

Figures

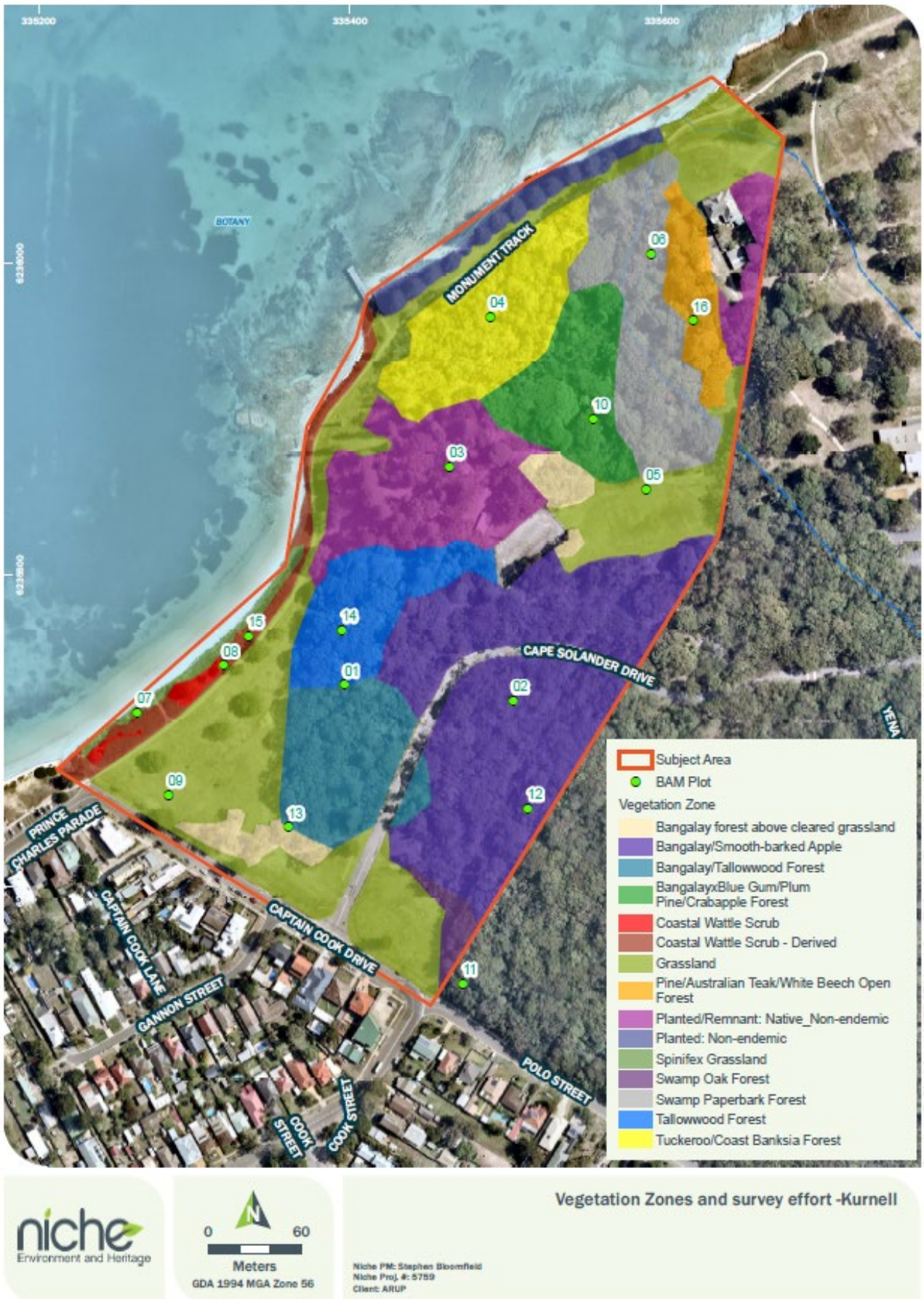


Figure 1.



Figure 2.



Figure 3.



Created by: YH/PM: T. Habitat features were identified using a combination of field observations and aerial photography. Date updated: 02/08/2023 10:00 AM



Habitat Features

Niche PM: Stephen Bloomfield
 Niche Proj. #: 5759
 Client: ARUP

Figure 4.



