



Saltwater Creek Vegetation Mapping and Condition Assessment

Alluvium Consulting

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1. Introduction

Eco Logical Australia (ELA) was commissioned by Alluvium Consulting to undertake vegetation surveying and mapping of wetland vegetation surrounding Saltwater Creek, South West Rocks within the Kempsey Shire Local Government Area.

This project seeks to review existing data and mapping, validate vegetation communities on-ground through the collection of strategic data on floristic and structural diversity, identify any additional communities, and identify the condition of vegetation communities (including degradative issues such as weed invasion and encroachment).

Information developed as part of this report will be used in planning, conservation operations and environmental assessments. It provides a basis for managing ecological communities of conservation significance, preparation of weed control strategies, rehabilitation plans, as well as developing appropriate strategies for the sustainable development surrounding the creek system.

The study area for this project is defined as the current mapped area of Coastal Management State Environmental Planning Policy (SEPP) coastal wetland proximity area, and the immediately adjacent areas that are identified as suitable wetland habitat (DPIE 2018a).

1.1. Background

Wetland vegetation communities in New South Wales are known to be an important aspect of landscape function, contributing to water flow and water quality, providing key habitat for aquatic invertebrates, birds and fish, and providing refuges during drought (Keith 2012). Since European settlement, many wetlands have been dramatically altered by vegetation clearing, alteration of water regimes and increased nutrient loads from urbanisation or agricultural activities in the surrounding catchments (Keith 2012). Wetland vegetation is characterised by plants that tolerate or require periodic inundation of fresh or brackish water. Factors affecting the distribution of wetland communities including elevation and the frequency and duration of inundation, degree of salinity in the water, oxygen and nutrient levels in the water and soil, and soil characteristics.

The Saltwater Creek catchment is approximately 8.7 km² located between the town of South West Rocks (in the west) and the Smoky Cape Range (in the east). Saltwater Creek is an intermittently open coastal creek/lagoon system, entering the ocean at Front Beach (**Figure 1**). Water levels in the creek and lagoon fluctuate in response to rainfall and evaporation when the sand berm is closed approximately 70% of the time. The creek and (to an extent) the lagoon, are both tidal when the berm is open to the ocean (WBM 2006). Saltwater Creek and Lagoon are primarily located on alluvial deposits overlain by recent fluvial and estuarine sediments (NPWS 1998).

Land use in the catchment is a mixture of urban areas, conservation areas (Hat Head and Arakoon National Park), a golf course, and a privately owned cleared area proposed for housing development to the west of the lagoon. A section of this area, adjacent to Phillip Drive, was previously used for storage of gasoline and diesel between 1961 and 1992 (WBM 2006).



Figure 1: Saltwater Creek study area

2. Methodology

2.1. Literature review

Existing mapping products and literature related to Saltwater Creek were reviewed to inform the field survey. Mapping of the study area has previously been undertaken at a scale of 1:25,000 by Kendall and Kendall (2016), and Kendal and Kendall (2003).

Kendall and Kendall (2016) mapping was undertaken at a scale of 1:25,000 across the Kempsey Shire LGA. Kendal and Kendall (2003) identified 24 vegetation communities across the Saltwater Creek catchment and nearby areas.

Soil landscape mapping had been undertaken for the region at a scale of 1:100,000 with 11 soil landscape units identified in the study area (**Table 1**) (DPIE 2018b). The majority of soil landscape were associated with estuarine and beach sands, with the exception of the low foothills of the Smoky Cape Range which is described as granitic with open dry sclerophyll forest and occurs east of Saltwater Lagoon.

A Bionet Atlas threatened species database search for records listed under the Biodiversity Conservation Act (2016) (BC Act) was undertaken within a 5 km radius of the Saltwater Creek study area (**Figure 2**).

Table 1: Soil landscape map units identified in the study area from DPIE 2018b

Name	Landscape description
Macleay Arm	Narrow extratidal flats of coastal interbarrier streams. Mixed Quaternary estuarine and barrier sands. Elevation <2 m; level. Sedgeland and swamp sclerophyll forest.
Seven Oaks	Level alluvial deltaic backswamps and floodbasins. Relief <1 m; elevation <5 m; slopes <1%. Often extensively drained. Wet meadow and sedgelands fringed by swamp sclerophyll forests.
Clybucca	Backbarrier muddy swale swamps and closed-depressions overlying Pleistocene sands. Relief <1 m; elevation <5 m; slopes <3%. Sedgelands, wet heath and Casuarina glauca and Melaleuca swamp sclerophyll forests (partly cleared for grazing).
Disturbed Terrain variant a	Cleared land
Hat Head variant a	Level closed and open-depressions perched within Pleistocene dunes. Relief <1 m; elevation <20 m. Open-depressions may have slopes of about 1%; closed-depressions are slightly concave or flat. Sedgeland and wet heath fringed by Melaleuca quinquenervia.
Valla	Undulating low foothills on granitics. Relief 10 - 90 m; elevation 10 - 50 m; slopes 5 - 15% (generally <10%). Open dry sclerophyll forest and tall open-forest, partly cleared.
Goolawah variant a	Aeolian variant. Stable vegetated foredunes and hind dunes on Holocene outer barrier sands.
Korogoro	Pleistocene low transgressive dunes. Extremely low relief (1 - 9 m, usually <3 m); low elevation (<10 m); slopes <5%. Low open-forest, uncleared.
Stuarts Point	Low inner barrier beach ridge plain on Pleistocene sand . Relief 1 - 9 m (usually <3 m); elevation <10 m; slopes <5%. Low open-forest, occasionally cleared
Goolawah	Mainland and barrier beaches, foredunes and hind dunes on Holocene outer barrier sands. Beaches and backplains with elevation and relief <3 m; slopes <5%. Dunes with relief <15 m; slopes 20 - 60%. Mostly bare sand on beaches and low shrubland on dunes.
Kundabung	Undulating rises and low hills on mudstones of the Kempsey Beds. Relief 10 - 30 m; elevation 5 - 50 m; slopes 5 - 10%. Open dry sclerophyll forest, partly cleared.

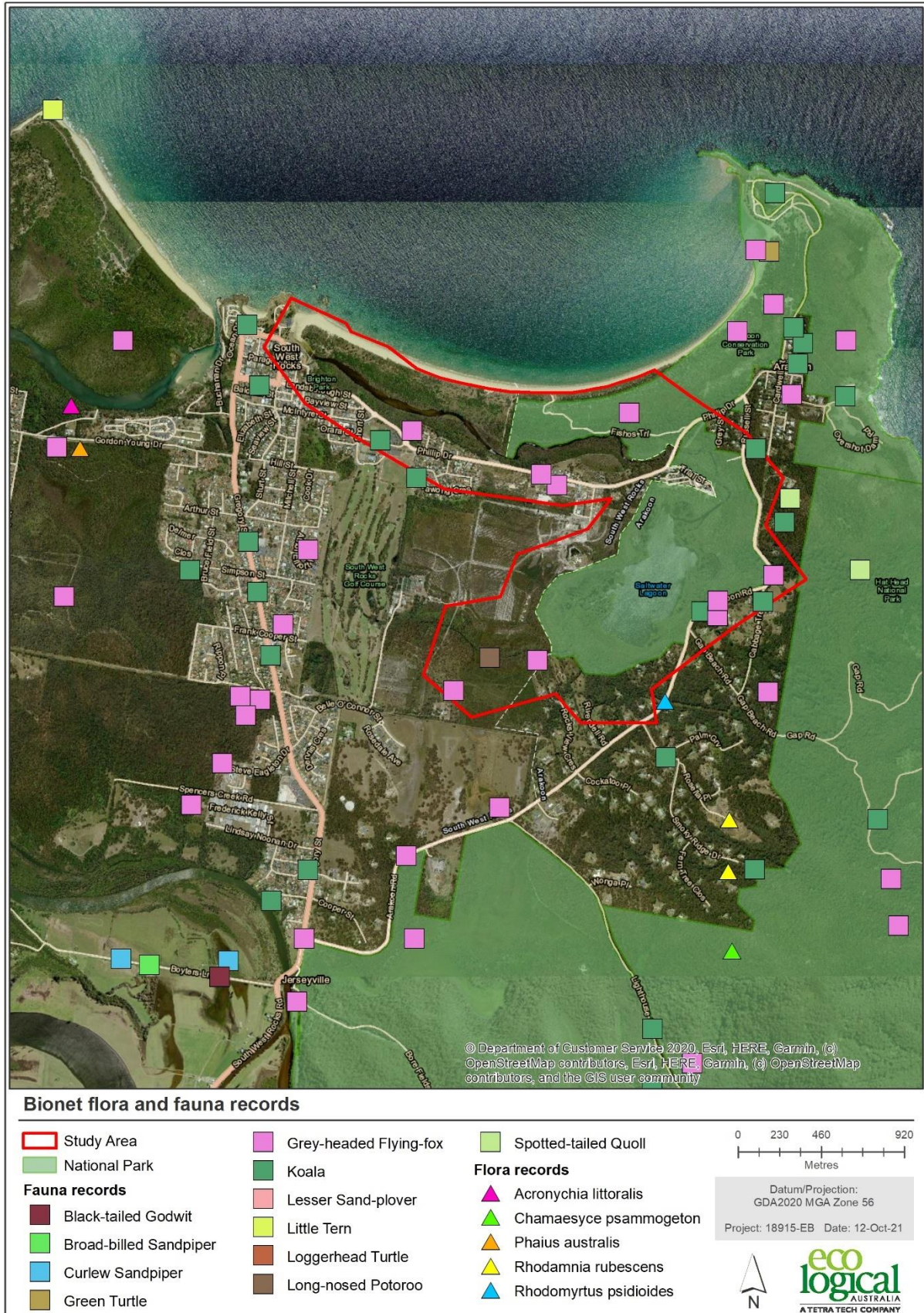


Figure 2: Threatened flora and fauna species records (Bionet)

2.2. Datasets utilised

Table 2 provides a summary of the major datasets utilised as part of this study.

Table 2: Datasets utilised for vegetation mapping

Data	Purpose	Reference
High resolution imagery	Distinct patterns in the imagery representing vegetation community boundaries were identified, linework created and attributed.	DoCS 2020
Vegetation mapping	Existing vegetation mapping was used as a guide to the occurrence, boundaries and extent of vegetation communities, as well as the assignment of PCTs	Kendell and Kendell 2016, Kendell and Kendell 2003
Wetland SEPP mapping	Delineation of the survey mapping boundaries	DPIE 2018a
Rapid Data Points	Field survey data was used to identify and assign PCTs	--
Soil landscape mapping	Soil mapping used to assist in identifying boundaries between vegetation communities	DPIE 2018b

2.3. Field survey

Surveys were undertaken between 28 and 30 July 2021 by ELA Senior Botanist/Restoration Ecologist Gordon Patrick, and ELA Botanist Liam Scanlan. Meandering traverses were undertaken across the study area with the intention of covering as much of the study area as possible. A total of 178 Rapid Data Points (RDPs) were surveyed as part of this project across the creek catchment (**Figure 4**), with 108 of these being vegetation validation points and 70 being weed observation points. Full floristic plots were not undertaken due to time constraints.

Vegetation surveys were undertaken in the field using mobile devices loaded with ESRI Collector and relevant Geographic Information System (GIS) datasets (aerial imagery, existing vegetation mapping, land tenure, SEPP wetland boundary etc.).

At each RDP the dominant canopy, midstorey and groundcover species; structural cover condition; vegetation structure; PCT; priority or environmental weed species and cover; threatened species and count; soil texture; fire history; vegetation condition; landform element and pattern; notes; photo number; surveyor; and date were recorded. RDPs are less comprehensive than full floristic vegetation plots, however they allow for rapid identification of PCTs and other features which could then be interpreted through Aerial Photographic Interpretation (API).

Targeted surveys for threatened flora species were not specifically undertaken as part of this project, however any observations of conservation significant flora and fauna species were noted, and locations recorded.

2.3.1. Unmanned Aerial Vehicle imagery

An Unmanned Aerial Vehicle (drone) was utilised to enhance the accuracy of Plant Community Type Mapping. A DJI Mavic Air was flown by a registered operator in accordance with the Civil Aviation Safety Authority (CASA) standard operating conditions. Approximately 85 high resolution photographs and video were taken across the study area. Aerial photographs captured allowed for post flight analysis of dominant canopy species, vegetation structure, condition, and interpretation of cover of various Plant Community Types (**Plate 1**). Aerial photographs were captured at variety of angles including oblique and top-down to provide additional information not available in existing aerial photography.

