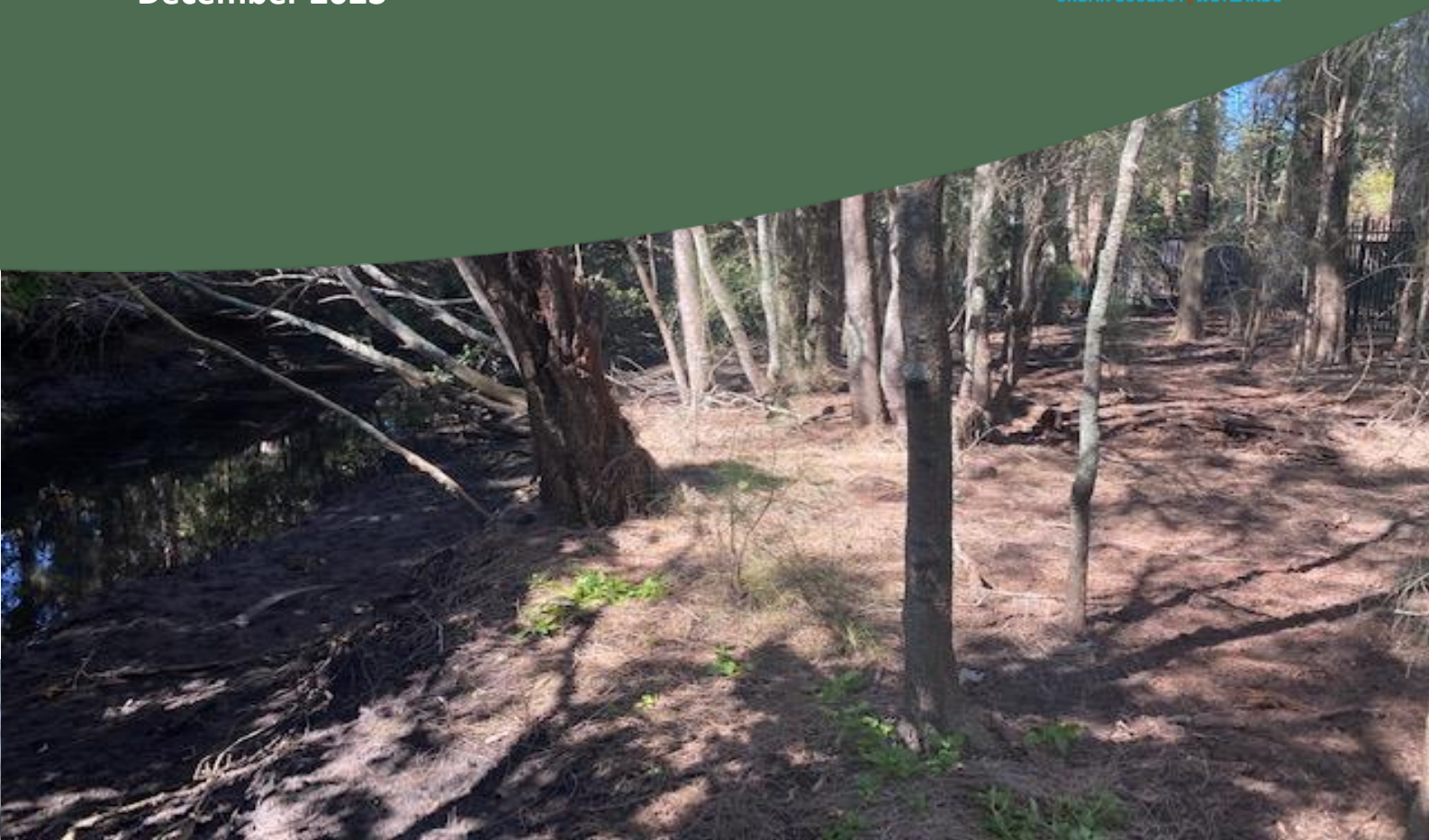


Riparian Plan and Coastal Impacts Assessment

12A John St, Avalon Beach

*Prepared by Ecological Consultants Australia TA
Kingfisher Urban Ecology and Wetlands*

December 2023



About this document



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Signed: Geraldene Dalby-Ball – Director of Ecological Consultants Australia

Executive Summary

Introduction

- The purpose of this plan is to provide information on the establishment and management of a riparian corridor at 12A John Street, Avalon Beach.
- This plan specifically focuses on the riparian zone, its location, creation, and management. Supplementary documents including the BDAR (Kingfisher 2023) contain information relevant to the riparian zone.

Methods

- On-ground surveys took place in Feb 2019, May 2019, Dec 2019, Mar 2020, Oct 2020, Jan 2021, and Sep 2023 by Senior Ecologist Geraldene Dalby-Ball and Ecologist Tina Feodoroff (2019 surveys) during full moon high-tides, low-tides, and rainfall events.
- Observations were made of the bank, bed, top of bank, tidal reach, and storm-tidal reach as well as of riparian vegetation along the creek to the Careel Bay wetlands.

Results

- The waterway is tidal at the site. The top of the bank has been determined from the mean high-water mark and has taken into consideration super high tide events and storm-tide combination events. The high tide (January 2021) and the storm high (March 2020) did not extend creek water into the property boundary of 12A John Street. The creek flowed full bank at both times.
- This part of Careel Creek can be considered a first-order tidal creek, rather than a second-order waterway, as no waterways are flowing into the creek upstream from this point. Existing stormwater moving into the creek is via pipes (enclosed) and then the open concreted section of Careel Creek to the natural bed-base creek that continues directly to this location. The 20m zone requested by the Council has been accepted by the property owner and used in this plan.
- The horizontal difference of the mean high and low tide is less than 1m in this location as the creek is channelised and tidal movement results in altering the depth as well as the width of water. King and high tides with storm rainfall show some ~2m lateral spread in parts of Careel Creek. John Street has minimal flooding from the creek relative to streets like Elaine Avenue. See also Coastal Report (Cardno 2020).
- The proposed development has been reduced so that the encroachment of built form into the riparian zone is only in the outer 50% and is 25m² of built form and just under 30m² of decking and steps. The decking and steps are off-ground and porous. An area of 80m² in the landscape zone will be planted with the riparian zone species and be contiguous with the riparian zone and form an offset for the encroachment (following the NSW Riparian Land Guidelines).
- A riparian zone has been designed with species from the PCT 4027 and native species growing upstream of the site.
- The ratio of tree replacement for no-net loss is 10:1 and these trees can be planted off-site. All native trees currently in the riparian zone are remaining.
- Stormwater will be managed to minimise impact and reverse some of the current impact (existing impact being sediment covering Mangrove pneumatophores).

- Considerations of the *Coastal Management Act 2016* (CM Act), *State Environmental Planning Policy (Resilience and Hazards) 2021*, *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and *Fisheries Management Act 1994* (FM Act) have been included.

Mitigation Measures

Before works:

1. Mark out the 20-metre riparian boundary and protection line with orange mesh para webbing or equivalent.
2. Install signage along the riparian boundary line. Signage to note entry only for permitted riparian works. No storage of building materials or vehicles. Any work in the riparian zone is to be supervised by an ecologist or equivalent.
3. Effective site management to ensure sediment does not enter the waterway.
4. Gain permission (or not) for rehabilitation of the riparian zone on the public property immediately adjoining the site. If granted then a qualified bush regeneration company, on the Council's approved contractor's list, to implement works and provide a brief report and photos to the council of the before and after works and certify that plants are locally native stock.