Threatened species recorded – Kurnell

Niche PM: Stephen Bloomfield
Niche Proj. #: 5759
Client: ARUP

Figure 5.



Threatened species recorded - LaPerouse

Niche PM: Stephen Bloomfield
Niche Proj. #: 5759
Client: ARUP

Figure 6.



Figure 7.

Appendix 1 – Plant community descriptions⁸

Kurnell

PCT: 661 Bangalay - Smooth-barked Apple - Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion

Landscape position: Occurs on coastal dune sand.

Description: Low open sclerophyll forest and woodland community.

Diagnostic features: Shrub and small tree layer with a prominent component of littoral rainforest (mesomorphic) species.

Diagnostic species: Trees: *Eucalyptus botryoides*, *Angophora costata*, *Eucalyptus robusta*, *Banksia integrifolia*, *Casuarina glauca*

Small Trees: *Banksia ericifolia*, *Banksia serrata*, *Cupaniopsis anacardioides*, *Banksia integrifolia*, *Pittosporum undulatum*, *Glochidion ferdinandi*, *Casuarina glauca*, *Leptospermum laevigatum*, *Elaeocarpus reticulatus*

Shrubs: *Breynia oblongifolia*, *Monotoca elliptica*, *Notelaea longifolia*, *Clerodendrum tomentosum*, *Leucopogon parviflorus*

Groundcovers: *Actinotus helianthin*, *Aotus ericoides*, *Lepidosperma laterale*; *Lomandra longifolia*, *Imperata cylindrical var. major*, *Pteridium esculentum*, *Commelina cyanea*, *Oplismenus imbecillis*

Vines and climbers: *Clematis aristata*, *Clematis glycinoides*, *Cissus Antarctica*, *Cissus hypoglauca*, *Hibbertia scandens*, *Geitonoplesium cymosum*, *Stephania japonica*, *Maclura cochinchinensis*, *Hibbertia scandens*, *Eustrephus latifolius*

This community dominates the study area and occurs in various formations. These formations have been classified into the following seven vegetation zones:

- Bangalay forest above cleared grassland
- Bangalay/Tallowwood Forest
- Bangalay x Blue Gum/Plum Pine/Crabapple Forest
- Pine/Australian Teak/White Beech Open Forest
- Planted/Remnant: Native_Non-endemic
- Tallowwood Forest
- Tuckeroo/Coast Banksia Forest.

A description of each zone and its alignment with PCT 661 has been provided below.

⁸ The diagnostic species provided at the start of each PCT description are sourced from the Vegetation Classification database (DPIE 2020c) and the Sydney Metro vegetation mapping (OEH 2016a).

Vegetation Zone: Bangalay forest above cleared grassland

Distribution within Site: Approximately 0.3 ha of this PCT was recorded at two locations within the Site, these being:

- adjacent to Captain Cook Drive
- near the carpark in the centre of the site (Figure 1).

Description: An open canopy of Bangalay (*Eucalyptus botryoides*) above a cleared understorey and maintained grassland. An isolated Tuckeroo (*Cupaniopsis anacardioides*) is present in the understorey, while the grassland is dominated by Couch (*Cynodon dactylon*) and the introduced Buffalo Grass (*Stenotaphrum secundatum*). Other native species present include Kidney Weed (*Dichindra repens*), Blue Flax-lily (*Dianella caerulea* var. *producta*) and Weeping Grass (*Microlaena stipoides*).

Condition and presence of weeds: This vegetation zone is in poor condition, due to its fragmented nature and size, location (i.e. within a cleared area) and lack of structure and species composition. Various introduced grasses, herbs and forbs are present within the groundcover.

High Threat Weeds recorded within this PCT include *Gazania rigens*, *Ehrharta erecta*, *Asparagus aethiopicus* and *Stenotaphrum secundatum*. Of these, *Asparagus aethiopicus* is listed as a priority weed under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Eucalyptus botryoides*.

Mid-storey: *Cupaniopsis anacardioides*.

Groundcover: None identified.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c) and dominant canopy species, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand, dominant canopy species and a determination of the most likely PCT that would have occupied the site prior to its modification based on geophysical characteristics (e.g. position, landform, aspect and lithology).