Drone photos and video have allowed detailed interpretation of aerial imagery where uncertainty occurs.



Plate 1: Example of drone imagery showing rushland with emergent Swamp Oak and Broad-Leaved Paperbark, and Eucalypt forest in the top left.

2.4. Vegetation Community mapping

Vegetation mapping was undertaken using an on-screen digitising approach in ArcGIS 10.2 at a scale of between 1:2,500 and 1:10,000. Spatial data were loaded into the Geographic Information System (GIS) and RDPs were overlain on high resolution aerial imagery (DoCS 2020).

RDPs were used as a guide to identify Plant Community Types. API was then used to generate linework based on distinct patterns in the imagery representing vegetation community boundaries with the most appropriate community attributed.

The final mapped product is considered sufficiently accurate at a 1:5,000 scale. Supplementary datasets such as soil landscape mapping were used to help inform the API and to delineate boundaries between vegetation communities.

PCTs were attributed in accordance with VIS Classification database (OEH 2021) which follows the NSW Vegetation Classification Assessment (Benson 2006). Where possible, PCTs were assigned based on a quantitative comparison of RDP data with the vegetation descriptions, characteristic species in the upper, mid and ground structural layers, vegetation structure, soils, landform and other relevant data contained within the VIS Classification database (OEH 2021).

Each polygon was assigned the following attributes:

- VegComm – Vegetation community identification code
- Condition – Condition of vegetation in each polygon
 - High – Few weeds, vegetation largely intact
 - Moderate – Moderate exotic cover, vegetation mostly intact
 - Low – High exotic cover, or vegetation disturbed
- Confidence – mapping confidence for each polygon:
 - 1 – field validated
 - 2 – high confidence API only
 - 3 – moderate confidence API only
- Area – Area of polygon in hectares
- Class – Vegetation class
- Formation – Vegetation formation
- CommName – Name of vegetation community
- Dominant – Dominant species in each community (see **Table 3**).
- PCTID – Equivalent Plant Community Type identification code

Table 3: Abbreviated dominant species for vegetation communities

Abbreviation	Detail
MQ	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)
CG	<i>Casuarina glauca</i> (Swamp Oak)
BM	<i>Baumea species</i> (Rushes)
RF	Rainforest (multiple dominant species)
EPI	<i>Eucalyptus pilularis</i> (Blackbutt)
ER	<i>Eucalyptus robusta</i> (Swamp Mahogany)

Abbreviation	Detail
LL	<i>Leptospermum laevigatum</i> (Coastal Tea Tree)
LLI	<i>Leptospermum liversidgei</i> (Olive Tea Tree)
EPL, EPI	<i>Eucalyptus planchoniana</i> (Needlebark Stringybark), <i>Eucalyptus pilularis</i>
ER	<i>Eucalyptus racemosa</i> (Scribbly Gum)
CP	<i>Livistona australis</i> (Cabbage Palm)
CI	<i>Corymbia intermedia</i> (Pink Bloodwood)
BA	<i>Banksia aemula</i> (Wallum Banksia)

3. Results

3.1. Vegetation communities

The entire study area is approximately 227 ha, of which 160 ha is comprised of either remnant or regenerating native vegetation. Other portions within the study area (**Figure 4**) consist of:

- 37.4 ha of built / modified land (primarily in the western section)
- 1.3 ha of parkland (centred around Brighton Park in the west and South West Rocks Holiday Park in the east)
- 27.5 ha of open water within Saltwater Creek and Saltwater Lagoon
- 1.3 ha of unconsolidated sand adjacent to the mouth of Saltwater Creek.

Overall, eighteen (18) native vegetation communities were identified (**Table 4**) and mapped (**Figure 4**) in the study area. The vegetation communities relate to twelve distinct Plant Community Types (PCTs) in the NSW classification system. There are three recognised Threatened Ecological Communities under the BC Act and two under the EPBC Act present in the study area. **Table 4** provides a breakdown of the different vegetation types identified, as well as their classification, conservation significance and the total area covered. Brief vegetation community profiles, including a photograph, for each separate vegetation type are presented in **Appendix A**.

Overall, four communities accounted for 60% of the total area, namely Broad-Leaved Paperbark Swamp Forest (SW01, 44 ha, 27%), Baumea Rushland (SW02, 19 ha, 12%) Scribbly Gum Open Forest (SW10, 18 ha, 11%), and Blackbutt Open Forest (SW06, 9%, 15 ha). The remaining 14 communities each made up less than 9% of the total area mapped (**Table 4**).

During the surveys no areas of Saltmarsh or stands of mangrove forest were observed, although scattered individual mature Grey Mangrove (*Avicennia marina*) were noted at a few locations within northern portion of Saltwater Lagoon.

Note that the recognition and division of vegetation communities as part of this study was a much finer scale than previously mapped by Kendall and Kendall (2016) (**Plate 2**).



Plate 2: Comparison of Saltwater Creek wetland vegetation linework (white lines) with the previously existing Kendall and Kendall (2016) linework (red lines).

Table 4: Vegetation communities of the study area

Vegetation code	Vegetation community	Equivalent PCT	EEC / TEC	Formation	Class	Area (ha)	% Area
SW01	Broad-leaved Paperbark swamp forest	1730 - Swamp paperbark - Baumea juncea swamp shrubland on coastal lowlands of the Central Coast and Lower North Coast	<p>Yes</p> <p>BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</p> <p>EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland</p>	Forested Wetlands	Coastal Floodplain Wetlands	43.55	27%
SW02	Baumea Rushland	1742 - Jointed Twig-rush sedgeland	<p>Yes</p> <p>BC Act: Endangered - Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</p>	Freshwater Wetlands	Coastal Freshwater Lagoons	19.09	12%
SW03	Tuckeroo – Hard Corkwood – Fig Littoral Rainforest	1537 - Tuckeroo - Yellow Tulipwood - Red fruited Olive Plum Littoral Rainforest of the lower North Coast	<p>Yes</p> <p>BC Act: Endangered - Littoral Rainforest in the NSW North Coast; Sydney Basin and South East Corner Bioregions</p> <p>EPBC Act: Critically Endangered - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</p>	Rainforests	Littoral Rainforests	3.22	2%
SW04	Swamp Oak swamp forest	1727 - Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast / (1235 - Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion)	<p>Yes</p> <p>BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</p> <p>EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland</p>	Forested Wetlands	Coastal Floodplain Wetlands	0.38	<1%
SW05	Blackbutt – Needlebark	685 - Blackbutt - Needlebark Stringybark shrubby open forest on	No	Dry Sclerophyll Forests	Coastal Dune Dry Sclerophyll Forests	7.59	5%

Vegetation code	Vegetation community	Equivalent PCT	EEC / TEC	Formation	Class	Area (ha)	% Area
	Stringybark Open Forest	coastal sands of the NSW North Coast Bioregion		(Shrubby sub-formation)			
SW06	Blackbutt Open Forest	1646 Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	No	Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	15.02	9%
SW07	Cabbage Palm Closed Forest	1537 Tuckeroo - Yellow Tulipwood - Red fruited Olive Plum Littoral Rainforest of the lower North Coast	Yes BC Act: Endangered - Littoral Rainforest in the NSW North Coast; Sydney Basin and South East Corner Bioregions EPBC Act: Critically Endangered - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Rainforests	Littoral Rainforests	3.90	2%
SW08	Sand Dune Scrub	1644 - Coast Tea Tree - Old Man Banksia coastal shrubland on foredunes of the Central and lower North Coast	No	Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	12.26	8%
SW09	Banksia Shrubland	663 - Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion	No	Heathlands	Wallum Sand Heaths	0.57	<1%
SW10	Scribbly Gum Open Forest	1074 - Pink Bloodwood open forest of the coastal lowlands of the NSW North Coast Bioregion	No	Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	17.92	11%
SW11	Red Bloodwood Open Forest	975 - Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the lower Clarence of the NSW North Coast Bioregion	No	Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	6.14	4%

Vegetation code	Vegetation community	Equivalent PCT	EEC / TEC	Formation	Class	Area (ha)	% Area
SW12	Swamp Mahogany – Broad-leaved Paperbark Forest	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast	Yes BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland	Forested Wetlands	Coastal Floodplain Wetlands	8.29	5%
SW13	Degraded Heathland	1706 - Leptospermum liversidgei-Callistemon citrinus-Xanthorrhoea fulva wet heath on coastal sands of lower North Coast	No	Heathlands	Wallum Sand Heaths	7.75	5%
SW14	Broad-leaved Paperbark – Batwing Fern Forest	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast	Yes BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland	Forested Wetlands	Coastal Floodplain Wetlands	0.27	<1%
SW15	Broad-leaved Paperbark – Heath-leaved Banksia Open Forest	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast	Yes BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland	Forested Wetlands	Coastal Floodplain Wetlands	3.84	2%
SW16	Wet Heath	1706 - Leptospermum liversidgei-Callistemon citrinus-Xanthorrhoea fulva wet heath on coastal sands of lower North Coast	No	Heathlands	Wallum Sand Heaths	7.83	5%

Vegetation code	Vegetation community	Equivalent PCT	EEC / TEC	Formation	Class	Area (ha)	% Area
SW17	Broad-leaved Paperbark – Cabbage Palm Open Forest	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast	<p>Yes</p> <p>BC Act: Endangered - Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</p> <p>EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland</p>	Forested Wetlands	Coastal Floodplain Wetlands	0.32	<1%
SW18	Pink Bloodwood – Broad-leaved Paperbark – Cabbage Palm Open Forest	1569 - Flooded Gum - Brush Box - Tallowwood mesic tall open forest on ranges of the lower North Coast	No	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	0.72	<1%
Total						158.68 ha	

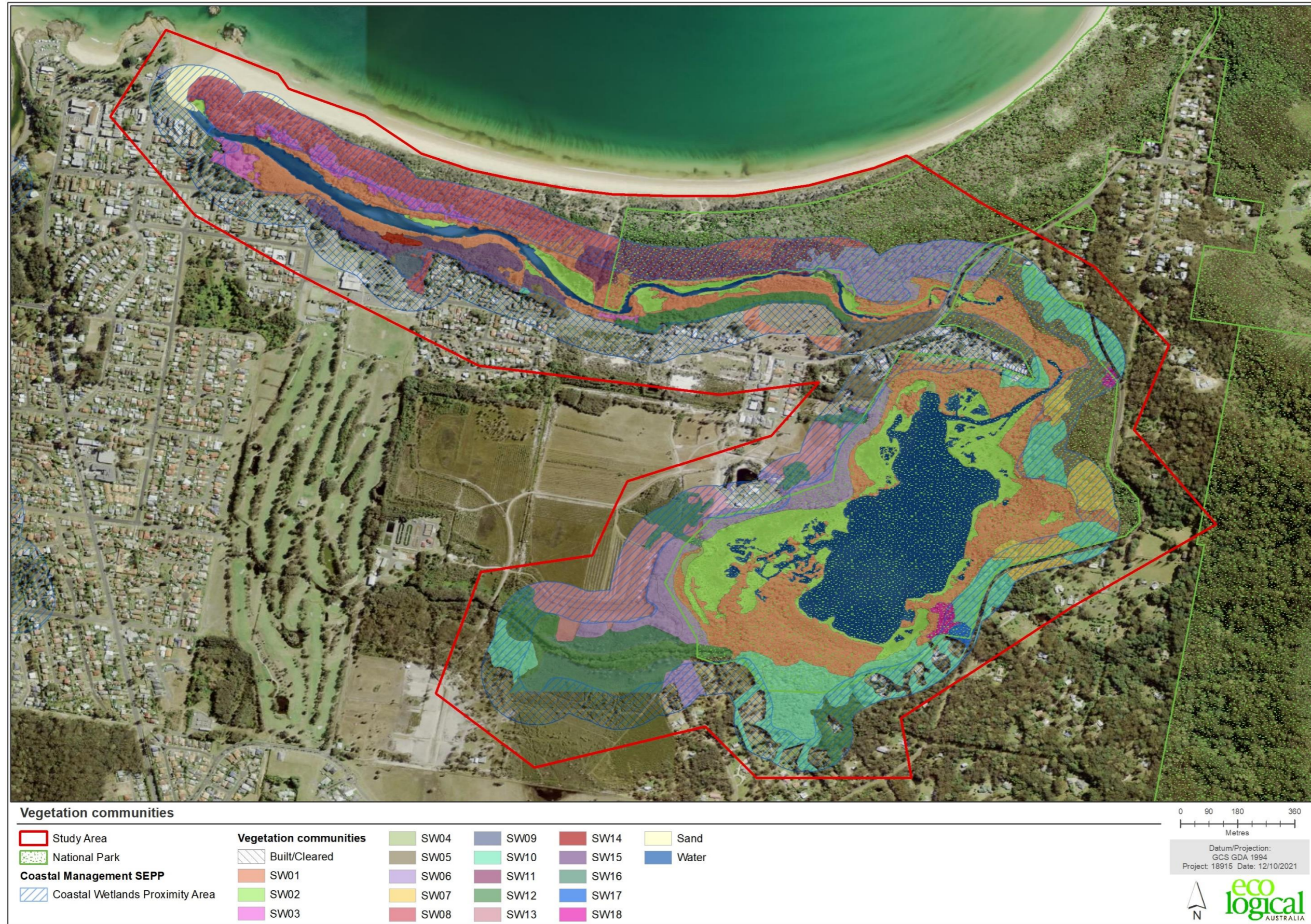


Figure 3: Vegetation communities / PCTs of the Saltwater Creek study area

3.2. Vegetation condition

All mapped polygons were assigned a vegetation condition class based on field observations including weed abundance and distribution (**Figure 4**). Polygons were assigned the following codes:

