

## Contextual Information

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This chapter covers the following Director General's Requirements:

DGR 2. CONTEXTUAL INFORMATION

### 2.1 Description of Proposal, Subject Site and Study Area

DGR 2.1 Description of proposal, Subject Site and study area

*A species impact statement must include a full description of the action proposed, including its nature, extent, location, timing and layout (Section 110(1)).*

#### 2.1.1 Nature

The proposed development involves the subdivision of Lot 1 DP 408800 to create four new housing lots (hereafter referred to as “the Subject Site”). The components associated with this proposal include:

- Subdivision to create four lots;
- Provision for the construction of four new Torrens Title dwellings;
- Services for power, water and stormwater management; and
- Provision for Asset Protection Zones (APZs).

*i. Buildings or other structures*

No other buildings are proposed under the current DA.

*ii. Associated infrastructure such as for sewage, electricity, gas or water*

All associated infrastructure plans are contained within the Statement of Environmental Effects (SEE).

*iii. Routes for access and egress; drainage infrastructure and changes made to surface water flows*

The existing stormwater and drainage regime on the site involves two main elements:

- General overland flow across the site, including from existing residential developments upslope, without any specific or defined drainage pattern. However, most of the initial rainfall soaks into the ground rather than running off; and
- The concentrated water flow from the road runoff and urban drainage above the Subject Site. Runoff traverses the site through the road stormwater drainage line from the north-western part of the site to the south-eastern corner.

Proposed stormwater management for the future dwellings involves a range of specific stormwater management and drainage features including:

- Excavation by hand of a catchment drain across the Subject Site above all of the proposed dwellings (if deemed necessary) to capture excess overland flows discharged from properties upslope and re-direct that excess water into the drainage line through the site;
- Capture of stormwater discharges from the driveway upslope and discharge of that water through drainage swales designed to maximise the infiltration of stormwater into the soil profile;
- The use of 'water sensitive urban design' principles in the development design requirements for each individual dwelling on the site which will capture rainwater for re-use in landscape irrigation and for other uses; and
- Identification of drainage swales for each individual dwelling to ensure that roof runoff is captured and discharged via infiltration into the soil profile downslope of each dwelling to maintain soil moisture regimes.

*iv. Bushfire asset protection zones*

The vegetation on the Subject Site is mapped as 'Bushfire Prone Land - Vegetation Category 1', and there is a requirement for the provision of bushfire protection measures to each of the proposed dwellings on the Subject Site.

The bushfire protection measures prescribed for the Subject Site have been prepared in consideration of the environmental sensitivity of the site and the EEC vegetation present. Bushfire protection measures also take into account the nature of rainforest vegetation, and the relative ease with which fuel reduction measures can be accommodated while causing minimal disturbance.

Specific elements of the bushfire protection measures which are to be undertaken on the Subject Site at Newport are detailed in the Vegetation Management Plan for the site include:

- The provision of APZ's for each proposed allotment with the following dimensions:
  - Lot 1a: APZ of 8.6 m to the west, 6.5 m to the north west (extending into Lot 22 DP 1036400), and 5 m wide along the northern side of the dwelling;

- Lot 1b: APZ of 5 m wide along the northern side and 13.5 m along the eastern side of dwelling;
  - Lot 1c: APZ of 2m wide on the west of the dwelling and increasing to 23m along the south western boundary; and
  - Lot 1d APZ of 13.5 m APZ along the eastern side and 23 m on the south and south-eastern side of the dwelling on allotment 1d (Figure 2.2);
- Retention of rainforest canopy of trees, including Cabbage Tree Palms, as they do not contribute to fire behaviour when under fuels are well managed;
  - Shrubs sparsely separated into clumps;
  - Low groundcover species managed by raking to remove excess plant matter;
  - Excessive fuel loads on the ground surface (above 10-12mm for the soil) raked and removed from the site; and
  - Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (2002).

v. *Landscaping*

Landscaping does not form part of the current DA. However, the majority of the Subject Site will be retained as native vegetation. The Littoral Rainforest present will be protected and managed under a Vegetation Management Plan (VMP). Any landscaping that is done in the future will consist of planting only species that are not invasive to bushland, and preferably contained to pots and edged garden beds. A protective positive covenant will be enforced over each of the lots, and will include specifications for landscaping and directions for following the management regime specified in the VMP. All Asset Protection Zones (APZs) will be managed to reduce fuel loads, but as extensions of the Littoral Rainforest conservation area, rather than landscaped, as per the VMP.

### **2.1.2 Extent**

For the purposes of this SIS, the current proposal includes the subdivision and development of Lot 1 DP 408800, which has an area of 0.59 ha. The total area of the proposed works within the DA comprises approximately 0.28 ha including indicative building footprints totalling 0.08 ha, associated services, development set-backs and APZs.

### **2.1.3 Location**

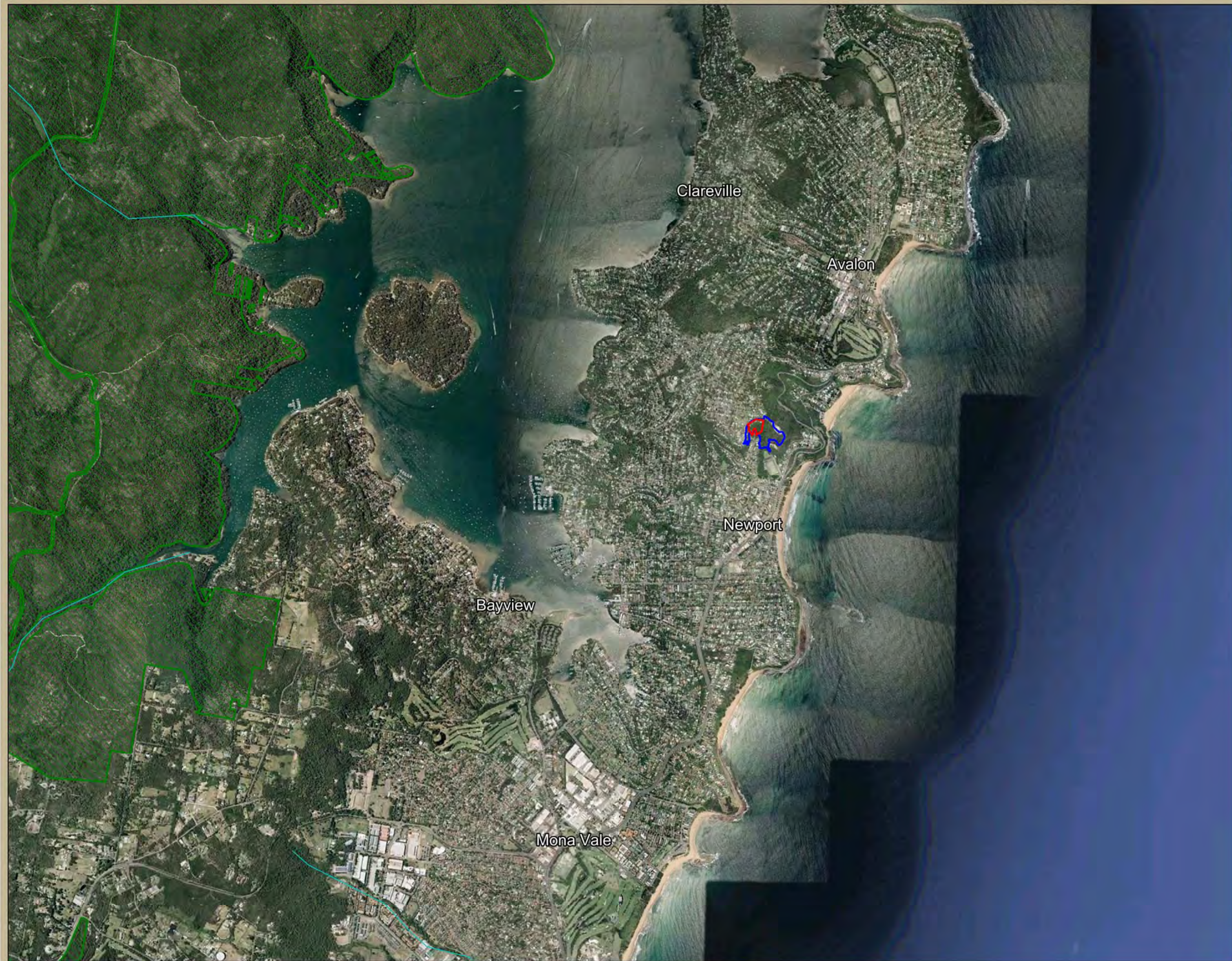
Development is proposed on the Subject Site as indicated in **Figure 2.1**, being Lot 1 DP 408800 and some associated works on Lots 21 and 22 DP 1036400, also known as 62 and 85 Hillside Road, Newport.

#### **2.1.4 Timing**

The current DA is seeking to subdivide Lot 1 DP 408800 and create four new lots. Future DA's will be submitted for each of the lots for approval to construct dwellings, and the timing for construction will be specified for each DA. The driveway and services will be constructed on approval of this DA, forecast for 2016/2017.

#### **2.1.5 Layout**

The layout (footprint) of the proposed development is shown in **Figure 2.2** and in architectural plans prepared by Martens and Associates are provided in the SEE.



**Legend**

- Subject Site
- Study Area
- National Parks and Reserves
- Watercourse

Image Source:  
Image © 2015 Sinclair Knight Merz  
(dated 01-01-2009)

Data Source:  
© Copyright Commonwealth of Australia  
(Geoscience Australia) 2006

NPWS (2012). NPWS Estate  
Data - Version 2/2012.



Figure 2.1. Location of the Subject Site and Study Area





- Legend**
- Subject Site
  - Approved Driveway (DA N0274/09)
  - Managed APZ (DA N0730/10)
  - Proposed Subdivision
  - Drainage Line
- Proposed Layout**
- Proposed Building Footprint
  - Set Back/ Modified Zone
  - Proposed APZ

Image Source:  
NearMap  
(dated 30-12-2014)



Figure 2.2. Proposed Works on the Subject Site



## 2.2 Land Tenure Information

### DGR 2.2 Land tenure information

The registered proprietor of the Subject Site is Cariste Pty Ltd. The Director of Cariste Pty Ltd; Mr Peter Roach, has the authority to lodge a development application in relation to the proposed development of the property.