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 1: Bangalay forest above cleared grassland (PCT 661) (Plot 13)

Vegetation Zone: Bangalay/Tallowwood Forest

Distribution within Site: Approximately 0.77 ha of this PCT was recorded within the Site, occurring in the southern portion of the Site at the entrance to the National Park.

Description: An open canopy of Bangalay (*Eucalyptus botryoides*), Tallowwood (*Eucalyptus microcorys*) with Smooth-barked Apple (*Angophora costata*) and Turpentine (*Syncarpia glomulifera*) occurring less frequently above a small tree layer of Tuckeroo, Coast Banksia (*Banksia integrifolia*) and Sweet Pittosporum (*Pittosporum undulatum*). Coast Teatree (*Leptospermum laevigatum*), in association with Coast Banksia, occurs at the entrance to the National Park.

A shrub layer consists of mesophyllic species such as Sweet Pittosporum, Coffee Bush (*Breynia oblongifolia*), Tuckeroo, Large- Mock-olive (*Notelaea longifolia*) and Hairy Clerodendrum (*Clerodendrum tomentosum*), with Tree Broom-heath (*Monotoca elliptica*) occurring less frequently.

The groundcover is dominated by the exotic Asparagus Fern. Native grasses and vines are also characteristic, these including Blady Grass (*Imperata cylindrica*), Weeping Grass (*Microlaena stipoides*), Kangaroo Grass (*Themeda triandra*), Scrambling Lily (*Geitonoplesium cymosum*), Cockspur Thorn (*Maclura cochinchinensis*), Pearl Vine (*Sarcopetalum harveyanum*) and Wombat Berry (*Eustrephus latifolius*). Other native species present include Bracken (*Pteridium esculentum*), Snake Vine (*Stephania japonica*), Spiny-headed Mat-rush (*Lomandra longifolia*) and Blue-flax Lily (*Dianella caerulea* var. *producta*).

Condition and presence of weeds: This vegetation zone is in low condition, due to the high cover of weed species in the groundcover, and the presence of Tallowwood in the canopy.

High Threat Weeds recorded within this PCT include *Cenchrus clandestinus*, *Lantana camara*, *Ochna serrulata* and *Olea europaea* subsp. *cuspidata*. Of these, *Lantana camara* and *Olea europaea* subsp. *cuspidata* are listed as priority weeds under the NSW Biosecurity Act 2015 for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Eucalyptus botryoides*.

Mid-storey: *Cupaniopsis anacardioides*, *Banksia integrifolia*, *Pittosporum undulatum*, *Leptospermum laevigatum*.

Under-storey: *Breynia oblongifolia*, *Monotoca elliptica*, *Notelaea longifolia*, *Clerodendrum tomentosum*.

Groundcover: *Imperata cylindrical* var. *major*, *Lomandra longifolia*, *Pteridium esculentum*, *Geitonoplesium cymosum*, *Stephania japonica*, *Maclura cochinchinensis*, *Eustrephus latifolius*.

Justification of evidence used to identify the PCT: Its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species in each strata, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand and dominant species.

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 2: Bangalay/Tallowwood forest (PCT 661) (Plot 1)

Vegetation Zone: Bangalay x Blue Gum/Plum Pine/Crabapple Forest

Distribution within Site: Approximately 0.68 ha of this PCT was recorded within the Site. It occurs in the central northern portion of the Site, to the north of the Cleared Grassland (Figure 1).

Description: An open canopy of *Eucalyptus botryoides* <--> *saligna*, with Crabapple (*Schizomeria ovata*) occurring less frequently, above a medium density mid-storey of Plum Pine (*Podocarpus elatus*), Sweet Pittosporum, Celery Wood (*Polyscias elegans*), Magenta Lilly Pilly (*Syzygium paniculatum*), Coast Banksia, Cabbage Palm (*Livistona australis*) and Flintwood (*Scolopia braunii*), though the latter occurs infrequently.

The understorey is dominated by Celery Wood, Magenta Lill Pilly (*Syzygium paniculatum*) and Blueberry Ash (*Elaeocarpus reticulatus*), with Rough Fruit Pittosporum and Coffee Bush also present. The introduced Lady-of-the-night (*Cestrum nocturnum*) is also common.