- Very high – No management actions recommended, continue to monitor condition (34 ha, 21%)
- High – Few weeds recorded; no major works required. An annual walk-through is recommended to remove emerging weeds and detect and treat small infestations (78 ha, 49%)
- Moderate – Some work required to treat small-moderate sized infestations (37 ha, 23%)
- Low – Major works required to remediate weed infestation or disturbance to vegetation (10 ha, 6%)

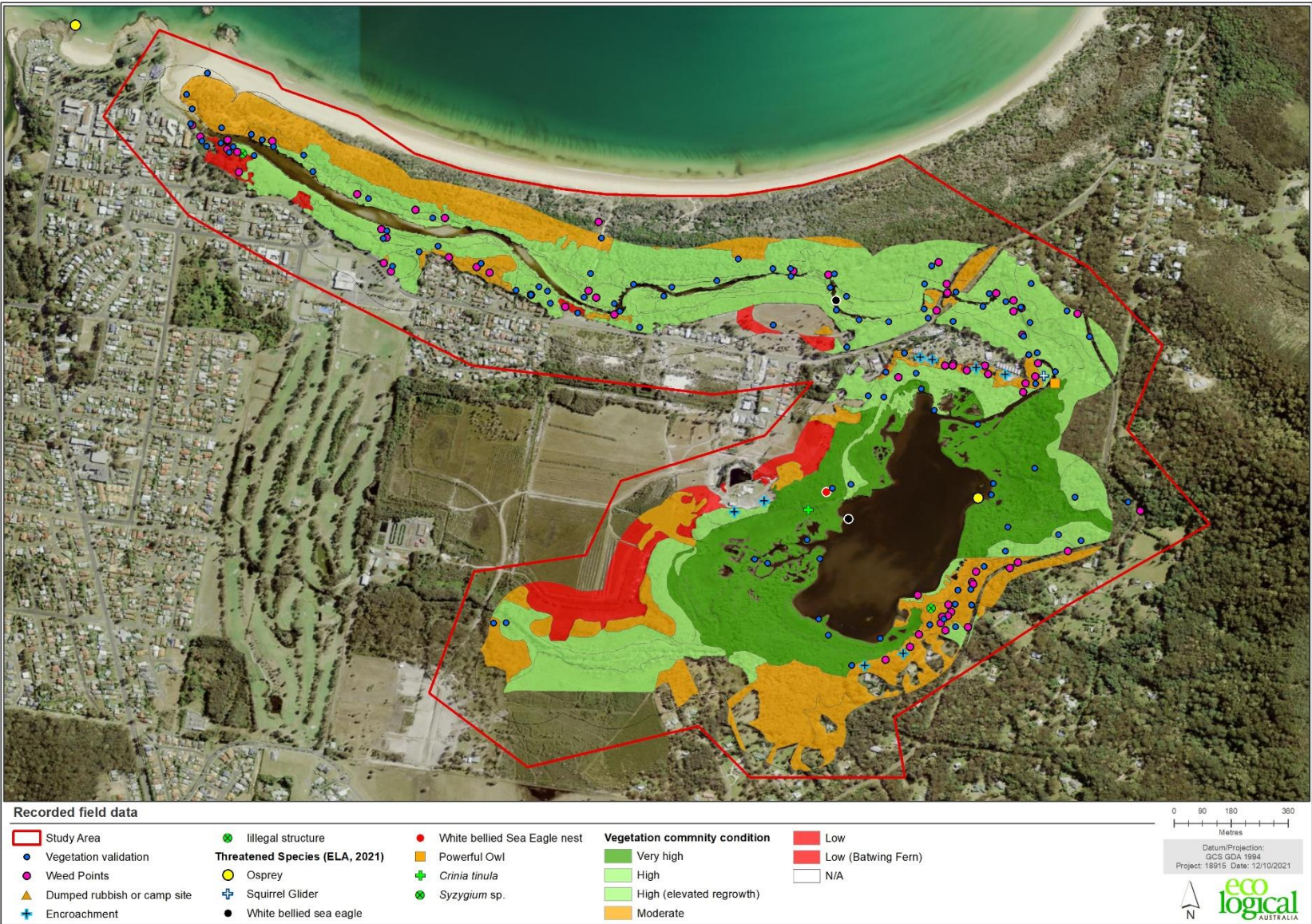


Figure 4: Rapid field data locations and vegetation community condition classes

3.3. Exotic species

Approximately 51 exotic weed species were identified in the study area, with most aggregations observed as being in the disturbed sections adjacent to the urban interface in the west and central portions of Saltwater Creek, in the vicinity of South West Rocks Holiday Park and near rural residential properties in the south east of the study area (**Figure 5**). Of these species, six are listed as Weeds of National Significance (WoNS) and 22 are listed as High Threat Weeds (HTW) (Dorrrough et al. 2018). The most recorded species were *Lantana camara* (26), followed by *Ipomoea cairica* (25), *Schefflera actinophylla* (17), *Senna pendula* var. *glabrata* (16) and *Baccharis halimifolia* (12), *Syagrus romanzoffiana* (12) and *Ochna serrulata* (10). The remaining twenty species were recorded <10 times. **Table 5** provides detail on the 28 species considered as having potential to be detrimental to the vegetation and habitats of the Saltwater Creek study area and provides the Biosecurity duty actions as well as an indicative priority ranking for management actions.

Table 5: Exotic weed species identified in the Saltwater Creek study area

Species	Common name	WoNS	HTW	Biosecurity duty (North Coast)	Times recorded	Priority	Location
<i>Lantana camara</i>	Lantana	✓	✓	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged, or offered for sale.	26	High	Widely distributed as moderately dense aggregations across the entire study area, generally in more elevated sections.
<i>Ipomoea cairica</i>	Coastal Morning Glory	--	✓	--	25	High	Widely distributed across the Saltwater Creek portion of the study area and the South West Rocks Holiday Park, generally in more elevated sections.
<i>Schefflera actinophylla</i>	Umbrella Tree	--	✓	--	17	Medium - High	Scattered individuals and small stands of trees particularly along the near bank areas of Saltwater Creek, sometimes in and adjacent to Littoral Rainforest pockets.
<i>Senna pendula</i> var. <i>glabrata</i>	Easter Cassia / Senna	--	✓	--	16	Medium - High	Generally located in disturbed / modified interface areas in the east and northern sections of the study area.
<i>Baccharis halimifolia</i>	Groundsel Bush	--	✓	Regional Recommended Measure <i>Whole region: The plant or parts of the plant should not be traded, carried, grown or released in the environment. Exclusion zone: Land</i>	12	High	Primarily located in the low-lying swampy areas adjacent to the eastern and central portions of Saltwater Creek.

Species	Common name	WoNS	HTW	Biosecurity duty (North Coast)	Times recorded	Priority	Location
				<i>managers should mitigate the risk of spread of the plant from their land. Land managers should mitigate the risk of the plant establishing on their land. Core infestation: Land managers should reduce impacts from the plant on priority assets.</i>			
<i>Syagrus romanzoffiana</i>	Cocos Palm	--	--	--	12	Medium - High	Generally located in disturbed / modified interface areas in the western and central portions of Saltwater Creek and scattered in the eastern side of Saltwater Lagoon.
<i>Ochna serrulata</i>	Ochna	--	✓	--	10	Medium	Generally located in disturbed / modified interface areas in the western and central portions of Saltwater Creek as well as South West Rocks Holiday Park.
<i>Asparagus aethiopicus</i>	Ground Asparagus Fern	✓	✓	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.	9	High	Primarily located as small aggregations in the areas adjacent to the eastern and central portions of Saltwater Creek and small patches in the disturbed / modified interface areas in the east of Saltwater Lagoon.
<i>Cinnamomum camphora</i>	Camphor Laurel	--	✓	--	8	Medium - High	Primarily located as scattered small trees in the areas adjacent to the eastern and central portions of Saltwater Creek, South West Rocks Holiday Park and in the east of Saltwater Lagoon.
<i>Paspalum mandiocanum</i>	Broadleaf Paspalum	--	✓	--	8	Medium	Generally located in disturbed / modified interface areas in the far western and central portions of Saltwater Creek.
<i>Nephrolepis cordifolia</i>	Fishbone Fern	--	--	--	6	Medium	Generally located in disturbed / modified interface areas in the western and central portions of Saltwater Creek – often near residences and South West Rocks Holiday Park.

Species	Common name	WoNS	HTW	Biosecurity duty (North Coast)	Times recorded	Priority	Location
<i>Solanum mauritianum</i>	Wild Tobacco Bush	--	--	--	5	Low	Located as scattered plants in disturbed / modified interface areas in the western and central portions of Saltwater Creek – often near residences.
<i>Asparagus plumosus</i>	Climbing Asparagus Fern	✓	✓	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.	4	High	Primarily located as isolated small clumps in the areas adjacent to the disturbed / modified interface areas of the western and central portions of Saltwater Creek.
<i>Rubus fruticosus</i> sp. aggregate	Blackberry	✓	--	Prohibition on certain dealings <i>Must not be imported into the state, sold, bartered, exchanged or offered for sale.</i> All species in the <i>Rubus fruticosus</i> species <i>aggregate</i> have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree	4	Medium - High	Primarily located as isolated small to moderate sized aggregations in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.
<i>Anredera cordifolia</i>	Madeira Vine	--	✓	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.	3	High	Located as isolated plants in the far west of the study area in remnant and planted vegetation areas near the pedestrian bridge over Saltwater Creek.
<i>Andropogon virginicus</i> and <i>Panicum maximum</i> var. <i>maximum</i>	Whiskey Grass and Guinea Grass	--	✓	--	2	Medium	Scattered distribution in disturbed areas along the urban interface in the west and central sections along Saltwater Creek.
<i>Araujia sericifera</i>	Moth Vine	--	✓	--	2	Medium - High	Isolated plants located in the east of the study area in small, disturbed section of moist sclerophyll forest near Arakoon Road.

Species	Common name	WoNS	HTW	Biosecurity duty (North Coast)	Times recorded	Priority	Location
<i>Bidens pilosa</i>	Cobblers Pegs	--	✓	--	2	Low	Primarily located as isolated small to moderate sized aggregations in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.
<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	Bitou Bush	✓	✓	Prohibition on certain dealings <i>Must not be imported into the state, sold, bartered, exchanged or offered for sale.</i> Biosecurity Zone The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high-water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone	2	Medium - High	Scattered plants located in the foredune and hind dune areas of the study area generally to the north of Saltwater Creek.
<i>Erythrina x sykesii</i>	Coral Tree	--	✓	--	2	Medium	A few scattered mature individuals within the study area, adjacent to Brighton Park in the west and South West Rocks Holiday Park in the east.
<i>Rumex sagittatus</i>	Rambling Dock, Turkey Rhubarb		✓	--	2	Low - Medium	Primarily located as individual plants and small aggregations in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.