During works:

1. Toolbox talks to all personnel on-site regarding the riparian zone and only riparian zone works to occur in that zone.
2. Effective site management to ensure sediment doesn't enter the waterway.
3. The riparian zone is to be delineated from remaining landscaping such that it is clear that the riparian zone and agreed off-set areas are for native plants and habitat retention and creation.
4. Approved tree removal to retain She-oak trunk pieces in 2-3m lengths for use as a natural border and habitat use in the riparian zone.
5. The riparian zone within the private property is to be vegetated as per this plan and be undertaken by suitably qualified people and signed off by the ecologist that it fulfills the approved plan (this plan). Including habitat log placement.

After completion of works:

1. Ongoing maintenance of the riparian zone to ensure the native species grow well and canopy trees are retained (at least 2 mature in the zone and 5 young at any time) and heavily vegetated in the mid and understorey. Minimum 12 months of assisted maintenance by Bush regeneration personnel. Sign-off on riparian works completion at the time of future OCs.
2. Exotic vegetation (except trees) will be removed from the riparian area. Exotic grass will be killed and replaced with native grasses and shrubs. Native vegetation will be retained. NB: The area of species mix A extends along the side of dwellings to ensure a minimum area of 80m² is vegetated with the Swamp Oak Forest community. This will be certified as having been achieved pre-OC or pre-CC of future dwellings.
3. Management of the site's interface with Careel Creek to monitor the stormwater inflow and assist, where appropriate, with the removal of rubbish/sediment build.
4. Monitor for erosion, get professional advice when needed, and notify the council when problematic erosion is occurring on the public land.

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1 Introduction

Ecological Consultants Australia (ECA) has been contracted to provide a Riparian Plan in association with proposed development at 12A John Street Avalon. This Plan specifically focuses on the riparian zone, its location, creation and management. Consideration of Coastal Management under the SEPP (Resilience and Hazards) 2021 has been included in this report in Section 4.

2 Site Description

The site which is the subject of this report is 12 A John Street, Avalon Beach NSW 2107 (Lot 2 DP 1237357) within the Northern Beaches Local Government Area (LGA) (see Figure 2.1). The site is approximately 1,552 m² in size and zoned C2 Environmental Conservation and C4 Environmental Living under the Pittwater Local Environmental Plan (LEP) 2014. The study area includes the site as well as any additional land traversed during the site survey.



Figure 2.1. Site Overview.

Source: SIX Maps.

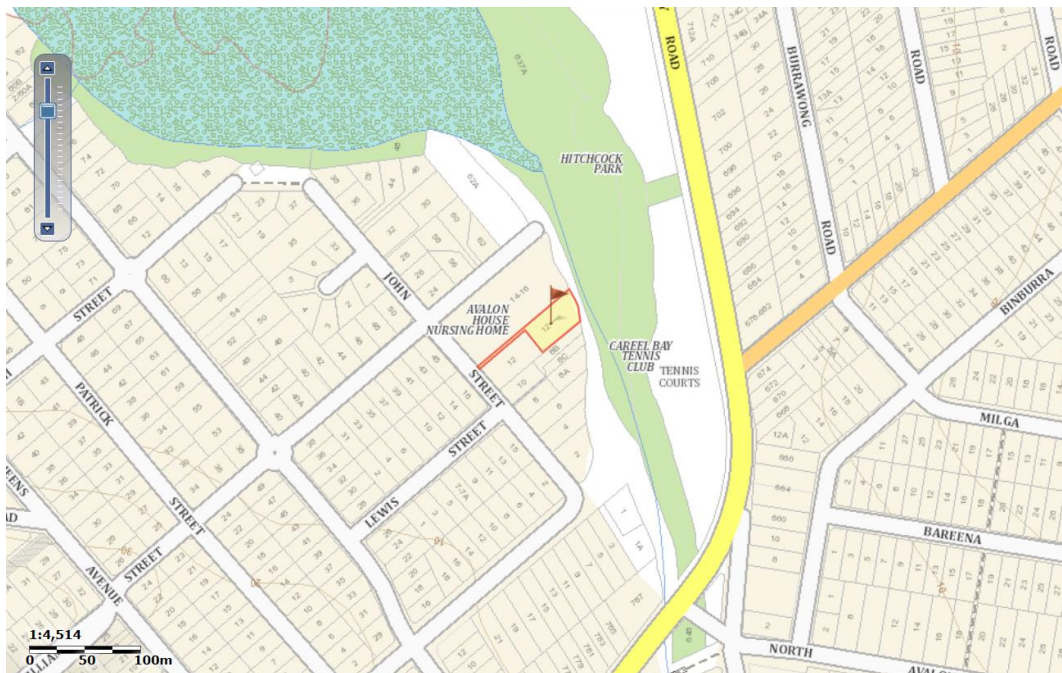


Figure 2.2. Site Location.

Source: SIX Maps.

3 Careel Creek

The property has direct interface with Careel Creek to the east which contains estuarine habitat including mangroves (see Figure 3.1). Careel Creek by definition of the *Water Management Act 2000* is a 1st order watercourse (see Figure 3.2). While there are fully enclosed pipes delivering stormwater to the creek (near Avalon Skate Park), these pipes are not deemed part of the watercourse. The main stormwater input near Avalon Skate Park continues up past Pittwater Palms and through Toongabbie Reserve.



Figure 3.1. Careel Creek.

Source: Water Management (General) Regulation 2018 hydroline spatial data 1.0.

Figure 2. The Strahler system

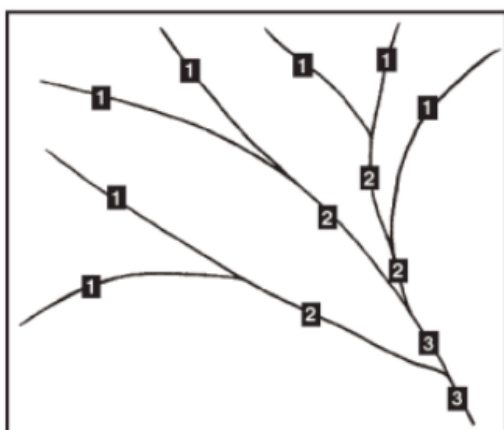


Table 1. Recommended riparian corridor widths

Watercourse type	VRZ width (each side of watercourse)	Total RC width
1 st order	10 metres	20 m + channel width
2 nd order	20 metres	40 m + channel width
3 rd order	30 metres	60 m + channel width
4 th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 metres	80 m + channel width

Note: where a watercourse does not exhibit the features of a defined channel with bed and banks, the department may determine that the watercourse is not waterfront land for the purposes of the WM Act.

Figure 3.2. Strahler Stream Order and Riparian Corridor Widths.

Source: Controlled activities – Guidelines for riparian corridors on waterfront land (DPE 2022).



