

Frankston City Council Biodiversity Action Plan Technical Report 2021–2036



Lifestyle Capital of Victoria



Frankston City Council Biodiversity Action Plan Technical Report 2021

Report and mapping by Daniel Miller
(maps from *Frankston Fauna Linkages and Crossing Structure Design* [Practical Ecology 2012]
inserted in this report were made by Colin Broughton)

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Introduction



1.1 Document purpose and structure

This document aims to collate and analyse existing information relevant to biodiversity in Frankston, identify knowledge gaps, and consider potential future threats to biodiversity. This document also informs the related Action Plan, which contains targeted, achievable actions to enhance biodiversity in Frankston.

Where relevant, in this Technical Report, issues that should be addressed in the Action Plan are highlighted with pop-outs labelled as 'Key Findings', as shown on the right. All key findings are then summarised in Section 6.

Key Finding #:

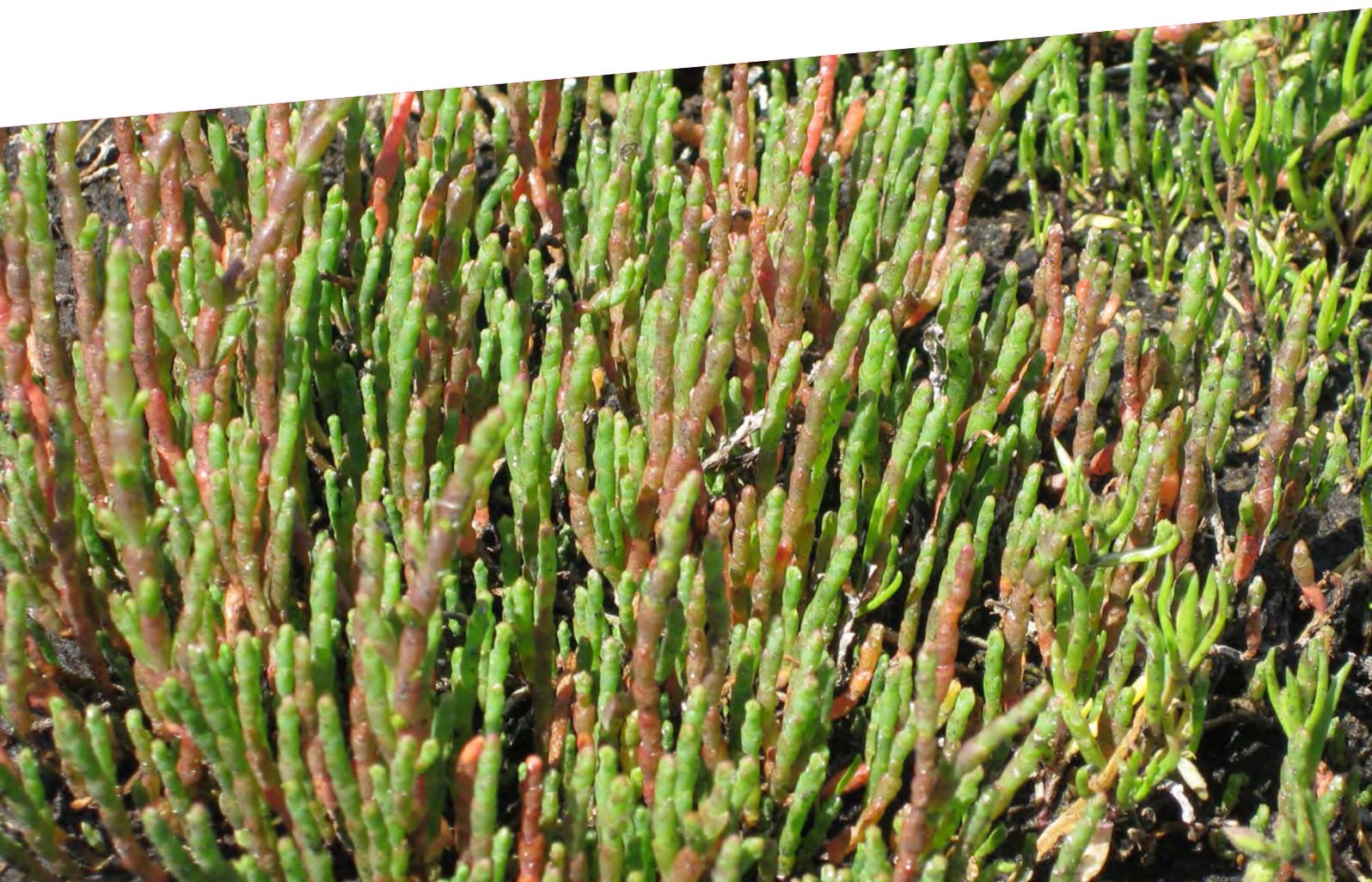
Description of Key Finding.

1.2 Definition of biodiversity

As defined in Frankston City Council's Biodiversity Policy (2018), biodiversity is "the variety of life in an area including the animals, plants and micro-organisms, the genes they contain and the ecosystems of which they are a part. Conservation of biodiversity is important for a healthy environment that supports life, human well-being and economic sustainability within our Municipality. Biodiversity provides us with fresh air, clean water and plant pollination, which contributes to food security. Frankston's biodiversity assets include indigenous vegetation and fauna, canopy trees, waterways, wetlands and coastal environments".

Terms related to 'biodiversity' include:

- nature
- the environment
- ecosystem
- flora and fauna
- conservation
- ecology
- wildlife
- biosphere
- habitat



1.2.1 The importance of biodiversity

There are many reasons why people value biodiversity, from the intrinsic belief that it has the right to exist, in and of itself, through to a recognition of the services that biodiversity provides to us (Figure 1).

Known as 'ecosystem services', biodiversity provides us with food, drinking water, fibres, and building and manufacturing materials. Additionally, nature provides less direct (but equally important) services such as carbon storage, filtering of air and water, pollination of food crops, protection from storms and floods, and places for rest and recreation. Recent studies have even shown that being in nature results in decreased prevalence of depression, anxiety, and stress (Bratman et al, 2012) (Cox et al, 2017)(Parr, 2007).

Residents of Frankston City value biodiversity for a number of reasons, and experience it in various ways. As part of the research for this report (and further discussed in Section 3), a vast majority of community survey respondents:

- showed high concern for various biodiversity values and their threats
- stated that they often visited natural areas in Frankston City
- said that they encourage Council to do more



Figure 1: Ecosystem services diagram. Figure is from the World Wildlife Fund's Living Planet Report 2018.



1.3 Acknowledgement of Country

Frankston City Council acknowledges the Bunurong people of the Kulin Nation as the Traditional Custodians of the lands and waters in and around Frankston City, and value and recognise local Aboriginal and Torres Strait Islander cultures, heritage and connection to land as a proud part of a shared identity for Frankston City.

Council pays respect to Elders past and present and recognises their importance in maintaining knowledge, traditions and culture in our community. Council also respectfully acknowledges the Bunurong Land Council as the Registered Aboriginal Party responsible for managing the Aboriginal cultural heritage of the land and waters where Frankston City Council is situated.

Frankston City sits within the land of the Bunurong people, whose country extends north-west to the Werribee River, east to Warragul, south-east to Wilson's Promontory, and south-west to Point Nepean. The Bunurong are part of the Kulin Nation, which comprises the Bunurong, Wurundjeri Woi Wurrung, Taungurong, Dja Dja Wurrung, and Wathaurong peoples.

Before European invasion and colonisation of Narm (Melbourne) in the early 19th century, First Nations people were living in Frankston City for an estimated 40,000 years, with the combined population of the Kulin Nation estimated to be around 20,000 people (Presland, 1985).

The Bunurong Land Council has been the registered Aboriginal party for the area in which Frankston City is located (and adjacent lands) since 2017. For further details visit: bunuronglc.org. As the Registered Aboriginal Party, the Bunurong Land Council Aboriginal Corporation was consulted during the preparation of the Technical Report and the Biodiversity Action Plan.

Development of this report and the Biodiversity Action Plan highlights the importance of learning from the Traditional Custodians of the land that sustains us and recognises a strong partnership between Council and the Bunurong Land Council Aboriginal Corporation in protecting and restoring our community's natural heritage (Key Finding 1).

For readers of this document outside of Bunurong Land, who are interested to learn which country they reside on, the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) map can be viewed at: aiatsis.gov.au/explore/map-indigenous-australia.

Key Finding 1: Implementing the Biodiversity Action Plan will build on the strong partnership between Council and the Bunurong Land Council Aboriginal Corporation in protecting and restoring our community's natural heritage.



1.4 Study area

The study area for this report focuses on Frankston City, but extends into the surrounding Local Government Areas (LGAs) for relevant sections throughout the report (Figure 2).

Frankston City is approximately 13,000 ha (or 130 km²) and is bounded by Port Phillip Bay to the West, the Cities of Kingston and Greater Dandenong to the north, the City of Casey to the east, and the Shire of Mornington Peninsula to the south (Figure 2).

Frankston City's population was estimated at 141,845 people as of 2018 (Australian Bureau of Statistics 2019), living across the suburbs of:

- Carrum Downs
- Frankston
- Frankston North
- Frankston South
- Karingal
- Langwarrin
- Langwarrin South
- Sandhurst
- Seaford
- Skye

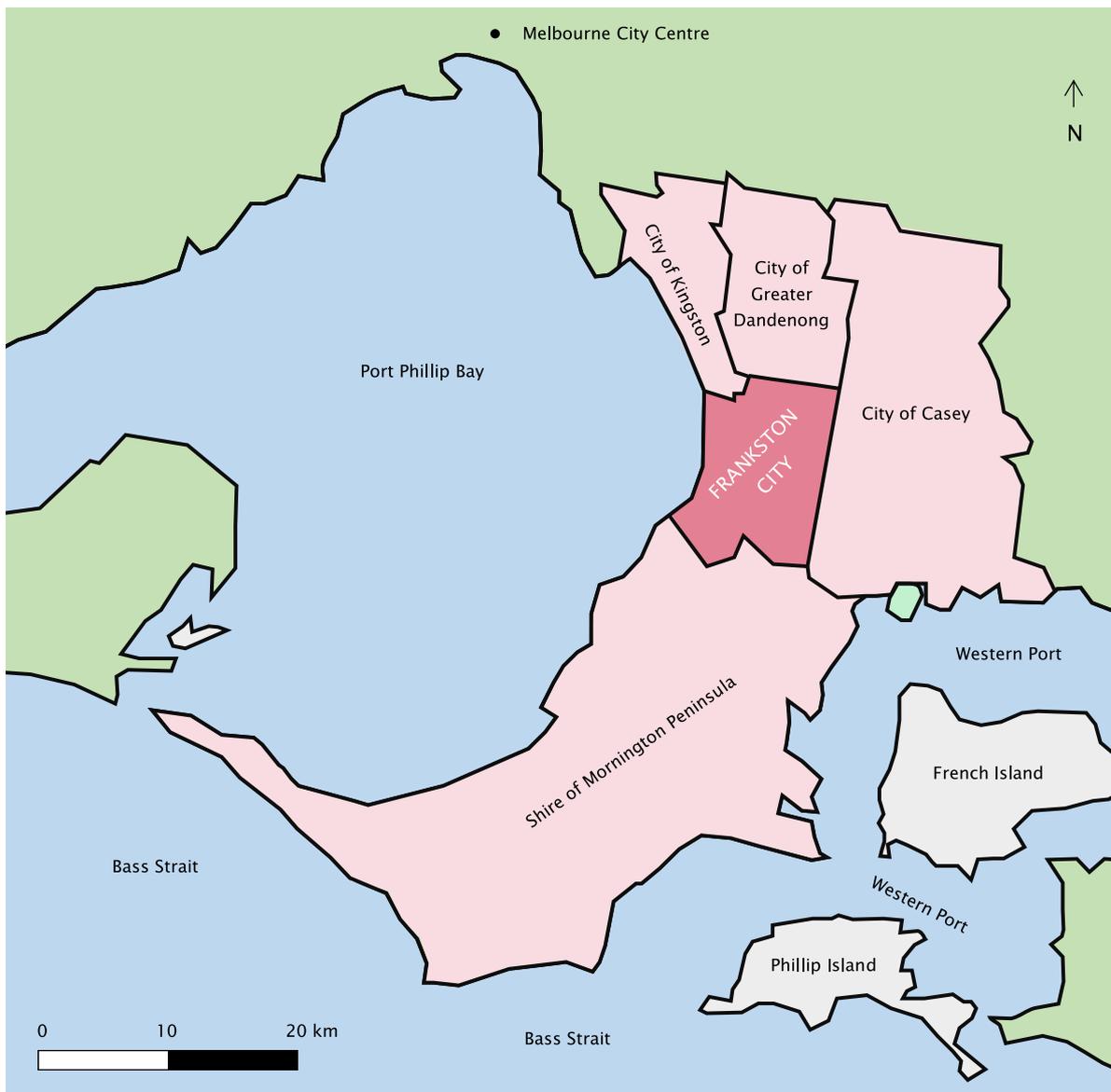


Figure 2: Location of the study area (Frankston City) and surrounding LGAs.

1.5 Regional context

Frankston City is located between the highly urbanised suburbs of Melbourne to the north, more rural and natural environments to the south and east, and Port Phillip Bay to the west. Frankston City is an area that is quite diverse for its size because of its location, as well as its various geologies and topographies. The positioning of Frankston also creates barriers: to the north with the city, and to the west with the bay. These barriers mean that Frankston City is one of the western and northern-most areas that urban maladapted species occur in the local area. Additionally, the various open spaces and wetlands in Frankston City provide some of the few viable wildlife corridors, from the landscape to the northeast, to the various habitat areas on the Mornington Peninsula in the south. Frankston City's geologies, plants, animals, and fungi are some of its greatest features, and contribute to the LGA's reputation as an urban biodiversity hotspot.

Frankston City is within the Port Phillip and Western Port Catchment (Figure 3), in the Dandenong sub-catchment (Melbourne Water, 2019). The main rivers and streams that flow through Frankston City are Sweetwater Creek, Kananook Creek and Boggy Creek.

The Port Phillip and Westernport Catchment Authority (PPWCMA) “works primarily with government departments, councils, water authorities, non-government environmental organisations and community groups, to protect and enhance the natural resources within the region. The PPWCMA also works closely with the Victorian Government and Australian Government to secure funds for priority projects and direct them to organisations to undertake on-ground works. At the local level, the PPWCMA helps landholders improve their knowledge, skills and practices and works with the broader public to increase participation in environmental conservation and gain their input on important environmental issues” (PPWCMA, 2021).

The Mornington Peninsula and Western Port Biosphere Reserve Foundation (MPWPBR) is a registered not-for-profit company, and part of a network of 714 biospheres around the world, designated by UNESCO. In addition to Frankston City Council, members of the MPWPBR include Bass Coast and Mornington Peninsula Shire Councils, Casey and Cardinia City Councils, PPWCMA, and Parks Victoria. The MPWPBR plays many roles, with one of its primary objectives to “promote sustainable development based on local community efforts and sound science. Biospheres make ideal learning sites to test and demonstrate innovative approaches to sustainable development and innovative approaches to living and working in harmony with nature. Biospheres encourage the community to develop better ways to meet social and economic needs, while conserving natural processes and biodiversity. They support this through research, monitoring, education and information exchange” (Western Port Biosphere, 2021).

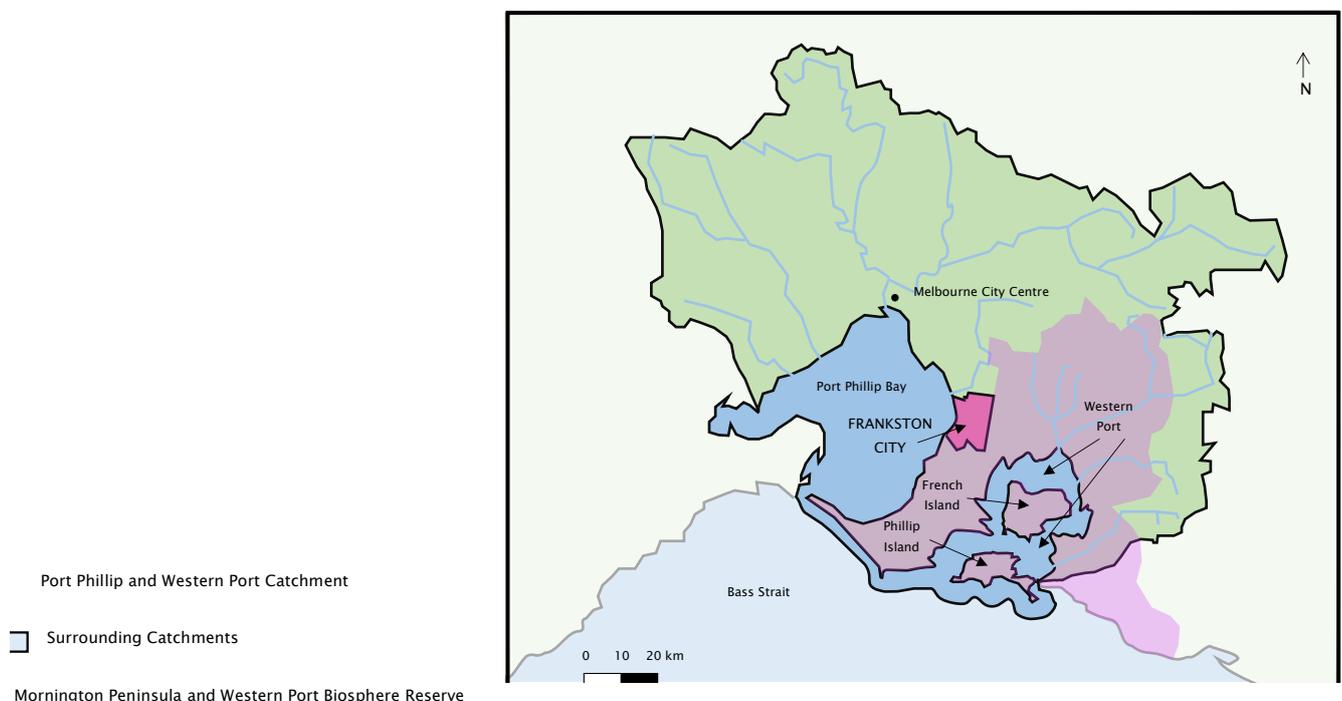


Figure 3: The boundaries of the Port Phillip and Western Port Catchment, and the Mornington Peninsula and Western Port Biosphere (2021).

1.6 Legislative and policy context

Frankston City Council's Biodiversity Action Plan is written in the context of a number of international, federal, state, and Council policies, acts, and strategies. Those that are particularly relevant to this document are:

International

Conventions:

- *Convention on Biological Diversity*
- *The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (Ramsar Convention)

Agreements:

- *Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment* (CAMBA)
- *Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment* (JAMBA)
- *Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds* (ROKAMBA)

Federal

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Australia's Strategy for Nature 2019-2030*

State

- *Wildlife Act 1975*
- *Planning and Environment Act 1987*
- *Flora and Fauna Guarantee Act 1988* (FFG Act)
- *Water Act 1989*
- *Catchment and Land Protection Act 1994* (CaLP Act)
- *Protecting Victoria's Environment – Biodiversity 2037* (2017)

Regional

- *Port Phillip and Western Port Catchment Authority's Regional Catchment Strategy* (2014)

Council

Frankston City Council's Planning Scheme, especially:

- **Planning Policy Framework:**
 - Clause 12 *Environmental and Landscape Values*
 - Clause 13.02-1S *Bushfire Planning*
- **Zones:**
 - Clause 35.04 *Green Wedge Zone* (GWZ)
 - Clause 35.06 *Rural Conservation Zone* (RCZ)
- **Overlays:**
 - Clause 42.01 *Environmental Significance Overlay* (ESO)
 - Clause 42.03 *Significant Landscape Overlay* (SLO)
 - Clause 44.06 *Bushfire Management Overlay* (BMO)
- **Particular Provisions:**
 - Clause 52.17 *Native Vegetation*
 - Clause 53.02 *Bushfire Planning*
- *Climate Change Impacts and Adaptation Plan* (2011)
- *Greening Our Future, Environmental Strategy 2014-2024* (2014)
- *Frankston's Biodiversity Policy* (2018)
- *Green Wedge Management Plan* (2019)
- *Towards Zero Emissions Plan 2019-2023* (2019)
- *Urban Forest Action Plan* (2020)

Frankston City's biodiversity in the past



The pre-colonisation distribution of Ecological Vegetation Classes (EVCs - defined in Box 1) in Victoria was modelled by the state government in 2005 (DSE 2005) and maps 17 EVCs including five mosaics (Map 2 and Box 1) present within the area that now forms Frankston (DSE, 2005). The modelling shows this relatively small area supported a high diversity of EVCs which included wetlands, saltmarshes, scrubs, woodlands, forests, heaths, and grasslands.

The geological origins of soils and topography (Figure 5) created this diversity, with sand blowing out of Port Phillip Bay over millennia collecting to different depths ('Q2' on Figure 5). This supported heathlands and heathy woodlands, and often created barriers that blocked streams flowing to the sea, which created large wetlands and resulted in deposits of peaty clay ('Q5' on Figure 5). Where the sand didn't reach, the older clay soils ('Tb' and 'S' on Figure 5) remained on the surface, and supported open grasslands and woodlands

Definition of Ecological Vegetation Classes (EVCs), EVC mosaics, and habitats

Ecological Vegetation Classes (EVCs) are a 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 (such as woodland, grassland and saltmarsh), landform (such as gully, foothill and plain) and other environmental characteristics, including soil type and climate.

EVC mosaics are mapping units that indicate multiple EVCs occurring in a fine-scale, interspaced arrangement. They are not unique communities with their own descriptions, but rather a combination of others, which are difficult to separate in a logical manner.

Habitats are the most general grouping that will be used in this document, and refer generally to the structure of vegetation (e.g. canopy trees/shrubs/groundlayer) present within and between EVCs. This grouping has been defined to eliminate discrepancies across EVC identification, when talking about large-scale patterns, and to more succinctly describe habitat preferences of Frankston City's fauna.

Rationale: Of course, sorting the natural world into separate groups is fraught with difficulties and complications. There is an abundance of diversity within vegetation communities, and, for example, two areas of Heathy Woodland might look noticeably different only 200m apart. These two areas could be supported by (somewhat) different soils, topography, and rainfall, resulting in slightly different plant, animal, and fungal communities.

It is, however, often necessary (and extremely useful) to group vegetation communities, in order to:

- More easily interpret patterns in the landscape
- Be able to apply botanical and ecological knowledge across multiple areas
- Understand faunal habitat preferences, and
- Apply conservation significances (and ultimately legal protections) on certain types of vegetation

This report, therefore, groups vegetation communities by both EVC and habitat, in order to more efficiently discuss patterns across Frankston City. It is, however, important to keep in mind that no grouping method is perfect, and there will always be variations across different areas.

Box 1: Definitions of Ecological Vegetation Classes (EVCs), EVC mosaics, and habitats.

The 17 EVCs found in Frankston City fell into the following five groupings of habitats (see the definition and rationale in Box 1):

- Closed Woodlands and Forests
- Open Woodlands
- Heathlands and Scrubs
- Grasslands
- Wetlands

Closed Woodlands and Forests, by far, covered the largest proportion of Frankston City before colonisation (45 per cent), followed by Open Woodlands (31 per cent; Figure 4).

Heathlands and Scrubs, Grasslands, and Wetlands covered smaller areas of the LGA (7, 8 and 9 per cent respectively), though were still substantial (Figure 4).

The following sub-sections provide more detailed descriptions of the vegetation, geologies, and fauna found in each of these habitats, and are based on Yugovic (2003), Bull (2014), DSE (2005), DELWP (2015), and Costermans (2020).

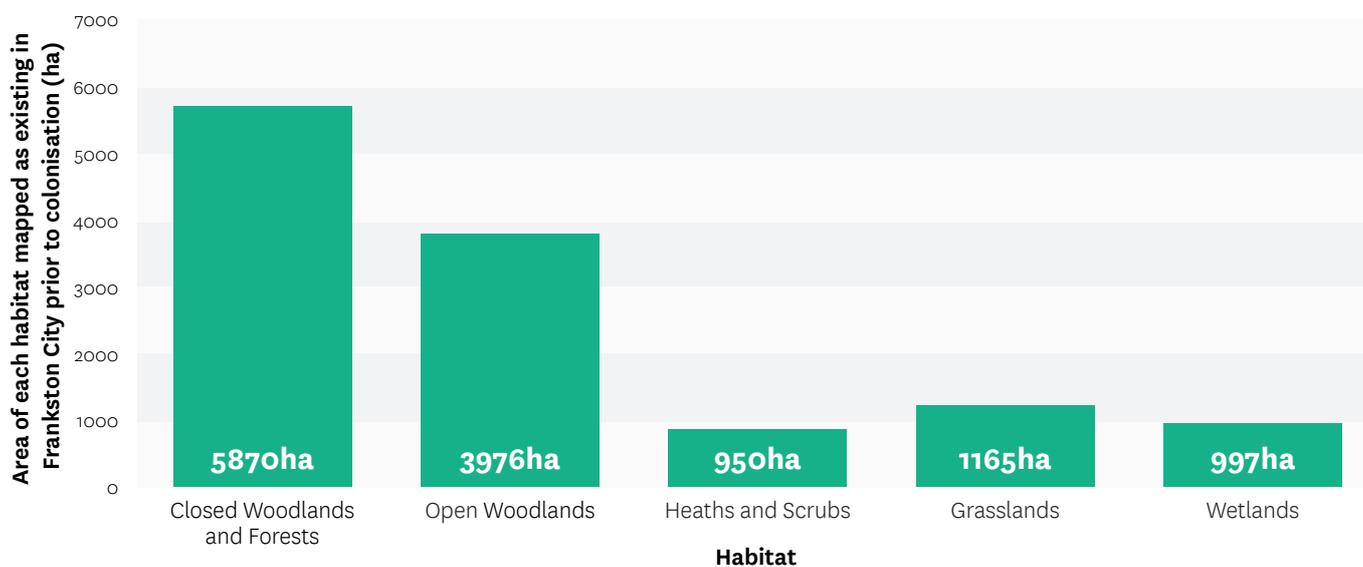


Figure 4: Area of habitats in Frankston City prior to colonisation as mapped by DSE (2005).



2.1 Closed Woodlands and Forests

The overall vegetation structure in Closed Woodlands and Forests (Figure 6) is characterised by a diverse canopy and Sub-canopy layer, and a relatively thick, closed understorey layer, with plenty of cover for small animals. Before colonisation, this habitat is believed to have covered the majority of the centre of Frankston City, (Map 1), mainly on geologies of siliceous sands (Figure 5).

Soils are characteristically sandy, with some loam, silt, and sometimes clay in certain areas.

Canopy trees are usually a wide variety of Eucalypts (*Eucalyptus* spp.), though in Frankston City also Coast Banksia (*Banksia integrifolia*) on the inland edge of coastal sand dunes.

Sub-canopy trees are usually present, which are often Wattles (*Acacia* spp.), and sometimes Sheoaks – with Black Sheoak (*Allocasuarina littoralis*) and Drooping Sheoak (*A. verticillata*) being the most common. Tea-trees (*Leptospermum* spp.) and Paperbarks (*Melaleuca* spp.) can also grow to the size of small trees in these habitats.

Small to large shrubs in this habitat are numerous, and include species such as Sweet Bursaria (*Bursaria spinosa*), Hop Goodenia (*Goodenia ovata*), various Cassinias (*Cassinia* spp.), and Common Heath (*Epacris impressa*).

Groundlayer vegetation includes various small shrubs, herbs, ferns, grasses, sedges and rushes, though often shaded out by dense shrubs and/or Austral Bracken (*Pteridium esculentum*).