Species	Common name	WoNS	HTW	Biosecurity duty (North Coast)	Times recorded	Priority	Location
<i>Senecio madagascariensis</i>	Fireweed	✓	✓	Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged, or offered for sale.	2	Medium	Primarily located as individual plants and small aggregations in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.
<i>Ehrharta erecta</i>	Panic Veldt Grass	--	✓	--	1	Low	Primarily located as small aggregations in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.
<i>Strelitzia nicolai</i>	Giant Bird of Paradise	--	--	--	1	Medium	One mature individual located in the north east of the study area in good quality remnant bushland off Arakoon Road.
<i>Phoenix canariensis</i>	Canary Island Date Palm	--	✓	--	1	Medium	One individual located in the eastern section of the study area in remnant vegetation adjacent to the walking path near Brighton Park.
<i>Thunbergia alata</i>	Black-eyed Susan	--	✓	--	1	Low	Primarily located as scattered individual plants in the areas adjacent to the disturbed / modified interface areas of the western and central portions along Saltwater Creek.
<i>Lonicera japonica</i>	Japanese Honeysuckle	--	✓	--	1	Medium	Located as isolated plants in the far west of the study area in remnant and planted vegetation areas near the pedestrian bridge over Saltwater Creek.

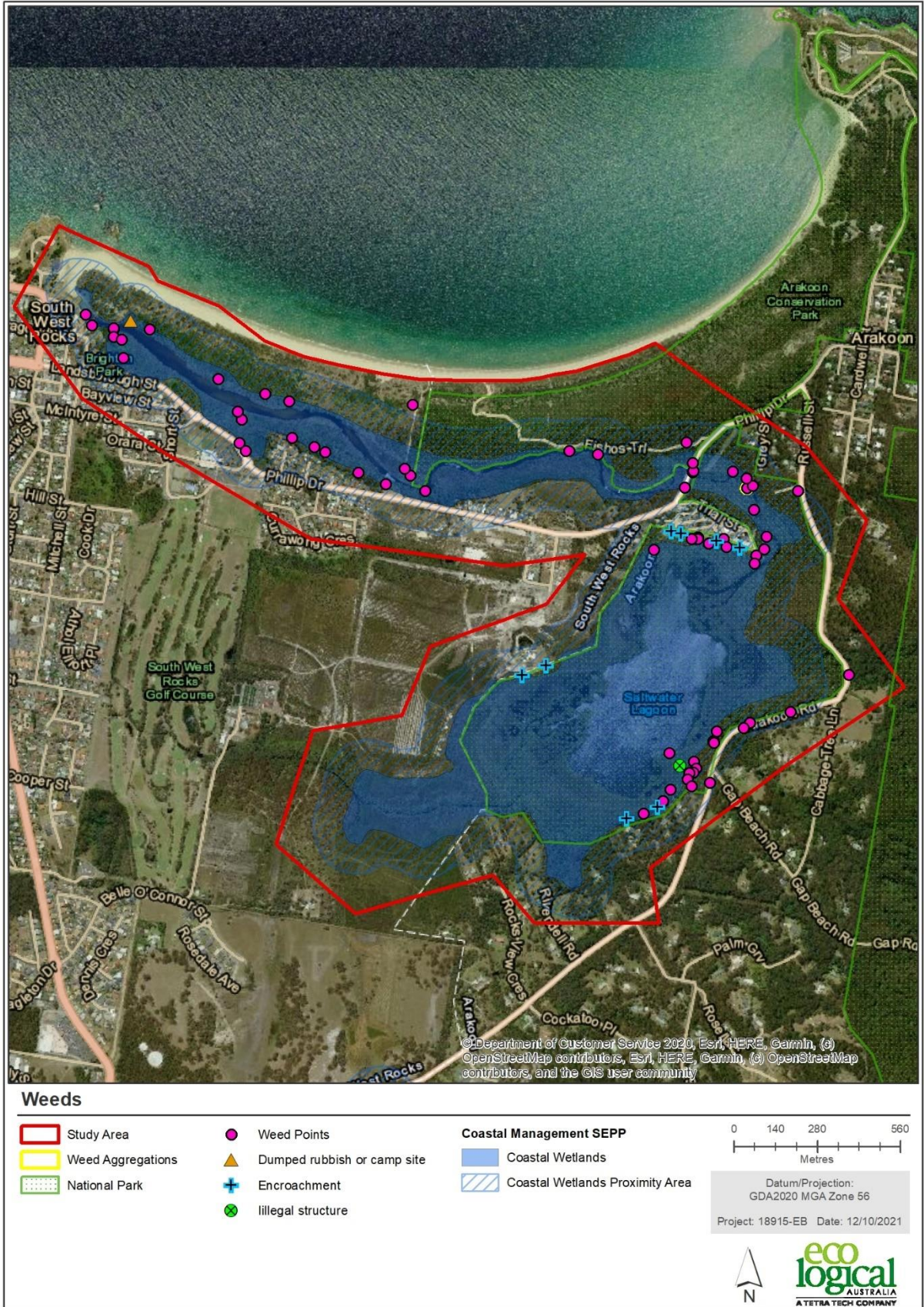


Figure 5: Weeds and encroachment issues of the study area

3.4. Encroachment areas

Up to seven encroachment areas into Hat Head National Park and the immediate Saltwater Lagoon catchment were identified as part of this study (**Figure 5**).

Two areas were identified as encroaching into Hat Head National Park in the south-east of the study area were adjacent to existing rural residential properties. Activities included minor land fill, vegetation clearing, timber / firewood collection, and maintenance activities (e.g. mowing / slashing) (**Plate 3** and **Plate 4**). One unauthorised timber and tarp structure (**Plate 5**) was also located within the south east of the study area well within Hat Head National Park. The structure appeared to be moderately well constructed.

Other areas of encroachment exist around South West Rocks Holiday Park, where general grounds maintenance activities (e.g. mowing / slashing) and what appear to be camping sites occur within the Hat Head National Park and Saltwater Lagoon areas.

Other incursions are apparent on the western side of Saltwater Lagoon (**Figure 5**) and appear to be associated with a large rural residential residence were cleared and maintained areas extend from the property into Hat Head National Park and the Saltwater Lagoon area. The dwelling and other infrastructure are located within the Coastal Wetlands Proximity Area. Note that this area was not physically inspected due to inability to access the location.

One area considered to be of past unauthorised camping/rubbish dumping was identified at Front Beach in the west of the study area (**Figure 5**). The area has moderate amounts of domestic rubbish present.



Plate 3: Landholder encroachment in Hat Head National Park, south east of Saltwater Lagoon



Plate 4: Landholder encroachment in Hat Head National Park, south east of Saltwater Lagoon

Plate 5: Illegal structure within Hat Head National Park

3.5. Observed fauna and threatened species

Although no formal fauna surveys were carried out, a total of 66 native fauna species were identified, which included 57 birds, six mammals and three frog species (**Appendix B**). No introduced / non-native fauna species were recorded during the surveys, with the exception of domesticated animals (i.e. dog, horse) Of the species observed seven threatened species were recorded during the survey (**Table 6** and **Figure 6**). This includes a pair of White-bellied Sea-eagles which were nesting on the western side of Saltwater Lagoon where a large in use stick nest was constructed (**Plate 6**).

In addition to the threatened fauna, one threatened flora species was also observed, *Syzygium paniculatum* (Magenta Lilly Pilly). The species is listed as Endangered under the NSW BC Act and Vulnerable under the Federal EPBC Act. At least one individual mature specimen was located in the west of the study area in remnant and rehabilitated littoral rainforest near to Brighton Park (**Figure 6**). It is unknown if the specimen has been planted or naturally recruited, no fruit was available at the time of the inspection and is needed to precisely identify the species.

Table 6: Threatened Fauna species observed in the study area

Species	Common Name	BC Act	EPBC Act	Description
<i>Pandion cristatus</i>	Eastern Osprey	Vulnerable	Not listed	Pair observed flying above Saltwater Lagoon. One individual also recorded at Horseshoe Bay in South West Rocks just outside the study area.
<i>Petaurus norfolcensis</i>	Squirrel Glider	Vulnerable	Not listed	Observed at eastern end of South West Rocks Holiday Park.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Vulnerable	Not listed	Observed above Saltwater Lagoon and Creek, with nesting site on western side of Saltwater Lagoon (Plate 6).
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	Not listed	Heard at eastern end of South West Rocks Holiday Park.
<i>Crinia tinnula</i>	Wallum Froglet	Vulnerable	Not listed	Heard in freshwater soak on western side of Saltwater Lagoon.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	Vulnerable	Not Listed	Observed in the Blackbutt - Needlebark Stringybark shrubby open forest along Saltwater Creek
<i>Hirundapus caudacutus</i>	White-throated Needletail	Not Listed	V / Migratory	Observed flying over Saltwater Lagoon.

**Plate 6: White-bellied Sea Eagle nest high in a *Eucalyptus pilularis* (Blackbutt)**



Figure 6: Threatened species observed in the study area

3.6. Coastal Management SEPP - Coastal Wetlands and Littoral Rainforest

Saltwater Creek and Saltwater Lagoon comprise approximately 97 ha of primarily high-quality Coastal Wetland vegetation, comprising defined wetland communities as those dominated by *Melaleuca* forests (SW01, SW12, SW14, SW15, SW17 – 56.27 ha); *Casuarina* forest (SW04 – 0.38 ha); and brackish and freshwater swamps (SW02 - 19.09 ha). All of the wetland areas within the study area are listed as being protected under the Coastal Management SEPP, as well as a listed EEC under the BC Act (SW01, SW02, SW04, SW12, SW14, SW15 and SW17). Except for SW02, the Coastal Wetland communities present also comprise vegetation that is listed for protection purposes under the Federal EPBC Act.

Although not previously mapped as being present in the Saltwater Creek study area, sections of Littoral Rainforest vegetation (SW03 and SW07) are also present, comprising a total of approximately 5.5 ha. These two mapped vegetation communities are afforded the same protection as for the Coastal Wetland areas (Coastal Management SEPP, BC Act and EPBC Act).

For this study, the current mapped Coastal Wetland and Littoral Rainforest areas have been validated*, including a 100 m proximity area to both these vegetation types. For comparative purposes, the new mapping has been compared to the existing Coastal Management SEPP mapping for Coastal Wetlands, with the results presented in **Figure 7**.

For the majority of the length of Saltwater Creek, the location of the existing Coastal Wetland areas and the associated 100 m proximity area is quite similar to the recently validated vegetation mapping. Exceptions being the addition the Littoral Rainforest and additional small sections of Coastal Wetland areas in the western portion which ultimately extends the 100 m proximity area slightly both landward and seaward. It is noted that a high proportion of the southern landward proximity area is located in already built or modified areas.

One section in the east of Saltwater Creek has remnant Coastal Wetland in a highly modified condition in the area off Phillip Drive approximately opposite Waiabar Avenue. This remnant which appears to be regularly maintained (i.e. slashed) is linked to the intact sections of Coastal Wetland located along Saltwater Creek. The addition of this area would potentially extend the proximity area limits – note that due to private ownership of the land site inspections were unable to be carried out.

In the locality of Saltwater Lagoon, areas in extent of Coastal Wetland are overall slightly reduced across the majority of the western edge, with the exception of the south-western corner where Coastal Wetland vegetation extends along the upper reaches of Saltwater Creek towards the Sewerage Treatment Plant.

In the eastern portion of Saltwater Lagoon, validated Coastal Wetland areas are generally consistent with existing mapping, although some stands of identified Coastal Wetland and Littoral Rainforest are located beyond these areas.

Recommendations in regard to potential boundary adjustments / revisions to the Coastal Management SEPP mapping in Saltwater Creek and Lagoon catchment is presented in **Section 4.4**.

*Note this study has not been able to access all privately owned land and may underestimate the full extent of wetland communities. The study has not assessed the hydrological regime of the study area.