Careel Creek at high-tide December 2020



Careel Creek at low-tide December 2020

5 Riparian Plan

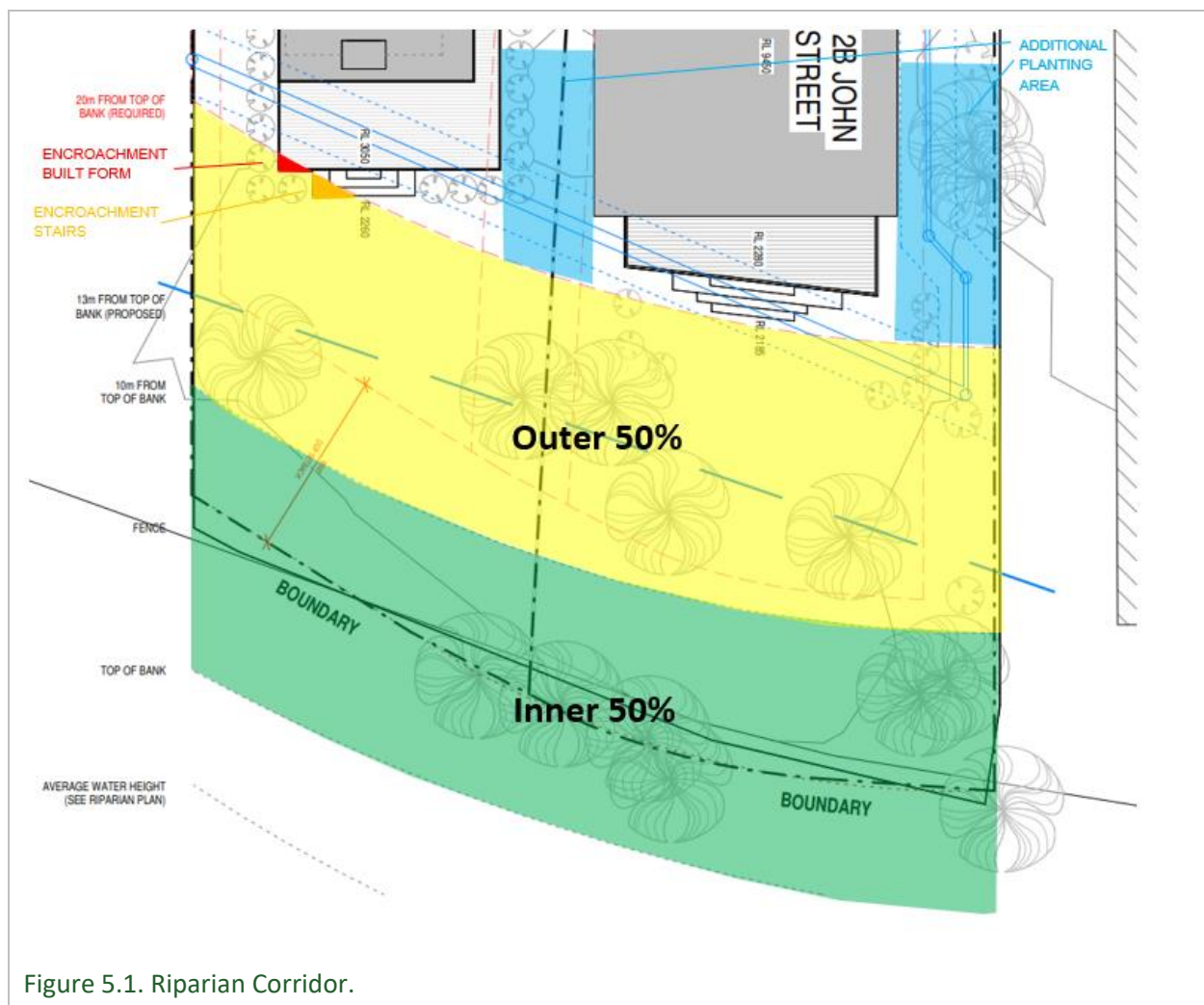
This Riparian Plan has been prepared in accordance with the guiding document for riparian corridors in NSW, *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE 2022).

The authors, along with knowledge of the local environment, are experienced with the requirements of riparian zone establishment, recreation and management having completed many large-scale projects throughout NSW.

The area between the development footprint and Careel Creek requires a Vegetated Riparian Zone (VRZ). Careel Creek is a 1st order watercourse and therefore, a 10 metre VRZ is required on each side of the watercourse. However, Northern Beaches Council has requested that Careel Creek be deemed a 2nd order watercourse and that a 20 metre VRZ be established.

Figure 5.1 shows the location of the 20-metre setback and riparian corridor to be revegetated (including both the inner and outer 50%). It should be noted that the riparian corridor proposed in this report is more than what is required under the *Water Management Act 2000* (WM Act).

Encroachments shown in Figure 5.1 are permitted, provided that they are offset by connecting an equivalent area to the riparian corridor within the development site. Additional planting areas are shown in Figure 5.1.





Riparian zone proposed for rehabilitation (public land)



Central waterway at low-tide and mudflats

5.1 Riparian Zone Re-creation

The riparian zone will be fully vegetated with locally native species characteristic of the two vegetation communities. Planting will occur within the private property boundary, and with council permission, on the bank of Careel Creek. Works on public land will be by Council approved companies (Total Earth Care or Dragonfly Environmental).



Area to be riparian area within the property boundary. NB fence on RHS of photo



Area to be converted for fully vegetated riparian zone (currently exotic grass and garden).

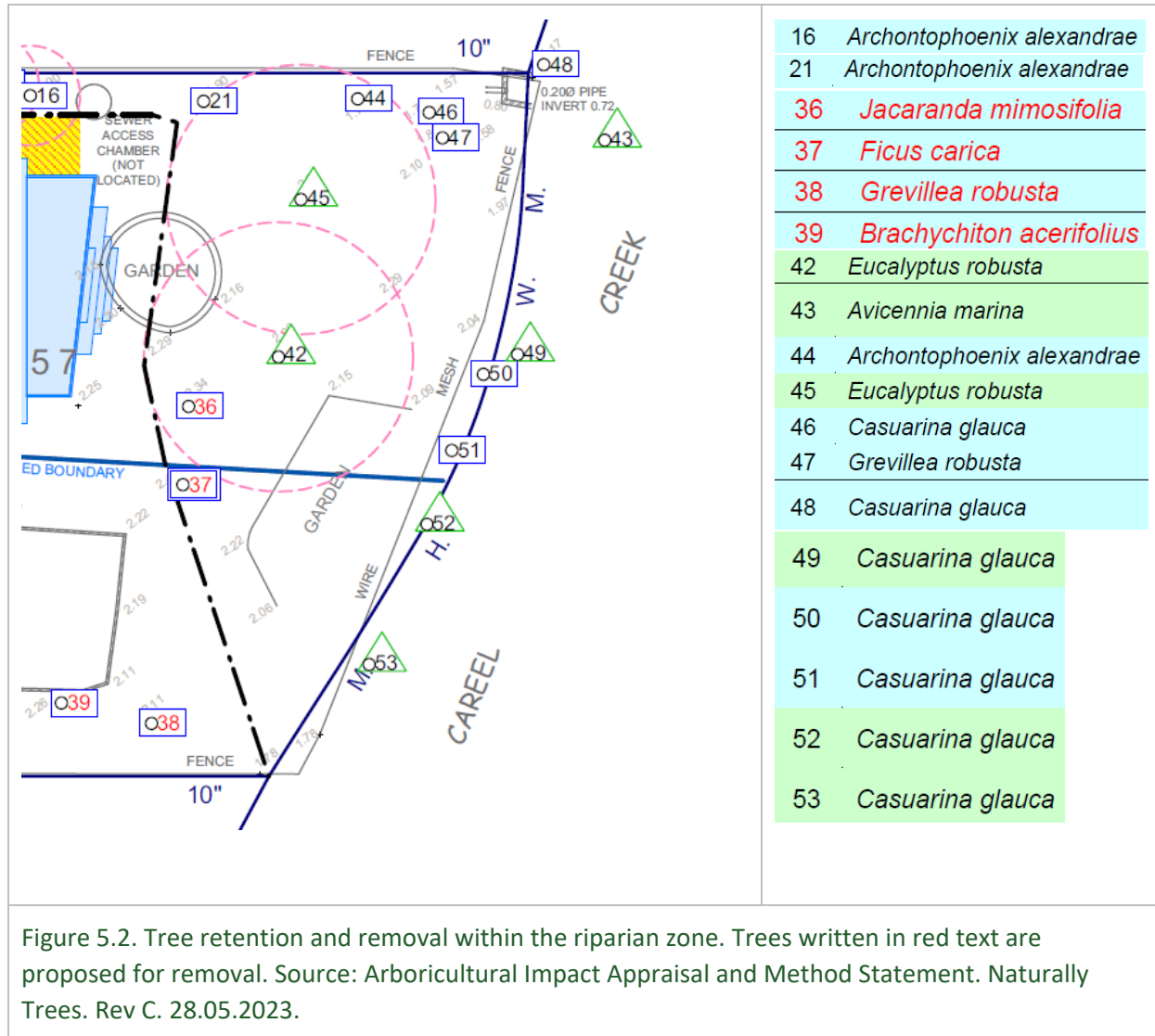
Looking directly to Careel Creek.