The Closed Woodland and Forest EVCs (including those in mosaics) that occurred in Frankston City before colonisation – are:

- Coast Banksia Woodland
- Gully Woodland
- Lowland Forest
- Damp-sand Herb-rich Woodland
- Heathy Woodland
- Swampy Riparian Woodland

Animals that would have likely inhabited Closed Woodlands and Forests before colonisation include:

- Agile Antechinus (*Antechinus agilis*)
- Dusky Antechinus (*Antechinus swainsonii*)
- Feathertail Glider (*Acrobates pygmaeus*)
- Common Brushtail Possum (*Trichosurus vulpecula*)
- Common Ringtail Possum (*Pseudocheirus peregrinus*)
- Growling Grass Frog (*Litoria raniformis*)
- Koala (*Phascolarctos cinereus*)
- Little Forest Bat (*Vespadelus vulturnus*)
- Powerful Owl (*Ninox strenua*)
- Spot-tailed Quoll (*Dasyurus maculatus*)
- Tree Goanna (*Varanus varius*)
- Tasmanian Pademelon (*Thylogale billardierii*)
- Dingo (*Canis lupus dingo*)
- Eastern Pygmy Possum (*Cercartetus nanus*)
- Carpet Python (*Morelia spilota*)
- Lowland copperhead (*Austrelaps superbus*)
- Short-beaked Echidna (*Tachyglossus aculeatus*)
- Southern Brown Tree Frog (*Litoria ewingii*)
- Southern Brown Bandicoot (*Isodon obesulus*)
- Long-nosed Bandicoot (*Perameles nasuta*)
- Sugar Glider (*Petaurus breviceps*)
- Swamp Skink (*Lissolepis coventryi*)
- Swamp Wallaby (*Wallabia bicolor*)
- Wombat (*Vombatus ursinus*)



Figure 6: Closed Woodland at Boggie Creek in Langwarrin. Photograph by Julian Drummond (Practical Ecology).

2.2 Open Woodlands

The overall vegetation structure in Open Woodlands is characterised by a relatively open canopy layer, sparse Sub-canopy trees, and large and medium shrubs. The ground layer is usually short (in comparison to Closed Woodlands and Forests), and dominated by grasses.

Before colonisation, this habitat is believed to have covered large swaths of the south-western and south-eastern portions of Frankston City. It occurred in the north-east in a mosaic with grasslands (Map 1), largely on geologies of Baxter sandstones and Silurian sediments (Figure 5).

Soils are characteristically clay, with a shallow sandy surface.

Canopy trees are dominated by Eucalypts, with the most common being River Red Gum (*Eucalyptus camaldulensis*) and Narrow-leaf Peppermint (*E. radiata*). **Sub-canopy trees** can be present, which are usually sparse and include Wattles, Sheoaks (with Black and Drooping Sheoaks being the most common), and Cherry Ballart (*Exocarpos cupressiformis*).

Small to large shrubs in this habitat are also usually sparse and include species such as Hedge Wattle (*Acacia paradoxa*) and Prickly Tea-tree (*Leptospermum continentale*).

Groundlayer vegetation is usually quite short, and is often dominated by grasses such as Kangaroo Grass (*Themeda triandra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Wallaby Grasses (*Rytidosperma* spp.), Spear Grasses (*Austrostipa* spp.), Tussock-grasses (*Poa* spp.), various herbs (often many wildflowers), and sprawling shrubs.

Open Woodland EVCs (including those in mosaics) that occurred in Frankston City before colonisation – are:

- Grassy Woodland
- Plains Grassy Woodland

Animals that would have likely inhabited Open Woodlands before colonisation include:

- Agile Antechinus
- Common Brushtail Possum
- Common Ringtail Possum
- Long-nosed Bandicoot
- Tasmanian Bettong
- Long-nosed Potoroo (*Potorous tridactylus*)
- Eastern Pygmy Possum
- Australian Bustard (*Ardeotis australis*)
- Bush-stone Curlew (*Burhinus grallarius*)
- Dingo
- White-footed Dunnart (*Sminthopsis leucopus*)
- New Holland Mouse (*Pseudomys novaehollandiae*)
- Water Rat (*Hydromys chrysogaster*)
- Eastern Barred Bandicoot (*Perameles gunnii*)
- Eastern Grey Kangaroo (*Macropus giganteus*)
- Eastern Quoll (*Dasyurus viverrinus*)
- Emu (*Dromaius novaehollandiae*)
- Koala
- Little Forest Bat
- Powerful Owl
- Short-beaked Echidna
- Southern Brown Tree Frog
- Southern Brown Bandicoot
- Sugar Glider
- Swamp Wallaby
- Swift Parrot (*Lathamus discolor*) (during its winter migration)
- Common Wombat

2.3 Heathlands and Scrubs

The overall vegetation structure in Heathlands and Scrubs (Image 10) is characterised by a lack of canopy and Sub-canopy trees, with a thick layer of small to large shrubs, and a sparse groundlayer of grass-like plants and herbs. Before colonisation, this habitat is believed to have covered small to medium patches of land scattered throughout Frankston City. These Heathlands were often surrounded by, and in a mosaic with, large areas of Closed Woodlands and Forests (Map 1), on geologies of predominantly siliceous sands (though this sand extends much deeper than in Closed Woodlands and Forests (Figure 5).

Soils are characteristically sandy, with the exception of Swamp Scrub and Estuarine Swamp Scrub, which occur on deposits of peats, loams, silts, and clays.



Figure 7: Open Woodland at Wilton Bushland Reserve in Carrum Downs. Photograph taken by David Fairbridge (Frankston City Council).

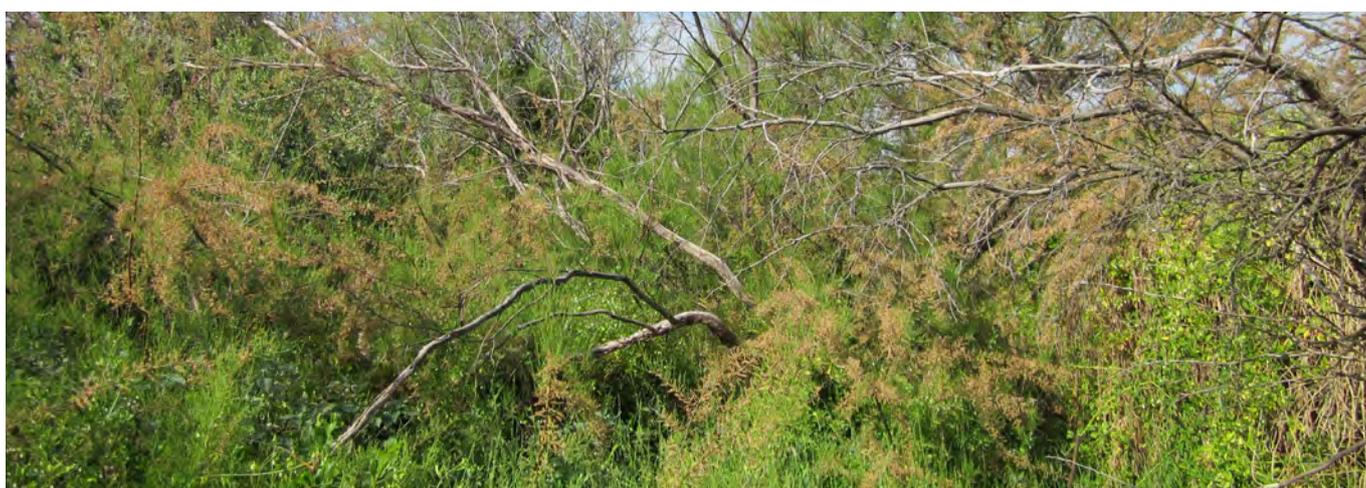


Figure 8: Scrub on the foreshore in Seaford. Photograph by Charlotte Townson (Practical Ecology).

Canopy trees are typically absent.

Sub-canopy trees are also typically absent.

Small to large shrubs are the dominant vegetation layer, with the largest usually being Swamp Paperbark (*Melaleuca ericifolia*), Woolly Tea-tree (*Leptospermum lanigerum*), Coast Tea-tree (*L. laevigatum*), and Coast Wattle (*Acacia longifolia*). Smaller shrubs include Seaberry Saltbush (*Rhagodia candolleana* subsp. *Candolleana*), Coast Beard-heath (*Leucopogon parviflorus*), and White Correa (*Correa alba*).

Groundlayer vegetation includes Karkala (*Carpobrotus rossii*), Bower Spinach (*Tetragonia implexicoma*), Small Poranthera (*Poranthera microphylla*), Flax-lilies (*Dianella* spp.), Austral Bracken, and various grasses, rushes and sedges.

Heathland and Scrub EVCs (including those in mosaics) that occurred in Frankston City before colonisation – are:

- Coastal Dune Scrub
- Coastal Headland Scrub
- Estuarine Swamp Scrub
- Sand Heathland
- Swamp Scrub

Animals that would have likely inhabited Heathlands and Scrubs before colonisation include:

- Common Brushtail Possum
- Common Ringtail Possum
- Eastern Quoll
- Little Forest Bat
- Short-beaked Echidna
- Dusky Antechinus
- Agile Antechinus
- White-footed Dunnart
- Dingo
- Eastern Quoll (*Dasyurus viverrinus*)
- Eastern Pygmy Possum
- Long-nosed Bandicoot
- Common Wombat
- Tasmanian Bettong
- Long-nosed Potoroo
- New Holland Mouse
- Water Rat
- Whites Skink (*Egernia whitii*)
- Common Scaly-foot (*Pygopus lepidopodus*)
- Southern Brown Bandicoot
- Southern Brown Tree Frog
- Swamp Rats (*Rattus lutreolus*)
- Swamp Skink
- Swamp Wallaby

2.4 Grasslands

The overall vegetation structure in Grasslands (Image 11) is – as the name suggests – dominated by grasses.

Before colonisation, this habitat is believed to have occurred in the north-east of Frankston City, interspaced with Open Woodlands, and along the coast in the north-west in a mosaic with Coastal Heaths and Scrubs (Map 1).

Soils and geologies vary between Tertiary Sediments of sandy clay-loams supporting Plains Grassland in the north-east of Frankston City, to Quaternary deposits of siliceous sand supporting Coastal Dune Grassland along the coast in the north-west.

Canopy trees are typically absent.

Sub-canopy trees are also typically absent.

Small to large shrubs are again, typically absent.

Groundlayer vegetation is dominated by grasses, rushes and sedges. Inland, species composition is similar to in Open Woodlands. Along the coast, dominant species is Hairy Spinifex (*Spinifex sericeus*) with some Bower Spinach (*Tetragonia implexicoma*), Rough Fireweed (*Senecio hispidulus*), and Dune Thistle (*Actites megalocarpus*) among other species.

Grassland EVCs (including those in mosaics) that occurred in Frankston City before colonisation are:

- Coastal Dune Grassland
- Plains Grassland

Animals that would have likely inhabited Grasslands before colonisation include:

- Eastern Barred Bandicoot
- White-footed Dunnart
- Southern Brown Bandicoot
- Long-nosed Bandicoot
- New Holland Mouse
- Water Rat
- Eastern Grey Kangaroo
- Emu
- Glossy Grass Skink (*Pseudemoia rawlinsoni*)
- Whites Skink
- Common Scaly-foot
- Short-beaked Echidna
- Southern Brown Tree Frog
- Swamp Rat
- Swift Parrot



Figure 9: Grassland (left) transitioning to scrub (right) on the foreshore in Seaford. Photograph by Charlotte Townson (Practical Ecology).



Figure 10: Wetland at Down's Estate in Seaford. Photograph by David Nance (Practical Ecology).

2.5 Wetlands

The overall vegetation structure in Wetlands (Figure 10) is dominated by sedges, rushes, and herbs, usually without any trees or large shrubs.

Before colonisation, this habitat is believed to have occurred in a large patch in the lowest part of Frankston City in the north-west, and a tiny patch in the south-west (Map 1).

Wetlands were created where wind-blown sands blocked creeks going out to sea, and over time sediments and dead plant matter collected and created surface geologies of Quaternary deposits.

Soils are characterised by peaty clays.

Canopy trees are typically absent, though there may be some scattered River Red Gums and Swamp Gums (*Eucalyptus ovata*).

Sub-canopy trees are also typically absent.

Small to large shrubs are again, typically absent, though there may be some Tree Everlastings (*Ozothamnus ferrugineus*), Kangaroo Apples (*Solanum laciniatum*), and Swamp Paperbarks.

Groundlayer vegetation is dominated by graminoids and herbs. Some of the more common graminoids are Club-sedges (*Isolepis* spp.), Spike-sedges (*Eleocharis* spp.), Rushes (*Juncus* spp.), Grass-sedges (*Carex* spp.), Bog-sedges (*Schoenus* spp.), Water-ribbons (*Triglochin* spp.), and Common Reed (*Phragmites australis*). Common herbs in wetlands include Slender Knotweed (*Persicaria decipiens*), Crassulas (*Crassula* spp.), Small Loosestrife (*Lythrum hyssopifolia*), and Water-milfoil (*Myriophyllum* spp.).

Wetland EVCs (including those in mosaics) that occurred in Frankston City before colonisation are listed below however it is likely there were more wetland EVCs present than indicated by the DELWP modelled EVC mapping:

- Estuarine Wetland
- Plains Grassy Wetland
- Submerged Aquatic Herbland

Animals that would have likely inhabited Grasslands before colonisation include:

- Australian Painted Snipe
- Australian Bustard (*Ardeotis australis*)
- Australasian Bittern (*Botaurus poiciloptilus*)
- Brolga (*Grus rubicunda*)
- Intermediate Egret (*Ardea intermedia*)
- Eastern Grey Kangaroo
- Eastern Snake-necked Turtle (*Chelodina longicollis*)
- Glossy Grass Skink
- Growling Grass Frog
- Latham's Snipe (*Gallinago hardwickii*)
- Little Egret (*Egretta garzetta*)
- Lowland Copperhead
- Magpie Goose (*Anseranas semipalmata*)
- Nankeen Night Heron (*Nycticorax caledonicus*)
- Southern Brown Tree Frog
- Southern Toadlet
- Swamp Skink
- Swamp Wallaby
- Water Rat

Community and expert opinions



Three main engagement sessions were run online throughout the research phase of this Technical Report, each running for two-and-a-half hours, which were:

- With members of community conservation groups on 17 September 2020
- With government agencies and other organisations (e.g. Parks Victoria, Major Road Projects Victoria, PPW CMA, various local experts and consultants) on 29 October 2020
- With Frankston City Council staff on 25 November 2020

Additionally, an online survey with biodiversity-related questions was created by Frankston City Council staff, which received over 120 responses, as well another with climate change-related questions.

Separate consultation with the Bunurong Land Council – as the appropriate Registered Aboriginal Party – will be undertaken before completing the Biodiversity Action Plan.

Data used for this section is from:

- detailed notes taken in each engagement session (by various Frankston City Council employees)
- from recordings
- from survey results – which were collated by Amy Henson (Frankston City Council) and then paraphrased for this report

These opinions and pieces of knowledge were used throughout, and inform, the rest of the Technical Report.

3.1 General findings

Overall, the community indicated that it most valued Frankston City's coastline and natural environment, and that protection of these natural values was one of its highest priorities. At the same time, the community has a high level of concern about climate change and loss of biodiversity.

Respondents to the Climate Change Survey indicated that in tackling climate change, Council's highest priority should be biodiversity conservation and growing the urban forest. The community is very concerned that Frankston City's natural assets are declining and not adequately protected for future generations. There is also a pressing need for better community engagement and sharing of knowledge about how to protect and enhance Frankston City's natural heritage.

The community has indicated a high level of support for addressing a number of biodiversity-related issues, with some of the most commonly-raised being:

- Increasing habitat connectivity, and reducing road-related risks for wildlife
- Protecting and managing biodiversity on private land
- Improving flora diversity and vegetation structure in reserves
- Management of pest plants and animals
- Loss of significant fauna (such as the Southern Brown Bandicoot)
- Human activities in reserves needing to better align with their conservation goals
- The need for better fire management, and integration with biodiversity management and protection
- Collaboration with adjoining councils and other government and private agencies
- Preparation for the climate emergency

The community also highlights that there is a lack of knowledge in many areas, in particular:

- A lack of flora and fauna habitat data (with koala habitat mentioned often)
- Alternatives to herbicide use for vegetation management
- Long-term plans for threatened species management
- Limited monitoring of threatened flora and fauna

The Action Plan will have a strong focus on community engagement, which is further discussed in section 5.6. It is evident that Frankston City's community has a wide range of knowledge about specific aspects the biodiversity of the local area (Appendix 3).

Frankston City's biodiversity now



This section aims to collate and present various data and knowledge about the current state of biodiversity in Frankston City, including:

- data from government databases
- discussions with land managers and other stakeholders
- data collected by Practical Ecology and other consultants in the past
- data provided by Frankston City Council

4.1 Habitat and native vegetation mapping

Data was combined from a number of sources to get the most accurate picture of habitat and native vegetation composition in Frankston City (see Map 3 for the data sources used and Map 4 for an aerial photograph of Frankston City).

EVC mapping across Frankston City has previously been completed on-ground by Bedggood et al. (2006) and Cooney (2019), (Map 4). Initially, shapefiles of these two data sources were compiled in QGIS (QGIS.org 2020), and where they overlapped (i.e. a patch of native vegetation was mapped in both studies), the older shapefile was deleted to leave the most recent one only. Following this, existing EVC modelling from DSE (2005) was added for any areas not covered in the two on-ground surveys. Finally, high-resolution aerial photos from Nearmap (2020) were used to refine the extent of all shapefiles to delete any areas that clearly do not contain any native vegetation (e.g. where the Peninsula Link Freeway has since been constructed, or where the low-resolution DSE mapping covers areas noticeably cleared of native vegetation).

Key Finding 2: Parts of the EVC mapping used in this report need to be ground-truthed to get an even more accurate representation of EVC distribution within Frankston City.

While this process may have missed some very small areas of native vegetation – in areas which had not been mapped on-ground and were not included in the low-resolution DSE mapping (Key Finding 2) – overall the resulting mapping gave a very good representation of the types and extents of native vegetation occurring in Frankston City.

4.2 Habitats

Today, all habitats that existed before colonisation still exist to some degree, albeit in modified states (see Sections 2.1 to 2.5 for descriptions of each habitat type). Closed Woodlands and Forests are still the most common habitat in Frankston City, largely due to extensive clearing of Open Woodlands and Grasslands, and the originally smaller size of Heathlands and Scrubs, and Wetlands (Figure 11).

Relatively substantial percentages of Closed Woodlands and Forests, Heathlands and Scrubs, and Wetlands still remain (Figure 11). Open Woodlands and Grasslands have been almost completely cleared, due to their easier conversion to agricultural land and other past land uses (Figure 12). The loss of woodlands has also been accompanied by a large scale loss of old growth hollow – bearing trees and habitat logs.

Closed Woodland and Forest EVCs (including those in mosaics) that currently occur in Frankston City are:

- Coast Banksia Woodland
- Damp Heathy Woodland
- Damp Sands Herb-rich Woodland
- Gully Woodland
- Heathy Woodland
- Lowland Forest
- Shrubby Gully Forest
- Swampy Riparian Woodland
- Swampy Woodland
- Valley Heathy Forest

Woodland EVCs (including those in mosaics) that currently occur in Frankston City are:

- Grassy Woodland
- Plains Grassy Woodland
- Damp Sands Herb-rich Woodland

Grassland EVCs (including those in mosaics) that currently occur in Frankston City are:

- Coastal Dune Grassland
- Plains Grassland

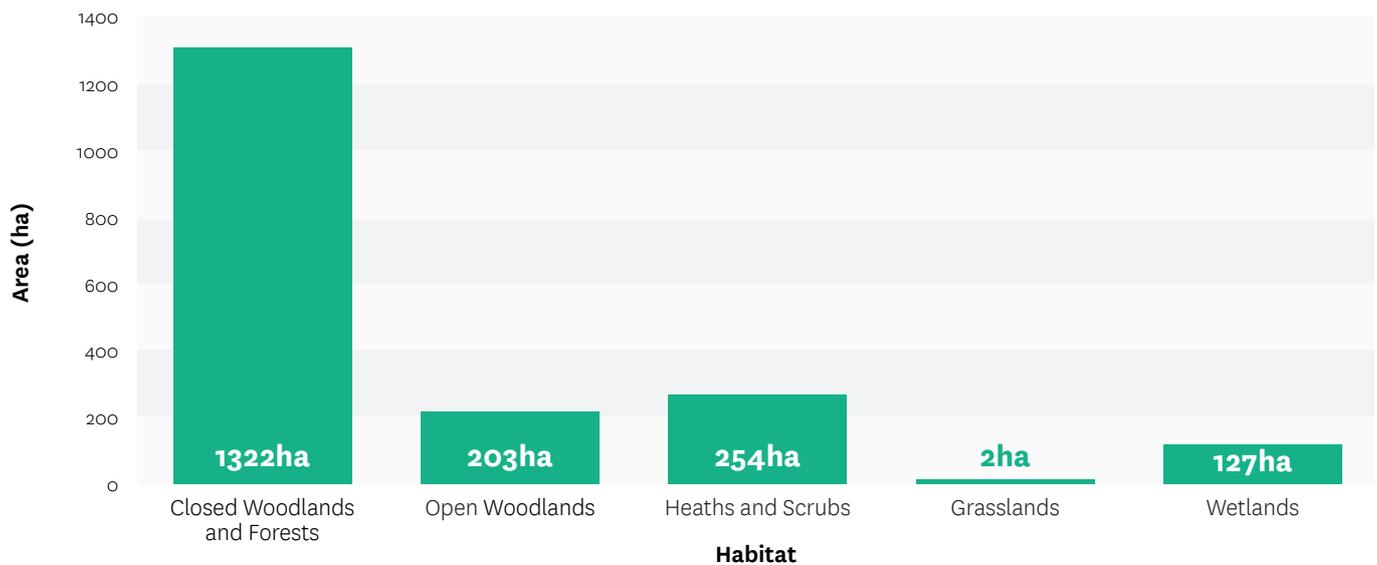


Figure 11: Area of each habitat in Frankston City today.

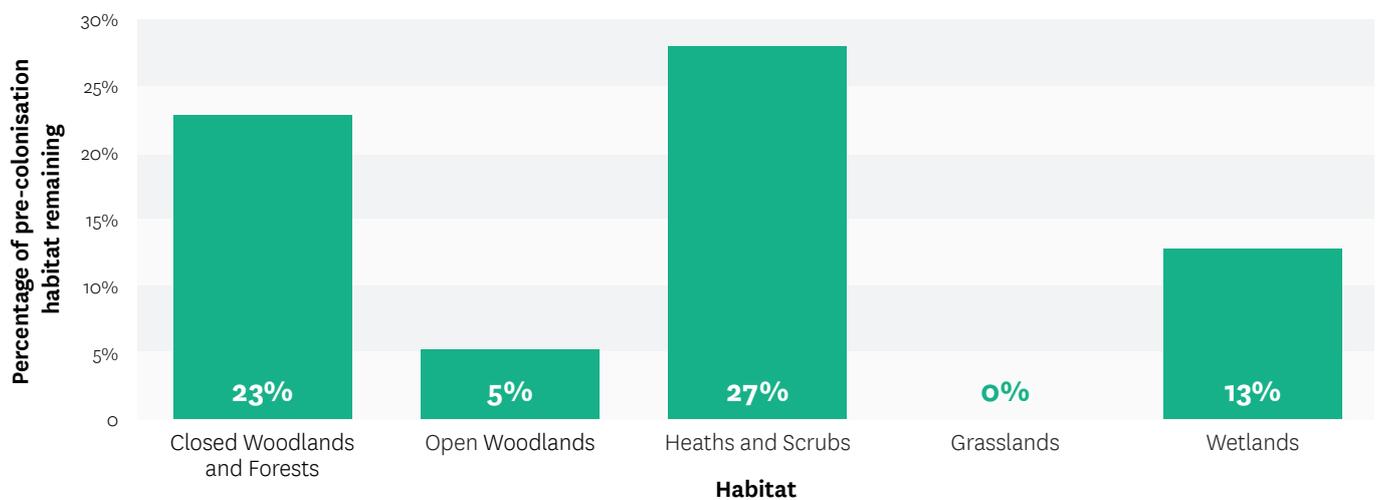


Figure 12: Proportion of each habitat in Frankston City remaining since colonisation.

Heathland and Scrub EVCs (including those in mosaics) that currently occur in Frankston City are:

- Damp Heathland
- Coastal Dune Scrub
- Coastal Headland Scrub
- Riparian Scrub
- Sand Heathland
- Swamp Scrub

Wetland EVCs (including those in mosaics) that currently occur in Frankston City are:

- Aquatic Herbland
- Aquatic Saline Meadow
- Aquatic Sedgeland
- Brackish Aquatic Herbland
- Brackish Wetland
- Plains Grassy Wetland
- Tall Marsh



4.3 Native vegetation

Overall, approximately 15 per cent of Frankston City’s original vegetation (Map 2) remains relatively intact (Map 4), with the remaining 85 per cent of the municipality either heavily modified (i.e. potentially still containing some indigenous plants, but not resembling an EVC) or entirely cleared (Figure 13).

All of the EVCs modelled by DSE (2005) as occurring in Frankston City before colonisation (i.e. before the 19th century) still remain, with the exception of the Swampy Riparian Woodland/Swamp Scrub mosaic (although patches of the mosaic’s component EVCs do still occur) (Table 1, Map 4).

Additionally, numerous EVCs have been recently mapped in Frankston City that were not modelled as occurring before colonisation (Table 1, Map 4). This is not surprising given that the modelling by DSE (2005) is low-resolution in scale, and rather than indicating changes in EVCs over time (although this is possible in some cases), indicates instead the importance of verifying data on the ground.

For this reason, it is difficult to determine the exact changes in each EVC’s size and distribution since colonisation. Native vegetation in Frankston City has clearly been isolated into small fragments over time. Today, patches of individual EVCs range in size from 0.02 to 76.90 ha, with the average size being 2.69 ha.

■ Native vegetation
■ Cleared and heavily modified land

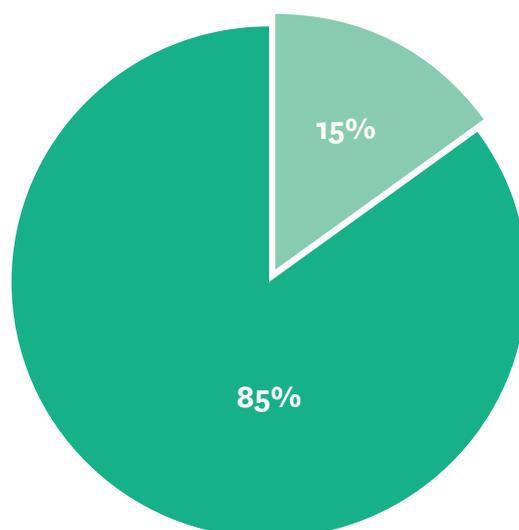
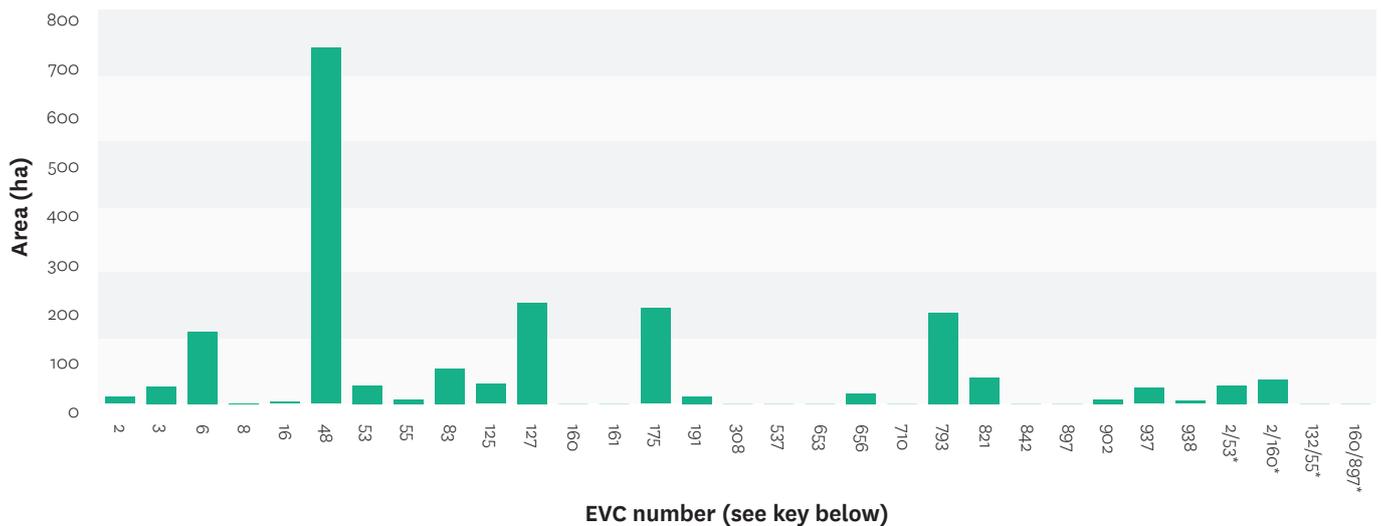


Figure 13: Proportions of land in Frankston City covered by native vegetation, or cleared and heavily modified land.