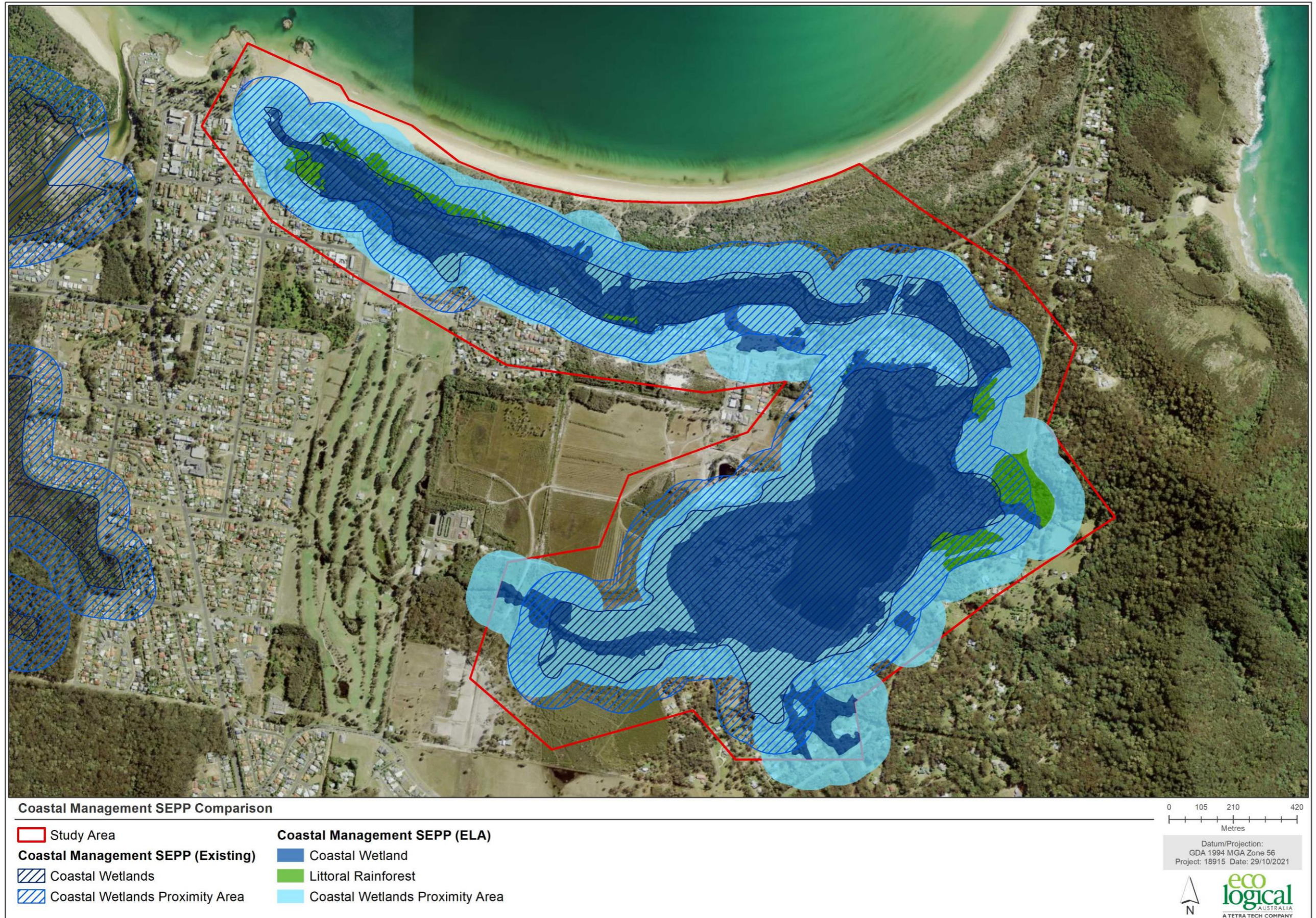


Figure 7: Existing and current extent of the Coastal SEPP mapping for Coastal Wetland and Littoral Rainforest areas

4. Management recommendations

4.1. Ecological restoration

Observations from field surveys in the subject area show that the majority of the vegetation condition is relatively high, meaning that specific areas can be targeted for effective weed control (**Table 7**).

To be most effective, weeds should be treated not only in Council and State-managed land but also privately owned residential lands in the catchment, South West Rocks Holiday Park, Golf Course and waste treatment plant.

Table 7: Treatment recommendations according to vegetation condition

Condition	Description	Focus areas	Target weeds
Very high	No management actions recommended, continue to monitor condition	Majority of Broad-leaved Paperbark forest and Baumea rushland around Saltwater Lagoon	All exotic species
High	Few weeds recorded; no major works required. An annual walk-through is recommended to remove emerging weeds, detect and treat small infestations, and monitor condition	Interface of Hat Head National Park, Saltwater Creek and urban areas	All exotic species
Moderate	Some work required to treat small-moderate sized infestations; some follow-up treatment will be required.	Between Saltwater Creek and Front Beach Bushland around Holiday Park	High and Medium High Priority species including: Camphor laurel, Lantana, Groundsel bush, Whiskey grass, Ochna, Ground Asparagus
Low	Major works required to remediate weed infestations and disturbance to vegetation. Work will be ongoing and require numerous follow-up treatments.	North and east of Brighton Park Interface of Holiday Park and Hat Head National Park	High to Medium priority species including: Camphor laurel, Coral tree, Lantana, Ochna, Ground Asparagus

The following weed species outlined below are considered to be a specific threat to wetland and the littoral rainforest communities in the study area and are recommended to be targeted as a priority for treatment.

4.1.1. Groundsel Bush (*Baccharis halimifolia*)

Groundsel bush is a dense, woody shrub native to the USA and is particularly suited to moist and coastal area. Groundsel Bush was observed in relatively low numbers across the majority of the site; however, it has the potential to colonize wetland environments via wind-dispersed seeds (**Plate 8**). Weed control at existing infestations is recommended to reduce the spread into further wetlands where control may be difficult and more time consuming.

A significant infestation was identified on the boundary of the South West Rocks Holiday Park and Hat Head NP where there are several large mature individuals (**Plate 7**).

Although it was not visited, Groundsel Bush infestation has previously been identified east of the golf course and surrounding the sewerage treatment works (Kendell and Kendell 2003). These sites should be targeted for survey and treatment as appropriate.



Plate 7: Large mature Groundsel Bush at the interface of the South West Rocks Holiday Park and Hat Head National Park

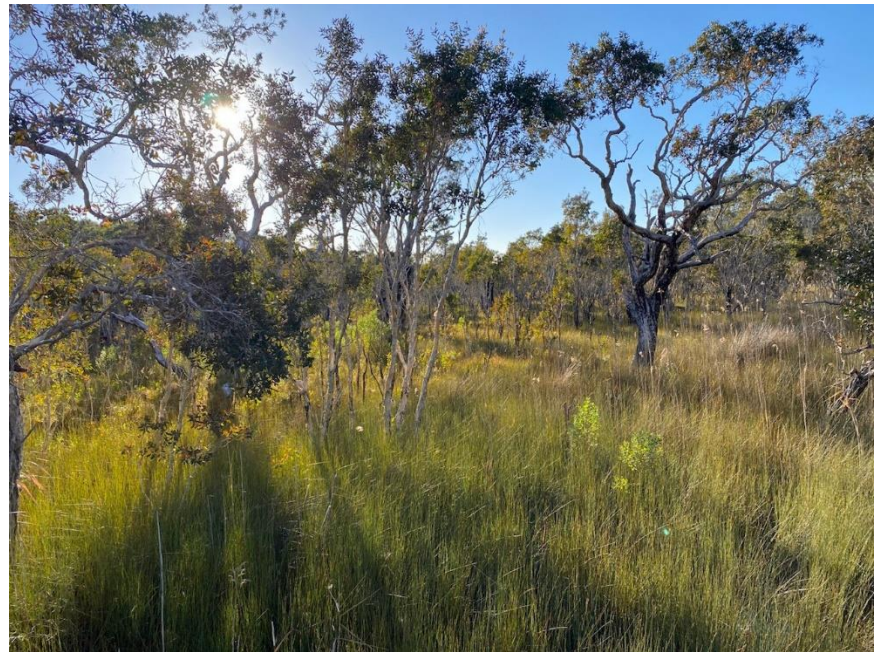


Plate 8: Groundsel Bush invading intact wetland vegetation on the margin on Baumea rushland and Broad-leaved Paperbark Swamp Forest

4.1.2. Umbrella Tree (*Schefflera actinophylla*)

Umbrella Tree is a native to rainforests in Northern Queensland. It is a multi-stemmed tree growing up to 10 m tall, occasionally growing as an epiphyte. Umbrella Tree has the potential to spread rapidly via the abundantly produced red-purple fleshy fruit which is dispersed by birds. Known as a “transformer weed”, it may colonize sclerophyllous wetlands where it can form a dense canopy and alter the community’s floristic composition, shifting the community away from sclerophyllous species towards more mesic species usually associated with rainforest (**Plate 9**).



Plate 9: Large mature Umbrella Tree

4.1.3. Camphor Laurel (*Cinnamomum camphora*)

Camphor Laurel is a tree native to China and Japan, growing up to 20 m in height, but generally 5-10 m in the study area. Similarly to Umbrella Tree, Camphor Laurel has the potential to shift sclerophyllous communities towards a more mesic floristic composition. It can also outcompete native species. Several large mature trees were identified, mostly in Eucalypt forest adjacent to wetland communities, and numerous seedlings were observed across the study area (**Plate 10**).

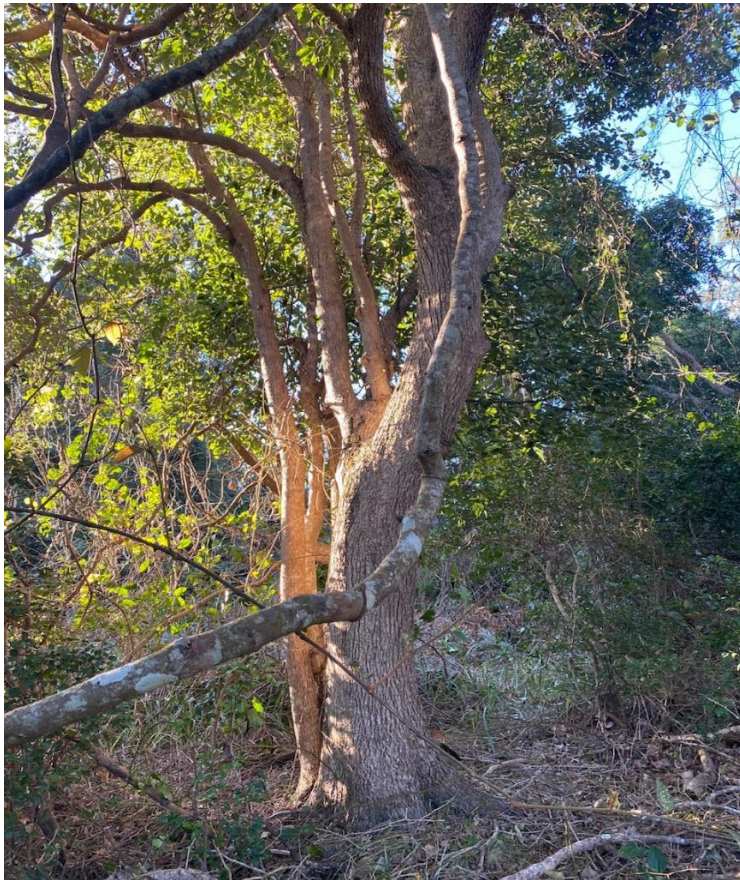


Plate 10: Large mature Camphor Laurel north of Brighton Park

4.1.4. Ground Asparagus (*Asparagus aethiopicus*)

Of the several species of exotic *Asparagus* recorded in the study area, Ground Asparagus is the greatest threat to vegetation communities. Ground Asparagus is a perennial ground layer plant native to South Africa with prickly stems and extensive root systems.

This species has the potential to become highly invasive and transform the ground and mid layers of coastal sclerophyll forest and littoral rainforest by forming a dense blanket of growth, supressing native species. No dense infestations were detected during the survey, and early treatment will be the best management action to prevent larger infestations that are difficult to manage (**Plate 11**).



Plate 11: Minor infestation of Ground Asparagus along Phillip Drive

4.1.5. Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundifolia*)

Bitou Bush is a concern primarily to sand dune scrub vegetation where it can outcompete native species and alter the natural dynamics of sand erosion and accretion on sand dunes (**Plate 12**). It is also a threat to Eucalypt forest or rainforest on sand (e.g. Blackbutt Open Forest or littoral rainforest) particularly in highly disturbed areas. The threat to wetland communities is less significant, as growth is less competitive in these environments.



Plate 12: Bitou Bush in sand dune scrub

4.1.7. Lantana (*Lantana camara*)

Lantana was the most frequently recorded exotic species in the study area (**Plate 13**). It was generally observed occurring as a small, isolated shrub in intact communities, or large dense shrubs in highly disturbed areas or community margins on roadsides or adjacent to cleared areas.