The groundcover is a mix of native and introduced species. Common native species include Native Wandering Jew, Native Grape, Spiny-headed Mat-rush, Blue Flax-lily, Kidney Weed, *Oplismenus imbecillis* and Stinking Pennywort (*Hydrocotyle laxiflora*). Common introduced species include Panic Veldt Grass, Asparagus Fern and Kikuyu Grass (*Cenchrus clandestinus*).

Condition and presence of weeds: This vegetation zone is in poor condition, due to the high cover of weed species in the groundcover, and modified structure and species composition.

High Threat Weeds recorded within this PCT include *Asparagus aethiopicus*, *Lantana camara* and *Ehrharta erecta*. Of these, *Asparagus aethiopicus*, *Cenchrus clandestinus* and *Lantana camara* are listed as priority weeds under the NSW Biosecurity Act 2015 for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Eucalyptus botryoides* <--> *saligna*.

Mid-storey: *Banksia serrata*, *Cupaniopsis anacardioides*, *Banksia integrifolia*, *Pittosporum undulatum*, *Glochidion ferdinandi*, *Elaeocarpus reticulatus*, *Cupaniopsis anacardioides*, *Breynia oblongifolia*, *Clerodendrum tomentosum*. *Maclura cochinchinensis*.

Groundcover: *Lomandra longifolia*, *Commelina cyanea*, *Oplismenus imbecillis*, *Geitonoplesium cymosum*,

Justification of evidence used to identify the PCT: Its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species in each strata, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand and dominant species.

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 3: Bangalay x Blue Gum/Plum Pine/Crabapple Forest (PCT 661) (Plot 10)

Vegetation Zone: Pine/Australian Teak/White Beech Open Forest

Distribution within Site: Approximately 0.34 ha of this PCT was recorded within the Site. It occurs in the north-east of the Site, to the west of the Cottage (Figure 1).

Description: An open canopy of planted pines (*Araucaria spp.*) and rainforest trees such as Bennett's Ash (*Flindersia bennettiana*) (non-endemic) and White Beech. Bangalay and Port Jackson Fig occur infrequently. The understorey is also open and consists of Sweet Pittosporum, Bennett's Ash and Plum Pine, with Cockspur Thorn occurring less frequently.

The groundcover is dominated by a high density layer of exotic species such as Buffalo Grass, Asparagus Fern and Panic Veldt Grass, with *Hydrocotyle bonariensis* occurring less frequently. Native species include Native Wandering Jew and *Oplismenus aemulus*, with Spiny-headed Mat-rush occurring less frequently.

Condition and presence of weeds: This vegetation zone is in poor condition, due to its fragmented nature and size, location (i.e. adjacent to a cleared area) and lack of structure and species composition. The groundcover also has a high cover of weed species.

High Threat Weeds recorded within this PCT include *Ochna serrulata*, *Paspalum dilatatum*, *Senna pendula var. glabrata*, *Schefflera actinophylla*, *Stenotaphrum secundatum*, and *Ehrharta erecta*. Of these, *Asparagus aethiopicus* is listed as a priority weed under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Eucalyptus botryoides*.

Mid-storey: *Pittosporum undulatum*, *Cupaniopsis anacardioides*, *Maclura cochinchinensis*.

Groundcover: *Lomandra longifolia*, , *Commelina cyanea*.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c) and dominant canopy species, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand, dominant canopy species and a determination of the most likely PCT that would have occupied the site prior to its modification based on geophysical characteristics (e.g. position, landform, aspect and lithology).

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 4: Pine/Australian Teak/White Beech Open Forest (PCT 661) (Plot 16)

Vegetation Zone: Planted/Remnant: Native_Non-endemic

Distribution within Site: Approximately 1.27 ha of this PCT was recorded at two locations within the Site, these being:

- the central portion of the Site, in association with open parkland and east of the Cook monument
- in the north-east of the Site, to the east of the cottage (Figure 1).

Description: An open canopy of remnant species such as Tuckeroo and Bangalay, as well as planted Norfolk Island Pine (*Araucaria heterophylla*), Brushbox (*Lophostemon confertus*), Tallowwood and Forest Red Gum (*Eucalyptus tereticornis*) above a cleared understorey and maintained grassland. No understorey is present, though an isolated introduced Black-berry Nightshade (*Solanum nigrum*) while the grassland is dominated by the introduced Panic Veldt Grass (*Ehrharta erecta*) and Buffalo Grass (*Stenotaphrum secundatum*). Native species present include Kidney Weed (*Dichindra repens*) and Couch.