Today, Heathy Woodland is by far the most widespread EVC in Frankston City, followed by Valley Heathy Forest, Grassy Woodland, Damp Heathy Woodland, Sand Heathland, and numerous other EVCs in more restricted distributions (Figure 14, Map 4). Coastal Dune Grassland, Wet Heathland, and the Plains Grassland/Plains Grassy Woodland mosaic are the most restricted EVCs, each covering areas of less than 1 ha (Figure 14, Map 4).

EVC number	EVC name	EVC mapped in pre-1750 map?	EVC present today?	Bioregional conservation status
2	Coast Banksia Woodland	Yes	Yes	Vulnerable
3	Damp Sands Herb-rich Woodland	Yes	Yes	Vulnerable
6	Sand Heathland	Yes	Yes	Rare
8	Wet Heathland	No	Yes	Depleted
16	Lowland Forest	Yes	Yes	Vulnerable
48	Heathy Woodland	Yes	Yes	Least concern
53	Swamp Scrub	Yes	Yes	Endangered
55	Plains Grassy Woodland	No	Yes	Endangered
83	Swampy Riparian Woodland	Yes	Yes	Endangered
125	Plains Grassy Wetland	Yes	Yes	Endangered
127	Valley Heathy Forest	No	Yes	Endangered
160	Coastal Dune Scrub	Yes	Yes	Depleted
161	Coastal Headland Scrub	Yes	Yes	Depleted
175	Grassy Woodland	Yes	Yes	Endangered
191	Riparian Scrub	No	Yes	Vulnerable
308	Aquatic Sedgeland	No	Yes	Not listed
537	Brackish Aquatic Herbland	No	Yes	Not listed
653	Aquatic Herbland	No	Yes	Not listed
656	Brackish Wetland	No	Yes	Endangered
710	Damp Heathland	No	Yes	Rare
793	Damp Heathy Woodland	No	Yes	Vulnerable
821	Tall Marsh	No	Yes	Not listed
842	Aquatic Saline Meadow	No	Yes	Not listed
897	Coastal Dune Grassland	No	Yes	Not listed
902	Gully Woodland	Yes	Yes	Endangered
937	Swampy Woodland	No	Yes	Endangered
938	Shrubby Gully Forest	No	Yes	Not listed
2/53	Coast Banksia Woodland/Swamp Scrub Mosaic	Yes	Yes	n/a
2/160	Coast Banksia Woodland/Coastal Dune Scrub Mosaic	Yes	Yes	n/a
83/53	Swampy Riparian Woodland/Swamp Scrub Mosaic	Yes	No	n/a
132/55	Plains Grassland/Plains Grassy Woodland Mosaic	Yes	Yes	n/a
160/897	Coastal Dune Scrub/Coastal Dune Grassland Mosaic	Yes	Yes	n/a

Table 1: Current mapped EVCs in Frankston City.



2	Coast Banksia Woodland	127	Valley Heathy Forest	656	Brackish Wetland
3	Damp Sands Herb-rich Woodland	132	Plains Grassland	710	Damp Heathland
6	Sand Heathland	160	Coastal Dune Scrub	793	Damp Heathy Woodland
8	Wet Heathland	161	Coastal Headland Scrub	821	Tall Marsh
16	Lowland Forest	175	Grassy Woodland	842	Aquatic Saline Meadow
48	Heathy Woodland	191	Riparian Scrub	897	Coastal Dune Grassland
53	Swamp Scrub	308	Aquatic Sedgeland	902	Gully Woodland
55	Plains Grassy Woodland	537	Brackish Aquatic Herbland	937	Swampy Woodland
83	Swampy Riparian Woodland	653	Aquatic Herbland	938	Shrubby Gully Forest
125	Plains Grassy Wetland				

Figure 14: Size of each mapped EVC within Frankston City. *EVC mosaic (a mixture of two EVCs in the same area).

4.3.1 Native vegetation on public and private land

Of the approximately 1,900 ha of native vegetation remaining in Frankston City, 40 per cent occurs on private land (e.g. bush blocks in the Langwarrin Woodlands [defined here as the area in the south-east of Frankston City with substantial native vegetation on private land (Figure 15).

The other 60 per cent of native vegetation occurs on publicly-owned, or privately-owned but publicly-managed land (hereafter referred to as ‘public land’) such as Melbourne Water managing the Edithvale-Seaford Wetlands Environment Area.

Of Frankston City’s public land, 47 per cent is covered by native vegetation, compared to only 9 per cent of private land (Figure 16).

These data demonstrate the clear success of public authorities in retaining vegetation on their land, as well as the susceptibility of vegetation on private land to clearing. Most EVCs are mapped as occurring largely on public land,

with the exception of a few. Around half of Swamp Scrub, Swampy Riparian Woodland, Grassy Woodland and Riparian Scrub occur on public land.

Only around a third of Heathy Woodland occurs on public land, although this EVC is by far the largest in Frankston City, and this proportion still represents a large area (Figure 17).

Less than 20 per cent of Wet Heathland, Lowland Forest, Plains Grassy Woodland, Plains Grassy Wetland, Valley Heathy Forest, and Swampy Woodland occur on public land, and thus are less secure than other communities (Figure 17 and Key Finding 3).

Key Finding 3: Investigate options for protecting and securing areas of Wet Heathland, Lowland Forest, Plains Grassy Woodland, Plains Grassy Wetland, Valley Heathy Forest, and Swampy Woodland (if found to be present following ground-truthing).

■ Private land
■ Public land

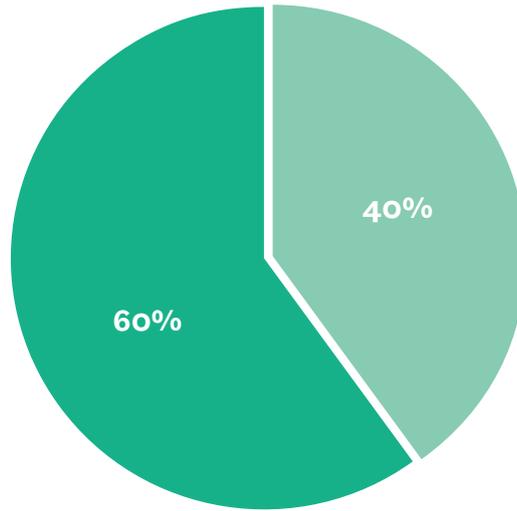


Figure 15: Proportions of native vegetation in Frankston City occurring on either public or private land.

■ Native vegetation
■ Cleared and heavily modified land

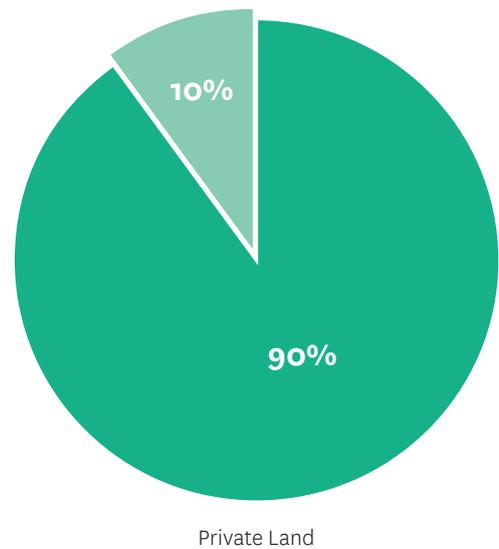
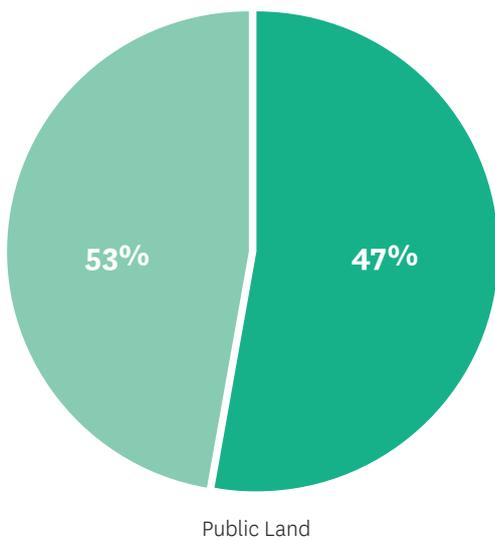


Figure 16: Proportions of public and private land in Frankston City covered by native vegetation or cleared and heavily modified land.

Given the long history of various land uses throughout Frankston City, it is not surprising that native vegetation is in various states of degradation. An unstandardised sample of a number of EVC patches indicates that some EVCs have been degraded to higher degrees than others (Figure 18 and Key Finding 4). This suggests past land uses in the area, such as Plains Grassy Woodland perhaps being more suitable for grazing due to its open structure, and how different vegetation types tolerated alterations, such as by invasive species and human disturbance.

Key Finding 4: Different EVCs are degraded to different degrees, requiring a tailored and priority-based approach to management.

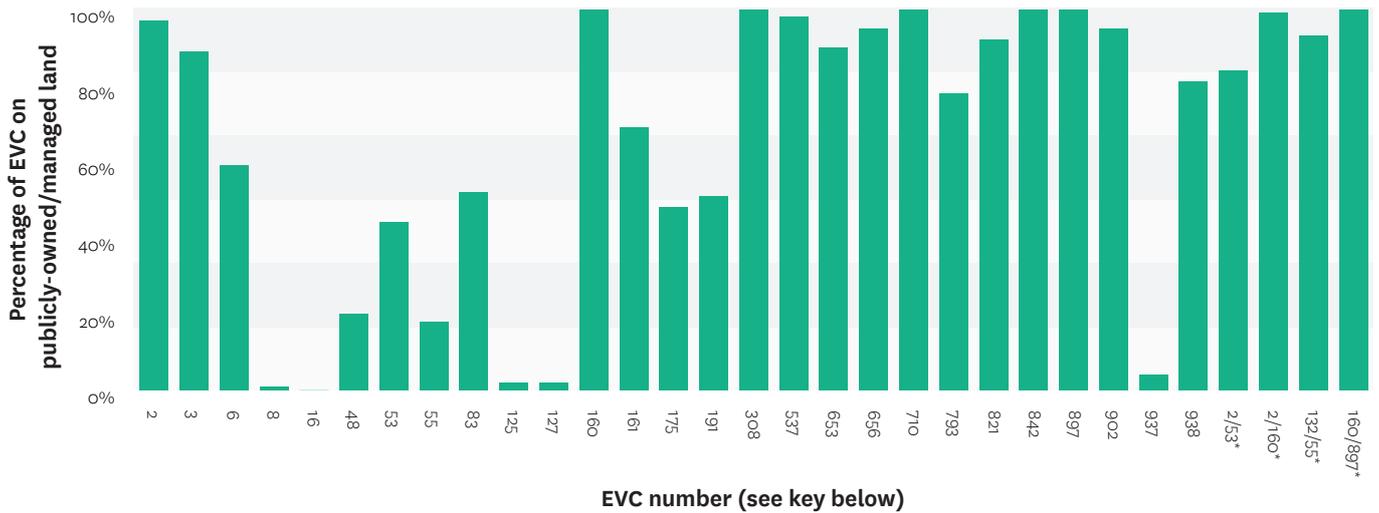


Figure 17: Proportion of each EVC in Frankston City occurring on either publicly-owned or managed land.
*EVC mosaic (a mixture of two EVCs in the same area).

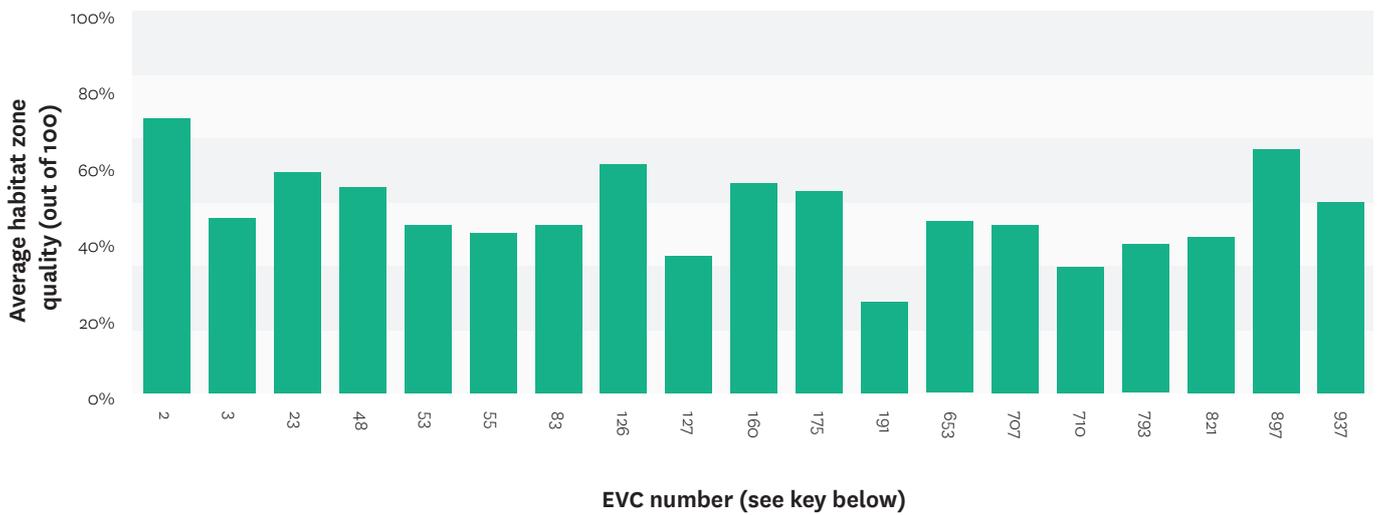


Figure 18: Average habitat zone quality (defined by Habitat Hectares scores) of EVCs based on an unstandardised sample of 63 habitat zones surveyed by Practical Ecology. This figure is intended to highlight that different EVCs may be at different levels of degradation, and is not intended to quantify the actual qualities of each respective EVC across Frankston City.

2	Coast Banksia Woodland	126	Swampy Riparian Complex	707	Sedgy Swamp Woodland
3	Damp Sands Herb-rich Woodland	127	Valley Heathy Forest	710	Damp Heathland
6	Sand Heathland	132	Plains Grassland	793	Damp Heathy Woodland
8	Wet Heathland	160	Coastal Dune Scrub	821	Tall Marsh
16	Lowland Forest	161	Coastal Headland Scrub	842	Aquatic Saline Meadow
23	Herb-rich Foothill Forest	175	Grassy Woodland	897	Coastal Dune Grassland
48	Heathy Woodland	191	Riparian Scrub	902	Gully Woodland
53	Swamp Scrub	308	Aquatic Sedgeland	937	Swampy Woodland
55	Plains Grassy Woodland	537	Brackish Aquatic Herbland	938	Shrubby Gully Forest
83	Swampy Riparian Woodland	653	Aquatic Herbland		
125	Plains Grassy Wetland	656	Brackish Wetland		

In addition to varying qualities of each EVC, it appears that EVCs on private and public land are degraded to different levels (Figure 19). In the same convenience sample used for Figure 18, 0 per cent of sampled habitat zones on public land were in excellent quality, 51 per cent were good, 44 per cent were moderate, and 5 per cent were poor (Figure 19). In contrast, 2 per cent of sampled habitat zones on private land were in excellent quality, 30 per cent were good, 56 per cent were moderate, and 12 per cent were poor (Figure 19).

Key Finding 5: EVCs on private land are more degraded than those on public land, and strategies to improve management on private land should be investigated.

This is not surprising given that public land is managed with higher obligations for protecting native vegetation. However, this is influenced by the types of EVCs that occur on private versus public land, which as mentioned above are themselves degraded to varying degrees (Key Finding 5). It is also important to note that the data collected on public land is likely skewed towards lower quality remnants, as data from high-quality remnants such as Frankston Nature Conservation Reserve and Studio Park were not in the sample.

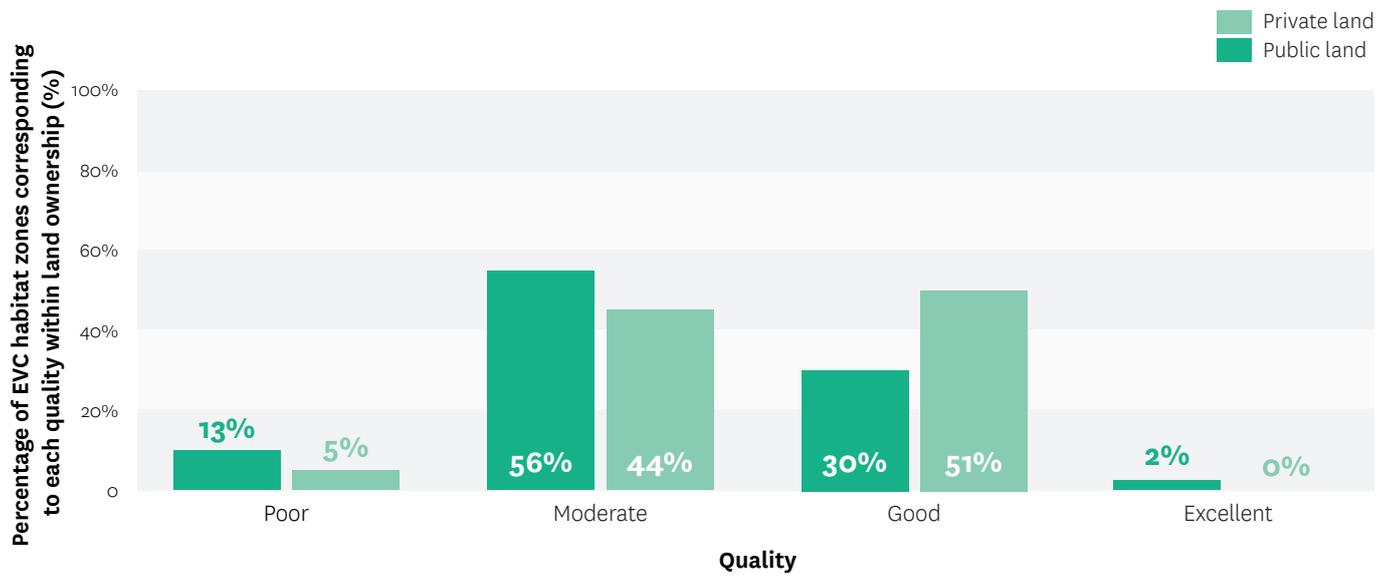


Figure 19: Qualities of EVC habitat zones on private and public land. Quality ranges are defined by Habitat Hectares scores (out of 100) where 0 to <25 is poor, ≥25 to <50 is moderate, ≥50 to <75 is good, and ≥75 to 100 is excellent. Based on an unstandardised sample of 63 habitat zones surveyed by Practical Ecology in previous work.



4.3.2 Recent losses

While all planning decisions for removal of native vegetation must adhere to the principles of ‘avoid, minimise and mitigate’, continued development has resulted a steady depletion and fragmentation of indigenous habitat within the municipality. For example, at The Pines Flora and Fauna Reserve, large areas of land were cleared for the Peninsula Link Freeway (Figure 20). Additionally, smaller areas are cleared regularly for low-density residential, industrial, and rural residential purposes.



Figure 20: Loss of native vegetation and connectivity in The Pines Flora and Fauna Reserve during the construction of the Peninsula Link Freeway. Aerial photos from Nearmap (2021).

4.4 Flora

While the previous section discussed the state of the overall assemblages of plant species (EVCs/native vegetation) in Frankston City, this section will discuss individual plant species. This section aims to answer three main questions relating to flora in Frankston City:

1. What do we currently know about Frankston City's flora, and what don't we know?
2. Which listed flora species occur in Frankston City?
3. Where is the most important flora habitat in Frankston City?

Key Finding 6: The diversity of flora species at many natural reserves is not documented due to a lack of detailed surveys.

Frankston City's natural reserve system encompasses 60 different reserves of varying sizes from small parks to large flora and fauna reserves. Data used for the analysis of flora in Frankston City's reserves were compiled from various surveys completed in previous years¹. Of Frankston City's 60 reserves, 32 have had detailed flora surveys completed, while 28 have not (Figure 21 and Key Finding 6).

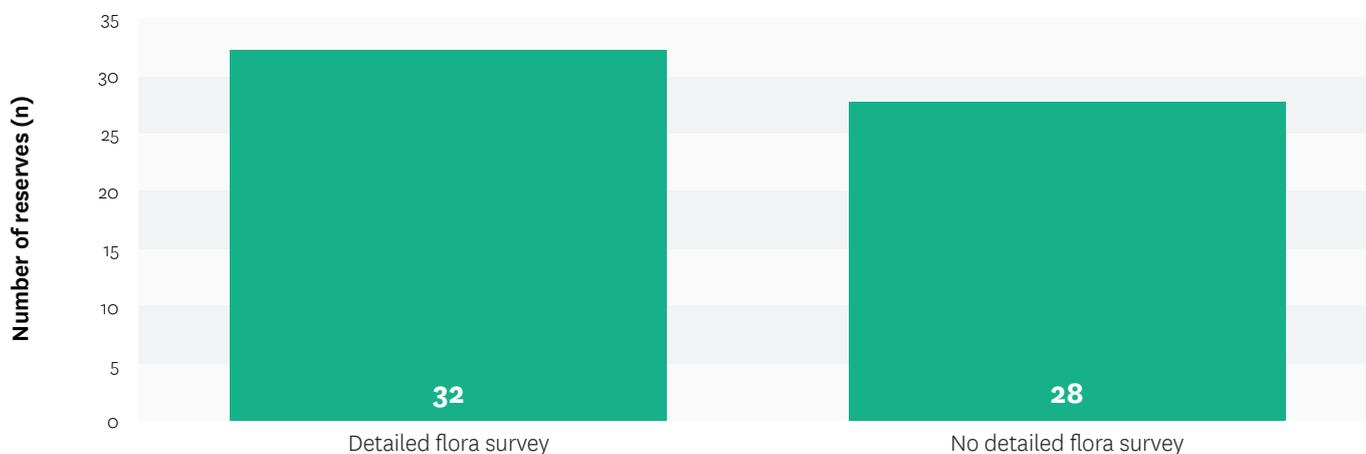


Figure 21: Number of reserves in Frankston City with and without detailed flora surveys.

Within the natural reserves that have had detailed flora surveys completed, an average of 81 indigenous flora species were detected, with the most diverse group of plants being trees and shrubs, followed by graminoids, and woody groundcovers, herbs and forbs (Figure 22).

The number of species detected at each reserve varied greatly, with as few as 17 indigenous species at one reserve, and up to as many as 180 at another. The diversity of understorey species accounted for much of this variation, pointing to poor structural diversity in some reserves (Key Finding 7). This is likely the result of a number of factors, including foot traffic at busier reserves, and past land uses such as grazing causing the loss of much of the understorey. Overall however, the diversity of indigenous understorey species was relatively high throughout reserves managed primarily for biodiversity, indicating the successful management of such reserves by Parks Victoria, Melbourne Water, and Frankston City Council.

Key Finding 7: Structural diversity of the vegetation at many of Frankston City's natural reserves could be improved through the reinstatement of understorey species.

1. Agriculture Victoria (2000), Bedgood et al. (2006), Biosis (2004a;b), Brunner and Courtney (1996; 1999a;b;c;d; 2003), Carr (1991), Department of Conservation & Environment (1991), Environmental Resources Management Australia (2005), Fairbridge et al. (2008), Felix Botanica (2004), Gordes (2000), Kananook Creek Association (2009), Kern (2004), McCaffrey and Legg (2007), McCaffrey et al. (2010), Muir et al. (1997), Riparian Australia (1999a;b), SMEC Australia (2011), Stephens et al. (2003), (Terra Forma 1999a;b;c;d;e; 2000a;b; 2002; 2003a;b;c; 2004), Terramatrix and IDLM (2010), Walker (1992), Walker (1993) and Yugovic (2005).

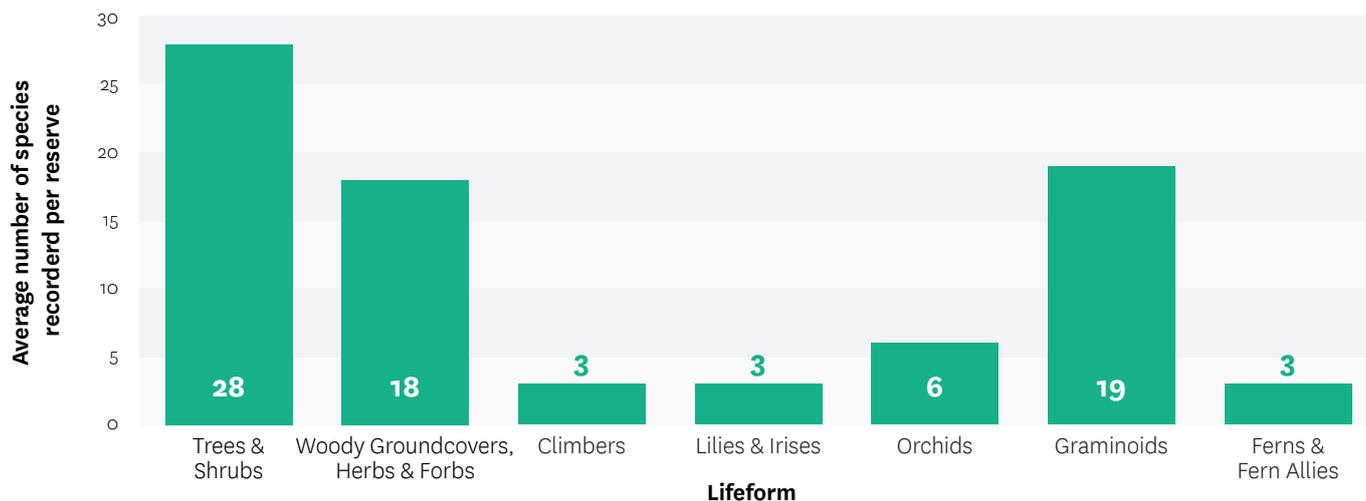


Figure 22: Species diversity of different vegetation components recorded throughout Frankston City's reserves. Compiled from 33 different reserves with detailed flora surveys, out of a total of 60 reserves.