Plate 13: Lantana and Easter Cassia / Senna south east of Saltwater Lagoon

4.1.8. Other frequently recorded species

Ipomoea cairica (Coastal Morning Glory), *Senna pendula* var. *glabrata* (Easter Cassia / Senna), and *Syagrus romanzoffiana* (Cocos Palm) were recorded >10 times each, however, do not represent significant threats to wetland communities in the study area.

Coastal Morning Glory has potential to smother vegetation but is generally confined to highly disturbed areas and community margins (e.g. along roadsides) (**Plate 14**). In these situations, complete eradication is extremely difficult, therefore this species is not considered a significant threat in the study area. Coastal Morning Glory frequently spreads vegetatively in garden waste and reducing the spread of vegetative material is the most effective management action.

Easter Cassia / Senna has the potential to infest forest communities on sand. In good condition vegetation, this species is likely to be easily managed. In highly disturbed areas and community edges, dense shrubs can occur and outcompete natural regeneration however this was not observed in the study area.



Plate 14: Infestation of Coastal Morning Glory and Lantana at the South West Rocks Holiday Park

4.2. Future development and catchment issues

Vegetation clearing and urbanisation of the catchment are major threats to Saltwater Creek wetland systems. WBM (2006) notes that the estuary system is already considered reaching or surpassing the natural capacity to accept and assimilate catchment stormwater nutrient loads. Any further loss of vegetation from the estuary buffer would reduce filtering and buffering potential, leading to degradation of the system. Increased artificial nutrient loads into the system are likely to favour exotic species and encourage weed infestations.

Development applications in the Saltwater Creek catchment should assess cumulative impacts of vegetation removal and increased catchment pressure, and it is recommended that future developments incorporate water sensitive urban design.

Current issues of unauthorised encroachment into Hat Head National Park and Saltwater Lagoon should be investigated and options to counter the incursions should be explored with the neighbouring landholders.

4.3. Threatened species

Protection of all the identified threatened species of the study area and their habitats is highly warranted. In particular, the White-bellied Sea-eagle nesting site on the eastern side of Saltwater Lagoon should be a priority when assessing impacts of potential future development. Residential development on the adjacent land should be appropriately buffered, with any potential impacts to be monitored.

Any impacts of future development on *Crinia tinnula* must also be assessed in terms of reduction of water quality and modification to acidity, changes to hydrology, and nutrient enrichment and chemical run off.

It is recommended that future targeted flora and fauna species surveys are carried out in the Saltwater Creek and Lagoon areas to provide the necessary data for management of threatened species.

4.4. Coastal Management SEPP

This study supports revision of the Coastal Management SEPP boundaries for Coastal Wetland and Littoral Rainforest areas, in the locality. **Figure 8** provides the locations where revisions to the boundaries of the Coastal SEPP are possible (and recommended) and additionally locations where the boundaries likely require modification, although are in need of further investigation to determine. Note that these areas occur within and immediately adjacent to private lands which were unable to be assessed on-ground as part of this study. **Table 8** provides comment and justification for any Coastal Management SEPP boundary revisions.

Table 8: Recommended and potential revisions to the Coastal Management SEPP boundaries of the Saltwater Creek catchment area

Recommendation	Location number	Comments
Coastal Management SEPP recommended expansion area (Pink)	1	This area should be revised in regard to newly confirmed areas of Littoral Rainforest (SW03).
	2	This area should be revised in regard to a section of vegetation previously mapped as dryer sclerophyll forest types which actually comprises of wetland vegetation (SW01, SW15).
	3	This area should be revised in regard to newly confirmed areas of wetland vegetation (SW01).
	4	This area should be revised in regard to newly confirmed areas of wetland vegetation extending to the west (SW12).
	5	This area should be revised in regard to newly confirmed areas of wetland vegetation (SW01) and Littoral Rainforest (SW07).
	6	This area should be revised in regard to newly confirmed areas of wetland vegetation (SW17) and Littoral Rainforest (SW07).
	7	This area should be revised in regard to newly confirmed areas of wetland vegetation (SW12) – area falls within private properties and may require further investigation.
	8	This area should be revised in regard to newly confirmed areas of Littoral Rainforest (SW03).
Coastal Management SEPP recommended reduction area (Yellow)	1	This area should be revised in regard to a section of vegetation previously mapped as wetland which actually comprises of Dry Sclerophyll forest types (SW05, SW08, SW09).
	2	This area should be revised in regard to a section of vegetation previously mapped as wetland which is actually comprised of Dry Sclerophyll forest (SW06).
Coastal Management SEPP potential expansion area (further investigation required) (Red)*	1	High possibility that a proportion of the cleared and maintained private land in this area may be regarded as wetland vegetation type.
	2	Potential that sections of this area comprise vegetation that is representative of wetland vegetation.
	3	Possible that sections of this area comprise vegetation that is representative of wetland vegetation.
	4	Potential that sections of this area comprise vegetation that is representative of wetland vegetation – note that some portions of this area have already been modified / cleared as part of an adjacent housing development.
	5	Possible that sections of this area comprise vegetation that is representative of wetland vegetation.

* Note: all locations are on and/or adjacent to private property.

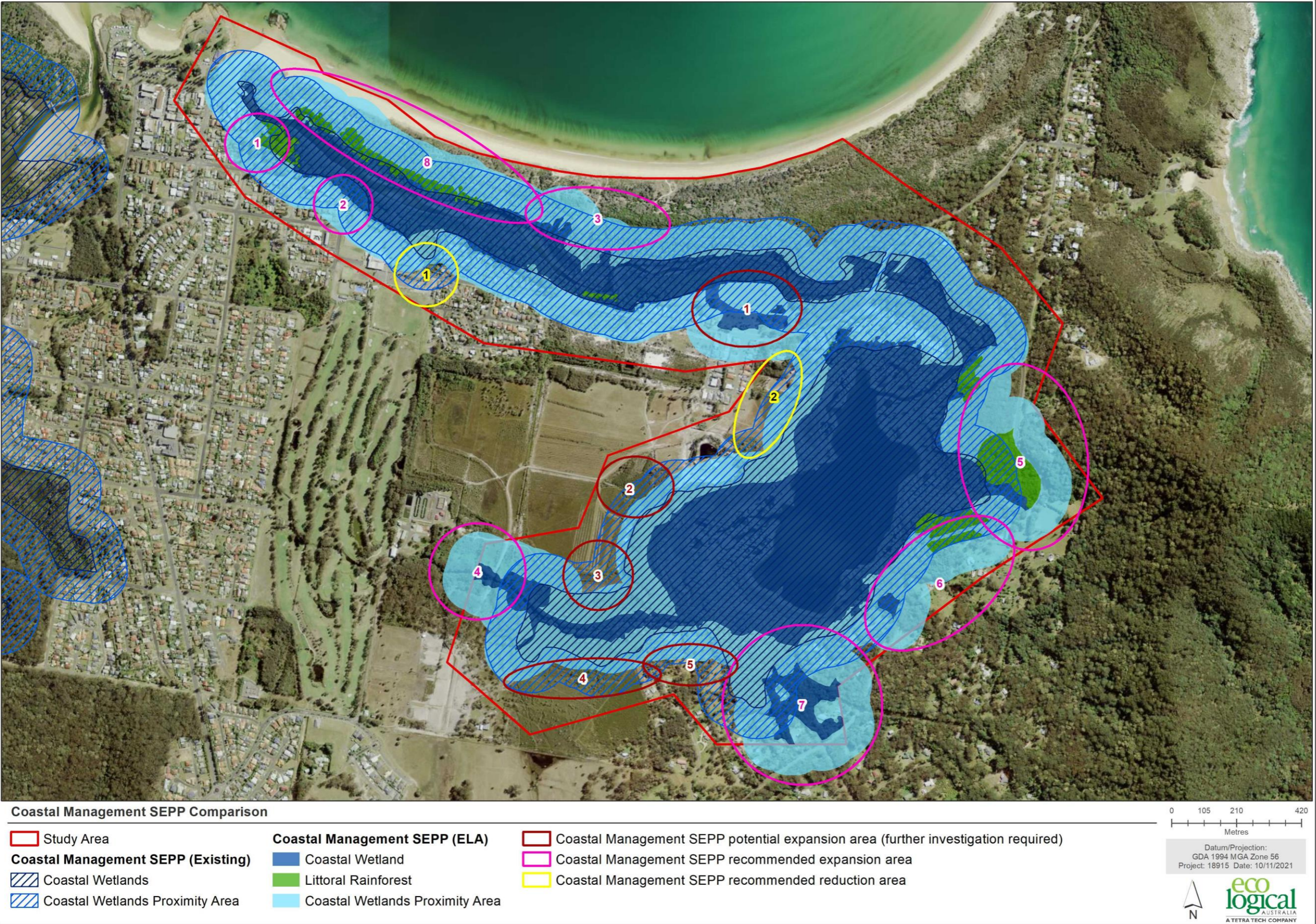


Figure 8: Locations of the recommended and potential revisions to the Coastal Management SEPP boundaries of the Saltwater Creek catchment area

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Appendix A Vegetation Community profiles

Broad-leaved Paperbark Swamp Forest (SW01)

Broad-leaved Paperbark swamp forest	
Equivalent PCT	1730 - Swamp paperbark - <i>Baumea juncea</i> swamp shrubland on coastal lowlands of the Central Coast and Lower North Coast
Vegetation formation – class	Forested Wetlands – Coastal Swamp Forest
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Melaleuca quinquenervia</i> , <i>Casuarina glauca</i>
Characteristic mid-storey	Generally absent but may include small trees such as <i>Glochidion ferdinandi</i> , or sclerophyllous shrubs such as <i>Banksia oblongifolia</i>
Characteristics groundcovers	<i>Baumea juncea</i> , <i>Phragmites australis</i> , <i>Gahnia clarkei</i> , <i>Juncus kraussii</i> , <i>Baumea teretifolia</i> , <i>Ficinia nodosa</i> , <i>Sporobolus virginicus</i> , <i>Bacopa monnieri</i>
Condition	Generally high condition, with some exotic species in low abundance including Groundsel Bush



Baumea Rushland (SW02)

Baumea Rushland	
Equivalent PCT	1742 - Jointed Twig-rush sedgeland
Vegetation formation – class	Freshwater Wetlands - Coastal Freshwater Lagoons
Conservation status	NSW BC Act: Endangered - Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East
	EPBC Act: Not listed
Characteristic canopy trees	Generally absent. May have sparsely scattered <i>Melaleuca quinquenervia</i> and <i>Casuarina glauca</i> , particularly on the community margins. <i>Avicennia</i> sp. also occurs on the margins of this community at Saltwater Lagoon.
Characteristic mid-storey	Absent
Characteristics groundcovers	<i>Baumea juncea</i> , <i>Baumea articulata</i> , <i>Phragmites australis</i> , <i>Gahnia clarkei</i> , <i>Juncus kraussii</i> , <i>Baumea teretifolia</i> , <i>Ficinia nodosa</i> , <i>Sporobolus virginicus</i> , <i>Bacopa monnieri</i> , <i>Paspalum distichum</i> , <i>Triglochin striata</i>
Condition	Very good - good condition with very low occurrence of exotic species



Tuckeroo – Hard Corkwood – Fig Littoral Rainforest (SW03)

Littoral rainforest	
Equivalent PCT	1537 - Tuckeroo - Yellow Tulipwood - Red fruited Olive Plum Littoral Rainforest of the lower North Coast
Vegetation formation – class	Rainforests – Littoral Rainforests
Conservation status	NSW BC Act: Endangered - Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Critically Endangered - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
Characteristic canopy trees	Characteristically dense canopy which can be made up of a variety of rainforest species including <i>Cupaniopsis anacardioides</i> , <i>Endiandra sieberi</i> , <i>Ficus</i> species, <i>Acronychia imperforata</i> , <i>Litsea australis</i> and <i>Syzygium oleosum</i> . Corresponds with Floyd's Suballiance No. 17: <i>Cupaniopsis anacardioides</i> .
Characteristic mid-storey	Comprised of a variety of rainforest trees including <i>Syzygium oleosum</i> , <i>Euroschinus falcata</i> , <i>Glochidion ferdinandi</i> , <i>Alectryon coriaceus</i> , <i>Polyscias elegans</i> , <i>Acronychia imperforata</i> and <i>Acronychia oblongifolia</i> . Smaller shrubs include <i>Breynia oblongifolia</i> and <i>Wikstroemia indica</i> . Vines / climbers are frequently observed including <i>Flagellaria indica</i> , <i>Hibbertia scandens</i> , <i>Cissus antarctica</i> , <i>Smilax australis</i> and <i>Maclura cochinchinensis</i> .
Characteristics groundcovers	<i>Lomandra longifolia</i> , <i>Oplismenus aemulus</i> , <i>Asplenium australis</i> , <i>Isolepis sp.</i> , <i>Viola hederacea</i>
Condition	High to low-moderate. Mostly occurs as small patches and has relatively high floristic influence from adjacent communities. The patches on the northern side of Saltwater Creek are in moderate-high condition with some observations of <i>Ochna serrulata</i> and <i>Asparagus aethiopicus</i> . Patches on the southern side near Brighton Park are more degraded with <i>Cinnamomum camphora</i> , <i>Ochna serrulata</i> , <i>Schefflera actinophylla</i> and <i>Asparagus aethiopicus</i> also recorded.