Condition and presence of weeds: This vegetation zone is in poor condition, due to its fragmented nature and size, location (i.e. within a cleared area) and lack of structure and species composition. Various introduced grasses, herbs and forbs are present within the groundcover.

High Threat Weeds recorded within this PCT include *Asparagus aethiopicus*, *Stenotaphrum secundatum* and *Ehrharta erecta*. Of these, *Asparagus aethiopicus* is listed as a priority weed under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Cupaniopsis anacardioides*, *Eucalyptus botryoides*.

Mid-storey: None identified.

Groundcover: None identified.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant canopy species, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand, dominant canopy species and a determination of the most likely PCT that would have occupied the site prior to its modification based on geophysical characteristics (e.g. position, landform, aspect and lithology).

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 5: Planted/Remnant: Native_Non-endemic (PCT 661) (Plot 3)

Vegetation Zone: Tallowwood Forest

Distribution within Site: Approximately 0.63 ha of this PCT was recorded within the Site. It occurs in the southern half of the site fronting the cleared grassland and foreshore area (Figure 1).

Description: An open canopy of Tallowwood (*Eucalyptus microcorys*) and Smooth-barked Apple (*Angophora costata*), with Turpentine occurring less frequently. Tallowwood is also present as an isolated mid-storey species.

The shrub layer consists of mesophyllic species such as Coffee Bush, Large- Mock-olive, Hairy Clerodendrum, Rough Fruit Pittosporum (*Pittosporum revolutum*), Sweet Pittosporum and Tuckeroo. Tree Broom-heath and Hickory Wattle (*Acacia implexa*) occur less frequently. The introduced African Olive and *Senna pendula var. glabrata* are also present.

The groundcover is dominated by the exotic Asparagus Fern, Buffalo Grass and Panic Veldt Grass. Native species include Spiny-headed Mat-rush, Bracken, Couch, Scrambling Lily, Cockspur Thorn (*Maclura cochinchinensis*), Milk Vine (*Marsdenia rostrata*).

Condition and presence of weeds: This vegetation zone is in low condition, due to the high cover of weed species in the groundcover, and the presence of Tallowwood in the canopy.

High Threat Weeds recorded within this PCT include *Ehrharta erecta*, *Olea europaea subsp. cuspidata*, *Senna pendula var. glabrata*, *Stenotaphrum secundatum* and *Asparagus aethiopicus*. Of these, *Olea europaea subsp. cuspidata* and *Asparagus aethiopicus* are listed as priority weeds under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Angophora costata* *Eucalyptus botryoides*.

Under-storey: *Cupaniopsis anacardioides*, *Pittosporum undulatum*, *Breynia oblongifolia*, *Monotoca elliptica*, *Notelaea longifolia*, *Clerodendrum tomentosum*

Groundcover: *Lomandra longifolia*, *Pteridium esculentum*, *Geitonoplesium cymosum*, *Maclura cochinchinensis*, *Eustrephus latifolius*

Justification of evidence used to identify the PCT: Its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species in each strata, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand and dominant species.

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 6: Tallowood Forest (PCT 661) (Plot 14)

Vegetation Zone: Tuckeroo/Coast Banksia Forest

Distribution within Site: Approximately 0.90 ha of this PCT was recorded within the Site. It occurs in the northern half of the site fronting the foreshore, near the decommissioned wharf (Figure 1).

Description: A canopy of Tuckeroo and Bangalay, as well as Port Jackson Fig (*Ficus rubiginosa*), above an understorey of Coast Banksia, Swamp Oak (*Casuarina glauca*). Mesophyllic shrub species such as Coffee Bush, Cockspur Thorn, Large- Mock-olive, Hairy Clerodendrum, Sweet Pittosporum are common, while Cheese Tree and the introduced African Olive are less common.

The groundcover is dominated by the exotic Asparagus Fern and Panic Veldt Grass, with the introduced species Wandering Jew (*Tradescantia fluminensis*) and Cobbler's Pegs (*Bidens pilosa*) present at as lower value of cover. Common native species include Spiny-headed Mat-rush, Native Grape (*Cayratia clematidea*), Native Wandering Jew (*Commelina cyanea*), Blue Flax-lily and Kidney Weed (*Dichandra repens*), Knobby Club-rush (*Ficinia nodosa*), *Oplismenus imbecillis*, Blady Grass. Wombat Berry and Snake Vine occur less frequently.