As previously mentioned, surveys in Frankston City's natural reserves detected an average of 81 indigenous species, which contrasts to an average of 50 species on private properties (based on an unstandardised sample of 13 surveys on private properties (Figure 18).

While the average number of species detected on private properties is substantially lower, these data still point towards substantial flora diversity on private properties (Key Finding 8).

Additionally, a number of the private property surveys included in the sample are on small parcels of land in the more urbanised parts of Frankston City (e.g. Seaford), which had as few as 5 indigenous plant species, while surveys in more rural parts (e.g. Langwarrin South) had as many as 158 indigenous plant species.

While these findings are not intended to indicate the precise diversity of flora on private land, they do indicate that it is substantial and warrants protection and management.

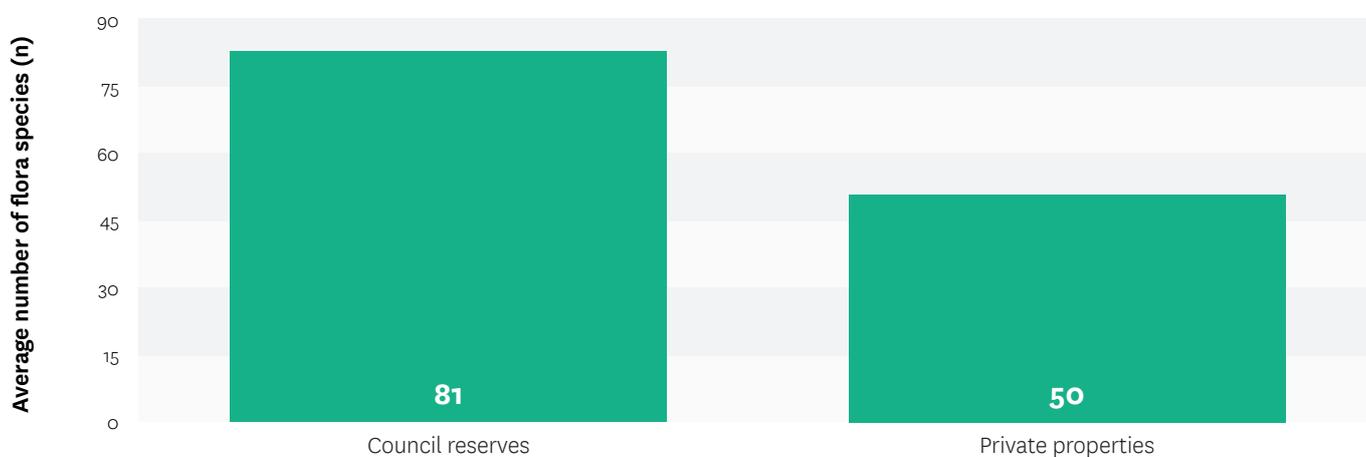


Figure 23: Average number of flora species recorded in detailed surveys of 32 of Frankston City's reserves, and an unstandardised sample of 13 surveys on private properties.

4.4.1 Listed flora

Records from the Victorian Biodiversity Atlas (VBA) were used to determine the presence of listed flora in Frankston City, as well as surrounding municipalities. Listed flora were defined as any indigenous flora species listed in The FFG Threatened List (DELWP August 2021). The Flora and Fauna Guarantee Amendment Act 2019 gives effect to a consistent national approach to assessing and listing threatened species using the Common Assessment Method (CAM) and establishing a single comprehensive list of threatened flora and fauna species, known as the FFG Act Threatened list (DELWP 2021).

Key Finding 8: There is substantial flora diversity on private land, which should be documented managed and protected.

After organising these records, we scrutinised them for accuracy. Initially, we viewed the natural distribution of each species using VicFlora (Royal Botanic Gardens Victoria 2015), and deleted from the list any species that were clearly outside of their natural ranges (i.e. their natural distributions did not overlap with the LGAs of Casey, Dandenong, Frankston, Kingston, or Mornington Peninsula).

Species with scattered, widespread natural distributions were not deleted at this stage, if it was unclear whether or not they naturally occur in the area.

Subsequently, if any species had three or fewer records in any of the five LGAs, their records were further interrogated by:

- viewing the location of each record on the VBA (DELWP 2020)
- viewing their natural distributions on VicFlora (Royal Botanic Gardens Victoria 2015), as well as on the Atlas of Living Australia (ALA 2012)
- determining if their associated geology was present in each LGA (i.e. records of species that solely grow on basalt soils were removed from Frankston City as there is no basalt in the LGA)

Any species whose records in Frankston City remained uncertain were then discussed with a local botanical experts. Records in Frankston City's surrounding LGAs were not as closely scrutinised and thus the lists of species in these LGAs in Section 7 are not considered definitive.

Following the above process, we established two categories of listed flora presence in each LGA (See Section 7 for the detailed list):

1. 'Present' species were listed flora species with at least one record since 2000
2. 'Not recently recorded' listed flora species were those with no records since 2000

Overall, 23 listed flora species were considered to be present in Frankston City, with the following species having multiple records since 2000 in Frankston City:

- Common Apple-berry (*Billardiera scandens* s.s.)
- Frankston Spider-orchid (*Caladenia robinsonii*)
- Fringed Helmet-orchid (*Corybas fimbriatus*)
- Green Leek-orchid (*Prasophyllum lindleyanum*)
- Grey Spike-sedge (*Eleocharis macbarronii*)
- Lacey River Buttercup (*Ranunculus amplus*)
- Lizard Orchid (*Burnettia cuneata*)
- Mentone Greenhood (*Pterostylis x toveyana*)
- Prawn Greenhood (*Pterostylis pedoglossa*)
- Purple Blown-grass (*Lachnagrostis semibarbata* var. *filifolia*)
- Purple Diuris (*Diuris punctata* var. *punctata*)
- River Swamp Wallaby-grass (*Amphibromus fluitans*)
- Southern Bristle-sedge (*Chorizandra australis*)
- Pale Swamp Everlasting (*Coronidium gunnianum*)
- Upright Panic (*Entolasia stricta*)

A number of these species are likely to be locally extinct in Frankston (for example Frankston Spider-orchid is currently known from only one wild population in Mornington Peninsula Shire) however, confirmation of their status within the municipality requires further investigation and targeted searches.

The following species had only one record in Frankston City since 2000, and while the LGA is within their natural range and therefore are considered present, are highlighted here as especially important to document:

- Annual Bitter-cress (*Cardamine paucijuga* s.s.)
- Grey Billy-buttons (*Craspedia canens*)
- Large River Buttercup (*Ranunculus papulentus*)
- Maroon Leek-orchid (*Prasophyllum frenchii*)
- Metallic Sun-orchid (*Thelymitra epipactoides*)
- Naked Sun-orchid (*Thelymitra circumsepta*)
- Swamp Everlasting (*Xerochrysum palustre*)
- Swamp Fireweed (*Senecio psilocarpus*)

Records of listed flora in Frankston City appeared to be scattered relatively evenly throughout the LGA, with The Pines and Langwarrin Flora and Fauna Reserves the only locations with noticeable clusters of records. However, the accuracy of these records is uncertain and requires verification (Key Finding 9).

Following confirmation of the presence and populations of listed flora in Frankston City, management actions can be prescribed in their habitats.

Many of the listed flora species present in Frankston City are not found in surrounding LGAs (see Appendix II), and thus their current locations (if still present) provide their last stronghold in the area of southeast Melbourne.

In contrast, dozens of species were recorded as being present in one or more surrounding LGAs, but not recently recorded in Frankston City (Appendix 2). Many of the species occurring only in Frankston City's surrounding LGAs do not have suitable habitat in Frankston City (e.g. species which grow on basalt). However, there are also species that could find a suitable habitat in Frankston City, and reintroducing these species would be extremely beneficial, to increase their populations and distributions across the wider landscape (Key Finding 10). Any such projects should adhere to the relevant guidelines or protocols for re-introduction or translocation of threatened flora.

Key Finding 9: Listed flora records in Frankston City are outdated and geographically inaccurate, requiring targeted surveys, and discussions with local botanists before any management actions can be defined.

Key Finding 10: Investigate the reintroduction of listed flora species from surrounding LGAs to Frankston City (where suitable habitat is present) to increase their populations in the landscape.

Relationship to other Council policies

Council's *Biodiversity Policy* (Frankston City Council, 2018) states that Council aims "to avoid removal of, and adverse impacts to, biodiversity assets including canopy trees (particularly those with hollows), indigenous vegetation, and habitat for indigenous fauna, waterways, wetlands and coastal environments". Additionally, the *Biodiversity Policy* highlights the need to promote "Frankston [City]'s rare and threatened flora and fauna as assets for the community to value, protect and contribute to their recovery".

The *Green Wedge Management Plan* (Frankston City Council et al., 2019) documents VBA records (as per this

Technical Report [though without scrutinising records]) of listed flora species in its precincts, including defining key ecological assets supporting such species.

While the *Urban Forest Action Plan* (Frankston City Council, 2020), *Climate Change Impacts and Adaptation Plan* (Frankston City Council, 2011) and *Greening Our Future, Environmental Strategy 2014-2024* (Frankston City Council, 2014) provide a number of key findings that would indirectly influence listed flora, the documents do not specifically refer to listed flora.

Summary: The *Biodiversity Action Plan* will be the main document that provides for actions related to the conservation of listed flora in Frankston City.

4.5 Fauna

The following section aims to answer four main questions relating to fauna in Frankston City:

1. What do we currently know about Frankston City's fauna, and what don't we know?
2. Which listed fauna species occur in Frankston City?
3. Where is the most important fauna habitat in Frankston City?
4. How well is fauna habitat connected throughout Frankston City, as well as to the wider landscape?

Data used for the analysis of fauna in Frankston City's reserves were compiled from various surveys completed in past years². Of Frankston City's 60 reserves, 26 have had detailed fauna surveys completed, while 34 have not (Figure 24). There are a number of reserves with substantial areas of native vegetation that have not yet been surveyed, these reserves in particular should be prioritised for fauna survey as part of a long term fauna monitoring program (Key Finding 11).

2. Brunner and Courtney (1996; 1999a;b;c;d); Brunner and Wallis (1993); Environmental Resources Management Australia (2005); Fairbridge et al. (2008); Koehler (2005); Legg (2012); McCaffrey and Legg (2007); McCaffrey et al. (2010); Norris (1992); Riparian Australia (1999a;b); SMEC Australia (2011); and Stephens et al. (2003).

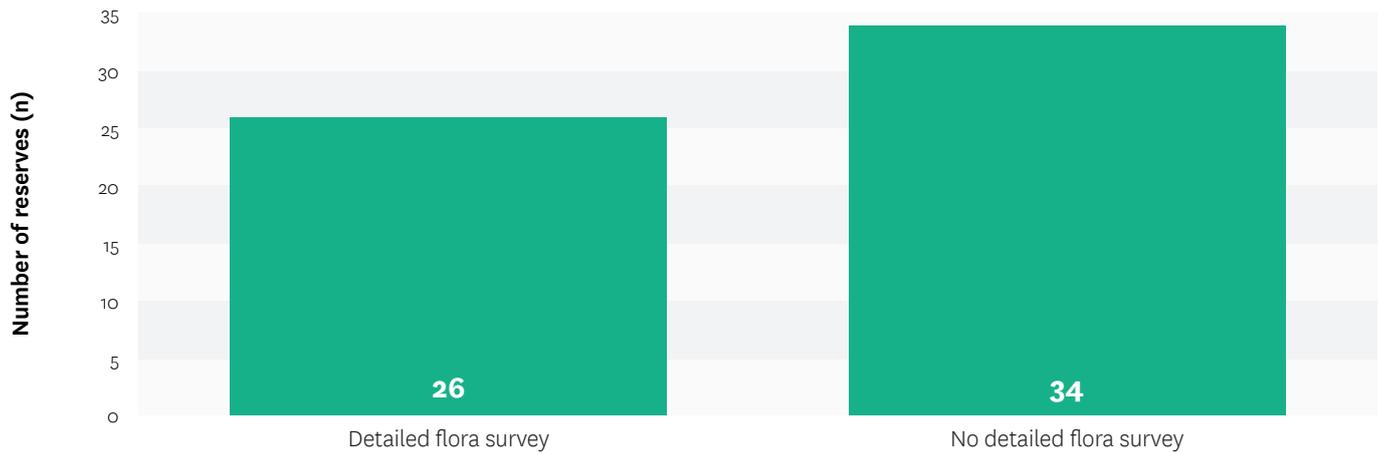


Figure 24: Number of reserves in Frankston City with and without detailed fauna surveys.

Analysis of fauna surveys conducted in 26 of Frankston City’s reserves shows the composition of fauna in the reserves is diverse and species-rich (Figure 25). It is important to note that a number of the surveys used for this analysis date back as far as 1992, which clearly require updating. However these data still provide a good indication of fauna composition in Frankston City.

Birds comprise the most commonly recorded group by far, followed by mammals, reptiles, and amphibians. Fish, crustaceans and invertebrates are sporadically recorded in low numbers throughout the reserve system, though minimal survey effort over time may be the reason for the sparse records to some degree.

Key Finding 11: Reserves (and other publicly-managed land) with sizeable fauna habitat should be surveyed regularly (especially reserves that have never been surveyed) within a long-term monitoring framework, in order to better understand how various fauna species utilise them.

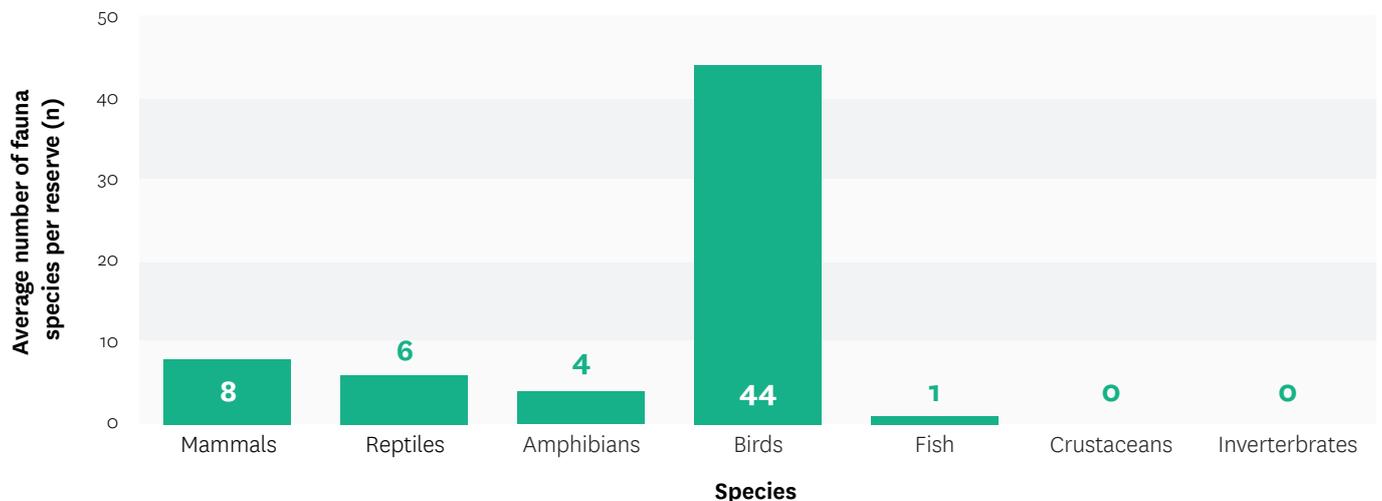


Figure 25: Average number of different fauna groups surveyed in each of Frankston’s reserves. Only reserves with detailed fauna surveys were included in this analysis.

The most commonly recorded indigenous mammals in Frankston City's reserves are Swamp Rat, Brushtail Possum, Ringtail Possum, Short-beaked Echidna, and Little Forest Bat, which were all recorded in at least 15 of the 26 sampled reserves. Notably, Bush Rat (*Rattus fuscipes*), has been recorded recently near Golf Links Road, an apparent range expansion for the species (Legg, 2020).

The most commonly recorded indigenous reptiles in Frankston City's reserves are Common Garden Skink (*Lampropholis guichenoti*), Blotched Blue-tongued Lizard (*Tiliqua nigrolutea*), Tiger Snake (*Notechis scutatus*), and Lowland Copperhead (*Austrelaps superbus*), also all recorded in at least 15 of the 26 sampled reserves.

The most commonly recorded indigenous amphibians in Frankston City's reserves are Southern Brown Tree Frog, Common Froglet (*Crinia signifera*), Pobblebonk (*Limnodynastes dumerilii*), and Whistling Tree Frog (*Litoria verreauxii*) – also known as Verreaux's Tree Frogs – again recorded in at least 15 of the 26 sampled reserves.

Many indigenous birds have been recorded across multiple reserves in Frankston City, with the most common being Australian Magpie (*Cracticus tibicen*), Grey Butcherbird (*Cracticus torquatus*), Magpie Lark (*Grallina cyanoleuca*), Red Wattlebird (*Anthochaera carunculata*), and Superb Fairy-wren (*Malurus cyaneus*).

Key Finding 12: Perform comprehensive surveys of fish, crustaceans and invertebrates throughout Frankston City (including on private land and in Boggy Creek).

The diversity of heath and woodland birds in Frankston City is quite high (Fairbridge, 2021), highlighting the importance (and success) of maintaining fragments of such habitats that act as stepping-stone fauna linkages across the landscape.

Fish, crustaceans, and invertebrates are not commonly recorded. However, fauna surveys do not usually target these species, but rather usually focus on terrestrial vertebrates (Key Finding 12), and many reserves do not contain aquatic habitats that would support fish. Despite this, some significant species have been recorded such as Dwarf Galaxias (*Galaxiella pusilla*) in Boggy Creek, and a variety of fish species in Kananook Creek.

While many of the abovementioned species are common throughout Victoria, Frankston City provides an important local or regional stronghold for a number of species such as Koala, Swamp Wallaby, Eastern Long-necked Turtle, and a diversity of microbats. These locally significant species are at risk of local decline and potentially local extinction. The habitat in Frankston City for these species is especially important given the municipality's location on the fringe of more highly-developed suburbs.



4.5.1 Listed fauna

As with flora, records from the VBA (Key Finding 13) were used to determine the presence of listed fauna in Frankston City, as well as surrounding LGAs. Listed fauna were defined as any indigenous fauna species listed in The FFG Threatened List (DELWP August 2021).

Three categories of listed fauna presence in each LGA were defined (See Appendix 2 for the detailed list):

1. 'Present' species were listed fauna species with at least five records, and at least one record since 2015
2. 'Potential visitors' were listed fauna species with at least one record since 2000 (which were not classified as 'present')
3. 'Not recently recorded' listed fauna species were those with no records since 2000.

Key Finding 13: Establish a mechanism (such as a permit condition) to ensure that surveys undertaken in Frankston City are entered into the Victorian Biodiversity Atlas and other citizen science platforms such as i-naturalist to ensure data is captured and allow ease of analysis.

Frankston City has similar numbers of listed fauna records to the surrounding LGAs of the Cities of Casey, Greater Dandenong and Kingston, though substantially fewer than the Shire of Mornington Peninsula (Figure 26).

This is not surprising given the much larger size of the Shire of Mornington Peninsula, the greater abundance of remnant vegetation, and the Shire's exposure to Port Phillip Bay, Western Port, and Bass Strait, increasing the diversity of seabirds such as Albatrosses (*Thalassarche* spp.), which do not often venture inland (see Appendix 2 for a full species list).

The following 29 listed fauna species were considered to be present in Frankston City:

- Australasian Bittern (*Botaurus poiciloptilus**)
- Australasian Shoveler (*Spatula rhynchotis**)
- Australian Fur Seal (*Tursiops australis*)
- Blue-billed Duck (*Oxyura australis**)
- Caspian Tern (*Hydroprogne caspia**)
- Common Greenshank (*Tringa nebularia**)
- Curlew Sandpiper (*Calidris ferruginea**)
- Dwarf Galaxias (*Galaxiella pusilla*)
- Eastern Great Egret (*Ardea alba modesta**)
- Eastern Snake-necked Turtle
- Freckled Duck (*Stictonetta naevosa**)
- Glossy Ibis (*Plegadis falcinellus**)
- Great Egret (*Ardea alba modesta**)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Hardhead (*Aythya australis*)
- Latham's Snipe
- Lewin's Rail (*Lewinia pectoralis*)
- Long-toed Stint (*Calidris subminuta**)
- Marsh Sandpiper (*Tringa stagnatilis**)
- Musk Duck (*Biziura lobata**)
- Nankeen Night-Heron (*Nycticorax caledonicus**)
- Pacific Gull (*Larus pacificus**)
- Pectoral Sandpiper (*Calidris melanotos**)
- Pied Cormorant (*Phalacrocorax varius**)
- Powerful Owl
- Royal Spoonbill (*Platalea regia**)
- Southern Toadlet (*Pseudophryne semimarmorata*)
- Swamp Skink
- Swift Parrot
- Whiskered Tern (*Chlidonias hybrida**)
- White-bellied Sea Eagle (*Haliaeetus leucogaster*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Wood Sandpiper (*Tringa glareola**)

Water birds and migratory shorebirds contribute significantly to this list (with many records from the Seaford Wetlands Ramsar site).

*Waterbirds and shorebirds

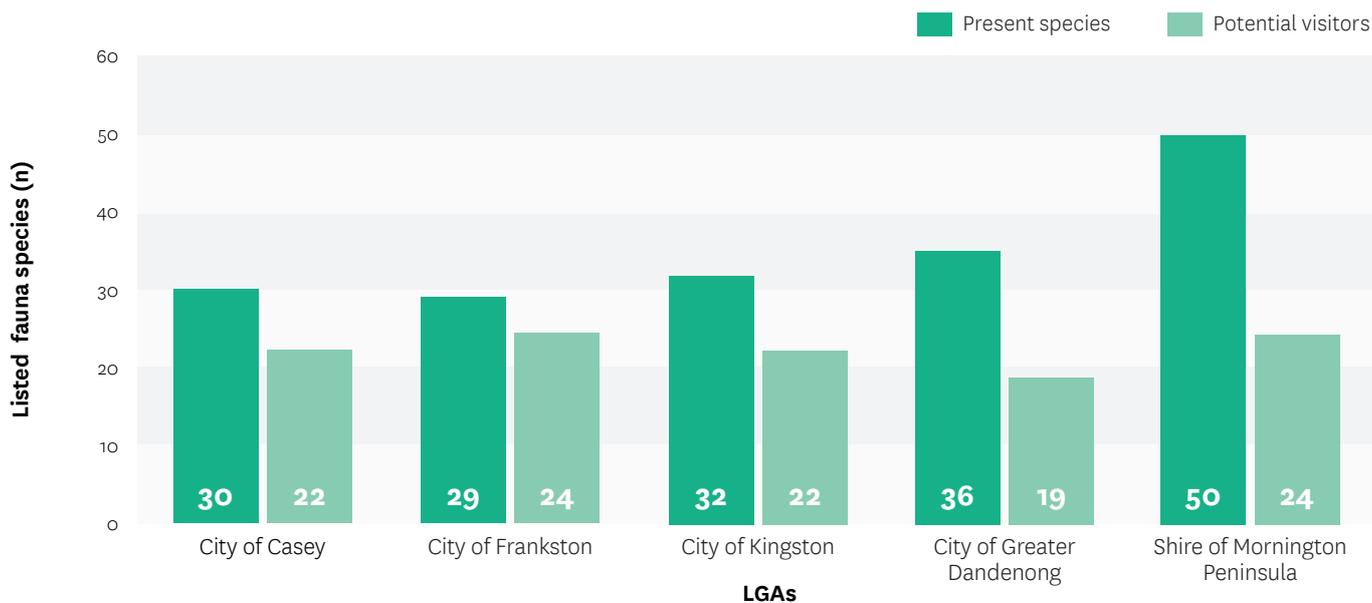


Figure 26: Number of listed fauna species recorded in Frankston City and surrounding LGAs. Species are defined as present if there are more than five recorded sightings and there is at least one sighting since 2015 in the LGA. Species are defined as potential visitors if there is at least one sighting since 2000 in the LGA. See Section 10 for the full list of listed fauna species in these LGAs.

Relationship to other Council policies

Council’s *Biodiversity Policy* (Frankston City Council, 2018) states that Council aims “to avoid removal of, and adverse impacts to, biodiversity assets including canopy trees (particularly those with hollows), indigenous vegetation, and habitat for indigenous fauna, waterways, wetlands and coastal environments”. Additionally, the *Biodiversity Policy* highlights the need to promote “Frankston [City]’s rare and threatened flora and fauna as assets for the community to value, protect and contribute to their recovery”.

The *Urban Forest Action Plan* (Frankston City Council, 2020) highlights the opportunity of urban forests to provide “food and shelter even to endangered fauna and other species of high conservation value”.

The *Green Wedge Management Plan* (Frankston City Council et al., 2019) documents VBA records (as per this *Technical Report* [though without scrutinising records]) of listed fauna species in its precincts, including defining key ecological assets supporting such species.

While the *Climate Change Impacts and Adaptation Plan* (Frankston City Council, 2011) and *Greening Our Future, Environmental Strategy 2014-2024* (Frankston City Council, 2014) provide a number of key findings that would indirectly influence listed fauna, the documents do not specifically refer to listed fauna.

Summary: The *Biodiversity Action Plan* will be the main document that provides for actions related to the conservation of listed fauna in Frankston City.

Listed fauna species records were clustered around seven main areas within Frankston City (Figure 27):

1. The Edithvale-Seafood Wetlands
2. The Pines Flora and Fauna Reserve
3. Langwarrin Flora and Fauna Reserve
4. Frankston Reservoir
5. Boggy Creek
6. Kananook Creek
7. Langwarrin Woodlands* (defined in Section 2.1 as the area in the south-east of Frankston City with substantial native vegetation on private land)

Areas 1-6 are managed by a combination of Parks Victoria, Melbourne Water and Frankston City Council. The Langwarrin Woodlands however, is a large area of privately owned properties with substantial native vegetation interspersed throughout.

These six areas appear to be the main strongholds for listed fauna in Frankston City, and are essential to secure and maintain for the continued presence of these listed fauna species in the area (Key Finding 14).

Key Finding 14: Consider creating criteria to prioritise restoration and/or maintenance works in listed fauna habitats.

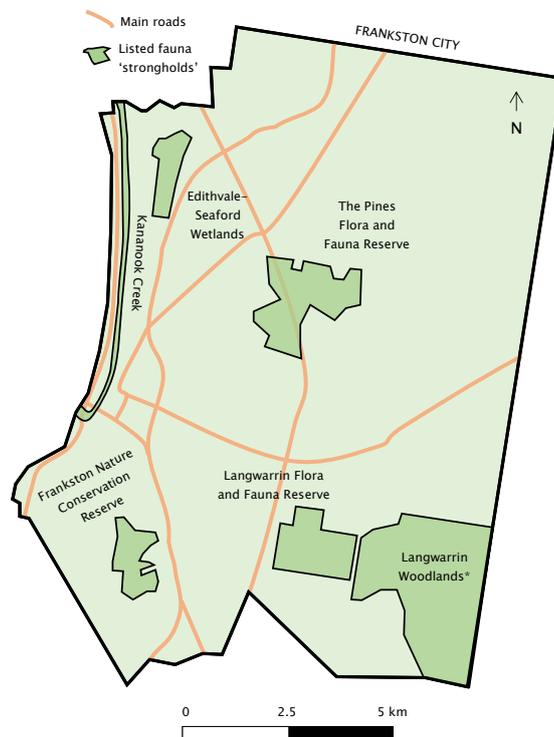


Figure 27: Listed fauna 'strongholds' in Frankston City.