Land use within the study area and the wider locality is shown in **Figure 2.4**.

#### **2.2.1 Description of the Subject Site**

The Subject Site is located at Lot 1 DP 408800 and Lot 21 and Lot 22 DP 1036400, also known as 62 and 85 Hillside Road, Newport and covers an area of approximately 1.06 ha. The Subject Site is zoned as E4 – Environmental Living under the *Pittwater Local Environmental Plan 2014* (LZN\_017). The Subject Site contains land subject to the Pittwater 21 Development Control Plan (DCP) Section B.4.17 Littoral Rainforest - Endangered Ecological Community. The site is bounded by residential properties on three sides, and Attunga Reserve adjoins the Subject Site to the east.

The Subject Site is generally vegetated with some cleared and landscaped areas surrounding an existing dwelling, derelict cottage, shed and driveway located towards the centre of the Subject site. Located around the cleared and exotic vegetation is littoral rainforest with a native canopy and exotic dominated understorey. In the north and southern sections of the Subject Site are areas of littoral rainforest with a native dominated understorey.

The Subject Site slopes steeply from the north-western side to the south-eastern boundary. There is extensive sandstone outcropping and boulders on the upper slopes. A drainage depression is present through the centre of the Subject Site.

#### **2.2.2 Description of the Study Area**

The Study Area includes the Subject Site and any additional areas that are likely to be affected by the proposal, either directly or indirectly. For the purposes of this SIS, the Study Area includes the surrounding undeveloped areas of the adjoining properties and a portion of the adjacent Attunga Reserve, as shown in **Figure 2.1**. The Study Area occurs wholly within the Pittwater LGA, in the Sydney Basin Bioregion.

##### *i. Soil Landscape*

The geology of the Subject Site is described as the Newport formation of the Narrabeen group of sandstones, some of which consist of quaternary deposits of alluvial materials, gravel, sand, silts and clay-derived particles.

Soils present on the Subject Site are colluvial materials of the Watagan soil landscape which are described as “*rolling to very steep hills on fine-grained Narabeen sediments*” with steep slopes, “*narrow convex crests and ridges*” and “*steep colluvial sideslopes, occasional sandstone boulders and benches*”. The soils themselves are shallow to deep

lithosols/siliceous sands and yellow podsolics on sandstones, and moderately deep brown and red podsolics on shales.

The Subject Site contains rock outcrops and large rock boulders with a variety of sand, clay and horizontal shale lenses through the site.

*ii. Fire History*

There is no evidence of recent fire in the Study Area, and it is unlikely to have occurred due to the low combustion potential of the rainforest vegetation.

*iii. Vegetation within the Study Area*

The vegetation of the Study Area includes the entire patch of Littoral Rainforest, as present on the Subject Site and adjoining Attunga Reserve, in various forms and condition, and also adjoining areas of urban native and exotic vegetation. Further to the east, moist forest types and heathland vegetation communities occur. A map of the vegetation communities present in the Study Area is shown in **Figure 4.2** and a detailed description of this vegetation is provided in Section 4.4.1.

### ***2.2.3 Significant Vegetation in the Locality***

The vegetation present in the Study Area is contiguous with native vegetation that forms a narrow stepping stone corridor in the locality, including the adjoining Attunga Reserve, native vegetation across undeveloped portions of the Barrenjoey Peninsular to the east and patches of vegetation that connects to Ku-Ring-Gai National Park to the west and Garigal National Park in the south, as shown in **Figure 2.5**.

### ***2.2.4 Local and Regional Corridors***

The Subject Site falls within a local corridor of vegetation that extends to the south, east and north. The widest part of the local corridor is 350 m, located within Attunga Reserve, to the east of the Subject Site, and the narrowest point is 26 m, occurring immediately to the south of the Subject Site, as shown in **Figure 2.5**. The proposed development of the Subject Site will not further reduce the width of the local corridor.

No regional corridors have been identified within the Study Area, however, within the broader locality, Ku-Ring-Gai Chase NP and Garigal NP form part of an important regional corridor for the Sydney Basin. The development of the Subject Site will not impede the effectiveness of this regional corridor.





**Legend**

- Subject Site
- Study Area
- Contours

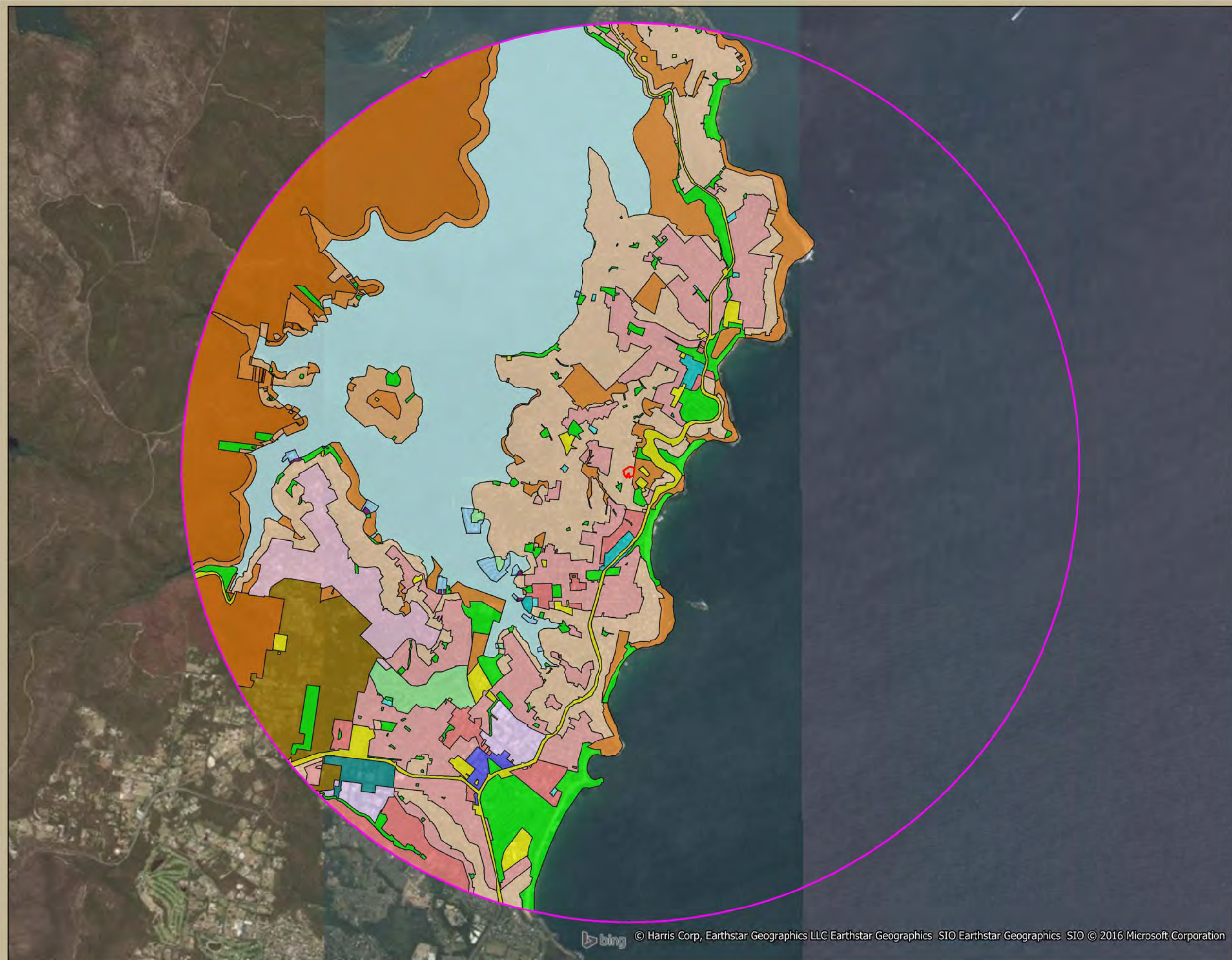
Image Source:  
Nearmap  
(dated 30-12-2014)

Data Source:  
NSW Land and Property  
Management Authority,  
SIX Viewer



Figure 2.3. Topography of the Subject Site and Study Area





- Legend**
- Subject Site
  - Locality (5km)
- Zone**
- B1 - Neighbourhood Centre
  - B2 - Local Centre
  - B4 - Mixed use
  - B7 - Business Park
  - E1 - National Parks/ Reserves
  - E2 - Environmental Conservation
  - E3 - Environmental Management
  - E4 - Environmental Living
  - IN2 - Light Industrial
  - IN4 - Working Waterfront
  - R2 - Low Density Residential
  - R3 - Medium Density Residential
  - R5 - Large Lot Residential
  - RE1 - Public Recreation
  - RE2 - Private Recreation
  - RU2 - Rural Landscape
  - SP2 - Infrastructure
  - W1 - Natural Waterways
  - W2 - Recreational Waterways

Data Source:  
Pittwater Council (2014). Pittwater  
Local Environmental Plan 2014 - LZN.



Figure 2.4. Land Use Zoning in the Locality



## 2.3 Vegetation

### DGR 2.3 Vegetation

The vegetation communities in the locality have been mapped by the Office of Environment and Heritage (OEH) as part of the broad-scale mapping project Sydney Metropolitan Catchment Management Authority (SMCMA) Vegetation Mapping (OEH, 2013b; OEH, 2013c).

The distribution of the vegetation communities occurring within the locality as mapped by the SMCMA is shown in **Figure 2.6**. The SMCMA map units have been verified and refined within the Subject Site by ground-truthing vegetation communities (refer to **Figure 4.2**).

The Critically Endangered Ecological Community Littoral Rainforest and Coastal Vine Thickets of Eastern Australia listed under the *EPBC Act* are known to occur within the Study Area. Other TSC Act listed Critically Endangered (CEEC) and Endangered Ecological Communities (EEC), as mapped by OEH (2013b; 2013c), that are known to occur in the wider locality include:

- Littoral Rainforest in the New South Wales North Coast Sydney Basin and South East Corner Bioregions (EEC);
- River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (EEC);
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC);
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC);
- Pittwater and Wagstaff Spotted Gum Forest in the Sydney Basin Bioregion (EEC);
- Coastal Upland Swamp in the Sydney Basin Bioregion (EEC);
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (EEC); and
- Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions (EEC).