Condition and presence of weeds: This vegetation zone is in low condition, due to the high cover of weed species in the groundcover.

High Threat Weeds recorded within this PCT include *Araujia sericifera*, *Schefflera actinophylla*, *Tradescantia fluminensis*, *Olea europaea subsp. cuspidata*, *Bidens pilosa*, *Ehrharta erecta* and *Asparagus aethiopicus*. Of these, *Olea europaea subsp. cuspidata* and *Asparagus aethiopicus* are listed as priority weeds under the NSW Biosecurity Act 2015 for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Cupaniopsis anacardioides*, *Eucalyptus botryoides*.

Mid-storey: *Banksia integrifolia*, *Casuarina glauca*, *Cupaniopsis anacardioides*, *Glochidion ferdinandi*, *Breynia oblongifolia*, *Notelaea longifolia*, *Clerodendrum tomentosum*.

Groundcover: None identified. *Lomandra longifolia*, *Imperata cylindrical var. major*, *Commelina cyanea*, *Oplismenus imbecillis*, *Stephania japonica*, *Maclura cochinchinensis*, *Eustrephus latifolius*.

Justification of evidence used to identify the PCT: Its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species in each strata, aligns this vegetation zone with PCT 661.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand and dominant species.

Conservation Status: PCT 661 is a component of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale which is listed as Endangered under the BC Act.



Plate 7: Tuckeroo/Coast Banksia Forest (PCT 661) (Plot 4)

PCT: 1778 Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney

Landscape position: Occurs on sheltered sandstone slopes along the foreshores of Sydney's major waterways and coastal escarpments and requires a combination of low elevation (between two and 45 metres above sea level) and mean annual rainfall that exceeds 1100 millimetres per annum.

Description: Open forest with a moist shrub layer and a ground cover of ferns, rushes and grasses.

Diagnostic features: None provided.

Diagnostic species: Trees: *Angophora costata*, *Banksia integrifolia*, *Eucalyptus piperita*, *Eucalyptus botryoides*, *Eucalyptus pilularis*

Glochidion ferdinandi; *Pittosporum undulatum*, *Allocasuarina littoralis*, *Breynia oblongifolia*, *Notelaea longifolia*, *Dodonaea triquetra*, *Elaeocarpus reticulatus*, *Polyscias sambucifolia*, *Acacia longifolia*,

Mid Stratum Species: *Myrsine variabilis*

Groundcovers: *Dianella caerulea*; *Pteridium esculentum*, *Lomandra longifolia*, *Entolasia stricta*, *Imperata cylindrica* var. *major*, *Microlaena stipoides* var. *stipoides*, *Poa affinis*, *Themeda australis*, *Xanthorrhoea arborea*, *Lepidosperma laterale*, *Pratia purpurascens*

Vines and climbers: *Smilax glyciophylla*, *Billardiera scandens*, *Pandorea pandorana*, *Glycine clandestina*

Vegetation Zone: Bangalay/Smooth-barked Apple Forest

Distribution within Site: Approximately 2.48 ha of this PCT was recorded within the south-eastern portion of the Site (Figure 1).

Description: An open canopy of Bangalay and Smooth-barked Apple, with Queensland Kauri (*Agathis robusta*) occurring on occasion.

The understorey consists of Large Mock-olive, Sweet Pittosporum, Tree Broom-heath, Blueberry Ash, Tick Bush (*Kunzea ambigua*), *Melaleuca nodosa*, Coast Banksia and Cabbage Palm. Tuckeroo is also present in very low numbers.

The groundcover is dominated by Spiny-headed Mat-rush, Blue Flax-lily, Bracken and Sweet Sarsparilla (*Smilax glyciophylla*), with a localised dominant patch of Giant Water Vine (*Cissus hypoglauca*) in the south-western portion of this vegetation zone near to, and to the east of, Cape Solander Drive. Milk Vine (*Marsdenia rostrata*) also occurs to a lesser extent. The introduced Asparagus Fern is also prevalent within the groundcover in those areas that are in close proximity to the roadway and other edge disturbances.