The following 36 listed fauna species (including 9 seabirds that are unlikely to utilise habitat within Frankston City) were considered to be either 'not recently recorded' or potential visitors in Frankston City, but present in one or more surrounding LGAs:

- Australian Little Bittern (*Ixobrychus dubius*)
- Baillon's Crake (*Porzana pusilla*)
- Bar-tailed Godwit (*Limosa lapponica*)
- Black Falcon (*Falco subniger*)
- Black-browed Albatross (*Thalassarche melanophris**)
- Black-faced Cormorant (*Phalacrocorax fuscescens*)
- Chestnut-rumped Heathwren (*Calamanthus pyrrhopygius*)
- Common Sandpiper (*Actitis hypoleucos*)
- Eastern Curlew (*Numenius madagascariensis*)
- Emu
- Fairy Prion (*Pachyptila turtur**)
- Glossy Grass Skink
- Grey Goshawk (*Accipiter novaehollandiae*)
- Hooded Plover (*Thinornis cucullatus*)
- Hooded Robin (*Melanodryas cucullata*)
- Indian Yellow-nosed Albatross (*Thalassarche carteri**)
- Little Egret (*Egretta garzetta*)
- Little Tern (*Sternula albifrons**)
- Magpie Goose (*Anseranas semipalmata*)
- Northern Giant-Petrel (*Macronectes halli**)
- Pacific Golden Plover (*Pluvialis fulva*)
- Plumed Egret (*Ardea intermedia plumifera*)
- Regent Honeyeater (*Anthochaera phrygia*)
- Ruddy Turnstone (*Arenaria interpres*)
- Shy Albatross (*Thalassarche cauta**)
- Sooty Oystercatcher (*Haematopus fuliginosus*)
- Southern Brown Bandicoot
- Southern Giant-Petrel (*Macronectes giganteus**)
- Spotted Harrier (*Circus assimilis*)
- White-footed Dunnart (*Sminthopsis leucopus*)
- White-fronted Tern (*Sterna striata**)
- White-winged Black Tern (*Chlidonias leucopterus**)

*Seabirds that are unlikely to utilise habitat within Frankston City, and were identified in the Shire of Mornington Peninsula.



As the above species are regularly found throughout one or more surrounding LGAs, it is worth asking the question: Why are they not found in Frankston City?

For most of the above species, this is due to lack of suitable habitat. However, a small number of these species are likely absent due to fragmented and degraded habitat, which could be improved through targeted works and potentially, species reintroductions. The most likely candidates for this are White-footed Dunnart, Glossy Grass Skink, and Southern Brown Bandicoot.

For example, Southern Brown Bandicoot (Image 17) was until about 20 years ago considered present in Frankston City, however its numbers have substantially declined over a decade and it is now considered likely to be locally extinct in former habitat including Langwarrin Flora and Fauna Reserve and the Pines Flora and Fauna Reserve (Wilson, 2013, DEPI 2014). Monitoring by Parks Victoria in the Pines Flora and Fauna reserve over the last decade (following completion of the Peninsula Link Freeway) has failed to detect Southern Brown Bandicoot (G. Kerr pers. comm. 2019).

Connectivity between the Cranbourne Botanic Gardens and The Pines has also been reduced due to development. Despite this loss of connectivity and the apparent loss of Southern Brown Bandicoot from the Frankston area there is potential to facilitate the species to re-establish in suitable habitat within Frankston. Recent research in peri-urban landscapes in the south east of the Melbourne Metropolitan Area (Maclagan et al. 2018) has shown that bandicoots can adapt readily to urbanised landscapes and are capable of reproducing and dispersing through a rural – urban matrix, if linear habitat connectivity is maintained. With dispersing populations nearby in the Royal Botanic Gardens Cranbourne and the surrounding area, there is potential to facilitate the species' dispersal into habitat within Frankston through improvement of linear linkages and targeted management of foxes and domestic cats (Wilson, 2013; Maclagan et al. 2018 Key Finding 15; habitat corridors are discussed in Section 4.6).

Key Finding 15: Consult with the Southern Brown Bandicoot Recovery Team and other experts to determine the feasibility of re-establishing population of Southern Brown Bandicoots in Frankston City.

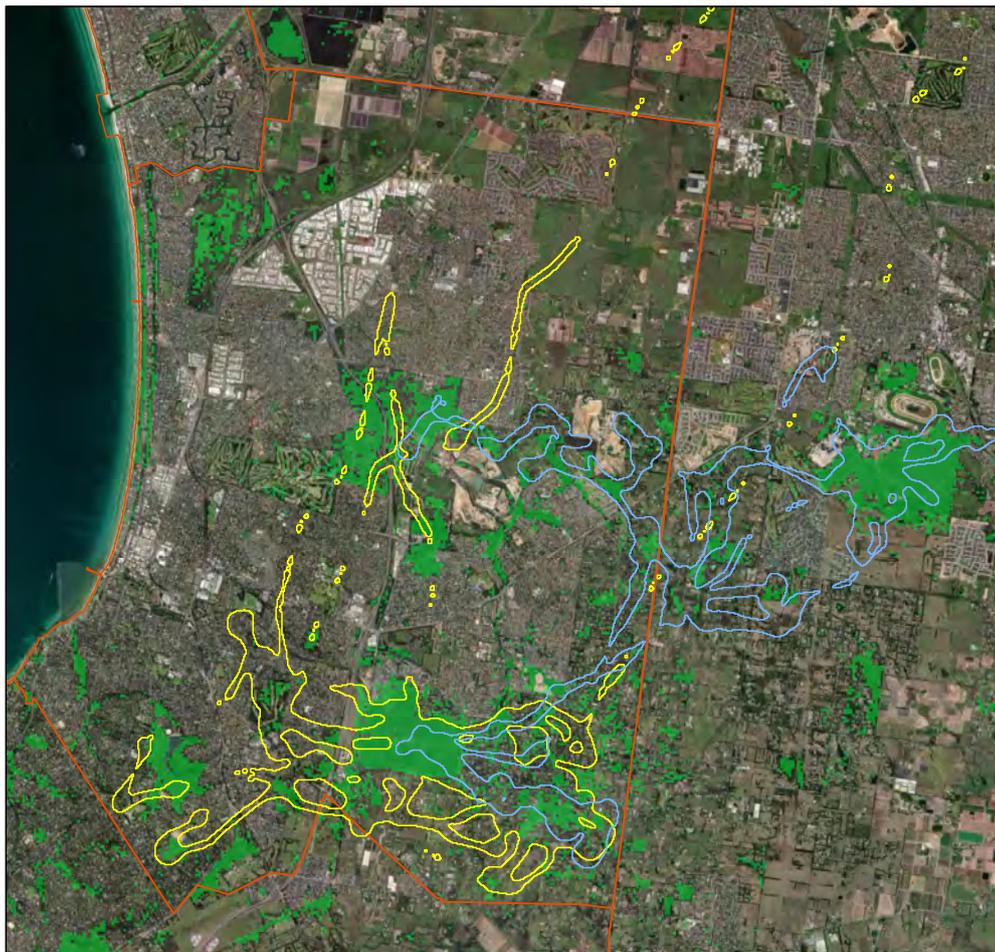
Key Finding 16: After consulting with experts, and feasibility analyses, integrate reintroductions of Southern Brown Bandicoot, Glossy Grass Skink, White-footed Dunnart, and other appropriate species into a 'Frankston Fauna Linkage and Reintroduction Strategy'.

Re-introductions of bandicoots should also be considered (Key Finding 16).

In a more positive example, Powerful Owl *Ninox strenua* (Box 2) – which was classified as a potential visitor to Frankston – has recently been recorded in Langwarrin Flora and Fauna Reserve and throughout private properties in the Langwarrin Woodlands (N. Bradsworth pers. comm. 2021).

Despite the specific habitat requirements considered usual for Powerful Owls (large forested areas such as national parks and state forests), the species has become established in remnants of forest and woodland within major urban centres, partly due to an abundance of prey (Hogan and Cooke 2010).

While the species has not been recently recorded breeding in the Frankston area, it is likely that suitable conditions are available within the municipality for a breeding pair to establish. Research by Deakin University (Bradsworth et al. 2021) has identified areas within Frankston (as part of a broader study) that could be potentially important Powerful Owl roosting habitat (Figure 28). It is considered that these areas are also the most likely areas where Powerful Owls would nest. If large hollows are available within these areas, there is potential for Powerful Owl to breed within the Frankston municipality.



Langwarrin/Cranbourne powerful owl range map

Legend

- 2020 range (16 nights)
- 2019 range (29 nights)
- Council boundaries

Roosting habitat

- Potentially suitable

0 1 2 4 km



Map produced by:
 Nick Bradsworth
 Deakin University
 Date: 15/04/21
 For more information please contact
 nbradsworth@deakin.edu.au
 GDA 1994 MGA Zone 55



Figure 28: Powerful Owl home range and potentially suitable roosting habitat – Langwarrin-Cranbourne. Map produced by Nick Bradsworth, Deakin University.

Powerful Owls in Frankston City?

The Powerful Owl is an iconic species endemic to the eastern Australian mainland, and is listed as ‘threatened’ under the FFG Act (DSE, 2009b). It is Australia’s largest owl, mainly preying on possums, gliders, and sometimes even flying foxes.

Powerful Owls rely on old-growth woodland and forests for breeding, and can cover large distances looking for prey, as recently mapped by Deakin University, where a female was tracked over a large range between Langwarrin Flora and Fauna Reserve and to the Royal Botanic Gardens, Cranbourne. This owl hunted extensively in privately owned bushland, emphasising the importance of relatively small, but interconnected remnant bushland patches. The breeding requirements of Powerful Owl highlight

the importance of maintaining remnant vegetation, even if the patches are small and the landscape partially fragmented, and in particular of retaining large old trees with hollows. Further monitoring of suitable roosting habitat within Frankston may identify potential Powerful Owl nesting areas with large hollow-bearing trees.



Box 2: Powerful Owls in Frankston City?

For listed fauna species that were classed as only potential visitors to Frankston City and surrounding LGAs, or species that once occurred and are now considered 'not recently recorded', see Appendix 2. It is not surprising that many fauna species have disappeared from Frankston City and the surrounding area given the extensive development of its landscape.

While the reintroduction of many of these species is unrealistic, certain species could return if long-term goals are put in place, and there is no reason that long-term goals cannot be aspirational. Due to the time and cost-prohibitive nature of conservation works, however, it is necessary to prioritise works for such goals (Figure 29).



Figure 29: Conceptual diagram of how to prioritise works for the enhancement of listed fauna habitat.

4.5.2 Wildlife mortality on roadsides

The *Frankston Fauna Linkages and Crossing Structure Design 2012* study (Practical Ecology, 2012) also collated a number of records relating to wildlife mortality – largely from roadsides (Figure 30). As would be expected, ground-dwelling and arboreal mammals accounted for a large proportion of casualties. In terms of birds, owl, nightjar and waterfowl species were over-represented in the records, likely due to these animals either hunting ground-dwelling prey – where they come into contact with vehicles - or more frequently making ground movements than other birds. Slower moving reptiles were also often recorded, such as the Blue-tongue Lizard and Eastern Long-necked Turtle.

Several ‘hotspots’ of high wildlife mortality were identified from the analysis of collated data (Practical Ecology, 2012). An obvious pattern was high wildlife casualty in areas where major roads intersected land supporting larger areas of higher quality fauna habitat (Key Finding 17).

Casualties were highest in the following areas:

- along McClelland Drive, particularly along Langwarrin Flora and Fauna Reserve and adjacent patches of fauna habitat
- along McClelland Drive where it passes between the Pines Flora and Fauna Reserve and habitat supported within Studio Park and quarry sites near Boggy Creek.

Key Finding 17: Use the ‘Frankston Fauna Linkages and Crossing Structure Design’ recommendations to create safe passages and structures for fauna movement across roads.

High casualties were also observed along roads adjacent to higher quality habitat patches, and where habitat corridors intersected roads (Map 10). The latter was observed in association with Skye Road and The Peninsula Country Golf Club, and also at points where Boggy Creek intersects with Cranbourne-Frankston Road. A similar hotspot was associated with residential land and associated roads near Golf-Links Road, Robinsons Road, and Frankston Golf Club.

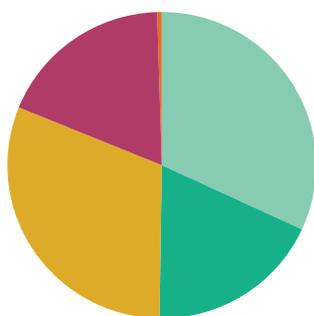


Several discrete hotspots of fauna casualties were also associated with the Nepean Highway and adjacent Frankston–Seaford Foreshore. Other areas included:

- roads adjacent to fauna habitat along Sweetwater Creek
- along Moorooduc Highway adjacent to Baxter Park
- to the east and west of Frankston Flora and Fauna Reserve, where the Mornington Peninsula Freeway dissects wetland fauna habitats
- along Ballarto Road, where agricultural land or remnant vegetation occur at both sides of the road

Within the remnant vegetation in the Langwarrin Woodlands area, higher casualty rates were observed along North Road and Robinsons Road, where they intersected higher quality, more intact remnant vegetation and associated fauna habitats.

Arboreal mammals
Ground-dwelling mammals



Common Brushtail Possum
Common Ringtail Possum
Sugar Glider
Swamp Wallaby
Short-beaked Echidna
Common Blue-tongued Lizard

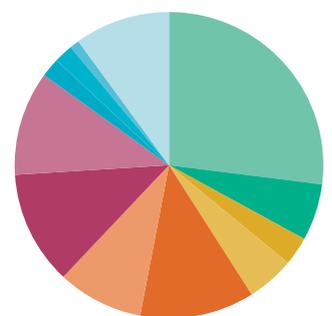


Figure 30: Recorded fauna casualties within Frankston City including A) fauna grouped into five categories and B) species or species groups accounting for 90 per cent of casualty records. Note that data is not comprehensive and was not collected or collated in an unbiased and systematic way. Data is from Practical Ecology (2012).

4.6 Habitat connectivity

A detailed study for the *Frankston Fauna Linkages and Crossing Structure Design* – completed by Practical Ecology (2012) – analysed the connectedness of fauna habitat throughout Frankston City and adjoining landscape, and made various recommendations (Key Finding 18). The following subsections provide a summary of the main findings of this study.

Initially, fauna linkages were identified, which were divided into two groups, each with three sub-groups:

Key Finding 18: Utilise recommendations in the ‘Frankston Fauna Linkages and Crossing Structure Design’ to create targeted actions for improving fauna linkages.

- 1. Patch linkages:** Non-linear areas of habitat forming a discrete patch of fauna habitat (e.g. native vegetation) or visually recognisable collections of smaller patches (e.g. habitat within golf courses). Patch linkages were divided into the three following subgroups:
 - i. Core areas: Large patches of native vegetation and/or fauna habitat which are greater than 50 ha
 - ii. Nodes: Medium-sized patches of native vegetation 20-50 ha in size
 - iii. Stepping stones: More fragmented collections of less than 20 ha patches of native vegetation
- 2. Corridor linkages:** Linear areas of existing or potential habitat for fauna that provide structural connectivity between patch linkages (in most cases) or overall permeability of the landscape (in all cases). Corridor linkages were divided into the three following subgroups:
 - i. Terrestrial corridors: Linear links of native vegetation generally greater than 1km long with less than 0.5km gaps
 - ii. Riparian corridors: Linear links along waterways supporting riparian habitat, at least some of which is composed of remnant vegetation
 - iii. Aquatic corridors: Waterways (natural or artificial) with little or no riparian habitat and primarily providing aquatic habitats or connectivity for fauna.

4.6.1 Existing fauna linkages

Overall, 131 fauna linkages were identified in Frankston City (Map 5). Of these, 96 were patch linkages and 35 were corridor linkages. Eighteen of the corridor linkages were aquatic or riparian corridors with the remainder (17) being terrestrial corridors. Over half (9) of the existing terrestrial corridors ran along roadsides or railway lines. Stepping stones were the most common patch linkages (47), with most being relatively small.

The results of this study showed that within Frankston City, fauna linkages were fragmented to a high degree, as expected in such an urbanised area. Core areas were largely isolated from one another, pointing to poor structural connectivity among the most important areas of fauna habitat.

The following management recommendations were made for all existing linkages:

- Secure land for conservation purposes wherever practicable
- Protect existing remnant vegetation and canopy cover
- Improve habitat quality through weed control, supplementary plantings (to increase structural complexity of habitat), retaining and fostering the development of hollow-bearing trees, and retaining and/or introducing logs
- Ensure plantings are composed of a mix of flora species, producing a range of food (e.g. nectar, fleshy fruits, seeds, tubers) and habitat (grasses, sedges, shrubs, trees) resources
- Manage and reduce threatening processes (e.g. erosion, rabbits, exotic predators, weed infestations)
- Widen habitat linkages, wherever possible, based on recommended width specifications
- Avoid urban development or further fragmentation of identified existing linkages
- Reduce the number of trails within existing reserves and avoid implementing new ones
- Undertake ecologically sensitive small-scale mosaic burning regimes
- Reduce speed limits and traffic volumes on roads adjacent to existing linkages
- Implement fauna crossing structures at recommended locations
- Reduce the impacts of cats and dogs surrounding higher priority linkages, by restricting ownership or implementing and enforcing curfews
- Undertake control of foxes and cats where required.

4.6.2 Proposed fauna linkages

In addition to analysing the existing fauna linkages within Frankston City, a number of proposed corridor linkages were identified (assessed against conservation significance, feasibility, and opportunity criteria), which are shown on Map 6. For these proposed linkages, a number of recommendations were made:

- Secure land that supports remnant vegetation for conservation purposes, and improve habitat quality of existing remnant vegetation within proposed linkages
- Wherever practicable, secure land along the general alignment route of high and very high priority linkages for conservation purposes
- Liaise with adjacent councils and other management authorities to implement corridor linkages and enhance patch linkages
- Pursue the implementation of proposed high and very high priority linkages through the planning scheme and landowner incentive schemes
- Pursue the revegetation of cleared land and the restoration/rehabilitation of remnant vegetation
- Avoid development or further fragmentation of identified existing linkages, particularly further subdivision within 500 m of any high or very high priority linkage
- Investigate whether landholders are interested in having revegetation/rehabilitation of fauna habitat undertaken on their property, through a questionnaire survey (or similar means) of landowners along higher priority corridors and associated patch linkages
- Attempt to secure land or provide incentives to landholders along priority corridor routes, which will eventually achieve continuous habitat
- Implement fauna crossing structures at recommended locations
- Manage and reduce threatening processes (e.g. erosion, rabbits, exotic predators, weed infestations) within linkages and adjacent land
- Reduce the impacts of cat and dogs surrounding higher priority linkages by restricting ownership or implementing and enforcing curfews.

4.6.3 Highest priority fauna linkages

In addition to the numerous corridors suggested above, two main corridors, each with a subsidiary corridor, were recommended as the highest priorities for implementation (Practical Ecology, 2012), (Map 7 and Key Finding 19):

- **Corridor 1:** The Pines Flora and Fauna Reserve to Royal Botanic Gardens Cranbourne (through Burdett's Quarry)
- **Corridor 2:** The Pines Flora and Fauna Reserve to Langwarrin Flora and Fauna Reserve
- **Subsidiary Corridor 1:** The Pines Flora and Fauna Reserve to Corridor 1 via Studio Park
- **Subsidiary Corridor 2:** Corridor 1 to the Langwarrin Woodlands (defined in Section 3.1 as the area in the south-east of Frankston City with substantial native vegetation on private land).

In order to establish Corridor 1, extensive collaboration between Frankston and Casey councils will be required (Key Finding 20). Given the potential to extend the distribution of Southern Brown Bandicoot by establishing this corridor, such a collaboration should be considered a high priority action for both councils.

While there are large areas of remnant vegetation within the City of Casey – to the north around Churchill National Park and Lysterfield Park, and along the LGA's southern coastline – the Royal Botanic Gardens Cranbourne retains the only large patch of vegetation in the LGA's central area.

Key Finding 19: Utilise 'Frankston Fauna Linkages and Crossing Structure Design' and this report to establish the feasibility of the two highest priority linkages.

Currently, the Royal Botanic Gardens Cranbourne is largely isolated, with the only substantial remnant vegetation nearby occurring in largely fragmented patches to the west in a mosaic of low-density residential and agricultural land (although it is separated by Settlers Run Golf Course, which is largely cleared with some vegetation in the roughs).

While the alignment for Corridor 1 was at the time of the Practical Ecology (2012) study considered the most appropriate, there has since been a large development in the north-west of the City of Casey, reducing the likelihood of creating a corridor of an appropriate size for species such as Southern Brown Bandicoot. Therefore, a corridor through the Settlers Run Golf Course, into the mosaic of bushland to the south-west, and across to The Pines Flora and Fauna Reserve (shown as Corridor 1 (alternative alignment[s]) on Map 7) may be a more realistic way to connect the Royal Botanic Gardens Cranbourne to other large remnants. Although this will depend on the long-term vision of Casey City Council, and the original alignment may in fact still be the most feasible (Key Finding 20).

In addition to the importance for the Royal Botanic Gardens Cranbourne to be connected to other remnants, a connection with Langwarrin Flora and Fauna Reserve (i.e. through Corridor 2) presents perhaps the only opportunity to allow longitudinal movement of ground-dwelling and arboreal fauna from Royal Botanic Gardens Cranbourne. Longitudinal movement towards the poles (i.e. south in Australia), of fauna is predicted across the globe as species will need to follow their climatic niches as temperatures rise (Adams-Hosking et al. 2011; Beaumont et al. 2016; Shoo et al. 2006) again highlighting the imminent importance of these fauna linkages.

If the establishment of these habitat corridors is not possible, and if cats and foxes can be excluded from The Pines Flora and Fauna Reserve (further discussed

4.6.4 Maintaining existing habitat connectivity into the future

It is acknowledged here that a certain amount of vegetation clearing is inevitable given the predicted population growth in Frankston City over the coming decades (see Section 5.1). There is, however, no reason that long-term planning cannot be implemented to ensure that such clearing occurs in a way that it has the least possible impact to habitat connectivity throughout the landscape.

The most effective way to secure the existing connectivity along high priority fauna linkages – and thus secure the existing vegetation located within them - is through the creation of a new Schedule to the Environmental Significance Overlay (hereafter referred to as the Habitat Corridor ESO, and shown on Map 8).

A Habitat Corridor ESO could act in addition to existing planning controls, such as Clause 52.17 Native Vegetation (which largely focuses on the property scale), and would influence the design of developments such that landscape-scale factors in relation to habitat connectivity are considered. These include:

- Vegetation removal should not be allowed where it significantly reduces landscape-level connectivity

Key Finding 20: Hold a meeting with Casey City Council to discuss the feasibility of Corridor C1 (including whether the best alignment is feasible) and establish further actions.

in Section 5.2), then translocations of Southern Brown Bandicoot from the Royal Botanic Gardens Cranbourne to the Pines may be the only way to increase their population size in the area and allow gene flow.

The other corridors listed at the top of this section are wholly located within Frankston City and thus are possible to address directly in the *Action Plan* that will be associated with this report. The implementation of these corridors is further addressed in the following section.

- If native vegetation clearing is unavoidable and results in separating the canopies of two or more patches, then fauna ladders should be installed
- New roads should have culverts installed underneath to allow movement of ground-dwelling fauna
- There could be obligations to restore connective habitat if fire risk is not increased under any new Land Management Plans created

Two areas have been recommended for the establishment of the Habitat Corridor ESO:

1. **Essential Areas**, which cover all of the *Proposed Fauna Linkages for Urgent Implementation* including additional areas in the north-east that allow for the establishment of different alignments of Corridor 1
2. **Additional Areas**, which cover all sizeable remnants of native vegetation adjacent to the Essential Areas, as well as maintaining habitat connectivity through the Langwarrin Woodlands and up the eastern boundary of the municipality through a network of linear vegetation (as shown on Map 9 and discussed in the following paragraph).



Throughout the Langwarrin Woodlands area (as shown on Map 9), the consolidation of vegetation data revealed an intricate network of linear vegetation in the form of trees along driveways, fencelines, and roads. It appears that much of this linear vegetation is planted, though some may be small linear remnants of native vegetation. In any case, this linear vegetation provides a vital linkage – especially for arboreal fauna – throughout the landscape. Much of this area was therefore included in the Habitat Corridor ESO.

While the Habitat Corridor ESO would cover substantial areas in the east and south-east of Frankston (Map 9), it is considered one of the highest priorities for biodiversity in Frankston City. Additionally, the Habitat Corridor ESO would not prohibit development in the area, but rather ensure that developments do not reduce habitat connectivity to a large degree.

The Habitat Corridor ESO could be modelled on Macedon Ranges Shire Council’s Schedule 6 to the Vegetation Protection Overlay (VPO6), which requires a permit to remove, destroy or lop any vegetation. The VPO6 does not

exempt planted vegetation (as it often provides important connective habitat), and applications must:

- Indicate the total extent of native vegetation on the subject land and the extent of proposed clearing, destruction or lopping, the location of any river, stream, watercourse, wetland or channel on the subject land and, if relevant, the location of areas with a slope exceeding 20 per cent
- Specify the purpose of the proposed clearing
- Demonstrate that the need for removal, destruction or lopping of remnant native vegetation has been reduced to the maximum extent that is reasonable and practicable
- Specify proposals for revegetation following disturbance or restoration of an alternate site, including proposed species and ground stabilisation
- If the area of proposed clearing exceeds 0.4 hectares, include a report on the vegetation and habitat significance of the area subject to the application that satisfies the responsible authority.

Relationship to Frankston City Council’s other environmental policies

Council’s *Biodiversity Policy* (Frankston City Council, 2018) states that Council is committed to “[e]nsuring all development proposals, capital works plans and maintenance operations which may impact on habitat connectivity, are critically assessed with reference to the *Frankston Fauna Linkages and Crossing Structure Design Study*, with a view to achieving the best possible outcomes for maintaining and enhancing biolinks”, and that “replanting projects will be strategic and include enhancement of key habitat patches and biolinks”.

The *Climate Change Impacts and Adaptation Plan* (Frankston City Council, 2011) lists two of the main steps in preparing for the climate emergency as:

- “Improving the quality and connectivity of [Frankston City’s] natural ecosystems”
- “Extending bio-linkages within the municipality”

Action 3.0 in the *Climate Change Impacts and Adaptation Plan* – “improve ecosystem resilience by maintaining and enhancing the quality of ecosystems by increasing connectivity between natural areas” – was defined as a high priority with Council’s Natural Reserves team, and Parks Victoria was listed as a stakeholder for this action.

The *Urban Forest Action Plan* (Frankston City Council, 2020) highlights the opportunity for Council to “plant indigenous species along streets that connect areas of biodiversity value”, and lists one of the five priority areas for tree

planting as “streets and open spaces that could be valuable connectors between areas of biodiversity value”.

The *Green Wedge Management Plan* (Frankston City Council et al., 2019) states that “opportunities exist for further conservation of existing native vegetation and the enhancement of the [...] network of wildlife corridors”, and recommends to “further investigate potential to protect and enhance nature corridors” within all areas of the Green Wedge Zone. It more specifically recommends “further protection and enhancement of Langwarrin to Frankston North corridor, Burdett’s Quarry to Studio Park Link, and the Pines Flora and Fauna Reserve to the Royal Botanic Gardens Cranbourne” (as per the *Proposed Fauna Linkages for Urgent Implementation* – 62).

The *Greening Our Future, Environmental Strategy 2014-2024* (Frankston City Council, 2014) states that “the Green Wedge will continue to showcase environmental best practices and provide habitat corridors”, and states that the *Biodiversity Action Plan* will “create and protect habitat corridors including installing fauna movement structures across linear barriers such as roads, improving habitat along known corridors, enlisting private property owners and establishing Landcare groups”, through the Capital Works budget.

Summary: Securing and improving Frankston City’s wildlife corridors is strongly supported by all of Council’s existing environmental policies, and is perhaps the most important issue for biodiversity in the municipality.

