

Bushland and Foreshore Reserves

Habitat Hectare Assessments and EVC Mapping



Report prepared for Kingston City Council

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Bushland and Foreshore Reserves– Habitat Hectare Assessments and EVC Mapping September 2023

Report by Miller, D., Savona, M. & Sears, K.

Fieldwork by Miller, D., Hunter, A., Plummer, A, Savona, M. & Sears, K.

Mapping by Miller, D., Nia, A., Savona, M. & Sears, K.

PRACTICAL ECOLOGY Pty Ltd

ACN: 082 911 377 ABN: 88 082 911 377

PO Box 228 Preston VIC 3072

(2B Stott Street Preston Vic 3072)

P: 9484 1555F: 9484 9133

www.practicalecology.com.au

Prepared for: City of Kingston
Contact: Lee James
Bushland Coordinator – Open Space
kingston.vic.gov.au
PH: 03 8586 1628
M: 0417 353 828
Lee.James@kingston.vic.gov.au

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1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by Kingston City Council to undertake Ecological Vegetation Class (EVC) mapping and Habitat Hectares assessments at key Bushland and Foreshore Reserves located across the municipality.

For most of these sites, this follows on from previous assessments of Bushland and Foreshore Reserves that were completed by Biosis between 2010 and 2012 and subsequently formed the basis of the *City of Kingston Biodiversity Strategy 2018–2023 Technical Report* (City of Kingston 2018a). The completion of the current assessments also aligns with tasks proposed within the *Biodiversity Strategy 2018–2023* (City of Kingston 2018b). This includes the completion of a *Habitat Hectare assessment review every 10 years* and review of *Council's EVC, flora and fauna status every 5 years*, with these scheduled to occur in 2022 and 2023 respectively.

1.1 Scope of Works

Overall, the key aim of this study is to provide updated information on the status of biodiversity values within selected Bushland and Foreshore Reserves through the completion of revised Habitat Hectare assessments and EVC mapping. The study also aims to guide future management by comparing changes in Habitat Hectare assessment data over time, and providing management recommendations reflective of the current issues and threats relevant to each reserve assessed.

To achieve these aims, this study has been based on the following scope of works:

1. The completion of a background review, with particular consideration to:
 - Previous flora and fauna assessments, and in particular information prepared by Biosis presented within the *City of Kingston Biodiversity Strategy 2018–2023 Technical Report* (City of Kingston 2018a) or other similar reports prepared for Council
 - Information accessible via DEECA's NatureKit to gain further insight into the areas likely to support native vegetation and the types of EVCs present
 - Ecological databases such as DEECA's Victorian Biodiversity Atlas (VBA) and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST), in order to develop a list of threatened flora species and vegetation communities likely to occur within the local area
2. The completion of site assessments at selected Bushland and Foreshore Reserves to:
 - Undertake Habitat Hectares assessments using the methodology outlined in the *Vegetation Quality Assessment Manual – Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004)
 - Ground-truth and update the boundaries of previous EVC mapping, and identify and map any additional EVCs and Habitat Zones based on observable attributes such as dominant and characteristic species and information provided in the *Assessor's Handbook – Applications to remove, destroy or lop native vegetation* (DELWP 2017a),

- Document any observed management issues or threats to native vegetation
 - Document Large and Scattered Trees, either as individuals or as a group where many exist in the one area
 - Document the location of any rare or endangered species observed during site assessments
 - Consider each Bushland and Foreshore Reserve’s potential to support populations of, or habitat for, significant flora and fauna species or threatened ecological communities, and opportunities to improve habitat for listed flora and fauna.
3. Reporting and mapping on the findings of the background review and site assessments to:
- Summarise the EVCs found across the Bushland and Foreshore Reserves assessed, including provision of information on floristic composition, and alignment with EPBC Act or *Flora and Fauna Guarantee Act 1988* (FFG Act) listed threatened communities if applicable
 - Provide information on any EPBC Act and/or FFG Act listed flora species recorded across the reserves during site assessments, include listing status and description of floral characteristics, habitat preferences and State/Australian distribution
 - For each reserve:
 - Provide updated Habitat Hectare assessment data and associated EVC information linked to mapping
 - Compare data from previous assessments by Biosis with the results of site assessments completed in this current study
 - Provide information pertaining to Large Trees and/or Scattered Trees
 - Note and map the presence of any EPBC Act and/or FFG Act listed flora species
 - Collate a flora species list for the reserve, based on information collected during site assessments
 - Provide a summary of management issues and opportunities applicable to the reserves
 - Provide general management recommendations aimed at best management practice techniques to ameliorate issues/threats that can be implemented across the reserves assessed.

1.2 Bushland and Foreshore Reserves Assessed

The 13 Bushland and Foreshore Reserves that were assessed as part of this study are listed in Table 1 with their locations shown on Map 0 in Appendix 1. Note that for some of the reserves, the defined assessment area only covered part of the reserve, i.e., not all areas of the reserve were subject to assessment. This is reflected in the contents of this report and associated mapping with assessment areas for each Bushland and Foreshore Reserve defined.

Table 1. Bushland and Foreshore Reserves included in this assessment

Site Number	Abbreviation	Name and Address	Assessment Area (ha)
1	BHP	Bald Hill Park 4–28 Inverness Street, Clarinda 3169	0.27
2	BBR	Bradshaw Bushland Reserve 450 Nepean Highway, Mordialloc 3195	1.86
3	CWR	Caruana Woodland Reserve 1A Caruana Dve, Dingley Village 3172	0.52
4	EG	Epsom Grassland Jack Holt Way, Mordialloc 3195	3.95
5	GR	Groves Reserve cnr of Nepean Highway and Station St (behind Scope Aust Ltd). Aspendale 3195	1.71
6	HP	Heights Park 194–248 Thames Promenade, Chelsea Heights 3196	2.03
7	KHR	Kingston Heath Reserve 285 Centre Dandenong Road, Cheltenham 3192.	1.95
8	MCR	Mordialloc Creek Reserve (North side of Creek from Wells Rd bridge to the fenceline approx. 60m E of railway line, near palm tree)	3.48
9	PE	Powernet Easement Reserve 515–521 Clayton Road (between Clayton Rd and Melosa Ave), Mordialloc 3195.	0.06
10	RWR	Rowan Woodland Reserve 2 Rowan Road	3.76
11	TGHR	The Grange Heathland Reserve 136 Osborne Avenue, Dingley Village 3172	7.98
12	FNR	Foreshore North Reserve Charman Rd, Mentone to Owen St, Mordialloc foreshore path	17.34
13	FSR	Foreshore South Reserve Mordialloc Creek/Nth Aspendale (Parana St) to Osprey Lane, Carrum	32.46
TOTAL			77.37 ha

1.2.1 Landscape

Bioregions are a landscape-scale approach to classifying the environment using a range of attributes such as climate, geomorphology, geology, soils, and vegetation. There are 28 bioregions identified within Victoria. All of the City of Kingston is located within the Gippsland Plains Bioregion (DEECA 2023a).

Under the Catchment and Land Protection Act 1994 (the CaLP Act), Victoria is divided into ten catchment regions with a Catchment Management Authority (CMA) established for each region (Victorian Water Industry Association Inc 2015). The Subject Site occurs within the Port Philip and Westernport Catchment (DEECA 2023a).

2. METHODS

2.1 Field Survey

Field surveys were completed by Kallista Sears, Daniel Miller, Michelle Savona, Adele Plummer and Amy Hunter between November 2022 and January 2023. Overall, these field surveys aimed to:

- Identify and map EVCs and Habitat Zones in the Bushland and Foreshore Reserves assessed based on observable attributes such as dominant and characteristic species and information provided in the *Assessor's Handbook – Applications to remove, destroy or lop native vegetation* (DELWP 2017a) including ground-truthing and updating the boundaries of those assessed previously
- Complete Habitat Hectares assessments using the methodology as outlined in the *Vegetation Quality Assessment Manual – Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004)
- Document Large and Scattered Trees, either as individuals or as a group where many exist in the one area
- Document the location of any listed species observed, and
- Document any observed management issues or threats to native vegetation.

Further detail regarding the field survey completed across each of the 13 Bushland and Foreshore Reserves assessed is provided below.

Note that for each reserve, species that were deemed notable or of interest to a particular reserve were also documented. This included species that were considered:

- Locally rare or less common
- Indicators of patches of higher quality vegetation
- New species not noted before in that reserve

2.2 Vegetation Categorisation, Classification and Quality

Vegetation was assessed for its categorisation according to the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017b), then it's Ecological Vegetation Class and finally, quality, as determined by a Habitat Hectare assessment.

2.2.1 Vegetation Categories

Vegetation was categorised in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017b) and the following:

- **Native Vegetation**

Native Vegetation as per the Victorian Planning Provisions (Clause 73.01): plants that are indigenous to Victoria, including trees shrubs, herbs and grasses.

- **Native Vegetation Patch**

A *patch* of native vegetation is either:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native
- Any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or
- Any mapped wetland included in the current wetlands layer available from DEECA.

- **Native canopy tree**

A *native canopy tree* is a mature tree (i.e., that is able to flower) that is greater than 3m in height and is normally found in the upper layer of the relevant vegetation type.

- **Large Tree**

A *Large Tree* is either: a live tree that is equal to or greater than the large tree benchmark for the species in the relevant EVC; or a standing dead tree has a trunk diameter of 40 centimetres or greater

- **Scattered Tree:**

A Scattered Tree is a native canopy tree that does not form part of a patch.

Scattered Trees are measured by diameter at breast height (DBH) at 1.3 metres above ground level. Scattered Trees have 2 size classes, Large Trees and Small Trees, i.e. those that have a DBH that is less than the large tree benchmark for the species in the relevant EVC.

2.2.2 Ecological Vegetation Classes (EVCs)

EVCs are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate). DEECA has also assigned a Bioregional Conservation Status (BCS) to each EVC–Bioregion combination based on its current extent and quality, when compared to its original (pre–1750) extent and condition.

Modelled EVC distribution (DEECA 2023a) was accessed to consider the EVCs likely to occur within each of the Bushland and Foreshore Reserves assessed. The information within reports for these same sites previously prepared by Biosis was also referenced (Biosis 2012a;b;c;d). In general, previously assigned EVCs by Biosis were maintained within this current study to facilitate appropriate consideration of Habitat Hectare assessment data.

A Habitat Hectare assessment is used to determine the condition and significance of a defined patch of native vegetation. The methodology used in undertaking a Habitat Hectare assessment is outlined in the *Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004). It involves

making visual and quantitative assessments on various characteristics of native vegetation patches according to established criteria that are set against an optimum benchmark.

This process begins with the identification of the benchmark EVC against which to assess quality. In most cases this EVC benchmark should reflect the present and pre-1750 vegetation that would have occurred on the site as mapped by DEECA. However, in some situations (e.g., a site containing derived vegetation that has established as a result of changes beyond the land managers control or has been established through historical revegetation works) the vegetation on site is reflective of a different EVC to that shown by modelled mapping.

Each EVC has an optimal benchmark representing its mature, natural (pre-1750) state. The Habitat Hectare assessment is based on 7 habitat/vegetation components and 3 landscape components, as shown in Table 2.

Table 2. Components and weightings of the habitat score[^]

Component		Maximum Score
Site Condition	Large Trees	10
	Tree Canopy Cover	5
	Understorey	25
	Lack of Weeds	15
	Recruitment	10
	Organic Litter	5
	Logs	5
Landscape Context	Patch Size	10
	Neighbourhood	10
	Distance to Core Area	5
Total		100

[^] Adapted from Vegetation Quality Assessment Manual version 1.3 (Add reference).
Where components are not applicable to a particular EVC and associated benchmark (e.g. trees and logs components in a grassland setting) a scaling factor is used.

As part of this study, native vegetation patches were separated into different Habitat Zones where:

- Their location was discrete within a particular assessment area (i.e. it is not continuous with another Habitat Zone)
- Adjoining Habitat Zones were representative of a different types of EVC,
- The condition score varied by more than 15 points (as per DELWP 2018a), or
- The extent of the continuous patch of vegetation was greater than 1 hectare (as per DELWP 2018a).

With regards to the Habitat Zones assessed, also note that:

- Where a Reserve had multiple patches of the same EVC, these multiple patches were mapped and scored as one Habitat Zone when they were of similar quality and would likely achieve the same 'Site Condition Score'. For example, numerous disjunct patches of Coastal Dune Grassland at Foreshore North Reserve were all called 'Habitat Zone 4' as they were similar in composition. This approach is consistent with Biosis whereby disjunct patches of a certain EVC had the same score across multiple patches (Biosis

2012a;b;c;d). For the Foreshore Reserves where hundreds of disjunct, often small patches were mapped, it was also not practical to assess the habitat/vegetation components of each individual mapped patch of native vegetation.

- Several areas of native vegetation observed appeared to have historically established through revegetation. There are therefore additional Habitat Zones included in this current study in comparison to those captured previously by Biosis which appears to have focused only on remnant patches of native vegetation (Biosis 2012a;b;c;d). Additionally, some areas subject to historic disturbance (mainly weed invasion) with remnant vegetation were not surveyed previously, however these were assessed during this study when they met the definition of a patch of native vegetation (DELWP 2017b). This approach aimed to provide Council with baseline data on areas that have had extensive revegetation works completed, or that are currently subject to high levels of disturbance, that can be used in subsequent assessments in the future. It also highlights the value of long-term revegetation projects and associated management, and the potential to recreate self-sustaining native vegetation over time that meets the definition of a 'patch'.
- In the case of Mordialloc Creek Reserve, the previous Biosis assessment mapped several habitat zones of EVC 952: Estuarine Reed Bed (Biosis 2012a). This is an EVC taken from the Benchmarks for Wetland Ecological Vegetation Classes in Victoria (DSE 2012). These wetland EVCs can only be used to assess the condition of wetland vegetation using a specialised method called the Index of Wetland Condition Assessment Procedure. The Wetland EVCs cannot be used for the Habitat Hectares condition assessment method. Hence when undertaking a Habitat Hectares assessment of areas mapped as EVC 952:Estuarine Reed Bed, the closest EVC available in the Gippsland Plain Bioregion, EVC821: Tall Marsh, was used as the benchmark EVC. This approach is the same as that used previously by Biosis in the 2012 Habitat Hectares assessment, and facilitates direct comparison between the 2012 and current Habitat Hectares assessments for zones of this EVC.

Note that for several reserves, it was not possible to accurately compare data between past assessments and those completed as part of this current study due to some inconsistencies in the data. Where this is relevant, it is detailed within the Reserves individual assessment at Section 4.

2.2.2.1 Habitat Hectares Values

To maintain consistency with previous reporting, particularly that by Biosis, Habitat Hectares values have been calculated for the Habitat Zones assessed as part of this study (Biosis 2012a;b;c;d).

A Habitat Hectare value is a measure of both the quality (habitat score) and quantity (hectares) of the vegetation within a Habitat Zone, and therefore requires consideration of the total number of hectares present. It is determined by multiplying the habitat score (as a decimal) of a Habitat Zone by its area (in hectares) in line with the following formula:

$$\text{Habitat Hectares value (ha)} = \text{extent of native vegetation (ha)} \times \text{condition score (0-1.0)}$$

Hence if a 1 ha patch had a condition score of 0.5, then its Habitat Hectare value would be 0.5 Habitat Hectares.

2.2.2.2 Other Comments

As above, the Habitat Zones completed as part of this study also aimed to capture areas of established revegetation that were largely indigenous and could be aligned with a suitable EVC, as well as patches of native vegetation deemed to be remnant. In some instances, such as at Bradshaw Bushland Reserve, while the canopy was dominated by non-indigenous but long standing overstorey trees, the understorey vegetation had sufficient cover to qualify as a patch of native vegetation, and hence also subject to a Habitat Hectare assessment. As relevant, the individual Bushland and Foreshore Reserve results provided in Section 4, provide further details of these instances.

Note that where plantings were still establishing within a particular Bushland or Foreshore Reserve, they have been categorised as “Revegetation”. Where plantings were either not representative of the benchmark EVC or not locally indigenous, they were considered to be weeds. Again, further information is provided within the sections below relevant to each Bushland or Foreshore Reserve.

Similarly, where a species was not considered as naturally occurring, locally, within an EVC, it was treated as a weed and contributed to the weed coverage for the purposes of the Habitat Hectares Scoring. Two species, Coast Tea-tree *Leptospermum laevigatum* and Coast Saltbush *Atriplex cinerea* are key examples of this within the Bushland and Foreshore Reserves assessed.

For patches of vegetation located closer to the coast, and representative of EVCs such as Coastal Dune Scrub, Coast Banksia Woodland and Coastal Headland Scrub, Coast Tea-tree *Leptospermum laevigatum* was considered as indigenous. However, for EVCs such as Heathy Woodland and Damp Sands Herb-rich Woodland, located in reserves further back from the coastline, Coast Tea-tree *Leptospermum laevigatum* was treated as a weed for the purposes of the Habitat Hectares assessments.

A similar approach was taken to Biosis with regards to the classification of Coast Saltbush *Atriplex cinerea*, with its natural distribution taken to be sandy foreshores deposits (Biosis 2012a;b;c;d). Where it occurred away from this natural distribution on sandy foreshores, for example within the coastal headlands and further back from the beachfront, it was treated as a weed when undertaking Habitat Hectare assessments.

2.2.3 Threatened Ecological Communities

Threatened ecological communities are listed under the EPBC and FFG Acts. The following approaches were used to determine if threatened ecological communities are likely present within the Bushland and Foreshore Reserves.

To determine if any EPBC Act listed communities are likely present within the Bushland and Foreshore Reserves, the Protected Matters Search Tool (PMST) was used to generate a report, including potential threatened communities, based on a 5km buffer around the Kingston municipality. Under the EPBC Act, key diagnostic criteria and condition thresholds are defined by The Commonwealth Threatened Species Scientific Committee. These define a benchmark to compare against and assist in identifying EPBC listed communities. The identified EVCs for each reserve were assessed against the key diagnostic criteria and condition thresholds of the threatened communities identified by the PMST, to determine if they are likely present.

Modelled distribution of FFG Act listed communities by DEECA was also accessed to give an indication of FFG-listed communities with potential to be present within each reserve. However, this modelling is derived from DEECA’s modelling of EVCs and Bioregions, where FFG-listed communities have been matched to one of more

EVCs and the bioregions in which they occur. Hence, the consideration of FFG-listed communities was not limited to those identified by the DEECA modelling.

While there are no specific criteria which determine the presence of FFG Act communities, an informal method of comparing site characteristics and floristics with community descriptions in the document: *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (DEECA 2023b) was undertaken. This document summarises the characteristics of FFG Act threatened communities, to assist with field recognition. An evaluation of the Habitat Zones/EVCs identified as part of this ecological assessment was made against the information in this document.

2.3 Large and Scattered Trees

All Large Trees within each Bushland and Foreshore Reserve were mapped and where practicable based on efficiencies, their DBH and species also recorded. This included Large Trees within Habitat Zones as well as Large Scattered Trees. Small Scattered Trees were also mapped outside of Habitat Zones, and as with Large Trees, their DBH and species recorded where practicable.

2.4 Flora Survey

During field surveys, the Bushland and Foreshore Reserves were inspected on foot. A species list (or defined area list) for indigenous or naturalised flora (i.e., not including planted species – although these were recorded in some cases) over each reserve was compiled for the purposes of the completion of Habitat Hectares assessments, as well as recording plant species occurring outside of Habitat Zones.

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per the protocols associated with Practical Ecology's FFG Act permit (No. 10008906) for the collection of plant material. In order to assist in the identification of some flora, major features of the specimens were collected where possible, including leaves, parts of branches, fruit and/or flowers.

2.5 Survey Limitations

The following considerations should be made regarding the limitations of the flora survey:

- It is expected that some other species, particularly orchid, lily and other herbaceous species that can only be observed for a limited period may not have been recorded during assessments completed
- The spring–summer season preceding the assessments were unusually wet; while this meant that many understorey and herb species flowered well into December/January aiding identification, some areas of Epsom Grassland and Caruana Woodland Reserve were under water such that the herb layer was not evident at the time of the assessment; this rainfall is also likely to have influenced the cover of weeds at several of the sites assessed compared to years with more average rainfall
- Flora surveys within each Bushland and Foreshore Reserve were undertaken over a relatively short period of time

- Along the steeper coastal sections of the Foreshore, especially north of Bay Street (much of the Northshore), field survey data was primarily captured by walking along the top and lower pathways along the shoreline/adjacent the vegetation, with excursions onto the slopes, where deemed necessary. This generally provided good perspective of the vegetation and was sufficient to collect representative data for Habitat Hectares assessments. However, the presence of smaller, rare, ground layer species on the steeped sloped sections, may have been missed.

Despite the above, the field survey is considered to have provided an adequate representation of existing conditions at the time of each assessment sufficient to undertake Habitat Hectares assessments and capture data on the flora species present.

Determination of vegetation boundaries was undertaken using ground-truthing with aerial photography. Mapping should be considered approximate only (e.g., +/- 1–5m).

2.6 Taxonomy

Flora and fauna taxonomy used in this report is in accordance with the Victorian Biodiversity Atlas Checklist dated 01/02/2023 (DELWP 2018).

2.7 Permits

Practical Ecology Pty Ltd staff are covered under a *The Wildlife Act 1975* Permit (No: 10010286) and FFG Act permit (No. 10010155) to take/keep protected flora, and Wildlife and Small Institutions Ethics Committee approval (37.21).

3. Results: Summary

This section gives an overview of the Habitat Hectares scoring and surveying across all 13 Bushland and Foreshore Reserves assessed. The individual reserves are discussed in more detail in Sections 4.1 through 4.13.

3.1 Ecological Vegetation Classes

Table 3 gives an overview of the Ecological Vegetation Classes (EVCs) found across the 13 Bushland and Foreshore Reserves. Mapping of the EVCs across each of these reserves is provided in Appendix 2. Further information on each of these EVCs including their associated floristics and representative photos, are given in Section 4.

Table 3. Ecological Vegetation Classes observed across the 13 Bushland and Foreshore Reserves assessed. The descriptions are adapted from their benchmark descriptions (DEECA 2023c).

EVC No.	EVC Name	BCS [^]	EVC Bioregion Benchmark Description	Applicable Reserve(s)
2	Coast Banksia Woodland	V	Restricted to near coastal localities on secondary or tertiary dunes behind Coastal Dune Scrub. Usually dominated by a woodland overstorey of Coast Banksia to 15 m tall over a medium shrub layer. The understorey consists of a number of herbs and sedges, including scramblers.	<ul style="list-style-type: none"> • Groves Reserve • Foreshore North Reserve • Foreshore South Reserve
3	Damp-sands Herb-rich Woodland	V	A low, grassy or bracken-dominated eucalypt forest or open woodland to 15 m tall with a large shrub layer and ground layer rich in herbs, grasses, and orchids. Occurs mainly on flat or undulating areas on moderately fertile, relatively well-drained, deep sandy or loamy topsoils over heavier subsoils (duplex soils).	<ul style="list-style-type: none"> • Bald Hill Park • Bradshaw Bushland Reserve • Rowan Woodland Reserve • The Grange Heathland Reserve
6	Sand Heathland	R	Treeless heathland (or with occasional emergent mallee-form eucalypts and/or Banksias) occurring on deep infertile sands. Consists of a low, dense heathy shrub layer and a number of sedges and sedge-like species. Grasses and herbs are notably absent or infrequent.	<ul style="list-style-type: none"> • The Grange Heathland Reserve • Foreshore North Reserve
48	Heathy Woodland	LC	Spans a variety of geologies but is generally associated with nutrient-poor soils including deep uniform sands (aeolian or outwash) and Tertiary sand/clay which has been altered to form quartzite gravel. Eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of bracken. Geophytes and annuals can be quite common but the ground cover is normally fairly sparse.	<ul style="list-style-type: none"> • Heights Park • Powernet Easement Reserve • Kingston Heath Reserve • Rowan Woodland Reserve • The Grange Heathland
53	Swamp Scrub	E	Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark <i>Melaleuca ericifolia</i> (or sometimes Woolly Tea-tree <i>Leptospermum lanigerum</i>) which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer.	<ul style="list-style-type: none"> • Kingston Heath Reserve • Mordialloc Creek Reserve • The Grange Heathland Reserve
55	Plains Grassy Woodland	E	An open, eucalypt woodland to 15 m tall occurring on a number of geologies and soil types. Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer.	<ul style="list-style-type: none"> • Caruana Woodland Reserve

EVC No.	EVC Name	BCSA [^]	EVC Bioregion Benchmark Description	Applicable Reserve(s)
125	Plains Grassy Wetland	E	This EVC is usually treeless, but in some instances can include sparse River Red-gum <i>Eucalyptus camaldulensis</i> or Swamp Gum <i>Eucalyptus ovata</i> . A sparse shrub component may also be present. The characteristic ground cover is dominated by grasses and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas.	<ul style="list-style-type: none"> • Epsom Grassland
132_62	Plains Grassland	E	Treeless or with occasional scattered trees above a largely grassy understorey on grey silty-loamy soils, often seasonally waterlogged. Shrubs may be also occasionally present.	<ul style="list-style-type: none"> • Epsom Grassland
160	Coastal Dune Scrub	D	Closed scrub to 5 m tall with occasional emergents occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds.	<ul style="list-style-type: none"> • Foreshore North Reserve • Foreshore South Reserve
161	Coastal Headland Scrub	D	Scrub or low shrubland to 2 m tall on steep, rocky coastal headlands often associated with cliffs exposed to the stresses of extreme salt-laden winds and salt spray from the south west. Occurs on shallow sands along rocky sections of the coast.	<ul style="list-style-type: none"> • Foreshore North Reserve
163	Coastal Tussock Grassland	V	A tussock grassland that may contain emergent shrubs. Occurs on exposed coastal cliffs and bluffs. Soils are saline and the strong salt-laden winds preclude tree growth.	<ul style="list-style-type: none"> • Foreshore North Reserve
311	Berm Grassy Shrubland	E	Low shrubland to 1.5 m tall occurring in sheltered coastal areas where sand deposits have formed as a result of low energy wave action. Contains a number of halophytic species over a ground layer of grasses and herbs.	<ul style="list-style-type: none"> • Foreshore North Reserve • Foreshore South Reserve
651	Plains Swampy Woodland	E	Eucalypt woodland to 15 m tall with ground layer dominated by tussock grasses, sedges and herbs. Shrubs are often scattered throughout. Occurs on poorly drained, seasonally waterlogged heavy soils.	<ul style="list-style-type: none"> • Caruana Woodland Reserve
653	Aquatic Herbland	*	Herbland of permanent to semi-permanent wetlands, dominated by sedges (especially on shallower verges) and/or aquatic herbs. Occurs on fertile paludal soils, typically heavy clays beneath organic accumulations.	<ul style="list-style-type: none"> • Kingston Heath Reserve
656	Brackish Wetland	E	Sedgeland or herbland, occasionally grassland, dominated by salt-tolerant species, but samphires, if present usually with low cover. Typically occurs on heavy, at least seasonally shallowly inundated to waterlogged soils, on a range of geologies. Common in estuaries, along the shorelines of saline/brackish lakes and along poorly defined drainage lines near the coast.	<ul style="list-style-type: none"> • Mordialloc Creek Reserve

EVC No.	EVC Name	BCS [^]	EVC Bioregion Benchmark Description	Applicable Reserve(s)
821	Tall Marsh	*	Occurs on Quaternary sedimentary geology of mainly estuarine sands, soils are peaty, silty clays, and average annual rainfall is approximately 600 mm. It requires shallow water (to 1 m deep) and low current–scour, and can only tolerate very low levels of salinity. Closed to open grassland/sedgeland to 2–3 m tall, dominated by Common Reed <i>Phragmites australis</i> and Cumbungi <i>Typha spp.</i> . Small aquatic and semi–aquatic species occur amongst the reeds.	<ul style="list-style-type: none"> • Kingston Heath Reserve • Mordialloc Creek Reserve
879	Coastal Dune Grassland	D	Consists of grasses and halophytes (succulents) that colonise the foredunes of ocean beaches. Soils are siliceous sands that have a very low humus content.	<ul style="list-style-type: none"> • Foreshore North Reserve • Foreshore South Reserve
937	Swampy Woodland	E	Open eucalypt woodland to 15 m tall with ground–layer dominated by tussock grasses and/or sedges and often rich in herbs. Occurs on poorly drained, seasonally waterlogged heavy soils, primarily on swamp deposits but extending to suitable substrates within some landscapes of sedimentary origin.	<ul style="list-style-type: none"> • Rowan Woodland Reserve • The Grange Heathland Reserve
952	Estuarine Reed Bed	*	Vegetation dominated by tall reeds (usually 1.5–3 m in height), in association with a sparse ground–layer of salt tolerant herbs. Distinguished from Estuarine Wetland (EVC 10) by the vigour and total dominance of the reeds, as well as the absence or low abundance of Samphires in the ground layer. Sub–saline situations of coastal estuaries (sometimes periodically blocked by sand bars), localised in scattered near coastal sites between Nelson and East Gippsland (DSE 2012). Please Note: This EVC is taken from the Benchmarks for Wetland Ecological Vegetation Classes in Victoria (DSE 2012). These wetland EVCs are used to assess the condition of wetland vegetation in Victoria using a specialised method called the Index of Wetland Condition Assessment Procedure. The Wetland EVCs cannot be used to for the Habitat Hectares condition assessment method. Hence when undertaking a Habitat Hectares assessment of areas mapped as Estuarine Reed Bed, the closest EVC available in the Gippsland Plain Bioregion, EVC821: Tall Marsh, was used as the benchmark EVC. This approach is the same as that used previously by Biosis in the 2012 Habitat Hectares assessment, and hence permits direct comparison between the 2012 and current Habitat Hectares assessments for zones of this EVC.	<ul style="list-style-type: none"> • Mordialloc Creek Reserve
953	Estuarine Scrub	*	Closed scrub to 6 m tall growing on the edge of estuarine waterbodies such as creeks, rivers and lagoons with intermediate salinity and poor drainage conditions. Dominated by Swamp Paperbark <i>Melaleuca ericifolia</i> with a halophytic (succulent) ground layer dominated by graminoids and herbs. Often occurs in close association with Estuarine Wetland.	<ul style="list-style-type: none"> • Mordialloc Creek Reserve

[^] Bioregional Conservation Status, V: Vulnerable, R: Rare, LC: Least Concern, V: Vulnerable, E: Endangered, D: Depleted. *: no status in Gippsland Plain Bioregion

3.1.1 Threatened Ecological Communities

3.1.1.1 EPBC Act Communities

Table 4 lists the Nationally threatened communities identified by the EPBC Act PMST based on a search area that included the entire Kingston municipality plus a five-kilometre buffer. Table 4 also indicates whether these Nationally threatened communities are ‘likely to’ or ‘may’ occur within this search area according to the EPBC Act PMST report.

Table 4. Details of threatened communities identified by the PMST

Community	Status	Type of Presence stated in EPBC Act PMST Report
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community likely to occur within search area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within search area
White Box–Yellow Box–Blakely’s Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within search area

Further details on each of these communities, including information regarding the typical EVCs within Victoria that they correspond with, is provided in Table 5 below.

As shown, Epsom Grassland contains vegetation typical of *Natural Damp Grassland of the Victorian Coastal Plains* and potentially *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains*. The presence of the former of these communities, at this reserve, is noted in the Approved Conservation Advice (DoE 2015) for this community; the observations during the current assessment area also indicate that the latter of these threatened communities could also occur.

Table 5. EPBC Act listed communities likely to occur on site

Listed communities	Description	Reserve(s) known or likely to occur
Natural Damp Grassland of the Victorian Coastal Plains	<p>The Victorian Coastal Plains Grassland ecological community generally corresponds to EVC 132: Plains Grassland, as benchmarked in the Victorian Gippsland Plain and Otway Plain bioregions. However, as EVCs are broadly defined, the National ecological community represents the damper expressions of EVC 132. The benchmark for EVC 132 in the Gippsland Plain bioregion identifies two specific floristic communities, only one of which is equivalent to the Victorian Coastal Plains Grassland: EVC 132_62: <i>South Gippsland</i> Plains Grassland.</p> <p>It is noted here that the Approved Conservation Advice (DoE 2015) for this community specifically states that the “Epsom Grassland in Mordialloc” is a known occurrence of this community.</p> <p>Note here also that part of this ecological community is listed in Victoria under the FFG Act as a threatened community under the name ‘<i>Plains Grassland (South Gippsland) Community</i>.’ Further detail is provided below with regards to this FFG Act listed community.</p>	<p>Known</p> <p>Occurs at Epsom Grassland, as per Approved Conservation Advice (DoE 2015)</p>
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	<p>Wetland EVCs most likely to correspond with the Seasonal Herbaceous Wetlands community, based on EVC descriptions and benchmarks, are deemed to be the following:</p> <ul style="list-style-type: none"> EVC 125: Plains Grassy Wetland + complexes (such as EVCs 755, 767, 959, 960), EVC 306: Aquatic Grassy Wetland, EVC 647: Plains Sedgy Wetland, EVC 678: Ephemeral Drainage–line Grassy Wetland, EVC 778: Gilgai Wetland, EVC 920: Sweet Grass Wetland, and EVC 956: Herb–rich Gilgai Wetland (DSEWPC 2012a). <p>This community represents temporary freshwater wetlands that are inundated on a seasonal basis, typically filling after winter–spring rains, and then drying out. The vegetation is generally treeless and dominated by a herbaceous ground layer, often with a considerable graminoid component and with forbs present (DSEWPC 2012b).</p>	<p>Possible</p> <p>Two patches of EVC 125: Plains Grassy Wetland at Epsom Grassland resemble this community, albeit in artificial excavations. These areas were inundated at the time of surveying such that it was not possible to capture the full range of species present. Hence, further surveys are needed to determine if these patches meet the requirements to be classified as a patch of this ecological community.</p>

Listed communities	Description	Reserve(s) known or likely to occur
White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland	<p>Box–Gum Grassy Woodlands and Derived Grasslands are characterised by a species–rich understorey of native tussock grasses, herbs and sparse, scattered shrubs, and the dominance, or prior dominance, of White Box <i>Eucalyptus albens</i>, Yellow Box <i>Eucalyptus melliodora</i> or Blakely's Red Gum <i>Eucalyptus blakelyi</i> trees. The tree–cover is generally discontinuous and consists of widely–spaced trees of medium height in which the canopies are clearly separated (Yates and Hobbs 1997).</p> <p>Relevant EVCs with synergies with this Ecological Community include (but not limited to) the following EVCs within the Goldfields, Highlands – Northern Fall, and Riverina bioregions:</p> <ul style="list-style-type: none"> EVC 47: Valley Grassy Forest EVC 55: Plains Grassy Woodland EVC 175: Grassy Woodland <p>While additional Victorian bioregions that could potentially support this listed community are documented in (Department of Environment 2010)), the Gippsland Plain Bioregion is excluded.</p>	<p>Unlikely</p> <p>Vegetation typically of this community was not observed during surveying. EVC 55, which sometimes has synergies with this national community was mapped at Caruana Woodland Reserve, but again, its vegetation clearly did not match key characteristics of this community. For example, there was an absence of White Box <i>Eucalyptus albens</i>, Yellow Box <i>Eucalyptus melliodora</i> and Blakely's Red Gum <i>Eucalyptus blakelyi</i> species within the Reserve.</p> <p>No other EVCs typically representing this community, were identified within the surveyed Bushland and Foreshore Reserves, and this community is not typical of the Gippsland Plain Bioregion.</p>

3.1.1.2 FFG Act Communities

In order to determine the FFG Act communities that may be present within the Bushland and Foreshore Reserves, modelling of FFG Act threatened communities by DEECA was intersected with reserve boundaries that had a 100m buffer added to each.

Across all the Bushland and Foreshore Reserves and their associated buffers, four FFG Act Communities are modelled by DEECA as potentially present. These are listed in Table 6 along with the description of each as per the document titled: *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (DEECA 2023b).

As shown in Table 6, only Epsom Grassland contains native vegetation and EVCs deemed representative of an FFG Act listed community, the *Herb-rich Plains Grassy Wetland (West Gippsland)*. This community is associated with areas of the reserve mapped as EVC 123: Plains Grassy Wetland to the west of the site.

It is also noted here that while DEECA modelled mapping does not model potential for other FFG Act communities at Epsom Grassland, the areas of EVC 132_62: Plains Grassland at this site are highly representative of the FFG Act listed *Plains Grassland (South Gippsland) Community*. This is consistent with information in the Approved Listing Advice for the EPBC Act community, Natural Damp Grassland of the Victorian Coastal Plains (DoE 2015), which states that part of this Federally listed “. . . community is listed in Victoria under the FFG Act as a threatened community under the name ‘Plains Grassland (South Gippsland) Community’”.

Table 6. FFG Act listed communities likely to occur on site

Listed communities	General Description (DEECA 2023b)	Reserve(s) mapped as occurring within or adjacent to according to DEECA	Comments
Central Gippsland Plains Grassland	The <i>Central Gippsland Grassland Community</i> is dominated by Kangaroo Grass <i>Themeda triandra</i> and includes a range of native herbs including Golden Weather-glass <i>Hypoxis hygrometrica</i> , Common Everlasting <i>Helichrysum apiculatum</i> , Yellow Rush-lily <i>Tricoryne elatior</i> and Common Rice-flower <i>Pimelea humilis</i> . Trees are rare although, in some places, there are thickets of Drooping She-oak <i>Allocasuarina verticillata</i> , Burgan <i>Kunzea ericoides</i> and saplings of Forest Red Gum <i>Eucalyptus tereticornis</i> .	<ul style="list-style-type: none"> • Caruana Woodland Reserve • Rowan Woodland Reserve DEECA mapping shows occurrences of EVC 55: Plains Grassy Woodland that overlap with our mapped polygons. As EVC 55 often corresponds to this FFG Act Community, it indicates its potential presence in these reserves.	Caruana Woodland Reserve and Rowan Woodland Reserve do not contain native vegetation or EVCs that align with this FFG Act listed community despite mapping by DEECA. Note that the distribution and composition of this community is similar to the <i>Plains Grassland (South Gippsland) Community</i> . As discussed in the main text, vegetation within Epsom Grassland is most similar to the South Gippsland Community, not the Central Gippsland Community.
Coastal Moonah Woodlands	The Coastal Moonah Woodland Community is open grassy woodland that is dominated by Moonah <i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> and found along parts of the Victorian coastline. Commonly associated species are Wirilda <i>Acacia retinodes</i> var. <i>uncifolia</i> , Coast Swainson-pea <i>Swainsona lessertiifolia</i> , Thyme Rice-Flower <i>Pimelea serpyllifolia</i> , Coast Tea-tree <i>Leptospermum laevigatum</i> , Coast Beard-heath <i>Leucopogon parviflorus</i> and Kidney-weed <i>Dichondra repens</i> . Other associated species include various grasses and sedges. Coastal Moonah Woodlands tend to occur on high-level dunes along the coast where soils are strongly alkaline and developed on moderately organic aeolian sands or on dune calcarenites.	<ul style="list-style-type: none"> • Groves Reserve • Foreshore North Reserve • Foreshore South Reserve DEECA mapping shows occurrences of EVC 160: Coastal Dune Scrub that overlap with our mapped polygons. As EVC 160 often corresponds to this FFG Act Community, this indicates its potential presence in these reserves.	Groves Reserve contains EVC 2: Coast Banksia Woodland patches across its extent. The dominant characteristics of Coast Moonah Woodland are not present on site. With regard to the Foreshore North and Foreshore South Reserves, Oates and Taranto (Oates and Taranto 2001) aligns EVC 858: Coastal Alkaline Scrub with this FFG Act community rather than EVC 160: Coastal Dune Scrub which has been mapped extensively along the Foreshore. Further to this, Moonah <i>Melaleuca lanceolata</i> is not regarded as site indigenous within the City of Kingston, with local occurrences deemed planted. Hence it is not expected that this community occurs naturally within the Kingston municipality.

Listed communities	General Description (DEECA 2023b)	Reserve(s) mapped as occurring within or adjacent to according to DEECA	Comments
Forest Red Gum Grassy Woodland	The Forest Red Gum Grassy Woodland Community is a type of woodland found at a number of sites in Gippsland. The community is characteristically dominated by Forest Red Gum <i>Eucalyptus tereticornis</i> , often with co-dominant Red Box <i>Eucalyptus polyanthemos</i> . Coast Grey Box <i>Eucalyptus bosistoana</i> occurs towards the coast, while Apple Box or But-But <i>Eucalyptus bridgesiana</i> is often co-dominant on sandy sites. Beneath the eucalypts, there are often scattered small trees of Lightwood <i>Acacia implexa</i> , and groves of Black She-oak <i>Allocasuarina littoralis</i> in some places.	<ul style="list-style-type: none"> • Caruana Woodland Reserve • Epsom Grassland • Rowan Woodland Reserve DEECA mapping shows occurrences of EVC 55: Plains Grassy Woodland that overlap with our mapped polygons. As EVC 55 often corresponds to this FFG Act Community, this indicates its potential presence in these reserves.	<p>Epsom Grassland and Rowan Woodland do not contain native vegetation or EVCs that align with this FFG Act listed community despite mapping by DEECA.</p> <p>While Caruana Woodland Reserve contains areas of EVC 55: Plains Grassy Woodland the characteristic dominance of Forest Red Gum associated with this FFG Act listed community does not occur.</p>
Herb-rich Plains Grassy Wetland (West Gippsland)	The Herb-rich Plains Grassy Wetland (West Gippsland) Community typically occurs in shallow (less than 50 cm deep) seasonal wetlands that fill in winter and spring and are dry by summer. Some may retain water for longer periods, but typically only have surface water for up to six months. The community contains a rich plant association of grasses, sedges, and aquatic herbs.	<ul style="list-style-type: none"> • Epsom Grassland • Mordialloc Creek Reserve DEECA mapping shows occurrences of EVC 125: Plains Grassy Wetland that align with our mapped polygons. As EVC 125 often corresponds to this FFG Act Community, this indicates its potential presence in these reserves.	<p>Mordialloc Creek Reserve does not contain native vegetation or EVCs that align with this FFG Act listed community despite mapping by DEECA.</p> <p>However, EVC 125: Plains Grassy Wetland is present at Epsom Grassland and such areas within the site are likely representative of this FFG community.</p>

3.2 Overview of Habitat Hectare Assessments

Table 7 below provides an overview of the areas of native vegetation across the 13 Bushland and Foreshore Reserves that were documented as part of this study and subject to Habitat Hectare assessments. As shown, a total of 44.4 ha of native vegetation was mapped as Habitat Zones across the reserves. This has an equivalent Habitat Hectare value of 18.3 habitat hectares.

Table 7. Overview of Habitat Hectares assessments of the 13 Bushland and Foreshore Reserves

Site Number	Abbreviation	Name	Assessment Area (ha)	Area of Native Vegetation documented (ha)	% of Assessment Area occupied by Habitat Zones	Total Habitat Hectares
1	BHP	Bald Hill Park	0.27	0.18	67%	0.06
2	BBR	Bradshaw Bushland Reserve	1.86	1.79	96%	0.66
3	CWR	Caruana Woodland Reserve	0.52	0.52	100%	0.18
4	EG	Epsom Grassland	3.95	3.70	94%	1.78
5	GR	Groves Reserve	1.71	0.59	35%	0.09
6	HP	Heights Park	2.03	0.69	34%	0.32
7	KHR	Kingston Heath Reserve	1.95	1.07	55%	0.36
8	MCR	Mordialloc Creek Reserve	3.48	1.55*	45%	0.83*
9	PE	Powernet Easement Reserve	0.06	0.05	83%	0.01
10	RWR	Rowan Woodland Reserve	3.76	3.67	98%	1.88
11	TGHR	The Grange Heathland Reserve	7.98	6.43	81%	3.82
12	FNR	Foreshore North Reserve	17.34	11.24	65%	4.23
13	FSR	Foreshore South Reserve	32.46	12.88*	40%	4.05
TOTAL			77.37	44.4	57	18.3

* Figure shown excludes 'Mixed Revegetation' refer to Section 4.8.3 and 4.13.3.

3.3 Significant Flora Species

Three State and/or Federally listed flora species were recorded during field surveys completed as part of this study. These species are Pale Swamp Everlasting *Coronidium gunnianum*, Sticky Wattle *Acacia howittii* and Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris*. In addition to these species, a number of flora recorded are Protected Flora under the FFG Act. Further detail regarding these species is provided below. It is understood that Purple Blown-grass *Lachnagrostis semibarbata*, which is listed as endangered under the FFG Act, has been observed at [REDACTED] by the bush crew [REDACTED] (personal communications, 10/7/2023). There are several records within the VBA from 1998 and 1999. Unfortunately, it was not noted during this assessment, likely due to the site being inundated with water at the time.

3.3.1 Pale Swamp Everlasting *Coronidium gunnianum*

Pale Swamp Everlasting *Coronidium gunnianum* is listed as critically endangered under the FFG Act and was recorded at [REDACTED].

This species is an erect rhizomatous perennial to approximately 50 cm high that can flower between the months of November to June, depending on the season.

Pale Swamp Everlasting *Coronidium gunnianum* is widespread throughout Victoria except for the north-west and the alpine and adjacent mountainous areas, and usually occurs at low elevations (under c. 100 m) where it is mostly in grasslands and riverine River Red-gum *Eucalyptus camaldulensis* Woodlands on soils that are prone to inundation (Royal Botanic Gardens Victoria 2023).

3.3.2 Sticky Wattle *Acacia howittii*

Sticky Wattle *Acacia howittii* is listed as vulnerable under the FFG Act and was recorded at [REDACTED].

This species is a shrub or tree, 3–9 m high that flowers mostly in October and is naturally confined to the east of Victoria, from the upper Macalister River area near Mt Howitt south to near Yarram and east to near Tabberabbera where it grows in moist forest October (Royal Botanic Gardens Victoria 2023). The species is however widely cultivated and known to be naturalising in some areas, such as Daylesford, Greater Melbourne and the Dandenong Ranges (Royal Botanic Gardens Victoria 2023).

As outlined in Section 3.3.2, Sticky Wattle *Acacia howittii* is not indigenous to [REDACTED]. It has either been planted on site or naturally established from other planted or naturalised specimens. While the species can potentially be retained on site, given the high-quality nature of indigenous vegetation present it will need to be monitored to ensure that it does not out-compete this indigenous vegetation where it is retained.

3.3.3 Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris*

Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris* is listed as endangered under the FFG Act and was recorded at [REDACTED].

Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris* is naturally confined to near-coastal sandy heaths and scrub areas slightly raised above saltmarsh, riparian scrub, rocky coastlines and foothill outcrops eastwards from about Marlo. Occurrences to the west of Marlo are considered naturalized from cultivated stock. The species is commonly grown as an ornamental, as a windbreak or street tree and sometimes gives rise to seedlings, particularly after fire (Royal Botanic Gardens Victoria 2023).

As for Sticky Wattle *Acacia howittii*, Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris* does not naturally occur within the Kingston municipality. Therefore, the specimens present have been planted, or have established naturally from other planted specimens. As mentioned for a number of reserves in Section 4, the species has the potential to hybridise with locally indigenous Swamp Paperbark *Melaleuca ericifolia*, and therefore consideration of its removal is recommended in some cases.

3.3.4 FFG Act Protected Flora

The Protected Flora controls are set out in Division 2 of Part 5 of the FFG Act. Species listed as Protected Flora under this act are plants from three sources:

- Plant taxa which are not threatened but are declared to be protected under section 46 of the *Flora and Fauna Guarantee Act 1988*
- Plant taxa which are listed as threatened under section 10 the *Flora and Fauna Guarantee Act 1988*
- Plant taxa belonging to communities which are listed as threatened under section 10 of the *Flora and Fauna Guarantee Act 1988*.

The Protected Flora List includes all members of the Asteraceae (daisies), all members of Epacridaceae (heaths), all members of Orchidaceae (orchids) and all Acacias (excluding Silver, Early Black, Lightwood, Blackwood and Hedge Wattles).

Based on the above definitions, several flora species recorded across the 13 Bushland and Foreshore Reserves are assessed as Protected Flora under the FFG Act. In addition to Pale Swamp Everlasting *Coronidium gunnianum*, Sticky Wattle *Acacia howittii* and Giant Honey-myrtle *Melaleuca armillaris subsp. armillaris* which are *plant taxa listed as threatened under the Act*, a number of other species that are *not threatened but are declared to be protected* are also present. Note that as per the definition above, all indigenous species within areas of FFG Act listed communities are also Protected Flora (i.e. all indigenous species within [REDACTED]).

The flora species lists for each Bushland and Foreshore Reserve are provided in Appendix 3 and indicate species that meet the definition of Protected Flora.

A summary of the number of protected flora documented within each reserve is provided in Table 8 below. Note that 'Type A' Protected Flora in this table this includes some species recorded that are cultivated and planted within the reserves. Refer to Appendix 3 for details.

Table 8. Overview of Habitat Hectares assessments of the 13 Bushland and Foreshore Reserves

Site Number	Abbreviation	Name	Number of FFG Act Plant Taxa Recorded by Type*		
			A	B	C
1	BHP	Bald Hill Park	8	0	n/a
2	BBR	Bradshaw Bushland Reserve	8	0	n/a
3	CWR	Caruana Woodland Reserve	2	0	n/a
4	EG	Epsom Grassland	3	1	32
5	GR	Groves Reserve	3	1	n/a
6	HP	Heights Park	5	0	n/a
7	KHR	Kingston Heath Reserve	10	0	n/a
8	MCR	Mordialloc Creek Reserve	9	0	n/a
9	PE	Powernet Easement Reserve	5	0	n/a
10	RWR	Rowan Woodland Reserve	16	0	n/a
11	TGHR	The Grange Heathland Reserve	28	1	n/a
12	FNR	Foreshore North Reserve	15	1	n/a
13	FSR	Foreshore South Reserve	8	1	n/a

* A: Plant taxa which are not threatened but are declared to be protected under FFG Act

B: Plant taxa which are listed as threatened under section 10 of FFG Act

C3: Plant taxa belonging to communities which are listed as threatened under FFG Act

In line with the provisions of the FFG Act, it is an offence to take, trade in, keep, move or process Protected Flora without a permit, or unless authorised by Order of the Governor in Council published in the *Government Gazette* (GIC Order). The FFG Act defines "take" to mean to kill, injure, disturb or collect. For all Protected Flora, the controls apply to flora "...in any form including the whole organism or any part or product, whether alive or dead or however processed." (Section 45 of the FFG Act).

4. Results: Individual Reserves

4.1 Bald Hill Park (Site #1)

4.1.1 Existing Ecological Conditions

Map 1 in Appendix 2 gives an overview of vegetation extent and EVCs documented across the assessment area associated with Bald Hill Park (BHP) as determined from the site assessment. Appendix 3 provides a list of the typical flora species observed within the assessment area, which covered approximately 2.7 ha.

Indigenous species present in the assessment areas included Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* along with Black Wattle *Acacia mearnsii* and Prickly Tea-tree *Leptospermum continentale*. Herbs and grasses such as Weeping Grass *Microlaena stipoides var. stipoides*, Supple Spear-grass *Austrostipa mollis*, Long Purple-flag *Patersonia occidentalis var. occidentalis* and Chocolate Lily *Arthropodium strictum s.s.* are also present, along with Shiny Cassinia *Cassinia longifolia*, Sandhill Sword-sedge *Lepidosperma sieberi*, Drooping Cassinia *Cassinia sifton*, Broom Spurge *Amperea xiphoclada var. xiphoclada* and Small Grass-tree *Xanthorrhoea minor subsp. lutea*. These include a mixture of both remnant and planted specimens. It is understood from the bush crew that much of the Prickly Tea-tree *Leptospermum continentale* is planted (██████████ Personal Communication).

While the assessment area associated with BHP is mapped by DEECA as comprising a mosaic of EVC 3: Damp Sands Herb-rich Woodland and EVC 48: Heathy Woodland, defining one EVC is necessary to complete a Habitat Hectare assessment. EVC 3: Damp Sands Herb-rich Woodland is described as having a *large shrub layer and ground layer rich in herbs, grasses, and orchids*, while EVC 48: Heathy Woodland is described as *lacking a secondary tree layer and generally supporting a diverse range of narrow or ericoid-leaved shrubs*. Given the presence of a shrub layer across much of the site, including species such as Black Wattle *Acacia mearnsii* and Prickly Tea-tree *Leptospermum continentale* along with a range of grasses and herbs, the vegetation on site was deemed to best represent EVC 3: Damp Sands Herb-rich Woodland. This EVC was also applied to a section of the assessment area to the west that has an absence of canopy species and mid-storey vegetation, with only native grasses and rushes present. It is understood that Coast Tea-tree *Leptospermum laevigatum* has historically been removed from this area lacking mid-storey vegetation (██████████ Communication, 10/7/2023).

Across the assessment area a range of weed species were present that exhibited a low-moderate cover depending on location. Species observed within the mapped Habitat Zones included Flatweed *Hypochaeris radicata*, Large Quaking-grass *Briza maxima*, Common Sow-thistle *Sonchus oleraceus*, Onion Grass *Romulea rosea*, Chickweed *Stellaria media*, Panic Veldt-grass *Ehrharta erecta*, Squirrel-tail Fescue *Vulpia bromoides*, Common Mouse-ear Chickweed *Cerastium glomeratum s.l.*, Rough Sow-thistle *Sonchus asper s.l.*, Fumitory *Fumaria spp.* and Cape Weed *Arctotheca calendula*. It is also noted that outside of defined Habitat Zones, the assessment area contains stands of Coast Tea-tree *Leptospermum laevigatum*. Given the location of BHP away from the coast and the mapping of Habitat Zones within this site as EVC 3: Damp Sands Herb-rich Woodland, this species was treated as a weed at this reserve.

4.1.2 Listed or Notable Species Observed

No listed species were observed, however the presence of species such as Long Purple-flag *Patersonia occidentalis* var. *occidentalis*, Chocolate Lily *Arthropodium strictum* s.s. and Small Grass-tree *Xanthorrhoea minor* subsp. *lutea* are notable observations for this reserve.

4.1.3 Habitat Hectare Assessments

The assessment area was found to have two Habitat Zones, with Habitat Zone 1 comprising two sub-sections as shown on Map 1 in Appendix 2.