Seagrass Meadows are listed as an Endangered Population under the NSW *Fisheries Management Act 1994*.

A broad range of communities, as mapped by OEH (2013c; 2013b), are known to occur in the locality, as shown in **Figure 2.6**. These vegetation communities have been described as per the SMCMA mapping with reference to Tozer *et al.* (2010) and relevant Scientific Committee determinations for Endangered Ecological Communities and are provided in

**Sections 2.3.1 – 2.3.5** below. Land uses and areas of significant native vegetation in the locality are shown in **Figure 2.4** and **2.5** respectively.

### **2.3.1 Coastal Escarpment Littoral Rainforest**

The SMCMA mapping for Coastal Escarpment Littoral Rainforest (Map Unit: S\_RF07) corresponds to the EEC listed community Littoral Rainforest in the New South Wales North Coast Sydney Basin and South East Corner Bioregions under the *TSC Act* and is a component of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, a CEEC under the *EPBC Act*.

Coastal Escarpment Littoral Rainforest is generally a closed forest found on protected escarpment slopes and gullies along the New South Wales coast dominated by rainforest species. The community is found up to 4 kilometres (km) from the coast at elevations less than 140 (m) and where rainfall exceeds 1200 millimetres (mm). This community prefers clay soils derived from shale layers and is found on the sheltered slopes of the lower Hacking River, the Sydney eastern suburbs, the Warringah escarpment and the Pittwater peninsula.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Emergent</b>	30 m ±7	5% ±0	<i>Angophora costata</i> , <i>Syncarpia glomulifera</i>
<b>Trees</b>	19 m ±5	64% ±23	<i>Acmena smithii</i> , <i>Livistona australis</i>
<b>Small Trees</b>	6 m ±3	18% ±18	<i>Eupomatia laurina</i> , <i>Livistona australis</i> , <i>Pittosporum undulatum</i> , <i>Synoum glandulosum</i> , <i>Breynia oblongifolia</i> , <i>Glochidion ferdinandi</i> , <i>Homalanthus populifolius</i> , <i>Notelaea longifolia</i>
<b>Ground covers</b>	1.0 m ±0.6	22% ±15	<i>Calochlaena dubia</i> , <i>Dianella caerulea</i> , <i>Oplismenus imbecillis</i> , <i>Pseuderanthemum variable</i> , <i>Doodia aspera</i> , <i>Blechnum cartilagineum</i> , <i>Adiantum aethiopicum</i> , <i>Adiantum hispidulum</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Cissus hypoglauca</i> , <i>Eustrephus latifolius</i> , <i>Smilax glycyphylla</i> , <i>Morinda jasminoides</i> , <i>Smilax australis</i>

### **2.3.2 Coastal Dune Littoral Rainforest**

The SMCMA mapping for Coastal Dune Littoral Rainforest (Map Unit: S\_RF06) also corresponds to the EEC listed community Littoral Rainforest in the New South Wales North Coast Sydney Basin and South East Corner Bioregions under the *TSC Act* and is a component of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, a CEEC under the *EPBC Act*.

Coastal Dune Littoral Rainforest is dominated by Tuckeroo (*Cupaniopsis anacardioides*) and is found on sandy substrates, unlike many other littoral rainforest communities. This community is found on recent sand deposits, typically in swales, depressions or low-lying

hind dunes. This community forms a low closed canopy of rainforest trees with an occasional eucalypt, casuarina, banksia or paperbark emergent. This community is currently only found in small, isolated stands of rainforest occurring in the Sydney area on the Kurnell Peninsula and Bundeena.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	15m	70%	<i>Cupaniopsis anacardioides</i> , <i>Syzygium paniculatum</i> , <i>Streblus brunonianus</i>
<b>Small Trees</b>	4m	10%	<i>Acmena smithii</i> , <i>Breynia oblongifolia</i> , <i>Pittosporum undulatum</i> , <i>Glochidion ferdinandi</i> , <i>Notelaea longifolia</i> , <i>Syzygium paniculatum</i>
<b>Ground covers</b>	0.4m	50%	<i>Pellaea falcata</i> , <i>Pteridium esculentum</i> , <i>Viola hederacea</i> , <i>Adiantum aethiopicum</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Cayratia clematidea</i> , <i>Cissus antarctica</i> , <i>Geitonoplesium cymosum</i> , <i>Hibbertia scandens</i> , <i>Maclura cochinchinensis</i> , <i>Marsdenia rostrata</i>

### 2.3.3 Coastal Headland Littoral Thicket

The SMCMA mapping for Coastal Headland Littoral Thicket (Map Unit: S\_RF08) also corresponds to the EEC listed community Littoral Rainforest in the New South Wales North Coast Sydney Basin and South East Corner Bioregions under the *TSC Act* and is a component of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, a CEEC under the *EPBC Act*.

Coastal Headland Littoral Thicket are situated on shale-influenced soils and found on sheltered headlands that face the open ocean. Due to the ocean-facing orientation and exposure to salt-laden winds this community forms a dense close-cropped thicket of rainforest trees. This community often has a stunted emergent layer, twisted tree trunks and low canopy of vines inhibiting the development of a shrub layer. This community occurs mainly between Newcastle and Batemans Bay and several stands in the Royal National Park and the Pittwater peninsula. This community is found below 160 m in elevation and less than 500 m from the ocean.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	15 m ±9	46% ±35	<i>Acmena smithii</i> , <i>Elaeodendron australe</i> , <i>Eucalyptus botryoides</i> , <i>Ficus rubiginosa</i> , <i>Livistona australis</i> , <i>Scolopia braunii</i>
<b>Small Trees</b>	8 m ±5	21% ±25	<i>Guioa semiglauca</i> , <i>Pittosporum undulatum</i> , <i>Diospyros australis</i> , <i>Myrsine variabilis</i> , <i>Clerodendrum tomentosum</i> , <i>Eupomatia laurina</i> , <i>Livistona australis</i> ,

			<i>Synoum glandulosum</i>
<b>Ground covers</b>	1.1 m ±0.6	23% ±14	<i>Oplismenus imbecillis</i> , <i>Asplenium flabellifolium</i> , <i>Doodia aspera</i> , <i>Gymnostachys anceps</i> , <i>Pellaea falcata</i> , <i>Pseuderanthemum variable</i> , <i>Viola hederacea</i> , <i>Dichondra repens</i> , <i>Gahnia melanocarpa</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Geitonoplesium cymosum</i> , <i>Cissus antarctica</i> , <i>Eustrephus latifolius</i> , <i>Pandorea pandorana</i> , <i>Smilax australis</i> , <i>Sarcopetalum harveyanum</i>

### 2.3.4 Coastal Warm Temperate Rainforest

Patches of the SMCMA mapping for Coastal Warm Temperate Rainforest (Map Unit: S\_RF03) does not meet criteria for either a State or Commonwealth listed threatened ecological community in this locality.

Coastal Warm Temperate Rainforest is a tall closed forest characterised by dense stands of *Ceratopetalum apetalum* (Coachwood) and/or *Doryphora sassafras* (Sassafras) in areas with clay loams derived from Narrabeen shale and occasionally basalt. This community is generally very shaded, highly diverse in ferns and vines and free from regular intense fire. This community is often found along the deep sheltered gullies of the Hacking River in Royal National Park and in Ku-ring-gai Chase National Park. This community requires over 1200 mm of rainfall and must be below 350 m in elevation.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Emergent</b>	40m	40%	<i>Eucalyptus pilularis</i> , <i>Eucalyptus saligna</i> , <i>Syncarpia glomulifera</i>
<b>Trees</b>	21 m ±8	49% ±32	<i>Ceratopetalum apetalum</i> , <i>Doryphora sassafras</i> , <i>Cryptocarya glaucescens</i> , <i>Callicoma serratifolia</i> , <i>Schizomeria ovata</i> , <i>Polyosma cunninghamii</i>
<b>Small Trees</b>	12 m ±6	42% ±25	<i>Acmena smithii</i> , <i>Synoum glandulosum</i> , <i>Guioa semiglaucula</i> , <i>Ficus coronata</i> , <i>Livistona australis</i> , <i>Eupomatia laurina</i> , <i>Diospyros australis</i>
<b>Shrubs</b>	1.7 m ±0.8	35% ±39	<i>Trochocarpa laurina</i> , <i>Wilkiea huegeliana</i> , <i>Notelaea longifolia</i> , <i>Tasmania insipida</i>
<b>Ground covers</b>	0.8 m ±0.3	12% ±10	<i>Blechnum cartilagineum</i> , <i>Doodia aspera</i> , <i>Adiantum formosum</i> , <i>Gymnostachys anceps</i> , <i>Calochlaena dubia</i> , <i>Pyrrhosia rupestris</i> , <i>Lastreopsis microsora</i> , <i>Pseuderanthemum variable</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Eustrephus latifolius</i> , <i>Morinda jasminoides</i> , <i>Smilax australis</i> , <i>Pandorea pandorana</i> , <i>Parsonsia straminea</i>