Swamp Oak swamp forest (SW04)

Swamp Oak swamp forest	
Equivalent PCT	1727 - Swamp Oak - Sea Rush - Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast / (1235 - Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion)
Vegetation formation – class	Forested Wetlands - Coastal Floodplain Wetlands
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Casuarina glauca</i>
Characteristic mid-storey	Generally absent, may include the vine <i>Parsonsia straminea</i>
Characteristics groundcovers	Very sparse and may include: <i>Juncus kraussii</i> , <i>Phragmites australis</i> , <i>Sporobolus virginicus</i> , <i>Apium prostratum</i>
Condition	High



Blackbutt – Needlebark Stringybark Open Forest (SW05)

Blackbutt – Needlebark Stringybark Open Forest	
Equivalent PCT	685 Blackbutt - Needlebark Stringybark shrubby open forest on coastal sands of the NSW North Coast Bioregion
Vegetation formation – class	Dry Sclerophyll Forests (Shrubby sub-formation) - Coastal Dune Dry Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Eucalyptus pilularis</i> , <i>Eucalyptus planchoniana</i> , with <i>Eucalyptus racemosa</i> , <i>Eucalyptus robusta</i> occasionally occurring
Characteristic mid-storey	Variable but may include <i>Callitris rhomboidea</i> , <i>Dodonaea triquetra</i> , <i>Synoum glandulosum</i> , <i>Glochidion ferdinandi</i> , <i>Dillwynia</i> spp., <i>Acacia linifolia</i> , <i>Acacia longifolia</i> subsp. <i>sophorae</i> , <i>Notelaea longifolia</i> .
Characteristics groundcovers	Variable depending on moisture availability but may include includes <i>Pteridium esculentum</i> , <i>Baumea juncea</i> , <i>Lomandra longifolia</i> , <i>Dianella caerulea</i> , <i>Imperata cylindrica</i> , <i>Lobelia purpurascens</i> , <i>Entolasia stricta</i> , <i>Geitonoplesium cymosum</i> , and <i>Phragmites australis</i> fringing Saltwater Creek.
Condition	Moderate – High



Blackbutt Open Forest (SW06)

Blackbutt Open Forest	
Equivalent PCT	1646 Smooth-barked Apple - Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast
Vegetation formation – class	Dry Sclerophyll Forests (Shrubby sub-formation) - Coastal Dune Dry Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Eucalyptus pilularis</i> , and occasionally <i>Banksia serrata</i>
Characteristic mid-storey	<i>Banksia serrata</i> , <i>Endiandra sieberi</i> , <i>Melaleuca ericifolia</i> , <i>Livistona australis</i> , <i>Monotoca elliptica</i> . A variant of this community occurs at the eastern end of Fishos Trail where <i>Callitris rhomboidea</i> makes up a dense midstorey with occasional <i>Endiandra sieberi</i> .
Characteristics groundcovers	<i>Pteridium esculentum</i> , <i>Lomandra longifolia</i> , <i>Hibbertia scandens</i> , <i>Xanthorrhoea</i> sp., <i>Dianella caerulea</i> , <i>Pandorea pandorana</i> , <i>Pomax umbellata</i> . The Fishos Trail variant is dominated by <i>Baloskion tetraphylla</i> . <i>Lomandra longifolia</i> , <i>Geranium solanderi</i> , <i>Pomax umbellata</i> , <i>Imperata cylindrica</i> were also recorded.
Condition	High, very low cover of <i>Senna pendula</i> var. <i>glabrata</i> was recorded along Fishos Trail



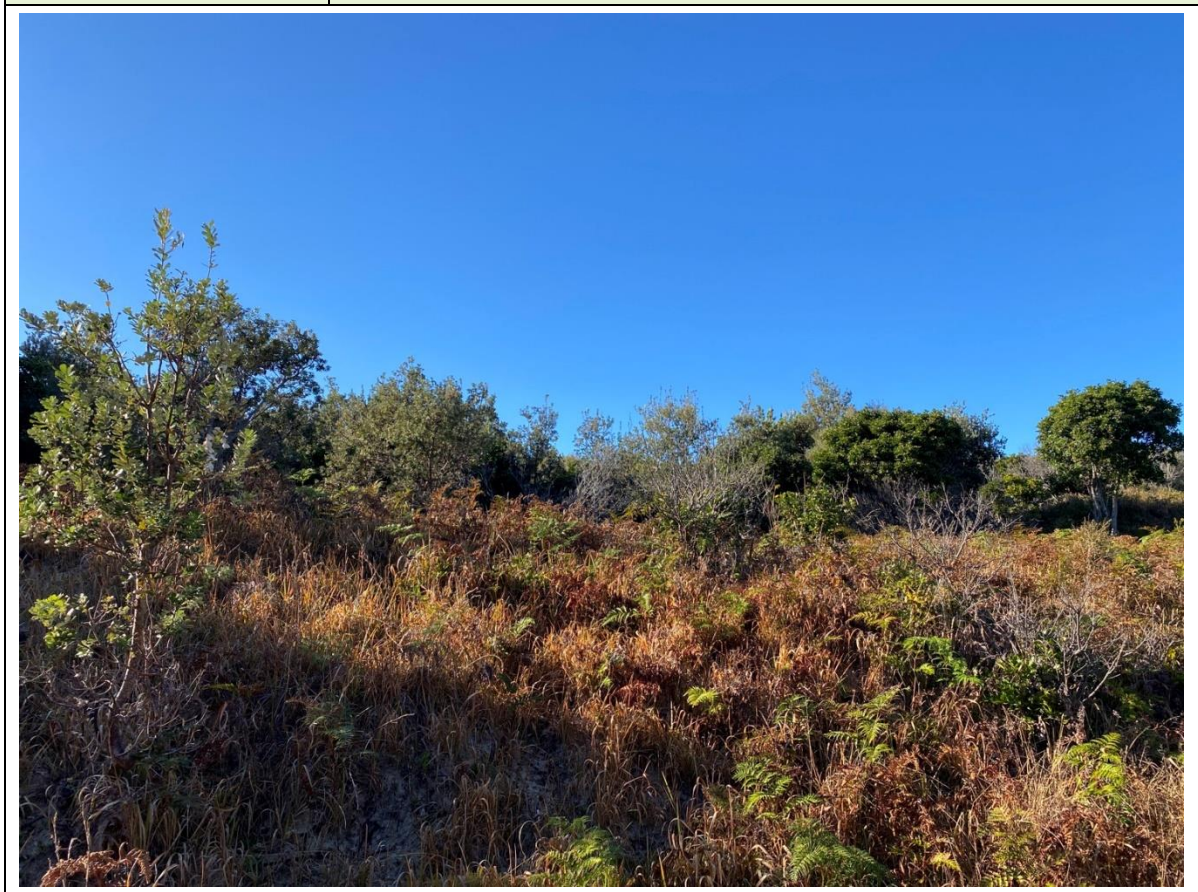
Cabbage Palm swamp forest (SW07)

Cabbage Palm swamp forest	
Equivalent PCT	1537 Tuckeroo - Yellow Tulipwood - Red fruited Olive Plum Littoral Rainforest of the lower North Coast
Vegetation formation – class	Rainforests – Littoral Rainforests
Conservation status	NSW BC Act: Endangered - Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Critically Endangered - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
Characteristic canopy trees	<i>Livistona australis</i> with tall emergent <i>Eucalyptus pilularis</i> . Corresponds with Suballiance No. 6 – <i>Archontophoenix-Livistona</i> (Floyd). <i>Melaleuca quinquenervia</i> may also occur in the canopy in less developed sites
Characteristic mid-storey	Generally very sparse due to dense canopy but may include <i>Livistona australis</i> , <i>Allocasuarina torulosa</i> , <i>Synoum glandulosum</i> , <i>Trochocarpa laurina</i> , <i>Glochidion ferdinandi</i> , <i>Cordyline stricta</i> , <i>Acronychia oblongifolia</i> , <i>Wilkiea huegeliana</i> , <i>Acmena smithii</i> , <i>Melodinus australis</i> , <i>Myoporum acuminatum</i>
Characteristics groundcovers	Patchy due to thick layer of <i>Livistona australis</i> litter and seasonal waterlogging but includes <i>Blechnum cartilagineum</i> , <i>Gahnia clarkei</i> , <i>Calochlaena dubia</i>
Condition	High, recently burnt with apparently low intensity fire. Low exotic cover with <i>Paspalum mandiocanum</i> recorded



Sand Dune Scrub (SW08)

Sand Dune Scrub	
Equivalent PCT	1644 Coast Tea Tree - Old Man Banksia coastal shrubland on foredunes of the Central and lower North Coast
Vegetation formation – class	Dry Sclerophyll Forests (Shrubby sub-formation) - South Coast Sands Dry Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	Low canopy of <i>Leptospermum laevigatum</i> , <i>Acacia longifolia</i> subsp. <i>sophorae</i> , <i>Banksia integrifolia</i> , <i>Banksia serrata</i>
Characteristic mid-storey	<i>Polyscias elegans</i> and occasionally juvenile <i>Cupaniopsis anacardioides</i>
Characteristics groundcovers	<i>Pteridium esculentum</i> , <i>Imperata cylindrica</i> , <i>Dianella congesta</i> , <i>Ficinia nodosa</i> , <i>Hibbertia scandens</i> and <i>Sporobolus virginicus</i> . <i>Spinifex sericea</i> occurs on the seaward edge of the community.
Condition	Appears to be highly disturbed with large patches of <i>Blechnum cartilagineum</i> , <i>Imperata cylindrica</i> and <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>



Banksia Shrubland (SW09)

Wet Heath	
Equivalent PCT	663 - Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion
Vegetation formation – class	Heathlands - Wallum Sand Heaths
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Banksia aemula</i> , <i>Melaleuca nodosa</i> , <i>Leptospermum trinervium</i> , <i>Melaleuca quinquenervia</i> , <i>Allocasuarina torulosa</i>
Characteristic mid-storey	<i>Parsonsia straminea</i> , <i>Monotoca elliptica</i> , <i>Leptospermum polygalifolium</i> , <i>Elaeocarpus reticulatus</i> , <i>Ricinocarpos pinifolius</i> , <i>Pultenaea</i> spp. <i>Pandorea pandorana</i>
Characteristics groundcovers	<i>Actinotus helianthi</i> , <i>Lomandra longifolia</i> , <i>Baloskion tetraphyllum</i>
Condition	High condition with low cover of <i>Paspalum mandiocanum</i> recorded



Scribbly Gum Open Forest (SW10)

Scribbly Gum Open Forest	
Equivalent PCT	1074 - Pink Bloodwood open forest of the coastal lowlands of the NSW North Coast Bioregion
Vegetation formation – class	Dry Sclerophyll Forests (Shrubby sub-formation) - Coastal Dune Dry Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Eucalyptus racemosa</i> with <i>Eucalyptus microcorys</i> , <i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i>
Characteristic mid-storey	Variable in structure and species composition, but generally consistent in floristic composition which includes <i>Casuarina littoralis</i> , <i>Livistona australis</i> , <i>Breynia oblongifolia</i> , <i>Callistemon saligna</i> , <i>Epacris microphylla</i> , <i>Pultenaea retusa</i> , <i>Callicoma serratifolia</i> , <i>Jacksonia scoparia</i> , <i>Dodonaea triquetra</i> , <i>Synoum glandulosum</i> , <i>Polyscias elegans</i> , <i>Trochocarpa laurina</i> . Variability may be due to fire history as well as soil types / aspect e.g. the foothills of Smoky Cape Range differ from lower, sandier sites.
Characteristics groundcovers	<i>Lomandra longifolia</i> , <i>Entolasia marginata</i> , <i>Gymnostachys anceps</i> , <i>Pteridium esculentum</i> , <i>Calochlaena dubia</i> , <i>Hardenbergia violacea</i> , <i>Themeda triandra</i> , <i>Lobelia purpurascens</i>
Condition	Generally high condition, no weeds recorded with the exception of one <i>Strelitzia nicolai</i> (Bird of Paradise)