Tape measure showing the 20m point to the top of bank.

Riparian Zone Tree Retention and Removal

The figure below summarises trees removal and retention within the riparian zone.

It is noted that trees 16, 21 and 37 are not native, and trees 38 and 39 are planted and not part of the original vegetation community. Trees proposed for removal in the riparian zone include trees 36-39.



Vegetation Retention and Removal










Patches of native ground plants are growing within the riparian zone though it is dominated by exotic grasses. Exotic vegetation (with the exception of trees) will be removed from the riparian area. Exotic grass will be killed and replaced with native grasses and shrubs. Native vegetation will be retained. NB: area of species mix A extends along the side of dwellings to ensure a minimum area of 80m² is vegetated with Swamp Oak Forest community (full strata). This will be certified as having been achieved pre-OC.










Species

The recommended planting list for the site is included below. The following list is a mixture of species which form the Swamp Oak Floodplain Forest EEC and other species which are known to occur in the area and commonly used in riparian revegetation programs. Species mixes are given at the end.

TREES Species Mix B, C, D, E, F, G, H	Swamp Oak (<i>Casuarina glauca</i>) 	Swamp Mahogany (<i>Eucalyptus robusta</i>) 	White Bottlebrush (<i>Callistemon salignus</i>) Species Mix C, D, E 	Prickly Paperbark (<i>Melaleuca styphelioides</i>) Species Mix C, D, E 	Cheese Tree (<i>Glochidion ferdinandi</i>) Species Mix A, C, D, E 
	Swamp Paperbark (<i>Melaleuca ericifolia</i>) Species Mix C, D, E 	Lilly Pilly (<i>Syzygium smithii</i>) Species Mix A, C, D, E Local provenance – large-leave form. 	Magenta Lilly Pilly (<i>Syzygium paniculatum</i>) Species Mix A, C, D, E Seed to be from known local source of original and not nursery hybrids 	Broad-leaved Paperbark (<i>Melaleuca quinquenervia</i>) Species Mix D, E, F 	

SHRUBS AND SEDGES	<p>Shrubs are to be planted in clumps of at least 8 plants per clump. Shrubs will support insects as well as insectivorous birds such as Blue Wrens.</p>	<p>Hop Goodenia (<i>Goodenia ovata</i>) Species Mix B, C, D, E, F</p> 	<p>Edges and boundaries can be planted with Lomandra and Dianella noting that Lomandra is to not make up more the 10% of the planting areas. Both species are to be locally native stock.</p>	<p>Blue Flax-lily (<i>Dianella caerulea</i>) Species Mix A, B, C</p> 	<p>Spiky-headed Mat-rush (<i>Lomandra longifolia</i>) Species Mix A, B, C</p> 
	<p>Leafy Twig Rush (<i>Cladium procerum</i>) Species Mix F, G, H, J</p> 	<p>Tall Sedge (<i>Carex appressa</i>) Species Mix C, D, E, F</p> 			





<p>GROUND COVER AND GRASSES</p> <p>Species Mix</p> <p>A, B, C</p>	<p>Indian Pennywort (<i>Centella asiatica</i>)</p> 	<p>Scurvy Weed (<i>Commelina cyanea</i>)</p> 	<p>Bordered Panic Grass (<i>Entolasia marginata</i>)</p> 	<p>Creeping Beard Grass (<i>Oplismenus imbecillis</i>)</p> 	
<p>VINES</p> <p>Species Mix</p> <p>B, C, D, F, G</p>	<p>Native vines will be planted over the fence and among sedges and logs</p>	<p>Common Silkpod (<i>Parsonsia straminea</i>)</p> 	<p>Lawyer Vine (<i>Smilax australis</i>)</p> 	<p>Snake Vine (<i>Stephania japonica</i>)</p> 	

5.2 Swamp Oak Floodplain Forest EEC Species List

Swamp Oak Floodplain Forest EEC species are more suitable for the area on the public property boundary including in the high 'saltmarsh' area (expected to be 4-6 times per year). All **Species Mix** G, H, I, J, K.

Table 5.1. Swamp Oak Floodplain Forest (only species not already covered in the above list).

Trees that are suitable for the riparian zone between the property fence and the top of bank.	
 <p>Waterbush <i>Myoporum acuminatum</i></p>	<p>Rushes and sedges for top of the bank back to the property fence. High Saltmarsh – may be occasionally inundated. Salt tolerant. Zone all public land and around stormwater outlet. All species provided below are growing in the local area (within 500m) and seed / pieces would come from those populations. NB: License needed to collected as saltmarsh is an Endangered ecological Community.</p>
<p>Bare Twig-rush <i>Baumea juncea</i></p> 	<p>Salt Marsh Rush <i>Juncus kraussii</i></p> 
<p>Austral Seablite <i>Suaeda australis</i></p> 	<p>Creeping Bushweed <i>Samolus repens</i></p> 

<p>Seashore Dropseed <i>Sporobolus virginicus</i></p> 	<p>Glasswort <i>Sarcocornia quinqueflora</i></p> 
<p>New Zealand Spinach <i>Tetragonia tetragonioides</i></p> 	
<p>Bermuda Grass <i>Cynodon dactylon</i></p> 	<p>Native Orache <i>Atriplex australasica</i></p> 

5.3 Support requirements

5.3.1 Weed management, bush regeneration and planting

Weed management will occur post planting of the riparian zone. The riparian zone will only have native species of these EECs. Maintenance is required for at least 12 months post planting.

5.3.2 Seed collection

Native seed stock has been collected from this community and will be available for planting. If seeds are present on, She-Oaks when removed they will be collected and used on/off-site. Excess seed will be given to council.