### 2.3.5 Central Coast Escarpment Moist Forest

The SMCMA mapping for Central Coast Escarpment Moist Forest (Map Unit: S\_WSF33) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Central Coast Escarpment Moist Forest is a tall open eucalypt forest with an open understorey of both mesophyllous and sclerophyllous shrubs and a continuous grassy groundcover found extensively on the foreshore slopes above the Hawkesbury River. The community is commonly found below 100 m in elevation on mid to lower south-facing slopes on Narrabeen sediments in areas that receive between 1150 – 1300 mm of mean annual rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	26 m ±4.1	35% ±13.1	<i>Angophora floribunda</i> , <i>Eucalyptus paniculata</i> subsp. <i>paniculata</i> , <i>Syncarpia glomulifera</i> , <i>Eucalyptus botryoides</i> , <i>Eucalyptus umbra</i> , <i>Eucalyptus piperita</i>
<b>Small Trees</b>	7.8 m ±2.5	14% ±11.1	<i>Allocasuarina torulosa</i> , <i>Synoum glandulosum</i> , <i>Livistona australis</i> , <i>Banksia integrifolia</i> , <i>Acmena smithii</i> , <i>Tristaniopsis laurina</i> , <i>Backhousia myrtifolia</i>
<b>Shrubs</b>	4.3 m ±2.4	20% ±16.8	<i>Livistona australis</i> , <i>Myrsine variabilis</i> , <i>Astrotricha floccosa</i> , <i>Dodonaea triquetra</i> , <i>Bursaria spinosa</i> , <i>Acacia floribunda</i> , <i>Acacia longissima</i> , <i>Pultenaea flexilis</i> , <i>Trema tomentosa</i> var. <i>aspera</i>
<b>Ground covers</b>	0.6 m ±0.3	50% ±20	<i>Calochlaena dubia</i> , <i>Pteridium esculentum</i> , <i>Blechnum cartilagineum</i> , <i>Dianella caerulea</i> , <i>Lomandra longifolia</i> , <i>Schelhammera undulata</i> , <i>Lepidosperma laterale</i> , <i>Gymnostachys anceps</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Billardiera scandens</i> , <i>Cassytha pubescens</i> , <i>Cissus hypoglauca</i> , <i>Clematis aristata</i> , <i>Geitonoplesium cymosum</i> , <i>Hibbertia dentata</i>

### 2.3.6 Coastal Enriched Sandstone Moist Forest

The SMCMA mapping for Coastal Enriched Sandstone Moist Forest (Map Unit: S\_WSF02) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Coastal Enriched Sandstone Moist Forest is a tall open eucalypt forest with a distinctive mesic shrub and small tree layer. This community is often dominated by eucalypts and smooth-barked apple (*Angophora costata*) in the upper canopy and forest oak (*Allocasuarina torulosa*) often located below. The groundcover tends to be dense with ferns and twiners. This community is often found in sandstone gullies and sheltered slopes enriched with clay material often sourced from the shale bands associated with Narrabeen sandstone on the Pittwater escarpment or Hawkesbury sandstone. The community occurs in areas between 10 – 120 m above sea level that receives between 850 – 1250 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	25 m ±6	34% ±15	<i>Angophora costata</i> , <i>Syncarpia glomulifera</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus pilularis</i> , <i>Eucalyptus saligna</i> , <i>Eucalyptus botryoides</i>
<b>Small Trees</b>	10 m ±5	30% ±21	<i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i> , <i>Ceratopetalum apetalum</i> , <i>Allocasuarina torulosa</i> , <i>Glochidion ferdinandi</i>
<b>Shrubs</b>	4.1 m ±2.9	25% ±18	<i>Notelaea longifolia</i> , <i>Pittosporum undulatum</i> , <i>Dodonaea triquetra</i> , <i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i> , <i>Polyscias sambucifolia</i> , <i>Pittosporum revolutum</i> , <i>Breynia oblongifolia</i> , <i>Myrsine variabilis</i>
<b>Ground covers</b>	1.3 m ±0.7	28% ±20	<i>Dianella caerulea</i> , <i>Lomandra longifolia</i> , <i>Calochlaena dubia</i> , <i>Entolasia stricta</i> , <i>Pteridium esculentum</i> , <i>Poa affinis</i> , <i>Pseuderanthemum variabile</i> , <i>Lepidosperma laterale</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Entolasia marginata</i> , <i>Gonocarpus teucroides</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Smilax glycyphylla</i> , <i>Pandorea pandorana</i> , <i>Eustrephus latifolius</i> , <i>Hibbertia dentata</i> , <i>Billardiera scandens</i> , <i>Cissus hypoglauca</i>

### 2.3.7 Central Coast Escarpment Dry Forest

The SMCMA mapping for Central Coast Escarpment Dry Forest (Map Unit: S\_WSF34) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Central Coast Escarpment Dry Forest is a moderately tall open forest that occurs on the dry, exposed foreshores overlooking the lower Hawkesbury River. This community is often dominated by forest oak (*Allocasuarina torulosa*), rough-barked apple (*Angophora floribunda*) and occasionally eucalypt species depending on the soil composition. The groundcover is moderate with kangaroo grass (*Themeda triandra*) and wire grass (*Entolasia stricta*) being very common. This community is restricted to the northerly and westerly aspects on Narrabeen sediments, the foreshore escarpments of Muogamarra and Marramarra reserves and occasionally on the exposed north side of the Hawkesbury River. This community occurs at elevations below 100 m and in areas that receive between 1000 - 1230 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	24 m ±6	37% ±18	<i>Angophora floribunda</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus umbra</i> , <i>Syncarpia glomulifera</i> , <i>Angophora costata</i> , <i>Corymbia gummifera</i>
<b>Small Trees</b>	9 m ±6	20% ±17	<i>Allocasuarina torulosa</i> , <i>Allocasuarina littoralis</i>
<b>Shrubs</b>	3.9 m ±2.9	25% ±16	<i>Xanthorrhoea arborea</i> , <i>Astrotricha floccosa</i> , <i>Acacia ulicifolia</i> , <i>Hibbertia empetrifolia</i> subsp. <i>empetrifolia</i>



<b>Ground covers</b>	0.9 m ±0.4	34% ±26	<i>Themeda australis, Lomandra confertifolia, Lomandra multiflora</i> subsp. <i>multiflora, Entolasia stricta, Panicum simile, Platysace linearifolia, Pomax umbellata</i>
<b>Vines and Climbers</b>	N/A	N/A	

### 2.3.8 Coastal Alluvial Bangalay Forest

The SMCMA mapping for Coastal Alluvial Bangalay Forest (Map Unit: S\_FoW01) corresponds to the EEC listed community River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions under the *TSC Act*.

Coastal Alluvial Bangalay Forest is found on low-lying alluvial deposits or sandy loams that have been washed from eroding sandstone ridges and gullies. This community is often associated with stream banks and inlets along the coastal zone and commonly floods with freshwater after heavy rains. Following saturation, these soils dry out to build a deep humic layer on top of the sand. This community is dominated by bangalay (*Eucalyptus botryoides*). A sparse lower layer of swamp oak (*Casuarina glauca*) is often found adjacent to the water and forest oak (*Allocasuarina torulosa*) is found on drier, elevated locations. This community has an open understory and a diverse ground layer with a high cover of ferns. This community is found less than five (5) km from the coastline in locations with an elevation less than 15 m and rainfall greater than 1200 mm.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Trees</b>	22 m ±6	29% ±16	<i>Eucalyptus botryoides, Angophora costata</i>
<b>Small Trees</b>	8 m ±4	17% ±15	<i>Allocasuarina torulosa, Livistona australis, Glochidion ferdinandi, Casuarina glauca</i>
<b>Shrubs</b>	5.4 m ±2.6	34% ±32	<i>Dodonaea triquetra, Acacia longifolia, Breynea oblongifolia</i>
<b>Ground covers</b>	1.2 m ±0.7	53% ±30	<i>Pteridium esculentum, Entolasia marginata, Imperata cylindrica</i> var. <i>major, Calochlaena dubia, Hydrocotyle peduncularis, Gahnia clarkei, Oplismenus imbecillis, Pratia purpurascens, Pseuderanthemum variabile, Pomax umbellata</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Eustrephus latifolius, Smilax glyciophylla, Kennedia rubicunda, Cissus hypoglauca, Glycine clandestina, Stephania japonica</i>

### 2.3.9 Coastal Enriched Sandstone Dry Forest

The SMCMA mapping for Coastal Enriched Sandstone Dry Forest (Map Unit: S\_DSF04) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Coastal Enriched Sandstone Dry Forest is a tall open eucalypt forest with an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover commonly found on the upper slopes and dry gullies of Sydney urban areas. It is widespread on the Hornsby plateau in areas that receive greater than 1000 mm of mean annual rainfall and are at elevations less than 200 m above sea level. It extends north of the Sydney area into the hinterland of the Central Coast.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	20 m ±5	29% ±16	<i>Angophora costata</i> <i>Corymbia gummifera</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus pilularis</i> , <i>Eucalyptus umbra</i> , <i>Syncarpia glomulifera</i>
<b>Small Trees</b>	8 m ±4	20% ±15	<i>Allocasuarina littoralis</i> , <i>Banksia serrata</i> , <i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i> , <i>Ceratopetalum gummiferum</i>
<b>Shrubs</b>	3.4 m ±2.0	19% ±14	<i>Acacia ulicifolia</i> , <i>Leptospermum trinervium</i> , <i>Persoonia levis</i> , <i>Acacia suaveolens</i> , <i>Acacia terminalis</i> <i>Lomatia silaifolia</i> , <i>Dodonaea triquetra</i> , <i>Banksia spinulosa</i>
<b>Ground covers</b>	1.3 m ±0.6	27% ±21	<i>Dianella caerulea</i> , <i>Entolasia stricta</i> , <i>Lomandra longifolia</i> , <i>Pteridium esculentum</i> , <i>Xanthosia pilosa</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Smilax glycyphylla</i> , <i>Billardiera scandens</i> , <i>Cassytha pubescens</i>

### 2.3.10 Coastal Flats Swamp Mahogany Forest

The SMCMA mapping for Coastal Flats Swamp Mahogany Forest (Map Unit: S\_FoW02) meets criteria as an EEC listed community Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions under the TSC Act.