Table 9 gives an overview of the Habitat Hectare results for the assessment area within BHP, while Table 10 gives a breakdown of the scoring for the two Zones that were assessed. This site was not subject to a previous assessment by Biosis.

No Large Trees were recorded across the assessment area. While Habitat Zone 2 only comprised two key species, Supple Spear-grass *Austrostipa mollis*, and Rush *Juncus* spp., a range of lifeforms and species were present across Habitat Zone 1. These included understorey trees, medium and small shrubs, herbs and graminoids. Overall, weed cover across Habitat Zone 1 was patchy with a moderate cover depending on location and included a range of species such as Chickweed *Stellaria media*, Panic Veldt-grass *Ehrharta erecta* and Fumitory *Fumaria* spp..

Table 9. Summary of Habitat Hectares results for Bald Hill Park

EVC	Habitat Zones	Total Area (ha)	Total Habitat Hectares
		2022	2022
EVC 3: Damp Sands Herb-rich Woodland	1 & 2	0.180	0.06

Table 10. Habitat Hectares scoring for Bald Hill Park

Habitat Zone		1	2
Bioregion		GipP	GipP
EVC Name (initials)		DsHrW	DsHrW
EVC Number		3	3
EVC Conservation Status		V	V
Year		2022/23 (PE)	2022/23 (PE)
Size of Zone (ha)		0.18	0.01
		Max Score	Score
Site Condition	Large Old Trees	10	0
	Canopy Cover	5	2
	Understorey	25	15
	Lack of Weeds	15	6
	Recruitment	10	3
	Organic Litter	5	5
	Logs	5	4
	EVC Standardiser	n/a	n/a
	Standardised Score	75	35.00
Landscape value	Patch Size	10	1
	Neighbourhood	10	0
	Distance to Core	5	0
Habitat points		100	36.0
Habitat Score (habitat points/100)		0.##	0.36
No. of Large Old Trees		na	na
Habitat Hectares, Area x Habitat Score (Hha)		0.06	0.0019

4.1.4 Photos



Figure 1. Habitat Zone 1 – Photos showing the indigenous groundstorey **Left:** Supple Spear-grass *Austrostipa mollis* dominates, **Right:** Long Purple-flag *Patersonia occidentalis* var. *occidentalis*.



Figure 2. **Left:** Coast Tea-tree *Leptospermum laevigatum* dominated area. **Right:** General site conditions

4.1.5 Management Issues and Opportunities

Table 11. Potential Threats, Management recommendations for Bald Hill Park

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the assessment area and its associated habitat. Further detail is provided in Section 5.1.1.
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>Various websites online, including Council's website (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership) note that a section to the west of Bald Hill Park is a dog-off leash area although no fencing surrounds this space. Hence dogs off lead can potentially move through native vegetation within the assessment area. Given the detrimental impacts detailed above, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Clear signage indicating dog status in the various sections of the reserve • Fencing off and clearly defining the dog-off-leash areas, or • Fencing sensitive areas of vegetation to exclude off-lead dogs from entering. • Proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership)
Dieback/ Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on

Issue/Opportunity	Priority*	Comment
		paths. Periodic monitoring is also recommended with test kits commercially available.
Ecological burning / inappropriate fire regime	2	A lack of ecological burning at the site in the long term may result in a lack of regeneration of some species. Assessing the desired frequency of burns within this reserve was outside of the scope of this assessment. It is highly recommended to consult with a local expert with knowledge of burn practices, as inappropriate fire regimes can result in the degradation of native vegetation in the longer term. Further detail is provided in Section 5.1.2.
Missing structural components in Habitat Zones	3	While Habitat Zone 1 contains a range of structural components, if the intention is to re-established EVC 3: Damp Sands Herb-rich Woodland within Habitat Zone 2 there is scope to add additional lifeforms to this patch.
Non-indigenous revegetation	2-3	Vegetation on site such as Southern Mahogany <i>Eucalyptus botryoides</i> and Coast Tea-tree <i>Leptospermum laevigatum</i> are likely from previous revegetation that occurred within the assessment area. Management of these species over time is recommended.
Spread of weeds from mowing/slashing	2	The southern end of the assessment area abuts an area subject to periodic mowing; it is recommended that care is taken during mowing to prevent inadvertent spread of weeds into assessment area and associated Habitat Zones.
Walking/bike tracks through vegetation/trampling	1	<p>Ad-hoc paths</p> <p>It is understood from the bush crew that the creation of ad-hoc pedestrian and bike trails through native vegetation at Bald Hill Park is an issue. Such paths encourage spread of weeds, trampling of vegetation, and erosion. It is recommended that if this issue is on-going, that native vegetation is protected by exclusion fencing and educational signage installed.</p>
Weed threats or invasion	1	<p>Relatively Common Bushland weeds</p> <p>As mentioned above, weeds across the assessment area included a suite of grassy and herbaceous weeds typical of urban bushland sites; their management will need to be ongoing, prioritised on areas with a higher cover of indigenous species such as Supple Spear-grass <i>Austrostipa mollis</i>, Long Purple-flag <i>Patersonia occidentalis var. occidentalis</i> and Chocolate Lily <i>Arthropodium strictum s.s.</i></p> <p>Woody weeds such as Ash <i>Fraxinus spp.</i> are present on site and should be removed.</p> <p>Coast Tea-tree <i>Leptospermum laevigatum</i> and non-indigenous Eucalypts including Southern Mahogany <i>Eucalyptus botryoides</i> are present. While not indigenous, these species likely provide habitat for local fauna. Hence staged removal of Coast Tea-tree <i>Leptospermum laevigatum</i>, coupled with revegetation, is recommended. Non-indigenous woody weeds should be replaced as they senesce. Regular monitoring to remove any regeneration of these non-indigenous species is also recommended.</p>
* 1 – High, 2 – Moderate and 3 – Low		

4.2 Bradshaw Bushland Reserve (Site #2)

4.2.1 Existing Ecological Conditions

Bradshaw Bushland Reserve (BBR), located between the Nepean Highway and Frankston Train line, contains both remnant vegetation and extensive areas of revegetation, with most revegetation dominated by indigenous species. Map 2 in Appendix 2 gives an overview of the extent of indigenous vegetation across BBR and the EVCs present. Most of the reserve is mapped as patches of native vegetation (Habitat Zones 1–3) representative of EVC3: Damp Sands Herb-rich Woodland.

It is noted that the previous mapping by Biosis Research (Biosis 2012a) shows only a single patch of EVC 3: Damp Sands Herb-rich Woodland along the eastern boundary of the reserve. It is assumed that in the preparation of this 2012 report, only remnant, site-indigenous patches of vegetation were mapped, not areas established through revegetation. As this current study aimed to consider the value of native vegetation, even in areas largely established through revegetation, all areas across BBR were subject to a Habitat Hectare assessment. The mapped Habitat Zones were generally synonymous with the Management Zones established across the site by Council.

Mapping by DEECA of vegetation extent across BBR indicates the presence of a mosaic of EVC 175: Grassy Woodland and EVC 3: Damp Sands Herb-rich Woodland. EVC3 was chosen as the most representative benchmark for the Habitat Hectares assessment across the entire reserve due to (i) previous mapping by Biosis, (ii) the sandy nature of the site, and (iii) large specimens (>70cm) of Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* to the north-west and south of the reserve which indicate that this EVC would have once dominated the reserve in its entirety. Note that this EVC was also applied to Habitat Zone 3, which has a canopy dominated by planted River Red-gum *Eucalyptus camaldulensis*, despite this not being a typical canopy species of this EVC. This approach aimed to ensure that future monitoring of the reserve and this Habitat Zone can continue to use the same benchmark following any EVC restoration works that may occur here in the future.

Appendix 3 details the flora species observed within BBR, inclusive of both remnant specimens and those that have been planted within the site over time. Flora species present across BBR include, but are not limited to, Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*, Black Wattle *Acacia mearnsii*, Sweet Bursaria *Bursaria spinosa*, Spiny-headed Mat-rush *Lomandra longifolia*, Showy Bossiaea *Bossiaea cinerea*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, Drooping Cassinia *Cassinia sifton*, Weeping Grass *Microlaena stipoides var. stipoides*, Supple Spear-grass *Austrostipa mollis*, Sandhill Sword-sedge *Lepidosperma sieberi*, Black-anther Flax-lily *Dianella revoluta s.l.*, Common Flat-pea *Platylobium obtusangulum*, Slender Clematis *Clematis decipiens* and Cherry Ballart *Exocarpos cupressiformis*, particularly in Habitat Zone 1. Similar species were observed across Habitat Zone 2 which also included a range of other species such as Twiggy Daisy-bush *Olearia ramulosa* likely planted as part of revegetation works. To the south of the site within Habitat Zone 3, as noted above River Red-gum *Eucalyptus camaldulensis* dominates the canopy with a high cover of Seaberry Saltbush *Rhagodia candolleana subsp. candolleana* beneath.

It is noted here that prescribed burns in selected areas of BBR have occurred over time, including as recently as 2014, by Council. Overall, these burns have been relatively small in size and focused in discrete areas at the centre and northern ends of the site, within the areas shown as both Habitat Zone 1 and Habitat Zone 2 on Map 2 in Appendix 1.

It is also noted that there is good quality native vegetation beyond the boundaries of BBR, between the western fenceline of the site and the trainline itself. Here species such as Kangaroo Grass *Themeda triandra*, Wallaby

Grass *Rytidosperma spp.* and Spear Grass *Austrostipa spp.* occur noting that weed species such as Bulbil *Watsonia meriana var. bulbillifera* are also prominent here. Ongoing engagement with the adjacent land manager is recommended with a view to improving management of this area.

While BBR is an actively managed reserve, with a friend's group in operation undertaking activities including hand weeding, there are a range of weed species present on site. Many of these weeds are however grassy and herbaceous weeds typical within urban bushland reserves such as BBR that require ongoing management over time. In terms of woody weeds, it is evident that large scale removal of Coast Tea-tree *Leptospermum laevigatum* has occurred across the site. As the native vegetation on site was assessed as EVC 3: Damp Sands Herb-rich Woodland, Coast Tea-tree *Leptospermum laevigatum* was treated as a weed at this location in terms of the assessment undertaken; this is in line with the treatment of this species on site and its physical removal that has occurred over time. In addition to Coast Tea-tree *Leptospermum laevigatum*, the weed species observed on site included Chickweed *Stellaria media*, Common Sow-thistle *Sonchus oleraceus*, Panic Veldt-grass *Ehrharta erecta*, Wall Fumitory, Flatweed *Hypochaeris radicata*, Large Quaking-grass *Briza maxima*, Soursob *Oxalis pes-caprae*, Oat *Avena spp.*, Ribwort *Plantago lanceolata*, Fescue *Vulpia spp.*, Common Mouse-ear Chickweed *Cerastium glomeratum s.l.* and Prostrate Knotweed *Polygonum aviculare s.l.*. Blackberry *Rubus fruticosus spp. agg.* was also observed within Habitat Zones 2 and 3, where within the former of these it was encroaching from the adjacent train line.

4.2.2 Listed or Notable Species Observed

No listed species were observed however the range of indigenous flora species present across the BBR. Of particular note are the following species, noting that some of these may have been established on site through revegetation works:

- Black-anther Flax-lily *Dianella revoluta s.l.*
- Cherry Ballart *Exocarpos cupressiformis*
- Common Apple-berry *Billardiera mutabilis*
- Common Flat-pea *Platylobium obtusangulum*
- Kangaroo Grass *Themeda triandra*
- Sandhill Sword-sedge *Lepidosperma sieberi*
- Showy Bossiaea *Bossiaea cinerea*
- Small-flower Flax-lily *Dianella brevicaulis*
- Small-leaf Bramble *Rubus parvifolius*
- Supple Spear-grass *Austrostipa mollis*
- Twiggy Daisy-bush *Olearia ramulosa*
- Wattle Mat-rush *Lomandra filiformis*

Note that some of these species, such as Sandhill Sword-sedge *Lepidosperma sieberi* dominate the ground layer in selected areas of the site. Other such as Cherry Ballart *Exocarpos cupressiformis* have a limited distribution however.

4.2.3 Habitat Hectare Assessments

Three Habitat Zones were identified on site and subject to Habitat Hectare assessments. As noted above, the distribution of these Habitat Zones generally followed the Management Zones established across the site by Council.

Table 12 gives an overview of the Habitat Hectare results for the reserve while Table 13 gives a breakdown of the scoring for these three Zones.

Three Large Trees were recorded across the site. Two of these were Coast Manna-gums *Eucalyptus viminalis subsp. pryoriana* located in Habitat Zone 2. The third was a large River Red-gum *Eucalyptus camaldulensis*, in Habitat Zone 3. A mature Sheoak *Allocasuarina spp.* is also present on the western boundary of Habitat Zone 2 close to the fenceline.

As shown in Table 13, the area marked as Habitat Zone 1 in this current study is generally in the same location as that marked as Habitat Zone 1 by Biosis (2012a). However, unlike the findings of Biosis, the canopy observed during the current study was considered below the 12m threshold associated with the benchmark for Damp Sands Herb-rich Woodland and was therefore given a score of 0 as opposed to 3. Scores also slightly differed regarding weeds. The results indicate either an overall increase in the cover of weeds, or the presence of a different suite of weeds that are now considered a high threat over time. Changes in overall weed cover could be attributable to the wet spring period in which the current surveys were undertaken in 2022, which resulted in prolific growth of grassy and herbaceous weeds. Changes in the determination of what is considered a high threat weed for the site at the time of each assessment could also contribute to this change in score. Beyond this, a key change was observed in the Logs component. In the current assessment, large logs (i.e. those over 35cm; 50% of benchmark Large Tree size for EVC 3) were not considered to be $\geq 25\%$ of the benchmark log length, and hence Habitat Zone 1 was attributed a score of 4 for logs, as opposed to 5 by Biosis. While the log cover is quite high, the majority of logs present were from previously felled Coast Tea-tree *Leptospermum laevigatum* with a diameter less than 35cm.

Table 12. Summary of Habitat Hectares results for Bradshaw Bushland Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
3: Damp Sands Herb Rich Woodland	1, 2, 3	1.79	0.29	0.66	0.07

Table 13. Habitat Hectares scoring for Bradshaw Bushland Reserve

Habitat Zone		1	2	3		
Bioregion		GipP	GipP	GipP		
EVC Name (initials)		DsHrW	DsHrW	DsHrW		
EVC Number		3	3	3		
EVC Conservation Status		V	V	V		
Year		2022/23 (PE)	2012 (Biosis)	2022/23 (PE)	2022/23 (PE)	
Size of Zone (ha)		0.43	0.29	1.12	0.24	
		Max Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	0	2	3
	Canopy Cover	5	0	3	2	2
	Understorey	25	15	15	15	10
	Lack of Weeds	15	6	7	6	9
	Recruitment	10	3	6	3	6
	Organic Litter	5	5	5	5	5
	Logs	5	4	5	2	4
	EVC Standardiser	n/a	n/a	n/a	n/a	n/a
	Standardised Score	75	33	42	35	39
Landscape value	Patch Size	10	1	1	1	1
	Neighbourhood	10	0	0	0	0
	Distance to Core	5	1	1	1	1
Habitat points		100	35.0	44.0	37.0	41.0
Habitat Score (habitat points/100)		0.##	0.35	0.44	0.37	0.41
No. of Large Old Trees			0	0	2	1
Habitat Hectares, Area x Habitat Score (Hha)			0.15	0.13	0.41	0.10

4.2.4 Photos



Figure 3. Left: Habitat Zone 2 – general vegetation condition. Right: Habitat Zone 3 – general vegetation condition.



Figure 4. Left: Kangaroo Grass *Themeda triandra* and other indigenous species in rail reserve along western edge of site. Right: Walking track through reserve

4.2.5 Management Issues and Opportunities

Table 14. Potential Threats, Management recommendations for Bradshaw Bushland Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the assessment area and its associated habitat. Further detail is provided in Section 5.1.1.
Dogs walked off-lead	2	<p>Dogs pose a number of threats to areas of native vegetation (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>Information available online suggests that dogs are allowed within the BBR provided they are on a leash. However, there is also signage at the reserve entrances to inform reserve users and a risk that dogs could be walked off lead in the park.</p> <p>Given the detrimental impacts detailed above, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing off and clearly defining the dog-off-lead areas, or • Fencing sensitive areas of vegetation to exclude off-lead dogs from entering. • Signage at entrances to reserves and paths indicating dog access status (e.g. whether dogs are not allowed, must be on-lead or can be off-lead) • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership)
Dieback/ Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. it is important

Issue/Opportunity	Priority*	Comment
		to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.
Inappropriate plantings / encroachment	3	BBR includes a range of planted vegetation, particular in the western half of the site (Habitat Zone 2) and to the south (Habitat Zone 3). Some of this planted vegetation has likely been present on site for a considerable period, given the size of some specimens such as a larger River Red-gum <i>Eucalyptus camaldulensis</i> . Given the habitat provided by this established vegetation to local fauna, it is not recommended that existing specimens are removed. Rather, regeneration of species that are non-site indigenous should be managed over time particularly where they are observed within Habitat Zone 1, and to a lesser extent Habitat Zone 2. Within Habitat Zone 3, replacement of the canopy species should be completed over a longer period such that the existing canopy should be replaced with site indigenous species over time, such as Coast Manna-gum <i>Eucalyptus viminalis subsp. pryoriana</i> .
Ecological burning / inappropriate fire regime	2	According to information provided as part of this study, small localised prescribed burns have been implemented across central and northern areas of BBR by Council. Documented burns took place between 2003 to 2015 and ranged in size from 50m ² to 731 m ² . Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Non-indigenous revegetation	3	Refer above to inappropriate plantings/encroachment
Rabbits/ Foxes	2	Pest animals were not observed during the site survey completed in 2022 although foxes are known to and expected to occur within the site. It is understood that Council undertakes control programs annually to curtail the impacts of foxes in the BBR and this should continue given use of the site by local fauna.
Weed threats or invasion	1	As mentioned above, weeds across BBR largely include a suite of grassy and herbaceous weeds typical of urban bushland sites; their continued management will need to be ongoing. Coast Tea-tree <i>Leptospermum laevigatum</i> has been removed to a large degree within the site and should continue. Blackberry <i>Rubus fruticosus spp. agg.</i> and Rose <i>Rosa spp.</i> are present on the western boundary of the site, with both of these present within Habitat Zone 3. It is apparent that Blackberry <i>Rubus fruticosus spp. agg.</i> has entered the site through unmanaged infestations within the adjacent corridor, with other species such as Bulbil <i>Watsonia meriana var. bulbifera</i> also present on this adjacent land very close to the fence line. Engagement with the adjacent landowner associated with the rail corridor is recommended to initial weed management in this area with a view to minimising ongoing encroachment of weeds into BBR.
* 1 – High, 2 – Moderate and 3 – Low		

4.3 Caruana Woodland Reserve (Site #3)

4.3.1 Existing Ecological Conditions

Map 3 in Appendix 2 gives an overview of vegetation extent and EVCs present across Caruana Woodland Reserve (CWR) as determined from the site assessment, while Appendix 3 details the flora species observed.

Most of CWR is representative of EVC 55: Plains Grassy Woodland, Habitat Zone 1, however there are two smaller areas of EVC 651: Plains Swampy Woodland, Habitat Zone 2, along swales (Figure 5). Both EVCs were characterised by an overstorey of River Red-gum *Eucalyptus camaldulensis*, with seedlings and immature trees evident, especially along the south-eastern boundary. The vegetation mapped as EVC 651: Plains Swampy Woodland differed from areas shown as EVC 55: Plains Grassy Woodland, with a higher cover of sedges and aquatic forbs present across areas of Habitat Zone 2.

At the time the Habitat Hectares assessments, and during an earlier brief site visit, the tree canopy was in poor health with an extensive outbreak of lerps (Figure 6). Further lerp infestations should be closely monitored and if the issue appears to be ongoing, a suitably qualified and/or experienced specialist should be engaged to suggest mitigation measures.

As typical for these EVCs, understorey tree and shrub cover were relatively sparse and included a number of Wattles *Acacia spp.* as well as Prickly Tea-tree *Leptospermum continentale*, Common Cassinia *Cassinia aculeata subsp. aculeata*, and Hop Goodenia *Goodenia ovata*. Many of these shrubs appear to have been planted for amenity (mainly near the road) and it is recommended that further shrub plantings are limited as this vegetation type typically does not contain a dense shrub layer. The groundlayer in areas of EVC 55: Plains Grassy Woodland was characterised by tussock grasses including Wallaby Grasses *Rytidosperma spp.*, Spear Grasses *Austrostipa spp.*, and Common Tussock-Grass *Poa labillardierei*. In areas of EVC 651: Plains Swampy Woodland, the groundlayer was characterised by grasses and sedges preferring wetter areas, including Knob Sedge *Carex inversa*, Mat Grass *Hemarthria uncinata var. uncinata*, and Club Sedges *Isolepis spp.*, as well as forbs such as Slender Knotweed *Persicaria decipiens*.

The understorey across the reserve has a high coverage of weed species. Key weed species included Toowoomba Canary-grass *Phalaris aquatica*, Panic Veldt *Ehrharta erecta*, Annual Veldt Grass *Ehrharta longiflora*, Kikuyu *Cenchrus clandestinus*, Rye grasses *Lolium spp.*, Tall Fescue *Festuca arundinacea*, Creeping Buttercup *Ranunculus repens*, and Fog Grass *Holcus spp.*. The cover of weed species was especially high in the areas adjacent to areas of EVC 651: Plains Swampy Woodland – likely as a result of rapid growth following a wetter than usual winter and spring.

Overall, this reserve appears to contain remnant vegetation unique within the Kingston municipality, and while continued management of the weeds on site is needed and landscape connectivity could be enhanced, the reserve provides great habitat in an otherwise urbanised landscape.

4.3.2 Listed or Notable Species Observed

No listed species were observed during the site assessment; however, it is considered likely that the reserve would support small forbs and graminoids which were not possible to observe when much of the site was inundated – especially marginal areas where such species often occur. It is expected that Kingston staff would recognise these species due to their extensive knowledge of local flora – which should be noted and added to

the species list for the reserve. For example, it is understood from the bush crew that Lesser Joyweed *Alternanthera denticulata* is present in the reserve.

4.3.3 Habitat Hectare Assessments

The reserve was divided into two Habitat Zones as shown in Table 15 and Table 16, with each Habitat Zone reflective of the two EVCs present.

Note that each Habitat Zone was assessed as a whole despite consisting of discrete patches. This was due to each patch marked as the same Habitat Zone number being of the same EVC with similar in character, and generally only separated by small paths, and in order to simplify monitoring for future years. This differs to the approach taken by Biosis where each discrete patch was scored (Biosis 2012b).

Table 15 gives an overview of the Habitat Hectare assessment results for the reserve, while Table 16 gives a breakdown of the scoring for the two Zones.

Table 15. Summary of habitat hectares results for Caruana Woodland Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
55: Plains Grassy Woodland	1	0.44	0.40	0.17	0.07
651: Plains Swampy Woodland	2	0.08	0.02	0.013	0.01
Total		0.52	0.42	0.183	0.08

Only one Large Tree was recorded, which was not recorded in the 2012 survey. This Large Tree fell within Habitat Zone 2, EVC 651: Plains Swampy Woodland, and therefore led to a high large tree score for this Habitat Zone given its small area. Otherwise, the condition score of the Habitat Zones deemed EVC 651: Plains Swampy Woodland remained the same as in 2012.

An improvement in the understorey score for Habitat Zone 1, EVC55: Plains Grassy Woodland, was observed compared to the 2012 survey, indicating an improved diversity and/or cover of indigenous understorey species. It did appear that there had been some planting in the western section of the reserve especially, therefore many of these established plants would have contributed to the higher score.

Within both Habitat Zones, the weed cover in the understorey remains very high, and is a key management issue for this reserve, along with the lerp outbreaks discussed earlier. The log score had also increased throughout Zone 1, EVC55: Plains Grassy Woodland, compared to 2012.

Table 16. Habitat Hectares scoring for Caruana Woodland Reserve

Habitat Zone			1				2		
Bioregion			GipP				GipP		
EVC Name (initials)			PGW				PSW		
EVC Number			55				651		
EVC Conservation Status			E				E		
Year			2022/23 (PE)	2012 (Biosis) (PGW1)	2012 (Biosis) (PGW2)	2012 (Biosis) (PGW3)	2022/23 (PE)	2012 (Biosis) (PSW1)	2012 (Biosis) (PSW2)
Size of Zone (ha)			0.44	0.26	0.09	0.05	0.026	0.01	0.01
		Max Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	0	0	0	0	9	0	0
	Canopy Cover	5	4	0*	9*	0*	4	11*	11*
	Understorey	25	15	5	5	5	5	5	5
	Lack of Weeds	15	4	5*	5*	5*	6	5*	5*
	Recruitment	10	5	1	5	5	5	5	0
	Organic Litter	5	3	3	3	3	3	3	3
	Logs	5	5	0	0	0	0	0	0
	EVC Standardiser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Standardised Score	75	36	14	18	18	32	28 [^]	24 [^]
Landscape value	Patch Size	10	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0
	Distance to Core	5	1	1	1	1	1	1	1
Habitat points		100	38	16	20	20	34	30	26
Habitat Score (habitat points/100)		0.##	0.39	0.16	0.20	0.20	0.52	0.30	0.26
No. of Large Old Trees			0	0	0	0	1	0	0
Habitat Hectares, Area x Habitat Score (Hha)			0.17	0.04	0.02	0.01	0.013	0.003	0.003

*Note that the Biosis report listed a score of 11 for Canopy Cover (with the highest possible score being 5) – and thus it was assumed that the scores for Lack of Weeds and Canopy Cover were swapped over.

[^] Final score as per Biosis Research (Biosis 2012b).

4.3.4 Photos



Figure 5. Left: Habitat Zone 1, EVC 55: Plains Grassy Woodland, in September 2022, when wet/waterlogged with lerp outbreak evident, and **Right:** in March 2023, when dry and trees recovering tree canopy and weedy understorey.



Figure 6. Left: Lerp infestation, and **Right:** Habitat Zone 2, EVC 651: Plains Swampy Woodland.

4.3.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 17. Site-specific Potential Threats, Management recommendations for Caruana Woodland Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.
Connectivity and Fragmentation	3	There is potential for improved connectivity of this reserve with vegetation along Westall Rd. Canopy tree connectivity could be improved through only a few tree plantings – although understorey connectivity should also be considered. More broadly there is potential to create a biodiversity corridor from The Grange through to Caruana and Rowan Woodland Reserves to Braeside Park but would require considerable planning. This could be achieved through stepping stone corridors and plantings along the highway – and is flagged here as a potential long-term goal for Kingston’s Bushland and Foreshore Reserves.
Dieback/Disease/Phytophthora/Pests	1	A severe lerp infection was evident with extensive dieback of the canopy. This should be carefully monitored to determine if this is a recurring issue leading to long-term deterioration of the River Red-gums <i>Eucalyptus camaldulensis</i> . Further lerp infestations should be closely monitored and if the issue appears to be ongoing, a suitably qualified and/or experienced specialist should be engaged to suggest mitigation measures. There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.

Issue/Opportunity	Priority*	Comment
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. However, in order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p> <p>Further to this, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Lack of ecological burning/ inappropriate fire regime	2	<p>Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. It is highly recommended to consult with a local expert with knowledge of burn practices, as inappropriate fire regimes can result in the degradation of native vegetation in the longer term. Further detail is provided in Section 5.1.2.</p>
Missing structural components in Habitat Zones	3	<p>There is only one large tree. This component is not quickly replaced, and will likely be improved over time through protecting existing trees and encouraging natural regeneration, which is occurring on site.</p> <p>Otherwise, all other attributes are present. While the understorey vegetation was degraded by weed invasion, this is likely to improve with continued management.</p>
Stormwater outflow and runoff	2	<p>Artificial swales exist in the reserve which support the Plains Swampy Woodland community. Any change to the hydrological regime of the area should be carefully considered as many of the species in the reserve rely on regular water supply</p>

Issue/Opportunity	Priority*	Comment
Weed threats or invasion	1	Weed species as listed above were present throughout the reserve particularly in the eastern half in areas with higher soil moisture – seemingly exacerbated by the higher than usual rainfall in the previous months. The suite of species on site and their control methods are likely familiar to Kingston staff and will require management over a number of years.
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.4 Epsom Grassland (Site #4)

4.4.1 Existing Ecological Conditions

Map 4 in Appendix 2 gives an overview of vegetation extent and EVCs present across Epsom Grassland (EG), as determined from the site assessment. Appendix 3 details the flora species observed.

Most of the EG is representative of EVC 132_62: Plains Grassland (Habitat Zone 1; Figure 7), with two smaller areas to the west representative of EVC 123: Plains Grassy Wetland (Habitat Zone 2) and EVC 821: Tall Marsh (Habitat Zone 3).

During the site assessment, parts of Habitat Zone 1, and the majority of Habitat Zones 2 and 3 were inundated. Because of this, in many cases it was difficult to assess the diversity of ground layer forbs and graminoids, and it is likely that there are species present which were not visible at the time of assessment.

Habitat Zone 1, EVC 132_62: Plains Grassland, was characterised by a diverse mix of graminoids including Kangaroo Grass *Themeda triandra*, Wallaby Grasses *Rytidosperma spp.*, Spear Grasses *Austrostipa spp.*, Rushes *Juncus spp.*, Long-haired Plume-grass *Dichelachne crinita*, Blown-grasses *Lachnagrostis spp.*, and Common Wheat-grass *Anthosachne scabra s.s.*. There was also a diversity of forbs and small shrubs including Smooth Rice-flower *Pimelea glauca*, [REDACTED] and [REDACTED]. [REDACTED] and [REDACTED]. Seemingly due to the high rainfall in the months leading up to the site assessment, there was an abundance of Common Reed *Phragmites australis* throughout this Habitat Zone which appeared to have recently germinated. While it is likely that many of these plants will not survive as the reserve dries out again, the appearance of this Habitat Zone at the time of assessment was nearing that of an ephemeral wetland.

Habitat Zone 2, EVC 123: Plains Grassy Wetland, was characterised mainly by Spike-sedges, with other plant species otherwise similar to Habitat Zone 1. Habitat Zone 3, EVC 821: Tall Marsh, was characterised by dense Common Reed *Phragmites australis*. Due to the inundation in these Habitat Zones, it was difficult to identify many smaller forbs and graminoids, although species identified included [REDACTED] Rushes *Juncus spp.*, [REDACTED] and [REDACTED]. [REDACTED] and [REDACTED].

Between Habitat Zones 2 and 3, on an embankment which appears to be man-made, the area was dominated by exotic grassy weeds, although there was an abundance of [REDACTED] and [REDACTED]. [REDACTED], which will be essential to consider during weed management (Figure 7).

The understorey has a high coverage of weed species in most areas, with a suite of species including Ribwort *Plantago lanceolata*, Sweet Vernal-grass *Anthoxanthum odoratum*, Paspalum *Paspalum dilatatum*, Cocksfoot *Dactylis glomerata*, Carrot *Daucus carota*, Yorkshire Fog *Holcus lanatus*, and Quaking Grasses.

Overall, this remnant appears to be unique in Kingston, and while continued management of the weeds on site is needed, the reserve provides great habitat of a highly cleared vegetation type in an otherwise urbanised landscape.

4.4.2 Listed or Notable Species Observed

██████████ listed as critically endangered on the FFG Act, was recorded within the reserve (Figure 7). Additionally, the abundance of ██████████, and ██████████ was noted. ██████████ which is listed as endangered under the FFG Act, has been observed at Epsom Grassland by the bush crew ██████████, Personal Communication, 10/7/2023). There are several records within the VBA from 1998 and 1999. Unfortunately, it was not noted during this assessment, likely due to the site being inundated with water at the time.

Areas of this reserve mapped as EVC 123: Plains Grassy Wetland and EVC 132: Plains Grassland are deemed representative of FFG Act listed communities, *Herb-rich Plains Grassy Wetland (West Gippsland)* and *Plains Grassland (South Gippsland) Community*, respectively. Hence species belonging to these communities are all protected species under the FFG Act (See Section 3.3.4).

4.4.3 Habitat Hectare Assessments

The reserve was divided into three Habitat Zones. Table 15 gives an overview of the Habitat Hectare results for the reserve while Table 16 gives a breakdown of the scoring for the three Habitat Zones.

Table 18. Summary of habitat hectares results for Epsom Grassland

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
125: Plains Grassy Wetland	1	3.48	3.36	1.67	1.24
132_62: Plains Grassland	2	0.19	0.19	0.09	0.07
821: Tall Marsh	3	0.03	0.03	0.02	0.01
	Total	3.70	3.58	1.78	1.32

An analysis of the Habitat Hectare site condition scores achieved by the current study compared to those documented by Biosis (2012a), indicate an improvement in scores achieved by all three Habitat Zones.

The Understorey score increased in all Habitat Zones, most noticeably in Habitat Zones 2 and 3, where the scores increased by 10 points, and seemed to be attributed to a diversity of graminoids in each. The Lack of Weeds score improved across each Habitat Zone, which was surprising given the rainfall in the previous months – however it was likely that the very high moisture level favoured the germination of indigenous wetland plants (e.g., Common Reed *Phragmites australis*), rather than the seed bank of exotic species present. The Recruitment component score also increased in Habitat Zone 3, with sufficient bare ground for recruitment within the Habitat Zone.

Table 19. Habitat Hectares scoring for Epsom Grassland

Habitat Zone		1		2		3	
Bioregion		GipP		GipP		GipP	
EVC Name (initials)		PG		PGW		TM	
EVC Number		132_62		125		821	
EVC Conservation Status		E		E		*	
Year		2022/3 (PE)	2012 (Biosis)	2022/3 (PE)	2012 (Biosis)	2022/3 (PE)	2012 (Biosis)
Size of Zone (ha)		3.48	3.36	0.19	0.19	0.03	0.03
		Max Score	Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a
	Understorey	25	15	10	15	5	15
	Lack of Weeds	15	7	4	7	7	11
	Recruitment	10	6	6	6	6	6
	Organic Litter	5	5	5	5	5	5
	Logs	5	n/a	n/a	n/a	n/a	n/a
	EVC Standardiser	n/a	1.36	1.36	1.36	1.36	1.36
Standardised Score		75	44.88	34	44.88	31.28	50.32
Landscape value	Patch Size	10	2	2	2	2	2
	Neighbourhood	10	0	0	0	0	0
	Distance to Core	5	1	1	1	1	1
Habitat points		100	47.88	37	47.88	34.28	53.32
Habitat Score (habitat points/100)		0.##	0.4788	0.37	0.4788	0.3428	0.5332
No. of Large Old Trees			n/a	n/a	n/a	n/a	n/a
Habitat Hectares, Area x Habitat Score (Hha)			1.67	1.24	0.09	0.07	0.02

*Not listed.

4.4.4 Photos



Figure 7. Top: Habitat Zone 1, EVC55: Plains Grassland, Bottom Left: [redacted] growing in grassy weeds between Habitat Zones 2 and 3, and Bottom Right: [redacted].

4.4.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 20. Site-specific Potential Threats, Management recommendations for Epsom Grassland.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.

Issue/Opportunity	Priority*	Comment
Dieback/Disease/Phytophthora/Pests	1	<p>There was no clear evidence of Phytophthora in the reserve. While Phytophthora is more commonly associated with Heathlands, coastal woodlands and Eucalypt forests which include more susceptible species, it is possible that other vegetation types could also be affected. Therefore, as a precaution it is recommended that good hygiene measures are implemented to reduce the potential for its introduction.</p>
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. However, in order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p> <p>Further to this, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Infrastructure upgrades	1	<p>Signage at this reserve indicated that replacement of a section of the boardwalk was planned. These works should be carefully designed and undertaken to ensure minimal impact to the grassland. Ideally it should be designed</p> <ul style="list-style-type: none"> • for longevity with materials that resist rot and deterioration, and • to allow future maintenance with minimal impacts to vegetation. <p>Grate type walkways are preferred as they allow greater light penetration</p>

Issue/Opportunity	Priority*	Comment
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Mowing regime and biomass control	1	A strategically mowing regime should be employed that: <ul style="list-style-type: none"> • mows selectively around indigenous patches to ensure they set seed • exotic grass species are mown before they set seed Ideally, the bare ground & inter-tussock space (i.e., area with no organic litter, rocks, or vegetation) would be monitored and used as an indication of when biomass control is desirable. Generally, the inter-tussock space should be maintained at greater than 30% over time and can be maintained through mowing and hand removal of biomass or prescribed fire.
Weed threats or invasion	1	Weed species as listed above were present throughout the reserve particularly in the eastern half in areas with higher soil moisture – seemingly exacerbated by the higher than usual rainfall in the previous months. The suite of species on site and their control methods are likely familiar to Kingston staff and will require continued management over a number of years.
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.5 Groves Reserve (Site #5)

4.5.1 Existing Ecological Conditions

Groves Reserve (GR) is located in Aspendale, and situated between the Frankston line rail reserve, the Nepean Highway and Station Street. While the reserve includes a fenced compound at the north end, this was not included in the assessment area associated with this study for this reserve as shown on Map 5 in Appendix 2. The reserve is narrow and triangular, and is dissected by a walking track through its centre between Station Street and a pedestrian crossing over the rail line. It contains native vegetation present on site as either a remnant patches or Scattered Trees. Appendix 3 details the flora species observed within the reserve, inclusive of both remnant specimens and those that have been planted within the site over time.

A previous assessment of the vegetation within Groves Reserve was undertaken by Dr Jeff Yugovic of Biosis in February 2018 (Biosis 2018), with the findings of this assessment outlined in a letter style report prepared for Council. While the reserve was not included in earlier works by Biosis covering natural areas throughout the municipality, the 2018 report contained information that allows for a comparison between 2018 site conditions and those observed as part of the current assessment in late 2022.

The previous Biosis report included the completion of Habitat Hectare assessments for 16 patches of non-planted vegetation and the documentation of scattered trees, with this vegetation deemed to be representative of EVC 2: Coast Banksia Woodland (Biosis 2018). Of key consideration with regard to the previous report is that the documentation of native vegetation on-site focused on remnant (non-planted) occurrences of Coast Banksia

Banksia integrifolia subsp. integrifolia, with the report acknowledging that “It can be difficult to distinguish planted from natural Coast Banksia *Banksia integrifolia subsp. integrifolia* . . .”.

As this current study aimed to consider the value of native vegetation across each Bushland and Foreshore Reserve, inclusive of indigenous vegetation that may have been established through planting, Coast Banksia *Banksia integrifolia subsp. integrifolia* specimens that may have been historically planted within Groves Reserve, along with patches of Coast Tea-tree *Leptospermum laevigatum* not recorded by Biosis (2018), were documented. This has resulted in the documentation of a number of Habitat Zones across the reserve along with Scattered Trees, noting here that some Habitat Zones were attributed the same score given similarities in structure and species composition.

In terms of EVC, the current assessment concurs with the findings of the Biosis 2018 report in that the vegetation within the reserve is representative of EVC 2: Coast Banksia Woodland. While this EVC occurs on site as patches of native vegetation with a canopy dominated by Coast Banksia *Banksia integrifolia subsp. integrifolia*, there are also instances where patches are dominated by Coast Tea-tree *Leptospermum laevigatum*, and Coast Banksia *Banksia integrifolia subsp. integrifolia* is absent. Given the presence of many Coast Banksia across this site, the Coast Banksia Woodland benchmark was assumed to have been historically present across all patches, even those without Coast Banksia present today.

Common remnant (site-indigenous) species in the ground layer across the site include Kidney Weed *Dichondra repens*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, Coast Wattle *Acacia longifolia subsp. sophorae* and Austral Bracken *Pteridium esculentum subsp. esculentum*. Common Onion-orchid *Microtis unifolia* was also observed in Habitat Zone 5. In addition to these remnant species are a number of planted indigenous specimens. This includes recently planted occurrences of Coast Banksia *Banksia integrifolia subsp. integrifolia*, including those documented as part of this study as Small Scattered Trees, along with older, planted specimens within Habitat Zone 9, which surrounds the fenced compound to the north. Other examples of planted indigenous vegetation include Prickly Moses *Acacia verticillata* and Drooping Sheoak *Allocasuarina verticillata*. Other non-indigenous species are also present such as Southern Mahogany *Eucalyptus botryoides* and [REDACTED]

While the site contains a number of patches of native vegetation along with Scattered Trees, this vegetation, along with the open space between them is dominated by a range of weed species. This includes a range of grassy and herbaceous weed species such as Annual Veldt-grass *Ehrharta longiflora*, Soursob *Oxalis pes-caprae*, Cleavers *Galium aparine*, Prairie Grass *Bromus catharticus*, Common Mouse-ear Chickweed *Cerastium glomeratum s.l.*, Galenia *Aizoon pubescens*, Hare's-tail Grass *Lagurus ovatus*, Panic Veldt-grass *Ehrharta erecta*, Angled Onion *Allium triquetrum*, Cape Weed *Arctotheca calendula*, Rat-tail Grass *Sporobolus africanus* and Kikuyu *Cenchrus clandestinus*. An area dominated by Rodondo Creeper *Drosanthemum candens* is also present near the centre of the site and close to the Nepean Highway. Pampas Lily-of-the-Valley *Salpichroa organifolia* is also present, along with Bridal Creeper *Asparagus asparagoides*. Cape Ivy *Delairea odorata* and woody weeds including Mirror Bush *Coprosma repens* and African Box-thorn *Lycium ferocissimum* are also present. Of particular note is the recent loss, due to storms, of Monterey Cypress trees that previously occurred along the boundary of the site with the Nepean Highway.

4.5.2 Listed or Notable Species Observed

No State or Federally listed flora species were observed within the reserve aside from [REDACTED] [REDACTED] that is likely to have been established from historical plantings, [REDACTED]

Of particular note are the larger remnant Coast Banksia *Banksia integrifolia subsp. integrifolia* that are present. This includes two Coast Banksia *Banksia integrifolia subsp. integrifolia* specimens that that have a DBH of 90cm; and an additional nine with a DBH at 50cm or greater. The benchmark DBH for a Large Tree within EVC 2: Coast Banksia Woodland is 50cm, meaning that 11 Large Trees are present on site, all of which are located within the Habitat Zones observed.

Note that one dead Coast Banksia *Banksia integrifolia subsp. integrifolia* is also present that appears to be an older, remnant specimen that has died since the previous report (Biosis 2018). This is located to the south of the pedestrian crossing over the rail line and is shown as a Large Scattered Tree on Map 5 in Appendix 2.

4.5.3 Habitat Hectare Assessments

Table 21 gives an overview of the Habitat Hectare assessment results for Groves Reserve.

This table provides an overview of the total area and Habitat Hectares achieved on site based on the assessment completed by Biosis in 2018, and data collected by Practical Ecology in 2022 across all areas of EVC 2: Coast Banksia Woodland documented across the site. As shown in Table 21, with the inclusion of additional Habitat Zones across the site based on both planted and non-planted areas representative of EVC 2: Coast Banksia Woodland, the total area of native vegetation documented as Habitat Zones increased from 0.398 ha in 2018 to 0.586 ha in 2022.

Table 21. Summary of habitat hectares results for Groves Reserve

EVC	Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2018	2022	2012
2: Coast Banksia Woodland	1–9	0.586	0.398	0.091	0.02

Table 22 gives a breakdown of the scoring for Habitat Zones documented across the reserve in 2022. In line with a number of the reserves covered by this study, a number of the patches documented across the reserve that achieved the same site condition and landscape value scores have been assigned the same Habitat Zone number. Where possible, the equivalent Habitat Zone from the previous report by Biosis (2018), is also shown in Table 22, with multiple or single Habitat Zones grouped as required to facilitate comparison of scores.

Habitat Zones 1, 2 and 5, documented as part of this current study, correspond to a range of numbered Habitat Zones across the reserve by Biosis (2018). Key changes to scoring between these assessments relate to the cover of weeds across these Habitat Zones in particular. Scoring is indicative that the cover of weeds has increased over time, although this is likely attributable to the wet spring period in which surveys were undertaken in 2022, which resulted in prolific growth grassy and herbaceous weeds. A key difference is in regards to Habitat Zone 5 as per the Practical Ecology 2022 assessment versus the scores for Habitat Zone 15 achieved by Biosis for this same area. This Habitat Zone contains two Large Canopy Trees and hence a score of 9 was attributed to Large Old Trees for this Habitat Zone given its relatively small area, as opposed to a score of 0 that was previously attributed to this Zone. Overall, the understorey score achieved remains unchanged however it is weed cover and the Large Tree score for Habitat Zone 5 that are quite different between assessment events.

With regards to the other Habitat Zones where a comparison between the 2018 and current assessment is possible, the overall scores achieved for these Habitat Zones remains largely unchanged. It is generally the lower weed scores achieved under the current assessment due to higher weed cover, but a higher cover of organic litter and logs compared to 2018 that has however generally resulted in such overall similar scores.

It is also noted here that while multiple Coast Banksia *Banksia integrifolia* subsp. *integrifolia* were mapped across the reserve in 2018, the data regarding these trees was not provided at the time of writing. A review of the DBH of a number of these trees across the site did indicate however that many recorded in 2018 were not Large Canopy Trees but rather Coast Banksia *Banksia integrifolia* subsp. *integrifolia* in general within and outside of the Habitat Zones documented. In any event, the scores for Large Tree attributed to the various Habitat Zones with them – aside from Habitat Zone 5 (equivalent to Habitat Zone 15 in Biosis (2018)) – were generally consistent with between 2018 and 2022.

Table 22. Habitat Hectares scoring for Groves Reserve

Habitat Zone		1	2	5	1–6, 8, 11–13, 15	3	9	4	14	6	16	7	10	8	7	9	
Bioregion		GipP				GipP		GipP		GipP		GipP		GipP		GipP	
EVC Name (initials)		CBW				CBW		CBW		CBW		CBW		CBW		CBW	
EVC Number		2				2		2		2		2		2		2	
EVC Conservation Status		V				V		V		V		V		V		V	
Size of Zone (ha)		0.158	0.020	0.009	0.103	0.077	0.072	0.084	0.111	0.006	0.006	0.057	0.047	0.069	0.059	0.104	
Max Score		Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	0	0	9	0	0	0	9	9	0	0	9	9	9	9	0
	Canopy Cover	5	0	0	2	0	2	2	4	4	4	4	4	2	2	4	4
	Understorey	25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Lack of Weeds	15	2	0	2	7	2	7	2	7	7	7	2	7	6	7	2
	Recruitment	10	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Organic Litter	5	5	4	5	3	5	3	5	3	3	3	5	3	3	3	3
	Logs	5	0	0	4	0	4	0	4	0	0	0	2	0	2	0	0
	EVC Standardiser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Standardised Score	75	12.0	9.0	27.0	15.0	19.0	17.0	29.0	28.0	19.0	19.0	27.0	26.0	27.0	28.0	14.0	
Landscape value	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Distance to Core	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Habitat points	100	14.0	11.0	29.0	17.0	21.0	19.0	31.0	30.0	21.0	21.0	29.0	28.0	29.0	30.0	16.0	
Habitat Score (habitat points/100)	0.##	0.14	0.11	0.29	0.17	0.21	0.19	0.31	0.30	0.21	0.21	0.29	0.28	0.29	0.30	0.16	
No. of Large Old Trees		0	0	2	0	0	0	3	3*	0	0	1	1*	3	2*	0	
Habitat Hectares, Area x Habitat Score (Hha)		0.022	0.002	0.003	0.02	0.016	0.01	0.026	0.03	0.001	0.001	0.002	0.01	0.002	0.02	0.017	

Not mapped

*The 2018 Biosis report does not give the number of Large Trees in each Habitat Zone (Biosis 2018). The values given here are estimates based on each zone's location and the mapped trees within it within the Biosis report. These trees were then cross-referenced with the tree details given within the arborist report by Treelogic (2019) to determine which were likely Large Trees (> 50 cm for Coast Banksia *Banksia integrifolia subsp. integrifolia* in EVC 2: Coast Banksia Woodland benchmark).

4.5.4 Photos



Figure 8. Left: Remnant Coast Banksia *Banksia integrifolia* subsp. *integrifolia* showing attack by borer. Right: Younger Coast Banksia *Banksia integrifolia* subsp. *integrifolia* – presumed planted.



Figure 9. Left: Large Coast Banksia *Banksia integrifolia* subsp. *integrifolia* specimen within site. Right: Example of Pine Tree close to Nepean Highway noting some have been removed following storm damage.

4.5.5 Management Issues and Opportunities

Table 23. Potential Threats, Management recommendations for Groves Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the assessment area and its associated habitat. Further detail is provided in Section 5.1.1.
Dieback/Disease/Phytophthora/Pests	1	<p>Dieback of some of the Coast Banksia <i>Banksia integrifolia subsp. integrifolia</i> on site has occurred. It was noted in the 2018 Biosis Research report that: <i>Native longicorn beetle larvae appear to be causing tree decline and are affecting old trees in particular sometimes leading to structural failure of trees. Borers are part of the local fauna and a low level of borer damage is normal and desirable. However borers appear to be out of balance for unknown reasons as on Seaford foreshore (Biosis 2006a). Fortunately the trees reach reproductive age before they are attacked by borers, so the population is not threatened although the trees are stunted and do not reach full size. . . . Currently there is no management response for borers.</i></p> <p>There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.</p>
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>Information available online suggests that dogs are allowed within the reserve provided they are on a leash. While no dogs were observed off-lead during the site assessments, the risk remains that dogs could be walked off-lead. In order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p> <p>Further to this, consideration of the following is recommended:</p>

Issue/Opportunity	Priority*	Comment
		<ul style="list-style-type: none"> Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves Established dedicated dog-off-lead areas outside of bushland reserves Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Ecological burning / inappropriate fire regime	2	A lack of ecological burning at the site in the long term may result in a lack of regeneration of some species. Assessing the desired frequency of burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Infrastructure upgrades	1	<p>Level Crossing Removal</p> <p>It is understood that the level crossing just north of the reserve is to be removed with an elevated rail bridge built over Station Street, Aspendale.</p> <p>It is recommended that Council work closely with Level Crossing Level Crossing Removal Authority (LXRA) to:</p> <ul style="list-style-type: none"> ensure this reserve and its remnant Coast Bankias <i>Banksia integrifolia subsp. integrifolia</i> are protected from impacts, and to improve biodiversity of the reserve following the LXR works where possible.
Missing structural components in Habitat Zones	2	<p>Vegetation</p> <p>There was a notable lack of mid-storey vegetation across most Habitat Zones; regeneration of woody species present was also notably absent.</p> <p>Logs</p> <p>Since the 2012 Biosis Report, the log score has increased for some of the Habitat Zones. However, many of the Habitat Zones still achieved a low score for this component. It is recommended that fallen logs are retained onsite for their habitat value, where ever possible. It is also possible that users/residents may be removing logs for firewood, although this was not observed. Educational signage could be considered to advise the public of the benefit of logs to biodiversity and they should not be removed.</p>
Rubbish dumping	3	Rubbish was observed across the reserve. Ongoing litter management is recommended. It is understood that a lot of litter pick up is already undertaken here.
Weed threats or invasion	1	Weed species as listed above were present throughout the reserve. The suite of species on site and their control methods are likely

Issue/Opportunity	Priority*	Comment
		<p>familiar to Kingston staff and will require continued management over several years.</p> <p>There were however a few high-threat weeds noted as not yet established/widespread which may be possible to eradicate: Pampas Lily-of-the-Valley <i>Salpichroa organifolia</i>, Bridal Creeper <i>Asparagus asparagoides</i>, Cape Ivy <i>Delairea odorata</i>, Mirror Bush <i>Coprosma repens</i> and African Box-thorn <i>Lycium ferocissimum</i>.</p>
* 1 – High, 2 – Moderate and 3 – Low		

4.6 Heights Park (Site #6)

4.6.1 Existing Ecological Conditions

Map 6 in Appendix 2 gives an overview of vegetation extent and EVCs present across Heights Park (HP) as determined from the site assessment. Appendix 3 details the flora species observed.

Vegetation within HP was representative of EVC 48: Heathy Woodland (Figure 10), including both native vegetation patches and Scattered Trees. The canopy was dominated by Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*, with understorey trees of Lightwood *Acacia implexa*, Black Wattle *Acacia mearnsii*, and Coast Banksia *Banksia integrifolia subsp. integrifolia*. The understorey was characterised by Austral Bracken *Pteridium esculentum subsp. esculentum*, Spear Grasses *Austrostipa spp.*, Spiny-headed Mat-rush *Lomandra longifolia*, Showy Bossiaea *Bossiaea cinerea*, Broom Spurge *Amperea xiphoclada var. xiphoclada* and Wild Parsnip *Trachymene composita*.

Habitat Zone 1 had a well-developed canopy of Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*, and had expanded in size in some areas mainly due to patches of indigenous understorey vegetation, especially Austral Bracken *Pteridium esculentum subsp. esculentum*. Habitat Zone 2 was not mapped in 2012 by Biosis but was defined as a Habitat Zone during this assessment due to the presence of Austral Bracken *Pteridium esculentum subsp. esculentum* and a large Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*. Habitat Zone 3 did not contain a canopy layer although it had a somewhat diverse, and relatively weed-free understorey. An additional patch of this Habitat Zone (Habitat Zone 3b) was mapped during this assessment where there was a patch of indigenous graminoids representative of Heathy Woodland. There was also a patch of Wallaby Grasses *Rytidosperma spp.* (Habitat Zone 4), which met the definition of a patch due to their high cover, which was not recorded in 2012. To the south-west of Habitat Zone 4, there were scattered Wallaby Grasses *Rytidosperma spp.*, which were marginally under the definition of a native vegetation patch, and it is likely that if targeted weed control occurred, that Habitat Zone 4's boundaries could be expanded to this area in the near future.

Several Scattered Trees occurred throughout HP, including a Swamp Gum *Eucalyptus ovata*, and River Red-gum *Eucalyptus camaldulensis* on the south-eastern boundary, which were otherwise not recorded throughout the rest of the reserve (Figure 11). This River Red-gum *Eucalyptus camaldulensis* and Swamp Gum *Eucalyptus ovata* may represent a historic transition to, or remnant of another community such as EVC 55: Plains Grassy Woodland or 651: Plains Swampy Woodland – especially given the slightly lower elevation of this area which may contain swamp deposits that historically supported large areas of such communities in the surrounding area.