Condition and presence of weeds: This vegetation zone is in a moderate to good condition, depending on its distance from disturbance (i.e. road). Weeds are dominant adjacent to these edges, their occurrence diminishing the greater the distance to the east of Cape Solander Drive.

High Threat Weeds recorded within this PCT include *Olea europaea subsp. cuspidata* and *Asparagus aethiopicus*, both of which are listed as priority weeds under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Angophora costata*, *Eucalyptus botryoides*.

Mid-storey: *Pittosporum undulatum*, *Notelaea longifolia*, *Elaeocarpus reticulatus*, *Banksia integrifolia*, *Cupaniopsis anacardioides*.

Groundcover: *Smilax glycyphylla*, *Dianella caerulea*, *Lomandra longifolia*, *Pteridium esculentum*.

Justification of evidence used to identify the PCT: Its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species in each strata, aligns this vegetation zone with PCT 1778.

The key matching characteristics are the vegetation zone's landscape position on coastal dune sand and dominant species.

Conservation Status: PCT 1778 does not conform to any TEC listed as under the EPBC or BC Acts.



Plate 8: Bangalay/Smooth-barked Apple Forest (PCT 1778) (Plot 2, Plot 12)

PCT: 772 Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion

Landscape position: Occurs on coastal sand mass frontal dunes and beach ridges, usually in exposed locations, along the eastern coastline of New South Wales.

Description: Low dense scrub. Some of the small patches that remain within its distribution range are derived from native plantings as part of dune stabilisation works and bush regeneration.

Diagnostic features: None provided.

Diagnostic species: Small *Leptospermum laevigatum*, *Banksia integrifolia* subsp. *integrifolia*
Trees:

Shrubs: *Acacia longifolia* subsp. *sophorae*, *Leucopogon parviflorus*, *Rhagodia candolleana* subsp. *candolleana*, *Breynia oblongifolia*, *Monotoca elliptica*

Groundcovers: *Actites megalocarpa*, *Carpobrotus glaucescens*, *Ficinia nodosa*, *Lomandra longifolia*, *Muehlenbeckia adpressa*, *Oxalis perennans*, *Spinifex sericeus*, *Zoysia macrantha*, *Pteridium esculentum*, *Pelargonium australe*, *Dianella congesta*, *Dichondra repens*, *Scaevola calendulacea*

This community also occurs as a highly disturbed variant (derived). As such, this PCT has been stratified into two vegetation zones:

- Coastal Wattle Scrub
- Coastal Wattle Scrub - derived

A description of each zone and its alignment with PCT 772 has been provided below.

Vegetation Zone: Coastal Wattle Scrub

Distribution within Site: Approximately 0.06 ha of this PCT was recorded as a linear strip along the beach front in the west of the Site (Figure 1).

Description: Coastal Wattle (*Acacia longifolia subsp. sophorae*) and Coast Banksia are present amongst a high density groundcover of predominantly introduced species, such as *Hydrocotyle bonariensis*, Buffalo Grass, Sea Rocket (*Cakile maritima*), Kikuyu Grass and Cobbler's Pegs. Native species present include Couch and Knobby Club-rush, with Hairy Spinifex (*Spinifex sericeus*), *Sporobolus virginicus* and Pigface (*Carpobrotus glaucescens*) occurring less frequently.

Condition and presence of weeds: This vegetation zone is of a low condition, due to its fragmented nature and size, location (i.e. subject to a high level of impact) and lack of structure and species composition. Various introduced grasses, herbs and forbs are present within the groundcover.

High Threat Weeds recorded within this PCT include *Asparagus aethiopicus*, *Bidens Pilosa*, *Cenchrus clandestinus*, *Stenotaphrum secundatum* and *Chrysanthemoides monilifera subsp. rotundata*. Of these, *Asparagus aethiopicus* and *Chrysanthemoides monilifera subsp. rotundata* are listed as priority weeds under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *Banksia integrifolia*.

Mid-storey: *Acacia longifolia subsp. sophorae*.

Groundcover: *Ficinia nodosa*, *Spinifex sericeus*, *Carpobrotus glaucescens*.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species, aligns this vegetation zone with PCT 772.