5.3.3 Planting size and density

Size and density provided here is minimum. A final detailed count of plants required will be submitted as part of the conditions for this DA.

Type	Density	Size
Canopy	Average 1 per 4m ²	Tube stock
Shrub	Average 2 per 4m ²	Tube stock
Ground	Average 4 per m ²	Tube stock
Vines	Average 1 per 20m ²	Tube stock
Off-site if approved		
Canopy	Average 1 per 4m ²	Tube stock
Sedges/rushes on top-of-bank 5 per linear meter		

6 Coastal Management Act 2016

The following addresses the considerations of the *Coastal Management Act 2016* with respect to the proposed development.

The State Environmental Planning Policy (SEPP) (Coastal Management) 2018 has been repealed and replaced with the SEPP (Resilience and Hazards) 2021.

The SEPP (Resilience and Hazards) 2021 provides that the 'coastal zone' means the area of land comprised of the following coastal management areas:

- (a) *the coastal wetlands and littoral rainforests area,*
- (b) *the coastal vulnerability area,*
- (c) *the coastal environment area,*
- (d) *the coastal use area.*

Relevant Clauses of the SEPP (Resilience and Hazards) 2021 have been addressed below.

6.1.1 Division 1 Coastal wetlands and littoral rainforests area

The site contains land identified as "coastal wetlands" on the Coastal Wetlands and Littoral Rainforests Area Map (see Figure 6.1).

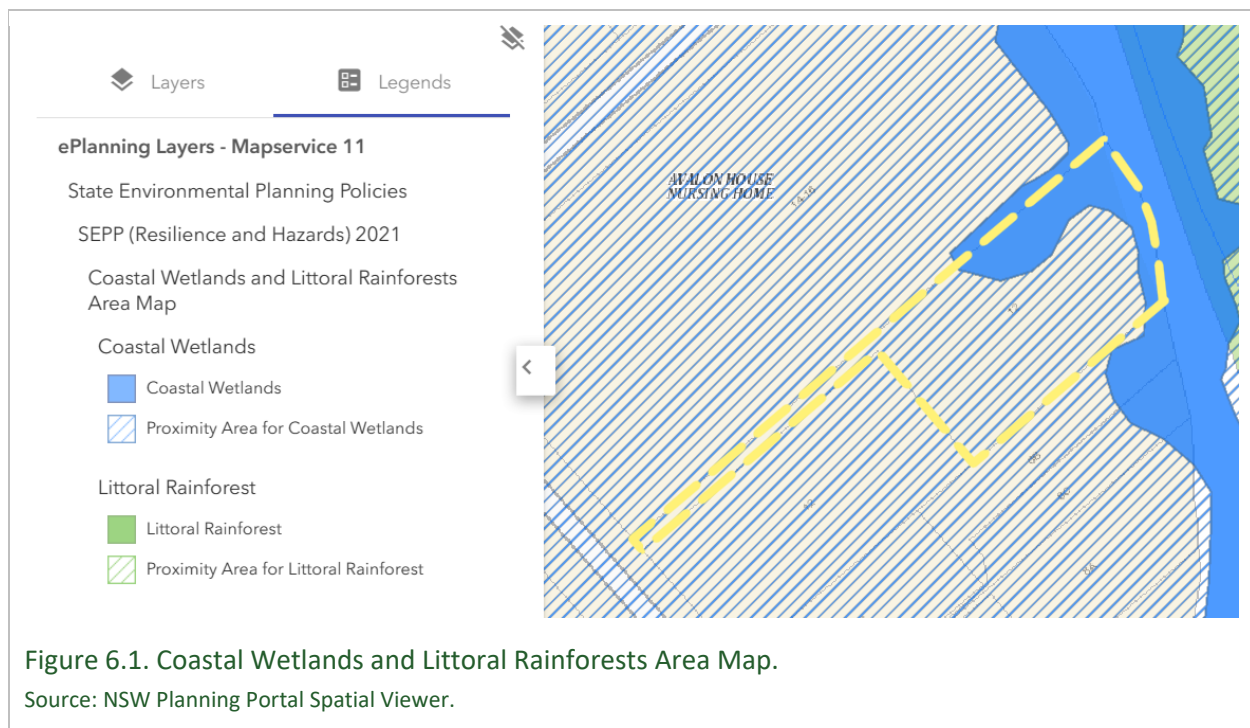


Figure 6.1. Coastal Wetlands and Littoral Rainforests Area Map.

Source: NSW Planning Portal Spatial Viewer.

2.7 Development on certain land within coastal wetlands and littoral rainforests area

(1) The following may be carried out on land identified as "coastal wetlands" or "littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map only with development consent—

- (a) the clearing of native vegetation within the meaning of Part 5A of the [Local Land Services Act 2013](#),**

(b) the harm of marine vegetation within the meaning of Division 4 of Part 7 of the [Fisheries Management Act 1994](#),

(c) the carrying out of any of the following:

(i) earthworks (including the depositing of material on land),

(ii) constructing a levee,

(iii) draining the land,

(iv) environmental protection works,

(d) any other development.

Note–

Clause 2.14 provides that, for the avoidance of doubt, nothing in this Part–

(a) permits the carrying out of development that is prohibited development under another environmental planning instrument, or

(b) permits the carrying out of development without development consent where another environmental planning instrument provides that the development may be carried out only with development consent.

(2) Development for which consent is required by subclause (1), other than development for the purpose of environmental protection works, is declared to be designated development for the purposes of the Act.

(3) Despite subclause (1), development for the purpose of environmental protection works on land identified as “coastal wetlands” or “littoral rainforest” on the Coastal Wetlands and Littoral Rainforests Area Map may be carried out by or on behalf of a public authority without development consent if the development is identified in:

(a) the relevant certified coastal management program, or

(b) a plan of management prepared and adopted under Division 2 of Part 2 of Chapter 6 of the [Local Government Act 1993](#), or

(c) a plan of management under Division 3.6 of the Crown Land Management Act 2016.

(4) A consent authority must not grant consent for development referred to in subclause (1) unless the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological and ecological integrity of the coastal wetland or littoral rainforest.

(5) Nothing in this clause requires consent for the damage or removal of a priority weed within the meaning of clause 32 of Schedule 7 to the [Biosecurity Act 2015](#).

(6) This clause does not apply to the carrying out of development on land reserved under the [National Parks and Wildlife Act 1974](#) if the proposed development is consistent with a plan of management prepared under that Act for the land concerned.

2.8 Development on land in proximity to coastal wetlands or littoral rainforest

Note–

The Coastal Wetlands and Littoral Rainforests Area Map identifies certain land that is inside the coastal wetlands and littoral rainforests area as “proximity area for coastal wetlands” or “proximity area for littoral rainforest” or both.

(1) Development consent must not be granted to development on land identified as “proximity area for coastal wetlands” or “proximity area for littoral rainforest” on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on—

(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest.

The proposed development will not significantly impact on the integrity of the biophysical, hydrological and ecological features of the adjacent coastal wetland. Biophysical and hydrological integrity can be maintained through the retention of native flora and the revegetation of the riparian zone. The installation of a living retainer wall established with native vegetation to stabilize the wetland environment/development site interface will assist ecological integrity. Additionally, the planting of native trees felled and not revegetated on-site at a similar but separate habitat at another location will ensure no net loss of habitat.