The understorey had a low-moderate cover of weeds with the most noticeable being Coast Tea-tree *Leptospermum laevigatum*, as well as some Drooping Cassinia *Cassinia sifton* – although widespread removals are not recommended and rather a staged approach as discussed below. There was also a large Southern Mahogany *Eucalyptus botryoides*, which is likely to hybridise with Coast Manna-gums *Eucalyptus viminalis* subsp. *pryoriana*. It is therefore essential to consider drilling and filling this tree to leave the habitat provided by its structure while ensuring that the risk of genetic pollution is minimised.

Apart from these non-indigenous trees and shrubs, understorey weeds included Veldt-grasses *Ehrharta* spp. (especially in Habitat Zone 2), Cape Weed *Arctotheca calendula*, Squirrel-tail Fescue *Vulpia bromoides*, and a range of other herbaceous weeds at low cover. There was also higher cover of Gazania *Gazania* spp. within and surrounding Habitat Zone 4.

4.6.2 Listed or Notable Species Observed

No listed species were observed however the overall diversity, structure, and health of the reserve was notable given its urban location. [REDACTED] was observed and considered notable within the City of Kingston.

4.6.3 Habitat Hectares Assessments

For the purpose of the Habitat Hectares assessment, the reserve was divided into four Habitat Zones as shown on Map 6 in Appendix 2, and is reflected in Table 24 and Table 25 below. Each Habitat Zone was assessed as a whole despite consisting of discrete patches. This approach was chosen because each patch was similar in character and was generally only separated by small paths. Further, this approach simplifies monitoring for future years. This differs to the approach taken by Biosis, where each discrete patch was scored.

Table 24 gives an overview of the Habitat Hectare results for the reserve while Table 25 gives a breakdown of the scoring for the three Habitat Zones.

Table 24. Summary of Habitat Hectares results for Heights Park

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
48: Heathy Woodland	1–4	0.69	0.56	0.323	0.291

Habitat Zone 1 of this study combines four Habitat Zones previously scored individually by Biosis in 2012. The Habitat Hectare score determined for Habitat Zone 1 is 0.53, which is similar to the weighted average score (by area) of 0.55 for the four zones individually scored in 2012 by Biosis. However, one additional Large Tree was documented. The Lack of Weeds component scored lower in 2022/23 for this Habitat Zone, likely as a result of the high rainfall in the months leading up to the site assessment. Otherwise, the results of this Habitat Zone point towards the continued quality of this relatively small remnant in an otherwise heavily modified reserve. This Habitat Zone has expanded in some areas, mostly where Austral Bracken *Pteridium esculentum* subsp. *esculentum* and other indigenous understorey species have colonised new areas, including under some Coast Tea-tree *Leptospermum laevigatum*.

Habitat Zone 2, which was not documented in 2012, received relatively low scores, as it appears to have been historically dominated by exotic weeds with recent colonisation by Austral Bracken *Pteridium esculentum subsp. esculentum*. This is reflected in the low scores for most of the understorey components of this Habitat Zone, although it scored well in regards to the Large Trees and Canopy components.

Habitat Zone 3 also appeared to remain relatively stable since 2012 – note that while the overall score obtained was lower than in 2012, this seemed to be due to several components being on the edge of category scores – and may not represent a real change in site condition. For example, the log length was only marginally below the length needed to receive the same score as in 2012.

Habitat Zone 4, not documented in 2012, received a very low score, because, as discussed above, the Habitat Zone was defined only by the presence of Wallaby Grasses *Rytidosperma spp.* Supplementary planting in this area would be beneficial however – as the current weed cover was dominated by exotic forbs which would be relatively simple to target with broadleaf herbicide prior to planting. The mowing regime here should also be considered such that Wallaby Grasses *Rytidosperma spp.* are allowed to set seed and recruit over time.

Table 25. Habitat Hectares scoring for Heights Park

Habitat Zone			1					2		3		4	
Bioregion			GipP					GipP		GipP		GipP	
EVC Name (initials)			HW					HW		HW		HW	
EVC Number			48					48		48		48	
EVC Conservation Status			LC					LC		LC		LC	
Year			2022/3 (PE)	2012 (Biosis) (HW1)*	2012 (Biosis) (HW2)*	2012 (Biosis) (HW4)*	2012 (Biosis) (HW5)*	2022/3 (PE)	2012 (Biosis)	2022/3 (PE)	2012 (Biosis) (HW3)	2022/3 (PE)	2012 (Biosis)
Size of Zone (ha)			0.49	0.11	0.03	0.01	0.28	0.04	Unmapped	0.14	0.13	0.02	Unmapped
		Max Score	Score	Score	Score	Score	Score	Score		Score	Score	Score	
Site Condition	Large Old Trees	10	5	0	0	0	10	10		0	0	0	
	Canopy Cover	5	4	0	0	5	5	5		0	0	0	
	Understorey	25	20	15	5	5	15	5		15	15	5	
	Lack of Weeds	15	7	13	4	15	13	4		13	15	0	
	Recruitment	10	6	10	3	3	6	5		1	3	5	
	Organic Litter	5	5	5	2	5	5	4		0	3	2	
	Logs	5	4	5	4	0	5	0		2	5	0	
	EVC Standardiser	n/a	n/a	n/a	n/a	n/a	n/a	n/a		n/a	n/a	n/a	
Standardised Score	75	51	48	18	33	59	33	31		41	12		
Landscape value	Patch Size	10	1	1	1	1	1	1		1	1	1	
	Neighbourhood	10	0	0	0	0	0	0		0	0	0	
	Distance to Core	5	1	1	1	1	1	1	1	1	1		
Habitat points		100	53	50	20	35	61	35	33	43	14		
Habitat Score (habitat points/100)		1.00	0.53	0.50	0.20	0.35	0.61	0.35	0.33	0.43	0.14		
No. of Large Old Trees		4	0	0	0	3	1	0	0	0	0		
Habitat Hectares (Area x Habitat Score)		0.260	0.055	0.006	0.004	0.171	0.014	0.046	0.056	0.003			

*Scored as one combined Habitat Zone in 2022/3 as shown in column to the left.

4.6.4 Photos



Figure 10. Top left: Habitat Zone 1 Top right: Habitat Zone 2 Bottom left: Habitat Zone 3 Bottom right: Habitat Zone 4. All Habitat Zones are representative of EVC48: Heathy Woodland.



Figure 11. Depression with Swamp Gum *Eucalyptus ovata* and River Red-gum *Eucalyptus camaldulensis*.

4.6.5 Management Issues and Opportunities

Table 26. Potential Threats, Management recommendations for Heights Park.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.
Dieback/Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. However, in order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p> <p>Further to this, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does

Issue/Opportunity	Priority*	Comment
		(https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Genetic pollution	1	<p>A large Southern Mahogany <i>Eucalyptus botryoides</i> on site was observed which has the potential to hybridise with Coast Manna-gum <i>Eucalyptus viminalis subsp. pryoriana</i>. It is recommended that this tree (and any others nearby) is drilled and filled to retain the habitat it provides, while safeguarding the genetic makeup of the remnant Coast Manna-gums <i>Eucalyptus viminalis subsp. pryoriana</i>. Biosis (2012b) also states that there are varying forms of Manna-gum on site which are not locally indigenous – and staged drilling and filling of these may also be appropriate to maintain the genetic integrity of the locally indigenous population although this would need to be carefully considered.</p> <p>As it will not be possible to collect seed from remnant trees on site as they are likely contaminated by non-indigenous genetic material, propagating indigenous trees from other sites without non-indigenous species would be beneficial for any plantings in the reserve.</p>
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Missing structural components in Habitat Zones	2	The main missing structural component on site is the lack of canopy trees in Habitat Zones 3 and 4. While Habitat Zone 3 currently resembles EVC 6: Sand Heathland, as documented by Biosis, historic imagery shows treed vegetation which is most likely to be Heathy Woodland (Biosis 2012b). Hence, establishment of canopy trees in these two zones (although not a priority for Zone 4 at this stage) is recommended. This could be via plantings or seed dispersal. As discussed above, this would need to ensure the genetic integrity of locally indigenous Coast Manna-gums <i>Eucalyptus viminalis subsp. pryoriana</i> .
Mowing regime & Spread of weeds from mowing/slashing	2	Selective mowing around patches of Wallaby Grass <i>Rytidosperma spp.</i> (Habitat Zone 4 and adjoining areas) is recommended to ensure the continued recruitment of Wallaby Grasses <i>Rytidosperma spp.</i> and potentially other species in these areas.
Weed threats or invasion	1	Weed species as listed above were present throughout the reserve particularly in the eastern half of the reserve in areas with higher soil moisture – seemingly exacerbated by the higher than usual rainfall in the previous months. The suite of species on site and their control methods are likely familiar to Kingston staff and will require continued management over a number of years.
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.7 Kingston Heath Reserve (Site #7)

4.7.1 Existing Ecological Conditions

The assessment areas associated with Kingston Heath Reserve (KHR) encompassed two disjunct areas, both accessible via Farm Road. The first assessment area is located to the south-west of the Kingston Heath Botanic Gardens and is surrounded by existing trails with a hockey pitch to its west. A constructed wetland is present in the southern part of this assessment area. The second assessment area is located at the northern end of the Botanic Gardens. Map 7 in Appendix 2 gives an overview of the extent of vegetation within these two assessment areas and the identified EVCs. Appendix 3 details the flora species observed across the two assessment areas, inclusive of both remnant specimens and those that have been planted over time.

Previous mapping of native vegetation within KHR, as per Biosis (2012b), documented a single large patch of EVC 53: Swamp Scrub within the first assessment area, east of the hockey pitch and south of open sports fields. The extent of this patch remained relatively unchanged and was subject to a Habitat Hectare assessment as part of this current study, as discussed below. This patch of EVC 53: Swamp Shrub is dominated Swamp Paperbark *Melaleuca ericifolia*, with emergent Black Wattle *Acacia mearnsii* and Blackwood *Acacia melanoxylon* also present. Other shrubs included Hedge Wattle *Acacia paradoxa*, Sweet Bursaria *Bursaria spinosa*, Tree Everlasting *Ozothamnus ferrugineus* and Hop Goodenia *Goodenia ovata*. Other species present include but are not limited to Small-leaved Clematis *Clematis microphylla s.s.*, Nodding Saltbush *Einadia nutans*, Black-anther Flax-lily *Dianella revoluta s.l.*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, Weeping Grass *Microlaena stipoides var. stipoides*, Spiny-headed Mat-Rush *Lomandra longifolia* and Austral Bracken *Pteridium esculentum subsp. esculentum*. It is noted that a number of these lower storey species are not likely to be site indigenous, and have been established through revegetation.

While the presence of a constructed wetland to the south of this EVC 53: Swamp Scrub patch was acknowledged in 2012, it did not form part of that previous assessment. As this current study aimed to consider the value of native vegetation both remnant and established through revegetation efforts, additional patches of vegetation have been mapped and subject to a Habitat Hectare assessment in the present study. This included the vegetation located within the constructed wetland and immediately surrounding it. Areas of the wetland where Bulrush *Typha spp.* dominates were deemed representative of EVC 821: Tall Marsh, with EVC 653: Aquatic Herbland deemed applicable to areas where species such as [REDACTED] and Common Spike-sedge *Eleocharis acuta* occur. The area to the west of the viewing platform, planted out with Common Tussock-Grass *Poa labillardierei*, Spiny-headed Mat-rush *Lomandra longifolia* and Bidgee-Widgee *Acaena novae-zelandiae*, and also containing emergent Drooping Cassinia *Cassinia Sifton*, Hop Goodenia *Goodenia ovata*, Rush *Juncus spp.* and Weeping Grass *Microlaena stipoides var. stipoides* was also assessed. Given the location of EVC 53: Swamp Scrub adjoining this patch, and pre-1750's mapping by DEECA which indicates the vegetation on site was a mosaic including this EVC, this planted vegetation was assessed against the benchmark for EVC 53: Swamp Scrub.

The second assessment area, in the northern part of KHR supports a number of remnant Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* trees, a number of which are Large Trees. The understorey supports a range of planted species such as Prickly Moses *Acacia verticillata*, Lightwood *Acacia implexa*, Tree Everlasting *Ozothamnus ferrugineus*, Black-anther Flax-lily *Dianella revoluta s.l.*, Spiny-headed Mat-rush *Lomandra longifolia* and Wattle Mat-rush *Lomandra filiformis*. A range of species assumed to be naturally occurring are also present, including Pale Rush *Juncus pallidus*, Wallaby Grass *Rytidosperma spp.* and Small-leaved Clematis *Clematis microphylla s.s.*, although the cover of such species is relatively low.

Four separate Habitat Zones were mapped in this second assessment area. While pre 1750's mapping by DEECA indicates that this area was historically EVC 3: Damp Sands Herb-rich Woodland, previous notes by Jeff Yugovic suggest EVC 48: Heathy Woodland was likely historically present in this area (Yugovic 2015). Both EVCs are closely related, with EVC 3: Damp Sands Herb-rich Woodland sometimes resembling a degraded form of EVC 48: Heathy Woodland. The Geological Survey of Victoria – 'Ringwood' indicates that the northern part of KHR sits on an island of geology Qpd – Sand ridges and hills, which could be suitable to both EVCs, with Heathy Woodland preferring less fertile soils than Damp Sands Herb-rich Woodland. A review of 1945's aerial imagery shows a cover of eucalypts with some heath-like understory and seems to be basis upon which EVC 48: Heathy Woodland was chosen by Jeff Yugovic. Given this, and that the reserve has been managed as EVC 48: Heathy Woodland, this was chosen as the benchmark EVC for Habitat Hectares assessments.

A number of Scattered Trees also occur to the north-east of the northernmost assessment area. These occur close to an area dominated by younger revegetation as shown on Map 7 in Appendix 1.

Across the two assessment areas associated with the KHR a number of weeds are present. However, many of these are grassy and herbaceous weeds typical within urban bushland reserves and will require ongoing management into the future. This includes species such as Panic Veldt-grass *Ehrharta erecta*, Wall Fumitory *Fumaria muralis*, Common Mouse-ear Chickweed *Cerastium glomeratum s.l.*, Common Vetch *Vicia sativa*, Yorkshire Fog *Holcus lanatus* and Cape Weed *Arctotheca calendula*. In terms of woody weeds, it is noted that the areas between mapped patches of EVC 3: Damp Sands Herb-rich Woodland in the second assessment area along the northern boundary of the site, contain areas dominated by older growth Coast Tea-tree *Leptospermum laevigatum*. Given the sites location away from the coast, this species was deemed outside its natural location, and therefore a weed for the purpose of the Habitat Hectares assessment. Few woody weeds aside from this species were observed.

4.7.2 Listed or Notable Species Observed

No listed species were observed however a range of indigenous species occur on site that are noteworthy given the location. This includes the overall stand of a remnant patch dominated by Swamp Paperbark *Melaleuca ericifolia* and the presence of a number of larger Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* to the north of the reserve.

4.7.3 Habitat Hectare Assessments

A total of eight Habitat Zones were identified within the assessment areas assessed and were subject to Habitat Hectare assessments.

Table 27 gives an overview of the Habitat Hectare results for the reserve while Table 28 gives a breakdown of the scoring for the Habitat Zones documented.

Four Large Trees were recorded within these Habitat Zone, all of which occur in the northern assessment area where patches representative of EVC3: Damp Sands Herb-rich Woodland were recorded. This included one large tree within each of Habitat Zone 2 and 5, along with two Large Trees within Habitat Zone 7. All trees within these Habitat Zones are Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*. It is also noted that a dead Scattered Tree was also documented to the north of the site. With a DBH of 63cm, this Scattered Tree is deemed large according to the provisions of the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017), given it is a *standing dead tree has a trunk diameter of 40 centimetres or greater*.

Note that the area marked as Habitat Zone 1 in this current study is generally in the same location as that marked as Habitat Zone SS1 by Biosis (2012b). Key changes between scores achieved over time are in relation to canopy cover, weeds, organic litter, and logs. The canopy cover achieved a score of 2 based on the current assessment, as opposed to a score of 3. This is expected to be indicative of a slight reduction in canopy health over time. Changes in overall weed cover could be attributable to the wet spring period in which surveys were undertaken in 2022 which resulted in prolific growth of grassy and herbaceous weeds. In terms of organic litter, current levels were greater than 50% of the benchmark cover for EVC 53: Swamp Scrub with native litter dominating; this is indicative of an improvement in score over time to a cover more in line with the benchmark.

Of particular note are scores for logs attributed to SS1 by Biosis (2012b), along with the associated standardiser for this EVC that was applied. There are no logs within the benchmark for EVC 53: Swamp Scrub, therefore the current score for this Habitat Zone is marked as “n/a” and a standardiser of 1.25 applied, as opposed to 1.15. This has also resulted in slightly different overall Site Conditions Scores for this patch of native vegetation.

Table 27. Summary of habitat hectares results for Kingston Heath Reserve

EVC	Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
48: Heathy Woodland	2, 5, 6, 7	0.15	n/a	0.05	n/a
53: Swamp Scrub	1, 8	0.84	0.68	0.27	0.31
653: Aquatic Herbland	4	0.05	n/a	0.03	n/a
821: Tall Marsh	3	0.03	n/a	0.01	n/a
Total		1.07	0.68	0.36	0.31

Table 28. Habitat Hectares scoring for Kingston Heath Reserve

Habitat Zone		1		2	3	4	5	6	7	8	
Bioregion		GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	GipP	
EVC Name (initials)		SS	SS	HW	TM	AH	HW	HW	HW	SS	
EVC Number		53	53	48	821	653	48	48	48	3	
EVC Conservation Status		E	E	LC	*	*	LC	LC	LC	V	
Year		2022 (PE)	2012 (Biosis) (SSS1)	2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)	
Size of Zone (ha)		0.83	0.68	0.04	0.03	0.05	0.03	0.06	0.02	0.01	
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	n/a	n/a	9	n/a	n/a	9	9	9	n/a
	Canopy Cover	5	2	3	4	n/a	n/a	4	2	4	0
	Understorey	25	15	15	5	15	15	5	15	5	5
	Lack of Weeds	15	2	7	2	6	9	2	2	6	9
	Recruitment	10	6	6	0	6	6	0	0	0	0
	Organic Litter	5	5	3	3	5	5	5	5	5	3
	Logs	5	n/a	4 [^]	5	n/a	n/a	5	5	5	0
	EVC Standardiser	n/a	1.25	1.15 [^]	n/a	1.36	1.36	n/a	n/a	n/a	n/a
	Standardised Score	75	38	44	28	44	48	30	38	34	17
Landscape value	Patch Size	10	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0
	Distance to Core	5	1	1	1	1	1	1	1	1	1
Habitat points		100	40	46	30	46	50	32	40	36	19
Habitat Score (habitat points/100)		0.##	0.40	0.46	0.30	0.46	0.50	0.32	0.40	0.36	0.19
No. of Large Old Trees		n/a	0	2	n/a	n/a	2	4	3	0	
Habitat Hectares, Area x Habitat Score (Hha)		0.27	0.31	0.01	0.01	0.03	0.01	0.02	0.01	0.0	

**Not listed in Gippsland Plain. EVC is 'endangered' in most other bioregions.*

[^] Inclusion of score for logs and application of standardiser of 1.15 appears to be an error as the benchmark for EVC 53: Swamp Scrub does not include a benchmark log cover.

4.7.4 Photos



Figure 12.Habitat Zone 1 – EVC 53: Swamp Scrub general vegetation condition



Figure 13. Left: Constructed wetland mapped as EVC 653: Aquatic Herbland and EVC 821: Tall Marsh.
Right: Established revegetation around the constructed wetland close to the viewing deck.



Figure 14. Areas with mature Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* at north of reserve mapped as EVC 48: Heathy Woodland

4.7.5 Management Issues and Opportunities

Table 29. Potential Threats, Management recommendations for Kingston Heath Reserve

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the assessment area and its associated habitat. Further detail is provided in Section 5.1.1.
Dieback/Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.
Dogs walked off-lead	1	Dogs pose a number of threats to native vegetation and wildlife (Holderness-Roddam 2011): <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation.

Issue/Opportunity	Priority*	Comment
		<ul style="list-style-type: none"> • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>Council's Interactive mapping (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership) shows a dog off-lead area adjacent to areas mapped as native vegetation within the assessment area, in particular to the east of the Habitat Zone 1. Given that the dog-off-leash area is unfenced, there is potential for dogs off-lead to move through areas of native vegetation. A rogue dog was observed within Habitat Zone 1 during the site assessment associated with this study; this was a large sized dog that was moving both along existing tracks and through the native vegetation.</p> <p>Given the detrimental impacts detailed above, consideration of the following is highly recommended:</p> <ul style="list-style-type: none"> • Clear signage regarding dog status, at the entrance to the reserve and paths • Fencing off and clearly defining the dog-off-leash areas, OR • Fencing sensitive areas of vegetation to exclude off-lead dogs from entering. • A Proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Inappropriate plantings / encroachment	3	<p>The KHR includes a range of planted vegetation. There are also a range of planted individuals elsewhere within the assessment area such as those within areas documented as EVC 3: Damp Sands Herb-rich Woodland that do not necessarily correspond what would be expected to occur in this EVC. Such species include various Wattle species such as Lightwood <i>Acacia implexa</i> and Prickly Moses <i>Acacia verticillata</i> although these species may naturally occur in some places. If the aim of future plantings across the reserve in the assessment areas is on ecological restoration more in line with the EVCs that are present, it is recommended that a series of appropriate planting palettes be developed to guide the installation of future plantings.</p>
Ecological burning / inappropriate fire regime	2	<p>Assessing the suitability and desired frequency of prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.</p>

Issue/Opportunity	Priority*	Comment
Rabbits/Foxes	2	Rabbits were observed during the site assessment with burrows also observed during the hockey pitch. It is expected that foxes would likely also inhabit the site, harbouring beneath areas with dense vegetation cover.
Walking tracks through vegetation/trampling	2	Habitat Zone 1 has a number of informal tracks that criss-cross through it. The edges of these tracks are not generally well defined allowing pedestrians and cyclists to encroach on vegetation close to the edge of the tracks. This can lead to trampling of existing and regenerating vegetation, while also causing soil compaction.
Weed threats or invasion	1	As mentioned above, weeds across Kingston Heath Reserve within the areas assessed largely include a suite of grassy and herbaceous weeds typical of urban bushland sites; their continued management will need to be ongoing. Of particular note is a large area with a high cover of Panic Veldt-grass <i>Ehrharta erecta</i> close to the hockey pitch on the western boundary of Habitat Zone 1; other grassy and herbaceous weeds are generally scattered. Coast Tea-tree <i>Leptospermum laevigatum</i> is present in areas within the northern assessment area forming a dense canopy in some areas; its removal should be staged and coupled with appropriate revegetation to mitigate impacts on small birds in particular on the sudden loss of the habitat it provides.
* 1 – High, 2 – Moderate and 3 – Low		

4.8 Mordialloc Creek Reserve (Site #8)

4.8.1 Existing Ecological Conditions

Map 8 in Appendix 2 gives an overview of vegetation extent and EVCs present across Mordialloc Creek Reserve (MCR) as determined from the site assessment. Appendix 3 details the flora species observed.

Vegetation within MCR was divided into five Habitat Zones: Habitat Zone 1 – EVC 952: Estuarine Reedbed, Habitat Zone 2 – EVC 953: Estuarine Scrub, Habitat Zones 3 and 4, lower and higher quality EVC 53: Swamp Scrub, and Habitat Zone 5 – EVC 821: Tall Marsh (Figure 15). There was also an area mapped as ‘Mixed Revegetation’ which contained a combination of remnant trees and various indigenous and non-indigenous plantings.

Habitat Zone 1, EVC 952: Estuarine Reed Bed, was characterised by a canopy or shrub layer of Swamp Paperbark *Melaleuca ericifolia*, and understorey species including [REDACTED] and Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*. There were numerous new patches of this Habitat Zone documented in 2022/23, where Swamp Paperbark *Melaleuca ericifolia* appeared to have recently colonised.

Habitat Zone 2, EVC 953: Estuarine Scrub, was dominated by Common Reed *Phragmites australis*, and smaller graminoids such as Little Club-sedge *Isolepis marginata*, [REDACTED] various Rushes *Juncus spp.*, and Knobby Club-rush *Ficinia nodosa*. Most of these patches were very narrow, occupying less than a metre wide strips along the banks of Mordialloc Creek.

Habitat Zone 3, EVC 53: Swamp Scrub, represented a relatively low-quality expression of Swamp Scrub with a consistent canopy/shrub layer of Swamp Paperbark *Melaleuca ericifolia*, and few common understorey species including Hop Goodenia *Goodenia ovata*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, and Cotton Fireweed *Senecio quadridentatus*.

Habitat Zone 4, also Swamp Scrub, was an unusual expression of Swamp Scrub and while consistently containing Swamp Paperbark *Melaleuca ericifolia*, appeared to represent a transition to another community such as EVC 55: Plains Grassy Woodland due to the presence of species such as River Red-gum *Eucalyptus camaldulensis*, Drooping Sheoak *Allocasuarina verticillata*, and a tussock-dominated understorey in many areas. This area had higher diversity than Habitat Zone 3, including species such as Small-flower Flax-lily *Dianella brevicaulis*, Long-haired Plume-grass *Dichelachne crinita*, various Wallaby Grasses *Rytidosperma spp.*, Bluebells, and Cherry Ballart *Exocarpos cupressiformis* above the banks of Mordialloc Creek. Towards the water's edge, there were large patches of [REDACTED] and [REDACTED].

Habitat Zone 5, Tall Marsh was a classic representation of Tall Marsh dominated by a dense stand of Common Reed *Phragmites australis* – occupying the same area as in 2012. Groundlayer species were similar to Habitat Zone 2 including Little Club-sedge *Isolepis marginata*, [REDACTED] and also [REDACTED].

The area mapped as 'Mixed Revegetation' contained a wide range of indigenous and non-indigenous species including large, remnant River Red-gums *Eucalyptus camaldulensis*, Common Boobialla *Myoporum insulare*, and plantings including Black-anther Flax-lily *Dianella revoluta s.l.*, Drooping Sheoak *Allocasuarina verticillata*, Tree Everlasting *Ozothamnus ferrugineus*, Austral Stork's-bill *Pelargonium australe*, and numerous non-indigenous natives. This area most closely resembled EVC55: Plains Grassy Woodland.

In 2012, Biosis (2012a) mapped two areas of EVC 656: Brackish Wetland, however in 2022/23 these areas were not observed and in their locations were Sheoak *Allocasuarina spp.* and Common Reed *Phragmites australis*. It is possible that the tree and shrub plantings have shaded out the area of Brackish Wetland with little emergent vegetation visible. It is understood from conversations with the bush crew that there was previously a lot of Salt Club-sedge *Bolboschoenus caldwellii* and that on recent inspection there was still some emerging but not a lot ([REDACTED], Personal Communication, 23/8/23).

There were numerous non-indigenous Honey-myrtles in the eastern half of the reserve, many of which appeared to be naturalising. Many of these Honey-myrtles were difficult to identify and it appeared they may be hybridising with the locally indigenous Swamp Paperbark *Melaleuca ericifolia*. Although Swamp Paperbark *Melaleuca ericifolia* mainly propagates clonally, there is the potential for hybrid seed material to colonise areas downstream of this area and it is therefore recommended to remove all non-indigenous Honey-myrtles from this area in a staged manner (drilling and filling would be appropriate to retain habitat). In many cases, these non-indigenous species occurred alongside Swamp Paperbark *Melaleuca ericifolia*, which is likely to colonise these areas following removal. It is also recommended to engage a specialist of the species who is able to determine if any of the Swamp Paperbarks *Melaleuca ericifolia* on site appear to be hybrids and if so, to consider removing these specimens as well. This is further discussed in Section 4.8.5.

While there was a suite of common weeds on site, the following high threat weeds were noted as being at a currently low-moderate cover with the possibility to eradicate: White Bladder-flower *Araujia sericifera* (also known as Moth Vine or Kapok), Bridal Creeper *Asparagus asparagoides*, Mirror Bush *Coprosma repens*, and Trailing African Daisy *Dimorphotheca fruticosa*.

4.8.2 Listed or Notable Species Observed

No listed species were observed however Habitat Zone 4 was noted as an unusual expression of Swamp Scrub with components of Plains Grassy Woodland and a diverse mix of understorey vegetation.

4.8.3 Habitat Hectare Assessments

For the purpose of the Habitat Hectares assessment, the reserve was divided into five Habitat Zones: Habitat Zone 1 – EVC 952: Estuarine Reedbed, Habitat Zone 2 – EVC 953: Estuarine Scrub, Habitat Zones 3 and 4, lower and higher quality EVC 53: Swamp Scrub, and Habitat Zone 5 – EVC 821: Tall Marsh, and an area defined as 'Mixed Revegetation', as shown in Map 8 and Table 30 and Table 31.

**Note that EVC 952: Estuarine Reed Bed is a wetland EVC that cannot be used as the benchmark for Habitat Hectares assessment. Following the approach of Biosis, the closest EVC benchmark within the Gippsland Plain Bioregion, EVC 821: Tall Marsh, was used for this purpose. Please see Section 2.2.2 and Table 3 for further details.*

Table 30 gives an overview of the Habitat Hectare results for the reserve while Table 31 gives a breakdown of the scoring for the three zones.

Table 30. Summary of Habitat Hectares results for Mordialloc Creek Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
53: Swamp Scrub	3 & 4	0.54	0.44	0.29	0.19
656: Brackish Wetland	n/a	0	0.01	0	0.004
821: Tall Marsh	5	0.10	0.10	0.05	0.04
952: Estuarine Reedbed	1	0.45	0.50	0.24	0.26
953: Estuarine Scrub	2	0.46	0.12	0.25	0.07
Mixed Revegetation	n/a	1.89	0	n/a	n/a
Total (including 'Mixed Revegetation')		3.44	1.17	-	n/a
Total (excluding 'Mixed Revegetation')		1.55	1.17	0.83	0.56

Please note that due to some discrepancies in the previous data from 2012, it was not possible to compare results and therefore the scores collected in 2022/23 are discussed in isolation.

Except for Habitat Zone 3, all Habitat Zones scored moderately highly, with good scores for the Understorey, Recruitment, and Organic Litter components given the small size of these remnants. The Lack of Weeds Score was moderate for all Habitat Zones – which is not surprising given that these estuarine communities are often subject to less intense weed invasion than freshwater or terrestrial vegetation, although there were a number of high threat weeds recorded. Habitat Zone 3 received a relatively low score due to the lack of groundlayer diversity, and would benefit from revegetation with appropriate species in the future.

Note that the Estuarine Scrub and Swamp Scrub Habitat Zones (2–4) received very low scores for Canopy Cover. While there was an abundance of Swamp Paperbark *Melaleuca ericifolia*, it was not at the height required to be considered part of the canopy in many cases, which is likely to change over time especially in newly colonised

areas. This is often the case for these communities however, with the canopy rarely reaching the benchmark height in many cases.

Table 31. Habitat Hectares scoring for Mordialloc Creek Reserve.

Habitat Zone		1	2	3	4	5
Bioregion		GipP	GipP	GipP	GipP	GipP
EVC Name (initials)		ER	ES	SS	SS	TM
EVC Number		952	953	53	53	821
EVC Conservation Status		*	*	E	E	*
Year		2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)	2022 (PE)
Size of Zone (ha)		0.448	0.464	0.109	0.426	0.102
		Max Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a
	Canopy Cover	5	n/a	3	0	n/a
	Understorey	25	15	20	5	20
	Lack of Weeds	15	9	9	9	7
	Recruitment	10	6	6	10	10
	Organic Litter	5	5	5	3	5
	Logs	5	n/a	0	n/a	n/a
	EVC Standardiser	n/a	1.36	1.15	1.25	1.25
	Standardised Score	75	47.6	49.61	33.75	52.5
Landscape value	Patch Size	10	4	4	4	4
	Neighbourhood	10	0	0	0	0
	Distance to Core	5	1	1	1	1
Habitat points		100	52.6	54.61	38.75	57.5
Habitat Score (habitat points/100)		0.##	0.526	0.5461	0.3875	0.575
No. of Large Old Trees		n/a	n/a	n/a	n/a	n/a
Habitat Hectares, Area x Habitat Score (Hha)		0.236	0.253	0.042	0.245	0.047

*Not listed.

4.8.4 Photos



Figure 15. Top Left: Habitat Zone 1 – EVC 952: Estuarine Reedbed, **Top Right:** Habitat Zone 2 – EVC 953: Estuarine Scrub, **Middle Left:** Habitat Zone 3 – EVC 53: Swamp Scrub (lower quality), **Middle Right:** Habitat Zone 4 – EVC 53: Swamp Scrub (higher quality), **Bottom Left:** Habitat Zone 5 – EVC821: Tall Marsh, and **Bottom Right:** Mixed Revegetation.

4.8.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 32. Potential Threats, Management recommendations for Mordialloc Creek Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	<p>In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.</p> <p>For Mordialloc Creek Reserve in particular, rising sea levels are likely to alter the salinity gradient along the creek, meaning that the transition between brackish and freshwater communities may shift. Ensuring continued connectivity along the creek is essential to allow species to colonise new areas.</p>
Connectivity	3	<p>With a number of large areas of habitat to the east (Woodlands Estate Wetland, Braeside Park, and wetlands around the Mornington Peninsula Freeway), there is potential in the long-term to revegetate the section of Mordialloc Creek to the east, although this would require considerable planning and implementation costs, however is flagged as a potential long-term goal.</p>
Dieback/Disease/Phytophthora/Pests	1	<p>There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.</p>
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness-Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. However, in order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p>

Issue/Opportunity	Priority*	Comment
		<p>Further to this, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. • Established dedicated dog-off-lead areas outside of bushland reserves • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves <p>Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).</p>
Genetic pollution	1	Towards the eastern section of the reserve, there were numerous non-indigenous Honey-myrtles. These should be removed to minimise hybridisation with the indigenous Swamp Paperbark <i>Melaleuca ericifolia</i> . As discussed above, it is also recommended to engage a specialist to determine if the Swamp Paperbark <i>Melaleuca ericifolia</i> on site contains any hybrid specimens.
Missing structural components in Habitat Zones	2	Habitat Zone 3 lacked much indigenous groundlayer vegetation, and therefore revegetation is recommended in areas with low weed cover, using species appropriate for the EVC and at the benchmark density.
Weed threats or invasion	1	<p>Weed species as listed above were present throughout the reserve particularly in the eastern half of the reserve in areas with higher soil moisture – seemingly exacerbated by the higher than usual rainfall in the previous months. The suite of species on site and their control methods are likely familiar to Kingston staff and will require continued management over a number of years.</p> <p>There were however a few high-threat weeds noted as not yet established/widespread which may be possible to eradicate: Bridal Creeper <i>Asparagus asparagoides</i>, Mirror Bush <i>Coprosma repens</i>, Trailing African Daisy <i>Dimorphotheca fruticosa</i>, and White Bladder-flower <i>Araujia sericifera</i>.</p>
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.9 Powernet Easement Reserve (Site #9)

4.9.1 Existing Ecological Conditions

Map 9 in Appendix 2 gives an overview of the EVCs identified within the Powernet Easement (PE) Reserve. The site assessment focused on two disjunct areas that contain native vegetation and are subject to management by Council. The vegetation patch to the east is mapped as Habitat Zone 1 and the patch of vegetation to the west as Habitat Zone 2. Appendix 3 details the flora species observed within these assessment areas.

Habitat Zone 1 is mapped by DEECA as a mosaic of EVC 3: Damp Sands Herb-rich Woodland and EVC 48: Heathy Woodland, while Habitat Zone 2 is mapped by DEECA as a mosaic of EVC 55: Plains Grassy Woodland, EVC 53: Swamp Scrub and EVC 132: Plains Grassland. The EVC benchmark descriptions for each of these EVCs was considered to determine the EVC most appropriate to each Habitat Zone. Consideration was also given to EVC descriptions in Oates and Taranto (2001). A review of the floristic attributes for these EVCs in Oates and Taranto (2001) indicated that the native vegetation present as Habitat Zone 1 is deemed a treeless, modified expression of EVC 48: Heathy Woodland. The heathy, ericoid-leaved shrubs characteristic of this EVC are present within this Habitat Zone, along with ground layer species such as Small Grass-tree [REDACTED]. As discussed below, Habitat Zone 2 is deemed a modified example of EVC 55: Plains Grassy Woodland based on underlying geology and the flora species present which are noted in references to this EVC, as discussed below.

Flora species present within Habitat Zone 1 were generally low growing and included but were not limited to [REDACTED], Broom Spurge *Amperea xiphoclada* var. *xiphoclada*, [REDACTED] and Spike Wattle *Acacia oxycedrus*. Other species present included [REDACTED], [REDACTED], Weeping Grass *Microlaena stipoides* var. *stipoides*, [REDACTED] and Wallaby Grass *Rytidosperma* spp.. While the overall weed cover was generally low and largely restricted to the outskirts of the Habitat Zone, species observed included Onion Grass *Romulea rosea*, Cape Weed *Arctotheca calendula*, Flatweed *Hypochaeris radicata*, Sheep Sorrel *Acetosella vulgaris*, and Buck's-horn Plantain *Plantago coronopus*.

Habitat Zone 2 contains a higher cover of medium shrubs than Habitat Zone 1, along with a range of other species. However, the overall cover of native species is relatively low within this Habitat Zone and it has a high cover of weed species. Indigenous flora included Prickly Tea-tree *Leptospermum continentale*, Large Kangaroo Apple *Solanum laciniatum* and Blackwood *Acacia melanoxylon*, with a range of herbs and graminoids present beneath these shrubs with a low overall cover. This included species such as [REDACTED]

[REDACTED] Weeds had abundant cover and included Large Quaking-grass *Briza maxima*, Scarlet Pimpernel *Anagallis arvensis*, Sweet Vernal-grass *Anthoxanthum odoratum*, Cape Weed *Arctotheca calendula*, Soft Brome *Bromus hordeaceus*, Common Mouse-ear Chickweed *Cerastium glomeratum* s.l., Panic Veldt-grass *Ehrharta erecta*, Cleavers *Galium aparine*, Hairy Bird's-foot Trefoil *Lotus subbiflorus*, Buck's-horn Plantain *Plantago coronopus*, Onion Grass *Romulea rosea*, Common Sow-thistle *Sonchus oleraceus*, Rat-tail Grass *Sporobolus africanus*, Squirrel-tail Fescue *Vulpia bromoides*, Rat's-tail Fescue, Kikuyu *Cenchrus clandestinus* and Couch *Cynodon dactylon*.

4.9.2 Listed or Notable Species Observed

No listed species were observed however the range of indigenous flora species present in the assessment areas is noteworthy given the degraded nature of the remainder of the site in particular. Of particular note are the following species:

- Broom Spurge *Amperea xiphoclada* var. *xiphoclada*
- [REDACTED]
- [REDACTED]
- [REDACTED]
- Long Purple-flag *Patersonia occidentalis* var. *occidentalis*
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

While it was not noted during the site assessment, it is understood that [REDACTED] has been observed in the PE Reserve by the Kingston Council bush crew.

4.9.3 Habitat Hectare Assessments

A Habitat Hectare assessment was undertaken the two Habitat Zones shown on Map 9 in Appendix 2. Habitat Zone 1 was located close to Clayton Road and deemed to be best represented by EVC 48: Heathy Woodland, noting that DEECA maps the area where this Habitat Zone occurs as a mosaic of EVC 3: Damp Sands Herb-rich Woodland and EVC 48: Heathy Woodland. Habitat Zone 2 located to the west of the end of Caringal Court and is located in an area mapped by DEECA as a mosaic of EVC 55: Plains Grassy Woodland, EVC 53: Swamp Scrub and EVC 132: Plains Grassland. A review of EVC benchmarks and with consideration of DEECA mapping and underlying geology, Habitat Zone 2 is considered to best represent a highly modified example of EVC 55: Plains Grassy Woodland.

While relatively close together, these two Habitat Zones and EVCs, along with associated mapping by DEECA reflect the underlying geology present across the PE Reserve. Habitat Zone 1 located on geology associated with sand ridges and sand hills, while Habitat Zone 2 is associated with swamp deposits, sands, silts and clay. Such swamp deposits are known to support Plains Grassy Woodland (Oates and Taranto 2001). This takes into account also Prickly Tea-tree *Leptospermum continentale* being noted as part of the shrub layer of this EVC according to Oates and Taranto (Oates and Taranto 2001), with other species present within this Habitat Zone such as Blackwood *Acacia melanoxylon* and Common Rice-flower *Pimelea humilis* are noted as part of the Gippsland Plain benchmark for this EVC.

Table 33 gives an overview of the Habitat Hectare results, while Table 34 gives a breakdown of the scoring for the two Habitat Zones. It is noted here that this site was not subject to previous assessment by Biosis.

No Large Trees were recorded across both Habitat Zones. Habitat Zone 1 has a relatively low cover of weeds, especially considering its context within the wider weed-dominated power easement, receiving a score of 9 for the Lack of Weeds component. Despite having a reasonable cover of native vegetation, this zone achieved a relatively low score for the Understorey component because only a few lifeforms were present (e.g., small shrubs, medium tufted graminoids etc). In contrast, Habitat Zone 2 scored 0 for the Lack of Weeds component given its much higher weed coverage¹, while its higher diversity of lifeforms afforded it a higher score for the Understorey component.

It is understood that Habitat Zone 2 is seasonally inundated and was recently burnt in 2021, both of which may have influenced its current floristics and weed characteristics as observed on site. Inundation can also bring with it weed propagules with fire providing opportunities for weed establishment requiring more intensive weed management post fire.

Given the location of these Habitat Zones beneath powerlines, the establishment of additional lifeforms relevant to EVC 48: Heathy Woodland and EVC 55: Plains Grassy Woodland, such as trees is of course not suitable. While this is the case, there is scope to enhance the potential for further regeneration of the species present through the ongoing management of weeds. There may also be scope to increase floristic diversity through the installation of some infill plantings, at least within Habitat Zone 2 that are mindful of the existing presence of groundstorey flora and the location of the site within a power easement with height restrictions likely applicable.

Table 33. Summary of Habitat Hectares results for Powernet Easement Reserve

EVC	Zones	Total Area (ha)	Total Habitat Hectares
		2022	2022
EVC 48: Heathy Woodland	1	0.02	0.004
EVC 55: Plains Grassy woodland	2	0.03	0.004
Total		0.05	0.008

¹ The score of 0 for the Lack of Weeds component indicates weed coverage greater than 50%, with over half of the weed coverage consisting of high threat weeds.

Table 34. Habitat Hectares scoring for Powernet Easement Reserve

Habitat Zone		1	2
Bioregion		GipP	GipP
EVC Name (initials)		HW	PGW
EVC Number		48	55
EVC Conservation Status		LC	E
Year		2022 (PE)	2022 (PE)
Size of Zone (ha)		0.02	0.03
		Max Score	Score
Site Condition	Large Old Trees	10	0
	Canopy Cover	5	0
	Understorey	25	5
	Lack of Weeds	15	9
	Recruitment	10	3
	Organic Litter	5	2
	Logs	5	0
	EVC Standardiser	n/a	n/a
	Standardised Score	75	19.0
Landscape value	Patch Size	10	1
	Neighbourhood	10	0
	Distance to Core	5	0
Habitat points		100	20.0
Habitat Score (habitat points/100)		0.##	0.20
No. of Large Old Trees		na	na
Habitat Hectares, Area x Habitat Score (Hha)		0.004	0.004

4.9.4 Photos



Figure 16. Habitat Zone 1 – treeless expression of EVC 48: Heathy Woodland



Figure 17. Habitat Zone 2 – treeless expression of EVC 55: Plains Grassy Woodland.

Left: General condition of shrub layer. Middle: [REDACTED].

Right: [REDACTED]

4.9.5 Management Issues and Opportunities

Table 35. Potential Threats, Management recommendations for Pownet Easement Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the assessment area and its associated habitat. Further detail is provided in Section 5.1.1.
Connectivity and Fragmentation	2	The Habitat Zones are islands of native vegetation within the power easement subject to edge effects and fragmentation. There may be longer term scope to link up the patches of native vegetation present through future revegetation projects, although limitations of the status of the site as a power easement are applicable.
Dieback/ Disease/Phytophthora/Pests	1	Dieback of Tea-tree <i>Leptospermum spp.</i> and Spike Wattle <i>Acacia oxycedrus</i> was evident on site. Dieback was observed within both Habitat Zone 1 and Habitat Zone 2 of the shrubs present. Studies have shown that Phytophthora dieback can affect areas of Heathy Woodland vegetation communities with species of Grass-tree, as is present on site, susceptible to the disease. Hygiene measures should be implemented to reduce long terms potential threats of this disease to the vegetation that is present; periodic monitoring is recommended with test kits commercially available.
Dogs walked off-lead	2	Dogs pose a number of threats to native vegetation and wildlife (Holderness-Roddam 2011): <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>It is expected that the power easement in general is used by members of the public walking their dogs off-lead. It would therefore be expected that dogs would move through the mapped Habitat Zones of native vegetation. Given the detrimental impact of dogs, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering.
Ecological burning / inappropriate fire regime	2	It is understood that Habitat Zone 2 was recently burnt in 2021. Assessing the desired frequency of burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Missing structural components in Habitat Zones	2	As mentioned above, there is limited scope to fully restore the Habitat Zones on site to patches of EVC 48: Heathy Woodland given their location within a power easement. There may be some scope to at least improve floristic diversity through infill plantings provided they are sensitive to site restrictions.

Issue/Opportunity	Priority*	Comment
Mowing regime & Spread of weeds from mowing/slashing	2	The assessment areas / Habitat Zones associated with the Powernet Easement Reserve occur as pockets of native vegetation within the wider easement area that are marked out with the use of bollards. Mowing of the wider easement adjacent to these areas, which is dominated by a suite of weeds occurs up to these bollards. Weed from the wider mown areas are currently encroaching into the marked Habitat Zones with the mowing and slashing immediately adjacent potential contributing to this spread and continuing to into the future. To reduce risks, an appropriate buffer around the zones could be established within which mowing is restricted to the use of pre-cleaned equipment only; mowing aimed at ensuring slash is ejected in one direction away from the Habitat Zones is also likely to assist.
Weed threats or invasion	1	There are a range of weeds present across both Habitat Zone 1 and Habitat Zone 2. This includes Onion Grass <i>Romulea rosea</i> , Cape Weed <i>Arctotheca calendula</i> , Flatweed <i>Hypochaeris radicata</i> , Sheep Sorrel <i>Acetosella vulgaris</i> and Buck's-horn Plantain <i>Plantago coronopus</i> in Habitat Zone 1. In Habitat Zone 2 it includes Large Quaking-grass <i>Briza maxima</i> , Scarlet Pimpernel, Sweet Vernal-grass <i>Anthoxanthum odoratum</i> , Cape Weed <i>Arctotheca calendula</i> , Soft Brome <i>Bromus hordeaceus</i> , Panic Veldt-grass <i>Ehrharta erecta</i> and Cleavers <i>Galium aparine</i> plus others. As there are a range of ground storey indigenous plants across the Habitat Zones, including herbs and orchids, weed management is required to prevent degradation and to allow for regeneration of such species into the future.
* 1 – High, 2 – Moderate and 3 – Low		

4.10 Rowan Woodland Reserve (Site #10)

4.10.1 Existing Ecological Conditions

Map 10 in Appendix 2 gives an overview of vegetation extent and EVCs present across Rowan Woodland Reserve (RWR) as determined from the site assessment. Appendix 3 details the flora species observed.

The southern portion of the reserve supports EVC 48: Heathy Woodland (Habitat Zone 1) dominated by Narrow-leaved Peppermint and Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*. This transitioned to EVC 3: Damp Sands Herb-rich Woodland towards north (Habitat Zones 2 and 3). A patch of EVC 937: Swampy Woodland was also observed in the north-west of corner of the reserve (Habitat Zone 4) which was not mapped previously. The northern section of the reserve had a high coverage of weed species hence the Damp Sands Herb-rich Woodland is divided into two Habitat Zones which were scored separately to reflect this.

Key weed species across the reserve included Panic Veldt-grass *Ehrharta erecta*, Annual Veldt-grass *Ehrharta longiflora*, Rye Grasses *Lolium spp.*, and Fumitory *Fumaria spp.* amongst a suite of other species. There were also discrete patches of Cut-leaf Geranium *Geranium dissectum*, Toowoomba Canary-grass *Phalaris aquatica*, Passion flower *Passiflora spp.*, Coast Wattle *Acacia longifolia subsp. sophorae*, Drooping Cassinia *Cassinia sifton*, and Coast Tea-tree *Leptospermum laevigatum* scattered throughout the reserve.

In the southern end of the reserve, there was reasonably high cover of Burgan *Kunzea ericoides* in some areas. Due to some recent and ongoing taxonomic changes of this species it is unclear if these plants represent a

natural occurrence of the species or an incursion from outside of its natural range. Until there is more clarity around the species it is recommended to monitor its abundance and respond as appropriate.

4.10.2 Listed or Notable Species Observed

No listed species were observed. Throughout the EVC 3: Damp Sands Herb-rich Woodland and EVC 48: Heathy Woodland Habitat Zones, several orchid and forb species were noted. These include:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

4.10.3 Habitat Hectare Assessments

For the purpose of the Habitat Hectares assessment, the reserve was divided into four Zones as shown in Map 10 (see also Figure 18 to Figure 20 and Table 36) supporting three EVCs between them.

The northern portion of the reserve (Zones 3 and 4) was unmapped in the 2012 assessment but based on the 2022 surveying was considered to meet the definition of a patch of native vegetation albeit with high weed coverage. This led to a considerable increase in the total area of native vegetation mapped across the reserve as part of this study.

Table 36 gives an overview of the Habitat Hectare results for the reserve while 0 gives a breakdown of the scoring for each of the Zones. Overall, an increase was observed in the area of native vegetation, habitat hectares scores and total habitat hectares supported by the reserve. There was a considerable increase in the habitat hectares score for Zone 2 (Damp Sands Herb-rich Woodland) primarily due to an increased score for the Understorey, Lack of Weeds and Recruitment components. The Understorey component provided the greatest increase mainly due to the diversity and abundance of graminoids, forbs, and small shrubs.

Table 36. Summary of habitat hectares results for Rowan Woodland Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
3: Damp Sands Herb-rich Woodland	2, 3	1.21	0.71	0.53	0.18
48: Heathy Woodland	1	1.95	1.46	1.15	0.74
937: Swampy Woodland	4	0.5	0	0.2	0
Total		3.67	2.17	1.88	0.92

Table 37. Habitat Hectares scoring for Rowan Woodland Reserve

Habitat Zone		1		2		3		4	
Bioregion		GipP		GipP		GipP		GipP	
EVC Name (initials)		HW		DSHrW		DSHrW		Not mapped	
EVC Number		48		3		3		Not mapped	
EVC Conservation Status		LC		V		V		Not mapped	
Year		2022/23 (PE)	2012 (Biosis)	2022/23 (PE)	2012 (Biosis)	2022/23 (PE)	2012 (Biosis)	2022/2 (PE)	2012 (Biosis)
Size of Zone (ha)		1.95	1.46	0.71	0.71	0.50		0.51	
		Max Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	7	5	0	0	5	5	
	Canopy Cover	5	4	4	4	2	2	2	
	Understorey	25	20	15	20	5	15	15	
	Lack of Weeds	15	7	6	7	2	0	0	
	Recruitment	10	6	6	6	3	3	3	
	Organic Litter	5	5	5	5	5	4	4	
	Logs	5	5	4	5	4	5	5	
	EVC Standardiser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Standardised Score	75	54	45	47	21	34	34		
Landscape value	Patch Size	10	2	2	2	2	2	2	
	Neighbourhood	10	0	1	0	0	0	0	
	Distance to Core	5	3	3	3	3	3	3	
Habitat points		100	59	51	52	26	32	39	
Habitat Score (habitat points/100)		0.##	0.59	0.51	0.52	0.26	0.32	0.39	
No. of Large Old Trees			29	10	0	0	0	4	
Habitat Hectares, Area x Habitat Score (Hha)			1.15	0.74	0.37	0.18	0.16	0.20	

4.10.4 Photos



Figure 18. Habitat Zone, EVC48: Heathy Woodland.



Figure 19. Habitat Zone 4, EVC937: Swampy Woodland).



Figure 20. Habitat Zone 2, EVC3: Damp Sands Herb-rich Woodland.