Coastal Flats Swamp Mahogany Forest is an open forest community found in areas of impeded drainage near coastal swamps, lagoons and along low-lying drainage flats. This community is dominated by swamp mahogany (*Eucalyptus robusta*) with a smaller tree layer often with swamp oak (*Casuarina glauca*) and paperbarks (*Melaleuca linariifolia*, *Melaleuca styphelioides*). This community has a distinct mesic understorey and a groundcover comprising of ferns, grasses and herbs that are periodically wet. This community occurs at

elevations between 1 - 6 m and the largest remnant in the Sydney Metropolitan area is in the Warriewood Wetlands, often on low-lying alluvium rather than marine sediments.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	28 m ±4	33% ±4	<i>Eucalyptus robusta</i>
<b>Small Trees</b>	12 m ±6	27% ±18	<i>Glochidion ferdinandi</i> , <i>Casuarina glauca</i> , <i>Livistona australis</i> , <i>Melaleuca linariifolia</i> , <i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i> , <i>Melaleuca styphelioides</i>
<b>Shrubs</b>	4.5 m ±0.7	20% ±21	<i>Homalanthus populifolius</i> , <i>Acacia longifolia</i> , <i>Dodonaea triquetra</i>
<b>Ground covers</b>	1.8 m ±1.0	29% ±18	<i>Entolasia marginata</i> , <i>Hypolepis muelleri</i> , <i>Commelina cyanea</i> , <i>Gahnia clarkei</i> , <i>Viola hederacea</i> , <i>Hydrocotyle peduncularis</i> , <i>Pteridium esculentum</i> , <i>Alternanthera denticulata</i> , <i>Calochlaena dubia</i> , <i>Oplismenus aemulus</i> , <i>Oplismenus imbecillis</i> , <i>Phragmites australis</i> , <i>Blechnum camfieldii</i> , <i>Centella asiatica</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Stephania japonica</i>

### 2.3.11 Coastal Freshwater Swamp Forest

The SMCMA mapping for Coastal Freshwater Swamp Forest (Map Unit: S\_FoW03) does not correspond to a State or Commonwealth listed threatened ecological community.

Coastal Freshwater Swamp Forest is found on poorly drained substrates that are periodically inundated by fresh or brackish water. This community can have an open to dense canopy dominated by swamp oak (*Casuarina glauca*) and to a lesser extent paperbarks (*Melaleuca* spp.). The shrub layer is very sparse and herbs, ferns, rushes, sedges and grasses can be found in various combinations in the community. The groundcover is often dependent on freshwater or brackish influence. This community is not restricted to particular substrates and is found across the coastal plain and hinterland of the Sydney Metropolitan area. This community occurs on floodplains, near freshwater lagoons and freshwater fed back swamps near coastal estuaries between elevations of 2 - 10 m and in areas that receive 850 – 1250 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	23 m ±9	35% ±20	<i>Casuarina glauca</i> , <i>Melaleuca quinquenervia</i>
<b>Small Trees</b>	6 m ±3	4% ±3	<i>Pittosporum undulatum</i> , <i>Glochidion ferdinandi</i>

<b>Ground covers</b>	1.9 m ±1.0	33% ±16	<i>Hypolepis muelleri</i> , <i>Entolasia marginata</i> , <i>Gahnia sieberiana</i> , <i>Typha orientalis</i> , <i>Commelina cyanea</i> , <i>Hemarthria uncinata</i> , <i>Lobelia anceps</i> , <i>Carex appressa</i> , <i>Gleichenia dicarpa</i> , <i>Histiopteris incisa</i> , <i>Isachne globosa</i> , <i>Persicaria decipiens</i> , <i>Setaria distans</i>
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### 2.3.12 Coastal Sandstone Foreshores Forest

The SMCMA mapping for Coastal Sandstone Foreshores Forest (Map Unit: S\_DSF06) does not correspond to a State or Commonwealth listed threatened ecological community.

Coastal Sandstone Foreshores Forest is an open forest with a moist shrub and ground cover layer found on sheltered sandstone slopes along the foreshores of Sydney's major waterways and coastal escarpments. This forest is restricted to sandstone soils derived from either Hawkesbury or Narrabeen geology and is found in areas with a combination of low elevation (between 2 and 45 m above sea level) and mean annual rainfall that exceeds 1100 mm per annum.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Trees</b>	18 m ±7	30% ±14	<i>Angophora costata</i> , <i>Banksia integrifolia</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus botryoides</i> , <i>Eucalyptus pilularis</i>
<b>Small Trees</b>	6 m ±4	24% ±17	<i>Glochidion ferdinandi</i> , <i>Pittosporum undulatum</i> , <i>Allocasuarina littoralis</i> , <i>Breynia oblongifolia</i> , <i>Notelaea longifolia</i> , <i>Dodonaea triquetra</i> , <i>Elaeocarpus reticulatus</i> , <i>Polyscias sambucifolia</i> , <i>Acacia longifolia</i> , <i>Myrsine variabilis</i>
<b>Ground covers</b>	1.1 m ±0.5	27% ±21	<i>Dianella caerulea</i> , <i>Pteridium esculentum</i> , <i>Lomandra longifolia</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> var. <i>major</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Poa affinis</i> , <i>Themeda australis</i> , <i>Xanthorrhoea arborea</i> , <i>Lepidosperma laterale</i> , <i>Pratia purpurascens</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Smilax glycyphylla</i> , <i>Billardiera scandens</i> , <i>Pandorea pandorana</i> , <i>Glycine clandestina</i>

### 2.3.13 Coastal Sandstone Gully Forest

The SMCMA mapping for Coastal Sandstone Gully Forest (Map Unit: S\_DSF09) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Coastal Sandstone Gully Forest is a moderately tall open forest that occupies sheltered rocky aspects on infertile Hawkesbury sandstone. This community is dominated by Sydney peppermint (*Eucalyptus piperita*) and smooth-barked apple (*Angophora costata*). The understory is a diverse mix of heath and shrub species such as banksias, tea-trees and

wattles. This community is widely distributed along the eastern extent of the Sydney sandstone plateaus at elevations below 500 m and in areas that receive more than 1000 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	16 m ±6	30% ±14	<i>Angophora costata</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus piperita</i> , <i>Eucalyptus sieberi</i>
<b>Small Trees</b>	8 m ±5	29% ±23	<i>Banksia serrata</i> , <i>Ceratopetalum gummiferum</i>
<b>Shrubs</b>	3.6 m ±1.7	30% ±18	<i>Leptospermum trinervium</i> , <i>Persoonia levis</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Persoonia pinifolia</i> , <i>Dillwynia retorta</i> , <i>Platysace linearifolia</i> , <i>Acacia terminalis</i> , <i>Acacia suaveolens</i> , <i>Pimelea linifolia</i> , <i>Epacris longiflora</i> , <i>Lambertia formosa</i> , <i>Petrophile pulchella</i> , <i>Pultenaea stipularis</i> , <i>Woolisia pungens</i> , <i>Bossiaea heterophylla</i>
<b>Ground covers</b>	1.3 m ±0.7	22% ±16	<i>Entolasia stricta</i> , <i>Lomandra longifolia</i> , <i>Caustis flexuosa</i> , <i>Gonocarpus teucrioides</i> , <i>Lomatia silaifolia</i> , <i>Pteridium esculentum</i> , <i>Xanthosia tridentata</i> , <i>Lepyrodia scariosa</i> , <i>Lomandra obliqua</i> , <i>Dianella caerulea</i> , <i>Lepidosperma laterale</i> , <i>Xanthosia pilosa</i> , <i>Doryanthes excelsa</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Smilax glycyphylla</i>

### 2.3.14 Estuarine Mangrove Forest

The SMCMA mapping for Estuarine Mangrove Forest (Map Unit: S\_SW01) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Estuarine Mangrove Forest is a low closed to open forest occurring on mudflats occurring in Sydney's harbour, river coves and estuaries. Two species of mangroves are found in Sydney, grey mangrove (*Avicennia marina*) a taller species that often occurs in pure stands with little to no understory and river mangrove (*Aegiceras corniculatum*) often occurring as a small tree or shrub scattered around grey mangroves along upper reaches of coastal riverbanks. The distribution of this community is dynamic and is often influenced by clearing regimes and infilling, however this community has been known to recolonise areas that were formerly occupied by saltmarsh or in areas where there has been sediment accumulation.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics

<b>Small Trees</b>	7 m ±3	57% ±15	<i>Avicennia marina</i> var. <i>australasica</i> , <i>Aegiceras corniculatum</i>
<b>Ground covers</b>	1.0 m ±0	6% ±6	<i>Sarcocornia quinqueflora</i>

### 2.3.15 Estuarine Swamp Oak Forest

The SMCMA mapping for Estuarine Swamp Oak Forest (Map Unit: S\_FoW08) corresponds to the EEC listed community, Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions under the *TSC Act*.

Estuarine Swamp Oak Forest occurs immediately above tidal influence in the zonation from mangroves to terrestrial sclerophyll and mesophyll forests and woodlands. This community occurs on the fringes of saline waterbodies such as rivers, lagoons and tidal lakes. This community is dominated by dense monospecific stands of swamp oak (*Casuarina glauca*), a sparse and low-growing shrub layer and has a thick ground cover of salt-tolerant herbs, rushes and sedges. This community is relatively low diversity and comprises of a mix of terrestrial and wetland-typical species. This community is widely distributed along the coast of the Sydney Basin at elevations below 2 m.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Trees</b>	15 m ±3	36% ±14	<i>Casuarina glauca</i>
<b>Small Trees</b>	6 m ±4	23% ±23	<i>Casuarina glauca</i> , <i>Avicennia marina</i> , <i>Goodenia ovata</i> , <i>Suaeda australis</i>
<b>Ground covers</b>	0.9 m ±0.5	40% ±21	<i>Juncus kraussii</i> , <i>Baumea juncea</i> , <i>Samolus repens</i> , <i>Phragmites australis</i> , <i>Sporobolus virginicus</i> , <i>Atriplex australasica</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Tetragonia tetragonioides</i>

### 2.3.16 Pittwater Spotted Gum Forest

The SMCMA mapping for Pittwater Spotted Gum Forest (Map Unit: S\_WSF11) corresponds to the EEC listed community, Pittwater and Wagstaff Spotted Gum Forest in the Sydney Basin Bioregion under the *TSC Act*.