The key matching characteristics are the vegetation zone's landscape position on the frontal dune and beach ridge, dominant species and a determination of the most likely PCT that would have occupied the site prior to its modification based on geophysical characteristics (e.g. position, landform, aspect and lithology).

Conservation Status: PCT 772 does not conform to any TEC listed as under the EPBC or BC Acts.



Plate 9: Coastal Wattle Scrub (PCT 772) (Plot 8)

Vegetation Zone: Coastal Wattle Scrub - derived

Distribution within Site: Approximately 0.31 ha of this PCT was recorded as a linear strip along the beach front in the west of the Site (Figure 1).

Description: This vegetation zone is a variant of Coastal Wattle Scrub described above. It differs in the fact it contains no shrub or tree cover. The groundcover is a similar mixture of native and introduced species, however this variant has a higher diversity of weed species.

Condition and presence of weeds: This vegetation zone is of a low condition, due to its fragmented nature and size, location (i.e. subject to a high level of impact) and lack of structure and species composition. Various introduced grasses, herbs and forbs are present within the groundcover.

High Threat Weeds recorded within this PCT include *Cenchrus clandestinus*, *Gazania rigens*, *Ipomoea cairica*, *Ehrharta erecta*, *Acetosa sagittata*, *Bidens pilosa* and *Stenotaphrum secundatum*. None of these are listed as a priority weed under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Overstorey: *None present.*

Mid-storey: *None present.*

Groundcover: *Ficinia nodosa*, *Spinifex sericeus*, *Carpobrotus glaucescens*.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species, aligns this vegetation zone with PCT 772.

The key matching characteristics are the vegetation zone's landscape position on the frontal dune and beach ridge, dominant species and a determination of the most likely PCT that would have occupied the site prior to its modification based on geophysical characteristics (e.g. position, landform, aspect and lithology).

Conservation Status: PCT 772 does not conform to any TEC listed as under the EPBC or BC Acts.



Plate 10: Coastal Wattle Scrub - derived (PCT 772) (Plot 15)

PCT: 1204 Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion

Landscape position: Found growing on mobile sand deposits such as beach foredunes and dune blowouts; fringes of sandy beaches of the coastline and sandy inlets.

Description: An open cover of grasses and herbs.

Diagnostic features: None provided.

Diagnostic species: Groundcovers: *Spinifex sericeus*, *Austrofestuca littoralis*, *Carpobrotus glaucescens*, *Calystegia soldanella*, *Actites megalocarpa*, *Isolepis nodosa*

Vegetation Zone: Spinifex Grassland

Distribution within Site: Approximately 0.12 ha of this PCT was recorded as a linear strip along the beach front in the west of the Site (Figure 1).

Description: An open cover of Hairy Spinifex and Couch, with the introduced *Hydrocotyle bonariensis* and Sea Rocket also prominent. Buffalo Grass, Cobbler's Pegs and Pigface occur less frequently.

Condition and presence of weeds: This vegetation zone is in a moderate condition, due to its fragmented nature and size, location (i.e. within a cleared area) and lack of structure and species composition. Various introduced grasses, herbs and forbs are present within the groundcover, however Hairy Spinifex is still a dominant species throughout this zone.

High Threat Weeds recorded within this PCT include *Bidens pilosa*, *Stenotaphrum secundatum* and *Chrysanthemoides monilifera subsp. rotundata*. Of these, *Chrysanthemoides monilifera subsp. rotundata* is listed as a priority weed under the NSW *Biosecurity Act 2015* for the Greater Sydney region (DPI 2020).

Characteristic species used for identification of PCT: The species recorded within this vegetation zone that align with the dominant species listed as characterising this PCT for each strata are provided below.

Groundcover: *Spinifex sericeus*, *Carpobrotus glaucescens*.

Justification of evidence used to identify the PCT: The disturbance and diminished structure of this vegetation zone makes it difficult to align to a PCT. However, its distribution and landscape position, along with available habitat information (DPIE 2020c, OEH 2016a) and dominant species, aligns this vegetation zone with PCT 1204.

The key matching characteristics are the vegetation zone's landscape position on the beach foredune and dominant species.

Conservation Status: PCT 1204 does not conform to any TEC listed as under the EPBC or BC Acts.



Plate 11: Spinifex Grassland (PCT 1204) (Plot 7)