4.10.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 38. Potential Threats, Management recommendations for Rowan Woodland Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.
Connectivity and Fragmentation	3	<p>Outside of the reserve boundary to the west is a reasonably sized patch of mature River Red-gum <i>Eucalyptus camaldulensis</i> which likely represents a remnant of Plains Grassy Woodland. Future management plans could look to incorporate this patch of vegetation.</p> <p>The reserve is also not far from Braeside Park Reserve, and improving connectivity between the two, perhaps along the perimeter of the Golf Course, would improve overall landscape connectivity.</p> <p>More broadly there is potential to create a biodiversity corridor from The Grange through to Caruana and Rowan Woodland Reserves to Braeside Park but would require considerable planning. This could be achieved through stepping stone corridors and plantings along the highway – and is flagged here as a potential long-term goal for Kingston's natural reserves.</p>
Dieback/Disease/Phytophthora/Pests	1	<p>There were several areas where Wattles <i>Acacia spp.</i> had senesced. There was evidence of galls in nearby Acacias. While this is a natural process with older trees more susceptible, to some extent – ongoing monitoring by Kingston's on-ground staff should consider whether this process appears to be an issue and if so, a suitably qualified and/or experienced specialist should be engaged.</p> <p>There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.</p>
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness-Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. However, in order to minimise the above impacts to dogs, it is recommended, at a minimum, to install signage clearly notifying users that dogs must be on-lead.</p> <p>Further to this, consideration of the following is recommended:</p>

Issue/Opportunity	Priority*	Comment
		<ul style="list-style-type: none"> Fencing sensitive areas of vegetation to exclude the potential for dogs walked off-lead (despite signage) from entering. A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves Established dedicated dog-off-lead areas outside of bushland reserves Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership).
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2.
Missing structural components in Habitat Zones	2	<p>Zones 2 and 3 lacked large trees. This component is not quickly replaced. However, this will be encouraged through protecting existing trees and encouraging natural regeneration.</p> <p>Weedy areas of Swampy Woodland and the northern section of Damp Sands Herb-rich Woodland in many areas lacked indigenous vegetation – through successive weed control sweeps would be expected to promote natural regeneration in such areas. Following weed control works, if natural regeneration is not observed – planting is recommended.</p>
Rabbits/Foxes	2	A fox and burrow were observed during the site visits. The continuation of an integrated fox control program is recommended to mitigate impacts to local fauna.
Unmaintained nest boxes	2	One informal nest box was observed in poor condition – either maintaining or replacing the nest box is recommended – although if only used by Possums it may be appropriate to remove given the habitat available in the trees on site.
Weed threats or invasion	1	<p>Non-indigenous woody species including Drooping Cassinia <i>Cassinia sifton</i></p> <p>In regards to the site non-indigenous woody species such as Coast Wattle <i>Acacia longifolia subsp. sophorae</i>, Coast Tea Tree <i>Leptospermum laevigatum</i>, and Drooping Cassinia <i>Cassinia sifton</i> the following is recommended:</p> <ul style="list-style-type: none"> Cut and paint juvenile plants to prevent their spread. Mature specimens can be removed or retained until they senesce naturally. If retained, they should be carefully monitored and small seedlings of these species should be routinely removed to prevent them establishing and potentially outcompeting nearby indigenous vegetation patches. Where dense patches are present and lack of similar vegetation structure in the vicinity, their removal should be planned in stages over several years, and revegetation with indigenous species appropriate to the EVC. <p>It is noted that <i>Cassinia Sifton</i> is also listed as protected under the FFG Act. Hence a permit may be needed for its removal and confirmation with DEECA is recommended regarding this.</p>
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.11 The Grange Heathland Reserve (Site #11)

4.11.1 Existing Ecological Conditions

The Grange Heathland Reserve (TGHR) is an exceptionally high-quality reserve, with a diverse mix of ecological communities: EVC 48: Heathy Woodland to its west, EVC 937: Swampy Woodland along the central drainage line, EVC 53: Swamp Scrub to the east, EVC 3: Damp-sands Herb-rich Woodland to the north and a small patch of EVC6: Sand Heathland to the west (Figure 21 to Figure 25). Map 11 in Appendix 2 gives an overview of the extent of these EVCs across TGHR as determined from the site assessment. Appendix 3 details the flora species observed.

Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* dominates the EVC 48: Heathy Woodland areas with an understorey of either diverse heathy shrubs, grasses and herbs or Austral Bracken *Pteridium esculentum subsp. esculentum*. These areas also have a high diversity of orchid species as noted further below. There was a small section to the south-west with several dead trees and poor condition of understorey. Kingston City Council staff explained that this was the result of flooding from the adjacent tip which submerged the area for ~ 6 months and deposited substantial clay layer. If practicable – sensitively removing this layer of clay would be beneficial to restore the natural soil profile, otherwise continued weed management is likely needed. Further measures to address drainage from the tip are also recommended to be explored such that the possibility of this reoccurring is minimised – such as the creation of planted swales (perhaps with the layer of clay if removed from its current location).

Areas of EVC 3: Damp Sands Herb-rich Woodland (Habitat Zone 6) to the north was unmapped by Biosis (2012a), however the present assessment found such areas met the definition of a patch of native vegetation. While this vegetation has affinities with EVC 48: Heathy Woodland in regards to its overstorey of Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana*, its understorey is dominated by grasses, particularly Weeping Grass *Microlaena stipoides var. stipoides*, with a relatively low coverage of shrubs, which is more typical of EVC 3: Damp Sands Herb-rich Woodland. A small area of EVC 6: Sand Heathland (Habitat Zone 1) continues to exist surrounded by EVC 48: Heathy Woodland (Habitat Zone 4) which was exceptionally diverse and with low weed cover.

Swamp Gum *Eucalyptus ovata* dominated the EVC 397: Swampy Woodland (Habitat Zone 5) with some Mealy Stringybark *Eucalyptus cephalocarpa* also present. The understorey varied with large areas of Thatch Saw-sedge *Gahnia radula*, a wetter area to the north of Common Reed *Phragmites australis*, as well as small areas of dense Swamp Paperbark *Melaleuca ericifolia* – the presence of Swamp Gums *Eucalyptus ovata* in such areas however precluded them from being defined as EVC 53: Swamp Scrub. As discussed below the area of EVC 937: Swampy Woodland and Common Reed *Phragmites australis* has extended northward slightly, which could be due to increased drainage from the synthetic sports fields to the north, as pointed out by Kingston City Council staff on site.

The area of EVC 53: Swamp Scrub was mapped as a single zone and was dominated by Swamp Paperbark *Melaleuca ericifolia*, with a relatively sparse understorey in most areas. However, there were distinct characteristics between different regions with the northern section within the reserve consisting of more mature, open, Swamp Paperbark *Melaleuca ericifolia* and the southern section, which was more recently burnt, supporting a denser stand of smaller, even aged Swamp Paperbark *Melaleuca ericifolia*. The Swamp Scrub had also expanded and colonised a considerable area outside of the reserve fence. As such this area had a high coverage of high

threat grassy weeds, particularly Panic Veldt Grass *Ehrharta erecta* and Annual Veldt Grass *Ehrharta longiflora* – which were also somewhat common in the EVC 937: Swampy Woodland.

4.11.2 Listed or Notable Species Observed

One FFG listed species (Vulnerable) [REDACTED] was observed. This species is not site indigenous, however it could be retained and monitored to ensure it does not out-compete indigenous vegetation.

The following species were also noted:

- Cherry Ballart *Exocarpos cupressiformis*
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- Red-fruit Saw-sedge *Gahnia sieberiana*
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

The location of some of these are given as points on Map 11 in Appendix 2. However, the sheer extent of orchids across the areas of EVC 48: Heathy Woodland and EVC 6: Sand Heathland precluded mapping all of them; their proliferation and management is credit to Kingston City Council staff.

4.11.3 Habitat Hectare Assessments

Table 39 gives an overview of the Habitat Hectares results for TGHR. The Habitat Hectares scoring reflects a considerable improvement in the condition of this reserve over the past ten years of management. The total area of native vegetation increased from 4.85 ha to 6.4 ha due to new areas colonised by EVC 53: Swamp Scrub and mapping of the vegetation to the reserve’s north as a patch of EVC 3: Damp Sands Herb-rich Woodland. This, combined with either a similar or improved habitat hectares score for each Habitat Zone, led to a corresponding increase in total Habitat Hectares across the reserve.

Table 40 further present a breakdown in the scoring against vegetation and landscape components for each of the Habitat Zones, and compares them to the previous Biosis (2012a) results.

Some of the zones previously mapped by Biosis have been combined into a single Habitat Zone, as differences in vegetation condition was not significant enough to justify a separate Habitat Zones according to the current practice for Habitat Hectare assessments. Hence, for some of our Habitat Zones in Table 40, several columns are indicated adjacent to it that correspond to the 2012 mapping.

Table 39. Summary of habitat hectares results for The Grange Heathland Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
3: Damp Sands herb-rich Woodland	6	0.52	0	0.29	0
6: Sand Heathland	1	0.06	0.06	0.04	0.04
48: Heathy Woodland	3 & 4	3.2	2.71	2.02	1.43
53: Swamp Scrub	2	1.7	1.323	0.96	0.58
937: Swampy Woodland	5	0.95	0.76	0.51	0.35
Total		6.43	4.85	3.82	2.40

Overall, the Habitat Hectare scores remained relatively similar to 2012, with slight increases observed in some. The most noticeable improvement was in Habitat Zone 4 (EVC 48: Heathy Woodland), where the Lack of Weeds and Recruitment scores both increased, contributing to an overall increase of 15 points for the Habitat Zone.

Habitat Zones supporting Swamp Scrub and Swampy Woodland scored lower than drier, heathy Habitat Zones, largely due to more significant weed pressure in these areas resulting in lower scores for the Lack of Weeds and Understorey components.

Habitat Zones supporting Sand Heathland and Heathy Woodland scored very high in almost all components. It is unlikely that these Habitat Zones' scores will substantially increase in the future (with the exception of possibly the Lack of Weeds and Large Tree components) – as their current state represents somewhat of a benchmark for what is achievable in an urban reserve. While the Understorey component for the Sand Heathland dropped from 25 in 2012 to 20 in the current assessment, this was due to just two lifeforms being slightly under their benchmark cover, and could represent a difference in observers or environmental conditions rather than a real change in quality.

No Habitat Zones received full scores for the Recruitment component – and ongoing, observational monitoring from Kingston's on-ground staff is encouraged to continually monitor the recruitment of shrubs and trees. The score for Large Trees was also not at benchmark for any of the Habitat Zones – though there were many mature trees marginally below the Large Tree size, and this score will likely improve over time. The Landscape Component scores were all relatively low, however this is inevitable in an urban setting.

Overall, the Habitat Hectare results point towards the continuing quality of this reserve, with gradual improvements evident from weed control works by Kingston on-ground staff.

Table 40. Habitat Hectares scoring for The Grange Heathland Reserve

Habitat Zone			1		2			3			4		5				6	-	
Bioregion			GipP		GipP			GipP			GipP		GipP				GipP	Not Mapped	
EVC Name (initials)			SH		SS			HW			HW		SW				DSHrW		
EVC Number			6		53			48			48		937				3		
EVC Conservation Status			R		E			LC			LC		E				V		
			2022 PE	2012 Biosis (SH1)	2022 PE	2012 Biosis (SS1)	2012 Biosis (SS2)	2012 Biosis (SS3)	2022 PE	2012 Biosis (HW2)	2012 Biosis (HW3)	2022 PE	2012 Biosis (HW1)	2022 PE	2012 Biosis (SW1)	2012 Biosis (SW2)	2012 Biosis (SW3)	2022 PE	2012 Biosis
Size of Zone (ha)			0.06	0.06	1.70	0.488*	0.36*	0.47*	1.96	1.24	0.23	1.24	1.24	0.95	0.29	0.15	0.32	0.52	Not Mapped
Max Score		Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	5	3	0	5	2	3	0	3	0	9	
	Canopy Cover	5	n/a	n/a	3	5	0	0	2	5	2	4	5	4	3	3	2	4	
	Understorey	25	20	25	20	20	5	15	20	15	20	25	25	15	15	10	15	15	
	Lack of Weeds	15	15	13	7	7	0	7	9	4	11	15	7	13	11	0	13	7	
	Recruitment	10	6	6	6	6	6	6	6	6	10	6	3	3	3	6	10	6	
	Organic Litter	5	5	3	5	5	3	3	5	5	5	5	3	5	3	3	5	5	
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	5	5	5	5	5	5	4	4	4	5	
	EVC Standardiser	n/a	1.36	1.36	1.25	1.25	1.25	1.25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Standardised Score	75	62.7	64.1	51.25	54	18	39	52	43	53	65	50	48	39	29	49	51	
Landscape value	Patch Size	10	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
	Neighbourhood	10	1	1	0	1	0	0	1	0	1	1	1	1	0	0	1	0	
	Distance to Core	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Habitat points	100	68.7	70.1	56.3	60	23	44	58	48	59	71	56	54	44	34	55	56		
Habitat Score (%)	0.##	0.69	0.70	0.56	0.60	0.23	0.44	0.58	0.48	0.59	0.71	0.56	0.54	0.44	0.34	0.55	0.56		
No. of Large Old Trees		n/a	n/a	n/a	n/a	n/a	n/a	13	5	0	11	>5	3	0	1	0	0		
Habitat Hectares (Hha) Area x Habitat Score		0.04	0.04	0.96	0.29*	0.08*	0.21*	1.14	0.60	0.14	0.88	0.69	0.51	0.13	0.05	0.18	0.29		

*These have been altered from the Biosis Report figures and are instead based on the area of mapped polygons in the 2012 Biosis Mapping provided by Council.

4.11.4 Photos



Figure 21. Habitat Zone 1, EVC6: Sand Heathland.



Figure 22. Top: Habitat Zone 5, EVC937: Swampy Woodland, dominated by Thatch Saw-sedge *Gahnia radula*, and **Bottom:** with Common Reed *Phragmites australis* dominating.



Figure 23. Habitat Zone 4, EVC48: Heathy Woodland with: **Top Left:** Austral Bracken *Pteridium esculentum subsp. esculentum* dominated understorey, **Bottom Left:** a more heathy shrub understorey, **Middle and Right:** a diversity of forbs such as orchids.



Figure 24. Habitat Zone 6, EVC3:Damp Sands Herb-rich Woodland with **Top:** an area with more open space and Spear Grasses *Austrostipa spp.* and **Bottom:** Weeping Grass *Microlaena stipoides var. stipoides* understorey.



Figure 25. Habitat Zone 2 – EVC53: Swamp Scrub with **Top:** A more open area with mature Swamp Paperbark *Melaleuca ericifolia*, and **Bottom:** an area with a dense stand of younger Swamp Paperbark *Melaleuca ericifolia*.

4.11.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 41. Potential Threats, Management recommendations for The Grange Heathland Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In time, climate change may impact in the longer term of the native vegetation within the reserve and its associated habitat. Further detail is provided in Section 5.1.1.
Connectivity and Fragmentation	3	There is potential to create a biodiversity corridor from The Grange through to Caruana and Rowan Reserves to Braeside Park but this would require considerable planning and revegetation. This could be achieved through stepping stone corridors and plantings along the highway through the golf course to the south – and is flagged here as a potential long term goal for Kingston’s natural reserves. Collaboration with the golf course regarding the planting of roughs and species selection for trees would also be beneficial in increasing landscape permeability.
Dieback/ Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected

Issue/Opportunity	Priority*	Comment
		<p>areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available. It is recommended to install a wash/hygiene station at the entrance of the reserve with associated signage.</p>
Dogs walked off-lead	2	<p>Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011):</p> <ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., blue-tongue lizards <i>Tiliqua scincoides</i>). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>No dogs were observed off-lead during the site assessments. It is understood that Dogs are not allowed within the Grange Heathland Reserve. Further a feral-proof fence excludes cats, dogs, rabbits, and foxes from the reserve thus preventing them from preying on indigenous fauna and flora.</p> <p>To ensure that the dog access restrictions are followed and minimise adverse impacts from dogs, it is recommended to:</p> <ul style="list-style-type: none"> • Update educational signage to explain the significance of this reserve, and threats posed by dogs and cats. • A proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in bushland and foreshore reserves • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership). • Consideration to defining this Reserve and other high quality and remnant bushland areas as Conservation Reserves, to indicate their significance to users.

Issue/Opportunity	Priority*	Comment
Genetic pollution	1	There is potential for naturally occurring plants within the reserve to hybridise with amenity plantings. This is especially the case for Swamp Paperbark <i>Melaleuca ericifolia</i> and its potential to hybridise with Giant Honey-myrtle <i>Melaleuca armillaris subsp. armillaris</i> . To prevent this, it is recommended to perform an audit of the surrounding area for any plants of Giant Honey-myrtle <i>Melaleuca armillaris subsp. armillaris</i> , and consider removing them if appropriate.
Rabbits/Hares/Foxes	3	Pest animals should be monitored to ensure they are not impacting upon the ecological values of the reserve.
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. It is highly recommended to consult with a local expert with knowledge of burn practices, as inappropriate fire regimes can result in the degradation of native vegetation in the longer term. Further detail is provided in Section 5.1.2.
Stormwater outflow and runoff or hydrology	2	Natural and artificial drainage lines exist in the reserve which support the Swamp Scrub and Swampy Woodland communities. Any change to the hydrological regime of the area should be carefully considered as many of the species in the reserve rely on regular water supply.
Walking tracks through vegetation/trampling	3	Movement through the reserve off walking tracks through discouraged. Consideration should be given to closing any regularly used informal tracks through the reserve coupled with education of users of the reserve regarding vegetation trampling given the sensitive nature of the ground storey flora present.
Weed threats or invasion	1	Weed species as listed above were present throughout the reserve. As discussed above, these weeds were most abundant in wetter areas of the site in Swamp Scrub and Swampy Woodland and around the boundaries – seemingly exacerbated by the higher than usual rainfall in the previous months. The suite of species on site and their control methods are likely familiar to Kingston staff and will require continued management over a number of years.
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.12 Foreshore North Reserve (Site #12)

4.12.1 Existing Ecological Conditions

Map 12 in Appendix 2 gives an overview of vegetation extent, type and EVCs present across the Foreshore North Reserve (FNR). Appendix 3 details the flora species observed.

Ten Habitat Zones were mapped across the FNR, representing seven EVCs. Each of these is briefly described in turn below.

It is also noted that, as described by Biosis (2012d), the FNR has undergone significant modification. Historically the foreshore, north of Monaco Street, consisted of the Melton White Clay Cliffs (Red Bluff Sands) with sand ridges and sand hills set further back. DEECA pre-1750's mapping indicates that this would have been EVC 161: Coastal Headland Scrub transitioning to areas of Heathy Woodland and Sand Heathland. In several stages during the 1900's the cliffs were blasted, recontoured to a milder slope vegetated and the promenade along the beach built (Whitehead 2018). As described below, much of this area supports vegetation representative of the EVC 161: Coastal Headland Scrub ecological community.

Coastal Headland Scrub (Habitat Zones 1 & 2)

North of Bay St, most of the FNR, is EVC 161: Coastal Headland Scrub (CHS). Figure 26 shows representative photos of this EVC along the foreshore slopes. Vegetation directly adjacent the promenade often had exotic vegetation and weeds that extended to varying depths up the slope transitioning into CHS. The CHS on the lower slopes typically supported low, often dense shrubs, typically Coast wattle *Acacia longifolia subsp. sophorae*, Coast Tea-tree *Leptospermum laevigatum* and Common Boobialla *Myoporum insulare*, but also consisting of other species shrub species such as Coast Daisy-bush *Olearia axillaris*, Sticky Daisy-bush *Olearia glutinosa*, Coast Everlasting *Ozothamnus turbinatus*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, and Hop Goodenia *Goodenia ovata*. Coast Pomaderris *Pomaderris paniculosa subsp. paralia* and Coast Beard-Heath *Leucopogon parviflorus* were less common. There was also the occasional Coast Banksia *Banksia integrifolia subsp. integrifolia* or Coast Manna-gum *Eucalyptus viminalis subsp. pryoriana* scattered amongst the patches, particularly north of Kitchener Street. *Gazania spp.* and Panic Veldt-grass *Ehrharta erecta* were dominant weeds. Other common weeds included Mirror Bush *Coprosma repens*, Buffalo Grass *Stenotaphrum secundatum*, Couch *Cynodon dactylon*, Rye Grass *Lolium spp.*, Coast Barb Grass *Parapholis incurva*, Sea Wheat Grass *Thinopyrum junceiforme*, and Cape Ivy *Delairea odorata*.

Further up the slope and on the plateau, the vegetation typically grew taller and more open, often with Hop Goodenia *Goodenia ovata* and Seaberry Saltbush *Rhagodia candolleana subsp. Candolleana* present in the understorey along with an increased cover of weeds, particularly Panic Veldt-grass *Ehrharta erecta*. On the plateau Drooping Sheoak *Allocasuarina verticillata* trees were also common, and a more diverse ground storey present.

Two Habitat Zones associated with CHS were mapped. Areas mapped as Habitat Zone 1 were of higher quality while those mapped as Habitat Zone 2 were characterised by increased weed coverage and/or reduced species diversity. Examples included:

- High weed coverage including high risk weeds not prevalent elsewhere such as Broom *Genista linifolia* and Blackberry *Rubus fruticosus* spp. agg. (North of Kitchener Road).
- Areas supporting a high density of Honey-myrtle *Melaleuca* spp., which are not indigenous to this EVC and contributed to weed coverage (North of Kitchener Road), with both Giant Honey Myrtle *Melaleuca armillaris* subsp. *armillaris* and Moonah *Melaleuca lanceolata* observed.
- Areas of Common Boobialla *Myoporum insulare* with very low diversity of other lifeforms present, sometimes also associated with high weed coverage of Blackberries *Rubus fruticosus* spp. agg. and Cape Ivy *Delairea odorata*.
- Areas with a high coverage of Coast Saltbush *Atriplex cinerea* but still consisting of 25% indigenous perennial cover, e.g. Seaberry Saltbush *Rhagodia candolleana* subsp. *Candolleana*. As with Honey-myrtle *Melaleuca* spp., this area is beyond the natural distribution for Coast Saltbush *Atriplex cinerea* and it was considered as contributing to the weed coverage.

Berm Grassy Shrubland (Habitat Zone 3) and **Coastal Dune Grassland** (Habitat Zones 4 & 5)

Both communities were mapped along the beach. EVC 311: Berm Grassy Shrubland (BGS) with Coast Saltbush *Atriplex cinerea* and EVC 879: Coastal Dune Grassland (CDG) by Hairy Spinifex *Spinifex sericeus*.

Two Habitat Zones of CDG were defined, both with low weed coverage:

- Habitat Zone 3 had a greater diversity of species. Of note, was the presence of Salt Couch *Sporobolus virginicus* and Australian Salt-grass *Distichlis distichophylla* within patches north and south of Rennisons Road carpark, which were not observed elsewhere in this community on the foreshore.
- Habitat Zone 4 consisted almost solely Hairy Spinifex *Spinifex sericeus*.

Key weed species observed alongside the CDG and BGS communities were Gazania *Gazania* spp., Sea-wheat Grass *Thinopyrum junceiforme*, and Mountain Bietou *Dimorphotheca jucunda*.

Coast Banksia Woodland (Habitat Zone 6)

Areas of EVC 2: Coast Banksia Woodland (CBW) included landscaped areas adjacent carparks (Kitchener Street and Dixon Street Carparks) and within the Peter Scullin Reserve. There was one Coast Banksia *Banksia integrifolia* subsp. *integrifolia* within the Kitchener Street carpark that fell short of classifying as a Large Tree but appeared mature. The understorey featuring Seaberry Saltbush *Rhagodia candolleana* subsp. *candolleana* and Bower Spinach *Tetragonia implexicoma* with weeds included Galenia *Aizoon pubescens*, Panic Veldt *Ehrharta erecta*, Mirror Bush *Coprosma repens*, Brome *Bromus* spp., and Sow Thistle *Sonchus* spp..

Coastal Dune Scrub (Zones 7 & 8)

South of Rosella St, the foreshore vegetation transitioned to EVC 160: Coastal Dune Scrub (CDS). The approach used was the same as that by Biosis (2012d), with two Habitat Zones defined:

- Zone 7 – A more open version of EVC 160: Coastal Dune Scrub along the front with low weed coverage and higher diversity of ground storey species within the spaces between shrubs such as Rounded Noon Flower *Disphyma crassifolium* subsp. *clavellatum*, Karkalla *Carpobrotus rossii*, Knobby Club-sedge

Ficinia nodosa and Spear Grasses *Austrostipa spp.*; this often graded into EVC 879: Coastal Dune Grassland.

- Zone 8 – A closed version of EVC 160: Coastal Dune Scrub further back from the beach and within the Peter Scullin Reserve. This had shrubs with lower diversity of ground storey species, although Bower spinach *Tetragonia implexicoma* was common, and typically had a higher weed coverage.

The closed-CDS within the Peter Scullin Reserve has landscape/revegetation plantings, while that further north it was more natural. Panic Veldt-grass *Ehrharta erecta* was a prominent weed in the closed-CDS, possibly encouraged by the conducive weather conditions leading up to surveying. Hare's-tail Grass *Lagurus ovatus* was a common weed of the open-CDS. Shrub species of the CDS community included Coast Tea Tree *Leptospermum laevigatum*, Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, Coast Wattle *Acacia longifolia subsp. sophorae*, White Correa *Correa alba*, Coast Everlasting *Ozothamnus turbinatus*, Cushion Bush *Leucophyta brownii*, and Common Boobialla *Myoporum insulare*.

Coastal Tussock Grassland (Zone 9)

EVC 163: Coastal Tussock Grassland (CTG) and the CHS EVC often occurred as a mosaic, with CTG occupying more exposed areas of the coastal cliffs/bluffs which are less able to support shrub growth. However, as mentioned by Biosis (2012d), the CTG community would generally occur on more exposed coasts than occurs on Kingston foreshore. Never-the-less, where a substantial areas of tussock grass species mixed with scattered emergent shrubs, representative of CTG, it was mapped as such and the Habitat Hectares scoring undertaken against the CTG EVC benchmark. Where smaller areas of CTG existed intermixed with CHS, the CHS ecological community was mapped and used as the benchmark for Habitat Hectares assessment.

Species representative of this community included Coast Tussock-grass *Poa poiformis var. poiformis*, Prickly Spear-grass, and occasionally Rounded Noon-flower *Disphyma crassifolium subsp. clavellatum* and Knobby Club-sedge *Ficinia nodosa*.

Sand Heathland (Zone 10)

Two small, well-managed areas of modified EVC 6: Sand Heathland are present and supported some species of note and described below. These areas fall within a strip between Naples Road and Mentone Parade that is mapped as historically (pre-1750's) supporting a EVC 48: Heath Woodland. However, much of the surrounding area in this strip now consists of relatively dense stands of Drooping Sheoak *Allocasuarina verticillata*, with plantings generally consistent with the CHS, not the SH, ecological community.

Inappropriate shrub plantings (e.g., Coast Wattle *Acacia longifolia subsp. sophorae* and Coast Tea Tree *Leptospermum laevigatum*) in the vicinity of the smaller patch and are not consistent with SH and should be removed.

As recommended by Biosis (2012d), this the area between Naples Rd and Mentone Parade, on the top plateau, could be gradually restored to Sand Heathland and is discussed below.

4.12.2 Listed or Notable Species Observed

No State or Federally listed flora species were observed within the reserve aside from [REDACTED] that is likely to have been established from historical plantings, [REDACTED]

A number of other species are however expected to be not often observed within the City of Kingston are of note. These are also identified within Map 12 in Appendix 2.

Within the EVC 6: Sand Heathland Habitat Zones and the immediate surrounding area supported several species of note:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Sea Box *Alyxia buxifolia*
- [REDACTED]
- Ruby Saltbush *Enchylaena spp.*
- Trap Door Spiders *Aganippe winsori*
- Sandhill Sword-sedge *Lepidosperma sieberi*

One instance of [REDACTED] was also observed within the area of CHS.

Several patches of CDG supported [REDACTED] and [REDACTED]

Coast Pomaderris *Pomaderris paniculosa subsp. paralla* and Coast Beard Heath *Leucopogon parviflorus*, were occasionally observed within CHS and identified within Map 12 in Appendix 2.

There was also a Large Coast Banksia *Banksia integrifolia subsp. integrifolia* near Mundy Street.

4.12.3 Habitat Hectare Assessments

As discussed above, the reserve was categorised into 10 Habitat Zones for the purpose of completing Habitat Hectares assessments. Due to the large area and number of vegetation patches in this Foreshore Reserve, it was not practical the calculate the Habitat Hectares score of each individual mapped patch of native vegetation. Hence, as was done in the earlier Biosis report, disjunct vegetation patches were grouped together as the same Habitat Zones based upon EVC and quality classes, and a generalised Habitat Hectares score assigned (Biosis 2012d).

Table 42 gives an overview of the Habitat Hectare results for the FNR, while Table 43 gives a breakdown of the scoring for each of the Habitat Zones. Overall, the total area of vegetation and total Habitat Hectares remained

constant compared to previous Biosis report. Similarly, the area and Habitat Hectares area of each individual EVC remained relatively similar between the 2012 and 2022 assessments. This is despite the loss of significant vegetation, primarily CHS, over the past decade due to infrastructure projects such as the shared pathway. This loss of vegetation has likely been recovered through the expansion of CHS into areas. South of Rennison Street, there appears to have been a seaward expansion of Coastal Dune Scrub into what was previously Coastal Dune Grassland in 2012, and an expansion of Coastal Dune Grassland beyond the fence into the beach area. There was also an increase of Berm Grassy Shrubland, with the establishment of patches of Coast Saltbush *Atriplex cinerea* along the beach, particularly north of Dixon Rd.

In regards to the Habitat Hectares scoring, there were slight variations between the components, but the overall scores were generally similar. Some observations include:

- For CHS Zones 1 and 2, the understorey component remained the same and improved, respectively.
- A slight decrease in the CDG Habitat Hectares area occurred. As mentioned earlier, there appeared to be a seaward shift in the various EVCs, such that the CDS encroached into areas that were previously CDG, while the CDG migrated beyond the fenced area onto the beach in front. This area is less protected, which may have prevented some of the more sensitive CDG species from expanding into the beach area with the Hairy Spinifex *Spinifex sericeus*. In contrast to Biosis, where a single CDG Habitat Zone was defined, this 2022 assessment defined two Zones, with Zone 4 having greater understorey diversity, while Zone 5 consisted almost solely of Hairy Spinifex *Spinifex sericeus*. This may have also contributed to the slight reduction in overall Habitat Hectares area. Surprisingly, despite this seaward shift, the overall area of CDG was the same as that in the 2012 assessment by Biosis.
- Prior Habitat Hectares assessments were not made by Biosis of the Coast Banksia Woodland and Coastal Tussock Grassland areas.
- There was an improvement in Sand Heathland Habitat Hectares Score, primarily due to an improvement in the Lack of Weeds component and recruitment component. Although the recruitment component is primarily due to the presence of *Goodenia Ovata*.
- The CDS also saw a very slight decrease in Habitat Hectares area. This is contributed in part to a increased area and lower Habitat Hectare score for Zone 8 – Closed CHS. The lower Habitat Hectare score is a result of lower scores for both Recruitment and Lack of Weeds components. Zone 7 – Open CHS decreased in area and was accompanied by a higher Habitat Hectare score due to an improved Lack of Weeds component.

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Table 42. Summary of habitat hectares results for Foreshore North Reserve

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
2: Coastal Banksia Woodland	6	0.19	0.14	0.05	n/a
6: Sand Heathland	10	0.015	0.012	0.008	0.005
160: Coastal Dune Scrub	7 & 8	2.58	2.49	0.78	0.90
161: Coastal Headland Scrub	1 & 2	7.31	7.46	2.98	3.11
163: Coastal Tussock Grass	9	0.19	0.14	0.06	n/a
311: Berm Grassy Shrubland	3	0.35	0.09	0.10	0.03
879: Coastal Dune Grassland	4 & 5	0.60	0.61	0.25	0.30
Total		11.24	10.94	4.23	4.35

Table 43. Habitat Hectares scoring for Foreshore North Reserve

Habitat Zone		1	2*		3		4*		5**		6		7		8		9		10						
Bioregion		GipP	GipP		GipP		GipP		GipP		GipP		GipP		GipP		GipP		GipP						
EVC Name (Initials)		CHS	CHS		BGS		CDG		CDG		CBW		CDS		CDS		CTG		SH						
EVC Number		161		161		311		879		879		2		160		160		163		6					
EVC Conservation Status		Depleted		Depleted		Endangered		Depleted		Depleted		Vulnerable		Depleted		Depleted		Vulnerable		Rare					
Year		2022 PE	2012 Biosis (CHS1)	2022 PE	2012 Biosis (CHS2)	2022 PE	2012 Biosis (BGS)	2022 PE	2012 Biosis (CDG)	2022 PE	2012 Biosis (CDG)	2022 PE	2012 Biosis ('CBW')	2022 PE	2012 Biosis (CDS1)	2022 PE	2012 Biosis (CDS2)	2022 PE	2012 Biosis ('CTG')	2022 PE	2012 Biosis (SH)				
Size of Zone (ha)		5.38	5.42	1.93	2.04	0.35	0.09	0.22	0.61	0.38	0.61	0.19	0.14	0.36	0.54	2.22	1.95	0.19	0.14	0.015	0.012				
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score				
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	No Score	n/a	n/a	n/a	n/a	n/a	No Score	n/a	n/a			
	Canopy Cover	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0		n/a	n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a	
	Understorey	25	15	15	10	5	5	5	15	15	5	15	5		5	5	5	5	5		5	5	15	15	
	Lack of Weeds	15	7	7	4	0	7	11	11	11	11	11	7		13	7	7	13	6		6	6	13	7	
	Recruitment	10	3	6	3	6	5	1	6	6	3	6	6		3	5	3	5	6		6	6	5	0	
	Organic Litter	5	5	5	5	5	3	3	5	3	5	3	5		5	5	5	3	5		5	5	5	4	
	Logs	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		0	n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a
	EVC Standardiser	n/a	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	n/a		1.36	1.36	1.36	1.36	1.36		1.36	1.36	1.36	1.36	1.36
	Standardised Score	75	40.9	45.0	30.0	21.8	27.3	27.3	50.5	47.7	32.7	47.7	23.0		35.5	30.0	27.3	35.5	30.0		30.0	30.0	51.8	35.5	
Landscape value	Patch Size	10	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2			
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Distance to Core	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1			
Habitat points		100	43.9	48.0	32.0	24.8	29.3	29.3	52.5	49.7	34.7	49.7	25.0	n/a	37.5	32.0	29.3	37.5	30.0	n/a	53.8	38.5			
Habitat Score (habitat points/100)		0.##	0.44	0.48	0.32	0.25	0.29	0.29	0.52	0.50	0.35	0.50	0.25	n/a	0.37	0.32	0.29	0.37	0.30	n/a	0.54	0.38			
No. of Large Old Trees		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a			
Habitat Hectares, Area x Habitat Score (Hha)		2.36	2.60	0.62	0.51	0.10	0.03	0.12	0.30	0.13	0.30	0.05	n/a	0.13	0.17	0.65	0.73	0.06	n/a	0.008	0.005				

*Please note that the CHS is an average of Habitat Hectare scores for lower quality areas with either low diversity and/or high weed coverage

**Please note that two Zones for CDG were used whereas Biosis used one.

4.12.4 Photos

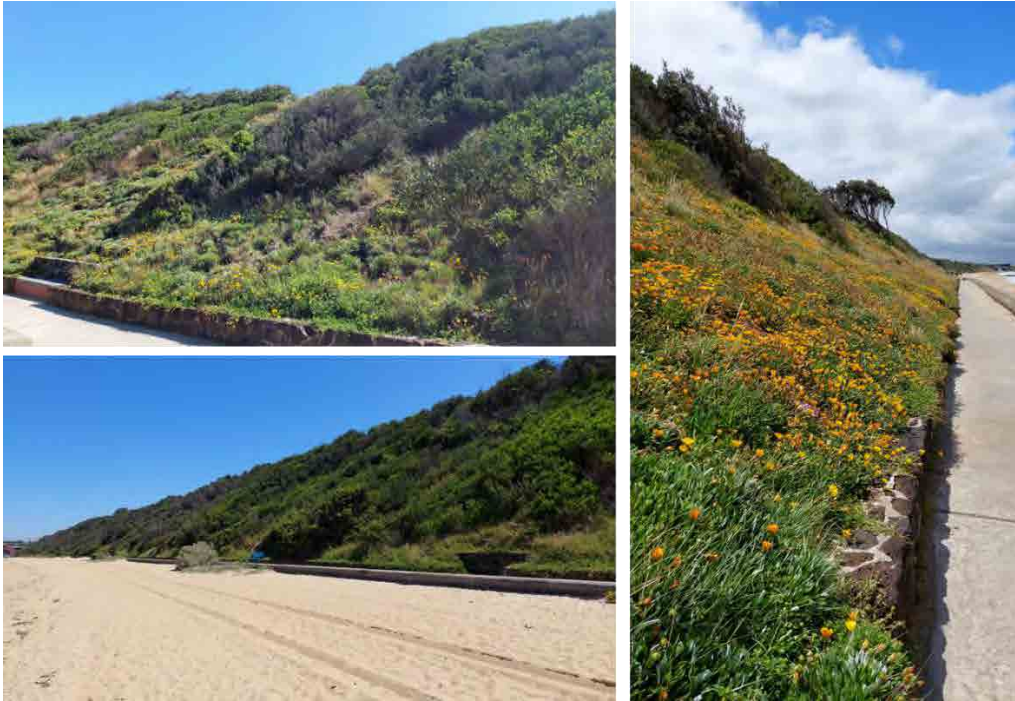


Figure 26. Habitat Zone 1 – EVC 161: Coastal Headland Scrub **left:** Overview images, **right:** showing weedy edge adjacent the promenade with *Gazanias Gazania spp.*



Figure 27. Habitat Zone 2 – Photos showing EVC 161: Coastal Headland Scrub areas with high weed coverage and/or low species and Lifeform diversity.



Figure 28. Habitat Zone 6 – Photos of EVC879: Coastal Dune Grassland within the FNR, with Hairy Spinifex *Spinifex sericeus*. **Left & Middle:** In many areas Hairy Spinifex *Spinifex sericeus* has extended significantly beyond the fence-line and is susceptible to trampling or damage from beach combing. **Right:** *Gazania Gazania spp.* and Seawheat grass *Thinopyrum junceiforme* were weeds within the CDG ecological community.



Figure 29. Habitat Zone 5 – Photos showing an area of high quality EVC879: Coastal Dune Grassland with [REDACTED]. These typically occurred behind the fence line where they are perhaps more protected.



Figure 30.Habitat Zone 5 – Photos showing an area of high quality EVC879: Coastal Dune Grassland with [REDACTED] These typically occurred behind the fence line where they are perhaps more protected.



Figure 31.Habitat Zone 6 – Photos showing EVC2: Coast Banksia Woodland within the FNR.

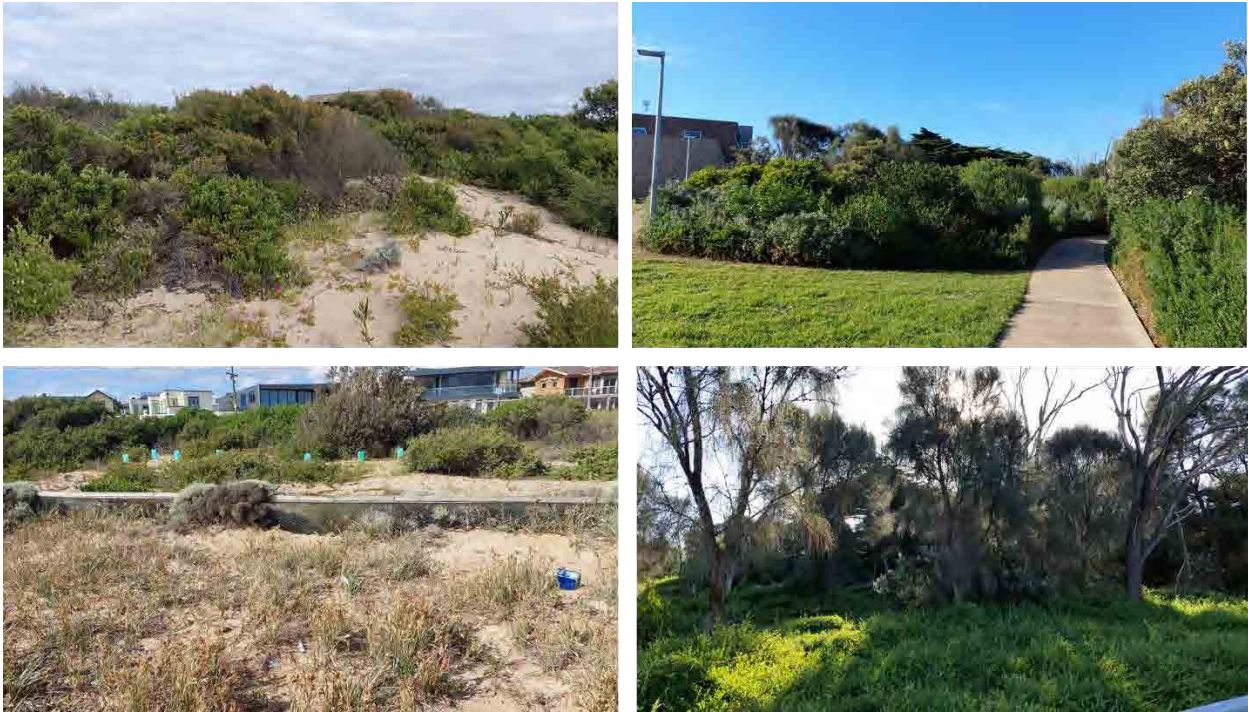


Figure 32. Habitat Zones 7 & 8 – Photos showing **Left:** Zone 7, Open EVC160: Coastal Dune Scrub. The lower picture shows EVC 879: Coastal Dune Grassland in the foreground and **Right:** Zone 8, Closed EVC160: Coastal Dune Scrub. Much of this was landscaped within the Peter Scullin Reserve. The lower image shows an area of Drooping Sheoaks *Allocasuarina verticillata* with a Bower Spinach *Tetragonia implexicoma* ground layer.



Figure 33. Habitat Zone 9 – Photos showing EVC168: Coastal Tussock Grass within the FNR. **Top:** Near Warrigal Rd. **Bottom:** Area of EVC168: Coastal Tussock Grass adjacent a remnant bluff near Parkers St. EVC311: Berm Grassy Scrubland is present in the foreground represented by the Coast Saltbush *Atriplex cinerea*.



Figure 34. Habitat Zone 10 – Photos showing EVC6: Sand Heathland within the FNR. **Top Left:** Overview image of small area to south, **Top Right:** Overview image of small area to south **Middle:** Trap Door Spider *Aganippe winsori*, **Right:** [redacted] not yet in bloom.

4.12.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 44. Potential Threats, Management recommendations for the Foreshore North Reserve.

Issue/Opportunity	Priority*	Comment
Climate Change	3	In the longer term, climate change may impact native vegetation within the reserve and erosion. Further detail is provided in Section 5.1.1.
Dieback/Disease/Phytophthora/Pests	1	There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.
Dogs walked off-lead	2	Dogs were observed throughout the reserve off lead. Dogs pose a number of threats to native vegetation and wildlife (Holderness–Roddam 2011): <ul style="list-style-type: none"> Their presence and scent can cause stress to the local wildlife.

Issue/Opportunity	Priority*	Comment
		<ul style="list-style-type: none"> • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., shorebirds). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>To minimise adverse impacts from dogs off-lead, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Clear, consistent, and prominent signage indicating dog status along the various sections of the Foreshore reserves • Educational signage to explain the threats posed by dogs and cats. • Fencing sensitive areas of vegetation to exclude off-lead dogs from entering. • A high profile and proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in across the foreshore reserves. • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership)
Fences	2	Ensure regular inspection and maintenance of fences. In some areas fences were missing, buried by sand or vegetation has extended beyond and may warrant a reassessment of fences (See also below).
Genetic pollution	2	There are occurrences of Angled Pigface <i>Carpobrotus aequilatus</i> from South Africa throughout the reserve, which can spread vegetatively and by seed, and can hybridise with native species. Hence its removal is recommended.
Inappropriate plantings / encroachment	1	<p>Common Boobialla <i>Myoporum insulare</i></p> <p>Common Boobialla <i>Myoporum insulare</i> has been planted extensively and, in some areas, has out-competed other species creating low-diversity, Common Boobialla <i>Myoporum insulare</i> “thickets”. Consider thinning these out in high priority areas and gradually planting other indigenous species if they do not naturally re-establish.</p> <p>Common Boobialla <i>Myoporum insulare</i> within the Open – Coastal Dune Scrub Zones should be carefully monitored to ensure it is not spreading and out-competing other species and lifeforms in this high-quality EVC nor the adjacent Coast Dune Grassland Zones.</p> <p>Further plantings of Common Boobialla <i>Myoporum insulare</i> should be avoided. It is also recommended to reassess recent plantings of Common Boobialla <i>Myoporum insulare</i> and removing these where they are inappropriate (See also below).</p>

Issue/Opportunity	Priority*	Comment
		<p>General Plantings</p> <p>Where possible, natural regeneration should be encouraged. Where plantings are necessary within existing vegetation, they should be carefully tailored to target aspects of the EVC benchmark that are missing (e.g., lifeform components or rare species).</p> <p>Further plantings of shrubs should ensure that they do not substantially exceed the EVC benchmark coverages. For example, there were instances of common shrub plantings (Coast Tea Tree <i>Leptospermum laevigatum</i>, Coast Wattle <i>Acacia longifolia</i> subsp. <i>sophorae</i>, and Common Boobialla <i>Myoporum insulare</i> within Open-Coastal Dune Scrub vegetation (Zone 7), where the benchmark coverage was already appropriate. This runs the risk of infilling these open gaps between shrubs which provide important opportunities for ground storey species (herbs and grasses) and wildlife foraging.</p> <p>There were some inappropriate plantings within the Sand Heathland area (see below).</p> <p>Coast Wattle <i>Acacia longifolia</i> subsp. <i>sophorae</i></p> <p>Ensure the correct subspecies, <i>Acacia longifolia</i> subsp. <i>sophorae</i> is used and not <i>Acacia longifolia</i> subsp. <i>longifolia</i>.</p> <p>Black Wattle <i>Acacia mearnsii</i></p> <p>There were several young Black Wattle <i>Acacia mearnsii</i> trees present on the plateau, which may have self-seeded from the wider area. While these are not typical of the CHS community, they could have potentially occurred occasionally within it. Intentionally planting of Black Wattle <i>Acacia mearnsii</i> is not recommended.</p>
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. It is highly recommended to consult with a local expert with knowledge of burn practices, as inappropriate fire regimes can result in the degradation of native vegetation in the longer term. Further detail is provided in Section 5.1.2
Missing structural components in Habitat Zones	2	Habitat Zones 3, 5, 6, 7, 8 (CDS, BGS, CBW and CDG Communities) lacked a diverse ground storey such as herbs, grasses, and prostrate shrubs. Habitat Zone 6 (CBW) lacked large trees. This component is not quickly replaced. However, this will be encouraged through protecting existing trees and encouraging natural regeneration.
Sand Heathland recommendations	1-3	<p>Inappropriate plantings of Coast wattle <i>Acacia longifolia</i> subsp. <i>sophorae</i>, Coast Everlasting <i>Ozothamnus turbinatus</i> and Coast Tea-tree <i>Leptospermum laevigatum</i> adjacent the trail, in the vicinity of the smaller, more southern SH area were observed. These are not consistent with SH and could encroach into these important SH areas and should be removed.</p> <p>Continued monitoring of adjacent vegetation is recommended to ensure it does not encroach into the SH Zones.</p> <p>As recommended by Biosis (2012c), the area between Naples Rd and Mentone Parade, on the top plateau, could be gradually restored to Sand Heathland over many years by:</p> <p>(a) Gradual removal of coastal species not indigenous to the EVC6: Sand Heathland</p> <p>(b) Facilitation of natural regeneration of existing heathland species</p>

Issue/Opportunity	Priority*	Comment
		(c) Weed management (d) Site reintroduction of site-extinct heathland species.
Walking tracks through vegetation/trampling	1	<p>Much of the CDG now extends beyond the existing fence line where it is susceptible to trampling and disturbance (e.g., from beach grooming). Consider fencing high quality area or areas where establishment of more sensitive species is desired.</p> <p>There was evidence, particularly along the southern half of the FNR, of beach grooming. Where this is adjacent coastal vegetation, it likely prevents the establishment and expansion of vegetation.</p>
Weed threats or invasion	1	<p>High threat weed species included: Blackberry <i>Rubus fruticosus spp. agg.</i>, Flax-leaf Broom <i>Genista linifolia</i>, Sea Wheat Grass <i>Thinopyrum junceiforme</i>, Marram Grass <i>Calamagrostis arenaria</i>, Mirror Bush <i>Coprosma repens</i>, Gazania <i>Gazania spp.</i> and Panic Veldt <i>Ehrharta erecta</i>. The Panic Veldt <i>Ehrharta erecta</i> coverage has likely been exacerbated by the higher than usual rainfall in the months prior to surveying. This suite of species and their control methods are likely familiar to Kingston staff and will require continued management over several years to control and prevent their further spread.</p> <p>There are some quite extensive open slope areas dominated by Gazania <i>Gazania spp.</i>. These could be gradually replaced either by spraying and planting with indigenous species or possibly by planting species such as Bower Spinach <i>Tetragonia implexicoma</i> and Seaberry Saltbush <i>Rhagodia candolleana subsp. candolleana</i> amongst it, which could outcompete and suppress Gazania <i>Gazania spp.</i> growth.</p> <p>In regards to the site non-indigenous Honey-myrtles <i>Melaleucas</i>, their containment and gradual replacement with indigenous species upon senescence, is recommended.</p> <p>In regards to Coast Saltbush <i>Atriplex cinerea</i> growing outside its natural range, the following is recommended:</p> <ul style="list-style-type: none"> • Cut and paint juvenile plants to prevent their spread. • Replace with indigenous species as they senesce • In high priority areas, their removal may be appropriate. Where they occur in dense plantings with an absence of nearby vegetation, removal should be planned in stages over several years.
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

4.13 Foreshore South Reserve (Site #13)

4.13.1 Existing Ecological Conditions

Map 13 in Appendix 2 gives an overview of vegetation extent, type and EVCs present across the Foreshore South Reserve (FSR). Appendix 3 details the flora species observed.

Six Habitat Zones were mapped across the FSR, representing four EVCs. Each of these is briefly described in turn below. These EVCs commonly occurred in patches amongst areas of non-native vegetation. There were some long stretches of the foreshore that consisted solely of exotic and weedy vegetation, such as the ~ 600 m long stretch between Hearle Ave to Kiandra Cl. Dominant weed species included Marram Grass *Calamagrostis arenaria*, Gazania *Gazania spp.*, Sea Wheat-grass *Thinopyrum junceiforme*, Hare's Tail Grass *Lagurus ovatus* as well as a range of succulent garden escapees. Also mapped are several areas of 'Revegetation', typically adjacent areas of infrastructure renewal projects. Several constructed swales were also observed along the FSR, many very recently planted, and are mapped as 'Swale Plantings'. The species planted varied between swales, but typically involve Knobby Club-sedge *Ficinia nodosa* as the dominant species within the swale itself.

It is understood that the FSR's vegetation has historically undergone extensive modification as a result of clearing, weed invasion, and development. As discussed by Biosis (2012d), the foreshore was reportedly largely bare some 30 years ago, apart from scattered patches of wattle *Acacia spp.*. Historically Berm Grassy Shrubland and Coastal Dune Grassland would have occurred on the primary dunes and graded into Coastal Dune Scrub and Coast Banksia Woodland further back on the fore and hind dunes. In the absence of fire, Coastal Dune Scrub can develop into Coast Banksia Woodland with an overstorey dominated by Coast Banksia *Banksia integrifolia subsp. integrifolia* with an understorey of more fire-retardant species such as Bower Spinach *Tetragonia implexicoma* and Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*. This may then revert back to CDG or CDS upon fire. Pre-European settlement, the Kingston foreshore supported extensive Coast Banksia Woodland with large Banksia Trees.

Berm Grassy Shrubland (Habitat Zone 1) and Coastal Dune Grassland (Habitat Zone 4)

Both communities were mapped along the beach. EVC 311: Berm Grassy Shrubland (BGS) featured Saltbush *Atriplex cinerea* with the occasional Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*, while and EVC 879: Coastal Dune Grassland (CDG) by Hairy Spinifex *Spinifex sericeus*.

Please note that patches of Coast Saltbush *Atriplex cinerea* were only considered as the Berm Grassy Shrubland EVC when they were located on or near the beachfront. Those set further back, where considered outside of their natural distribution and treated as a weed. A similar approach was taken by Biosis (2012d).

Key weed species observed alongside the CDG and BGS communities were Gazania *Gazania spp.*, Sea-wheat Grass *Thinopyrum junceiforme*, Marram Grass *Calamagrostis arenaria*, Rye-grass *Lolium spp.*, and Sow Thistles *Sonchus spp.*

Several occurrences of Sea Spurge *Euphorbia paralias* were observed and are noted on the mapping, and should be eliminated and the areas monitored for further germination of this serious coastal weed.

Coast Banksia Woodland (Habitat Zones 5 & 6)

Areas of EVC 2: Coast Banksia Woodland (CBW) included:

- Smaller groups of Coast Banksia *Banksia integrifolia subsp. integrifolia* Trees that were otherwise surrounded by Coastal Dune Scrub Vegetation
- Areas of more extensive CBW south of Monica Ave
- Some landscaped areas within the Victory Park Playground.

Two Zones of CBW were mapped:

- Zone 5 represents a lower quality CBW community, typically consisting of higher weed coverage, and a lack of ground and understorey cover. In many cases the weeds formed a thick carpet preventing natural regeneration. Key weeds included Buffalo Grass *Stenotaphrum secundatum*, Mirror Bush *Coprosma repens*, Galenia *Aizoon pubescens*, Panic Veldt *Ehrharta erecta*, Karo *Pittosporum crassifolium* and exotic succulents.
- Zone 6 represents a higher quality CBW community. It typically had lower weed coverage and higher understorey and ground storey diversity. The understorey often featured Seaberry Saltbush *Rhagodia candolleana subsp. candolleana* and Bower Spinach *Tetragonia implexicoma* but also included less common species such as [REDACTED] *Leucophyta brownii*, Sea Box *Alyxia buxifolia*, Coast Pomaderris *Pomaderris paniculosa subsp. paralia*, Coast Wattle *Acacia longifolia subsp. sophorae*, and Coast Beard-Heath *Leucopogon parviflorus*.

As discussed in more detail in Section 4.13.5, several Coast Banksias *Banksia integrifolia subsp. integrifolia* had senesced or were in poor health. Many also appeared to have been felled in the past with multiple stems originating from a much larger base. Hence while these did not meet the definition of a Large Tree based on their diameter at breast height, they may be quite old. Further, several Large Coast Banksia *Banksia integrifolia subsp. integrifolia* Trees and Stags were observed and are noted on Map 13. As discussed at Section 4.13.5, these Large Banksias as well as other mature specimens, should be protected and managed to encourage natural regeneration. Seeds could also be collected for planting elsewhere along the foreshore.

Coastal Dune Scrub (Zones 2 & 3)

Patches of Coastal Dune Scrub (CDS), some small and others more extensive, are scattered across the foreshore amongst weed and exotic species. These were dominated by Coast Tea Tree *Leptospermum laevigatum*, Coast Wattle *Acacia longifolia subsp. sophorae*, and Coast Everlasting *Ozothamnus turbinatus*. There were also occasional patches of Coast Beard-Heath *Leucopogon parviflorus*. Other species included Cushion Bush *Leucophyta brownii*, White Correa *Correa alba*, Common Boobialla *Myoporum insulare*, Coast Pomaderris *Pomaderris paniculosa subsp. paralia* and Seaberry Saltbush *Rhagodia candolleana subsp. candolleana*. Two CDS Zones were defined:

- Zone 2 – This was typically a closed version of EVC 160: Coastal Dune Scrub (CDS) with lower diversity of ground storey species, although Bower spinach *Tetragonia implexicoma* was common, and typically had a higher weed coverage.