Pittwater Spotted Gum Forest is a tall open forest dominated by stands of spotted gum (*Corymbia maculata*) and occasionally grey ironbark (*Eucalyptus paniculata*) and broad-leaved white mahogany (*Eucalyptus umbra*) on the foreshores and escarpments of the Pittwater peninsula. The midstorey of this community is often a mixed layer of mesic and dry

shrub species and occasional palms. At times the ground cover may appear very grassy in areas of frequent fire and Burrawang (*Macrozamia communis*) is often present above a scatter of grasses, ferns and small vines. This community is closely associated with Narrabeen sediments exposed on rises, escarpments and footslopes throughout northern Pittwater LGA and Wagstaff peninsula. This community is found at elevations below 100 m and in areas that receive 1150 – 1300 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	24.8 m ±3.9	35% ±0	<i>Corymbia maculata</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus umbra</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus botryoides</i>
<b>Small Trees</b>	9 m ±5	27.5% ±24.7	<i>Allocasuarina torulosa</i> , <i>Elaeocarpus reticulatus</i> , <i>Glochidion ferdinandi</i>
<b>Shrubs</b>	1.8 m ±1.4	15% ±0	<i>Podolobium ilicifolium</i> , <i>Macrozamia communis</i> , <i>Notelaea longifolia</i> , <i>Synoum glandulosum</i> subsp. <i>Glandulosum</i>
<b>Ground covers</b>	0.5 m ±21.2	50% ±21	<i>Billardiera scandens</i> , <i>Dianella caerulea</i> , <i>Entolasia stricta</i> , <i>Lomandra longifolia</i> , <i>Xanthorrhoea macronema</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i> , <i>Schelhammera undulata</i> , <i>Themeda australis</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Eustrephus latifolius</i> , <i>Pandorea pandorana</i> , <i>Cassytha pubescens</i> , <i>Cissus hypoglauca</i> , <i>Geitonoplesium cymosum</i> , <i>Lomandra filiformis</i>

### 2.3.17 Sydney North Exposed Sandstone Woodland

The SMCMA mapping for Sydney North Exposed Sandstone Woodland (Map Unit: S\_DS11) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Sydney North Exposed Sandstone Woodland is an exposed heathy woodland with a typically low eucalypt canopy and a variable structure from open woodland to open forest. The dominant canopy species in this community includes Red Bloodwood (*Corymbia gummifera*) and Scribbly Gums (*Eucalyptus haemastoma*, *Eucalyptus racemosa*) with a lower canopy of Old-man Banksia (*Banksia serrata*). This community has a shrub layer that has a diverse range of sclerophyllous plants including banksia, tea-tree and wattles. The density of the shrub layer in this community is highly dependent on the fire frequency of the site. The ground cover of this community is largely sedges and grasses. This community is widely distributed across the Hawkesbury sandstone plateau of northern Sydney and the hinterland of the Central Coast on free-draining sandy soils in exposed locations. This community is coastal woodland and is restricted to elevations between 200 – 500 m and to areas that receive more than 900 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/-)	Cover (%)	Floristics
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	SD)	(+/- SD)	
<b>Small Trees</b>	8 m ±0	15% ±0	<i>Banksia serrata, Corymbia gummifera, Eucalyptus haemastoma, Corymbia eximia</i>
<b>Shrubs</b>	2.5 m ±0	35% ±0	<i>Acacia suaveolens, Allocasuarina distyla, Banksia ericifolia subsp. ericifolia, Boronia ledifolia, Gompholobium grandiflorum, Hakea dactyloides, Lambertia formosa, Leptospermum trinervium, Platysace linearifolia, Pultenaea tuberculata</i>
<b>Ground covers</b>	0.7 m ±0	15% ±0	<i>Cyathochaeta diandra, Entolasia stricta, Lepidosperma concavum, Lepyrodia scariosa, Lomandra glauca</i>

### 2.3.18 Coastal Sand Tea-tree Banksia Scrub

The SMCMA mapping for Coastal Sand Tea-tree Banksia Scrub (Map Unit: S\_HL02) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Coastal Sand Tea-tree Banksia Scrub is a littoral heath and scrub found on the coastal foredunes and beach ridges near the open ocean. This community is dominated by a dense cover of coast tea-tree (*Leptospermum laevigatum*) and coast banksia (*Banksia integrifolia*). The height of the scrub layer is dependent on exposure to prevailing winds. Despite the exposed location there usually is a soil profile as a result of clay influence in a sandstone headland or of sheltering from leeward scrubs that is able to support mesic shrubs and eucalypt species. This community has a small patchy distribution along the coast zone of the Sydney region between Port Stephens to Wollongong.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	11 m ±5	40% ±27	<i>Leptospermum laevigatum, Banksia integrifolia, Cupaniopsis anacardioides</i>
<b>Shrubs</b>	4.0 m ±1.9	28% ±21	<i>Monotoca elliptica, Breynia oblongifolia, Acacia longifolia, Pittosporum undulatum, Notelaea longifolia, Westringia fruticosa</i>
<b>Ground covers</b>	0.9 m ±0.7	27% ±24	<i>Lomandra longifolia, Commelina cyanea, Ficinia nodosa, Pelargonium australe, Pteridium esculentum, Dichondra repens, Viola hederacea, Imperata cylindrica var. major</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Hibbertia scandens, Glycine clandestina, Kennedia rubicunda</i>

### 2.3.19 Coastal Fore-dune Wattle Scrub

The SMCMA mapping for Coastal Fore-dune Wattle Scrub (Map Unit: S\_HL05) does not meet criteria for either a State or Commonwealth listed threatened ecological community.



Coastal Foredune Wattle Scrub is a low dense scrub found on coastal sand mass frontal dunes and beach ridges along the eastern coastline of New South Wales. The dominant species in this community are coast tea-tree (*Leptospermum laevigatum*) and coastal wattle (*Acacia longifolia*). The height of this community is reduced due to exposure to prevailing winds. Throughout the Sydney metropolitan area, several small patches that remain are derived from native plantings as part of dune stabilisation works and bush regeneration and are species poor. In remaining diverse remnants several salt-tolerant succulent herbs and grasses can be found that are unique to this community.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Small Trees</b>	5 m ±2	21% ±23	<i>Acacia longifolia</i> , <i>Leptospermum laevigatum</i> , <i>Banksia integrifolia</i> , <i>Monotoca elliptica</i>
<b>Shrubs</b>	2.7 m ±1.1	42% ±24	<i>Leucopogon parviflorus</i> , <i>Breynia oblongifolia</i> , <i>Rhagodia candolleana</i>
<b>Ground covers</b>	0.9 m ±0.4	20% ±15	<i>Spinifex sericeus</i> , <i>Carpobrotus glaucescens</i> , <i>Ficinia nodosa</i> , <i>Pelargonium australe</i> , <i>Dianella congesta</i> , <i>Dichondra repens</i> , <i>Scaevola calendulacea</i>

### 2.3.20 Coastal Headland Clay Heath

The SMCMA mapping for Coastal Headland Clay Heath (Map Unit: S\_HL01) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Coastal Headland Clay Heath is found on headlands with clay-influenced soil that promote a good cover of kangaroo grass (*Themeda australis*) and spiny-headed mat-rush (*Lomandra longifolia*) amongst the ground cover. This community is often associated with Narrabeen sandstone and shales on the northern beaches and south of Garie in Royal National Park. This community was desirable for grazing, with many sites now disturbed. Scrub she-oak is an important component of the assemblage.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Shrubs</b>	2.3 m ±1.5	23% ±14	<i>Hibbertia empetrifolia</i> , <i>Westringia fruticosa</i> , <i>Acacia longifolia</i> , <i>Banksia integrifolia</i> , <i>Leptospermum laevigatum</i> , <i>Pittosporum undulatum</i> , <i>Acacia myrtifolia</i> , <i>Allocasuarina distyla</i> , <i>Breynia oblongifolia</i> , <i>Homalanthus populifolius</i> , <i>Lasiopetalum ferrugineum</i>
<b>Ground covers</b>	1.0 m ±0	40% ±0	<i>Hibbertia empetrifolia</i> , <i>Dianella caerulea</i> , <i>Lomandra longifolia</i> , <i>Lomandra multiflora</i> , <i>Themeda australis</i> , <i>Pratia purpurascens</i> , <i>Astroloma humifusum</i> , <i>Centella asiatica</i> , <i>Desmodium varians</i> , <i>Dichondra repens</i> , <i>Entolasia stricta</i> , <i>Gahnia aspera</i> , <i>Gonocarpus</i>

			<i>teucroides</i> , <i>Microlaena stipoides</i> var. <i>stipoides</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Billardiera scandens</i> , <i>Cassytha glabella</i> , <i>Polymeria calycina</i>

### 2.3.21 Coastal Sandstone Rock Plate Heath

The SMCMA mapping for Coastal Sandstone Rock Plate Heath (Map Unit: S\_HL09) does not correspond to a State or Commonwealth listed threatened ecological community.

Coastal Sandstone Rock Plate Heath is a community containing massive sandstone plates or pavements that are exposed on Hawkesbury sandstone ridge tops across Sydney's coastal plateaus. This community comprises of a stunted open to sparse heath or shrub community that form on these outcrops or in a mosaic with bare rock and moss. Common dominant species include tick bush (*Kunzea ambigua*) and *Darwinia fascicularis*. Shrub cover and species compositions vary between sites. This community is restricted to rock platforms mostly in areas that receive between 1200 – 1500 mm of rainfall. This community is found on the Woronora and Hornsby plateaus.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Shrubs</b>	2.0 m ±0	55% ±49	<i>Kunzea ambigua</i> , <i>Leucopogon microphyllus</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Darwinia fascicularis</i> , <i>Epacris microphylla</i> , <i>Leptospermum trinervium</i> , <i>Persoonia pinifolia</i> , <i>Allocasuarina littoralis</i> , <i>Calytrix tetragona</i> , <i>Dillwynia retorta</i> , <i>Hakea sericea</i> , <i>Hakea teretifolia</i> , <i>Monotoca ledifolia</i> , <i>Pultenaea tuberculata</i> , <i>Zieria laevigata</i>
<b>Ground covers</b>	0.5 m ±0	35% ±7	<i>Drosera peltata</i> , <i>Lepidosperma viscidum</i> , <i>Lepyrodia scariosa</i> , <i>Schoenus ericetorum</i> , <i>Cyathochaeta diandra</i> , <i>Empodisma minus</i> , <i>Poranthera ericifolia</i> , <i>Thelionema umbellatum</i> , <i>Tricostularia pauciflora</i>

### 2.3.22 Coastal Sandstone Heath-Mallee

The SMCMA mapping for Coastal Sandstone Heath-Mallee (Map Unit: S\_HL08) does not correspond to a State or Commonwealth listed threatened ecological community.

