	Thymelaeaceae	6197	*Wikstroemia indica*				2
Plantae	Flora	Tropaeolaceae	6215	*Tropaeolum majus*	*	Nasturtium		1
Plantae	Flora	Typhaceae	6217	*Typha orientalis*		Broad-leaved Cumbungi		14
Plantae	Flora	Ulmaceae	6761	*Trema tomentosa var.*		Native Peach		2
Plantae	Flora	Uvulariaceae	3566	*Schelhammera undulata*				1
Plantae	Flora	Verbenaceae	6248	*Lantana camara*	*	Lantana		49
Plantae	Flora	Verbenaceae	6252	*Phyla nodiflora*	*	Carpet Weed		1
Plantae	Flora	Verbenaceae	6256	*Verbena bonariensis*	*	Purpletop		8
Plantae	Flora	Violaceae	6266	*Hybanthus monopetalus*		Slender Violet-bush		5
Plantae	Flora	Violaceae	11863	*Viola banksii*				11
Plantae	Flora	Violaceae	6272	*Viola hederacea*		Ivy-leaved Violet		23
Plantae	Flora	Vitaceae	6281	*Cayratia clematidea*		Native Grape		14
Plantae	Flora	Vitaceae	6282	*Cissus antarctica*		Water Vine		13
Plantae	Flora	Vitaceae	6283	*Cissus hypoglauca*		Giant Water Vine		22
Plantae	Flora	Xanthorrhoeaceae	9309	*Xanthorrhoea latifolia subsp.*			P	2
Plantae	Flora	Xanthorrhoeaceae	6319	*Xanthorrhoea media*			P	2
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	11
Plantae	Flora	Zingiberaceae	6913	*Alpinia arundelliana*		Native Ginger		1
Plantae	Flora	Zingiberaceae	6787	*Hedychium gardnerianum*	*	Ginger Lily		1
Plantae	Flora	Zosteraceae	13649	*Zostera muelleri subsp.*				1
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*		Little Bent-winged Bat	V,P	1
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae*		Large Bent-winged Bat	V,P	8