Challenges to Frankston City's biodiversity



This section aims to present some of the main biodiversity-related issues identified during the research and consultation phases of this report, which will flow on to targeted actions in the *Action Plan*.

5.1 Non-indigenous plants and bushland management

The same data collated for Section 4.4 was used to analyse non-indigenous plant presence in Frankston City's reserves. The most common non-indigenous plant species (recorded at 15 or more reserves) were:

- Panic Veldt-grass (**Ehrharta erecta* var. *erecta*) – recorded at 30 reserves
- Sweet Pittosporum (*#Pittosporum undulatum*) – recorded at 27 reserves
- Sweet Vernal Grass (**Anthoxanthum odoratum*) – recorded at 24 reserves
- Boneseed (**Chrysanthemoides monilifera*) – recorded at 23 reserves
- Blackberry (**Rubus fruticosus* spp. agg.) – recorded at 23 reserves
- Large Quaking-grass (**Briza maxima*) – recorded at 22 reserves
- Yorkshire Fog (**Holcus lanatus*) – recorded at 22 reserves
- Sallow Wattle (*#Acacia longifolia* subsp. *Longifolia*) – recorded at 20 reserves
- Radiata Pine (**Pinus radiata*) – recorded at 20 reserves
- Cat's Ear (**Hypochaeris radicata*) – recorded at 20 reserves
- English Ivy (*Hedera helix*) – recorded at 19 reserves
- Brown-top Bent (**Agrostis capillaris* s.l.) – recorded at 18 reserves
- Kikuyu (**Cenchrus clandestinus*) – recorded at 16 reserves
- Bluebell Creeper (**Billardiera heterophylla*) – recorded at 15 reserves
- Annual Veldt-grass (**Ehrharta longiflora*) – recorded at 15 reserves
- Annual Meadow-grass (**Poa annua*) – recorded at 15 reserves

While the above species are the most common in Frankston City's reserves, the data used for this analysis does not include cover abundance of these species, and thus the above list should be read as the most common species in Frankston City and not necessarily those with the largest impact.

While a number of weeds such as Sweet Pittosporum, Panic Veldt-grass and Blackberry are commonly recorded throughout Frankston City, weed control programs by their nature need to be site-specific and focused on protecting ecological values.

Various large-scale vegetation studies - such as those by Fairbridge et al. (2008), Bedggood et al. (2006), and Cooney (2019) - have documented priority and common weeds across Frankston City, with weed cover, species, and management recommendations varying greatly across sites.

As previously discussed in Section 4, management of native vegetation on public land appears to have been successful in Frankston City. For example, at Seaford Foreshore Reserve, Townson (2014) documented the eradication of 13 weed species in one quadrat, and seven in another by bushland contractors, over only three years of management. Non-indigenous species that persisted over the three years of management were more common and vigorous species such as Panic Veldt-grass, Coast Wattle, and Kikuyu.

The successful management of Seaford Foreshore was also documented in a report by McCaffrey et al. (2010), which showed increases in native vegetation cover from 1992-2009/2010 (Figure 31). McCaffrey et al. (2010) stated that "significant native vegetation restoration by the Council and community groups (e.g. Friends of Seaford Foreshore), along with open-bottom fencing along primary dunes have led to a large increase in vegetation condition".

It became clear in discussions with staff and contractors currently managing Frankston City's reserves that they hold a large base of knowledge pertaining to bushland management, evident in the current quality of Frankston's reserves, as discussed above. The main issue raised during consultation (Section 3) was that funding is somewhat restrictive, a reality in conservation works almost always encountered. This was raised during the discussion of the establishment of the *Proposed Fauna Linkages for Urgent Implementation* (Section 4.6), with valid concerns that their establishment could detract funding from existing works (Key Finding 21). The establishment of these fauna linkages is, however, considered a high priority for the municipality and therefore further funding and/or reprioritising works will be needed (Key Finding 21).

Key Finding 21: Investigate how to fund works for the habitat corridors recommended in Section 2.3.3, without detracting from other bushland.

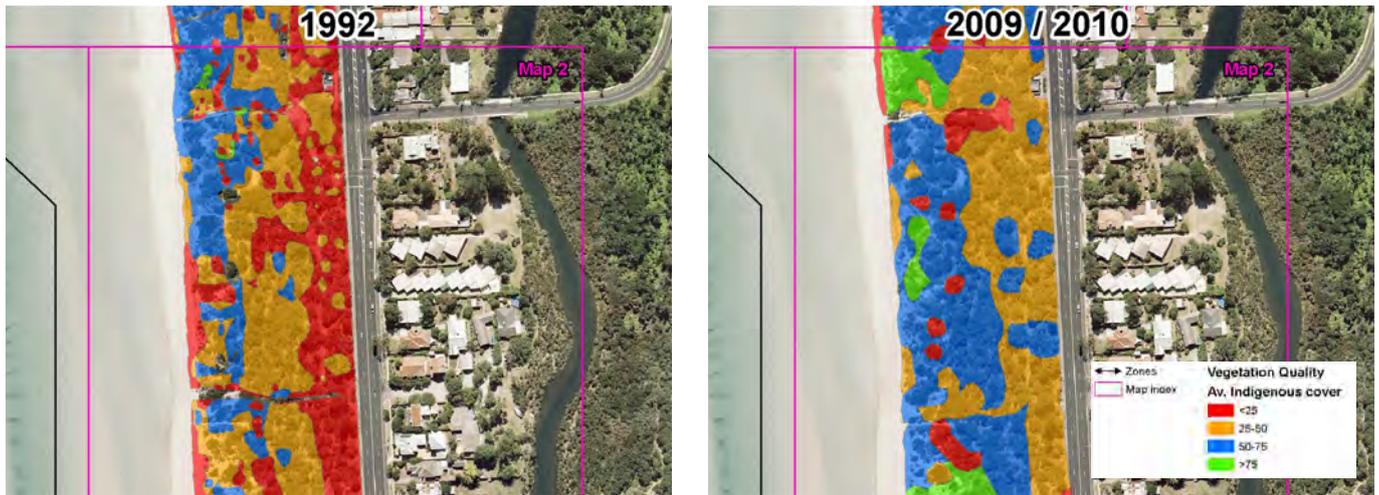


Figure 31: An example of change in indigenous vegetation cover from 1992 to 2009/2010 at Seaford Foreshore.

Further it is recommended that a yearly forum for Bushland contractors, natural reserves rangers and friends' groups be established to exchange knowledge and ideas on the management of local bushland to promote best – practice bushland management throughout the city's natural reserves (Key Finding 22).

In addition to the knowledge held by bushland contractors, Costermans (2020) indicated that in Frankston City, friends groups who have worked in reserves long-term (for decades in many cases), often act as long-term knowledge keepers who communicate their knowledge about specific sites to Council staff when they arrive in new positions or when new Councillors are elected. For this reason, Council's continuing support of the Frankston Environmental Friends Network is considered vital for the retention of knowledge, supporting their various on-ground works (Key Finding 23) and ensuring that their work complements that of the various land managers they work with.

In order to gather, summarise, and interrogate knowledge and practices related to bushland management in Frankston City (of which an extensive enough review is largely outside the scope of this report), it is recommended to create a Frankston City Weed Management Strategy that can cover both private and public properties (Key Finding 24).

Key Finding 22: Establish a yearly forum for bushland contractors, friends groups, local experts and Frankston City Council staff to meet and discuss best practice bushland management.

Key Finding 23: Continue (and expand if possible) the funding of the Frankston Environmental Friends Network.

Key Finding 24: Create a Frankston City Weed Management Strategy for public and private land.

5.2 Pest animals

As throughout the rest of the country, pest animals are present throughout Frankston City (DELWP, 2020), posing one of the most difficult challenges to biodiversity. Frankston City Council (2019a) lists the most significant pest animals as:

- Black Rat (*Rattus rattus*)
- Common Blackbird (*Turdus merula*)
- Common Starling (*Sturnus vulgaris*)
- European Goldfinch (*Carduelis carduelis*)
- European Rabbit (*Oryctolagus cuniculus*)
- European Red Fox (*Vulpes vulpes*)
- Feral Cat (*Felis catus*)
- Green Shore Crab (*Carcinus maenas*)
- House Mouse (*Mus musculus*)
- House Sparrow (*Passer domesticus*)
- Indian Myna (*Acridotheres tristis*) – which have been highlighted as a significant concern by the community
- Mosquitofish (*Gambusia holbrooki*)
- Northern Pacific Seastar (*Asterias amurensis*)
- Spotted Turtle-dove
- Brown Rat

The above species are widespread throughout the surrounding area and while it is extremely important that their numbers are controlled, it is highly unlikely that any can be eradicated from Frankston City.

Therefore, continued control of these species in priority areas (e.g. around large areas of native fauna habitat) should be advanced. The importance of feral animal control is demonstrated in the example of the Southern Brown Bandicoot, where predation by foxes and cats is considered to have significantly contributed to its decline including within Frankston where it is considered locally extinct (DEPI 2014).

Council's *Vertebrate Pest Management Plan* (SMEC 2011) was developed to manage the impacts of vertebrate pests in the city's natural reserves. The plan adopts an integrated pest management strategy and is designed with an adaptive management approach with monitoring and refinement over time. However, it does not address pest animal impacts on private land and has not been updated.

It is timely to review this plan, update it based on current information and include private land within its scope (Key Finding 25). The updated plan and its implementation should be aligned with the *Eastern Region Pest Animal Strategy 2020–2030* (Ecological Australia 2020) developed by the Eastern Region Pest Animal Network of which Frankston City Council is a member.

Effective management of pest animals cannot be achieved without a regional approach, therefore working collaboratively with its network partners will be essential if Council is to minimise the impacts of pest animals at a local scale and contribute to effective control across the South East Region. Updating the Frankston Vertebrate Pest Management Plan will provide an opportunity to consult widely with the community and experts to review the impacts and further develop responses to predation of native wildlife by cats.

Key Finding 25: Continue to expand pest animal control programs, and update Council's Vertebrate Pest Management Plan.

Managing Cat Predation

Predation of native wildlife by the Cat is listed as a potentially threatening process under the Victorian Flora and Fauna Guarantee Act 1988 and feral cats are listed as a key threatening process in Australia under the EPBC Act (1999).

Fox and cat predation are likely to have the largest impact on native wildlife within the Frankston municipality and Council undertakes ongoing fox control within its natural reserves and partners with Melbourne Water to control foxes within the Seaford wetlands. However, cat predation, while likely to have the same impact on small native fauna as does predation by foxes, presents particular challenges for local government.

While much research in Australia has focused on feral cat control, recent studies confirm that pet cats are capable of driving declines in local populations of native wildlife species.

A review of recent research on the impact of domestic cats on wildlife by Legge et. al. (2020) concluded that a roaming and hunting pet cat kills an average of 186 mammals, birds and reptiles each year (including 115 native animals), which is about a quarter of what an average feral cat kills in the bush (748 mammals, birds and reptiles, including 576 native) per year. But pets occur at a high density in small areas, so local predation pressure can be substantial; in those areas in which they occur, pet cats collectively kill 28–52 times more animals per square kilometre than do feral cats in natural

environments, and 1.3–2.3 times more animals per square kilometre than do feral cats living in urban environments. This review calculated an average overall toll of 390 million vertebrates killed in Australia by pet cats each year.

At a local level this has significant implications for biodiversity conservation within the Frankston municipality and is borne out by local wildlife shelters which consistently report that high numbers of rescued native animals are attacked by cats.

In addition the indirect effects of pet cats on the feeding behaviour, breeding behaviour and success of local populations may have significant impacts on fauna populations. Native animals may change their ranging behaviour, including feeding or breeding in suboptimal areas so as to avoid cats ultimately driving population decline even if direct impact of predation is low.

Despite the significant impacts, the review noted that whereas the management of feral cats across the Australian landscape remains challenging, the options for reducing the impacts from pet cats are technically much more feasible, but requires careful community engagement and a range of measures including:

- Registration
- De-sexing
- Cat prohibition in new developments
- Exclusion fencing
- Cat curfews - part-day or 24 hour, and
- controlling nuisance cats.

Frankston City Council implements a number of these measures including imposing a cat curfew between dusk and dawn with a legal requirement for a cat to be secured inside a private property during these times. However, evidence indicates that time-bound curfews of cats are unlikely to prevent cat impacts. Cats that roam at night may encounter different species of animals (typically, more mammals) than cats that wander during

the day (typically, more birds); day or night curfews may, therefore, change the type of animal caught, but not the overall predation rate (Legge et. al. 2020).

There is a need to further engage with the community on responsible cat ownership as well as considering the costs benefits of imposing and enforcing compliance with a 24-hour cat curfew in line with other LGAs within the region in order to reduce the predation pressure by domestic cats.

5.3 Urban expansion

The most recent demographic data - included in the report Population and household forecasts, 2011 to 2036 by .id The Population Experts (2016) projects the population of Frankston City to grow by 23,440 by 2036 (Figure 33) with the greatest growths in:

- Carrum Downs (5,894)
- Langwarrin-Langwarrin South (4,071)
- Frankston Central (3,610)
- Seaford (2,883).

Key Finding 26: A strategic planning review of the Langwarrin Woodlands should be performed, to plan early for how to allow development in the area without impacting biodiversity to a significant and unacceptable degree.

Without strategic planning, it is inevitable that the population growth in the Langwarrin-Langwarrin South area would significantly impact on the Langwarrin Woodlands area (defined in Section 2.1 as the area in the south-east of Frankston City with substantial native vegetation on private land) (Key Finding 26). Additionally, the expected 4,000 new residents in the Langwarrin Woodlands area (Map 9) will lead to substantial challenges in fire safety due to the amount of bushland in the area, again highlighting the importance of early planning.

This planning review should also consider:

- The Habitat Corridor ESO (Section 4.6)
- Increasing the minimum lot size in areas of high biodiversity value (e.g. the Langwarrin Woodlands). It is noted here that the *Green Wedge Management Plan* already considers many of these issues.

Key Finding 27: Hold regular training sessions for statutory planners delivered by an external provider with expertise in navigating the planning system's bushfire and biodiversity clauses.

While all planning decisions for removal of native vegetation must adhere to the principles of 'avoid, minimise and mitigate' under state-wide and local controls, continued development has resulted a steady depletion and fragmentation of indigenous habitat within the municipality, as illustrated in Figure 33.

Through the consultation process for this report it was noted by a number of stakeholders that Council's statutory planning process (in relation to applications to remove native vegetation) would benefit from provision of regular training programs and updates for planners in biodiversity and bushfire planning. Such a program would provide planners with a range of tools and perspectives to assess complex applications involving native vegetation management to achieve balanced outcomes for the benefit of applicant's proposals, effective fire management and biodiversity conservation (Key Finding 27).

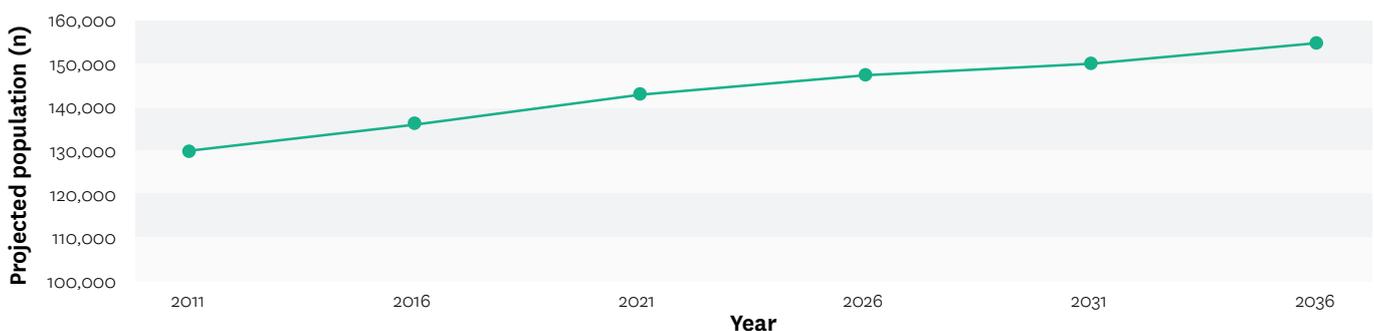
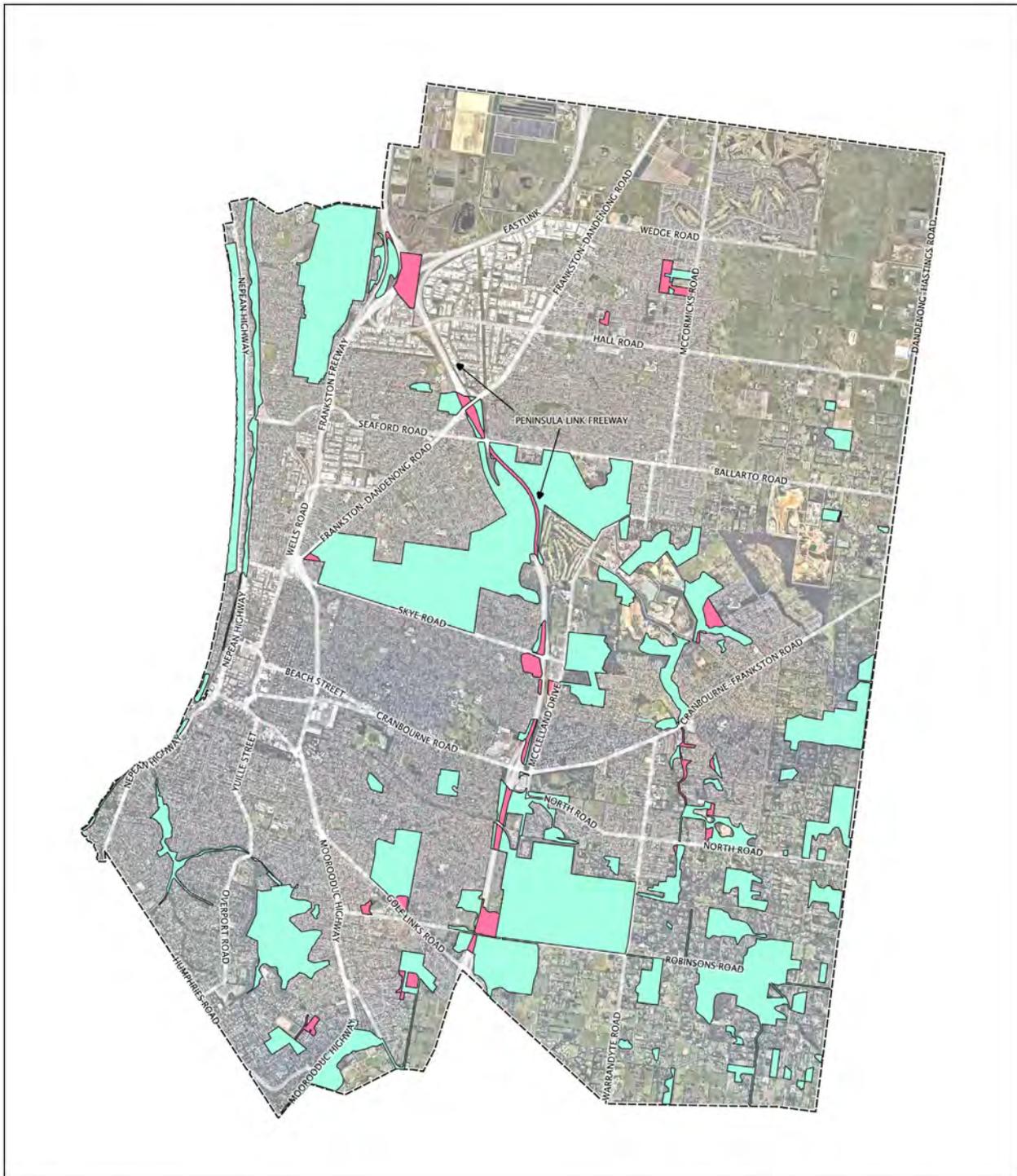


Figure 32: Projected population for Frankston City. Data from .id The Population Experts (2016).

Loss of Native Vegetation from Frankston's ESO 1 'Native Vegetation and Fauna Habitat' Due to Permitted Development

-  Frankston City
-  Loss of locally significant habitat from ESO 1 through permitted removal of native vegetation since 2006 (114 ha)
-  Extant native vegetation and fauna habitat currently covered by ESO 1



Map Created: September 2021

Paper Size: A3

0 750 1500 m



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Disclaimer

Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

Aerial Photography from Nearmap (2020).

Figure 33: Loss of native vegetation from Frankston's ESO 1 due to permitted development (2021).

5.4 Biodiversity and bushfire relationship

While the *Frankston Biodiversity Action Plan* and associated *Technical Report* do not aim to document bushfire risk in Frankston City nor recommend associated planning controls for bushfire itself, it is here recognised that biodiversity and bushfire are intrinsically linked in a number of ways, such as:

- Dwelling construction in bushland areas (e.g. the Langwarrin Woodlands) results in clearing large areas of native vegetation for defensible space and CFA access requirements
- There are large areas of cleared land in Frankston City that could support numerous developments, which are safer from a bushfire perspective, and require less (or no) clearing
- Low-density developments (i.e. housing interspersed with bushland) are both more hazardous from a bushfire perspective, and result in more native vegetation removal than high-density urban developments
- Cultural burning can result in positive outcomes both for biodiversity and cultural heritage, although further investigation is needed (Key Finding 28). A recent report by the Bunurong Land Council Aboriginal Corporation (2020) states that “[t]raditional owners...have cultural obligations to protect the land. Bunurong people are interested in exploring cultural burning around the Edithvale-Seaford site for example”.

Key Finding 28: Consult with the Bunurong Land Council to establish a long-term vision for the potential implementation of cultural burning in Frankston City.

As with urban expansion, early strategic planning of the development of areas within the BMO – especially the Langwarrin Woodlands area (Map 9) – is needed to ensure that bushfire and biodiversity issues are considered as early as possible to allow for long-term planning.

5.5 Biodiversity on private land

As discussed throughout Section 3, there are significant biodiversity values on private land within Frankston. In addition to strategies discussed above, the following would be beneficial (Key Finding 29).

- The establishment of an incentives program such as:
 - Hume City Council’s Conserving our Rural Environment (CoRE) Grant, which involves an ecologist visiting private properties with substantial biodiversity values, talking with the landowner about their intentions for the site, and then creating a land management plan that guides conservation works, partially paid for by Council (see hume.vic.gov.au/Your-Council/Grants-and-Awards/Rural-Engagement-Program)
 - Mornington Peninsula Shire Council’s Biolinks Support Grant, which provides funding for landowners to create habitat corridors (see mornpen.vic.gov.au/Community-Services/Grants-and-Awards/Biolinks-Support-Grant)
 - Mornington Peninsula Shire Council’s Conservation Land Rate, which involves a reduction in rates for landowners with large properties who demonstrate they have completed certain conservation-related works (see mornpen.vic.gov.au/Your-Property/Rates-Valuations/Rates-rebates-concessions-and-applications/Conservation-Land-Rate)
- A rural version of the Gardens for Wildlife Program that considers improving factors such as habitat connectivity, bushfire, and endangered species habitat
- Establishing cat curfews in buffer zones around all EVC patches identified in Map 4 and cat exclusion zones around areas identified as being of the highest biodiversity value within the municipality.

Key Finding 29: Create a package of programs (as defined in Section 5.5) to assist in the management of biodiversity values on private land.

5.5.1 Quarry sites

As highlighted in Section 4.6.3, one of the most important fauna linkages in Frankston City runs through quarry land, which also contains substantial areas of vegetation. Burdett’s Quarry and other quarry sites are considered some of the most important areas of private land to resolve for biodiversity purposes.

Key Finding 30: Resolve long-term planning for quarry sites in order to maintain (and improve) long-term habitat connectivity into the future.

The *Frankston Green Wedge Management Plan* (Frankston City Council 2019) highlights the need to “[m]anage the operation, rehabilitation and future employment opportunities associated with quarry and landfill activities ensuring that conflict with surrounding uses does not occur”. The Plan also highlights that at Burdett’s Quarry, the “sand resource would likely be extinguished in 3-5 years. The long-term aspiration is for the site to transition to an industrial use once extraction activities cease and remediation occurs”.

If the site is transformed into an industrial area, it would be essential for landscape connectivity to plan early to address the fauna linkage recommendations set out in Section 4.6.3 (Key Finding 30).

5.6 Community education

Whilst the focus of the *Action Plan* is on undertaking targeted achievable management actions that will have a direct impact on biodiversity, we acknowledge that focused community engagement or educational activities will be required in the longer-term, though this is somewhat beyond the scope of this report. The information provided below is an example of potential community educational/engagement activities that could be undertaken in the longer term:

- General educational material (parkland maps, flora and fauna posters, specific information for adjoining residents, weed education program, etc)
- Investigate a variety of other education strategies such as open days, competitions and school programs
- Investigate neighbouring councils’ programs and incorporate where appropriate. Share resources and knowledge and operate regionally where applicable
- Create a biodiversity@frankstoncity.vic.gov.au email address, for residents to address biodiversity identification and management issues
- Create a Frankston City Biodiversity ‘welcome pack’ for new residents
- Create stronger programs with schools to educate on improvements of schools grounds, especially those next to existing bushland

A number of specific concerns and ideas were raised during the community consultation phase that could be addressed through community education (Key Finding 31), which were:

- A lack of community knowledge around how indigenous and native ecosystems function, and some lack of respect for reserves
- An increased human recreation usage of green spaces and parks due to COVID-19 leading to disruption to wildlife and degradation of habitat through things like bike jumps, goat tracks and litter
- Increased use of lighting, both residential and at sport facilities, having a detrimental impact on biodiversity
- The potential to encourage community members of all ages to get involved with local reserves or parks such as through scouts and guides, rotary clubs and Landcare networks

- An increased use of artificial turf and manufactured play surfaces reducing benefits to biodiversity
- The need for enhanced maintenance and promotion of natural assets, to increase tourism and enhance Frankston’s coastal image as a desirable destination
- The potential to increase indigenous planting on nature strips, encouraged through events such as street contests
- The possibility to work with real estate agents and new residents to give home owners an environmental information package with information on the surrounding environment and how to care for it. This could include resources on Gardens for Wildlife, Friends and other environmental groups, environmental weeds, and reserves
- Following up planting days with a ‘wow, look at it now’ type activity
- Developing a centralised hub in Frankston for environmental information and queries
- Education on the removal of environmental weeds from private property and encouraging indigenous species, especially adjoining to nature reserves
- Community education and engagement with biodiversity and appropriate fuel management
- A dedicated Community Fireguard within Council to hold community and individual sessions with high risk landowners such as in Langwarrin Woodlands
- Partnerships with educational institutions and community groups similar to Green Army, as well as further citizen science programs
- QR codes in reserves and parks, with links to information on animals and plants
- The potential to collaborate with mental health providers and Frankston Hospital.

Key Finding 31: Create a package of educational materials for the concerns set out in this section of the Technical Report.

5.7 The Climate Emergency

Frankston City Council declared a Climate Emergency on 18 November 2019. The public's high level of concern about the climate emergency was one of the clearest results of the consultation phase of this *Technical Report* (Section 11).

Models of coastal inundation created by DELWP (2014) predict sea levels to rise by 20, 47 and 82 cm by 2040, 2070 and 2100 respectively (Figure 34). Additionally, storm tides (with added wind forcing) are predicted by the same models to increase by 6, 13, and 19 per cent by 2040, 2070 and 2100 respectively (Figure 34).