Coastal Sandstone Heath-Mallee is a structurally variable community ranging from a treeless heath to low open woodland with mallees, commonly found on exposed skeletal soils along narrow ridges and exposed slopes of both the Woronora and Hornsby plateaus. The heath community is dominated by heath-leaved banksia (*Banksia ericifolia* subsp. *Ericifolia*) and a diverse range of other banksias, tea-trees, hakeas, wattles, grevilleas and geebung. The upper stratum may include low mallees and mallee-form eucalypts. The ground cover is variable comprising of sedges and other monocots. This community is widespread across

the coastal Hawkesbury sandstone plateaus of Sydney at elevations between 50 – 250 m and in areas that receive more than 1100 mm of rainfall.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Trees</b>	7.0 m ±3	17% ±13	<i>Angophora hispida</i> , <i>Banksia serrata</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus obstans</i> , <i>Eucalyptus luehmanniana</i> , <i>Eucalyptus haemastoma</i> . <i>Eucalyptus multicaulis</i>
<b>Shrubs</b>	3.08 m ±1.3	49% ±24	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Boronia ledifolia</i> , <i>Leptospermum trinervium</i> , <i>Leucopogon microphyllus</i> , <i>Acacia suaveolens</i> , <i>Leptospermum arachnoides</i> , <i>Grevillea oleoides</i> , <i>Hakea teretifolia</i> , <i>Banksia oblongifolia</i> , <i>Hakea dactyloides</i> , <i>Lambertia formosa</i> , <i>Leptospermum squarrosom</i> , <i>Darwinia fascicularis</i> , <i>Conospermum taxifolium</i> , <i>Hakea gibbosa</i> , <i>Pimelea linifolia</i> , <i>Epacris microphylla</i> , <i>Epacris pulchella</i> , <i>Kunzea capitata</i> , <i>Persoonia lanceolata</i> , <i>Hemigenia purpurea</i> , <i>Petrophile pulchella</i> , <i>Pultenaea tuberculata</i> , <i>Banksia marginata</i> , <i>Allocasuarina distyla</i>
<b>Ground covers</b>	0.8 m ±0.5	36% ±20	<i>Lomandra obliqua</i> , <i>Xanthorrhoea media</i> , <i>Actinotus minor</i> , <i>Cyathochaeta diandra</i> , <i>Dampiera stricta</i> , <i>Caustis pentandra</i> , <i>Schoenus imberbis</i> , <i>Lepyrodia scariosa</i>

### 2.3.23 Coastal Upland Wet Heath Swamp

The SMCMA mapping for Coastal Upland Wet Heath Swamp (Map Unit: S\_FrW02) corresponds, in part, to the EEC listed community, Coastal Upland Swamp in the Sydney Basin Bioregion under the *TSC Act*.

Coastal Upland Wet Heath Swamp is a wet heath-open sedgeland community that has a sparse to dense heath layer and is a component of the sandstone upland swamp complex found across Sydney Basin Bioregion. This community occurs in zones in or proximate to drainage lines where water seepage is more constant than it is in more elevated parts of the swamp and on peaty, regularly waterlogged soils. The upper stratum is dominated by banksia, hakea and tea-tree. Swamp banksia (*Banksia robur*) is a characteristic species of this community. The ground cover is diverse and abundant with sedges and ferns. This community is restricted to the coastal zone to areas that receive more than 1200 mm of rainfall. This community is found extensively on Maddens Plains and to a lesser extent Royal and Ku-ring-gai national park and above the Warringah escarpment.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
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<b>Shrubs</b>	1.5 m ±0	5-35%	<i>Hakea teretifolia</i> , <i>Banksia ericifolia</i> subsp. <i>ericifolia</i> , <i>Banksia robur</i> , <i>Viminaria juncea</i> , <i>Sprengelia incarnata</i> , <i>Banksia oblongifolia</i> , <i>Dillwynia floribunda</i> , <i>Leptospermum juniperinum</i> , <i>Boronia parviflora</i> , <i>Epacris obtusifolia</i> , <i>Isopogon anemonifolius</i>
<b>Ground covers</b>	Up to 1 m	70-90%	<i>Empodisma minus</i> , <i>Leptocarpus tenax</i> , <i>Gleichenia dicarpa</i> , <i>Xanthorrhoea resinosa</i> , <i>Entolasia stricta</i> , <i>Lepyrodia scariosa</i> , <i>Selaginella uliginosa</i> , <i>Dampiera stricta</i> , <i>Gahnia sieberiana</i> , <i>Lepidosperma limicola</i> , <i>Mitrasacme polymorpha</i> , <i>Blandfordia nobilis</i> , <i>Chorizandra sphaerocephala</i> , <i>Schoenus brevifolius</i> , <i>Gymnoschoenus sphaerocephalus</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Cassytha glabella</i>

### 2.3.24 Estuarine Saltmarsh

The SMCMA mapping for Estuarine Saltmarsh (Map Unit: S\_SW02) corresponds to the EEC listed community, Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions, under the *TSC Act*.

Estuarine Saltmarsh communities consist of low succulent herbs and rushes that form plains on tidally inundated land which adjoin open water and mangroves. Salinity is highly variable in this community depending on tidal influence, evaporation and fresh water accumulation. This community is dominated by chenopod species in frequently inundated areas within the estuarine saltmarsh while other species such as sea rush (*Juncus kraussii*) occupy drier and more elevated terrestrial margins. Within the Sydney Bioregion, many remnants are small in size, highly fragmented and patchy in distribution.

A floristic and structural summary of this community is provided below.

	<b>Height (m) (+/- SD)</b>	<b>Cover (%) (+/- SD)</b>	<b>Floristics</b>
<b>Shrubs</b>	0.5 m ±0	4%	<i>Aegiceras corniculatum</i> , <i>Avicennia marina</i> , <i>Casuarina glauca</i> , <i>Rhagodia candolleana</i>
<b>Ground covers</b>	0.6 m ±0.3	58%±21	<i>Samolus repens</i> , <i>Sarcocornia quinqueflora</i> , <i>Sporobolus virginicus</i> , <i>Juncus kraussii</i>

### 2.3.25 Beach Spinifex Grassland

The SMCMA mapping for Beach Spinifex Grassland (Map Unit: S\_GL01) does not meet criteria for either a State or Commonwealth listed threatened ecological community.

Beach Spinifex Grassland is an open cover of grasses and herbs that fringe the sandy beaches of the coastline and sandy inlets. This community is often temporary, found growing on mobile sand deposits. The dominant species is Grass Hairy Spinifex (*Spinifex sericeus*). This community is found across beach strands in New South Wales.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Ground covers</b>	Estimated 0.1 – 0.3m	Estimated 70%	<i>Spinifex sericeus</i>

### 2.3.26 Coastal Headland Grassland

The SMCMA mapping for Coastal Headland Grassland (Map Unit: S\_GL02) corresponds to the EEC listed community; Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions, under the *TSC Act*.

Coastal Headland Grassland comprises a low-growing continuous cover of kangaroo grass (*Themeda triandra*) and tussocks of spiny headed mat-rush (*Lomandra longifolia*). This community occurs on clay soils on exposed headlands, cliff faces and podsoil sand dunes along the coastal zone. Isolated clumps of native shrubs may occur, including coastal wattle (*Acacia longifolia*) and banksia species. This community occurs in small patch sizes at disjunct locations although it is widespread along coastal New South Wales.

A floristic and structural summary of this community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Shrubs</b>	1.5 m	1%	<i>Leucopogon parviflorus</i> , <i>Pimelea linifolia</i> , <i>Senecio lautus</i> , <i>Westringia fruticosa</i> , <i>Astroloma humifusum</i>
<b>Ground covers</b>	0.4m	98%	<i>Centella asiatica</i> , <i>Eragrostis brownii</i> , <i>Ficinia nodosa</i> , <i>Poranthera microphylla</i> , <i>Schoenus apogon</i> , <i>Themeda australis</i> , <i>Lomandra longifolia</i>
<b>Vines and Climbers</b>	N/A	N/A	<i>Glycine tabacina</i>

### 2.3.27 Seagrass Meadows

The SMCMA mapping for Seagrass Meadows (Map Unit: S\_SW03) is listed as an Endangered Population under the NSW *Fisheries Management Act 1994*.

Seagrass Meadows are marine vegetation in estuaries and lagoons covering four separate genera, Eel Grass (*Zostera capricorni*), Seagrass (*Posidonia australis*), Sea Wracks (*Halophila* spp.) and Seatassels (*Ruppia* spp.). Eelgrass species are the most extensive occurring at Towra Point and the lower reaches of the river. This community is found in estuaries and lagoons of the Hacking, Georges and Parramatta Rivers. Coastal lagoon systems at Dee Why and Narrabeen Lakes also support this population community.

A floristic and structural summary of this population community is provided below.