(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

Development will not significantly impact on the quantity and quality of surface and groundwater flows to and from the adjacent coastal wetland or littoral rainforest. Pre-existing council approved drain outlets are in operation and public awareness on the best practice management of healthy drains will prevent significant impacts to surface and groundwater flows. Public awareness of Landcare and Bush care groups that work at Careel Creek will also mitigate significant impact caused by higher density development.

6.1.2 Division 3 Coastal environment area

2.10 Development on land within the coastal environment area

(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—

(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,

The ecological environment is considered in this report. Concluded: no significant impact.

(b) coastal environmental values and natural coastal processes,

The coastal environmental values and natural coastal processes will not be significantly altered from current conditions. Concluded: no significant impact.

(c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,

No change expected. No coastal lakes.

(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,

Assessed in this report including EPBC Act and BC Act and locally native species. Concluded: no significant impact.

(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,

There will be no change in accessibility and an overall increased desire to be in this space.

(f) Aboriginal cultural heritage, practices and places,

None specifically listed for this location. The whole of the Estuary is a place of resources and spiritual connection, there are middens within the estuary banks and areas of importance to The First People – this site however has no middens or obvious meeting, cultural area or caves/ overhangs or trees of specific importance. AHIMS Search shown no specific places within the site or immediate surrounds.

(g) the use of the surf zone.

Not applicable.

(2) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or

(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

The development is designed and will be managed to avoid and/or minimize any adverse impact.

6.1.3 Division 4 Coastal use area

2.11 Development on land within the coastal use area

(1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority:

(a) has considered whether the proposed development is likely to cause an adverse impact on the following:

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

No impact

(ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,

No impact

(iii) the visual amenity and scenic qualities of the coast, including coastal headlands,

No impact

(iv) Aboriginal cultural heritage, practices and places,

No impact

(v) cultural and built environment heritage, and

No impact

(b) is satisfied that—

(i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or

Satisfied

(ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or

Satisfied

(iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and

Satisfied

(c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.

Been accounted for.

6.1.4 Division 5 General

2.13 Development in coastal zone generally—development not to increase risk of coastal hazards

Development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land.

The development does not increase coastal hazards – the installation of the living retainer wall and public awareness of best practice waterway management mitigates erosion and water pollution respectively thus maintaining the integrity of the coastal zone.

2.13 Development in coastal zone generally—coastal management programs to be considered

Development consent must not be granted to development on land within the coastal zone unless the consent authority has taken into consideration the relevant provisions of any certified coastal management program that applies to the land.

No certified coastal management programs were identified on this land.

2.14 Other development controls not affected

Subject to section 2.5, for the avoidance of doubt, nothing in this Part—

(a) permits the carrying out of development that is prohibited development under another environmental planning instrument, or

(b) permits the carrying out of development without development consent where another environmental planning instrument provides that the development may be carried out only with development consent.

a) the development is permitted

b) development consent is being sought

7 EPBC Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance.

A search of the Protected Matters Search Tool (PMST) was conducted to identify matters of national environmental significance within a 5 km radius of the subject land. Appendix I includes the PMST report. A summary has been provided below.

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	108
Listed Migratory Species:	63

National Heritage Places

Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves are within 5 km of the site. The proposed development does not impact the Ku-ring-gai Chase National Park, Lion, Long or Spectacle Island Nature Reserves.

Commonwealth Marine Areas

The proposed development does not impact Commonwealth Marine Areas.

Listed Threatened Ecological Communities

TEC	EPBC Act Listing Status	Present on site?
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	Endangered	Coastal Swamp Oak Forest present on site and adjoining lands. Impacts to this community are discussed in the BDAR (Kingfisher 2023).
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Not present on site.

Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Not present on site.
Eastern Suburbs Banksia Scrub of the Sydney Region	Critically Endangered	Not present on site.
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Not present on site.
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Present northwest of the site. Site sits up stream of this community.
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Not present on site.
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Present northwest of the site. Site sits up stream of this community.



Figure 7.1. Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion. Source: SEEDPortal The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.



Figure 7.2. Proximity to Seagrass. Source: SEEDPortal The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.

8 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) is the principal piece of legislation for managing the NSW fishery resource. The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

In particular, the objects of this Act include—

- (a) to conserve fish stocks and key fish habitats, and
- (b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and
- (c) to promote ecologically sustainable development, including the conservation of biological diversity, and, consistently with those objects—
- (d) to promote viable commercial fishing and aquaculture industries, and
- (e) to promote quality recreational fishing opportunities, and
- (f) to appropriately share fisheries resources between the users of those resources, and
- (g) to provide social and economic benefits for the wider community of New South Wales, and
- (h) to recognise the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect, and promote the continuation of, Aboriginal cultural fishing.

The proposed development is set back 20 meters from Careel Creek. No alteration of the geomorphology of the waterway that would result in altered flow or volume of water is proposed. The installation of a retaining wall will see the protection of mangrove and seagrass vegetation adjacent to the site. Additionally, the retaining wall will enable ecosystem processes to continue that support the health of the ecological community. Stormwater from the site will be managed such that there is to be a positive or neutral impact on the receiving water. Figure 8.1a-b shows the stormwater plans for the site.



Main saltmarsh within 300m of the site.