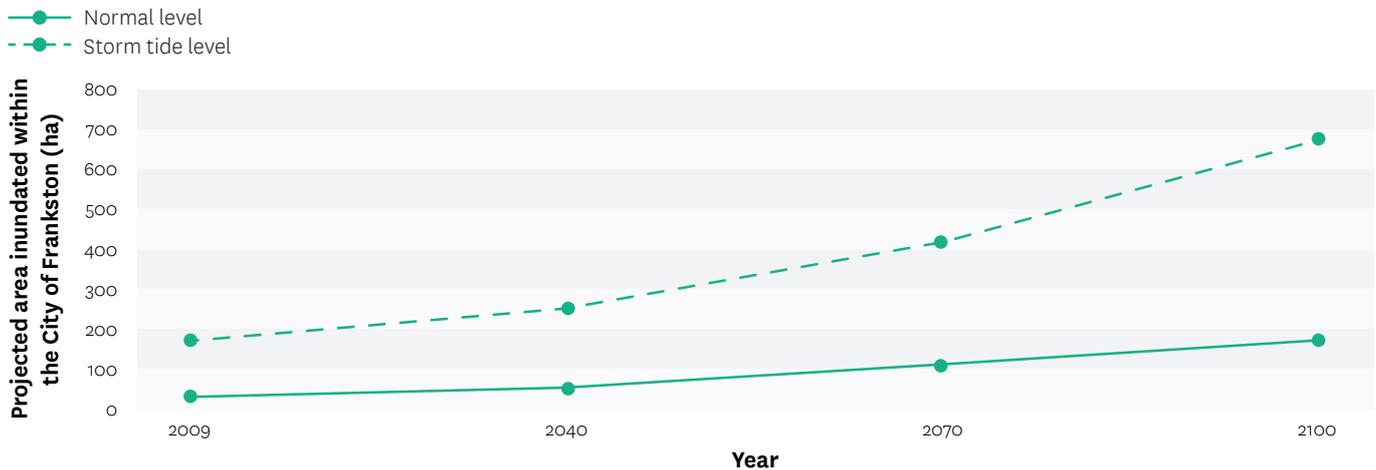


Figure 34: Areas of Frankston City projected to be inundated in normal sea levels and during storm tides from 2009 to 2040, 2070 and 2100. Inundation modelling is from DELWP (2014).

It is important to note that these models are based on the current topography of Victoria, and mitigation measures such as sea walls have the potential to alleviate some of this sea level rise (Key Finding 32).

Currently, approximately 20 ha of Frankston City is mapped as being inundated, which is inclusive of wetlands, streams, creeks, and coastal inlets.

Looking into the future, this is projected to increase to 42, 101, and 197 ha by 2040, 2070, and 2100 respectively, if no mitigation measures are put in place (Figure 34).

Storm tides (with added wind forcing) are modelled as potentially inundating approximately 177 ha within Frankston City as of 2009. These storm tides are projected to increase to potentially inundate 243, 404, and 683 ha by 2040, 2070, and 2100 respectively, if no mitigation measures are put in place (Figure 34).

While sea level rise will have widespread effects on Frankston City as a whole, there are potentially significant impacts on specific EVCs. A number of EVCs that occur in coastal and riparian areas are most at risk of inundation (Figure 35 and Key Finding 33).

The EVCs with the greatest risk of inundation are Plains Grassy Wetland and the Coast Banksia Woodland/Swamp Scrub Mosaic, with the area inundated projected to increase from 12 to 53 per cent and 0 to 36 per cent respectively (Figure 35). Additionally, storm tides are projected to temporarily inundate a number of other EVCs, surprisingly even the inland Plains Grassland/Plains Grassy Woodland mosaic.

Vegetation and associated soils are well known as a store of organic carbon, with its removal and disturbance being a substantial contributor to CO₂ emissions worldwide (Martínez-Mena et al., 2002). While sequestering organic carbon through revegetation (and the retention of remnant revegetation) should not be seen as a sufficient remediation measure for burning inorganic carbon (i.e. fossil fuels), it is still an important process with many obvious benefits to biodiversity.

Key Finding 32: Sea level rise presents a major risk to Frankston City as a whole, and detailed planning will be required to address this challenge.

Key Finding 33: A number of EVCs are projected to be especially impacted by sea level rise, and strategies for addressing these impacts will be crucial.

The *Towards Zero Emissions Plan 2019–2023* (Frankston City Council, 2019b) states that “[w]hilst Council is committed to implementing...initiatives as outlined [in the plan], there will remain some unavoidable (residual) greenhouse gas emissions that need to be accounted for”, and that “carbon sequestration through reforestation” is an appropriate trade-off.

Key Finding 34: Investigate the possibility of establishing carbon offsets in Frankston City.

By following procedures set out in the National Carbon Offset Standard (Commonwealth of Australia 2017), it may be possible to use remnant vegetation in the municipality as carbon offsets (with the added benefit of retaining such vegetation), as well as revegetation for habitat corridors (Key Finding 34).

- ◇— EVC 1 Coastal Dune Scrub/Coastal Dune Grassland Mosaic
- EVC 2 Coast Banksia Woodland
- △— EVC 48 Heathy Woodland
- EVC 125 Plains Grassy Wetland
- ▣— EVC 161 Coastal Headland Scrub
- EVC 897 Plains Grassland/Plains Grassy Woodland Mosaic
- EVC 904 Coast Banksia Woodland/Swamp Scrub Mosaic
- EVC 921 Coast Banksia Woodland/Coastal Dune Scrub Mosaic

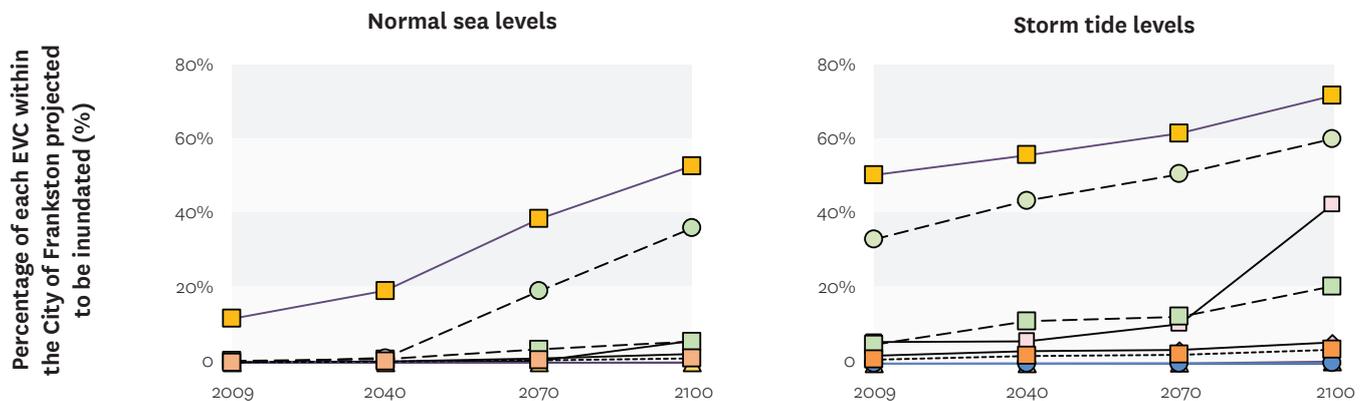


Figure 35: Percentage of EVCs in Frankston City projected to be inundated in normal sea levels and during storm tides from 2009 to 2040, 2070 and 2100. Please note that EVCs not in the figure are not projected to be inundated by any amount by 2100. Inundation modelling is from DELWP (2014).

Summary of Key Findings



This section summarises the various Key Findings identified throughout this *Technical Report*, which will be addressed in the associated *Action Plan*. Overall, four main themes emerged from the *Technical Report* (Figure 36).

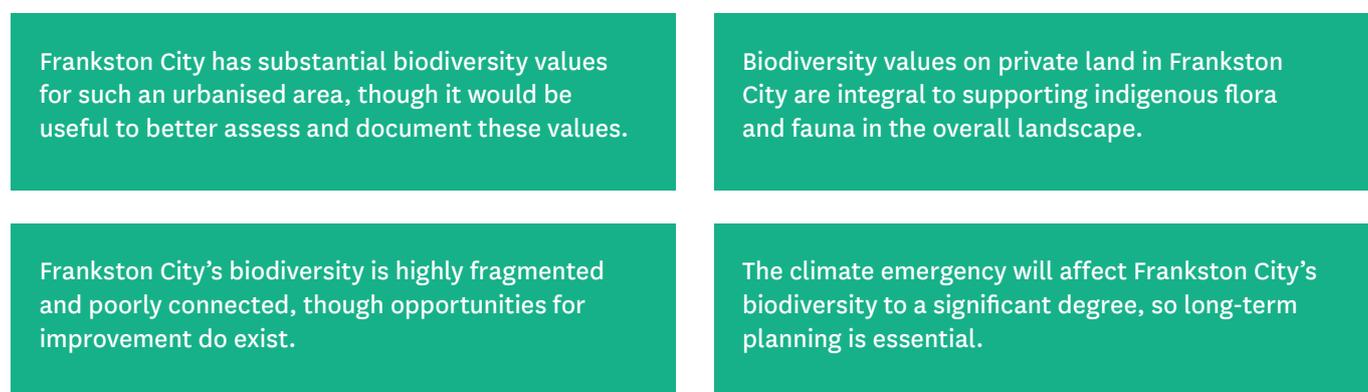


Figure 36: The four main themes identified in the *Technical Report*.

Key Finding 1: Implementing the Biodiversity Action Plan will build on the strong partnership between Council and the Bunurong Land Council Aboriginal Corporation in protecting and restoring our community's natural heritage.	11
Key Finding 2: Parts of the EVC mapping used in this report need to be ground-truthed to get an even more accurate representation of EVC distribution within Frankston City.	29
Key Finding 3: Investigate options for protecting and securing areas of Wet Heathland, Lowland Forest, Plains Grassy Woodland, Plains Grassy Wetland, Valley Heathy Forest, and Swampy Woodland (if found to be present following ground-truthing).	33
Key Finding 4: Different EVCs are degraded to different degrees, requiring a tailored and priority-based approach to management.	34
Key Finding 5: EVCs on private land are more degraded than those on public land, and strategies to improve management on private land should be investigated.	35
Key Finding 6: The diversity of flora species at many natural reserves is not documented due to a lack of detailed surveys.	38
Key Finding 7: Structural diversity of the vegetation at many of Frankston City's natural reserves could be improved through the reinstatement of understorey species.	38
Key Finding 8: There is substantial flora diversity on private land, which should be documented, managed and protected.	40
Key Finding 9: Listed flora records in Frankston City are outdated and geographically inaccurate, requiring targeted surveys, and discussions with local botanists before any management actions can be defined.	41
Key Finding 10: Investigate the reintroduction of listed flora species from surrounding LGAs to Frankston City (where suitable habitat is present) to increase their populations in the landscape.	41
Key Finding 11: Reserves (and other publicly-managed land) with sizeable fauna habitat should be surveyed regularly (especially reserves that have never been surveyed) within a long-term monitoring framework, in order to better understand how various fauna species utilise them.	42
Key Finding 12: Perform comprehensive surveys of fish, crustaceans and invertebrates throughout Frankston City (including on private land and in Boggy Creek).	43

Key Finding 13: Establish a mechanism (such as a permit condition) to ensure that surveys undertaken in Frankston City are entered into the Victorian Biodiversity Atlas to centralise all data and allow ease of analysis.	44
Key Finding 14: Consider creating criteria to prioritise restoration and/or maintenance works in listed fauna habitats.	46
Key Finding 15: Consult with the Southern Brown Bandicoot Recovery Team and other experts to determine the feasibility of re-establishing population of Southern Brown Bandicoots in Frankston City.	47
Key Finding 16: After consulting with experts, and feasibility analyses, integrate reintroductions of Southern Brown Bandicoot, Glossy Grass Skink, White-footed Dunnart, and other appropriate species into a ‘Frankston Fauna Linkage and Reintroduction Strategy’.	47
Key Finding 17: Use the ‘Frankston Fauna Linkages and Crossing Structure Design’ recommendations to create safe passages and structures for fauna movement across roads.	49
Key Finding 18: Utilise recommendation in the ‘Frankston Fauna Linkages and Crossing Structure Design’ to create targeted actions for improving fauna linkages.	51
Key Finding 19: Utilise the ‘Frankston Fauna Linkages and Crossing Structure Design’ and this report to establish the feasibility of the two highest priority linkages.	52
Key Finding 20: Hold a meeting with Casey City Council to discuss the feasibility of Corridor C1 (including whether the best alignment is feasible) and establish further actions.	53
Key Finding 21: Investigate how to fund works for the habitat corridors recommended in Section 2.3.3, without detracting from other bushland.	56
Key Finding 22: Establish a yearly forum for bushland contractors, friends groups, local experts and Frankston City Council staff to meet and discuss best practice bushland management.	57
Key Finding 23: Continue (and expand if possible) the funding of the Frankston Environmental Friends Network.	57
Key Finding 24: Create a Frankston City Weed Management Strategy for public and private land.	57
Key Finding 25: Continue to expand pest animal control programs, and update Council’s Vertebrate Pest Management Plan.	58
Key Finding 26: A strategic planning review of the Langwarrin Woodlands should be performed, to plan early for how to allow development in the area without impacting biodiversity to a significant and unacceptable degree.	59
Key Finding 27: Hold regular training sessions for statutory planners delivered by an external provider with expertise in navigating the planning system’s bushfire and biodiversity clauses.	59
Key Finding 28: Consult with the Bunurong Land Council to establish a long-term vision for the potential implementation of cultural burning in Frankston City.	61
Key Finding 29: Create a package of programs (as defined in Section 5.5) to assist in the management of biodiversity values on private land.	61
Key Finding 30: Resolve long-term planning for quarry sites in order to maintain (and improve) long-term habitat connectivity into the future.	61
Key Finding 31: Create a package of educational materials for the concerns set out in this section of the Technical Report.	62
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Key Finding 34: Investigate the possibility of establishing carbon offsets in Frankston City.	64

References



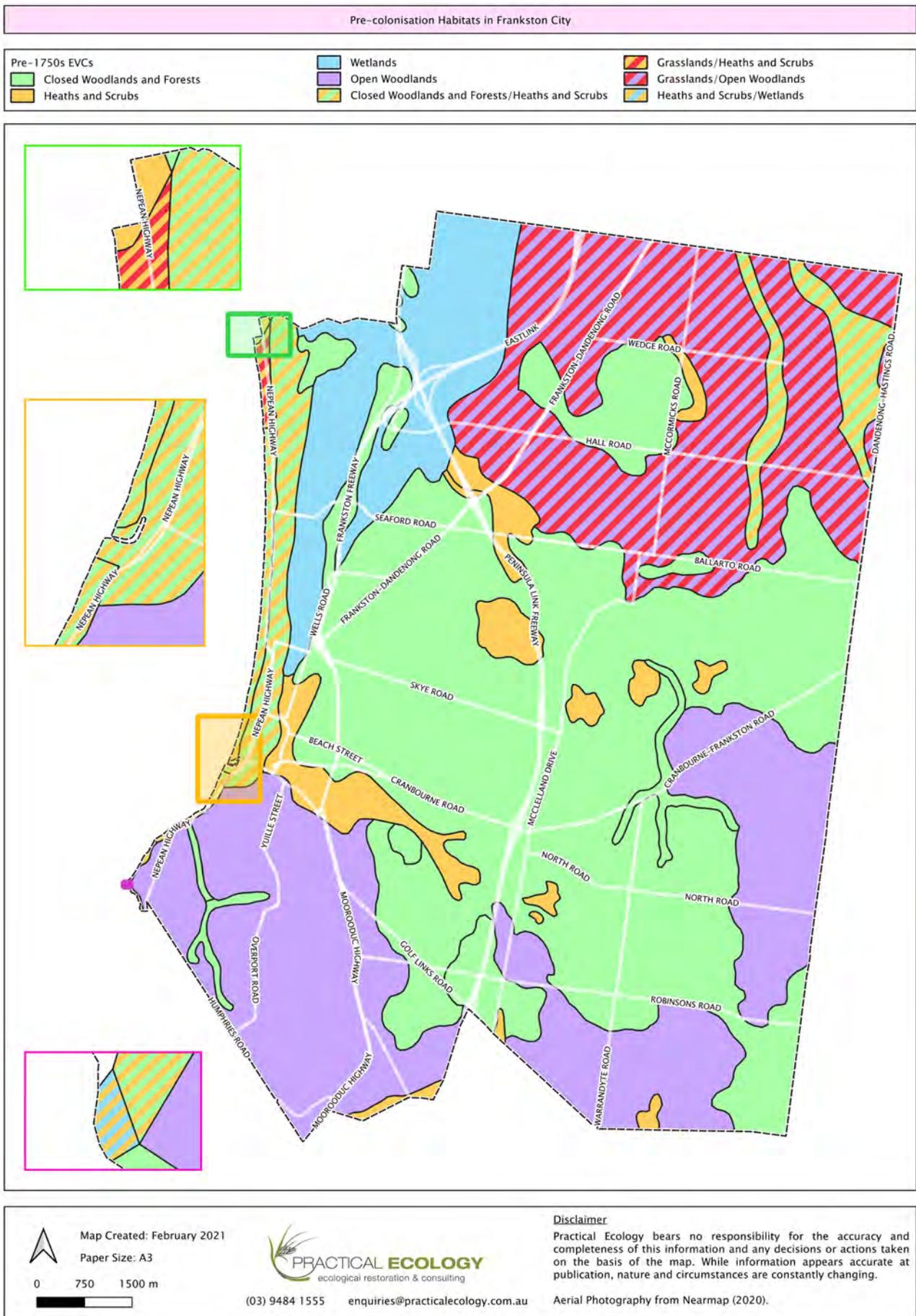
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- Terra Forma (1999c) *Outlook Reserve Management Plan*.
- Terra Forma (1999d) *Paratea Management Plan*.
- Terra Forma (1999e) *Sweetwater Creek Reserve Management Plan*.
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- Terra Forma (2000b) *Belvedere Bushland Reserve Management Plan*.
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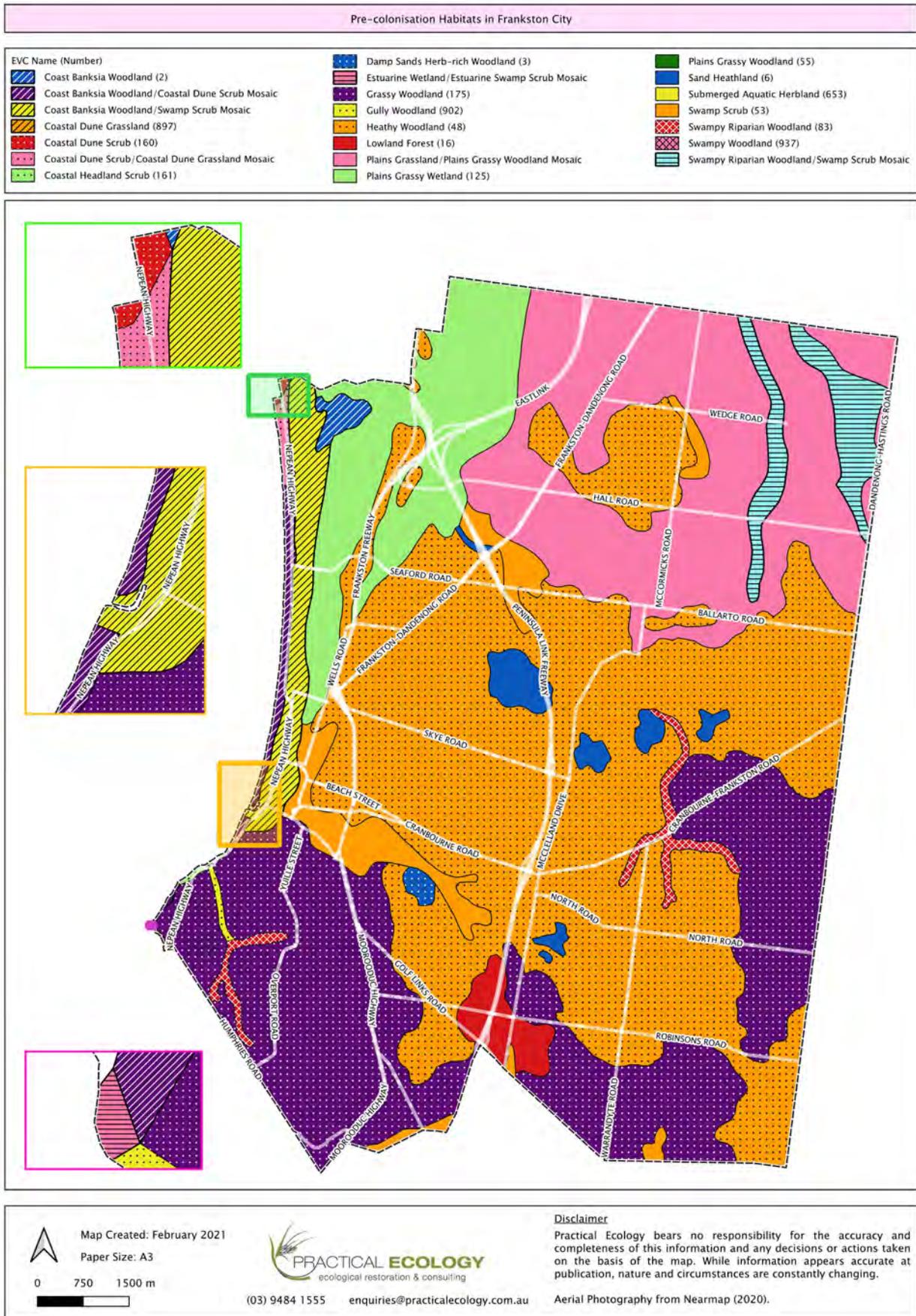
Maps



Map 1 Pre-colonisation habitats in Frankston City



Map 2 Pre-colonisation Ecological Vegetation Classes (EVCs) in Frankston City



Map 3 Data sources for EVC mapping

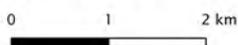
Data Collection Method
■ On-ground (1997 and 2006)
■ On-ground (2019)
■ Desktop (2020)

This map shows the data collection methods used to create the 'Extant Ecological Vegetation Classes in Frankston City' maps shows on the following pages. On-ground data was collated from surveys conducted by Ecology Australia (in both 1997 and 2006) and EcoLink (in 2019). This on-ground data was combined with extant EVC modelling by DELWP (2005) in areas which had not been surveyed by these studies. The extents of all three data sources were modified using aerial images (e.g. where roads have been built, or to refine the extent of DELWP modelling to visible patches of vegetation [as this modelling is very low resolution]). Please note this map is not intended to be definitive and is intended to be refined with future ground-truthing surveys.



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Aerial Photography from Nearmap (2020).

Map 4 Extant EVCs

Extant Ecological Vegetation Classes in Frankston City – Aerial Photography Page 1 of 1

Extant EVCs This map is a collation of aerial photography from Nearmap (2020) presented here to assist in interpretation of the following maps.