Red Bloodwood Open Forest (SW11)

Red Bloodwood Open Forest	
Equivalent PCT	975 - Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the lower Clarence of the NSW North Coast Bioregion
Vegetation formation – class	Dry Sclerophyll Forests (Shrubby sub-formation) - Coastal Dune Dry Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Corymbia gummifera</i> , <i>Banksia serrata</i>
Characteristic mid-storey	<i>Monotoca elliptica</i> , <i>Smilax australis</i> , <i>Dodonaea triquetra</i> , <i>Banksia integrifolia</i> , <i>Pandorea pandorana</i> , <i>Acacia longifolia</i> subsp. <i>sophorae</i> , <i>Acacia suaveolens</i> , <i>Callitris rhomboidea</i> , and occasional <i>Livistona australis</i> , <i>Cupaniopsis anacardioides</i> and <i>Endiandra sieberi</i>
Characteristics groundcovers	<i>Baloskion tetraphylla</i> , <i>Pteridium esculentum</i> , <i>Imperata cylindrica</i> , <i>Stephania japonica</i> , <i>Themeda triandra</i> , <i>Pomax umbellata</i>
Condition	Generally high, low cover of <i>Ipomoea cairica</i> recorded



Swamp Mahogany – Broad-leaved Paperbark forest (SW12)

Swamp Mahogany – Broad-leaved Paperbark Forest	
Equivalent PCT	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast
Vegetation formation – class	Forested Wetlands - Coastal Floodplain Wetlands
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Eucalyptus robusta</i> , <i>Melaleuca quinquenervia</i>
Characteristic mid-storey	<i>Banksia integrifolia</i> , <i>Persoonia</i> , <i>Leptospermum polygalifolium</i> , <i>Glochidion ferdinandi</i>
Characteristics groundcovers	<i>Lomandra longifolia</i> , <i>Imperata cylindrica</i>
Condition	High



Degraded heathland (SW13)

Degraded heathland	
Equivalent PCT	1706 - <i>Leptospermum liversidgei</i> - <i>Callistemon citrinus</i> - <i>Xanthorrhoea fulva</i> wet heath on coastal sands of lower North Coast (classification based on past site inspection ~ 10 years previous – G. Patrick)
Vegetation formation – class	Heathlands - Wallum Sand Heaths
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	N/A
Characteristic mid-storey	N/A
Characteristics groundcovers	<i>Baumea</i> species. Site of proposed residential development, subject to ongoing slashing. Comprises part of the former site of Shell oil terminal sites between 1961 and 1992 (WBM 2006). Not visited on-ground due to access constraints.
Condition	Low, area is regularly slashed



Broad-leaved Paperbark – Batwing Fern Forest (SW14)

Broad-leaved Paperbark – Batwing Fern Forest	
Equivalent PCT	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast
Vegetation formation – class	Forested Wetlands - Coastal Floodplain Wetlands
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Melaleuca quinquenervia</i>
Characteristic mid-storey	<i>Glochidion ferdinandi</i> , <i>Homalanthus populifolius</i> , <i>Polyscias elegans</i> , <i>Archontophoenix cunninghamiana</i> , <i>Acacia maidenii</i>
Characteristics groundcovers	<i>Histiopteris incisa</i> , <i>Pteridium esculentum</i>
Condition	Moderate-high condition, some <i>Lantana camara</i> recorded



Broad-leaved Paperbark – Heath-leaved Banksia Open Forest (SW15)

Broad-leaved Paperbark – Heath-leaved Banksia Open Forest	
Equivalent PCT	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast
Vegetation formation – class	Forested Wetlands - Coastal Floodplain Wetlands
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Melaleuca quinquenervia</i> and occasional <i>Casuarina glauca</i>
Characteristic mid-storey	<i>Banksia ericifolia</i>
Characteristics groundcovers	<i>Gahnia clarkei</i> , <i>Gahnia sieberi</i> , <i>Blechnum cartilagineum</i> , <i>Empodisma minus</i> , <i>Pteridium esculentum</i> , <i>Xanthorrhoea species</i> , <i>Baumea juncea</i> , <i>Gleichenia dicarpa</i>
Condition	High



Wet Heath (SW16)

Wet Heath	
Equivalent PCT	1704 Fern-leaf Banksia - Prickly-leaved Paperbark-Tantoon - Leptocarpus tenax wet heath on coastal sands of the Central Coast and lower North Coast
Vegetation formation – class	Heathlands - Wallum Sand Heaths
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	Emergent stunted <i>Melaleuca quinquenervia</i> and <i>Eucalyptus robusta</i> may occur
Characteristic mid-storey	<i>Melaleuca thymifolia</i> , <i>Callistemon pachyphyllus</i> , <i>Epacris microphylla</i> , <i>Banksia robur</i> , <i>Banksia ericifolia</i> , <i>Hakea Actites</i> , <i>Baeckea frutescens</i> , <i>Boronia species</i>
Characteristics groundcovers	<i>Gahnia species</i> , <i>Xanthorrhoea species</i> , <i>Baumea species</i> , <i>Cyperus species</i> , <i>Juncus species</i> , <i>Drosera species</i> , <i>Utricularia species</i> .
Condition	High condition. This community was not validated on-ground due to access constraints and the characteristic species lists are indicative only. Occurs on the south-west of Saltwater Lagoon adjacent to recently cleared vegetation.



Broad-leaved Paperbark – Cabbage Palm Open Forest (SW17)

Broad-leaved Paperbark – Cabbage Palm Open Forest	
Equivalent PCT	1717 - Broad-leaved Paperbark - Swamp Mahogany - Swamp Oak - Saw Sedge swamp forest of the Central Coast and Lower North Coast
Vegetation formation – class	Forested Wetlands - Coastal Floodplain Wetlands
Conservation status	NSW BC Act: Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
	EPBC Act: Endangered - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland
Characteristic canopy trees	<i>Melaleuca quinquenervia</i>
Characteristic mid-storey	<i>Glochidion ferdinandi</i> , <i>Neolitsea australis</i> , <i>Parsonsia straminea</i>
Characteristics groundcovers	<i>Gahnia clarkei</i> , <i>Gynochthodes jasminoides</i> , <i>Geitonoplesium cymosum</i> , <i>Oplismenus aemulus</i>
Condition	High condition with low cover of <i>Lantana camara</i> and <i>Senna pendula</i> var. <i>glabrata</i>



Pink Bloodwood – Broad-leaved Paperbark – Cabbage Palm Open Forest (SW19)

Pink Bloodwood – Broad-leaved Paperbark – Cabbage Palm Open Forest	
Equivalent PCT	1569 - Flooded Gum - Brush Box - Tallowwood mesic tall open forest on ranges of the lower North Coast
Vegetation formation – class	Wet Sclerophyll Forests (Shrubby sub-formation) - North Coast Wet Sclerophyll Forests
Conservation status	NSW BC Act: Not listed
	EPBC Act: Not listed
Characteristic canopy trees	<i>Corymbia intermedia</i> , <i>Melaleuca quinquenervia</i> , <i>Livistona australis</i> , <i>Eucalyptus resinifera</i> , <i>Casuarina glauca</i>
Characteristic mid-storey	<i>Livistona australis</i> , <i>Synoum glandulosa</i> , <i>Trochocarpa laurina</i> , <i>Notelaea longifolia</i> , <i>Cordyline stricta</i> , <i>Glochidion ferdinandi</i> , <i>Neolitsea dealbata</i> , <i>Melicope micrococca</i>
Characteristics groundcovers	<i>Lomandra longifolia</i> , <i>Gahnia clarkei</i> , <i>Gynochthodes jasminoides</i> , <i>Marsdenia rostrata</i> , <i>Smilax australis</i>
Condition	High condition with low cover of <i>Lantana camara</i> and <i>Araujia sericifera</i> recorded



Appendix B Fauna species recorded

Common name	Scientific name	BC Act	EPBC Act
Australasian Darter	<i>Anhinga novaehollandiae</i>	P	--
Australasian Figbird	<i>Sphecotheres vieilloti</i>	P	--
Australian Magpie	<i>Gymnorhina tibicen</i>	P	--
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>	P	--
Australian Pelican	<i>Pelecanus conspicillatus</i>	P	--
Australian Wood Duck	<i>Chenonetta jubata</i>	P	--
Tusked Frog	<i>Adelotus brevis</i>	P	--
Bar-shouldered Dove	<i>Geopelia humeralis</i>	P	--
Black Swan	<i>Cygnus atratus</i>	P	--
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	P	--
Black-shouldered Kite	<i>Elanus axillaris</i>	P	--
Brown Honeyeater	<i>Lichmera indistincta</i>	P	--
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	V,P	--
Brush Bronzewing	<i>Phaps elegans</i>	P	--
Brushtail Possum	<i>Trichosurus sp.</i>	P	--
Common Eastern Froglet	<i>Crinia signifera</i>	P	--
Crested Pigeon	<i>Ocyphaps lophotes</i>	P	--
Eastern Great Egret	<i>Casmerodius modesta</i>	P	--
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	P	--
Eastern Osprey	<i>Pandion cristatus</i>	V,P	--
Eastern Whipbird	<i>Psophodes olivaceus</i>	P	--
Eastern Yellow Robin	<i>Eopsaltria australis</i>	P	--
Feathertail Glider	<i>Acrobates pygmaeus</i>	P	--
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	P	--
Galah	<i>Eolophus roseicapilla</i>	P	--
Golden Whistler	<i>Pachycephala pectoralis</i>	P	--
Grey Butcherbird	<i>Cracticus torquatus</i>	P	--
Grey Fantail	<i>Rhipidura albiscapa</i>	P	--
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	P	--
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	P	--
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	P	--
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	P	--
Little Wattlebird	<i>Anthochaera chrysoptera</i>	P	--

Common name	Scientific name	BC Act	EPBC Act
Long-nosed Bandicoot	<i>Perameles nasuta</i>	P	--
Masked Lapwing	<i>Vanellus miles</i>	P	--
Noisy Friarbird	<i>Philemon corniculatus</i>	P	--
Noisy Miner	<i>Manorina melanocephala</i>	P	--
Pacific Black Duck	<i>Anas superciliosa</i>	P	--
Pied Butcherbird	<i>Cracticus nigrogularis</i>	P	--
Pied cormorant	<i>Phalacrocorax varius</i>	P	--
Pied Currawong	<i>Strepera graculina</i>	P	--
Powerful Owl	<i>Ninox strenua</i>	V,P	--
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	P	--
Red Wattlebird	<i>Anthochaera carunculata</i>	P	--
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	P	--
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	P	--
Silveryeye	<i>Zosterops lateralis</i>	P	--
Southern Boobook	<i>Ninox novaeseelandiae</i>	P	--
Southern Emu-wren	<i>Stipiturus malachurus</i>	P	--
Spotted Pardalote	<i>Pardalotus punctatus</i>	P	--
Squirrel Glider	<i>Petaurus norfolcensis</i>	V,P	--
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	P	--
Superb Fairy-wren	<i>Malurus cyaneus</i>	P	--
Swamp Wallaby	<i>Wallabia bicolor</i>	P	--
Variegated Fairy-wren	<i>Malurus lamberti</i>	P	--
Wallum Froglet	<i>Crinia tinnula</i>	V,P	--
Welcome Swallow	<i>Hirundo neoxena</i>	P	--
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	V,P	--
White-cheeked Honeyeater	<i>Phylidonyris niger</i>	P	--
White-eared Honeyeater	<i>Nesoptilotis leucotis</i>	P	--
White-faced Heron	<i>Egretta novaehollandiae</i>	P	--
White-throated Needle-tail	<i>Hirundapus caudacutus</i>	P	V,C,J,K
Willie Wagtail	<i>Rhipidura leucophrys</i>	P	--
Wonga Pigeon	<i>Leucosarcia melanoleuca</i>	P	--
Yellow-faced Honeyeater	<i>Caligavis chrysops</i>	P	--
Yellow-tailed Black-Cockatoo	<i>Zanda funereus</i>	P	--

Note: P – Protected species; V – Vulnerable species; C,J,K – Migratory species; **Bold** text indicates threatened species.