- Zone 3 – This was typically a more open version of EVC 160: Coastal Dune Scrub along the front with low weed coverage and higher diversity of ground storey species within the spaces between shrubs such as Rounded Noon Flower *Disphyma crassifolium subsp. clavellatum*, Karkalla *Carpobrotus rossii*, Knobby Club-sedge *Ficinia nodosa*; this often graded into EVC 879: Coastal Dune Grassland.

Common weeds included Marram Grass *Calamagrostis arenaria*, Sea Wheat Grass *Thinopyrum junceiforme*, Panic Veldt-grass *Ehrharta erecta*, Galenia *Aizoon pubescens*, Cape Ivy *Delairea odorata*, Sow Thistle *Sonchus spp.*, Hare's Tail Grass *Lagurus ovatus*, and exotic succulents.

4.13.2 Listed or Notable Species Observed

No State or Federally listed flora species were observed within the reserve aside from [REDACTED] that is likely to have been established from historical plantings, [REDACTED]

However, two other species of note, also identified within Map 13 in Appendix 2, include:

- Patches of Coastal Beard-heath, that are less often observed along the Foreshore
- Several Large Coast Banksia *Banksia integrifolia subsp. integrifolia* Trees and Stags. Of note is a very large living Banksia near The Glade, that is likely a remnant of original Coast Banksia Woodland. As discussed at Section 4.13.5 this and the other Large Banksias should be protected and managed to encourage natural regeneration. Seed could also be collected for planting elsewhere along the foreshore. Some regeneration appeared to have occurred in some areas, although the often-high weed coverage likely inhibits this.

4.13.3 Habitat Hectare Assessments

As discussed above, the FSR was categorised into six Habitat Zones for the purpose of completing Habitat Hectares assessments. Due to the large area and number of vegetation patches in this Foreshore Reserve, it was not practical to calculate the Habitat Hectares score of each individual mapped patch of native vegetation. Hence, as was done by Biosis (2012d), disjunct vegetation patches were grouped together as the same Habitat Zones based upon EVC and quality classes, and a generalised Habitat Hectares score assigned.

Table 45 gives an overview of the Habitat Hectare results for the FSR, while Table 46 gives a breakdown of the scoring for each of the Habitat Zones. Overall, the total Habitat Hectares area more than doubled compared to the 2012 Biosis report. This was due to a 50% increase in the total area of mapped native vegetation (8.3 to 13.2) combined with overall increased Habitat Hectare scores for each EVC. Similarly, the area of vegetation and Habitat Hectares area of each individual EVC increased between the 2012 and 2022 assessments. The area of CDG and CDS showed the largest increase in area, 1.3 to 2.2 ha, and 6.1 to 9.4 ha, respectively, while the area of CBW increased only slightly from 0.9 to 1.1 ha. This increase is attributed to:

- expansion of CHS into areas previously dominated by weeds.
- weed management and revegetation works, a credit to the reserve management.

The overall area of the Southern Foreshore is ~ 34 ha, with only 13.2 ha of this mapped as patches of native vegetation. Hence there is considerable scope to increase the area of native vegetation through restoration of

these areas (weed control, natural regeneration, or revegetation where this is not possible). This would also have the benefit of improved connectivity, including with the Seaford Foreshore Reserve.

As discussed in Section 4.13.1 two zones of each CDS (Zone 2 and 3) and CBW (Zone 5 and 6) were defined. In the case of CDS, Zone 3 represented a higher quality with a Habitat Hectare score of 49.7 compared to a score of 30.6 for Zone 2. The higher score for Zone 3 is due to higher Recruitment and Understorey components. Zone 3 also typically had lower weed coverage than Zone 2, however this is not reflected in the Habitat Hectares scores, as both zones fell into the Lack of Weeds, 5–25% category. With further management, it should be possible to enhance Zone 2 patches to that of Zone 3.

Table 45. Summary of habitat hectares results for Foreshore South Reserve (Please note that the Biosis Figures include those from Biosis Report Phase 4 and Biosis Report Phase 2 – Bonbeach Foreshore)

EVC	Habitat Zones	Total Area (ha)		Total Habitat Hectares	
		2022	2012	2022	2012
2: Coastal Banksia Woodland	5 & 6	1.13	0.88	0.30	0.22
160: Coastal Dune Scrub	2 & 3	9.4	6.13	2.96	1.65
311: Berm Grassy Shrubland	1	0.17	0.06	0.06	0.02
879: Coastal Dune Grassland	4	2.18	1.25	0.73	0.10
Revegetation/Swale Plantings	n/a	0.36	0	n/a	n/a
Total (including Revegetation/Swale Plantings)		13.24	8.32	4.05	2.00
Total (excluding Revegetation/Swale Plantings)		12.88	8.32	4.05	2.00

In the case of CBW, Zone 6 represented a higher quality with a Habitat Hectares score of 43 compared to a score of 14 for Zone 5. The higher score for Zone 6 is largely due to higher Recruitment, Lack of Weeds, and Understorey components. As evident by the higher quality of Zone 6 there is considerable scope to improve the quality of the valuable Zone 5 Coastal Banksia Woodland patches across the foreshore. This is discussed further under threats and management section.

Table 46. Habitat Hectares scoring for Foreshore South Reserve. (Please note that in the 2012 Biosis reporting, the Bonbeach Foreshore area was assessed separately in its Stage 2 Report, while the rest of the FSR was assessed in its Stage 4 Report. Hence the Biosis Scores presented in this table are annotated with Bonbeach or FSR, respectively, to indicate which report and area they refer to. They have been aligned as best as possible for comparison to this present report’s 2022 assessment.)

Habitat Zone			1		2*			3*		4			5*		6*			
Bioregion			GipP		GipP			GipP		GipP			GipP		GipP			
EVC Name (Initials)			BGS		CDS			CDS – OPEN/HQ		CDG			CBW – LQ		CBW – HQ			
EVC Number			311		160			160		879			2		2			
EVC Conservation Status			Endangered		Depleted			Depleted		Depleted			Vulnerable		Vulnerable			
			2022 PE	2012 Biosis Zone 2 FSR	2022 PE	2012 Biosis Zone 4 FSR	2012 Biosis Zone 2 Bonbeach	2022 PE	2012 Biosis	2022 PE	2012 Biosis Zone 3 FSR	2012 Biosis Zone 1 Bonbeach	2022 PE	2012 Biosis Zone 5 FSR	2022 PE	2012 Biosis Zone 3 Bonbeach		
Size of Zone (ha)			0.17	0.06	8.97	4.89	1.24	0.43	n/a	2.18	0.87	0.38	0.64	0.31	0.49	0.57		
		Max Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score		
Site Condition	Large Old Trees	10	n/a	n/a	n/a	n/a	na	n/a	n/a	n/a	n/a	n/a	2	0	3	3		
	Canopy Cover	5	n/a	n/a	n/a	n/a	na	n/a		n/a	n/a	n/a	n/a	0	0	2	0	
	Understorey	25	5	5	5	5	5	15		5	5	5	5	5	5	15	5	
	Lack of Weeds	15	7	4	7	7	7	7		7	7	7	11	0	7	7	7	
	Recruitment	10	10	5	6	3	3	10		6	6	6	1	3	0	6	6	
	Organic Litter	5	3	5	3	3	3	3		5	3	3	0	2	3	3	3	
	Logs	5	n/a	n/a	n/a	n/a	na	n/a		n/a	n/a	n/a	n/a	n/a	0	0	5	2
	EVC Standardiser	n/a	1.36	1.36	1.36	1.36	1.36	1.36		1.36	1.36	1.36	1.36	1.36	n/a	n/a	n/a	n/a
	Standardised Score	75	34.1	25.9	28.6	24.5	24.5	47.7		31.4	28.6	23.2	12.0	15.0	41.0	26.0		
Landscape value	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Distance to Core**	5	1	1	1	1	3	1	1	1	3	1	1	1	1	3		
Habitat points		100	36.1	27.9	30.6	26.5	28.5	49.7	n/a	33.4	30.6	27.2	14.0	17.0	43.0	30.0		
Habitat Score (habitat points/100)		0.##	0.36	0.28	0.31	0.27	0.29	0.50	n/a	0.33	0.31	0.27	0.14	0.17	0.43	0.30		
No. of Large Old Trees			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	0	3	2		
Habitat Hectares, Area x Habitat Score (Hha)			0.06	0.02	2.75	1.30	0.35	0.21	n/a	0.73	0.27	0.10	0.09	0.05	0.21	0.17		

*Please note that two Zones were used for CDS and CBW whereas Biosis used one.

** Please note that a small section of shoreline south of Patterson River is within 1 km of the Seaford Foreshore Reserve and would therefore score 3 for this Landscape Factor. However, a value of 1 was assumed as as everything north of Patterson River was > 1 km and < 5km from either Braeside Park or Seaford Foreshore Reserve.

4.13.4 Photos



Figure 35. A small patch of Habitat Zone 1 – EVC311: Berm Grassy Shrubland with Coastal Saltbush *Atriplex cinerea* on the beach. This photo is also an example of a lengthy Foreshore area dominated by weeds.



Figure 36. Habitat Zone 2 – Lower quality EVC160: Coastal Dune Scrub: **Left:** These patches often featured Coast Wattle *Acacia longifolia subsp. sophorae* and Coast Tea-tree *Leptospermum laevigatum* and surrounded by areas of weed; Marram grass *Calamagrostis arenaria* is evident in the foreground, **Right:** A Less common patch of by Coast Beard-heath *Leucopogon parviflorus*.



Figure 37. Habitat Zone 3– Higher quality EVC160: Coastal Dune Scrub: **Left** near Kara Grove **Right** Near Monica Avenue



Figure 38. Habitat Zone 4 – EVC879: Coastal Dune Grassland: **Top** Hairy Spinifex *Spinifex sericeus* and often had low weed coverage (5–10%), **Bottom** Less common amongst the **[REDACTED]** **[REDACTED]** Hairy Spinifex *Spinifex sericeus*.



Figure 39. Zone 5 – Lower quality EVC2: Coast Banksia Woodland. This often had a high weed coverage – *Galenia Aizoon pubescens*, Buffalo Grass *Stenotaphrum secundatum* and exotic succulents are evident in these photos.



Figure 40. Zone 6 – Higher quality EVC2: Coast Banksia Woodland: **Top, Bottom left** near Monica Ave, **Bottom right:** A large remnant Coast Banksia *Banksia integrifolia subsp. integrifolia* of high conservation value.



Figure 41. Examples of erosion: **Top:** near Mordialloc Ck, Some Hairy Spinifex *Spinifex sericeus* has established along the very edge of the sandbag wall, **Bottom:** Near Foy Ave, Marram Grass *Calamagrostis arenaria*

4.13.5 Management Issues and Opportunities

The table below outlines the key threats and management recommendations in relation to them.

Table 47. Potential Threats, Management recommendations for the Foreshore North Reserve.

Issue/Opportunity	Priority*	Comment
Beach grooming	2	<p>There was evidence along much of the FSR of mechanical beach grooming. Beach grooming can have several negative ecological impacts such as (Defeo <i>et al.</i> 2009; Hyndes <i>et al.</i> 2022):</p> <ul style="list-style-type: none"> – preventing the establishment and expansion of vegetation. This can also increase dune susceptibility to erosion, – reducing the abundance, richness, and biomass of many invertebrate species which depend upon sea wrack/organic matter, and in turn provide food for shorebirds. – disrupting fauna using the foreshore <p>The frequency, timing, and location of beach grooming may warrant reassessment and expert advice, to minimise the above potential impacts.</p>
Climate Change	3	<p>In the longer term, climate change may impact native vegetation within the reserve and increase erosion due to higher sea levels and more frequent storm surges. Further detail is provided in Section 5.1.1.</p>

Issue/Opportunity	Priority*	Comment
Coast Banksia Woodland	2	<p>As discussed by Biosis, CBW previously occurred extensively on the Kingston foreshore south of Mordialloc Creek. Hence further protection, restoration and revegetation of Coast Banksia Woodland is recommended. As discussed by Biosis this involves:</p> <ul style="list-style-type: none"> - <i>site re-introductions of Coast Banksia Banksia integrifolia subsp. integrifolia of local provenance</i> - <i>facilitation of natural recruitment from existing Coast Banksia Banksia integrifolia subsp. integrifolia</i> - <i>intensive weed management of developing stands of woodland.</i> <p>As mentioned below, taller vegetation such as stands of Banksia could be strategically placed where possible to frame view lines, to discourage tree vandalism.</p> <p>Six Large Coast Banksia <i>Banksia integrifolia subsp. integrifolia</i> Trees including one Stag are present along the FSR. Of note is a very large living Banksia near The Glade, that is likely a remnant of original Coast Banksia Woodland. These should be protected and managed to encourage natural regeneration. Seed stock could also be collected for planting elsewhere along the foreshore.</p>
Connectivity and Fragmentation	3	<p>As discussed above, there are large stretches of non-native vegetation that prevents the formation of a continuous corridor along the FSR. With ongoing, long-term weed and restoration works, a long continuous corridor and connectivity to Seaford Foreshore Reserve is achievable. This would also require careful placement of accessways and infrastructure renewal projects to ensure some vegetation connectivity through them.</p>
Dieback/ Disease/Phytophthora/Pests	1	<p>Coast Banksia <i>Banksia integrifolia subsp. integrifolia</i> Dieback</p> <p>Dieback of some of the Coast Banksia <i>Banksia integrifolia subsp. integrifolia</i> has occurred on the FSR. It is unclear if this is a result of tree vandalism and/or disease such as by the <i>Native longicorn beetle larvae</i>, as observed in the 2018 report for Grooves reserve and on the Seaford foreshore (Biosis 2018).</p> <p>A tree health audit and annual monitoring of Coast Banksias <i>Banksia integrifolia subsp. integrifolia</i>, particularly older, more established specimens may be warranted to understand the cause of decline/senescence and protect these valuable trees, including from vandalism.</p> <p>Phytophthora</p> <p>There was no clear evidence of Phytophthora in the reserve. However, it has the potential for introduction, especially via visitors coming from affected areas on the Mornington Peninsula, or through contaminated machinery or materials brought onsite. Studies have shown that heathlands, coastal woodlands, and dry Eucalypt forests are most at risk from Phytophthora. Hence good hygiene measures should be implemented to reduce the potential for its introduction. It is important to ensure that footwear, tools, and vehicles are always clean on arrival and departure, to source pathogen-free material and plant stock, and ensure paths are well-defined with signage to encourage users to stay on paths. Periodic monitoring is also recommended with test kits commercially available.</p>
Dogs walked off-lead	2	<p>Dogs were observed throughout the reserve off lead.</p> <p>Dogs pose a number of threats to native vegetation and wildlife (Holderness-Roddam 2011):</p>

Issue/Opportunity	Priority*	Comment
		<ul style="list-style-type: none"> • Their presence and scent can cause stress to the local wildlife. • Their droppings act as a fertilizer for weeds, encouraging weed growth over indigenous vegetation. • Their fur can attract seed of exotic plant species which is then spread into other areas. • They can kill wildlife (e.g., shorebirds). While cats are known to be opportunist hunters, recent studies have shown that dogs are also highly problematic to native species. <p>To minimise adverse impacts from dogs off-lead, consideration of the following is recommended:</p> <ul style="list-style-type: none"> • Clear, consistent, and prominent signage indicating dog status along the various sections of the Foreshore reserves • Educational signage to explain the threats posed by dogs and cats. • Fencing sensitive areas of vegetation to exclude off-lead dogs from entering. • A high profile and proactive approach to community education, monitoring, and enforcement to ensure responsible dog/pet ownership in across the foreshore reserves. • Established dedicated dog-off-lead areas outside of bushland reserves • Updating the interactive mapping on the council website to indicate No dogs allowed and dog on-lead areas as well as dogs off-lead areas as it currently does (https://www.kingston.vic.gov.au/council/local-laws/pets/dog-ownership)
Erosion	3	<p>There was evidence of erosion along parts of the FSR to varying degrees. In some cases, such as sandbagging directly south of Mordialloc Ck, this is likely due to changed coastal processes due to infrastructure. Climate change is also likely a key driver.</p> <p>Fencing to protect areas of erosion is recommended as well as educational signage.</p> <p>In regards to vegetation management, the exotic Marram Grass <i>Calamagrostis arenaria</i> that is abundant across the FSR, can also encourage erosion. Its deeper root system compared to native species and propensity to trap sand can lead to steeper dune profiles that are more susceptible to undercutting. Hence the gradual removal of Marram Grass <i>Calamagrostis arenaria</i> and replacement with native species such as Hairy Spinifex <i>Spinifex sericeus</i> may reduce erosion.</p>
Fences	2	Ensure regular inspection and maintenance of fences. In many areas fences were either missing or buried by sand, or vegetation has extended beyond them and may warrant a reassessment of fences (See also below).
Genetic pollution	2	There are occurrences of Angled Pigface <i>Carpobrotus aequilatus</i> from South Africa throughout the reserve, which can spread vegetatively and by seed, and can hybridise with native species. Hence its removal is recommended.
Inappropriate plantings / encroachment	2	<p>General Plantings</p> <p>Where possible, natural regeneration should be encouraged. Where plantings are necessary within existing vegetation, they should be carefully tailored to</p>

Issue/Opportunity	Priority*	Comment
		<p>target aspects of the EVC benchmark that are missing (e.g., lifeform components or rare species).</p> <p>Coast Wattle <i>Acacia longifolia subsp. sophorae</i></p> <p>Ensure the correct subspecies, <i>Acacia longifolia subsp. sophorae</i> is used and not <i>Acacia longifolia subsp. longifolia</i>.</p>
Lack of ecological burning/ inappropriate fire regime	2	Assessing the desired frequency of further prescribed burns within this reserve was outside of the scope of this assessment. Further detail is provided in Section 5.1.2
Missing structural components in Habitat Zones	2	<p>Zones 1 (BGS), 2 (CDS), 4 (CDG), 5(CBW) lacked a diverse ground storey such as herbs, grasses, and prostrate shrubs. In some cases, such as Zones 1 and 5, there was also often a lack of middle storey species.</p> <p>Zones 5 and 6 (CBW) lacked canopy and large trees. This component is not quickly replaced. However, this will be encouraged through protecting existing trees and encouraging natural regeneration.</p>
Stormwater outflow and runoff or hydrology	3	<p>Drains</p> <p>Drains were observed discharging directly into the FSR. These were often local hot spots for weeds and sand erosion.</p> <p>Swales</p> <p>Several large constructed swales were observed along the FSR to treat storm water. A consistent planting approach in line with Foreshore EVCs is recommended as well as resources for their ongoing maintenance. Some of the more established swales were weedy with Marram Grass <i>Calamagrostis arenaria</i>. The Swale creates conditions not typical of the foreshore because plants within the depression need to withstand periods of inundation and dry. Hence species planted within the depression should be carefully chosen from the local EVCs to tolerate these conditions yet still provide foreshore habitat (e.g., <i>Ficinia nodosa</i>, <i>Poa poiformis</i>, <i>Juncus Pallidus</i>).</p>
Tree vandalism/illegal pruning	1	<p>Vegetation vandalism such as pruning of shrubs and tree removal to achieve view lines was evident along the FSR. Large Council signs alerting to recent vandalism were observed in several areas. Continuation of this practice is recommended as a deterrent, as well as exploration of other opportunities to support this such as education around zero tolerance for tree vandalism, local stewardship, and prosecutions.</p> <p>For revegetation works, particularly of Coast Banksia Woodland, the Taller trees could be strategically placed in stands that frame view lines, discouraging their removal. There is an example of this in relation to CDS north of Kara Grove. Revegetation works could also priorities high value areas and/or areas where there is community buy in and stewardship.</p>
Walking tracks through vegetation/trampling	1	<p>Ad-hoc paths</p> <p>There were numerous ad hoc paths leading from private properties through the FSR vegetation to the beach. These encourage spread of weeds, trampling of vegetation, and erosion. It is recommended that these paths are consolidated into formal shared tracks and adjacent vegetation protected. This could be implemented in conjunction with weed and revegetation works.</p> <p>Protection of CDG</p> <p>Much of the CDG is not protected by fence line, making it susceptible to trampling and disturbance (e.g., from beach grooming). Consider fencing</p>

Issue/Opportunity	Priority*	Comment
		<p>high quality area or areas where establishment of more sensitive species is desired.</p> <p>There was evidence along much of the FSR of beach grooming. Where this is adjacent coastal vegetation, it likely prevents the establishment and expansion of vegetation.</p>
Weed threats or invasion	1-3	<p>There are extensive areas (over half of the FSR) that are dominated by <i>Gazania Gazania spp.</i>, Marram Grass <i>Calamagrostis arenaria</i>, Sea Wheat-Grass <i>Thinopyrum junceiforme</i>, Galenia <i>Aizoon pubescens</i>, Buffalo Grass <i>Stenotaphrum secundatum</i>, Panic Veldt <i>Ehrharta erecta</i>, Cape Ivy <i>Delairea odorata</i>, exotic succulents and other weeds. A long-term aim should be to gradually restore these areas through weed control, natural regeneration and revegetation, to achieve a linear, well connected foreshore reserve similar to Seaford Foreshore Reserve. Revegetation works could also priorities high value areas and/or areas where there is community buy in and stewardship, which may minimise tree vandalism.</p> <p>As noted on Map 13, there are also several localised/discrete patches of high-risk weeds such as Myrtle Leaf-milkwort <i>Polygala myrtifolia</i>, Sea Spurge <i>Euphorbia paralias</i>, Cape Ivy <i>Delairea odorata</i>, African Box-thorn <i>Lycium ferocissimum</i>, Maidenhair Creeper <i>Muehlenbeckia complexa</i>, Indian Hawthorn <i>Rhaphiolepis indica</i>, Madeira Vine <i>Anredera cordifolia</i>, Ground Asparagus Fern <i>Asparagus scandens</i>. Management of these invasive weeds is highly recommended to avoid their further spread.</p> <p>In regards to the one site non-indigenous Honey-myrtle <i>Melaleuca</i>, its containment and gradually replacement with indigenous species upon senescence, is recommended.</p> <p>Otherwise, focused weed management directed to high priority areas is recommended.</p> <p>In regards to Coast Saltbush <i>Atriplex cinerea</i> growing outside its natural range, the following is recommended:</p> <ul style="list-style-type: none"> • Cut and paint juvenile plants to prevent their spread. • Replace with indigenous species as they senesce • In high priority areas, their removal may be appropriate. Where they occur in dense plantings with an absence of nearby vegetation, removal should be planned in stages over several years. <p>Garden Escapees</p> <p>Many of the exotic daisies and succulents likely originated as garden escapees, with similar species on occasion planted by residents within the FSR adjacent properties. Consider developing/promoting a program to encourage adjacent residents to plant indigenous species and to avoid high risk coastal weeds.</p>
Rabbits/Hares/Foxes	3	<p>The occasional burrow was noted. Pest animals should be monitored to ensure they are not impacting upon the ecological values of the reserve.</p>
* 1 – High/Short-term, 2 – Moderate/Medium-term and 3 – Low/Long-term		

5. Conclusions and Recommendations

As highlighted in Section 3 and Section 4 above, a total of 20 EVCs were recorded across the 13 Bushland and Foreshore Reserves assessed as part of this study. This includes EVCs that have a Bioregional Conservation Significance within the Gippsland Plain Bioregion ranging from Least Concern through to Endangered. With the inclusion of native vegetation established within the reserves through previous revegetation efforts, such as wetland vegetation within Kingston Heath Reserve, the area of native vegetation recorded as part of this study totalled 44.4 ha, representing 57% of the total assessment areas covered by this study.

With consideration given to whether or not the native vegetation and the EVCs identified within each reserve was representative of an EPBC Act or FFG Act listed community, this study also found that the native vegetation within Epsom Grassland is representative of such communities. This includes the EPBC Act listed communities, *Natural Damp Grassland of the Victorian Coastal Plains* and *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains*. It also includes the FFG Act listed community, Herb-rich Plains Grassy Wetland (West Gippsland).

A number of listed and notable flora species were also throughout the reserves. Of particular note is the presence of FFG Act listed [REDACTED] within [REDACTED]. A range of Protected Flora species listed under the FFG Act were also recorded across the reserves, along with a range of notable locally indigenous species. While the presence of other FFG Act listed species including [REDACTED] is also noteworthy, such species are in effect “weeds” within the reserves given their natural occurrence in eastern Victoria.

Given the urban nature of the Bushland and Foreshore Reserves assessed, the site assessments completed identified a range of management issues and opportunities. These are summarised for each reserve individually throughout Section 4 and aim to ensure that the ecological values observed are appropriately managed moving forward. Provided below is a summary of the management these issues and opportunities identified, with generalised management recommendations for the Bushland and Foreshore Reserves based on these recommendations also provided. This is provided in addition to a review of options as they relate to future monitoring within the Bushland and Foreshore Reserves in Section 5.2.

5.1 Overview of Key Issues and Opportunities

Table 48 below summarises the management issues/opportunities identified for each Bushland and Foreshore Reserve as presented throughout Section 4. Several of the management issues/opportunities identified across the reserves are relatively common for sites containing native vegetation or “bushland” in an urban context. These include a range of issues related to connectivity and fragmentation, mowing regimes, dogs walked off lead, weed threats and vegetation trampling. Historical plantings of non-indigenous plants, and the proliferation and encroachment of such specimens on native vegetation are also noteworthy in the context of the Kingston municipality in particular.

As shown, these issues/opportunities have also been prioritised for each reserve to provide Council with some general guidance on the need to undertake management intervention in the short (e.g., 1–3 years), medium (e.g., 4–10 years) or longer (10+ years) term. These relate to high, moderate, and lower priority management issues respectively. General recommendations with regard to each of the issues /opportunities is also provided below, noting that specific information for each reserve is included within Section 4.

Table 48. Threats and management issues across the reserves.

Issue/Opportunity	Reserve and Issue/Opportunity Priority Ranking*												
	BHP	BBR	CWR	EG	GR	HP	KHR	MCR	PE	RWR	TGHR	FNR	FSR
Beach grooming/cleaning													2
Climate Change	3	3	3	3	3	3	3	3	3	3	3	3	3
Coast Banksia Woodland													2
Connectivity and Fragmentation			3					3	2	3	3		3
Dieback/ Disease/Phytophthora/Pests	1	1	1	1	1	1	1	1	1	1	1	1	1
Dogs walked off-lead	2	2	2	2	2	2	1	2	2	2	2	2	2
Erosion													3
Fences												2	2
Genetic pollution						1		1			1	2	2
Inappropriate plantings / encroachment		3					2					1	2
Infrastructure upgrades				1	1								
Ecological burning / inappropriate fire regime	2	2	2	2	2	2	2		2	2	2	2	2
Missing structural components in Habitat Zones	3		3		2	2		2	2	2		2	2
Mowing regime & Spread of weeds from mowing/slashing	2			1		2			2				
Non-indigenous revegetation	2	3										2	
Rabbits/Foxes		2					2			2	3		3
Removal of logs					2								
Rubbish dumping					3								
Sand Heathland recommendations												1-3*	
Stockpiling of materials							2						
Stormwater outflow and runoff or hydrology			2								2		3
Tree vandalism/illegal pruning													1
Unmaintained nest boxes										2			
Walking/bike tracks through vegetation/trampling	1						2				3	1	1
Weed threats or invasion	1	1	1	1	1	1	1	1	1	1	1	1	1-3
Management Priority*	*Where a range is given it indicates that there are multiple actions – some of higher importance while others longer term												
	1 - High/Short-term					2 - Moderate/Medium-term				3 - Low/Long-term			

Provided below in Table 49 are general management recommendations aimed at best management practice techniques to address the issues/opportunities that have been identified. These management recommendations should be considered in the context of their priority ranking for each reserve in the table above in terms of identifying the timeframe for implementing such recommendations.

Note that as Climate Change and Ecological Burning are municipal wide issues that require significant planning to address, these have been addressed separately below in Section 5.1.1 and Section 5.1.2 respectively

Table 49. Management Recommendations

Issue/Opportunity	General Recommendations
Beach grooming	<ul style="list-style-type: none"> Reassess program of beach grooming to minimise ecological impacts along the Foreshore.
Coast Banksia Woodland	<ul style="list-style-type: none"> Protect, restore, and revegetate Coast Banksia Woodland along the Foreshore South Reserve. Protect Large remnant trees and encourage natural regeneration.
Connectivity and Fragmentation	<ul style="list-style-type: none"> Investigate potential to provide connected canopies and stepping-stones to link existing reserves through urban areas through street tree plantings – ensuring that this occurs in tandem with shrub plants to ensure that habitat created does not increase habitat for Noisy Miners <i>Manorina melanocephala</i>. Consider creation of biodiversity corridor from The Grange through to Caruana and Rowan Woodland Reserves to Braeside Park. Link disconnected patches of native vegetation within reserves with revegetation where appropriate. Consider a “corridor of green” program or similar to link reserves to each other through native vegetation and habitat enhancement on private properties.
Dieback/ Disease/Phytophthora/Pests	<ul style="list-style-type: none"> Monitor infestations of pests and diseases within reserves and apply appropriate management response. Investigate if Phytophthora is present within selected reserves and continue to monitor presence periodically if initially absent. Install wash/hygiene stations at selected reserve such as The Grange, coupled with associated signage to avoid introduction of Phytophthora
Dogs walked off-lead	<ul style="list-style-type: none"> Consider an update to the interactive web-based mapping to highlight reserves where dogs must be on a lead in addition to off-lead. Install signage at entrances to reserves to denote status in relation to dog walking. Consider fencing at Bald Hill Park to contain dogs within Dogs Off-leash area only. Consider defining the Grange Heathland Reserve and other high quality and remnant bushland areas as Conservation Reserves, to clearly indicate their significance.
Erosion	<ul style="list-style-type: none"> Fence sensitive areas. Consider gradual removal of Marram Grass <i>Calamagrostis arenaria</i> and replacement with indigenous species.
Fences	<ul style="list-style-type: none"> Undertake a review of fencing to determine existing maintenance and/or removal requirements. Ensure any existing fences to be retained are regularly inspected and maintained. Replace missing fencing where appropriate with new fencing (such as Foreshore areas).
Genetic pollution	<ul style="list-style-type: none"> Consider removal of non-indigenous flora species that have potential to hybridise with site indigenous species (for example Southern Mahogany <i>Eucalyptus botryoides</i>, non-indigenous Honey-myrtles <i>Melaleuca spp.</i> and Pigface <i>Carpobrotus aequilaterus</i> species).

Issue/Opportunity	General Recommendations
Inappropriate plantings / encroachment	<ul style="list-style-type: none"> • Ensure that future plantings are appropriate for the site and consider the EVCs known to occur or would have once been present within reserve. • Consider growth of plants when selecting species to install to ensure the future potential of such plantings to encroach on existing remnant vegetation is avoided and minimised.
Infrastructure upgrades	<ul style="list-style-type: none"> • Infrastructure upgrades should minimise impacts to native vegetation and aim for an overall gain in biodiversity. This is particularly pertinent to Groves Reserve, Epsom Grassland, and the Foreshore Reserves, where infrastructure upgrades are currently planned or underway.
Missing structural components in Habitat Zones	<ul style="list-style-type: none"> • Consider planting additional lifeforms listed in the EVC benchmarks or other local relevant information to enhance site ecological values.
Mowing regime & Spread of weeds from mowing/slashing	<ul style="list-style-type: none"> • Ensure that mowing of any areas dominated by indigenous grasses, such as at Heights Park and Epsom Grassland, is timed to allow for seed set and recruitment. • Ensure that care is taken during mowing of open space adjacent to patches of native vegetation to prevent inadvertent spread of weeds into these areas. • Mowing/Biomass control at Epsom Grassland could be informed by through monitoring of the inter-tussock space and maintaining this above 30%.
Non-indigenous revegetation	<ul style="list-style-type: none"> • Continue progressive removal of non-indigenous revegetation over time particularly of species such as Coast Tea-tree <i>Leptospermum laevigatum</i> (where appropriate), Southern Mahogany <i>Eucalyptus botryoides</i> and River Red-gum <i>Eucalyptus camaldulensis</i> (where appropriate, e.g., BBR). • Ensure that removal of non-indigenous revegetation is staged and coupled with revegetation as replacement habitat for local fauna.
Rabbits/Hares/Foxes	<ul style="list-style-type: none"> • Monitor presence of pest animals and undertake measures for control to minimise impacts and in line with statutory requirements.
Removal of logs	<ul style="list-style-type: none"> • Provide signage to educate the public on the benefits of logs to biodiversity and incorporate into Council environmental awareness programs/events.
Rubbish dumping	<ul style="list-style-type: none"> • Implement rubbish removal on an ongoing basis, to avoid others continuing to dump rubbish on site. • Incorporate issue into Council environmental awareness programs/events.
Sand Heathland recommendations	<ul style="list-style-type: none"> • Remove inappropriate plantings from relevant areas. • Monitor adjacent vegetation to ensure encroachment into Sand Heathland areas does not occur. • Undertake longer term actions aimed at restoring this EVC as detailed above.
Soil compaction – General/Cyclists/Pedestrians	<ul style="list-style-type: none"> • Ensure trails are appropriately signposted and reserve users are directed to stay on designated paths. • Consider lining edges of tracks with pinned down logs to define tracks.
Stockpiling of materials	<ul style="list-style-type: none"> • Avoid stockpiling materials such as mulch on site for long periods; ensure that any soil stockpiles are appropriately covered to avoid run off and removed to avoid becoming an area where weeds emanate into and from
Stormwater outflow and runoff or hydrology	<ul style="list-style-type: none"> • Avoid changes to existing hydrological regimes that existing EVCs rely on.

Issue/Opportunity	General Recommendations
Tree vandalism/illegal pruning	<ul style="list-style-type: none"> • Continue the current practice of signposting areas of Tree Vandalism. • Explore other opportunities such as education, local stewardship, and prosecutions. • Future revegetation works could strategically place large trees around view lines where possible.
Unmaintained nest boxes	<ul style="list-style-type: none"> • Review condition of nest box present within Rowan Woodland Reserve – either maintaining or replacing the nest box as deemed necessary.
Walking tracks through vegetation/trampling	<ul style="list-style-type: none"> • Ensure trails are appropriately signposted and reserve users are directed to stay on designated paths. • Consider lining edges of tracks with pinned down logs to define tracks. • Consider consolidating the many ad-hoc paths leading from private properties through the Foreshore South Reserve to the Beach, into formal shared tracks.
Weed threats or invasion	<ul style="list-style-type: none"> • Continue to undertake weed control works through reserves, with works undertaken in a manner sensitive to the indigenous vegetation that is present. • Ensure that weed management works is timed to minimise weed seed set. • Engage with adjacent landowners, such as Metro Trains Melbourne, to discuss issues weed encroachment from adjacent properties at sites such as Groves Reserve and Bradshaw Bushland Reserve. • Undertake appropriate hygiene measures for vehicles, plant and equipment to minimise the spread of weeds between reserves. • Ensure that removal of non-indigenous species or areas of woody weeds in particular is staged and coupled with revegetation as replacement habitat for local fauna

5.1.1 Climate Change

Anthropogenic climate change presents perhaps the greatest biodiversity challenge in living memory, and while addressing the issue is outside of the scope of this project, some general principles are described here.

Currently, restoration and revegetation planning for the impacts of climate change are somewhat in the experimental stage, although some well-known ecological principles can be applied. For example, it is known that plant species are variously adapted to their respective ‘climate envelopes’ (see definition below), and that within a species there can be a range of genetic variation related to climate adaptations (Standards Reference Group SERA 2017).

Climate envelope: “*The climate range in which a species currently exists can be referred to as its ‘climate envelope’. During climate change this climate envelope is likely to uncouple from the current location in which the species exists and, where conditions become hotter, move further poleward or to higher elevations. This means that the species may be lost from the more equatorial extreme of the range and need more help to adapt as it, or its genotypes, move poleward or to higher elevations. However, as precipitation is likely to change in less predictable ways, it is likely that the displacement of climate envelopes will be more complex*” – Standards Reference Group SERA 2017.

As a result of climate change, species’ climate envelopes are projected to move either longitudinally (in the case of the Southern Hemisphere – south) or altitudinally (higher in elevation).

Based on the above knowledge, the most practical (and widely used) method for climate-proofing ecosystems in terms of plant species is to include genetic material from ‘future climate envelopes’ i.e., north or from lower elevation, in revegetation projects. For Kingston – given its topography – this means collecting seed from provenances to the north of the actual planting site – ideally from similar vegetation communities with similar underlying geologies.

The above is however in contrast to the traditional thinking of revegetation projects in terms of ensuring that local provenance material is used, in order to maintain local adaptations. Additionally, it is likely that some plant species and populations already have the genetic diversity needed to adapt to future climates – though this is very difficult to determine.

In terms of fauna, most mitigation strategies focus on enhancing longitudinal connectivity such that species and populations can move south as temperatures increase.

We do not set out concrete instructions for climate-proofing Kingston here, but rather highlight the importance of this process. Additionally, we flag that collaboration with academic institutions may be the best path forward in this situation, to both bring resources, as well as the capability to rigorously analyse results of this emerging practice and communicate them to the wider scientific and land management communities.

It would also be worth considering joining the Eastern Alliance for Greenhouse Action (EAGA), which is a collaboration of eight Council’s in Melbourne’s east – including many around Kingston, for sharing resources and knowledge – see link below.

External climate-proofing resources are provided below:

- Eastern Alliance for Greenhouse Action:
<https://eaga.com.au/projects/bushland-and-urban-biodiversity-management-in-a-changing-climate/>
- Greening Australia’s *Climate Proofing Australia* available at:
<https://www.greeningaustralia.org.au/what-we-do/climate-proofing-australia/>
- Society for Ecological Restoration *Australia’s National standards for the practice of ecological restoration in Australia Appendix 3 Genetics, fragmentation and climate change—implications for restoration of local indigenous vegetation communities* (Page 39) available at:
<http://seraustralasia.com/standards/National%20Restoration%20Standards%202nd%20Edition.pdf>
- A number of reports and papers linked from **the CSIRO’s *Ecological engineering for biodiversity adaptation to climate change*** here:
<https://research.csiro.au/biodiversity-knowledge/projects/ecological-engineering-biodiversity>

5.1.2 Ecological Burning

As many of the vegetation types assessed during this project are highly reliant on fire for recruitment – it is essential to ensure that an appropriate burn regime is implemented. While we did not observe any issues related to fire frequency (although this was not specifically monitored), we highlight this here to ensure that the long-term health of these reserves is maintained.

For each reserve, it is recommended that a specific burn regime is developed based on the appropriate fire intervals for the respective vegetation types. These could be integrated bushfire management plans which detail human safety and planning, fuel breaks, fire intervals, and monitoring recommendations. This would

ideally be performed in conjunction with a local specialist with knowledge of the fire responses of respective vegetation communities in each reserve, while taking into account the known and potential presence of flora and fauna habitat.

If implementing planned burns is not possible at certain reserves, then we would recommend to determine if any of the species present, or potentially present, are reliant on fire for germination. If this is the case, then supplementary planting or direct seeding with treated seeds may be necessary for such species.

5.2 Future Monitoring

The text below briefly details a number of monitoring methods and tools that may be useful for staff from the City of Kingston in general with regards to management of the Bushland and Foreshore Reserves, or that could be incorporated into future monitoring events that take place.

5.2.1 Indigenous Understorey Vegetation Cover Mapping

It is recommended to establish a GIS based mapping system to facilitate monitoring and show the progress of weed control and revegetation works over time. It is recommended that this mapping system incorporates:

- areas of priority weed species requiring control such as noxious weeds or localised areas of weeds with high potential to spread and establish elsewhere.
- The location of significant indigenous species/vegetation
- priority work zones that support higher quality vegetation, high biodiversity values such as rare species, or sites of historical or community significance
- vegetation quality attributes (species composition, structural diversity, and ecosystem function).

5.2.2 Significant Flora and Fauna and Weed Locations

To create an ongoing and up-to-date catalogue of Kingston's biodiversity values and weed infestations, it is recommended that a simple app is decided on that can be used on a mobile phone by all of Kingston's on-ground staff. It is understood that Merginmaps is about to be trialled by the Kingston bush crew for this purpose.

This should allow Kingston Staff to quickly collect point and polygon data on their phones, which can then be viewed by others immediately after collection without the need to manually upload and download data.

Ideally the flora and fauna data collected would also be uploaded to the Victorian Biodiversity Atlas.

5.2.3 Ecological Restoration Progress

It is recommended that a Monitoring tool be developed in line with the *National standards for the practice of ecological restoration in Australia* and that the tool is designed so that the data can be translated into the *progress evaluation 'recovery wheel' defined by these standards*.

This will require development of a set of specific monitoring indicators tailored to Kingston’s reserves. It is recommended that this includes numerical or data-based monitoring indicators (i.e. species richness, weed cover), so that the scoring method is more objective.

Some examples for how these can be adapted for Kingston’s reserves are provided below in Table 50. It would likely be easier to apply this system to each EVC on site, so that the benchmark can be used to compare progress to.

Table 50. Example of three components for a five-star rating system for Kingston’s reserves. Multiple indicators could be defined for each attribute.

Recovery Wheel Attribute	Indicator	One-star	Two-star	Three-star	Four-star	Five-star
Species composition	Indigenous Plant Diversity	< 20 % of benchmark diversity	20 to <40 % of benchmark diversity	40 to <60 % of benchmark diversity	60 to <80 % of benchmark diversity	80 % or more of benchmark diversity
Structural diversity	Structural Diversity*	0 or 1 structural layer present	2 structural layers present	3 structural layers present	4 structural layers present	5 structural layers present
External Exchanges	Connectivity – <i>may be defined specifically for different fauna guilds</i>	Reserve >1 km from another natural reserve without stepping stone connectivity**	Reserve >1 km from another natural reserve with stepping stone connectivity**	Reserve <1 km from another natural reserve without stepping stone connectivity**	Reserve <1 km from another natural reserve with stepping stone connectivity**	Reserve contiguous with another natural reserve

**The relevant components for structural diversity should be based on an appropriate EVC benchmark. Components to consider could be: groundlayer, shrub layer, sub-canopy tree layer, canopy layer, scramblers/climbers. Note however that as not all EVCs contain all of these components. For example, in an EVC that does not normally contain a sub-canopy or canopy layer, the groundlayer could be broken up into groundlayer forbs, graminoids, and shrubs such that there are still 5 components.*

***In this example, the distance between stepping stones may need to be defined based on specific fauna guilds.*

The above would then ideally be aligned with specific goals for each reserve/patch of vegetation. For example, it may be the aim to improve connectivity for woodland birds – such that the two-star ranking is met with stepping stone connectivity at specific distances based on the species present. However, if connectivity for arboreal mammals is the goal, then meeting the five-star rank may be necessary if they require a continuous canopy.

5.2.4 Photo-points

Photo points are a simple yet extremely useful tool for tracking changes in a site over time, and are especially useful when presenting the progress of revegetation works to stakeholders or other interest groups.

It would therefore be useful to set up multiple photo-points in areas where works will be undertaken, or areas are of particular interest, which can then be replicated each year and preferably throughout the seasons.

Photo-points are ideally marked with a star picket, although it is also possible to use mobile mapping application to collect photos and track point locations.

5.2.5 Bird Monitoring and Citizen Science

Monitoring bird populations is one of the most accessible ways to measure the habitat created and enhanced by weed control and restoration projects. These can be conducted by Kingston staff, external contractors, or by volunteers, and offers an excellent opportunity to involve community groups.

The *Survey Techniques* developed by BirdLife Australia (2020) are a standardised set of methods which are easily applied and used, and thus are the most appropriate for bird monitoring in Kingston. Additionally, data can be recorded on a mobile phone using the Birdata app on either iPhone or Android, making it easily accessible.

Bird monitoring is especially recommended where the goals for certain reserves is to improve the habitat for certain bird guilds. While monitoring the habitat *itself* is still beneficial (i.e. the presence of a well-developed shrub layer) – monitoring the actual abundance and diversity of birds can be useful to determine if bird populations are responding, and if not, whether other factors need to be improved such as connectivity or pest animal populations.

The 2 ha, 20 minute systematic bird survey is recommended for these purposes, where Kingston staff, contractors or amateur birders undertake the survey.

This could be further supplemented by the fixed route monitoring approach, that could be made accessible to the general public or community groups, allowing more frequent monitoring. This could be supported by offering outreach program with occasional surveys led by an ornithologist or someone with a practical knowledge of birds, to build community confidence in undertaken the fixed route surveys. The fixed route monitoring involves defining a fixed route through the area of interest. To keep the fixed route surveys consistent, it is important to:

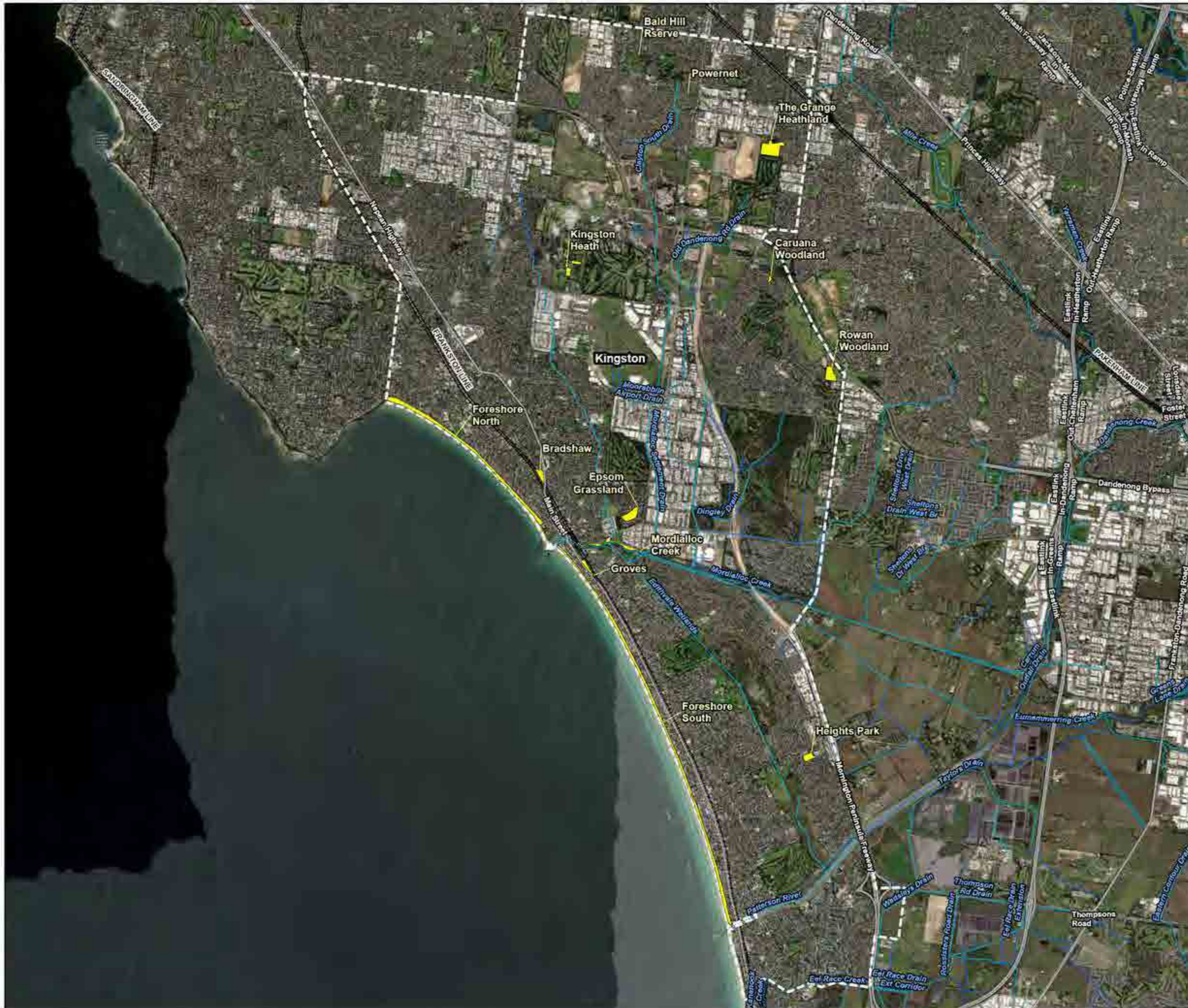
- Make sure you keep to the same route on each survey
- Conduct your surveys at the same time of day
- Take the same amount of time to do each survey
- Ideally, conduct your surveys under optimum conditions – calm, no rain, warm conditions

Monitoring other fauna such as frogs, microbats and mammals is also beneficial – however birds have been highlighted here due to the relative ease of monitoring.

Appendix 1. Bushland and Foreshore Reserves Overview Map

See next page.

Map 0. Overview Map
Kingston Natural Resources Area
and Foreshores



Legend

- Reserves
- Kingston city
- Constructed watercourse
- Natural watercourse
- Railways

Details

Mapping by: Ali Nia
 Date: 5/10/2023
 Version: 1
 Aerial photography from Esri World Imagery.
 Data Source: Base layers courtesy of VicMap,
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Appendix 2. Individual Reserve Maps


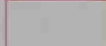

Maps commence on next page.