	Height (m) (+/- SD)	Cover (%) (+/- SD)	Floristics
<b>Seagrasses</b>	N/A	N/A	<i>Zostera capricorni</i> , <i>Zostera muelleri</i> , <i>Heterozostera tasmanica</i> , <i>Halophila ovalis</i> , <i>Halophila decipiens</i> , <i>Halophila australis</i> , <i>Posidonia australis</i> , <i>Ruppia polycarpa</i> , <i>Ruppia megacarpa</i>

## 2.4 Plans and Maps

### DGR 2.4 Plans and maps

The following maps are provided at the end of each chapter within the SIS:

#### Chapter 1

- Figure 1.1. Aerial Photograph of the Subject Site; and
- Figure 1.2. Zoning of the Subject Site

#### Chapter 2

- Figure 2.1. Location of the Subject Site and Study Area
- Figure 2.2. Proposed Works on the Subject Site
- Figure 2.3. Topography of the Subject Site and Study Area
- Figure 2.4. Landuse Zoning in the Locality
- Figure 2.5. Areas of Significant Native Vegetation in the Locality
- Figure 2.6. Vegetation Communities in the Locality

#### Chapter 3

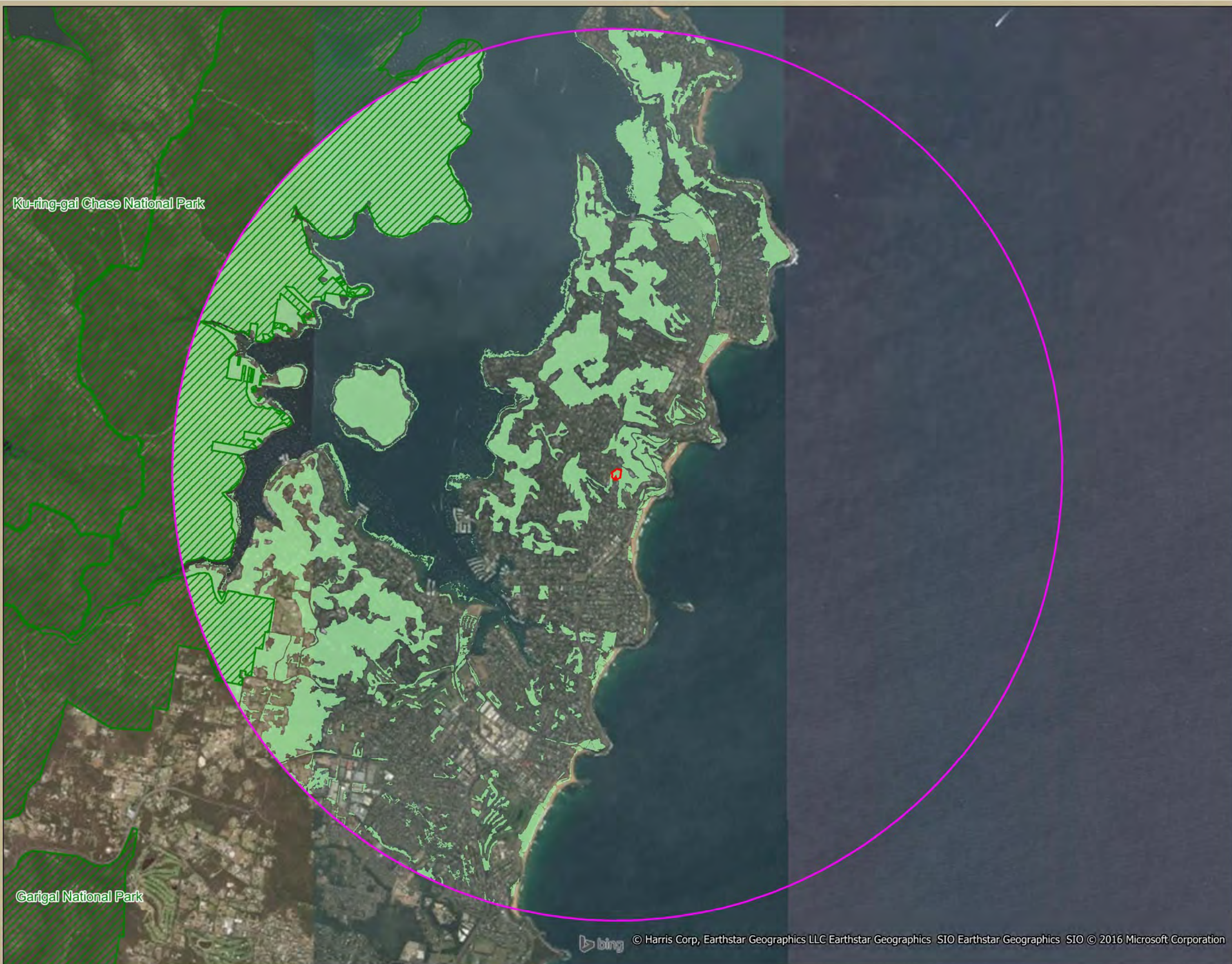
- Figure 3.1. Threatened Flora Recorded within the Locality
- Figure 3.2. Threatened Fauna Recorded within the Locality

#### Chapter 4

- Figure 4.1. Flora and Fauna Survey Locations
- Figure 4.2. Vegetation Communities within the Study Area

## Chapter 5

- Figure 5.1. Vegetation Removed and Retained on the Subject Site
- Figure 5.1. Powerful Owl Habitat in the Locality



- Legend**
- Subject Site
  - Locality (5km)
  - Native Vegetation
  - National Parks and Reserves

Ku-ring-gai Chase National Park

Carigal National Park

Data Source:  
 OEH (2013). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.

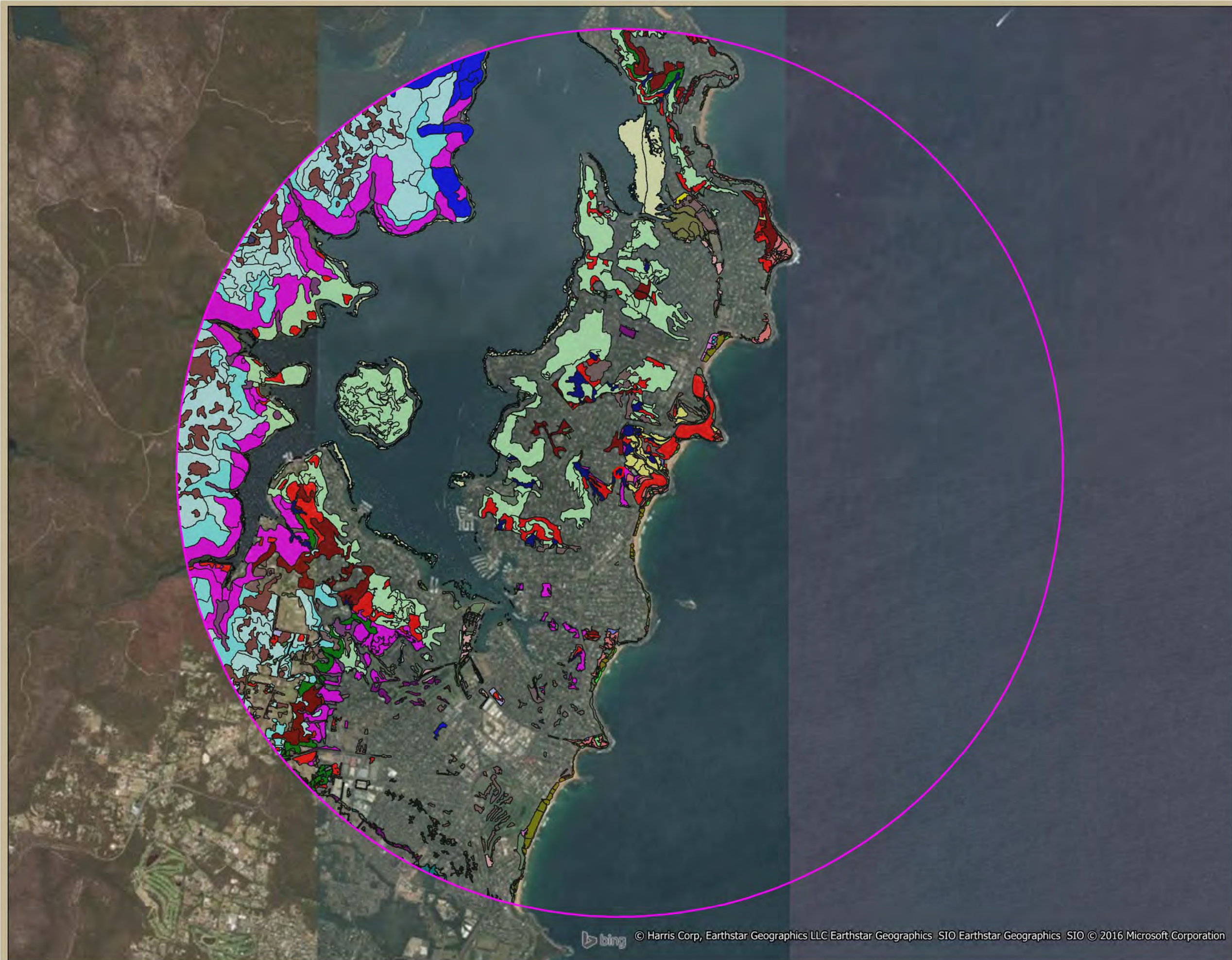
NPWS (2012). NPWS Estate Data - Version 2/2012.



Figure 2.5. Areas of Significant Native Vegetation in the Locality







- Legend**
- Subject Site
  - Locality (5km)
- Vegetation Community**
- Coastal Dune Littoral Rainforest
  - Coastal Escarpment Littoral Rainforest
  - Coastal Headland Littoral Thicket
  - Coastal Warm Temperate Rainforest
  - Central Coast Escarpment Moist Forest
  - Coastal Enriched Sandstone Moist Forest
  - Central Coast Escarpment Dry Forest
  - Coastal Alluvial Bangalay Forest
  - Coastal Enriched Sandstone Dry Forest
  - Coastal Flats Swamp Mahogany Forest
  - Coastal Freshwater Swamp Forest
  - Coastal Sandstone Foreshores Forest
  - Coastal Sandstone Gully Forest
  - Estuarine Mangrove Forest
  - Estuarine Swamp Oak Forest
  - Pittwater Spotted Gum Forest
  - Sydney North Exposed Sandstone Woodland
  - Coastal Sand Tea-tree-Banksia Scrub
  - Coastal Fore-dune Wattle Scrub
  - Coastal Headland Clay Heath
  - Coastal Sandstone Rock Plate Heath
  - Coastal Sandstone Heath-Mallee
  - Coastal Upland Wet Heath Swamp
  - Estuarine Saltmarsh
  - Beach Spinifex Grassland
  - Coastal Headland Grassland
  - Seagrass Meadows
  - Plantations
  - Urban Native and Exotic Cover
  - Weeds and Exotics
  - Rock, Sand, Built landscapes
  - Cleared

Data Source:  
 OEH (2013). The Native Vegetation of the Sydney Metropolitan Area. Office of Environment and Heritage NSW.



Figure 2.6. Vegetation Communities in the Locality