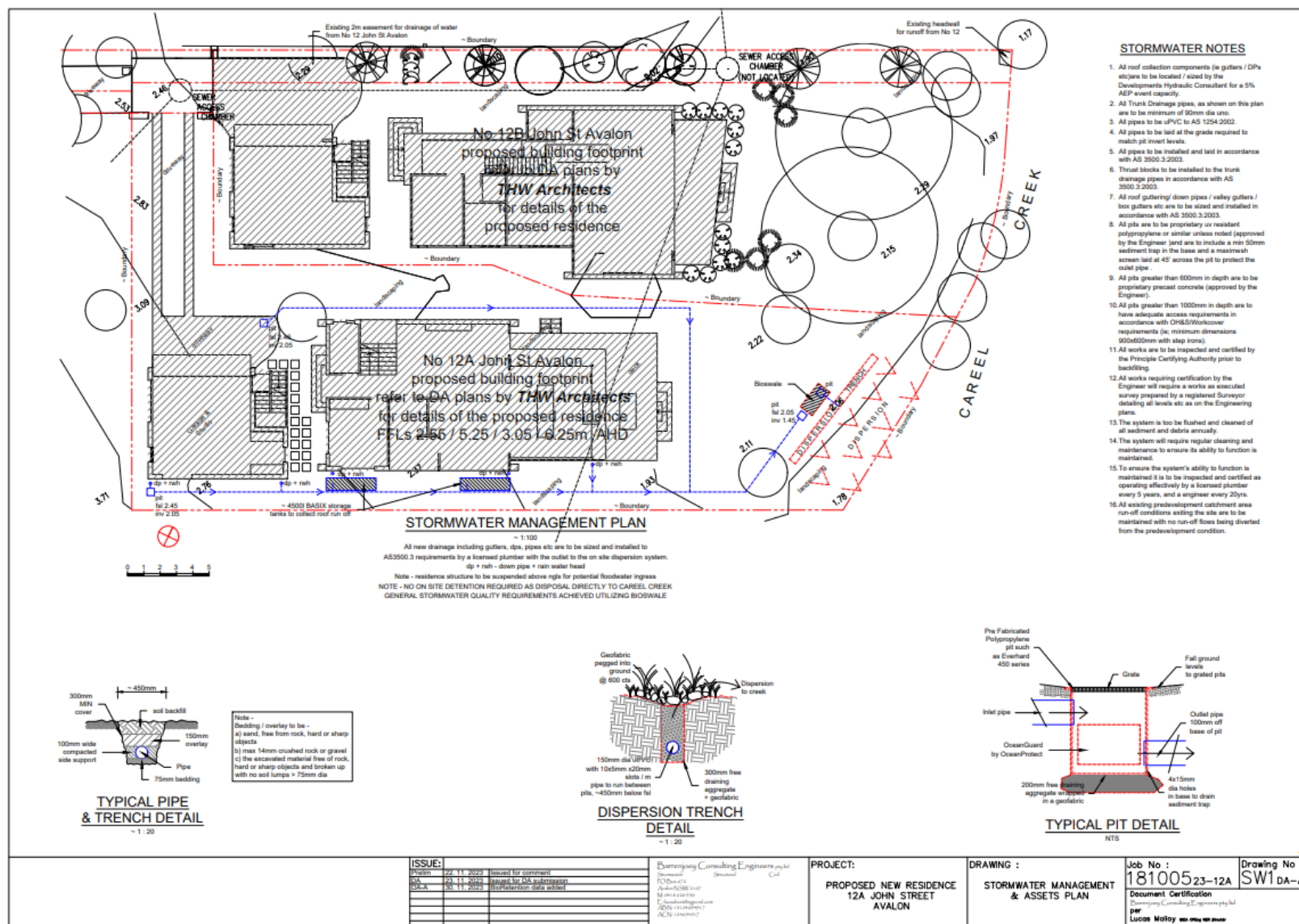


Figure 8.1a. Stormwater Management & Assets Plan. Sheet 1 of 2. Source: Barrenjoey Consulting Engineers Pty Ltd. 30.11.2023.

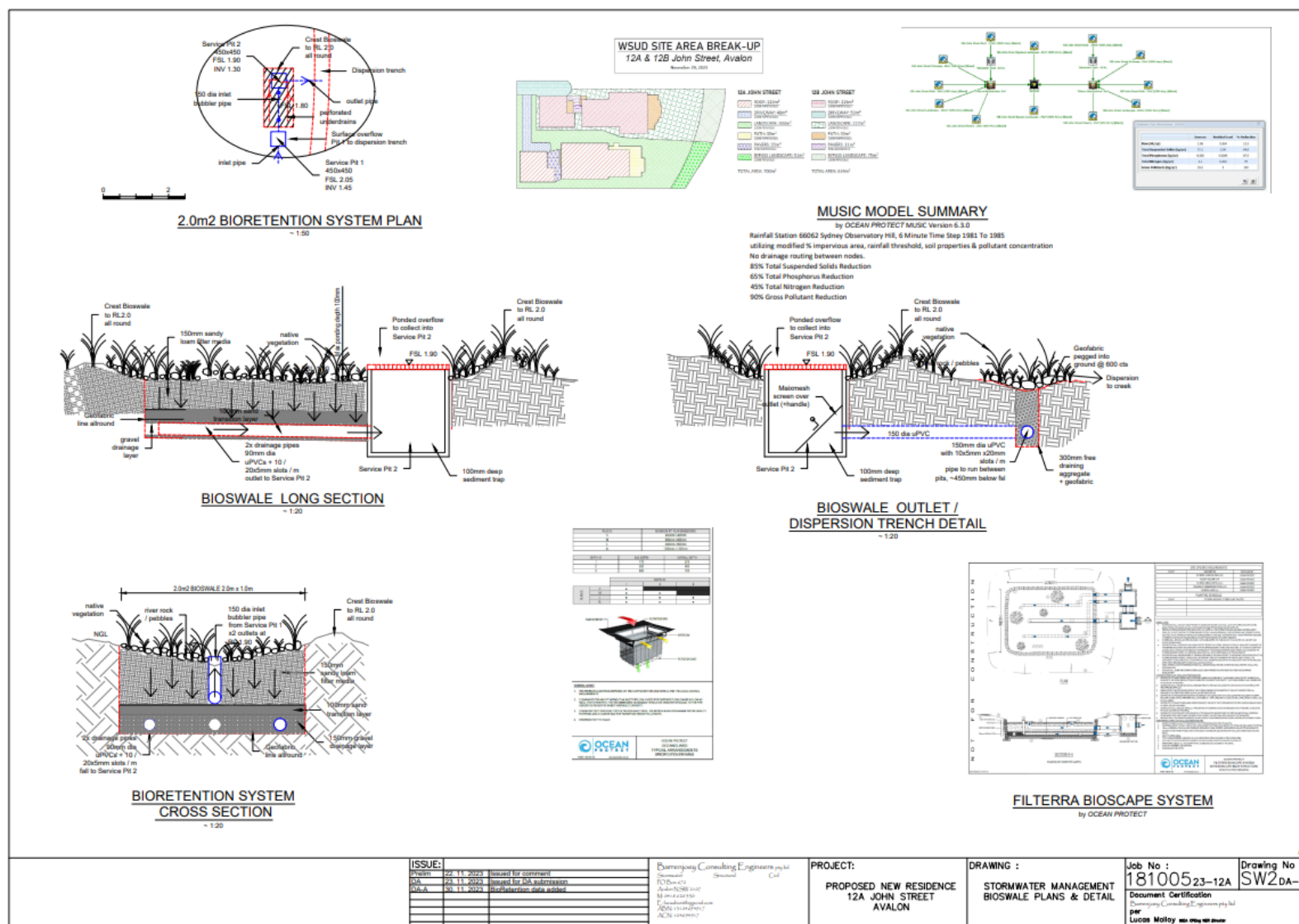


Figure 8.2b. Stormwater Management & Assets Plan. Sheet 1 of 2. Source: Barrenjoey Consulting Engineers Pty Ltd. 30.11.2023.

9 References

DPE 2022, Controlled activities – Guidelines for riparian corridors on waterfront land

https://www.nrar.nsw.gov.au/data/assets/pdf_file/0008/386207/licensing_approvals_controlled_activities_riparian_corridors.pdf

10 Appendices

10.1 Appendix I – Protected Matters Report

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	108
Listed Migratory Species:	63

Matters of National Environmental Significance

National Heritage Places		[Resource Information]	
Name	State	Legal Status	Buffer Status
Natural			
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	NSW	Listed place	In buffer area only

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only

Listed Threatened Ecological Communities

[Resource Information]

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

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area	In feature area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area	In feature area
Eastern Suburbs Banksia Scrub of the Sydney Region	Critically Endangered	Community may occur within area	In feature area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In buffer area only
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Community likely to occur within area	In buffer area only
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Community Name	Threatened Category	Presence Text	Buffer Status
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species

[Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Erythrorhynchus radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needle-tail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Lathamus discolor</u> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<u>Limosa lapponica baueri</u> Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Macronectes giganteus</u> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<u>Macronectes halli</u> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Melanodryas cucullata cucullata</u> South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In feature area
<u>Neophema chrysostoma</u> Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Numenius madagascariensis</u> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<u>Pachyptila turtur subantarctica</u> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Phoebastria fusca</u> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Pterodroma leucoptera leucoptera</u> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
<u>Pterodroma neglecta neglecta</u> Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Pycnoptilus floccosus</u> Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Rostratula australis</u> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Stagonopleura guttata</u> Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Sternula nereis nereis</u> Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Thalassarche bulleri</u> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Thalassarche bulleri platei</u> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Thalassarche carteri</u> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Thalassarche cauta</u> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Thalassarche eremita</u> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
<u>Thalassarche impavida</u> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [66463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
FISH			
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat known to occur within area	In feature area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Seriola lalandi Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Litoria aurea</u> Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Mixophyes balbus</u> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
<u>Balaenoptera borealis</u> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<u>Balaenoptera musculus</u> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<u>Balaenoptera physalus</u> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<u>Chalinolobus dwyeri</u> Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Dasyurus maculatus maculatus (SE mainland population)</u> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Eubalaena australis</u> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Isodon obesulus obesulus</u> Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Notamacropus parma</u> Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Petauroides volans</u> Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Petaurus australis australis</u> Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Petrogale penicillata</u> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</u> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Potorous tridactylus tridactylus</u> Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Pseudomys novaehollandiae</u> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Pteropus poliocephalus</u> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
OTHER			
<u>Dendronephthya australis</u> Cauliflower Soft Coral [90325]	Endangered	Species or species habitat may occur within area	In buffer area only
PLANT			
<u>Acacia bynoeana</u> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Acacia terminalis subsp. Eastern Sydney (G.P. Phillips 126) listed as Acacia terminalis subsp. terminalis MS</u> Sunshine Wattle (Sydney region) [91564]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Asterolasia elegans</u> [56780]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Astrotricha crassifolia</u> Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Caladenia tessellata</u> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Cryptostylis hunteriana</u> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Cynanchum elegans</u> White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In buffer area only
<u>Darwinia biflora</u> [14619]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Eucalyptus camfieldii</u> Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Genoplesium baueri</u> Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Grevillea shiressii</u> [19186]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
<u>Haloragodendron lucasii</u> Hal [6480]	Endangered	Species or species habitat may occur within area	In buffer area only
<u>Kunzea rupestris</u> [8798]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Lasiopetalum joyceae</u> [20311]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Leucopogon exolasius</u> Woronora Beard-heath [14251]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Melaleuca biconvexa</u> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Melaleuca deanei</u> Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Micromyrtus blakelyi</u> [6870]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Persicaria elatior</u> Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<u>Persoonia hirsuta</u> Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area	In buffer area only
<u>Pimelea curviflora var. curviflora</u> [4182]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Prostanthera densa</u> Villous Mintbush [12233]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Prostanthera junonis</u> Somersby Mintbush [64960]	Endangered	Species or species habitat may occur within area	In buffer area only
<u>Rhizanthella slateri</u> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In buffer area only
<u>Rhodamnia rubescens</u> Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<u>Rhodomyrtus psidioides</u> Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Syzygium paniculatum</u> Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Thesium australe</u> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
<u>Caretta caretta</u> Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Chelonia mydas</u> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
<u>Eretmochelys imbricata</u> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Hoplocephalus bungaroides</u> Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area	In feature area
<u>Natator depressus</u> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
<u>Carcharias taurus (east coast population)</u> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Carcharodon carcharias</u> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Galeorhinus galeus School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
SNAIL			
Meridolum maryae Maroubra Woodland Snail, Maroubra Land Snail [89884]	Endangered	Species or species habitat known to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Flesh-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Diomedea epomophora</u> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Diomedea exulans</u> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Diomedea sanfordi</u> Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
<u>Fregata ariel</u> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<u>Fregata minor</u> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
<u>Macronectes giganteus</u> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<u>Macronectes halli</u> Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Phaethon lepturus</u> White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
<u>Phoebastria fusca</u> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Sternula albifrons</u> Little Tern [82849]		Species or species habitat may occur within area	In feature area
<u>Thalassarche bulleri</u> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Thalassarche carteri</u> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Thalassarche cauta</u> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Thalassarche eremita</u> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
<u>Thalassarche impavida</u> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Thalassarche melanophris</u> Black-browed Albatross [64472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Thalassarche salvini</u> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<u>Thalassarche steadi</u> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Migratory Marine Species			
<u>Balaenoptera borealis</u> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<u>Balaenoptera edeni</u> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<u>Balaenoptera musculus</u> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Lagenorhynchus obscurus</u> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<u>Lamna nasus</u> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
<u>Megaptera novaeangliae</u> Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
<u>Mobula alfredi as Manta alfredi</u> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
<u>Mobula birostris as Manta birostris</u> Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
<u>Natator depressus</u> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<u>Orcinus orca</u> Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
<u>Rhincodon typus</u> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
<u>Cuculus optatus</u> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
<u>Hirundapus caudacutus</u> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<u>Monarcha melanopsis</u> Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<u>Limosa lapponica</u> Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
<u>Numenius madagascariensis</u> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<u>Pandion haliaetus</u> Osprey [952]		Species or species habitat known to occur within area	In buffer area only
<u>Tringa nebularia</u> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

11 Authors

With over 25 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by Southeast Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

Geraldene Dalby-Ball DIRECTOR



SPECIALISATIONS

- Urban Ecology – and habitat rehabilitation and re-creation.
- Urban waterway management – assessing, designing and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration – assessment, design and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor – environmental design, guidelines and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

- **Director and Ecologist**, Ecological Consultants Australia. 2014-present
- **Director and Ecologist**, Dragonfly Environmental. 1998-present
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Practicing member and vice president** Ecological Consultants Association of NSW

Brooke is a passionate and dedicated ecologist with valuable on ground experience working on bush regeneration projects throughout the Sydney Region. She has worked with various stakeholders across both public and private sectors to deliver sustainable and achievable environmental outcomes. She has worked on major construction contractors as well as smaller contractors to deliver tailored environmental solutions on time and within budget.

Brooke completed her Bachelor of Science at the University of Wollongong and is currently expanding her skills and knowledge undertaking Cert III in Conservation and Ecosystem Management at TAFE.

Brooke has experience conducting fieldwork and preparing a range of reports including the Flora and Fauna Assessment, Vegetation Management Plan (VMP), Biodiversity Development Assessment Report (BDAR), Certification Certification, Construction Environmental Management Plan (CEMP), Review of Environmental Factors (REF), and Environmental Impact Assessment (EIA).

Brooke has exceptional communication and customer service skills and can deliver professional ecological assessments.

Key Projects:

- Threatened species surveys.
- Flora and fauna surveys.
- Fauna spotter and handler.
- Aquatic fauna relocation.

Brooke Thompson ECOLOGIST



SPECIALISATIONS

- GIS mapping
- Fauna spotting
- Aquatic fauna relocation and handling
- Habitat tree assessment, marking and mapping
- Floristic plot surveys
- Flora and fauna field surveys

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. June 2022-*present*
- **Natural Area Specialist**, Dragonfly Environmental. January 2022-*present*
- **Volunteer**, Microplastic Surveying, University of Wollongong 2021
- **Volunteer**, Frog Surveying, Chad Beranek B EnvSc (Hons) UTS 2016

QUALIFICATIONS AND MEMBERSHIPS

- **BSc Conservation Biology**, University of Wollongong.
- Currently undertaking Cert III Conservation and Ecosystem Management.
- WHS General Induction of Construction Industry NSW White Card.