- Map 1. Bald Hill Park
- Map 2. Bradshaw Bushland Reserve
- Map 3. Caruana Woodland Reserve
- Map 4. Epsom Grassland
- Map 5. Groves Reserve
- Map 6. Heights Park
- Map 7. Kingston Heath Reserve
- Map 8. Mordialloc Creek Reserve
- Map 9. Powernet Easement Reserve
- Map 10. Rowan Woodland Reserve
- Map 11. The Grange Heathland Reserve
- Map 12. Foreshore North Reserve
- Map 13. Foreshore South Reserve




Map 1. Baldhill Park Reserve
Kingston Natural Resources Area
and Foreshores

Legend

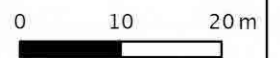
-  Assessment Area
-  Parcels
-  Contours (10m)

Habitat Zones

-  Damp Sands Herb-rich Woodland

Details

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Map 2. Bradshaw Bushland Reserve

Kingston Natural Resources Area and Foreshores



Legend

- Assessment Area
- Parcels
- Contours (10m)
- Railways

Habitat Zones

- Damp Sands Herb-rich Woodland

Details

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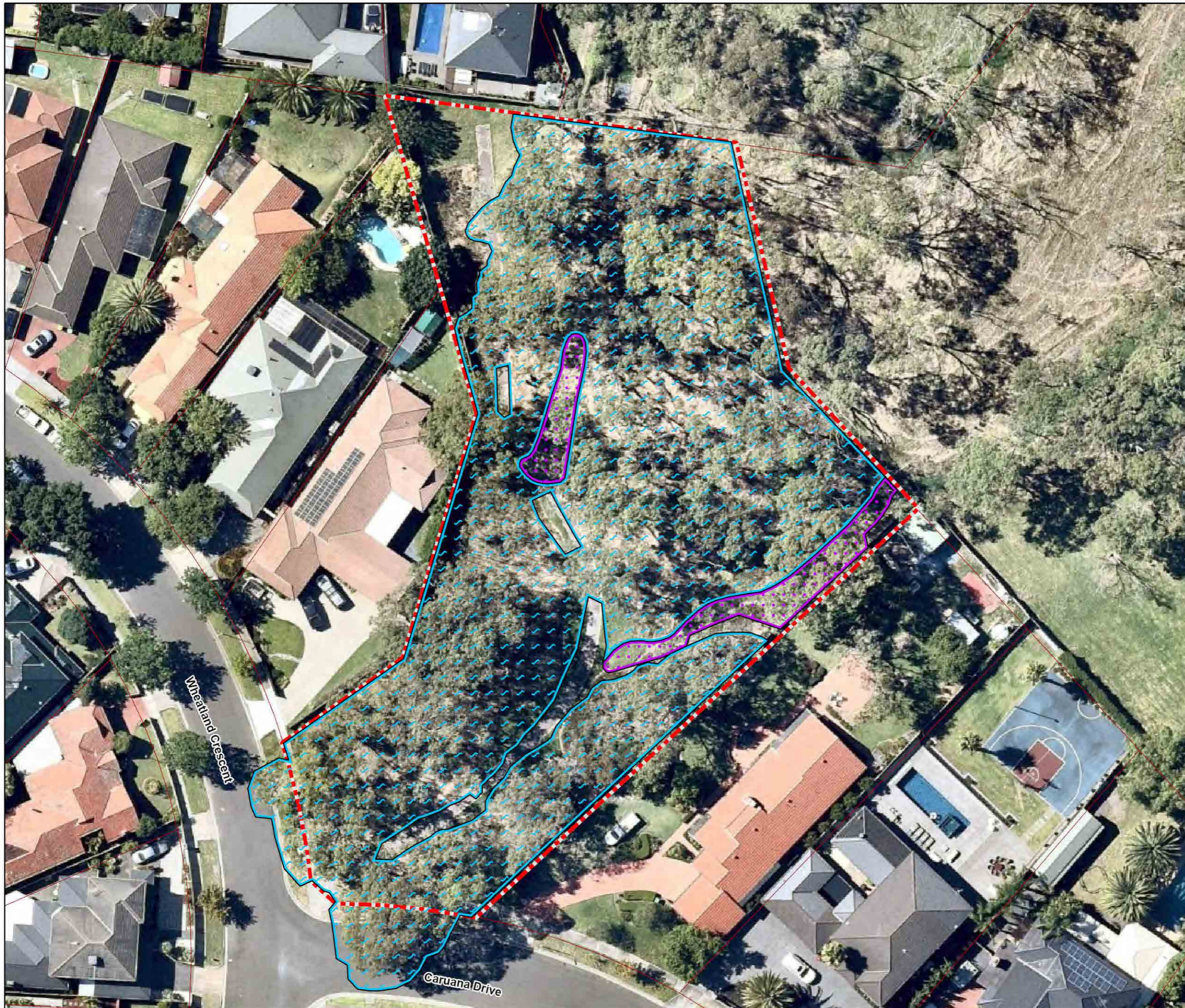
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Map 3. Caruana Woodland Reserve


Kingston Natural Resources Area and Foreshores


Legend

 Assessment Area

 Parcels

Habitat Zones

 Plains Grassy Woodland

 Plains Swampy Woodland

Details

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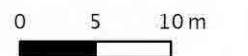
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Map 4. Epsom Grassland
Kingston Natural Resources Area
and Foreshores



Legend

Assessment Area

Parcels

Habitat Zones

Plains Grassland

Plains Grassy Wetland

Tall Marsh

Details

Mapping by: Ali Nia

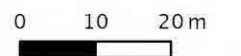
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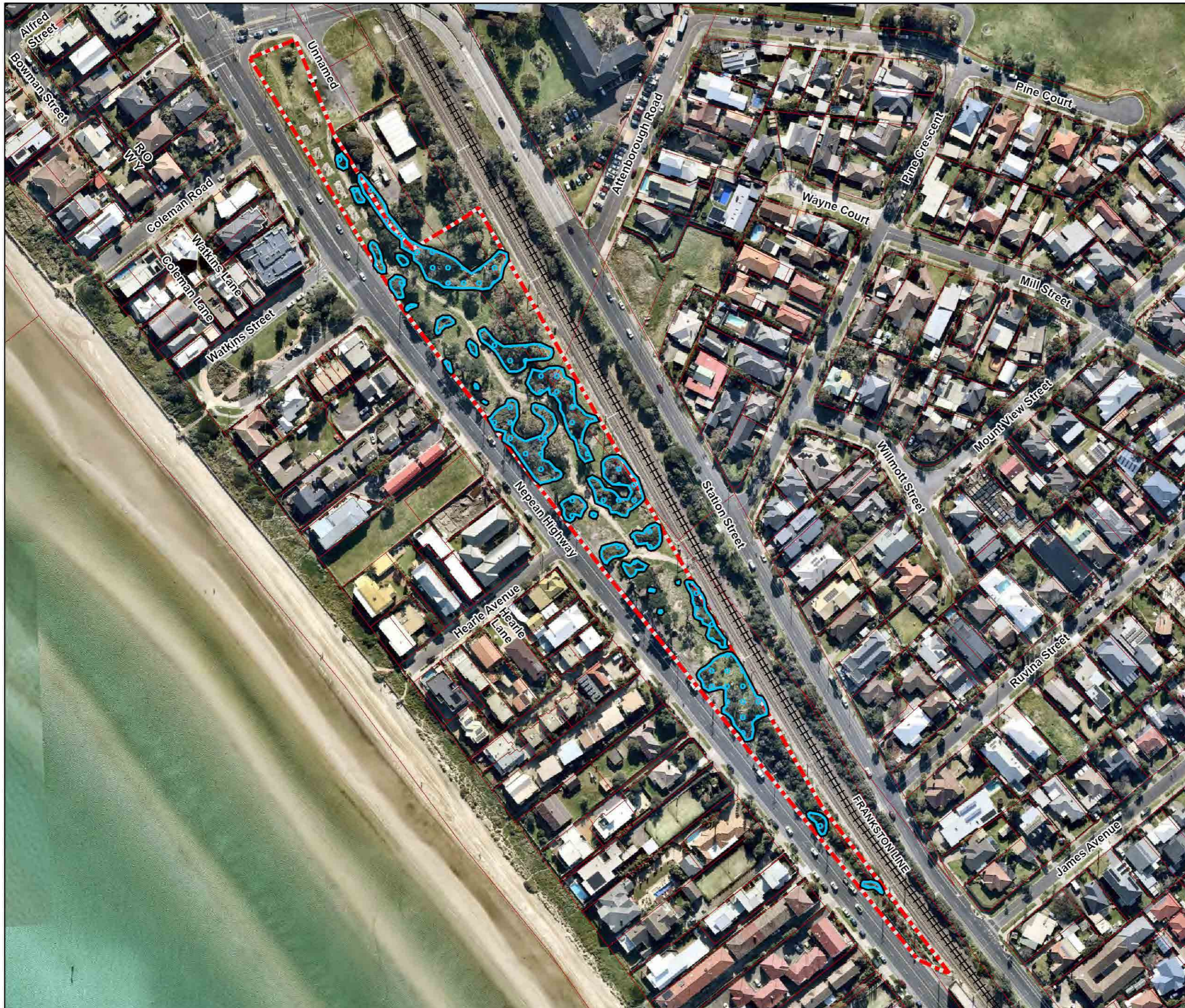
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
Map 5. Groves Reserve
Kingston Natural Resources Area
and Foreshores




Legend

 Assessment Area

 Parcels

 Railways

Habitat Zones

 Coast Banksia Woodland

Details

Mapping by: Ali Nia

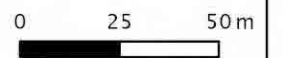
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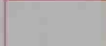
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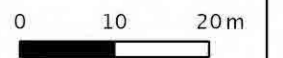
Map 6. Heights Park
 Kingston Natural Resources Area
 and Foreshores

Legend

-  Assessment Area
-  Parcels
- Habitat Zones**
-  Heathy Woodland

Details

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

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Map 7. Kingston Heath Reserve

Kingston Natural Resources Area and Foreshores

Legend

-  Assessment Area
-  Parcels
-  Contours (10m)

Habitat Zones

-  Aquatic Herbland
-  Heathy Woodland
-  Revegetation
-  Swamp Scrub
-  Tall Marsh

Details

Mapping by: Ali Nia
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Map 8. Mordialloc Creek Reserve

Kingston Natural Resources Area and Foreshores

Page 1 of 4



Legend

- Assessment Area
- Parcels
- Constructed watercourse
- Railways
- Habitat Zones**
- Estuarine Reedbed
- Estuarine Scrub
- Mixed Revegetation
- Swamp Scrub



Details

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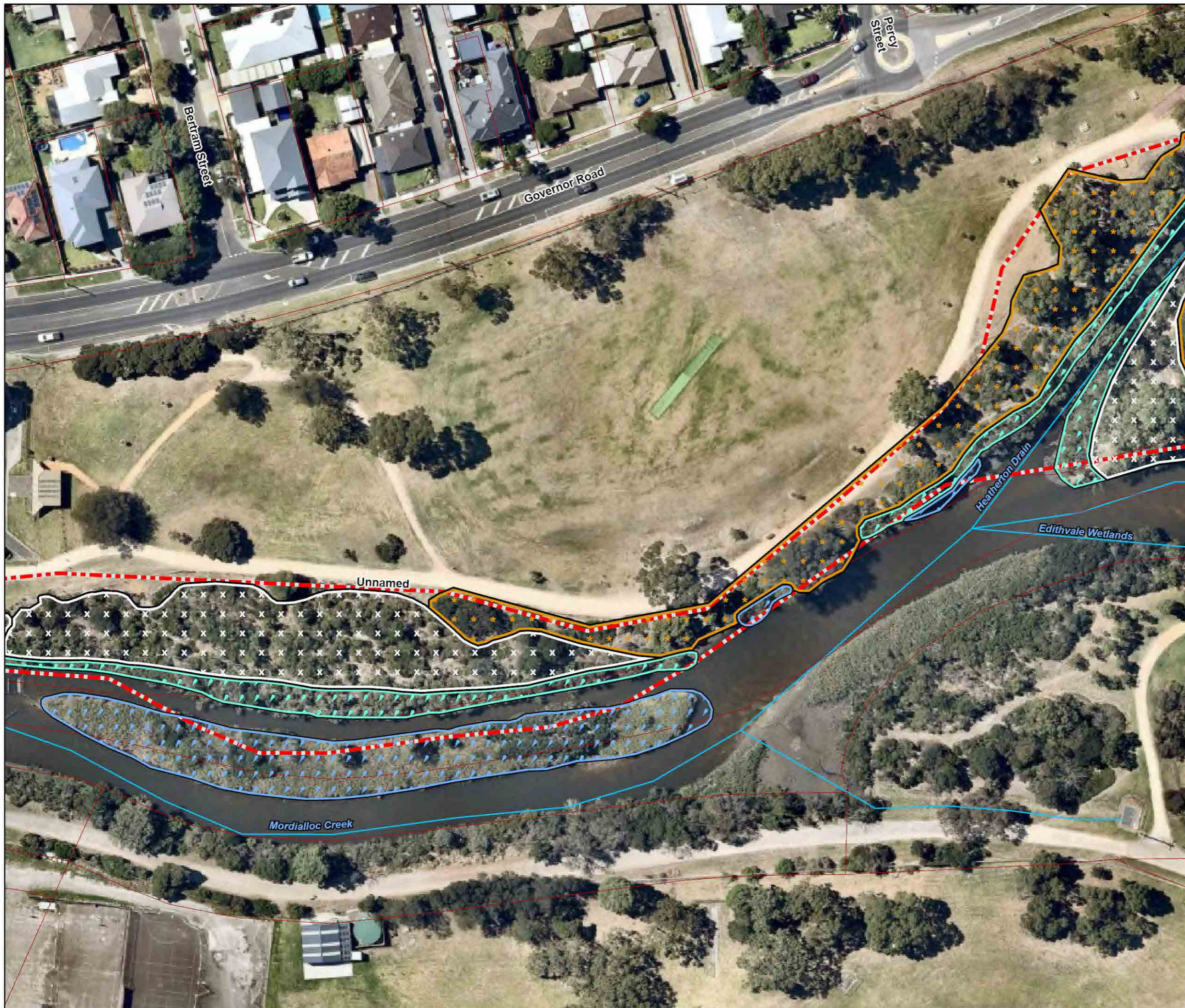
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Map 8. Mordialloc Creek Reserve

Kingston Natural Resources Area and Foreshores

Page 2 of 4



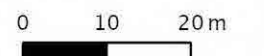
Legend

- Assessment Area
 - Parcels
 - Constructed watercourse
- ### Habitat Zones
- Estuarine Reedbed
 - Estuarine Scrub
 - Mixed Revegetation
 - Swamp Scrub



Details

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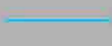
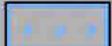




Map 8. Mordialloc Creek Reserve

Kingston Natural Resources Area and Foreshores

Page 3 of 4



Legend

-  Assessment Area
 -  Parcels
 -  Constructed watercourse
- ### Habitat Zones
-  Estuarine Reedbed
 -  Estuarine Reeds swamp
 -  Estuarine Scrub
 -  Mixed Revegetation
 -  Swamp Scrub



Details

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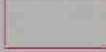
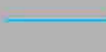
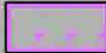




Map 8. Mordialloc Creek Reserve

Kingston Natural Resources Area and Foreshores

Page 4 of 4



Legend

-  Assessment Area
 -  Parcels
 -  Constructed watercourse
- ### Habitat Zones
-  Estuarine Reedswamp
 -  Estuarine Scrub
 -  Mixed Revegetation
 -  Swamp Scrub
 -  Tall Marsh



Details

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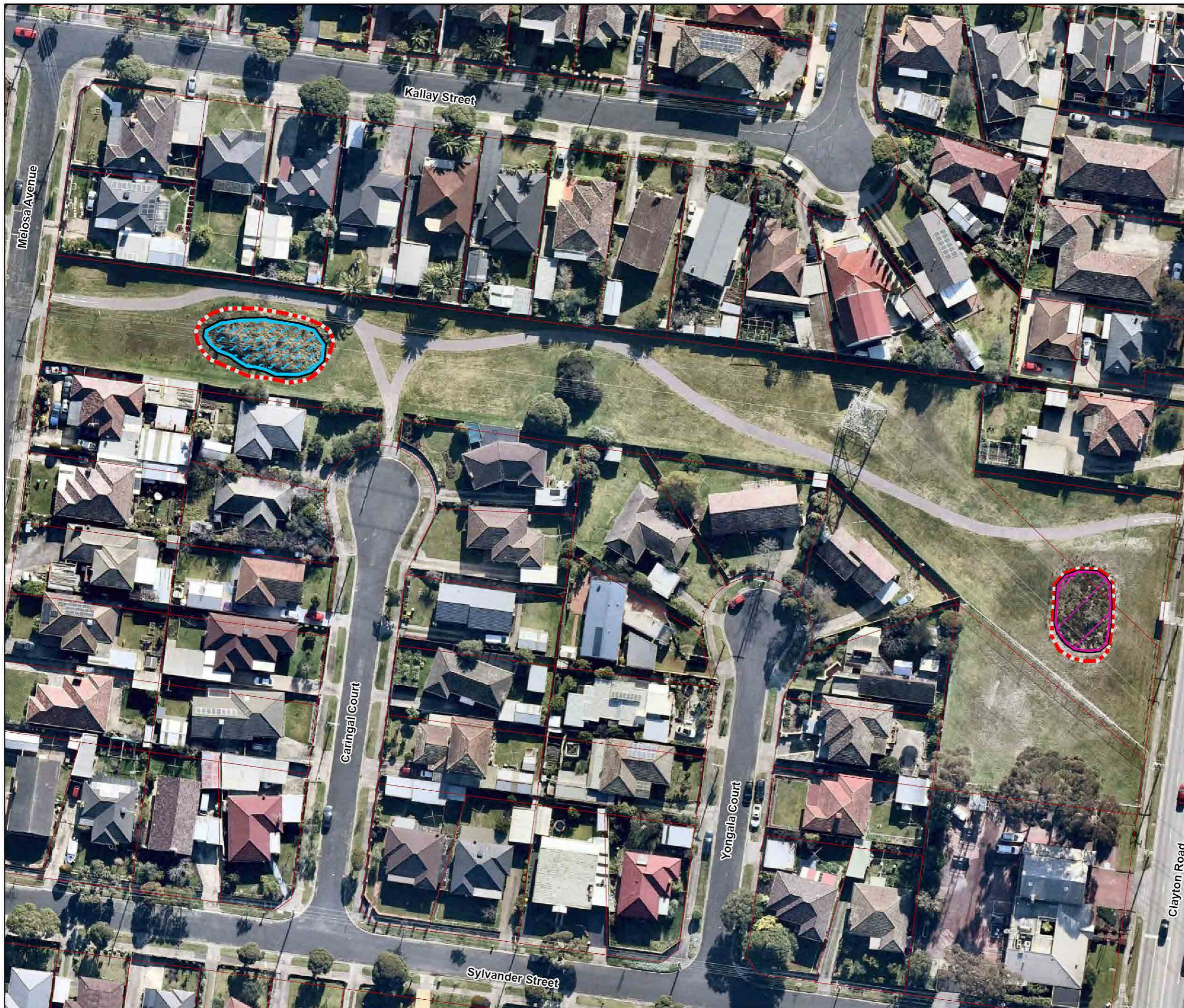
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Map 9. Powernet Easement Reserve

Kingston Natural Resources Area and Foreshores



Legend

Assessment Area

Parcels

Habitat Zones

Heathy Woodland

Plains Grassy Woodland

Details

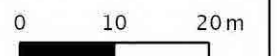
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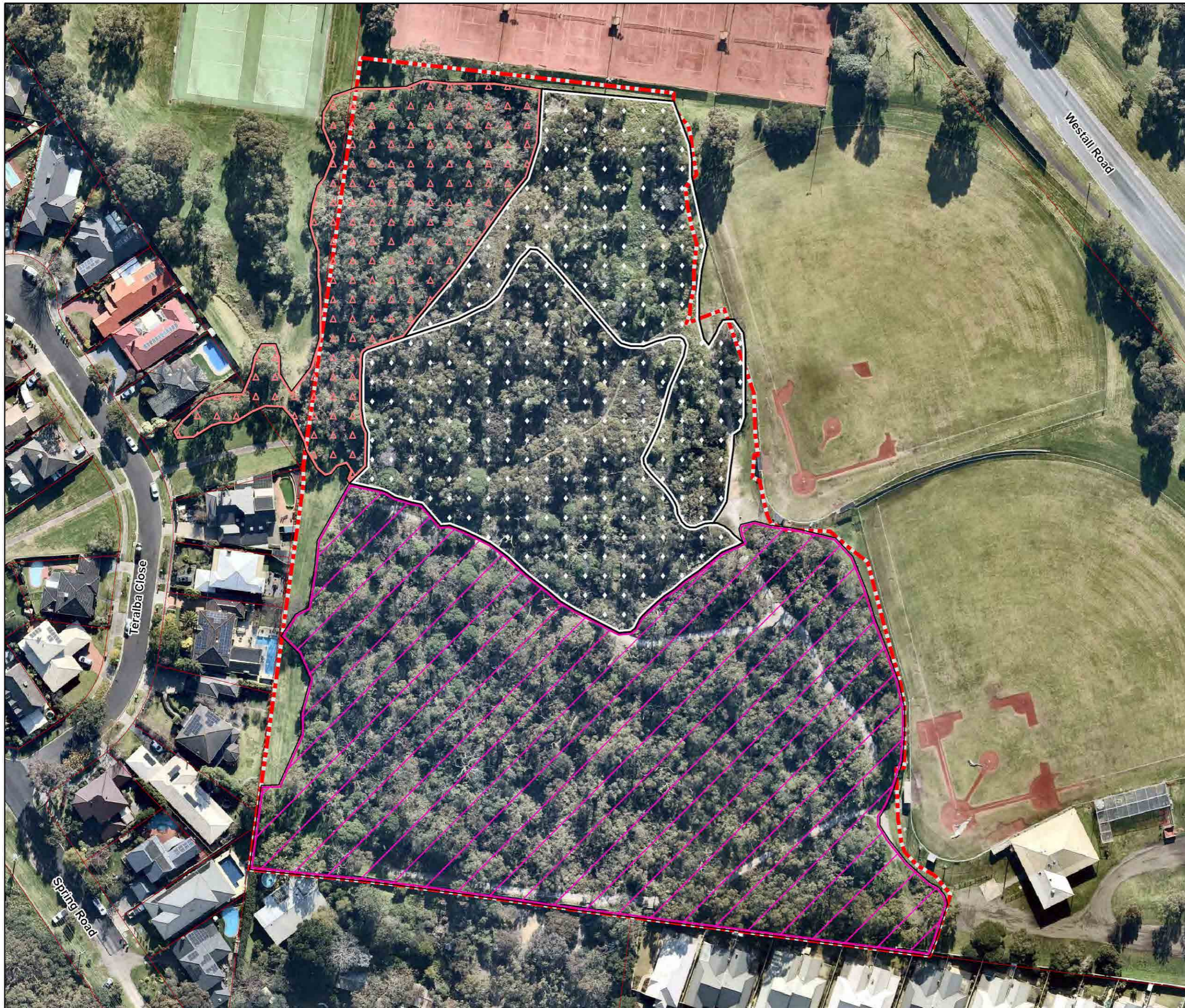
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Map 10. Rowan Woodland Reserve

Kingston Natural Resources Area and Foreshores



Legend

Assessment Area

Parcels

Habitat Zones

Damp Sands Herb-rich Woodland

Heathy Woodland

Swampy Woodland

Details

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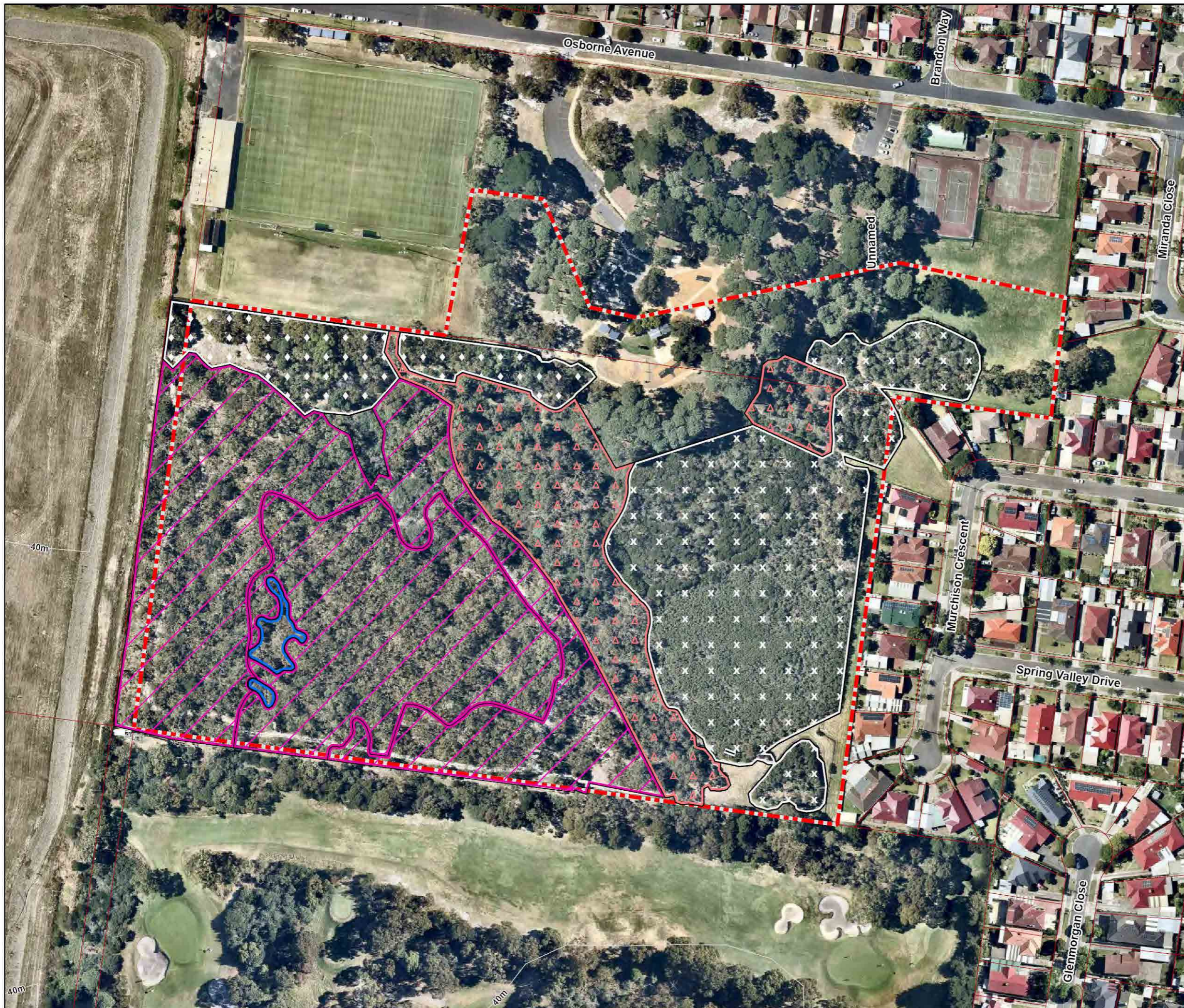


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Map 11. The Grange Heathland Reserve

Kingston Natural Resources Area and Foreshores



Legend

Assessment Area

Parcels

Contours (10m)

Habitat Zones

Damp Sands Herb-rich Woodland

Heathy Woodland

Sand Heathland

Swamp Scrub

Swampy Woodland

Details

Mapping by: Ali Nia

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Version: 1

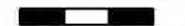
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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 1 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Berm Grassy Shrubland
- Coastal Dune Grassland
- Coastal Headland Scrub



Details

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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 2 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Berm Grassy Shrubland
- Coast Banksia Woodland
- Coastal Headland Scrub
- Sand Heathland



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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 3 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Berm Grassy Shrubland
- Coastal Dune Grassland
- Coastal Headland Scrub
- Sand Heathland



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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 4 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Coast Banksia Woodland
- Coastal Headland Scrub
- Coastal Tussock Grassland
- Revegetation



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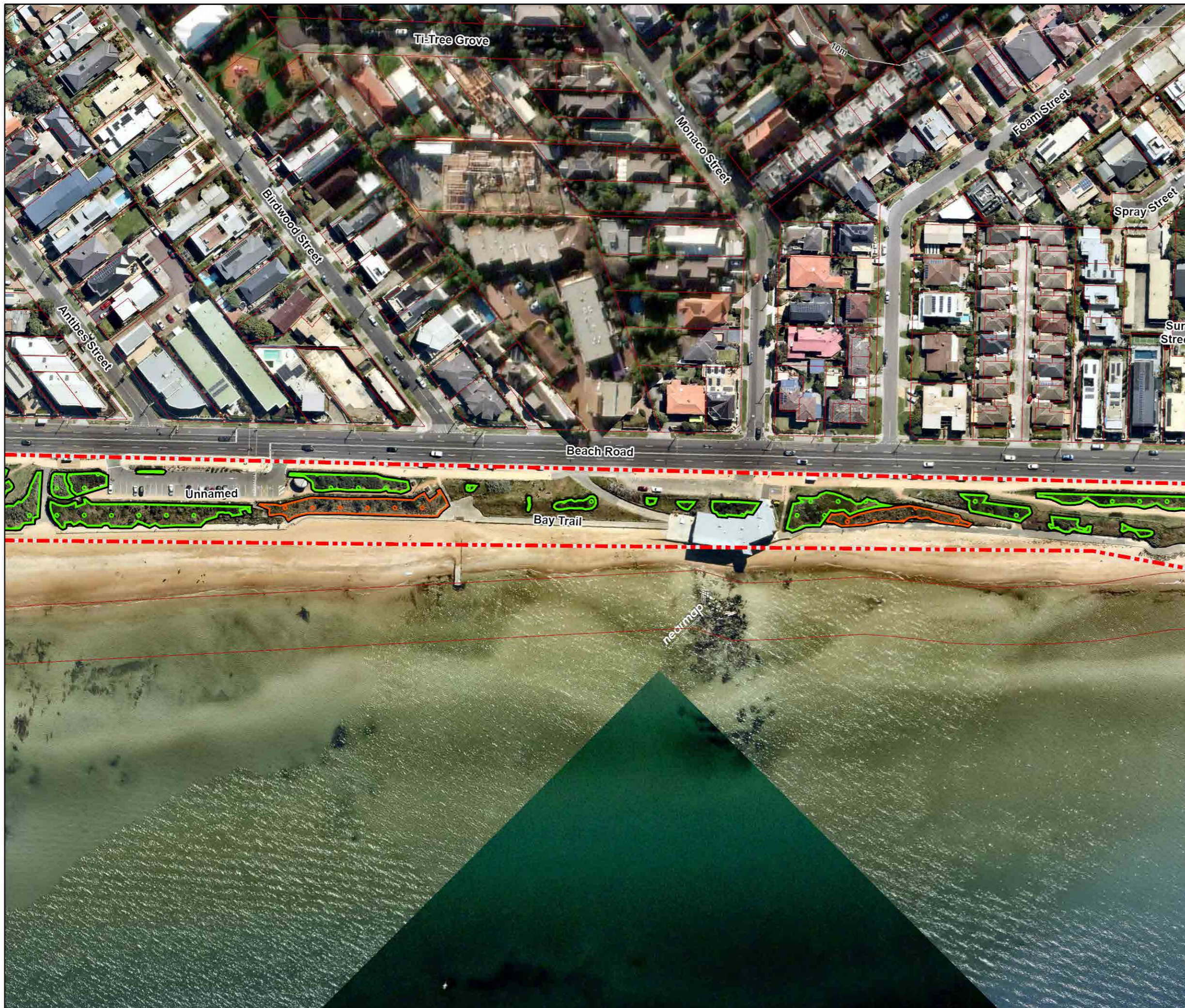
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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 5 of 8



Legend

-  Assessment Area
-  Parcels
-  Contours (10m)



Habitat Zones

-  Coastal Headland Scrub
-  Coastal Tussock Grassland



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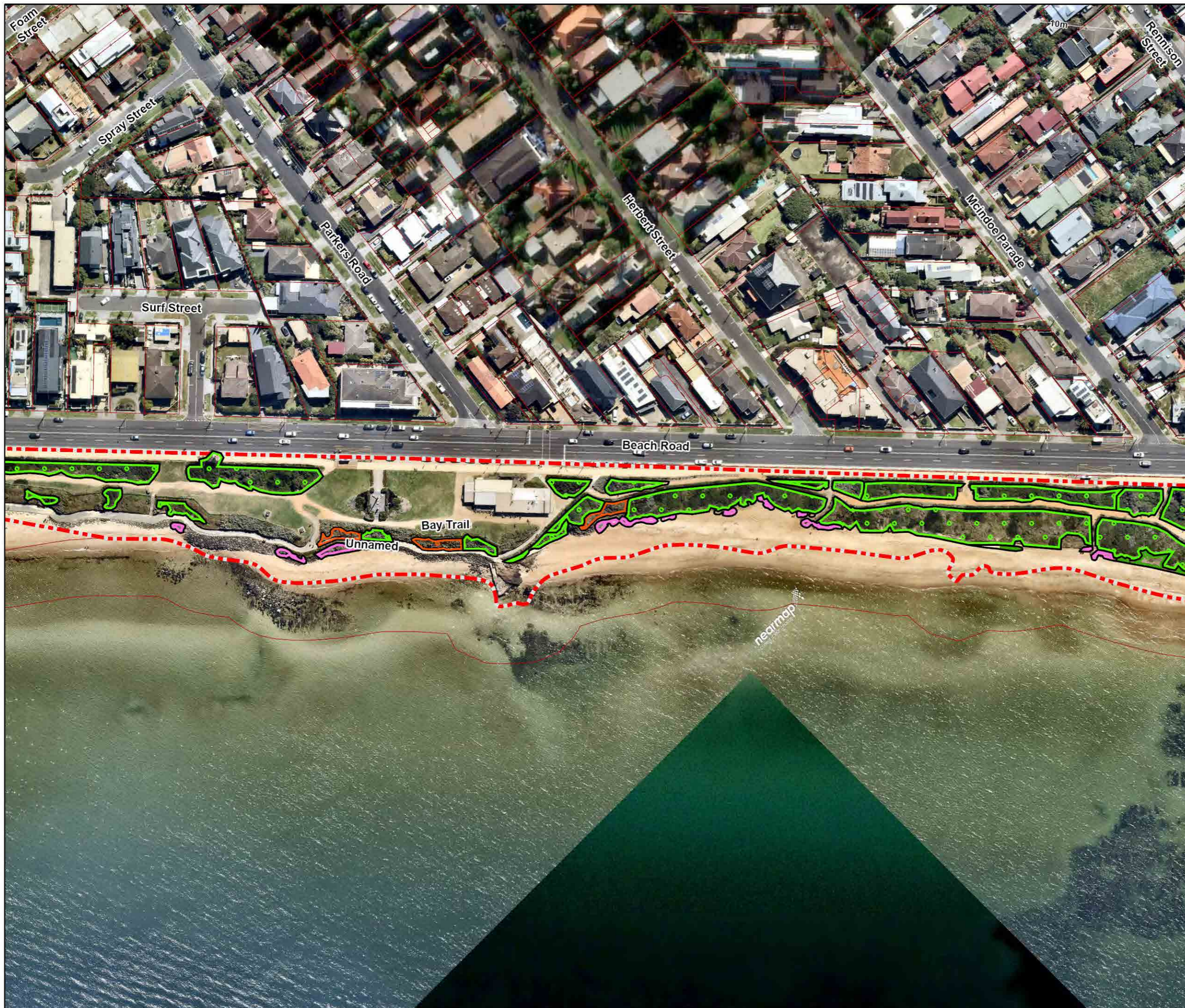


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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 6 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Berm Grassy Shrubland
- Coastal Dune Grassland
- Coastal Headland Scrub
- Coastal Tussock Grassland



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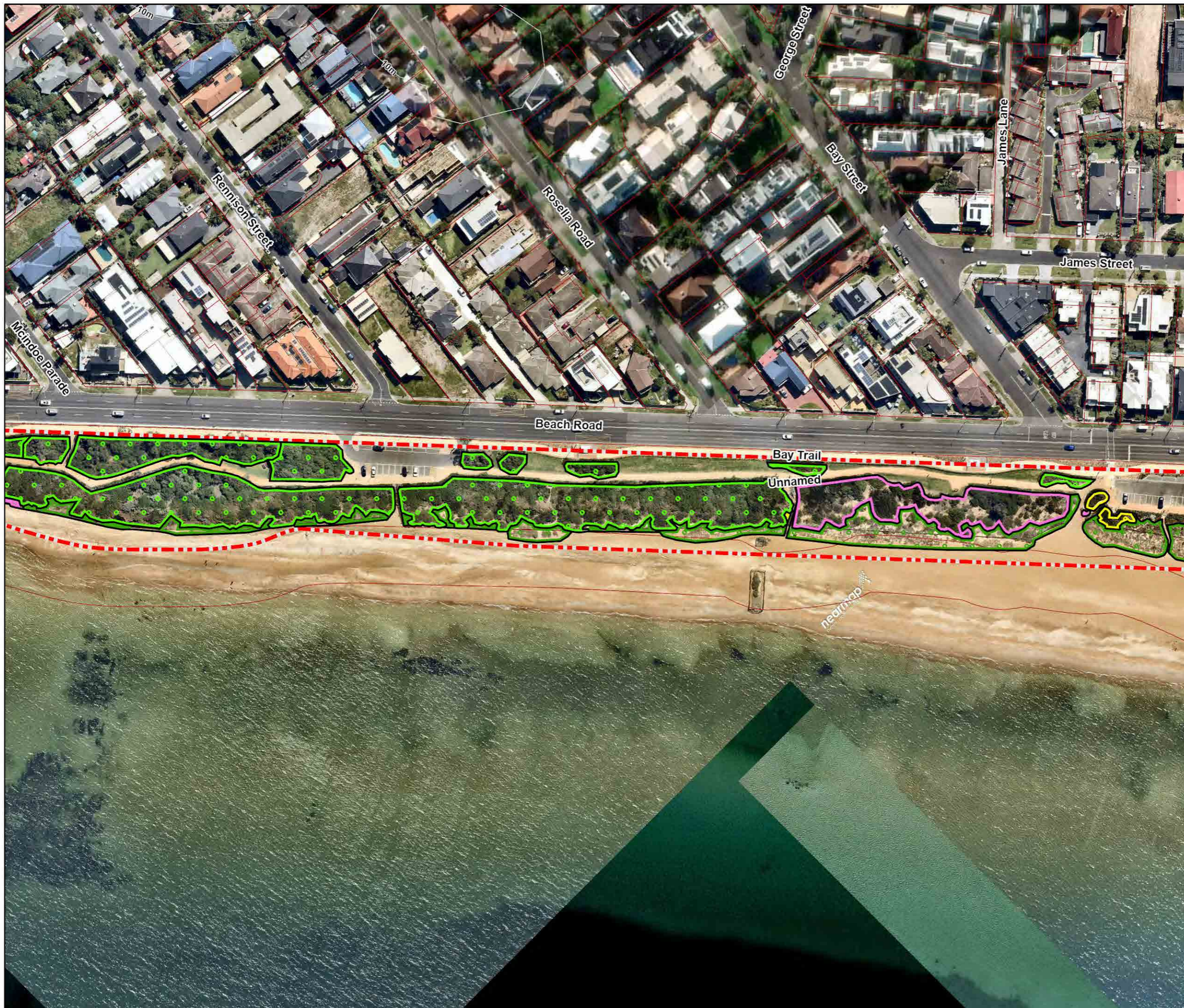
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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 7 of 8



Legend

- Assessment Area
- Parcels
- Contours (10m)

Habitat Zones

- Berm Grassy Shrubland
- Coastal Dune Grassland
- Coastal Dune Scrub
- Coastal Headland Scrub



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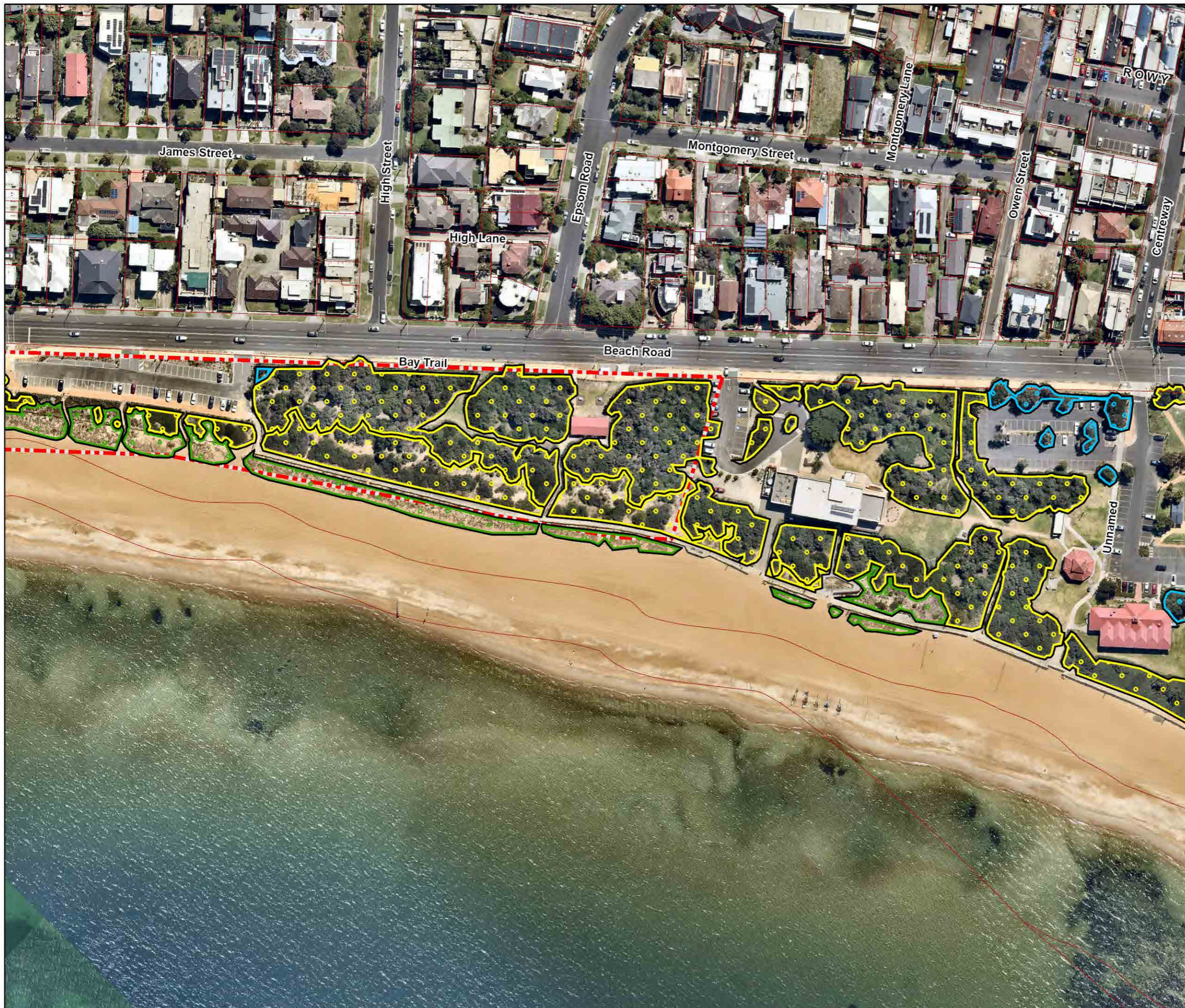
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Map 12. Foreshore North Reserve

Kingston Natural Resources Area and Foreshores

Page 8 of 8



Legend

- Assessment Area
- Parcels

Habitat Zones

- Coast Banksia Woodland
- Coastal Dune Grassland
- Coastal Dune Scrub



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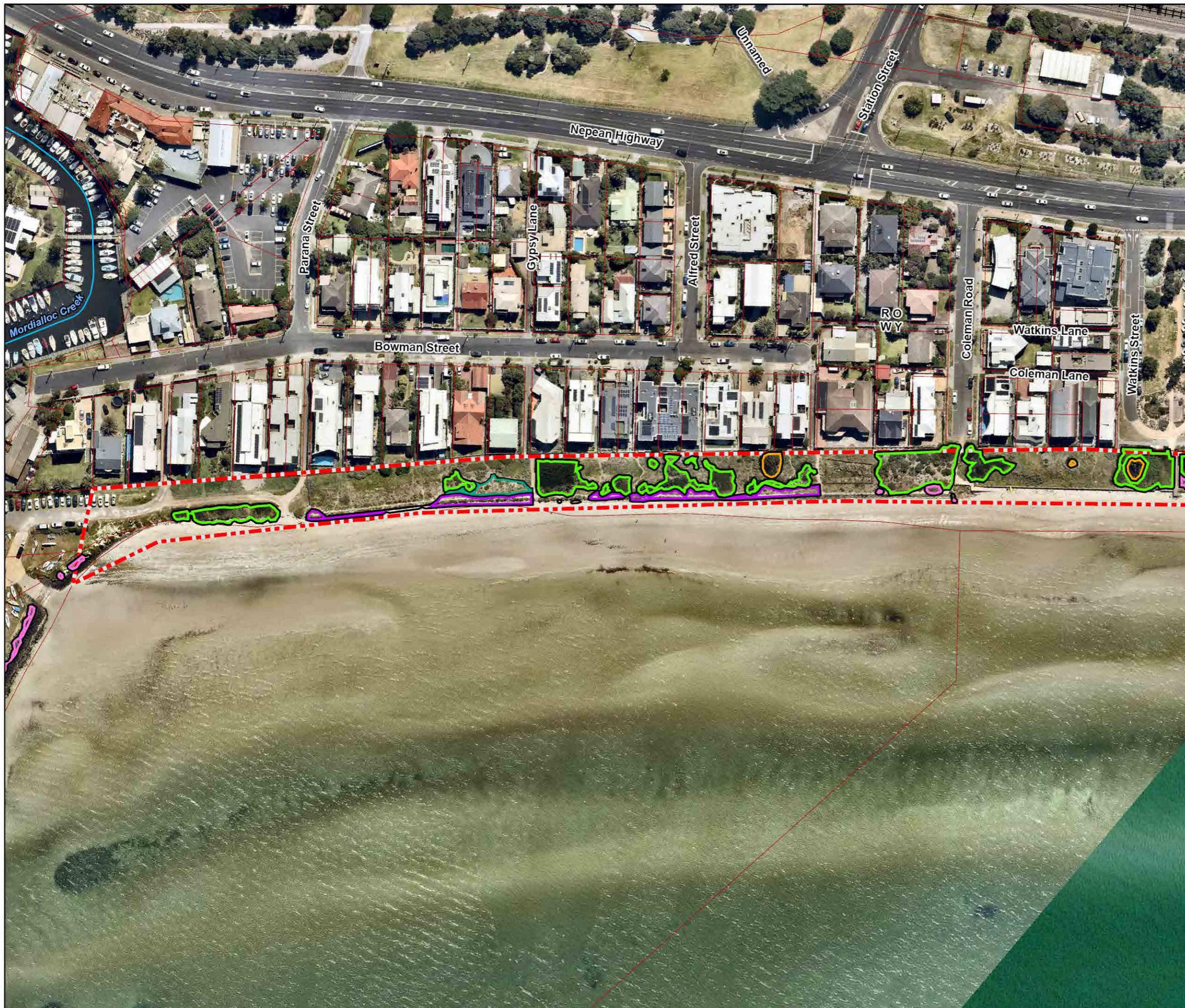
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 1 of 19



Legend

- Assessment Area
- Parcels
- Constructed watercourse
- Railways

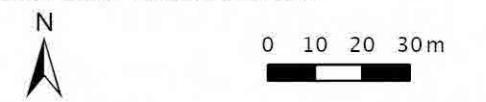
Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 2 of 19



Legend

- Assessment Area
- Parcels
- Railways

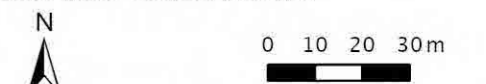
Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



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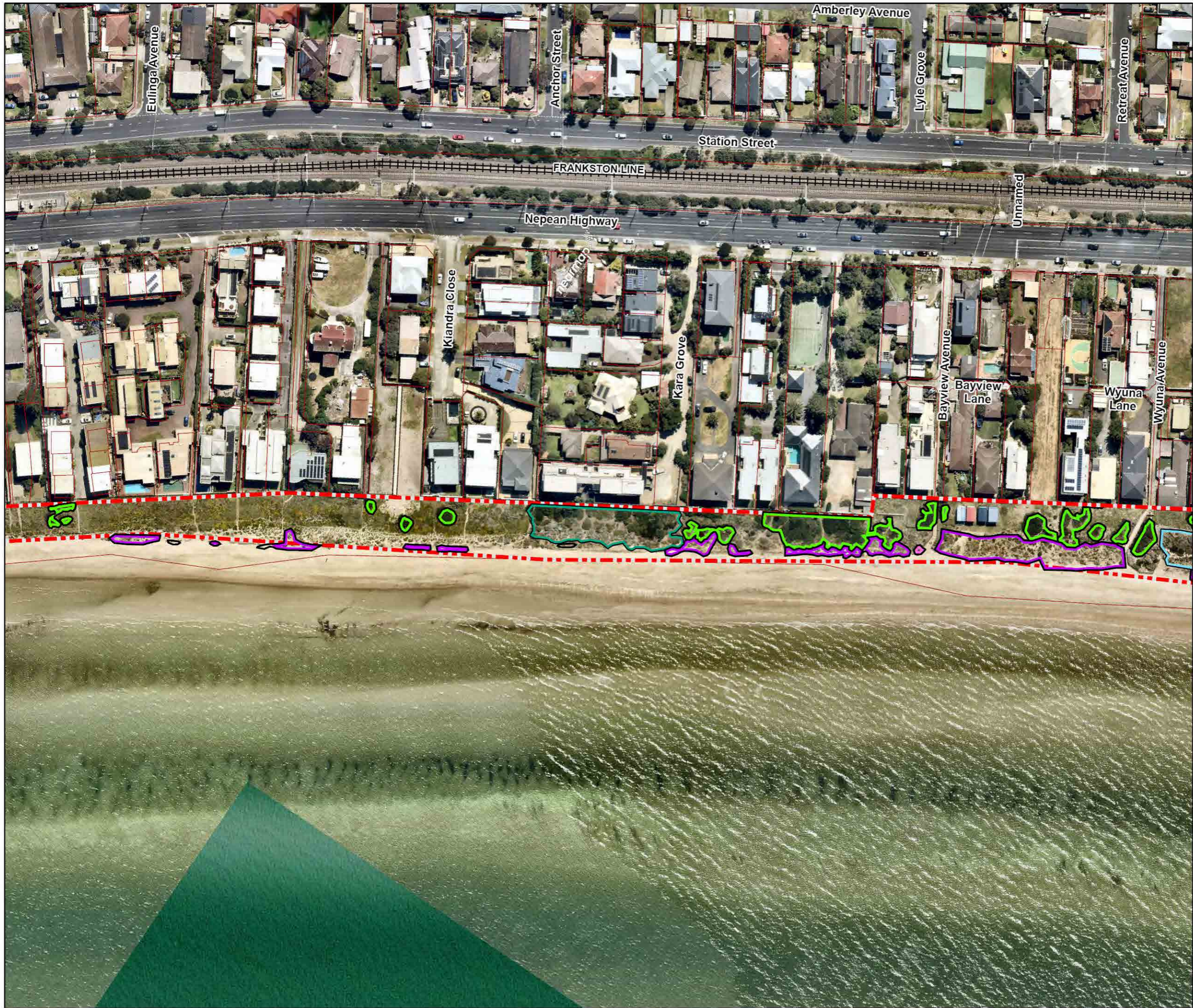


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Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

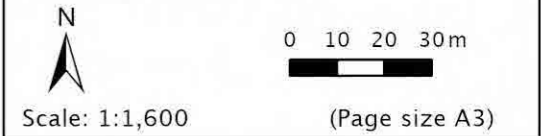
- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland

Other Vegetation

- Swale Plantings



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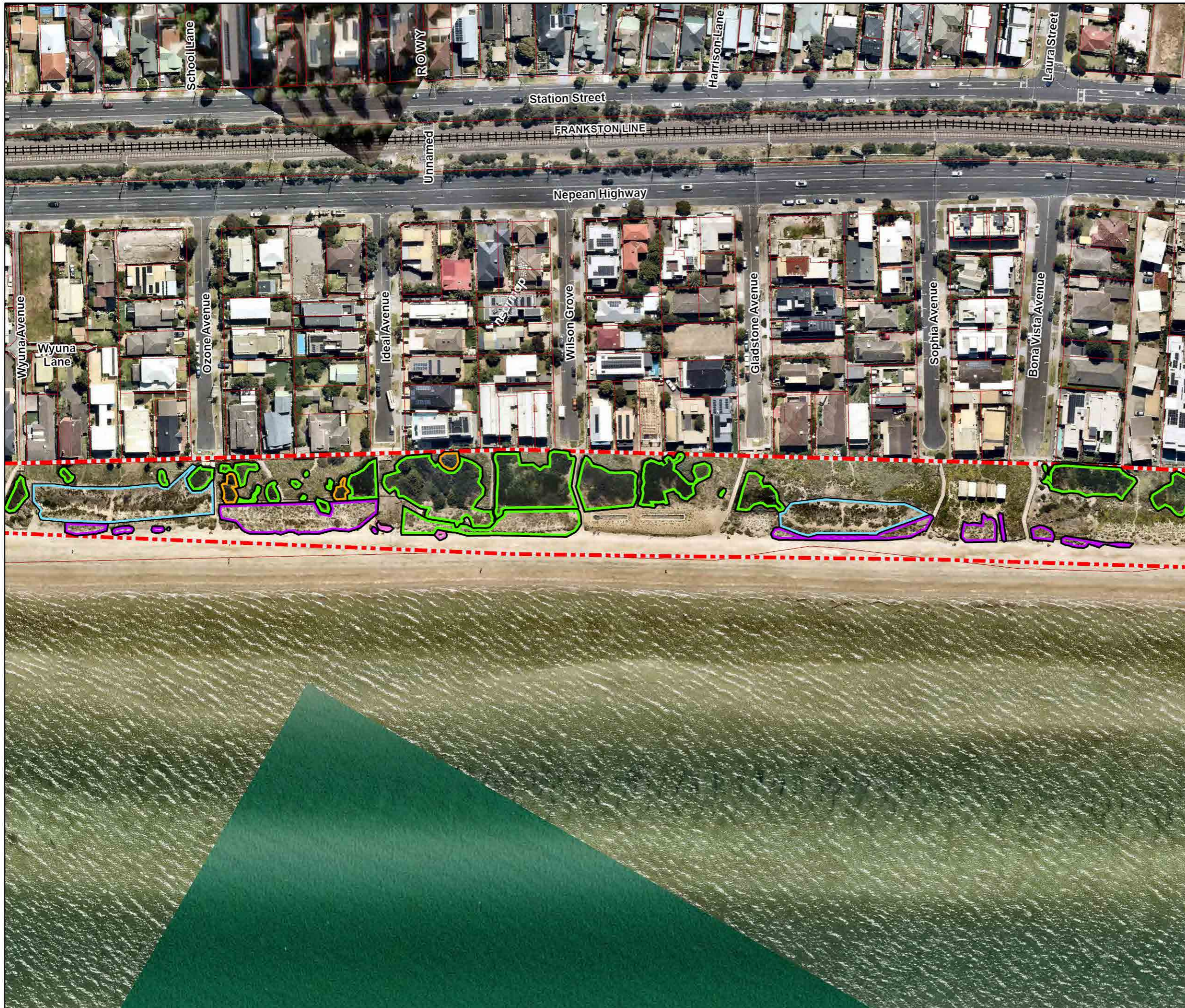
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 4 of 19



Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)

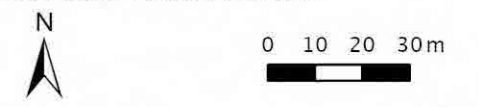
Other Vegetation

- Swale Plantings



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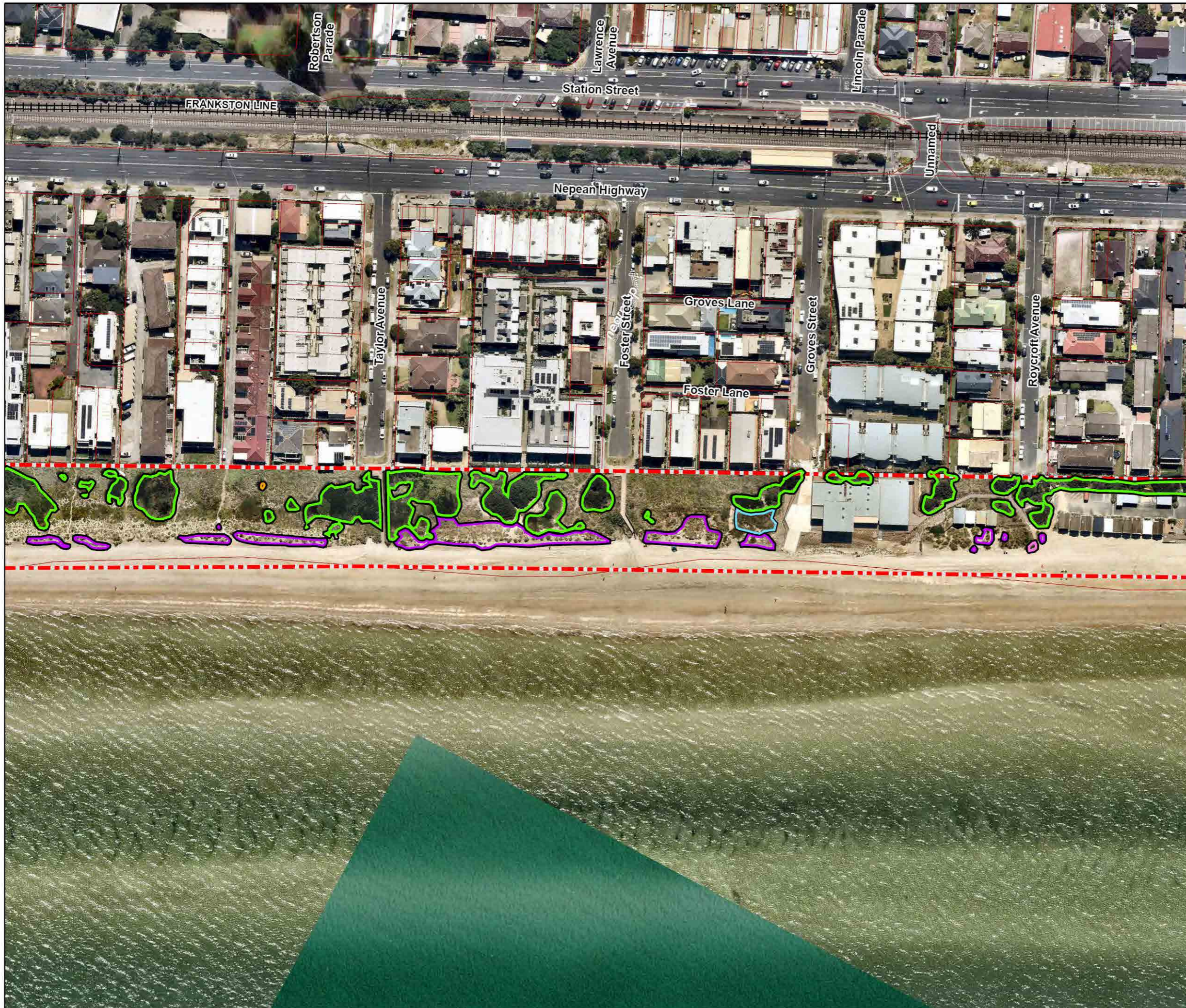
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 5 of 19



Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)

Other Vegetation

- Swale Plantings



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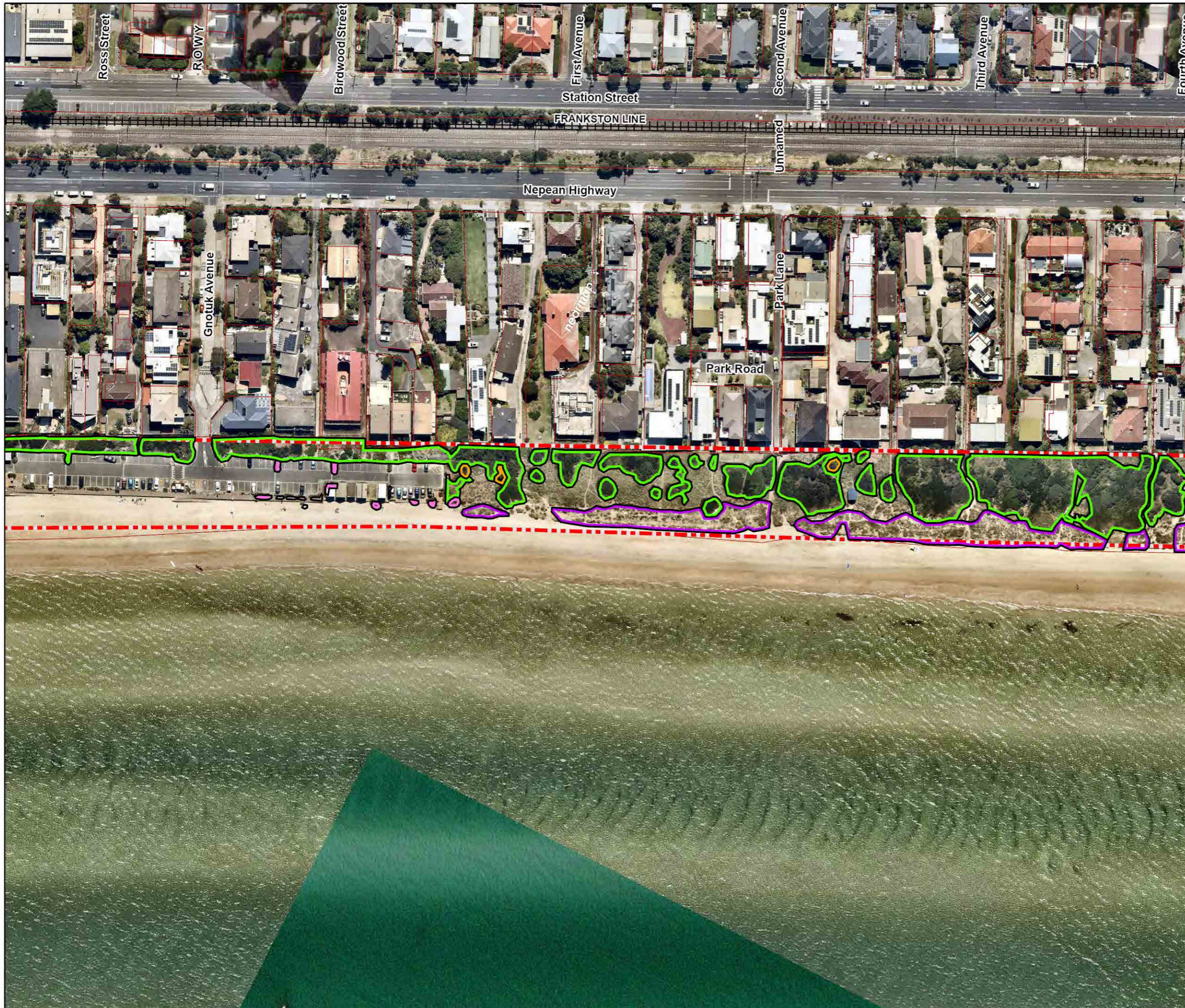
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 6 of 19



Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



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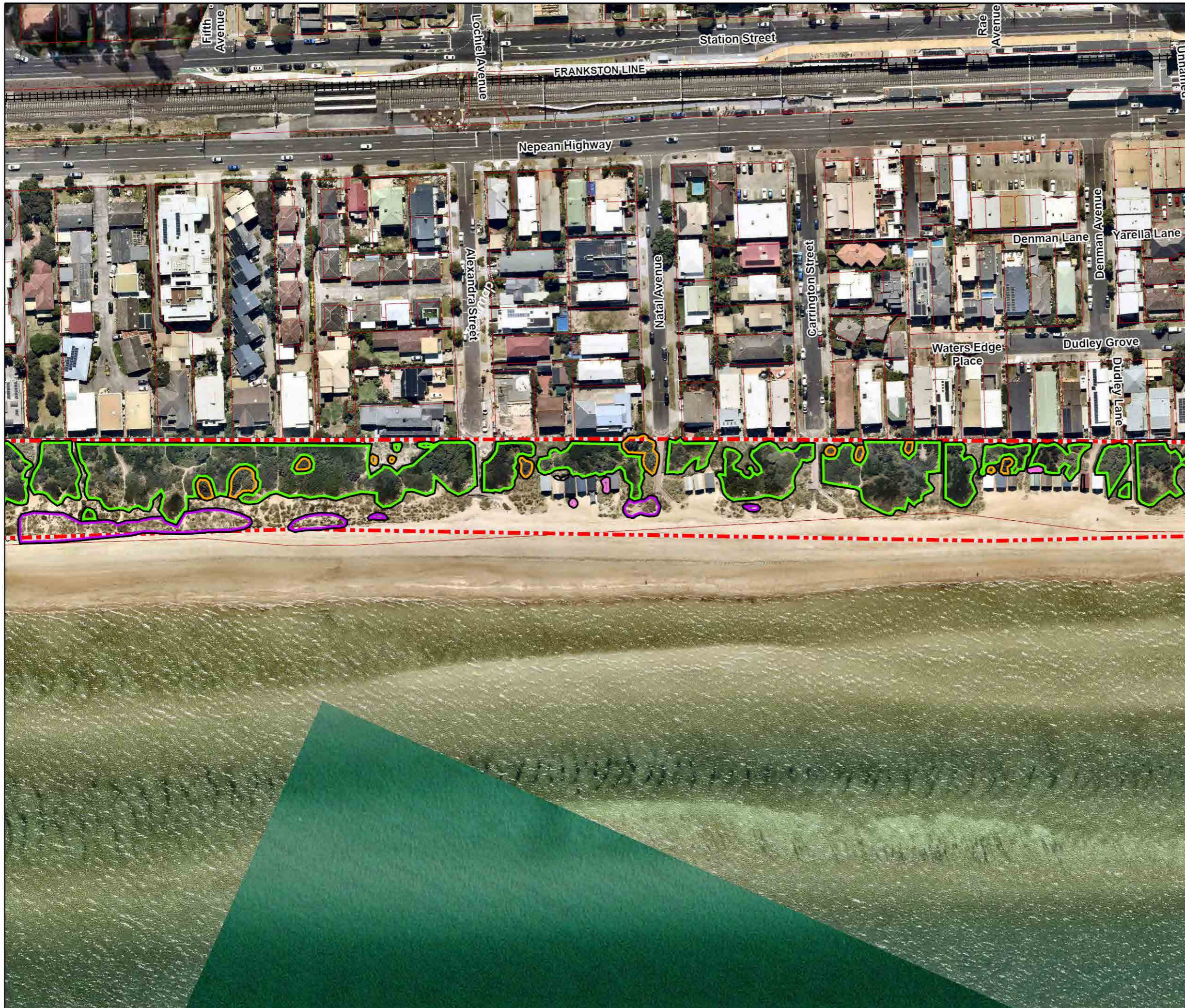
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 7 of 19



Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



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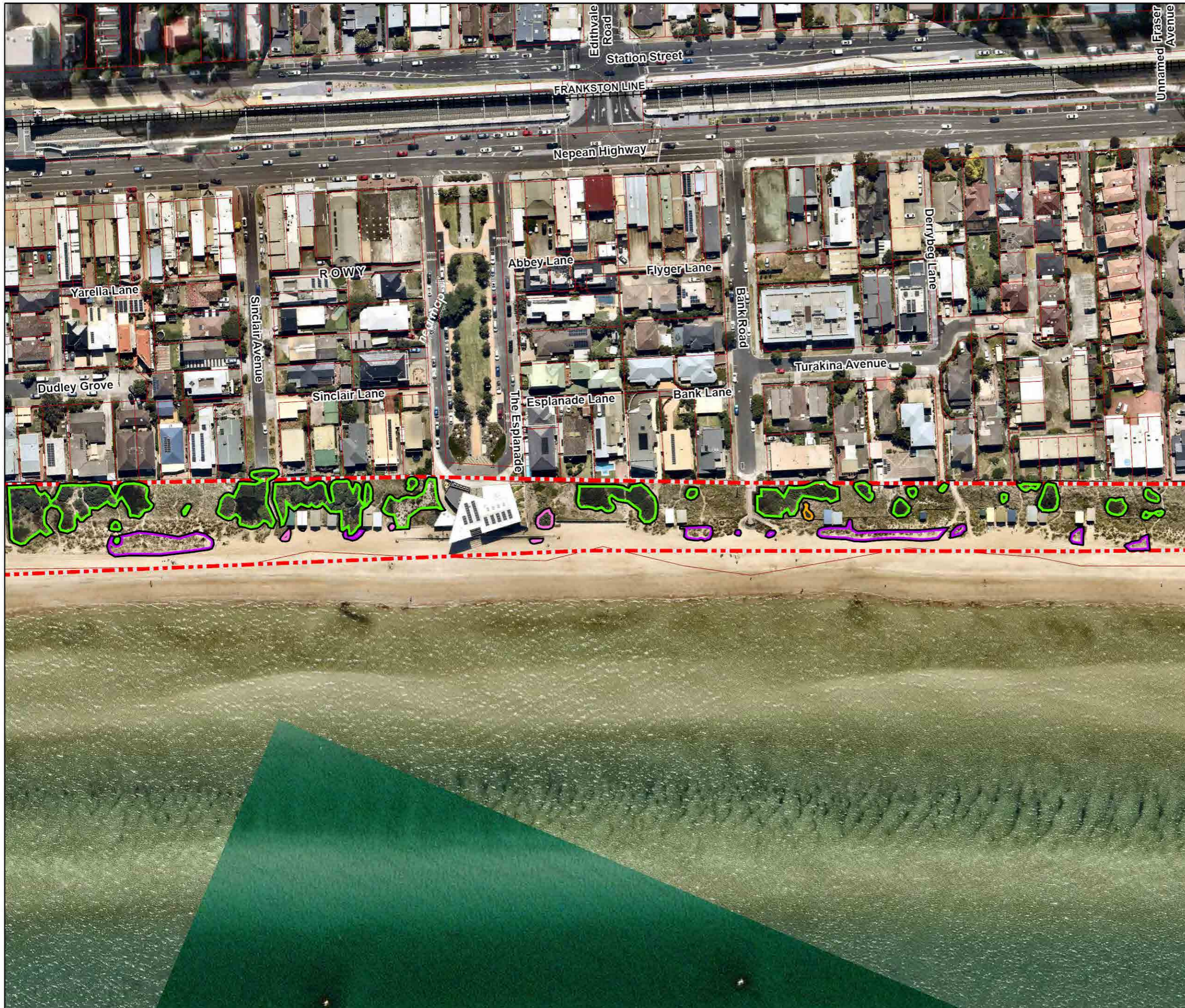
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Map 13. Foreshore South Reserve
 Kingston Natural Resources Area and Foreshores

Legend

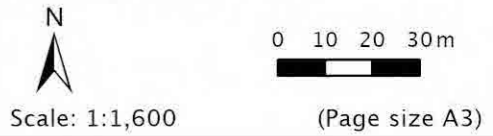
- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)

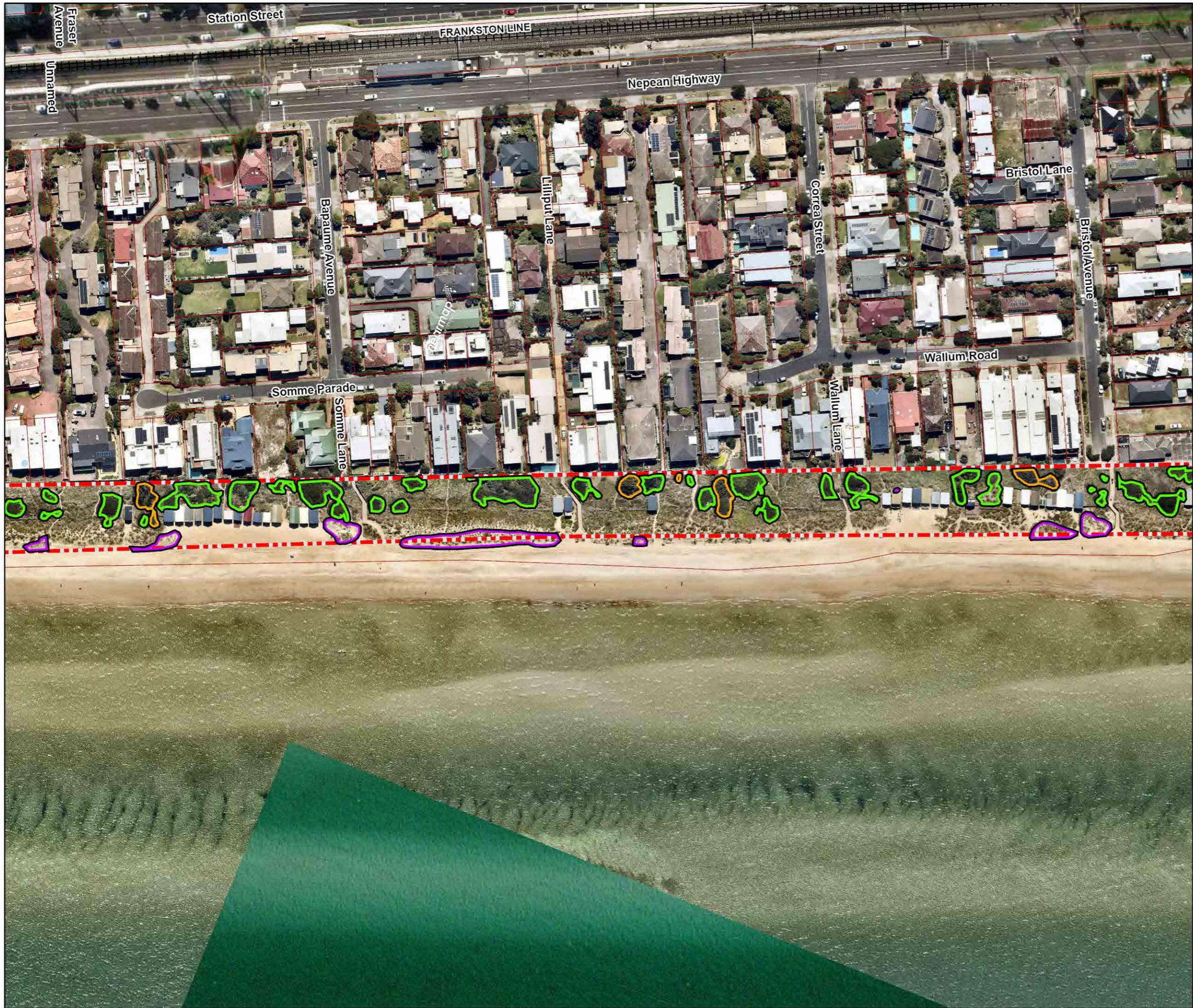


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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 9 of 19

Legend

- Assessment Area
- Parcels
- Railways

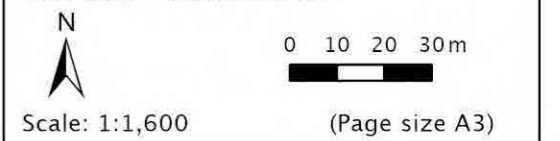
Habitat Zones

- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



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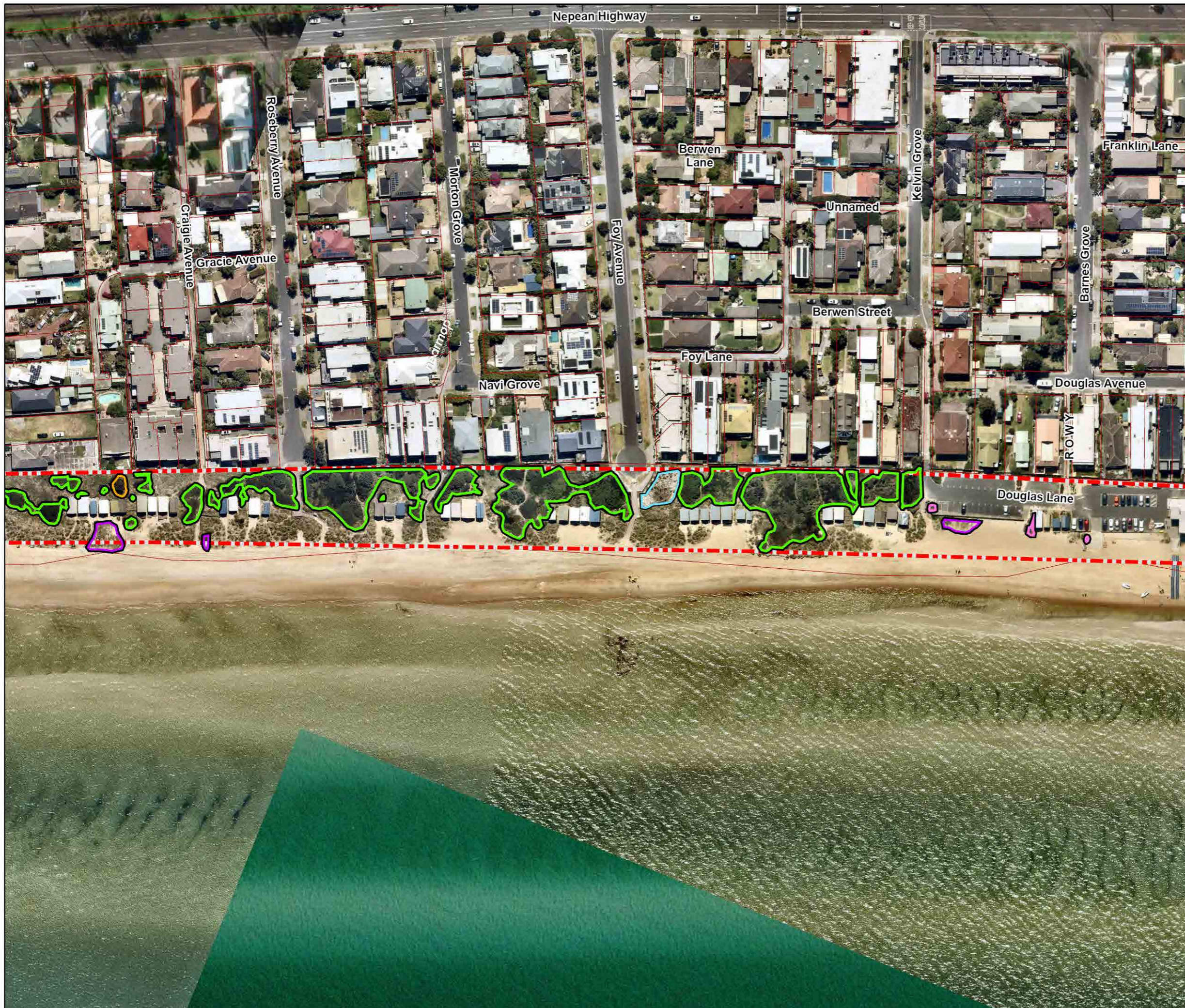
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 10 of 19



Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)

Other Vegetation

- Swale Plantings



Details

Mapping by: Ali Nia
 Date: 2/26/2024
 Version: 1
 Aerial photography from Nearmap (Dec. 2022).
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area
- Parcels

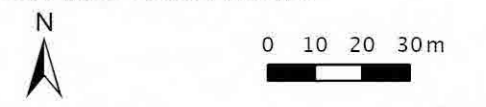
Habitat Zones

- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



Details

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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area
- Parcels

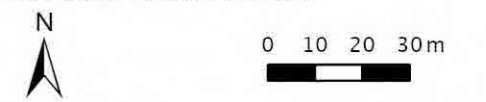
Habitat Zones

- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



Details

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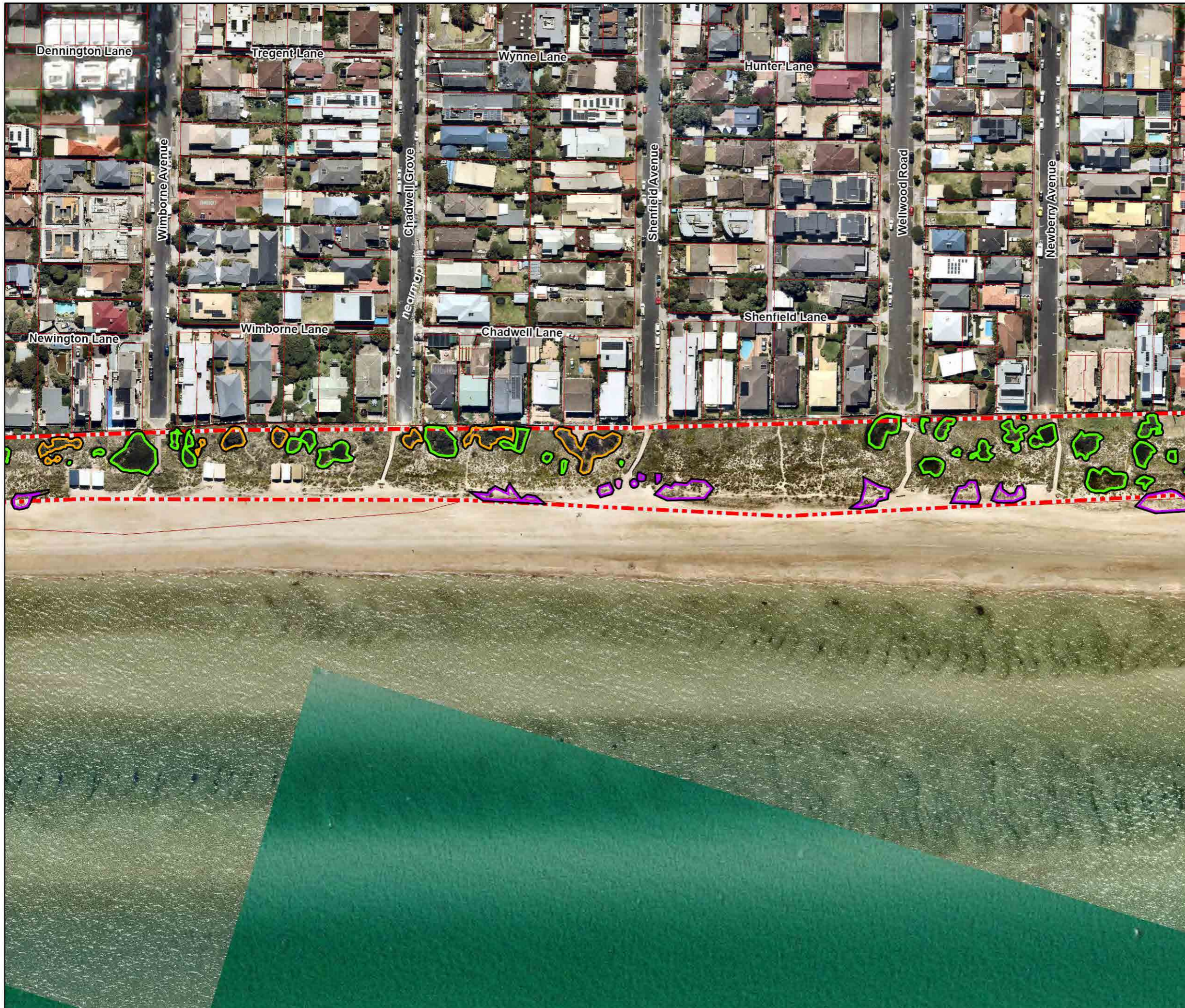
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area
- Parcels

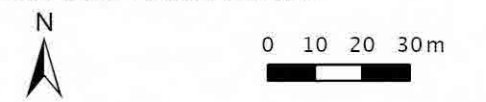
Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



Details

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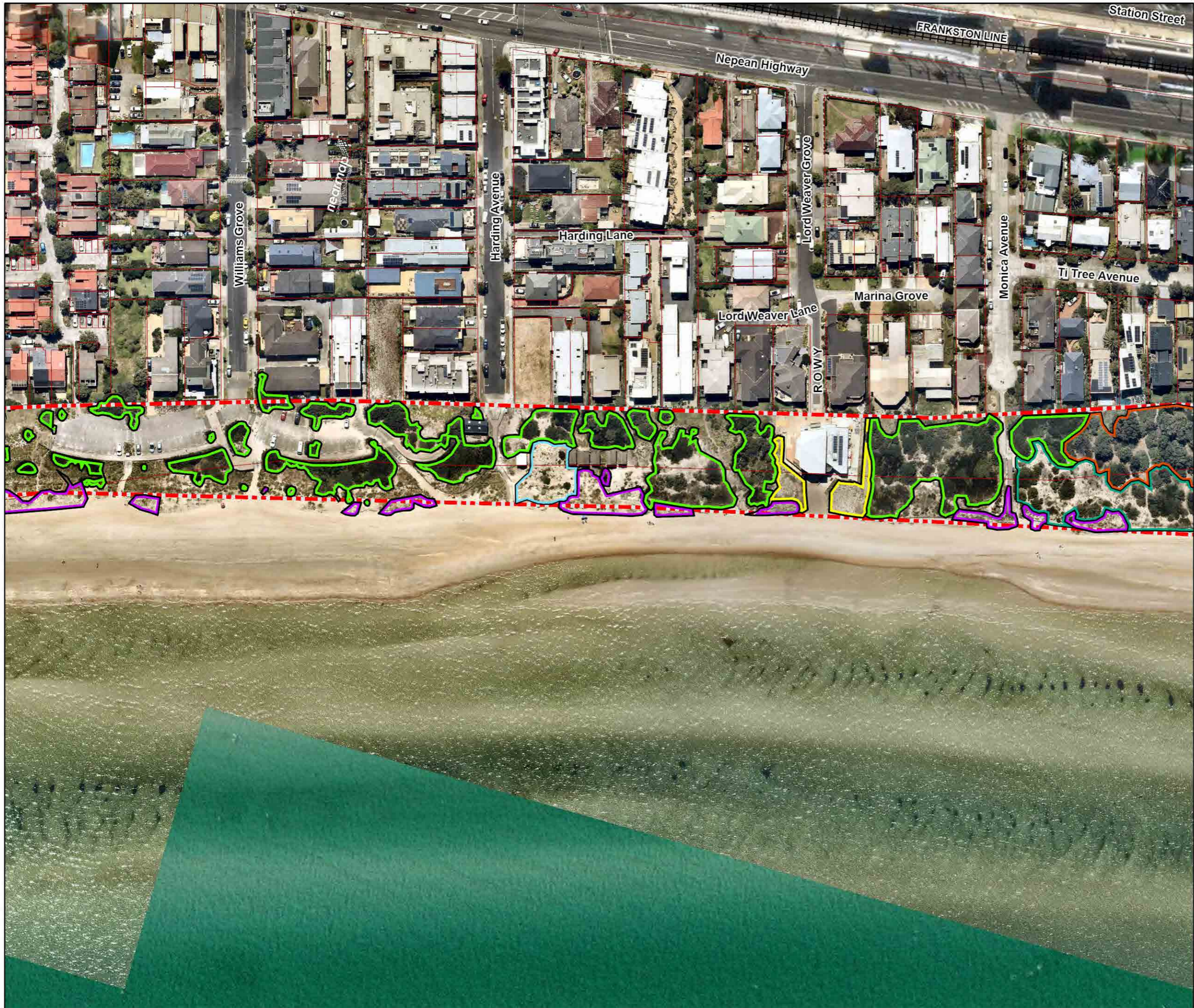


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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland
- Coast Banksia Woodland (HQ)

Other Vegetation

- Revegetation
- Swale Plantings



Details

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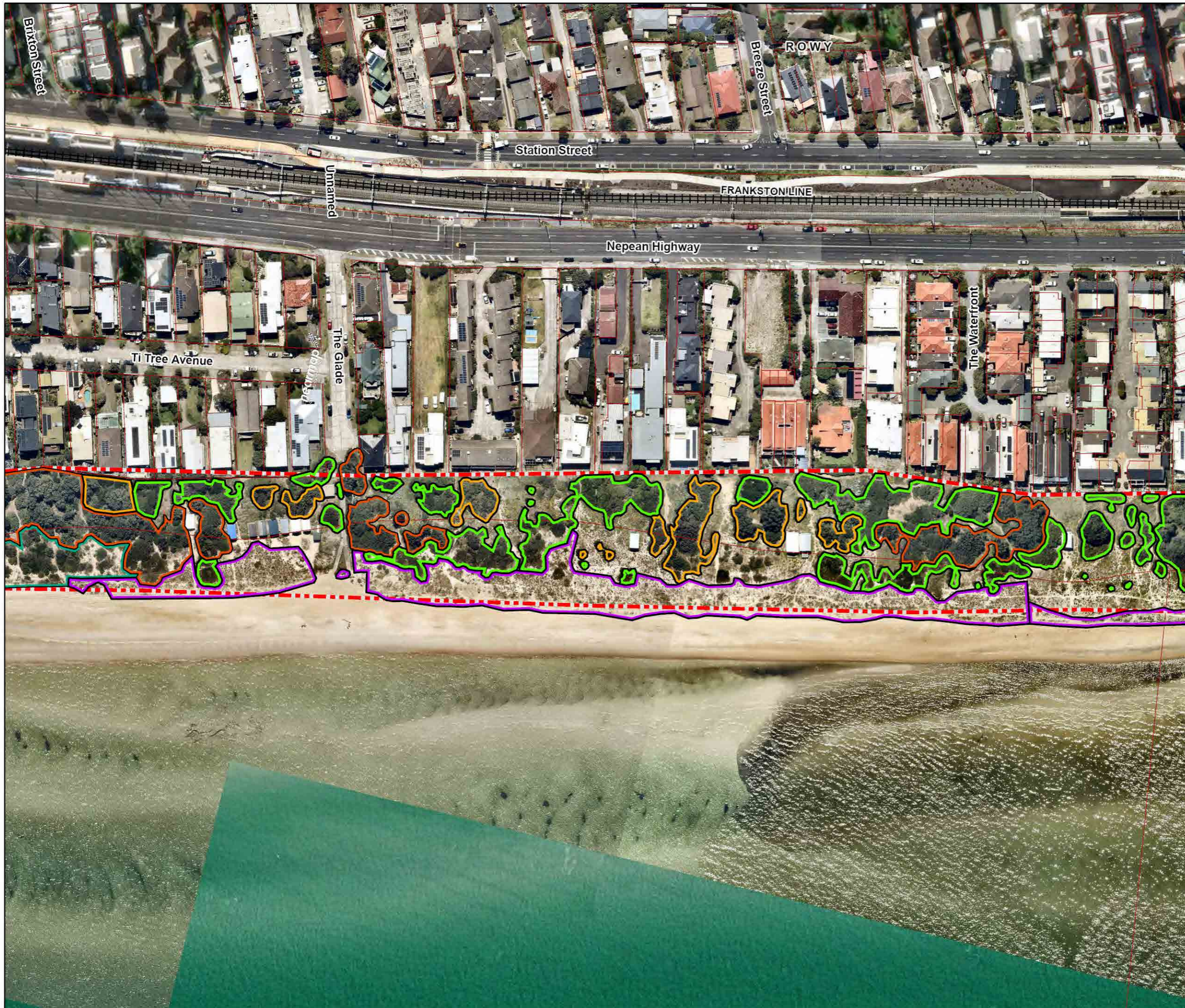
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Legend

- Assessment Area
- Parcels
- Railways

Habitat Zones

- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)
- Coast Banksia Woodland (HQ)



Details
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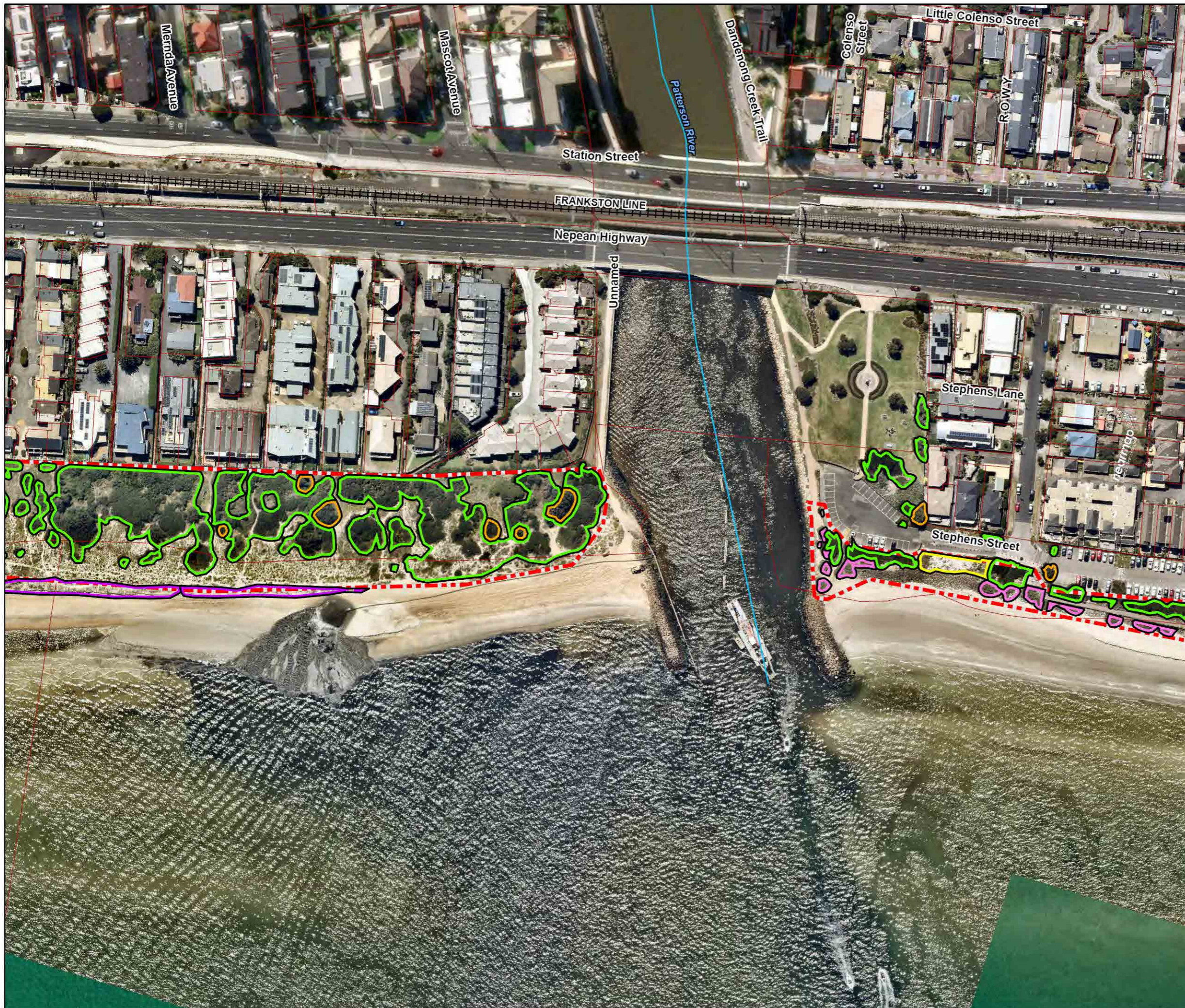
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area
- Parcels
- Constructed watercourse
- Railways

Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)

Other Vegetation

- Revegetation



Details

Mapping by: Ali Nia
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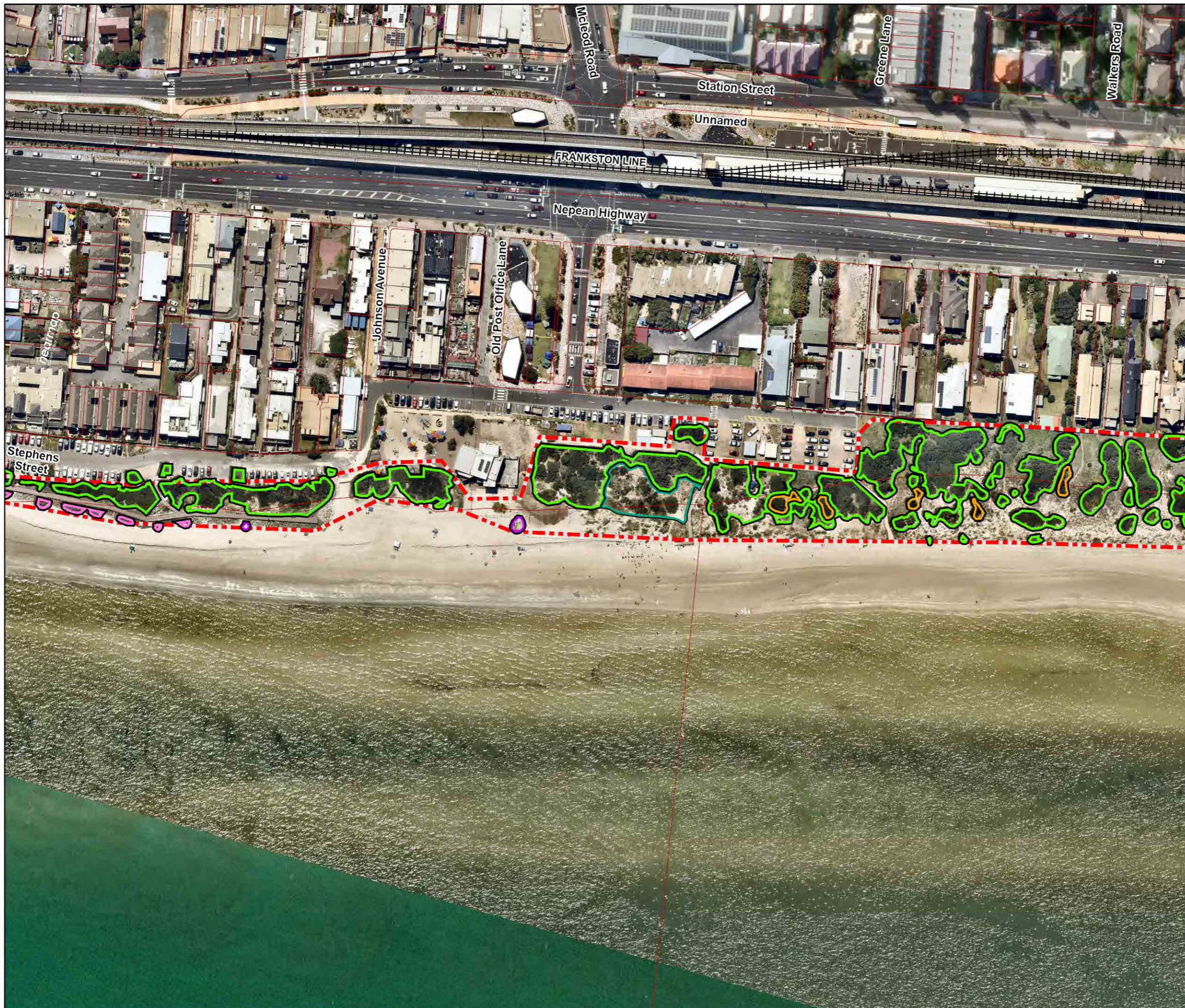
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

Page 17 of 19



Legend

- Assessment Area
- Parcels
- Railways

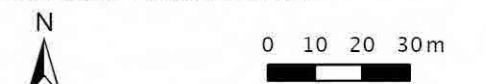
Habitat Zones

- Berm Grassy Scrubland
- Coastal Dune Scrubland (LQ/Closed)
- Coastal Dune Scrubland (HQ/Open)
- Coastal Dune Grassland
- Coast Banksia Woodland (LQ)



Details

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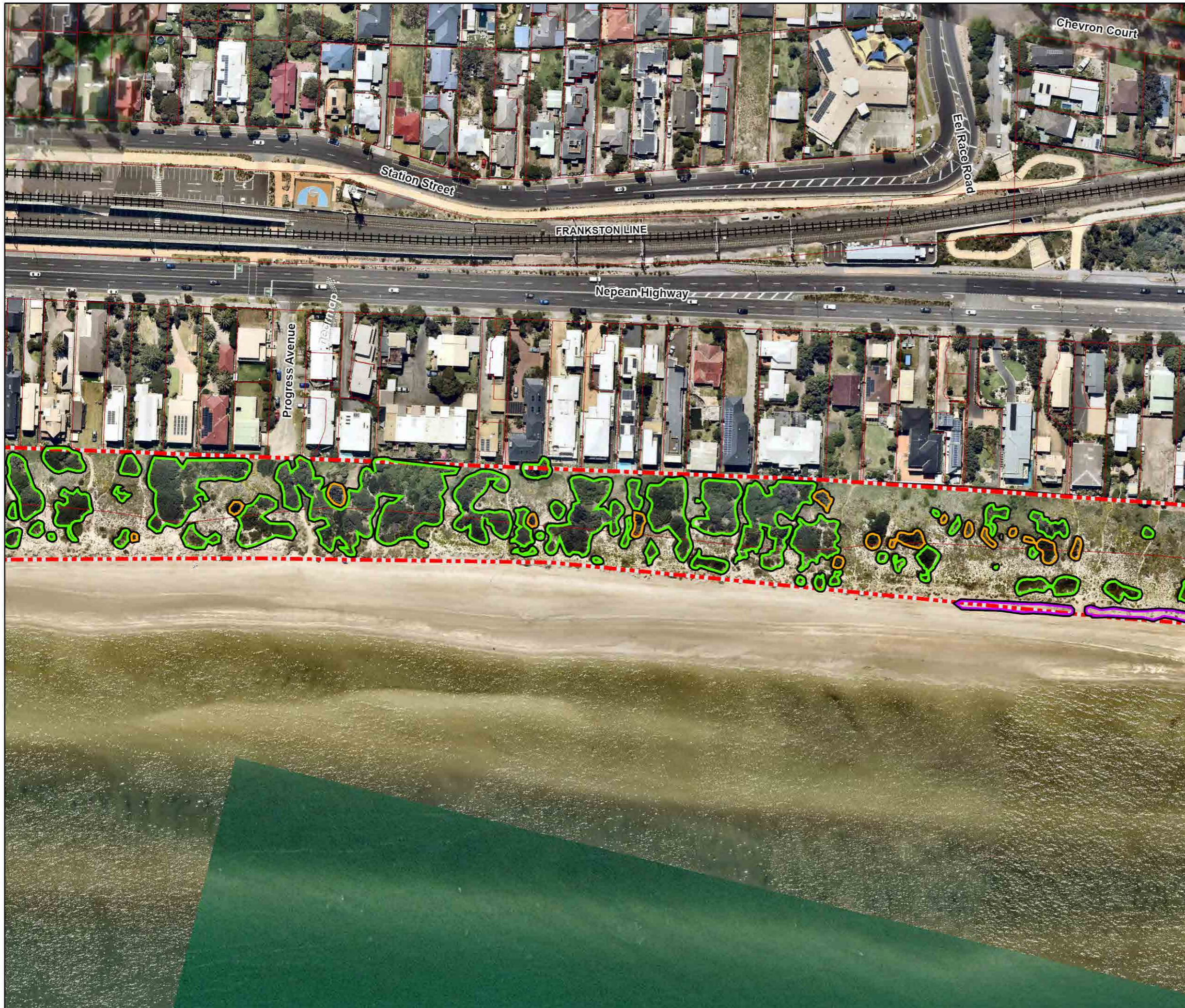
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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Legend

- Assessment Area (Red dashed line)
- Parcels (Thin grey line)
- Railways (Black line with cross-ticks)

Habitat Zones

- Coastal Dune Scrubland (LQ/Closed) (Green outline)
- Coastal Dune Grassland (Purple outline)
- Coast Banksia Woodland (LQ) (Orange outline)



Details

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Scale: 1:1,600 (Page size A3)

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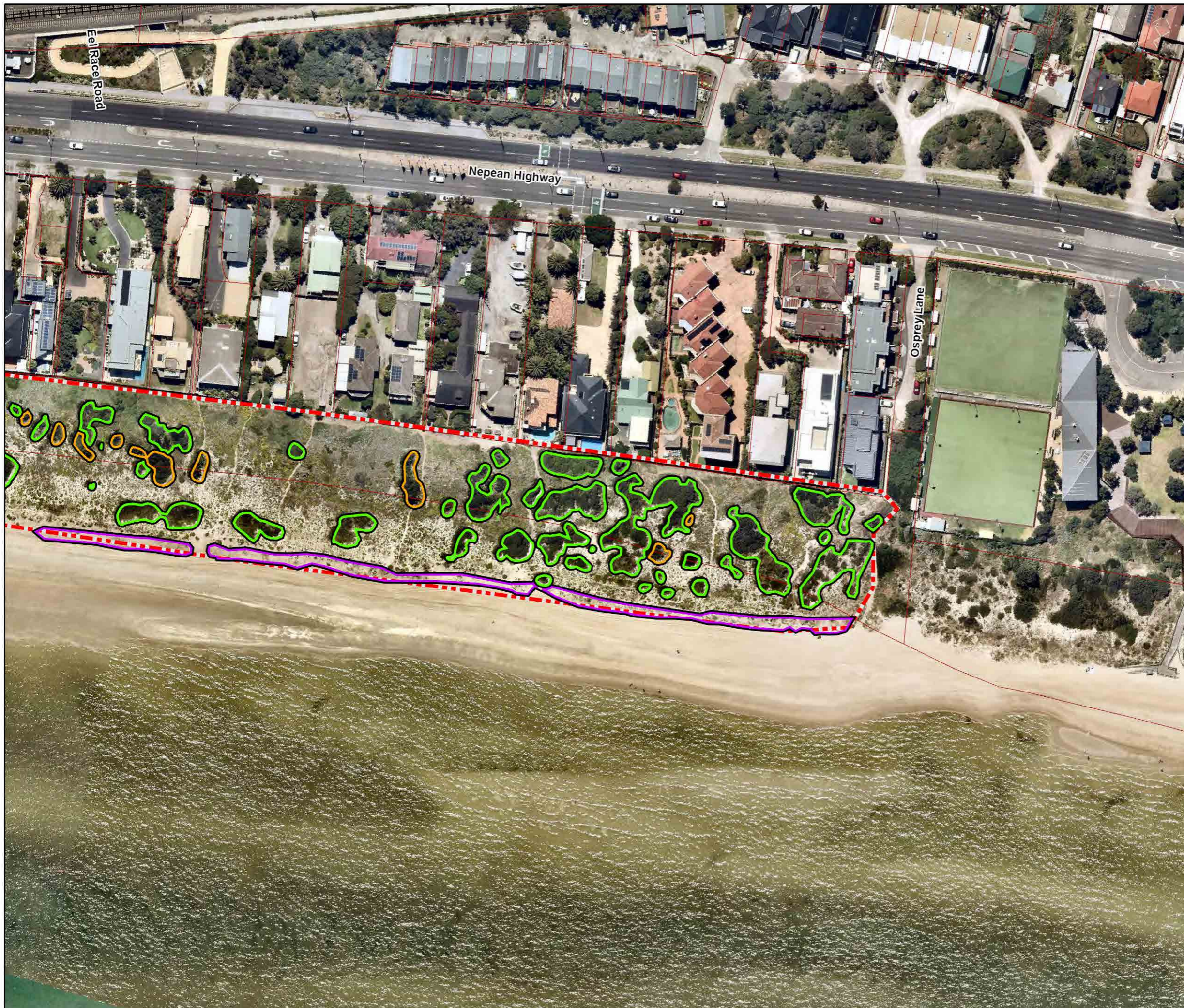
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Map 13. Foreshore South Reserve

Kingston Natural Resources Area and Foreshores

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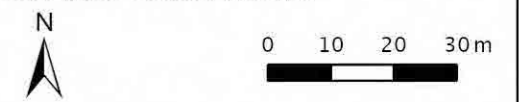
Legend

- Assessment Area (Red dashed line)
- Parcels (Thin red line)
- Railways (Black cross-hatch pattern)
- Habitat Zones**
 - Coastal Dune Scrubland (LQ/Closed) (Green outline)
 - Coastal Dune Grassland (Purple outline)
 - Coast Banksia Woodland (LQ) (Orange outline)



Details

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Appendix 3. Flora Lists

* Denotes exotic species

Denotes native species that are known to grow outside their natural range

^ EPBC Act and FFG Act listing status:

EPBC Act 1999: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant

FFG Act 1998: Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable, En(ExV): Endangered (extinct in Vic)

^^FFG Act Protected Flora includes:

- all members of the following plant families: Asteraceae, Epacridaceae, Orchidaceae,

- all members of the following genera: *Acacia* (excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon*, *Acacia paradoxa*), *Baeckea*, *Boronia*, *Calytrix*, *Gompholobium*, *Grevillea*, *Prostanthera*, *Sphagnum*, *Stydlidum*, *Thryptomene*, *Thysanotus*, *Xanthorrhoea*

- a number of plant taxa as listed at <https://www.environment.vic.gov.au/conserving-threatened-species/protected-flora-and-listed-fish>

- All protected species on public land require a permit for removal unless they are planted or cultivated. The FFG Act does not distinguish whether a species is within or outside its natural range.

Bald Hill Park

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act ^{^^} Protected Flora
Monocotyledons						
Asparagaceae		<i>Arthropodium strictum s.l.</i>	Chocolate Lily			
Cyperaceae		<i>Lepidosperma sieberi</i>	Sandhill Sword-sedge			
Hemerocallidaceae		<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily			
Iridaceae		<i>Patersonia occidentalis var. occidentalis</i>	Long Purple-flag			
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass			
Juncaceae		<i>Juncus amabilis</i>	Hollow Rush			
Juncaceae	#	<i>Juncus bufonius</i>	Toad Rush			
Juncaceae		<i>Juncus pallidus</i>	Pale Rush			
Juncaceae		<i>Juncus spp.</i>	Rush			
Poaceae		<i>Alra spp.</i>	Hair Grass			
Poaceae		<i>Austrostipa mollis</i>	Supple Spear-grass			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae		<i>Microlaena stipoides var. stipoides</i>	Weeping Grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			
Xanthorrhoeaceae		<i>Lomandra filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Xanthorrhoeaceae						Yes
Dicotyledons						
Anthemideae	#	<i>Cotula australis</i>	Common Cotula			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae						Yes
Asteraceae	#					Yes
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus asper s.l.</i>	Rough Sow-thistle			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Caryophyllaceae	*	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae		<i>Allocasuarina littoralis</i>	Black Sheoak			
Casuarinaceae		<i>Allocasuarina spp.</i>	Sheoak			
Crassulaceae		<i>Crassula sieberiana s.l.</i>	Sieber Crassula			
Euphorbiaceae		<i>Amperea xiphoclada var. xiphoclada</i>	Broom Spurge			
Fabaceae		<i>Aotus ericoides</i>	Common Aotus			
Fabaceae		<i>Dillwynia glaberrima</i>	Smooth Parrot-pea			
Fabaceae	*	<i>Vicia spp.</i>	Vetch			
Mimosaceae						Yes
Mimosaceae						Yes
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle			
Mimosaceae						Yes
Myrtaceae	#	<i>Eucalyptus botryoides</i>	Southern Mahogany			
Myrtaceae		<i>Eucalyptus spp.</i>	Eucalypt			
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum			
Myrtaceae		<i>Leptospermum continentale</i>	Prickly Tea-tree			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae		<i>Leptospermum myrsinoides</i>	Heath Tea-tree			
Oleaceae	*	<i>Fraxinus spp.</i>	Ash			
Onagraceae		<i>Epilobium billardiereanum</i>	Variable Willow-herb			
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory			
Proteaceae		<i>Hakea spp.</i>	Hakea			
Rutaceae						Yes
Thymelaeaceae		<i>Pimelea humilis</i>	Common Rice-flower			

Bradshaw Bushland Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFCA	FFG Act Protected Flora
Monocotyledons						
Cyperaceae		<i>Cyperus</i> spp.	Flat Sedge			
Cyperaceae		<i>Lepidosperma sieberi</i>	Sandhill Sword-sedge			
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella brevicaulis</i>	Small-flower Flax-lily			
Hemerocallidaceae		<i>Dianella</i> spp.	Flax Lily			
Juncaceae		<i>Juncus pallidus</i>	Pale Rush			
Poaceae		<i>Austrostipa mollis</i>	Supple Spear-grass			
Poaceae		<i>Avena</i> spp.	Oat			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae	#	<i>Cynodon dactylon</i>	Couch			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae		<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass			
Poaceae		<i>Poa</i> spp.	Tussock Grass			
Poaceae		<i>Rytidosperma</i> spp.	Wallaby Grass			
Poaceae		<i>Themeda triandra</i>	Kangaroo Grass			
Poaceae	*	<i>Vulpia</i> spp.	Fescue			
Xanthorrhoeaceae		<i>Lomandra filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Splny-headed Mat-rush			
Dicotyledons						
Anthemideae	#	<i>Cotula australis</i>	Common Cotula			
Asteraceae	#					Yes
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Caryophyllaceae	*	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae		<i>Allocasuarina</i> spp.	Sheoak			
Casuarinaceae		<i>Allocasuarina verticillata</i>	Drooping Sheoak			
Chenopodiaceae		<i>Einadia nutans</i>	Nodding Saltbush			
Chenopodiaceae		<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>	Seaberry Saltbush			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Fabaceae		<i>Bossiaea cinerea</i>	Showy Bossiaea			
Fabaceae		<i>Platylobium obtusangulum</i>	Common Flat-pea			
Haloragaceae		<i>Gonocarpus</i> spp.	Raspwort			
Mimosaceae		<i>Acacia dealbata</i>	Silver Wattle			
Mimosaceae						Yes
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle			
Mimosaceae						Yes
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red-gum			
Myrtaceae		<i>Eucalyptus</i> spp.	Eucalypt			
Myrtaceae		<i>Eucalyptus viminalis</i> subsp. <i>pryoriana</i>	Coast Manna-gum			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae	#	<i>Melaleuca ericifolia</i>	Swamp Paperbark			
Myrtaceae		<i>Melaleuca</i> spp.	Honey-myrtle			
Myrtaceae						Yes
Onagraceae		<i>Epilobium billardiereanum</i>	Variable Willow-herb			
Oxalidaceae		<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel			
Oxalidaceae	*	<i>Oxalis pes-caprae</i>	Soursob			
Papaveraceae	*	<i>Fumaria muralis</i> subsp. <i>muralis</i>	Wall Fumitory			
Pittosporaceae		<i>Billardiera mutabilis</i>	Common Apple-berry			
Pittosporaceae		<i>Bursaria spinosa</i>	Sweet Bursaria			
Plantaginaceae	*	<i>Plantago lanceolata</i>	Ribwort			
Polygonaceae	*	<i>Polygonum aviculare</i> s.l.	Prostrate Knotweed			
Portulacaceae	#	<i>Portulaca oleracea</i>	Common Purslane			
Proteaceae		<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia			
Ranunculaceae		<i>Clematis declivens</i>	Slender Clematis			
Rosaceae		<i>Acaena echinata</i>	Sheep's Burr			
Rosaceae	*	<i>Rosa</i> spp.	Rose			
Rosaceae	*	<i>Rubus fruticosus</i> spp. <i>agg.</i>	Blackberry			
Rosaceae		<i>Rubus parvifolius</i>	Small-leaf Bramble			
Santalaceae		<i>Exocarpos cupressiformis</i>	Cherry Ballart			
Solanaceae		<i>Solanum laciniatum</i>	Large Kangaroo Apple			

Caruana Woodland Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Monocotyledons						
Alliaceae	*	<i>Allium triquetrum</i>	Angled Onion			
Cyperaceae		<i>Carex inversa</i>	Knob Sedge			
Cyperaceae		<i>Carex spp.</i>	Sedge			
Cyperaceae	*	<i>Cyperus eragrostis</i>	Drain Flat-sedge			
Cyperaceae		<i>Isolepis spp.</i>	Club Sedge			
Cyperaceae		<i>Schoenus apogon</i>	Common Bog-sedge			
Juncaceae		<i>Juncus spp.</i>	Rush			
Poaceae	+	<i>Agrostis capillaris</i>	Brown-top Bent			
Poaceae		<i>Amphibromus spp.</i>	Swamp Wallaby-grass			
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae		<i>Bromus spp.</i>	Brome			
Poaceae	*	<i>Cenchrus clandestinus</i>	Kikuyu			
Poaceae	+	<i>Dactylis glomerata</i>	Cocksfoot			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae	+	<i>Elymus spp.</i>	Couch			
Poaceae	*	<i>Festuca arundinacea</i>	Tall Fescue			
Poaceae		<i>Hemarthria uncinata var. uncinata</i>	Mat Grass			
Poaceae	+	<i>Holcus spp.</i>	Fog Grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae		<i>Poa labillardierei</i>	Common Tussock-grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Dicotyledons						
Asteraceae						Yes
Asteraceae	*	<i>Helminthotheca echioides</i>	Ox-tongue			
Asteraceae	*	<i>Lactuca serriola</i>	Prickly Lettuce			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Fabaceae	*	<i>Trifolium angustifolium var. angustifolium</i>	Narrow-leaf Clover			
Fabaceae		<i>Vicia sativa</i>	Common Vetch			
Fabaceae		<i>Viminaria juncea</i>	Golden Spray			
Geraniaceae	*	<i>Geranium dissectum</i>	Cut-leaf Crane's-bill			
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia			
Lythraceae		<i>Lythrum spp.</i>	Loosestrife			
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae						Yes
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red-gum			
Myrtaceae		<i>Leptospermum continentale</i>	Prickly Tea-tree			
Oleaceae	*	<i>Fraxinus angustifolia</i>	Desert Ash			
Onagraceae		<i>Epilobium spp.</i>	Willow Herb			
Plantaginaceae	*	<i>Callitriche stagnalis</i>	Common Water-starwort			
Plantaginaceae	*	<i>Plantago lanceolata</i>	Ribwort			
Polygonaceae		<i>Persicaria decipiens</i>	Slender Knotweed			
Polygonaceae	*	<i>Rumex conglomeratus</i>	Clustered Dock			
Ranunculaceae	*	<i>Ranunculus repens</i>	Creeping Buttercup			
Rosaceae		<i>Acaena novae-zelandiae</i>	Bidgee-widgee			
Rosaceae	*	<i>Rubus fruticosus spp. agg.</i>	Blackberry			
Rubiaceae	*	<i>Gallium aparine</i>	Cleavers			

Epsom Grassland

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Monocotyledons						
Cyperaceae						Yes**
Cyperaceae						Yes**
Cyperaceae						Yes**
Cyperaceae						Yes**
Iridaceae	*	<i>Gladiolus spp.</i>	Gladiolus			
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass			
Iridaceae	*	<i>Sisyrinchium micranthum</i>	Striped Rush-leaf			
Juncaceae						Yes**
Juncaceae						Yes**
Orchidaceae						Yes***
Orchidaceae						Yes***
Poaceae	*	<i>Alra caryophyllea subsp. caryophyllea</i>	Silvery Hair-grass			
Poaceae						Yes**
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae						Yes**
Poaceae	*	<i>Avena fatua</i>	Wild Oat			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae	*	<i>Briza minor</i>	Lesser Quaking-grass			
Poaceae	*	<i>Dactylis glomerata</i>	Cocksfoot			
Poaceae						Yes**
Poaceae						Yes**
Poaceae	*	<i>Elymus repens</i>	English Couch			
Poaceae	*	<i>Festuca arundinacea</i>	Tall Fescue			
Poaceae						Yes**
Poaceae	*	<i>Holcus lanatus</i>	Yorkshire Fog			
Poaceae						Yes**
Poaceae						Yes**
Poaceae	*	<i>Paspalum dilatatum</i>	Paspalum			
Poaceae						Yes**
Poaceae	*	<i>Poa annua s.s.</i>	Annual Meadow-grass			
Poaceae						Yes**
Poaceae						Yes**
Poaceae						Yes**
Poaceae	*	<i>Sporobolus africanus</i>	Rat-tail Grass			
Poaceae						Yes**
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			
Xanthorrhoeaceae						Yes**
Dicotyledons						
Apiaceae	*	<i>Daucus carota</i>	Carrot			
Asteraceae		<i>Brachyscome spp.</i>	Daisy			Yes***
Asteraceae		<i>Coronidium gunnianum</i>	Pale Swamp Everlasting		Cr	Yes***
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae	*	<i>Leontodon saxatilis subsp. saxatilis</i>	Hairy Hawkbit			
Asteraceae	*	<i>Sonchus asper s.s.</i>	Rough Sow-thistle			
Brassicaceae	*	<i>Brassica spp.</i>	Turnip			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			Yes**
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Gentianaceae	*	<i>Centaurium erythraea</i>	Common Centaury			
Geraniaceae		<i>Geranium spp.</i>	Crane's Bill			Yes**
Goodeniaceae		<i>Goodenia radicans</i>	Shiny Swamp-mat			Yes**
Hypericaceae		<i>Hypericum gramineum</i>	Small St John's Wort			Yes**
Lythraceae		<i>Lythrum hyssopifolia</i>	Small Loosestrife			Yes**
Plantaginaceae		<i>Plantago gaudichaudii</i>	Narrow Plantain			Yes**
Plantaginaceae	*	<i>Plantago lanceolata</i>	Ribwort			Yes**
Plantaginaceae		<i>Veronica gracilis</i>	Slender Speedwell			Yes**
Rubiaceae	*	<i>Galium aparine</i>	Cleavers			
Thymelaeaceae		<i>Pimelea glauca</i>	Smooth Rice-flower			Yes**

** These species were protected as they are part of the FFG Act listed community, *Herb-rich Plains Grassy Wetland (West Gippsland)*, or *Plains Grassland (South Gippsland) Community*.

***These species are declared protected flora under the FFG Act and also protected as they are part of the above FFG-listed community.

Groves Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Monocotyledons						
Alliaceae	*	<i>Agapanthus praecox subsp. orientalis</i>	Agapanthus			
Alliaceae	*	<i>Allium triquetrum</i>	Angled Onion			
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper			
Orchidaceae						Yes
Poaceae	*	<i>Avena spp.</i>	Oat			
Poaceae	*	<i>Bromus catharticus</i>	Prairie Grass			
Poaceae	*	<i>Cenchrus clandestinus</i>	Kikuyu			
Poaceae	#	<i>Cynodon dactylon</i>	Couch			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae	*	<i>Lagurus ovatus</i>	Hare's-tail Grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae	*	<i>Sporobolus africanus</i>	Rat-tail Grass			
Dicotyledons						
Alzooaceae	*	<i>Alzoon pubescens</i>	Galenia			
Alzooaceae	*	<i>Drosanthemum candens</i>	Rodondo Creeper			
Anthemideae	#	<i>Cotula australis</i>	Common Cotula			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae	*	<i>Delairea odorata</i>	Cape Ivy			
Asteraceae	*	<i>Gazania spp.</i>	Gazania			
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae	*	<i>Sonchus asper s.l.</i>	Rough Sow-thistle			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Calenduleae		<i>Dimorphotheca fruticosa</i>	Trailing African Daisy			
Caryophyllaceae	*	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae	*	<i>Allocasuarina spp.</i>	Sheoak			
Casuarinaceae	*	<i>Allocasuarina verticillata</i>	Drooping Sheoak			
Chenopodiaceae	*	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush			
Convolvulaceae	*	<i>Dichondra repens</i>	Kidney-weed			
Euphorbiaceae	*	<i>Euphorbia peplus</i>	Petty Spurge			
Fabaceae	*	<i>Lotus spp.</i>	Trefoil			
Geraniaceae	*	<i>Pelargonium spp.</i>	Stork's Bill			
Malvaceae	*	<i>Malva spp.</i>	Mallow			
Mimosaceae	#					Yes
Mimosaceae	#					Yes
Myrtaceae	#	<i>Eucalyptus botryoides</i>	Southern Mahogany			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae	#					
Oxalidaceae	*	<i>Oxalis pes-caprae</i>	Soursob		En	Yes
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory			
Plantaginaceae	*	<i>Plantago coronopus</i>	Buck's-horn Plantain			
Proteaceae	*	<i>Banksia integrifolia subsp. integrifolia</i>	Coast Banksia			
Rosaceae	*	<i>Cotoneaster spp.</i>	Cotoneaster			
Rubiaceae	*	<i>Coprosma repens</i>	Mirror Bush			
Rubiaceae	*	<i>Gallium aparine</i>	Cleavers			
Solanaceae	*	<i>Lycium ferocissimum</i>	African Box-thorn			
Solanaceae	*	<i>Salpichroa origanifolia</i>	Pampas Lily-of-the-Valley			
Solanaceae	*	<i>Solanum nigrum s.l.</i>	Black Nightshade			

Heights Park

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Ferns and Allies						
Dennstaedtiaceae		<i>Peridium esculentum subsp. esculentum</i>	Austral Bracken			
Monocotyledons						
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella longifolia s.l.</i>	Pale Flax-lily			
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass			
Juncaceae		<i>Juncus spp.</i>	Rush			
Poaceae	*	<i>Aira caryophylla subsp. caryophylla</i>	Silvery Hair-grass			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae		<i>Microlaena stipoides var. stipoides</i>	Weeping Grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Dicotyledons						
Araliaceae		<i>Trachymene composita</i>	Parsnip Trachymene			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae	#	[REDACTED]	[REDACTED]			Yes
Asteraceae	*	<i>Erigeron spp.</i>	Fleabane			
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae		[REDACTED]	[REDACTED]			Yes
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Caryophyllaceae	*	<i>Cerastium glomeratum s.s.</i>	Sticky Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae		<i>Allocasuarina verticillata</i>	Drooping Sheoak			
Crassulaceae		<i>Crassula spp.</i>	Crassula			
Dilleniaceae		<i>Hibbertia fasciculata var. prostrata</i>	Bundled Guinea-flower			
Euphorbiaceae		<i>Amperea xiphioclada var. xiphioclada</i>	Broom Spurge			
Fabaceae		<i>Bossiaea cinerea</i>	Showy Bossiaea			
Fabaceae		<i>Dillwynia spp.</i>	Parrot Pea			
Fabaceae	*	<i>Trifolium angustifolium var. angustifolium</i>	Narrow-leaf Clover			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Mimosaceae		<i>Acacia implexa</i>	Lightwood			
Mimosaceae		[REDACTED]	[REDACTED]			Yes
Mimosaceae		[REDACTED]	[REDACTED]			Yes
Mimosaceae		[REDACTED]	[REDACTED]			Yes
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum			
Myrtaceae		<i>Kunzea leptospermoides</i>	Yarra Burgan			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae		<i>Leptospermum myrsinoides</i>	Heath Tea-tree			
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory			
Polygonaceae	*	<i>Acetosella vulgaris</i>	Sheep Sorrel			
Proteaceae		<i>Banksia integrifolia subsp. integrifolia</i>	Coast Banksia			
Solanaceae		<i>Solanum laciniatum</i>	Large Kangaroo Apple			
Solanaceae	*	<i>Solanum nigrum s.s.</i>	Black Nightshade			

Kingston Heath Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Ferns and Allies						
Dennstaedtiaceae		<i>Preridium esculentum subsp. esculentum</i>	Austral Bracken			
Monocotyledons						
Cyperaceae		<i>Bolboschoenus caldwellii</i>	Salt Club-sedge			
Cyperaceae		<i>Carex appressa</i>	Tall Sedge			
Cyperaceae		<i>Carex spp.</i>	Sedge			
Cyperaceae		<i>Eleocharis acuta</i>	Common Spike-sedge			
Cyperaceae		<i>Lepidosperma spp.</i>	Sword Sedge			
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella tasmanica</i>	Tasman Flax-lily			
Juncaceae	#	<i>Juncus bufonius</i>	Toad Rush			
Juncaceae		<i>Juncus pallidus</i>	Pale Rush			
Juncaceae		<i>Juncus spp.</i>	Rush			
Juncaginaceae		<i>Cynogeton procerum s.s.</i>	Common Water-ribbons			
Poaceae		<i>Austrostipa mollis</i>	Supple Spear-grass			
Poaceae	*	<i>Bromus catharticus</i>	Prairie Grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae	*	<i>Holcus lanatus</i>	Yorkshire Fog			
Poaceae		<i>Microlaena stipoides var. stipoides</i>	Weeping Grass			
Poaceae		<i>Poa labillardierei</i>	Common Tussock-grass			
Poaceae		<i>Poa sieberiana</i>	Grey Tussock-grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae	*	<i>Vulpia spp.</i>	Fescue			
Typhaceae		<i>Typha spp.</i>	Bulrush			
Xanthorrhoeaceae		<i>Lomandra filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Dicotyledons						
Aizoaceae	*	<i>Aizoon pubescens</i>	Galenia			
Anthemideae	#	<i>Cotula australis</i>	Common Cotula			
Anthemideae	*	<i>Cotula coronopifolia</i>	Water Buttons			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae						Yes
Asteraceae	#					Yes
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus asper s.l.</i>	Rough Sow-thistle			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Caryophyllaceae	*	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae		<i>Allocasuarina spp.</i>	Sheoak			
Chenopodiaceae		<i>Einadia nutans</i>	Nodding Saltbush			
Chenopodiaceae		<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush			
Crassulaceae		<i>Crassula sieberiana s.l.</i>	Sieber Crassula			
Fabaceae		<i>Lotus spp.</i>	Trefoil			
Fabaceae	*	<i>Trifolium spp.</i>	Clover			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia			
Malvaceae	*	<i>Malva parviflora</i>	Small-flower Mallow			
Malvaceae		<i>Malva spp.</i>	Mallow			
Mimosaceae		<i>Acacia implexa</i>	Lightwood			
Mimosaceae	#					Yes
Mimosaceae						Yes
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae	*	<i>Acacia saligna</i>	Golden Wreath Wattle			
Mimosaceae						Yes
Mimosaceae						Yes
Myrtaceae		<i>Eucalyptus spp.</i>	Eucalypt			
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae	#	<i>Melaleuca ericifolia</i>	Swamp Paperbark			
Onagraceae		<i>Epilobium billardiereanum</i>	Variable Willow-herb			
Onagraceae		<i>Epilobium hirtigerum</i>	Hairy Willow-herb			
Papaveraceae	*	<i>Fumaria muralis subsp. muralis</i>	Wall Fumitory			
Pittosporaceae		<i>Billardiera mutabilis</i>	Common Apple-berry			
Pittosporaceae		<i>Bursaria spinosa</i>	Sweet Bursaria			
Polygonaceae	*	<i>Acetosella vulgaris</i>	Sheep Sorrel			
Polygonaceae		<i>Rumex spp.</i>	Dock			
Proteaceae		<i>Hakea spp.</i>	Hakea			
Ranunculaceae		<i>Clematis microphylla s.s.</i>	Small-leaved Clematis			

Kingston Bushland and Foreshore Areas - Habitat Hectare Assessments and EVC Mapping

Family	Origin	Scientific Name	Common Name	EPBC [^]	FFG [^]	FFG Act Protected Flora
Rosaceae		<i>Acaena novae-zelandiae</i>	Bidgee-widgee			
Solanaceae		<i>Solanum laciniatum</i>	Large Kangaroo Apple			
Solanaceae	*	<i>Solanum nigrum s.l.</i>	Black Nightshade			
Urticaceae		<i>Urtica spp.</i>	Nettle			

Mordialloc Creek Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Monocotyledons						
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper			
Cyperaceae		<i>Carex spp.</i>	Sedge			
Cyperaceae		<i>Ficinia nodosa</i>	Knobby Club-sedge			
Cyperaceae	*	<i>Isolepis levynsiana</i>	Tiny Flat-sedge			
Cyperaceae		<i>Isolepis marginata</i>	Little Club-sedge			
Cyperaceae		<i>Machaerina spp.</i>	Twig Sedge			
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella brevicaulis</i>	Small-flower Flax-lily			
Hemerocallidaceae		<i>Dianella longifolia var. longifolia s.l.</i>	Pale Flax-lily			
Juncaceae		<i>Juncus bufonius</i>	Toad Rush			
Juncaceae		<i>Juncus spp.</i>	Rush			
Juncaginaceae		<i>Cyanogeton procerum s.s.</i>	Common Water-ribbons			
Poaceae	*	<i>Alra caryophyllaea subsp. caryophyllaea</i>	Silvery Hair-grass			
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae	*	<i>Avena spp.</i>	Oat			
Poaceae	*	<i>Briza minor</i>	Lesser Quaking-grass			
Poaceae		<i>Bromus spp.</i>	Brome			
Poaceae	*	<i>Cenchrus clandestinus</i>	Kikuyu			
Poaceae	*	<i>Dactylis glomerata</i>	Cocksfoot			
Poaceae		<i>Dichelachne crinita</i>	Long-hair Plume-grass			
Poaceae	*	<i>Ehrharta calycina</i>	Perennial Veldt-grass			
Poaceae	*	<i>Holcus lanatus</i>	Yorkshire Fog			
Poaceae		<i>Lachnagrostis filiformis s.s.</i>	Common Blown-grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae		<i>Phragmites australis</i>	Common Reed			
Poaceae	*	<i>Poa annua s.s.</i>	Annual Meadow-grass			
Poaceae		<i>Poa labillardierei</i>	Common Tussock-grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae		<i>Themeda triandra</i>	Kangaroo Grass			
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-rail Fescue			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Dicotyledons						
Aizoaceae	*	<i>Aizoon pubescens</i>	Galenia			
Anthemideae	*	<i>Cotula coronopifolia</i>	Water Buttons			
Apiaceae	*	<i>Apium graveolens</i>	Celery			
Apiaceae		<i>Lilaeopsis polyantha</i>	Australian Lilaeopsis			
Apocynaceae	*	<i>Araujia sericifera</i>	White Bladder-flower			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Erigeron spp.</i>	Fleabane			
Asteraceae	*	<i>Gamochaeta purpurea s.s.</i>	Spiked Cudweed			
Asteraceae	*	<i>Hypochoeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae	*	<i>Leontodon saxatilis subsp. saxatilis</i>	Hairy Hawkbit			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus asper s.s.</i>	Rough Sow-thistle			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Asteraceae	*	<i>Symphotrichum spp.</i>	Aster			
Boraginaceae	*	<i>Echium plantagineum</i>	Paterson's Curse			
Brassicaceae		<i>Brassicaceae spp.</i>	Crucifer			
Brassicaceae	*					Yes
Calenduleae	*	<i>Dimorphotheca fruticosa</i>	Trailing African Daisy			
Campanulaceae		<i>Lobelia anceps</i>	Angled Lobelia			
Caryophyllaceae	*	<i>Cerastium glomeratum s.s.</i>	Sticky Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed			
Casuarinaceae		<i>Allocasuarina verticillata</i>	Drooping Sheoak			
Chenopodiaceae	*	<i>Atriplex prostrata</i>	Hastate Orache			
Chenopodiaceae		<i>Einadia nutans</i>	Nodding Saltbush			
Chenopodiaceae		<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Euphorbiaceae	*	<i>Euphorbia pepus</i>	Petty Spurge			
Fabaceae	*	<i>Trifolium angustifolium var. angustifolium</i>	Narrow-leaf Clover			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Geraniaceae		<i>Geranium molle</i>	Dove's Foot			
Geraniaceae		<i>Pelargonium australe</i>	Austral Stork's-bill			
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia			
Lythraceae		<i>Lythrum hyssopifolia</i>	Small Loosestrife			
Mimosaceae						Yes
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle			

Kingston Bushland and Foreshore Areas – Habitat Hectare Assessments and EVC Mapping

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red-gum			
Myrtaceae	#				En	Yes
Myrtaceae		<i>Melaleuca ericifolia</i>	Swamp Paperbark			
Myrtaceae		<i>Melaleuca spp.</i>	Honey-myrtle			
Myrtaceae						Yes
Onagraceae		<i>Epilobium spp.</i>	Willow Herb			
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory			
Pittosporaceae		<i>Bursaria spinosa</i>	Sweet Bursaria			
Plantaginaceae	†	<i>Plantago coronopus</i>	Buck's-horn Plantain			
Plantaginaceae	*	<i>Plantago lanceolata</i>	Ribwort			
Plantaginaceae	*	<i>Veronica arvensis</i>	Wall Speedwell			
Polygonaceae	†	<i>Polygonum aviculare s.s.</i>	Hogweed			
Polygonaceae	*	<i>Rumex crispus</i>	Curled Dock			
Primulaceae	*	<i>Lysimachia arvensis var. arvensis</i>	Scarlet Pimpernel			
Primulaceae		<i>Samolus repens</i>	Creeping Brookweed			
Proteaceae		<i>Hakea spp.</i>	Hakea			
Ranunculaceae		<i>Clematis decipiens</i>	Slender Clematis			
Ranunculaceae		<i>Clematis microphylla s.s.</i>	Small-leaved Clematis			
Rosaceae		<i>Acaena novae-zelandiae</i>	Bidgee-widgee			
Rosaceae	*	<i>Rubus fruticosus spp. agg.</i>	Blackberry			
Rosaceae		<i>Rubus parvifolius</i>	Small-leaf Bramble			
Rubiaceae	*	<i>Coprosma repens</i>	Mirror Bush			
Rubiaceae	*	<i>Galium aparine</i>	Cleavers			
Santalaceae		<i>Exocarpos cupressiformis</i>	Cherry Ballart			
Scrophulariaceae	#	<i>Myoporum insulare</i>	Common Boobialla			
Solanaceae		<i>Solanum aviculare</i>	Kangaroo Apple			
Solanaceae	*	<i>Solanum nigrum s.s.</i>	Black Nightshade			
Urticaceae	*	<i>Parietaria judaica</i>	Wall Pellitory			
Campanulaceae		<i>Wahlenbergia spp.</i>	Bluebell			

Powernet Easement Reserve

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Monocotyledons						
Hemerocallidaceae		<i>Caesia parviflora</i>	Pale Grass-lily			
Iridaceae		<i>Patersonia occidentalis</i> var. <i>occidentalis</i>	Long Purple-flag			
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass			
Juncaceae	#	<i>Juncus bufonius</i>	Toad Rush			
Juncaceae		<i>Juncus pallidus</i>	Pale Rush			
Orchidaceae						Yes
Orchidaceae						Yes
Poaceae	+	<i>Aira cupaniana</i>	Quicksilver Grass			
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae	*	<i>Briza minor</i>	Lesser Quaking-grass			
Poaceae	*	<i>Bromus hordeaceus</i>	Soft Brome			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae		<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass			
Poaceae		<i>Rytidosperma</i> spp.	Wallaby Grass			
Poaceae	*	<i>Sporobolus africanus</i>	Rat-tail Grass			
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			
Poaceae	*	<i>Vulpia myuros</i>	Rat's-tail Fescue			
Xanthorrhoeaceae						Yes
Dicotyledons						
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Campanulaceae		<i>Wahlenbergia gracilis</i>	Sprawling Bluebell			
Caryophyllaceae	*	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed			
Dilleniaceae		<i>Hibbertia fasciculata</i> var. <i>prostrata</i>	Bundled Guinea-flower			
Droseraceae		<i>Drosera peltata</i> s.l.	Pale Sundew			
Euphorbiaceae		<i>Amperea xiphioclada</i> var. <i>xiphioclada</i>	Broom Spurge			
Fabaceae	*	<i>Lotus subbiflorus</i>	Hairy Bird's-foot Trefoil			
Fabaceae	*	<i>Trifolium</i> spp.	Clover			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae						Yes
Myrtaceae		<i>Leptospermum continentale</i>	Prickly Tea-tree			
Onagraceae		<i>Epilobium billardiereanum</i>	Variable Willow-herb			
Plantaginaceae	*	<i>Plantago coronopus</i>	Buck's-horn Plantain			
Polygonaceae	*	<i>Acetosella vulgaris</i>	Sheep Sorrel			
Primulaceae	*	<i>Lysimachia arvensis</i> var. <i>arvensis</i>	Scarlet Pimpernel			
Rubiaceae	*	<i>Galium aparine</i>	Cleavers			
Solanaceae		<i>Solanum laciniatum</i>	Large Kangaroo Apple			
Thymelaeaceae		<i>Pimelea humilis</i>	Common Rice-flower			

Rowan Woodland Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Fern and Allies						
Dennstaedtiaceae		<i>Pteridium esculentum subsp. esculentum</i>	Austral Bracken			
Monocotyledons						
Asparagaceae		<i>Arthropodium strictum s.s.</i>	Chocolate Lily			
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper			
Cyperaceae		<i>Gahnia radula</i>	Thatch Saw-sedge			
Cyperaceae		<i>Lepidosperma spp.</i>	Sword Sedge			
Hemerocallidaceae		<i>Caesia parviflora</i>	Pale Grass-lily			
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella longifolia s.l.</i>	Pale Flax-lily			
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass			
Juncaceae		<i>Juncus amabilis</i>	Hollow Rush			
Juncaceae		<i>Juncus spp.</i>	Rush			
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae		<i>Bromus spp.</i>	Brome			
Poaceae	*	<i>Cenchrus clandestinus</i>	Kikuyu			
Poaceae	#	<i>Cynodon dactylon</i>	Couch			
Poaceae	*	<i>Cynosurus echinatus</i>	Rough Dog's-tail			
Poaceae	*	<i>Ehrharta calycina</i>	Perennial Veldt-grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae		<i>Microlaena stipoides var. stipoides</i>	Weeping Grass			
Poaceae	*	<i>Paspalum dilatatum</i>	Paspalum			
Poaceae		<i>Poa spp.</i>	Tussock Grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae	*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue			
Typhaceae		<i>Typha domingensis</i>	Narrow-leaf Cumbungi			
Typhaceae		<i>Typha orientalis</i>	Broad-leaf Cumbungi			
Xanthorrhoeaceae		<i>Lomandra filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra filiformis subsp. filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Xanthorrhoeaceae						Yes
Dicotyledons						
Anthemideae	#	<i>Cotula australis</i>	Common Cotula			
Araliaceae		<i>Trachymene composita</i>	Parsnip Trachymene			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	#					Yes
Asteraceae	*	<i>Delairea odorata</i>	Cape Ivy			
Asteraceae	*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane			
Asteraceae	*	<i>Hypochoeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus asper s.s.</i>	Rough Sow-thistle			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Brassicaceae		<i>Brassicaceae spp.</i>	Crucifer			
Caryophyllaceae	*	<i>Cerastium glomeratum s.s.</i>	Sticky Mouse-ear Chickweed			
Casuarinaceae		<i>Allocasuarina littoralis</i>	Black Sheoak			
Casuarinaceae		<i>Allocasuarina paludosa</i>	Scrub Sheoak			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Dilleniaceae		<i>Hibbertia fasciculata var. prostrata</i>	Bundled Guinea-flower			
Euphorbiaceae		<i>Amperea xiphioclada var. xiphioclada</i>	Broom Spurge			
Euphorbiaceae		<i>Ricinocarpos pinifolius</i>	Wedding Bush			
Fabaceae		<i>Bossiaea cinerea</i>	Showy Bossiaea			
Fabaceae		<i>Dillwynia glaberrima</i>	Smooth Parrot-pea			
Fabaceae	*	<i>Medicago spp.</i>	Medic			
Fabaceae		<i>Platylobium obtusangulum</i>	Common Flat-pea			
Fabaceae		<i>Pultenaea humilis</i>	Dwarf Bush-pea			
Fabaceae	*	<i>Trifolium angustifolium var. angustifolium</i>	Narrow-leaf Clover			
Fabaceae	*	<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Geraniaceae		<i>Geranium dissectum</i>	Cut-leaf Crane's-bill			

Kingston Bushland and Foreshore Areas - Habitat Hectare Assessments and EVC Mapping

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia			
Haloragaceae		<i>Gonocarpus tetragynus</i>	Common Raspwort			
Lauraceae		<i>Cassytha spp.</i>	Dodder Laurel			
Mimosaceae		<i>Acacia implexa</i>	Lightwood			
Mimosaceae	#					Yes
Mimosaceae						Yes
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle			
Mimosaceae						Yes
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red-gum			
Myrtaceae		<i>Eucalyptus cephalocarpa s.s.</i>	Mealy Stringybark			
Myrtaceae		<i>Eucalyptus ovata</i>	Swamp Gum			
Myrtaceae		<i>Eucalyptus radiata subsp. radiata</i>	Narrow-leaf Peppermint			
Myrtaceae		<i>Eucalyptus spp.</i>	Eucalypt			
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum			
Myrtaceae		<i>Kunzea leptospermoides</i>	Yarra Burgan			
Myrtaceae		<i>Leptospermum continentale</i>	Prickly Tea-tree			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae		<i>Leptospermum myrsinoides</i>	Heath Tea-tree			
Myrtaceae		<i>Melaleuca ericifolia</i>	Swamp Paperbark			
Papaveraceae		<i>Fumaria spp.</i>	Fumitory			
Passifloraceae	*	<i>Passiflora spp.</i>	Passion Flower			
Phyllanthaceae		<i>Poranthera microphylla s.s.</i>	Small Poranthera			
Pittosporaceae		<i>Billardiera mutabilis</i>	Common Apple-berry			
Pittosporaceae		<i>Bursaria spinosa</i>	Sweet Bursaria			
Polygonaceae	*	<i>Acetosella vulgaris</i>	Sheep Sorrel			
Rutaceae						Yes
Santalaceae		<i>Exocarpos cupressiformis</i>	Cherry Ballart			
Solanaceae		<i>Solanum aviculare</i>	Kangaroo Apple			
Solanaceae		<i>Solanum laciniatum</i>	Large Kangaroo Apple			
Solanaceae	*	<i>Solanum nigrum s.s.</i>	Black Nightshade			

The Grange Heathland Reserve

Family	Origin	Scientific Name	Common Name	EPBCA	FFGA	FFG Act Protected Flora
Fern and allies						
Dennstaedtiaceae		<i>Pteridium esculentum subsp. esculentum</i>	Austral Bracken			
Monocotyledons						
Alliaceae	*	<i>Allium triquetrum</i>	Angled Onion			
Anthericaceae						Yes
Asparagaceae		<i>Arthropodium strictum s.s.</i>	Chocolate Lily			
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper			
Colchicaceae		<i>Burchardia umbellata</i>	Milkmaids			
Cyperaceae		<i>Gahnia radula</i>	Thatch Saw-sedge			
Cyperaceae		<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge			
Cyperaceae		<i>Lepidosperma spp.</i>	Sword Sedge			
Hemerocallidaceae		<i>Caesia parviflora</i>	Pale Grass-lily			
Hemerocallidaceae		<i>Dianella admixta</i>	Black-anther Flax-lily			
Hemerocallidaceae		<i>Dianella longifolia s.l.</i>	Pale Flax-lily			
Hemerocallidaceae		<i>Dianella spp.</i>	Flax Lily			
Iridaceae		<i>Patersonia occidentalis var. occidentalis</i>	Long Purple-flag			
Juncaceae		<i>Juncus spp.</i>	Rush			
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Poaceae	*	<i>Aira caryophyllea subsp. caryophyllea</i>	Silvery Hair-grass			
Poaceae	*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae	*	<i>Avena spp.</i>	Oat			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae		<i>Deyeuxia quadrifida</i>	Reed Bent-grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae		<i>Ehrharta longiflora</i>	Annual Veldt-grass			
Poaceae	*	<i>Elymus repens</i>	English Couch			
Poaceae		<i>Microlaena stipoides var. stipoides</i>	Weeping Grass			
Poaceae		<i>Phragmites australis</i>	Common Reed			
Poaceae		<i>Poa ensiformis</i>	Sword Tussock-grass			
Poaceae		<i>Poa labillardierei</i>	Common Tussock-grass			
Poaceae		<i>Poa spp.</i>	Tussock Grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae	*	<i>Vulpia spp.</i>	Fescue			
Restionaceae		<i>Hypolaena fastigiata</i>	Tassel Rope-rush			
Xanthorrhoeaceae		<i>Lomandra filiformis subsp. filiformis</i>	Wattle Mat-rush			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Xanthorrhoeaceae		<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush			
Xanthorrhoeaceae						Yes
Dicotyledons						
Anthemideae		<i>Cotula australis</i>	Common Cotula			
Araliaceae		<i>Trachymene composita</i>	Parsnip Trachymene			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	#					Yes
Asteraceae						Yes
Asteraceae	*	<i>Hypochaeris radicata</i>	Flatweed			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus asper s.s.</i>	Rough Sow-thistle			
Campanulaceae		<i>Wahlenbergia gracilis</i>	Sprawling Bluebell			
Caryophyllaceae	*	<i>Cerastium glomeratum s.s.</i>	Sticky Mouse-ear Chickweed			
Caryophyllaceae	*	<i>Stellaria media</i>	Chickweed			
Casuarinaceae		<i>Allocasuarina paludosa</i>	Scrub Sheoak			
Chenopodiaceae		<i>Einadia nutans</i>	Nodding Saltbush			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Crassulaceae		<i>Crassula sieberiana s.s.</i>	Sieber Crassula			
Dilleniaceae		<i>Hibbertia spp.</i>	Guinea Flower			
Droseraceae		<i>Drosera auriculata</i>	Tall Sundew			
Droseraceae		<i>Drosera macrantha subsp. planchonii</i>	Climbing Sundew			
Ericaceae						Yes
Ericaceae						Yes
Euphorbiaceae		<i>Amperea xiphioclada var. xiphioclada</i>	Broom Spurge			

Kingston Bushland and Foreshore Areas - Habitat Hectare Assessments and EVC Mapping

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Euphorbiaceae		<i>Ricnocarpus pinifolius</i>	Wedding Bush			
Fabaceae		<i>Bossiaea cinerea</i>	Showy Bossiaea			
Fabaceae		<i>Dillwynia glaberrima</i>	Smooth Parrot-pea			
Fabaceae	*	<i>Genista linifolia</i>	Flax-leaf Broom			
Fabaceae		<i>Platylobium obtusangulum</i>	Common Flat-pea			
Fabaceae	+	<i>Ulex europaeus</i>	Gorse			
Fabaceae	*	<i>Vicia sativa</i>	Common Vetch			
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia			
Haloragaceae		<i>Gonocarpus tetragynus</i>	Common Raspwort			
Lauraceae		<i>Cassytha spp.</i>	Dodder Laurel			
Mimosaceae		<i>Acacia dealbata</i>	Silver Wattle			
Mimosaceae	#				Vu	Yes
Mimosaceae	#					Yes
Mimosaceae						Yes
Mimosaceae		<i>Acacia melanoxylon</i>	Blackwood			
Mimosaceae						Yes
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle			
Mimosaceae						Yes
Mimosaceae						Yes
Mimosaceae						Yes
Myrtaceae		<i>Eucalyptus cephalocarpa s.s.</i>	Mealy Stringybark			
Myrtaceae		<i>Eucalyptus ovata</i>	Swamp Gum			
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum			
Myrtaceae		<i>Leptospermum continentale</i>	Prickly Tea-tree			
Myrtaceae	#	<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae		<i>Leptospermum myrsinoides</i>	Heath Tea-tree			
Myrtaceae		<i>Melaleuca ericifolia</i>	Swamp Paperbark			
Onagraceae		<i>Epilobium spp.</i>	Willow Herb			
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory			
Phyllanthaceae		<i>Poranthera microphylla s.s.</i>	Small Poranthera			
Pittosporaceae		<i>Billardiera mutabilis</i>	Common Apple-berry			
Plantaginaceae	*	<i>Plantago lanceolata</i>	Ribwort			
Polygalaceae		<i>Comesperma volubile</i>	Love Creeper			
Proteaceae		<i>Banksia marginata</i>	Silver Banksia			
Proteaceae		<i>Hakea ulicina</i>	Furze Hakea			
Proteaceae		<i>Persoonia juniperina</i>	Prickly Geebung			
Ranunculaceae		<i>Clematis microphylla s.s.</i>	Small-leaved Clematis			
Rosaceae		<i>Acaena novae-zelandiae</i>	Bidgee-widgee			
Rubiaceae	*	<i>Gallium aparine</i>	Cleavers			
Rubiaceae		<i>Opercularia varia</i>	Variable Stinkweed			
Rutaceae		<i>Correa reflexa</i>	Common Correa			Yes
Santalaceae		<i>Exocarpos cupressiformis</i>	Cherry Ballart			
Solanaceae		<i>Solanum aviculare</i>	Kangaroo Apple			
Thymelaeaceae		<i>Pimelea humilis</i>	Common Rice-flower			
Violaceae		<i>Viola hederacea sensu Willis (1972)</i>	Ivy-leaf Violet			

Foreshore North Reserve

Family	Origin	Scientific Name	Common Name	EPBC ^A	FFG ^A	FFG Act Protected Flora
Monocotyledons						
Alliaceae	*	<i>Allium triquetrum</i>	Angled Onion			
Anthericaceae		<i>Laxmannia spp.</i>	Wire Lily			
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper			
Cyperaceae		<i>Ficinia nodosa</i>	Knobby Club-sedge			
Cyperaceae		<i>Isolepis spp.</i>	Club Sedge			
Cyperaceae		<i>Lepidosperma sieberi</i>	Sandhill Sword-sedge			
Cyperaceae		<i>Lepidosperma spp.</i>	Sword Sedge			
Hemerocallidaceae		<i>Dianella brevicaulis</i>	Small-flower Flax-lily			
Iridaceae	*	<i>Romulea spp.</i>	Onion Grass			
Orchidaceae						Yes
Orchidaceae						Yes
Orchidaceae						Yes
Poaceae	*	<i>Aira spp.</i>	Hair Grass			
Poaceae		<i>Austrostipa flavescens</i>	Coast Spear-grass			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae	*	<i>Briza maxima</i>	Large Quaking-grass			
Poaceae	*	<i>Briza minor</i>	Lesser Quaking-grass			
Poaceae	*	<i>Bromus catharticus</i>	Prairie Grass			
Poaceae	*	<i>Bromus diandrus</i>	Great Brome			
Poaceae	*	<i>Bromus spp.</i>	Brome			
Poaceae	*	<i>Calamagrostis arenaria</i>	Marram Grass			
Poaceae	*	<i>Cynodon dactylon var. dactylon</i>	Couch			
Poaceae		<i>Distichlis distichophylla</i>	Australian Salt-grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Festuca spp.</i>	Fescue			
Poaceae	*	<i>Holcus lanatus</i>	Yorkshire Fog			
Poaceae	*	<i>Lagurus ovatus</i>	Hare's-tail Grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae	*	<i>Parapholis incurva</i>	Coast Barb-grass			
Poaceae		<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass			
Poaceae		<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass			
Poaceae		<i>Rytidosperma spp.</i>	Wallaby Grass			
Poaceae		<i>Spinifex sericeus</i>	Hairy Spinifex			
Poaceae		<i>Sporobolus virginicus</i>	Salt Couch			
Poaceae	*	<i>Stenotaphrum secundatum</i>	Buffalo Grass			
Poaceae	*	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass			
Poaceae	*	<i>Vulpia spp.</i>	Fescue			
Xanthorrhoeaceae		<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			
Dicotyledons						
Aizoaceae	*	<i>Aizoon pubescens</i>	Galenia			
Aizoaceae	*	<i>Carpobrotus aequilaterus</i>	Angled Pigface			
Aizoaceae	*	<i>Carpobrotus edulis</i>	Hottentot Fig			
Aizoaceae		<i>Carpobrotus rossii</i>	Karkalla			
Aizoaceae		<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower			
Aizoaceae	*	<i>Drosanthemum candens</i>	Rodondo Creeper			
Aizoaceae		<i>Tetragonia implexicoma</i>	Bower Spinach			
Anthemideae		<i>Cotula spp.</i>	Cotula			
Apocynaceae		<i>Alyxia buxifolia</i>	Sea Box			
Apocynaceae	*	<i>Vinca spp.</i>	Periwinkle			
Araliaceae	*	<i>Hedera helix s.l.</i>	English Ivy			
Asteraceae	*	<i>Arctotheca calendula</i>	Cape Weed			
Asteraceae	*	<i>Delairea odorata</i>	Cape Ivy			
Asteraceae	*	<i>Gazania linearis</i>	Gazania			
Asteraceae	*	<i>Gazania rigens</i>	Trailing Gazania			
Asteraceae	*	<i>Hypochaeris spp.</i>	Cat's Ear			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Asteraceae	*	<i>Sonchus spp.</i>	Sow Thistle			
Brassicaceae	*	<i>Brassica spp.</i>	Turnip			
Brassicaceae	*	<i>Cakile maritima subsp. maritima</i>	Sea Rocket			

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Brassicaceae	*	<i>Raphanus raphanistrum</i>	Wild Radish		
Calenduleae	*	<i>Dimorphotheca jucunda</i>	Mountain Bietou		
Campanulaceae		<i>Lobelia anceps</i>	Angled Lobelia		
Caryophyllaceae	*	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed		
Caryophyllaceae	*	<i>Cerastium vulgare</i>	Common Mouse-ear Chickweed		
Caryophyllaceae	*	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed		
Caryophyllaceae	*	<i>Silene gallica</i>	French Catchfly		
Casuarinaceae		<i>Allocasuarina verticillata</i>	Drooping Sheoak		
Chenopodiaceae		<i>Atriplex cinerea</i>	Coast Saltbush		
Chenopodiaceae	*	<i>Chenopodium album</i>	Fat Hen		
Chenopodiaceae		<i>Enchylaena spp.</i>	Ruby Saltbush		
Chenopodiaceae		<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush		
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed		
Crassulaceae	*	<i>Crassula multicava subsp. multicava</i>	Shade Crassula		
Crassulaceae		<i>Crassula spp.</i>	Crassula		
Ericaceae					Yes
Fabaceae	*	<i>Dipogon ilgnosus</i>	Common Dipogon		
Fabaceae	*	<i>Genista linifolia</i>	Flax-leaf Broom		
Fabaceae	*	<i>Lotus subbiflorus</i>	Hairy Bird's-foot Trefoll		
Fabaceae	*	<i>Medicago polymorpha</i>	Burr Medic		
Fabaceae	*	<i>Melilotus indicus</i>	Sweet Melilot		
Fabaceae	*	<i>Trifolium spp.</i>	Clover		
Fabaceae	*	<i>Vicia spp.</i>	Vetch		
Gentianaceae	*	<i>Centaurium erythraea</i>	Common Centaury		
Geraniaceae		<i>Pelargonium spp.</i>	Stork's Bill		
Goodeniaceae		<i>Goodenia ovata</i>	Hop Goodenia		
Lauraceae		<i>Cassytha pubescens s.s.</i>	Downy Dodder-laurel		
Malvaceae	*	<i>Malva spp.</i>	Mallow		
Mimosaceae					Yes
Mimosaceae		<i>Acacia paradoxa</i>	Hedge Wattle		
Myrtaceae		<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum		
Myrtaceae		<i>Leptospermum laevigatum</i>	Coast Tea-tree		
Myrtaceae	#			En	Yes
Myrtaceae	*	<i>Melaleuca lanceolata</i>	Moonah		
Oleaceae	*	<i>Fraxinus angustifolia</i>	Desert Ash		
Onagraceae		<i>Epilobium billardiereanum subsp. billardiereanum</i>	Smooth Willow-herb		
Papaveraceae	*	<i>Fumaria spp.</i>	Fumitory		
Pittosporaceae		<i>Bursaria spinosa</i>	Sweet Bursaria		
Pittosporaceae	#	<i>Pittosporum undulatum</i>	Sweet Pittosporum		
Plantaginaceae	*	<i>Plantago coronopus</i>	Buck's-horn Plantain		
Polygonaceae		<i>Muehlenbeckia adpressa</i>	Climbing Lignum		
Polygonaceae	*	<i>Polygonum aviculare s.l.</i>	Prostrate Knotweed		
Primulaceae	*	<i>Lysimachia arvensis</i>	Pimpernel		
Proteaceae		<i>Banksia integrifolia subsp. integrifolia</i>	Coast Banksia		
Proteaceae	*	<i>Hakea drupacea</i>	Sweet Hakea		
Ranunculaceae		<i>Clematis microphylla s.l.</i>	Small-leaved Clematis		
Rosaceae		<i>Acaena novae-zelandiae</i>	Bidgee-widgee		
Rosaceae	*	<i>Cotoneaster spp.</i>	Cotoneaster		
Rosaceae	*	<i>Raphiolepis indica</i>	Indian Hawthorn		
Rosaceae	*	<i>Rubus fruticosus spp. agg.</i>	Blackberry		
Rubiaceae	*	<i>Coprosma repens</i>	Mirror Bush		
Rutaceae					Yes
Scrophulariaceae		<i>Myoporum insulare</i>	Common Boobialla		
Solanaceae		<i>Solanum aviculare</i>	Kangaroo Apple		
Solanaceae	*	<i>Solanum chenopodioides</i>	Whitetip Nightshade		
Sterculioideae		<i>Lasiopetalum baueri</i>	Slender Velvet-bush		

Foreshore South Reserve

Family	Origin	Scientific Name	Common Name	EPBC	FFG	FFG Protected Flora
MONOCOTYLEDONS						
Agavaceae	*	<i>Agave americana</i>	Century Plant			
Alliaceae	*	<i>Agapanthus praecox subsp. orientalis</i>	Agapanthus			
Asparagaceae	*	<i>Asparagus aethiopicus</i>	Emerald fern			
Asphodelaceae	*	<i>Aloe arborescens</i>	Tree Aloe			
Asphodelaceae	*	<i>Aloe maculata</i>	Common Soap Aloe			
Cyperaceae		<i>Ficinia nodosa</i>	Knobby Club-sedge			
Iridaceae	*	<i>Freesia spp.</i>	Freesia			
Poaceae		<i>Austrostipa spp.</i>	Spear Grass			
Poaceae	*	<i>Bromus catharticus</i>	Prairie Grass			
Poaceae	*	<i>Calamagrostis arenaria</i>	Marram Grass			
Poaceae	*	<i>Cenchrus setaceus</i>	Fountain Grass			
Poaceae	*	<i>Ehrharta erecta</i>	Panic Veldt-grass			
Poaceae	*	<i>Lagurus ovatus</i>	Hare's-tail Grass			
Poaceae	*	<i>Lolium spp.</i>	Rye Grass			
Poaceae		<i>Poa poliformis</i>	Coast Tussock-grass			
Poaceae		<i>Spinifex sericeus</i>	Hairy Spinifex			
Poaceae	*	<i>Stenotaphrum secundatum</i>	Buffalo Grass			
Poaceae	*	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass			
DICOTYLEDONS						
Aizoaceae	*	<i>Aizoon pubescens</i>	Galenia			
Aizoaceae	*	<i>Carpobrotus edulis</i>	Hottentot Fig			
Aizoaceae		<i>Carpobrotus rossii</i>	Karkalla			
Aizoaceae		<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower			
Aizoaceae		<i>Tetragonia implexicoma</i>	Bower Spinach			
Apocynaceae		<i>Alyxia buxifolia</i>	Sea Box			
Asteraceae						Yes
Asteraceae	*	<i>Arctotis stoechadifolia</i>	White Arctotis			
Asteraceae	*	<i>Delairea odorata</i>	Cape Ivy			
Asteraceae	*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane			
Asteraceae	*	<i>Gazania spp.</i>	Gazania			
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae						Yes
Asteraceae	*	<i>Senecio angulatus</i>	Climbing Groundsel			
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sow-thistle			
Asteraceae	*	<i>Sonchus spp.</i>	Sow Thistle			
Basellaceae	*	<i>Anredera cordifolia</i>	Madeira Vine			
Brassicaceae	*	<i>Cakile spp.</i>	Sea Rocket			
Brassicaceae	*	<i>Matthiola incana</i>	Stock			
Calenduleae	*	<i>Dimorphotheca jucunda</i>	Mountain Bietou			
Calenduleae	*	<i>Dimorphotheca spp.</i>	Cape Marigold			
Casuarinaceae		<i>Allocasuarina verticillata</i>	Drooping Sheoak			
Chenopodiaceae		<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush			
Convolvulaceae		<i>Dichondra repens</i>	Kidney-weed			
Crassulaceae	*	<i>Aeonium haworthii</i>	Pinwheel Aeonium			
Crassulaceae	*	<i>Cotyledon orbiculata</i>	Pig's Ear			
Crassulaceae		<i>Crassula spp.</i>	Crassula			
Ericaceae						Yes
Euphorbiaceae	*	<i>Euphorbia paralias</i>	Sea Spurge			
Fabaceae		<i>Kennedia prostrata</i>	Running Postman			
Geraniaceae		<i>Pelargonium spp.</i>	Stork's Bill			
Malvaceae	*	<i>Malva arborea</i>	Tree Mallow			
Mimosaceae						Yes
Mimosaceae	*	<i>Paraserianthes lophantha subsp. lophantha</i>	Cape Wattle			
Myrtaceae		<i>Leptospermum laevigatum</i>	Coast Tea-tree			
Myrtaceae	*				En	Yes
Myrtaceae	*	<i>Melaleuca nesophila</i>	Showy Honey-myrtle			
Oleaceae	*	<i>Fraxinus angustifolia</i>	Desert Ash			
Pittosporaceae	*	<i>Pittosporum crassifolium</i>	Karo			
Polygalaceae	*	<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort			
Polygonaceae	*	<i>Muehlenbeckia complexa</i>	Maldenhair Creeper			
Proteaceae		<i>Banksia integrifolia subsp. integrifolia</i>	Coast Banksia			
Proteaceae	*	<i>Hakea drupacea</i>	Sweet Hakea			
Ranunculaceae		<i>Clematis microphylla s.l.</i>	Small-leaved Clematis			
Rhamnaceae		<i>Pomaderris paniculosa subsp. paralia</i>	Coast Pomaderris			
Rosaceae	*	<i>Rhaphiolepis spp.</i>	Indian Hawthorn			

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Rubiaceae	*	<i>Coprosma repens</i>	Mirror Bush	
Rutaceae				Yes
Scrophulariaceae		<i>Myoporum insulare</i>	Common Boobialla	
Solanaceae	*	<i>Lycium ferocissimum</i>	African Box-thorn	
Solanaceae	*	<i>Salpichroa origanifolia</i>	Pampas Lily-of-the-Valley	
Solanaceae	*	<i>Solanum nigrum s.s.</i>	Black Nightshade	
Tropaeolaceae	*	<i>Tropaeolum majus</i>	Nasturtium	
Verbenaceae	*	<i>Lantana camara</i>	Lantana	

Appendix 4. Habitat Hectares Assessment Sheet

Starts on next page.

Please note a modified assessment sheet is used for grassland communities without a shrubby or tree overstorey.

Appendix 5. References

- Biosis (2012a) *Assessment of City of Kingston Natural Reserves (Stage 1): The Grange Heathland Reserve, Rowan Woodland Reserve, Bradshaw Park, Epsom Park, Mordialloc Creek Reserve.*
- Biosis (2012b) *Assessment of City of Kingston Natural Reserves (Stage 2): Kingston Heath Reserve, Caruana Reserve, Heights Park, Bonbeach Foreshore.*
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