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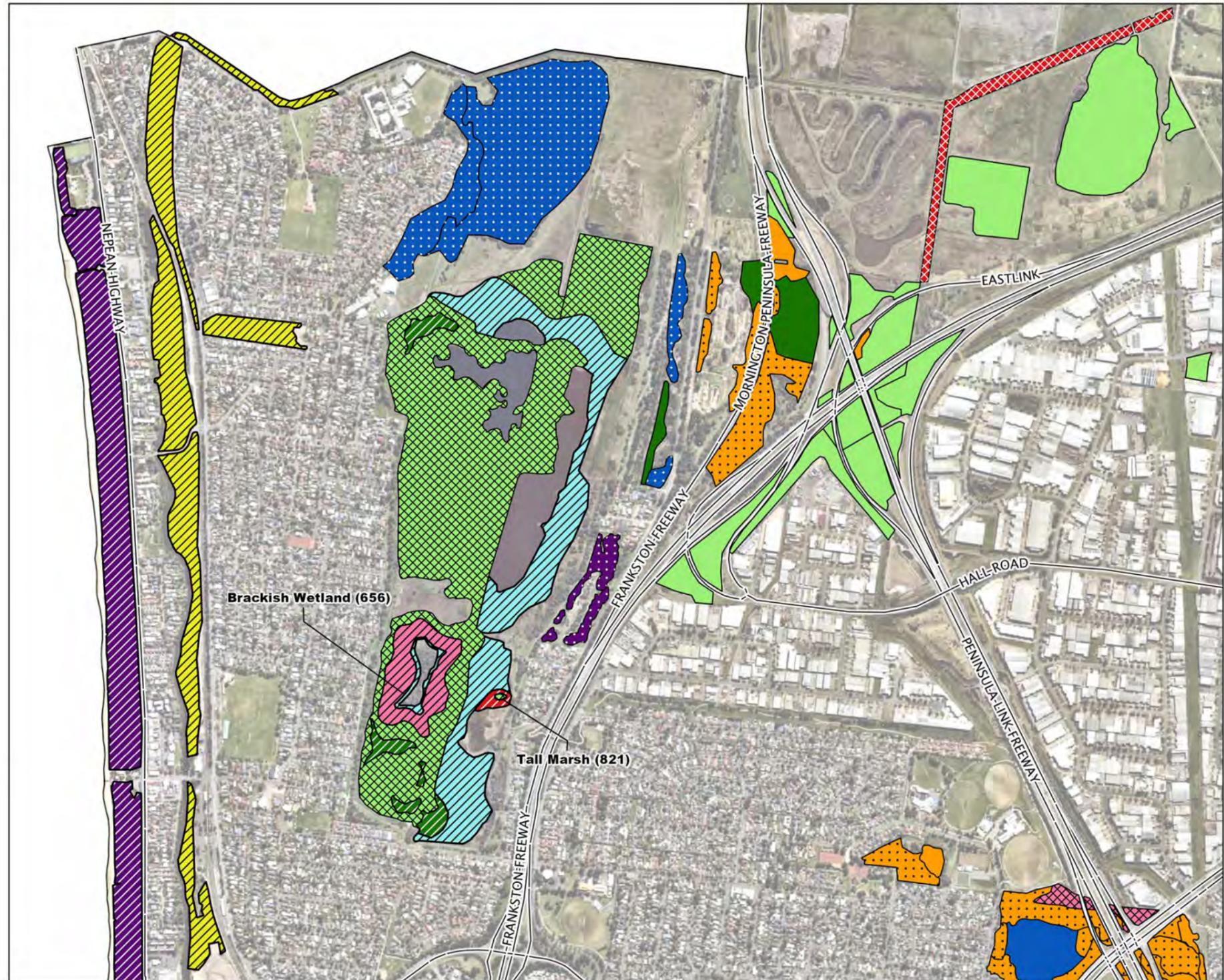
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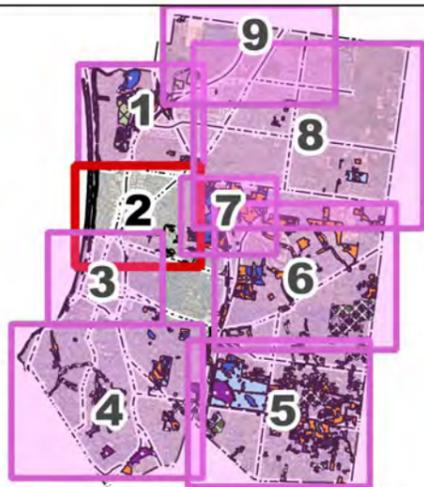
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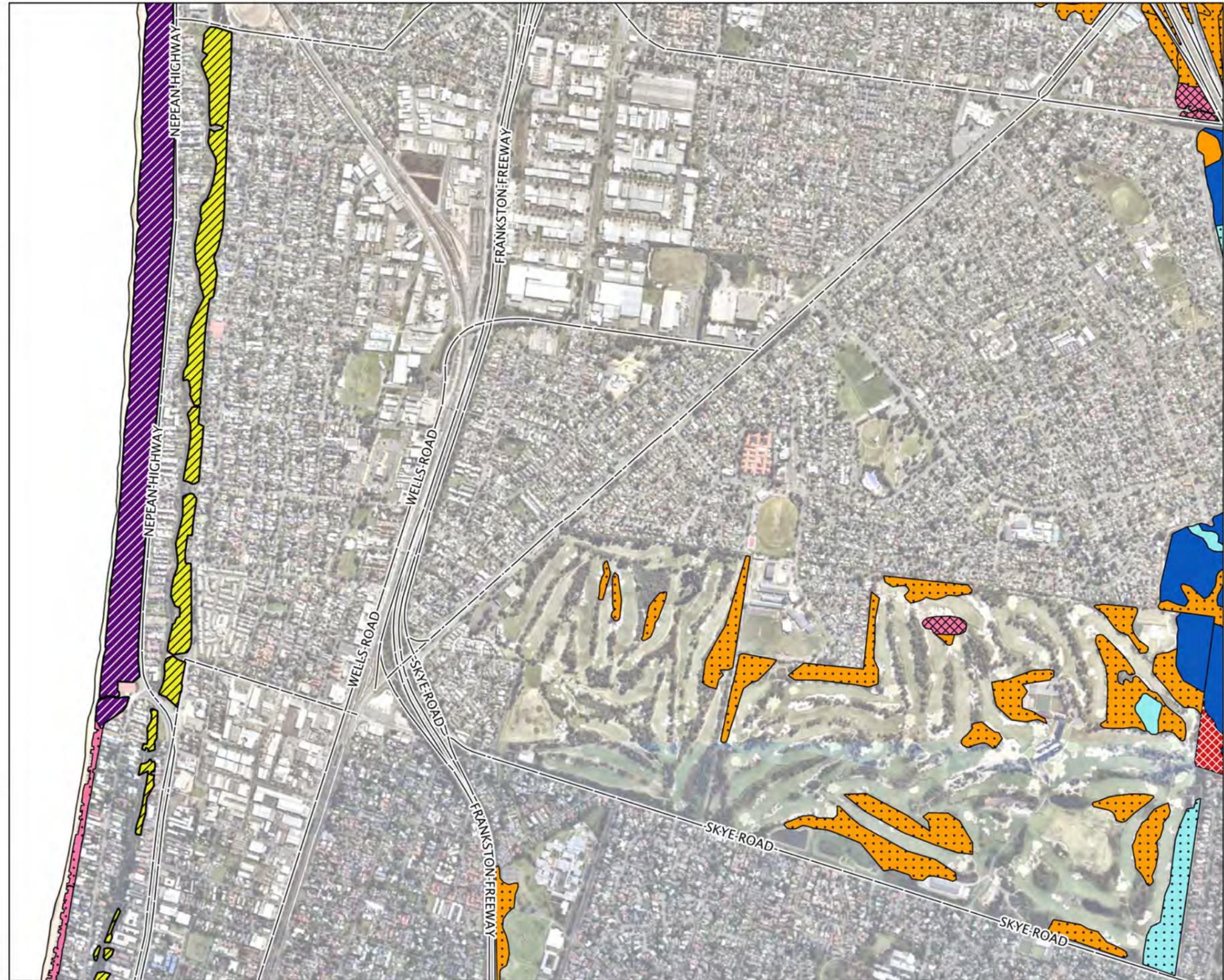
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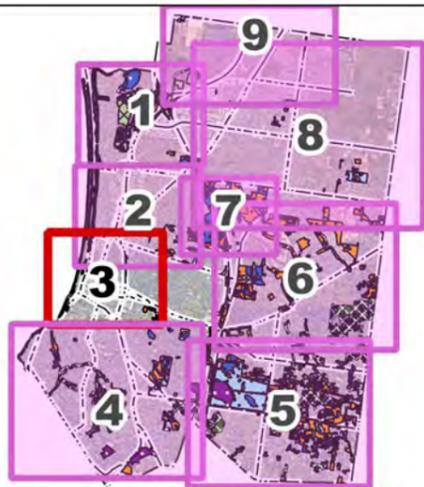
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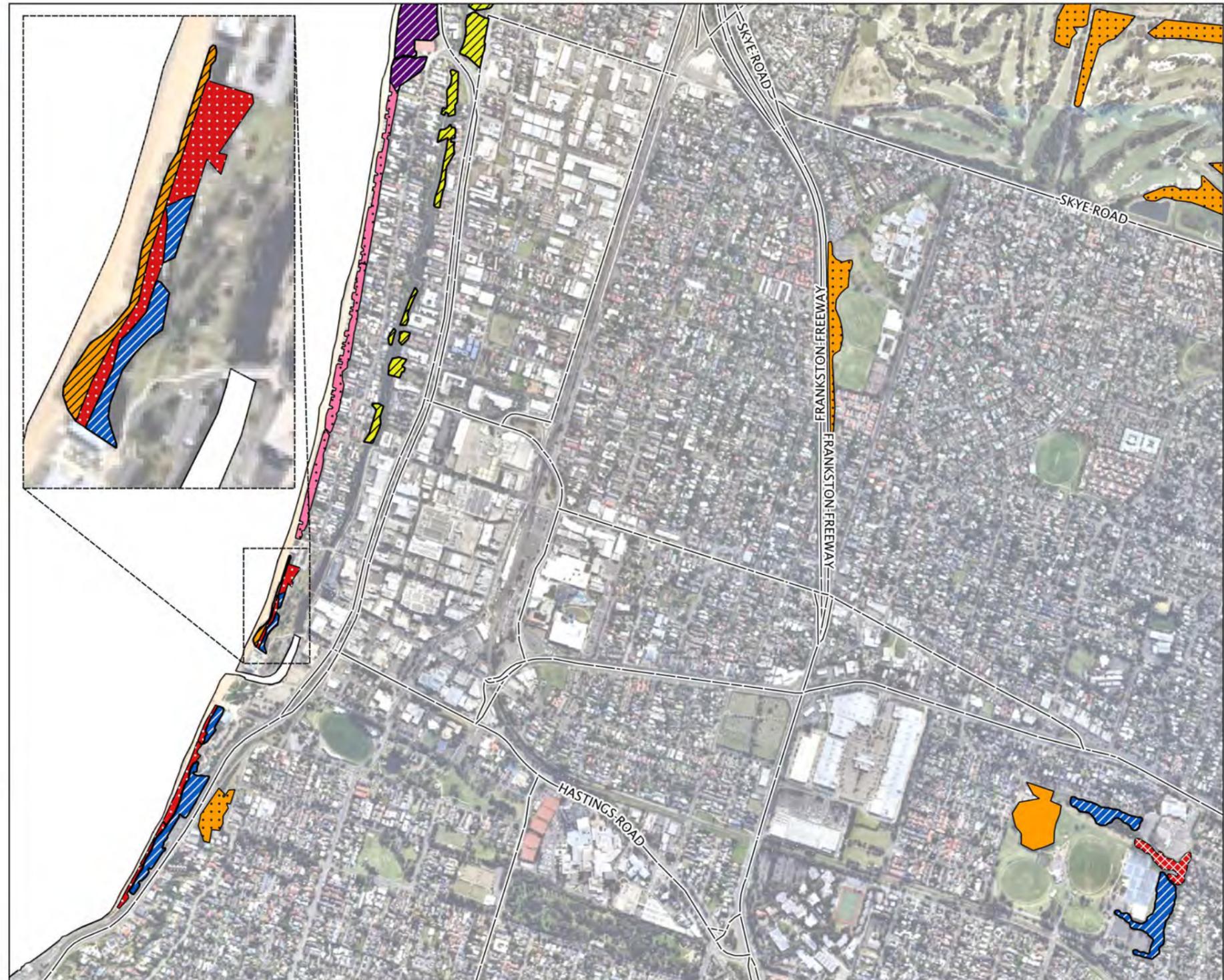
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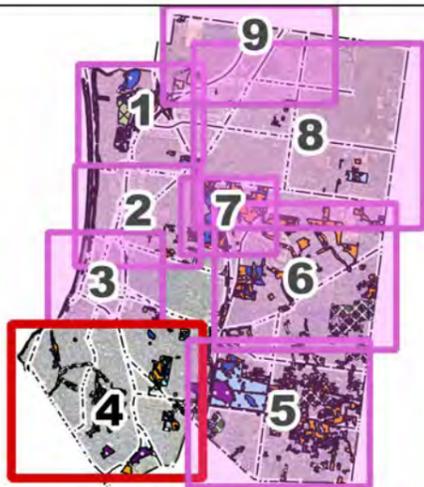
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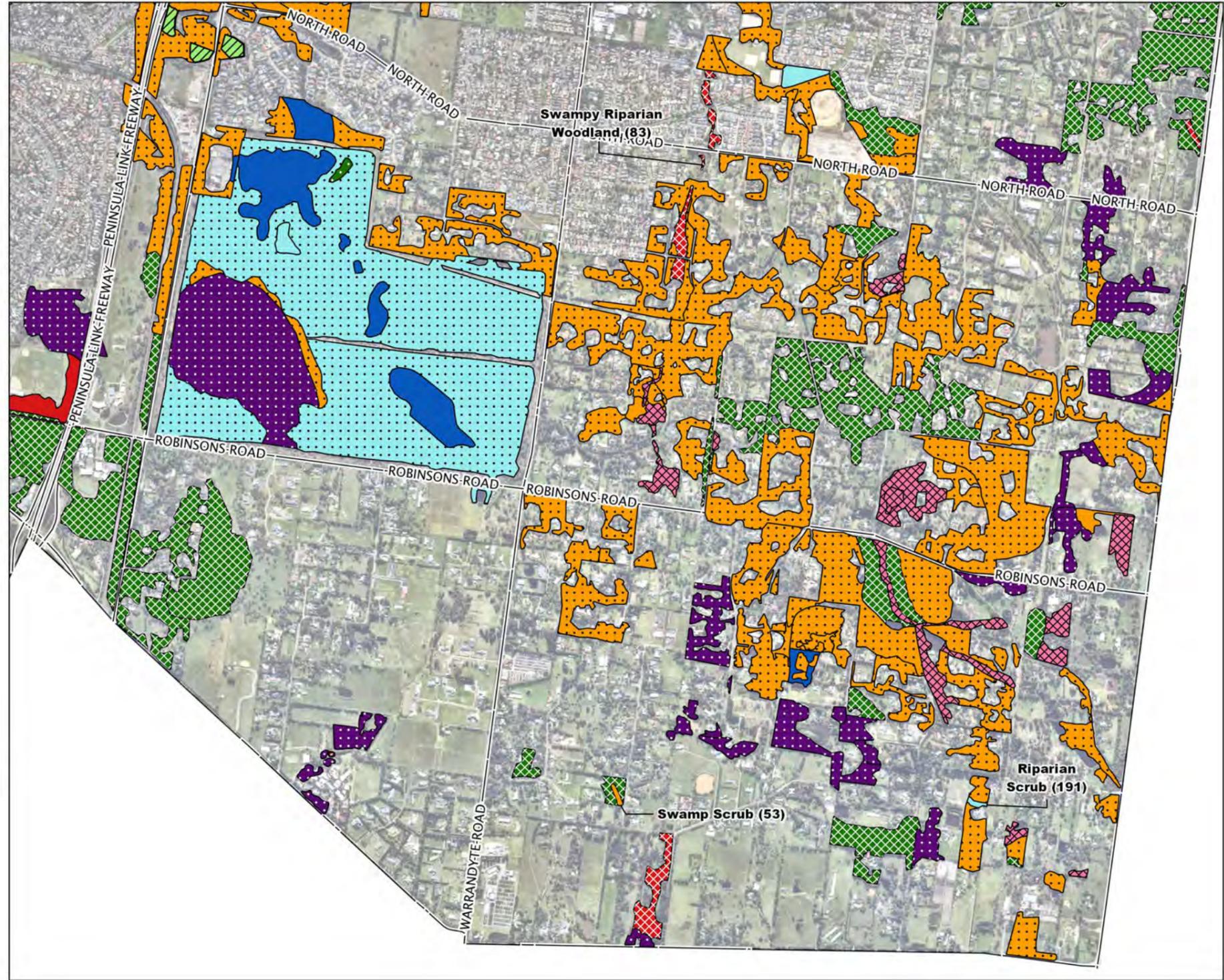
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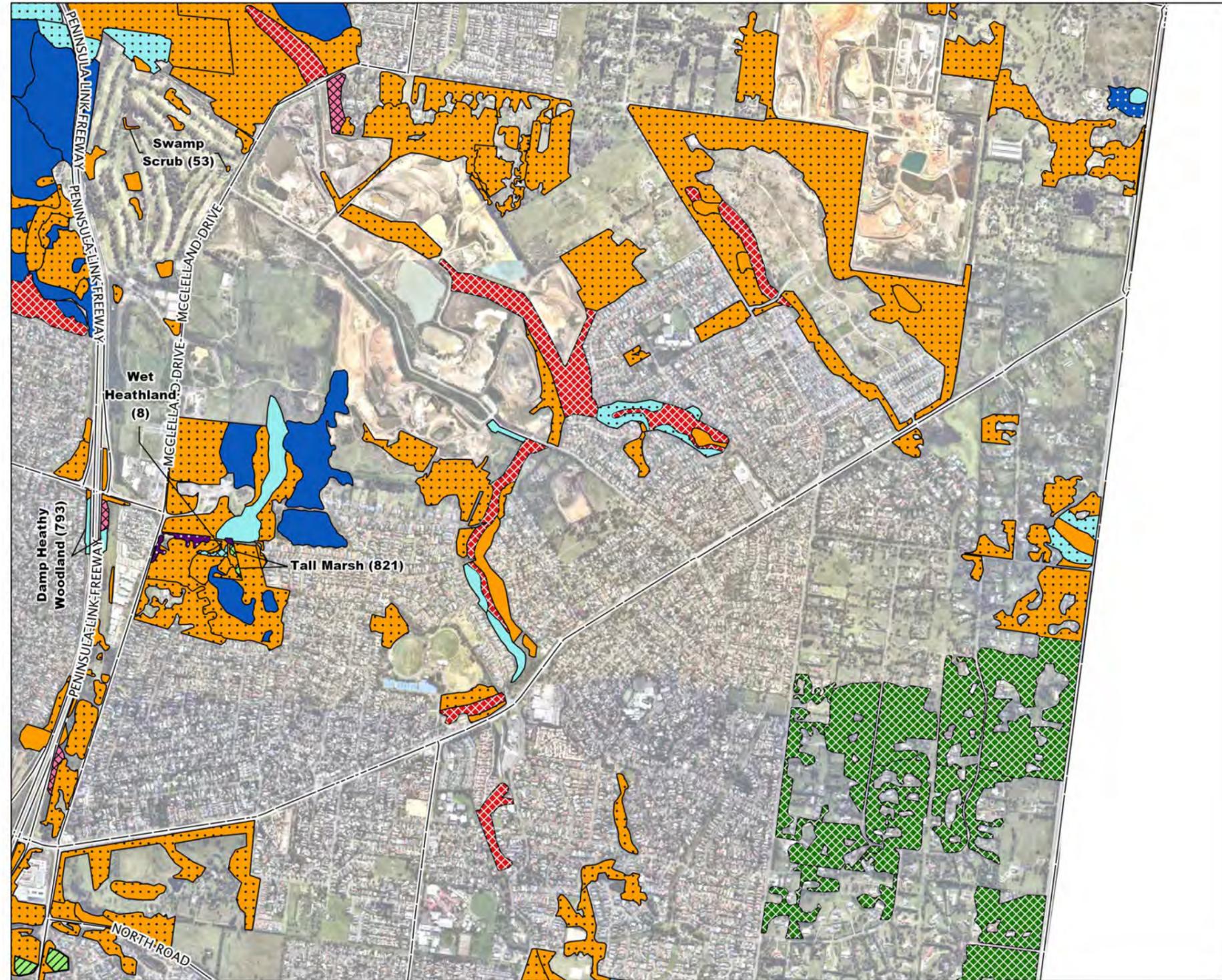
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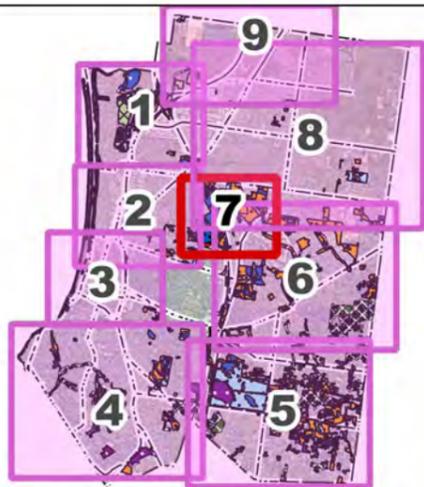
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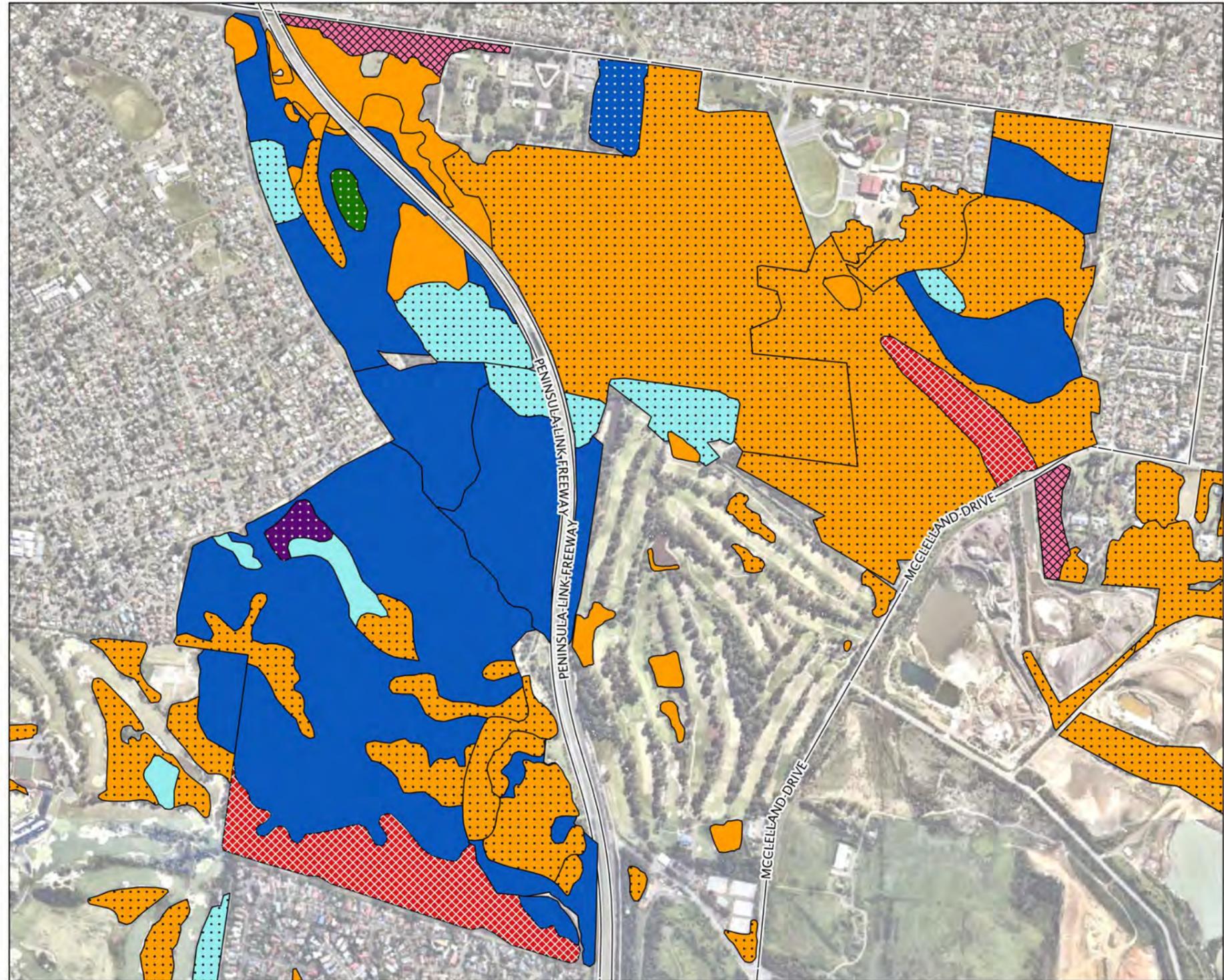
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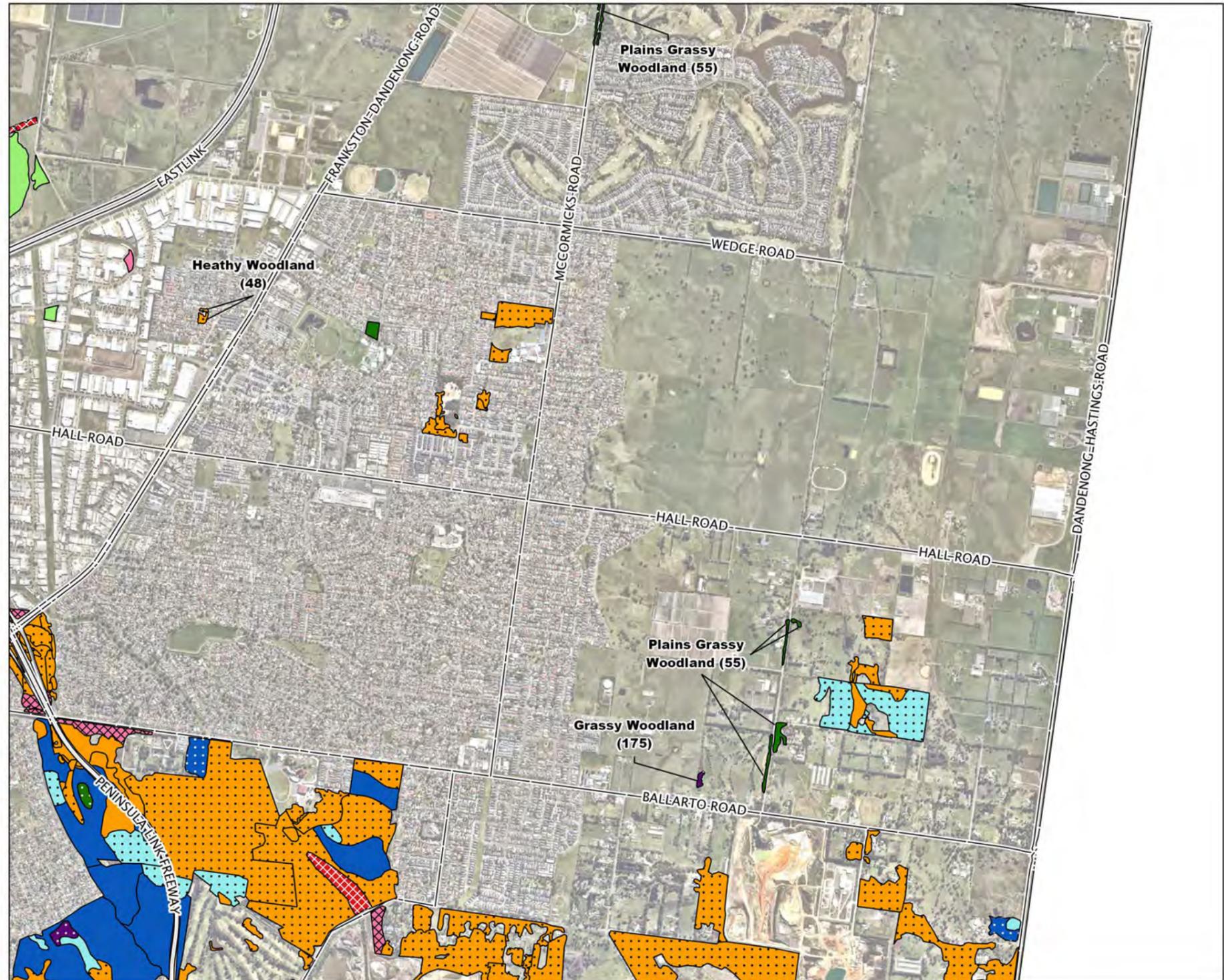
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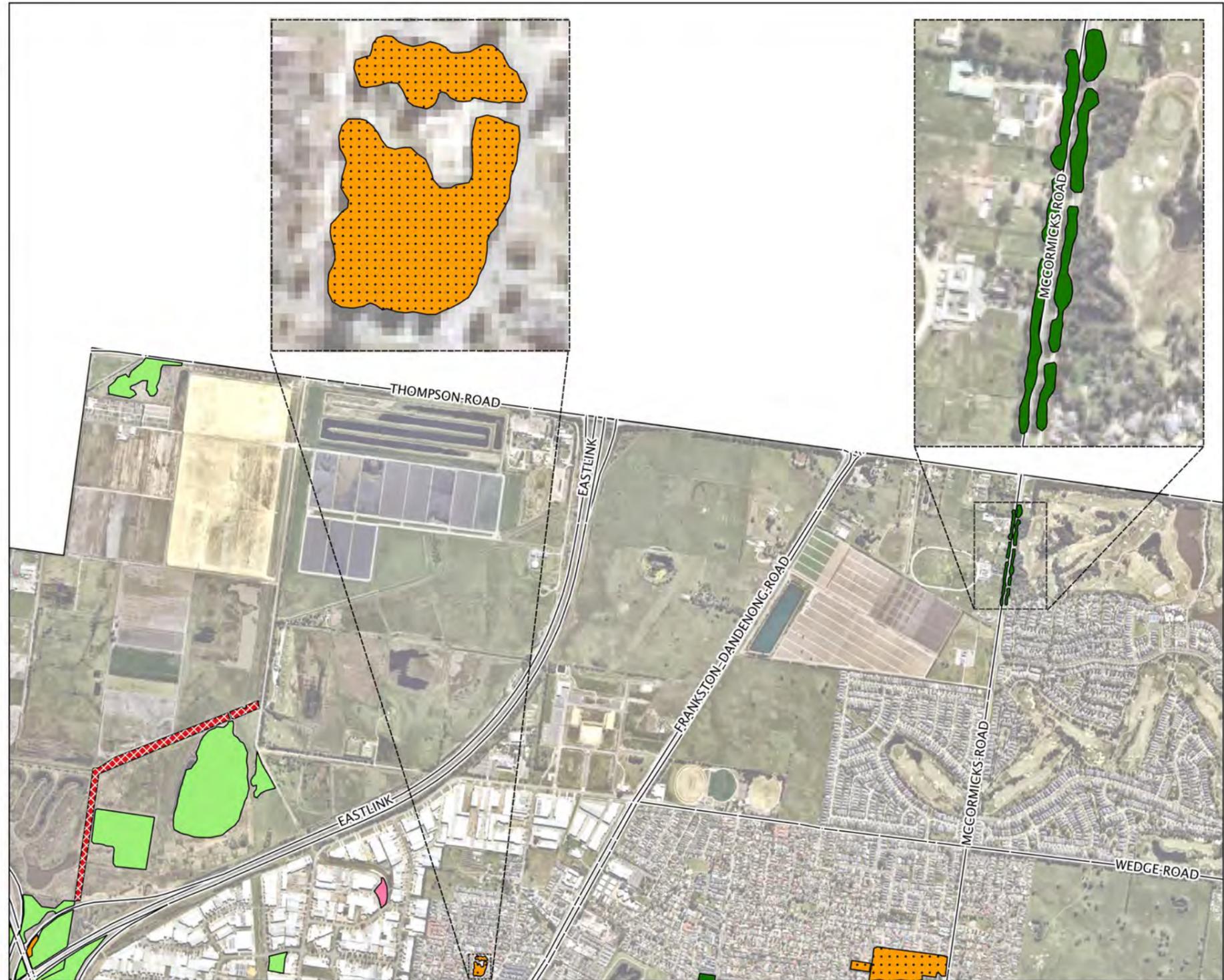
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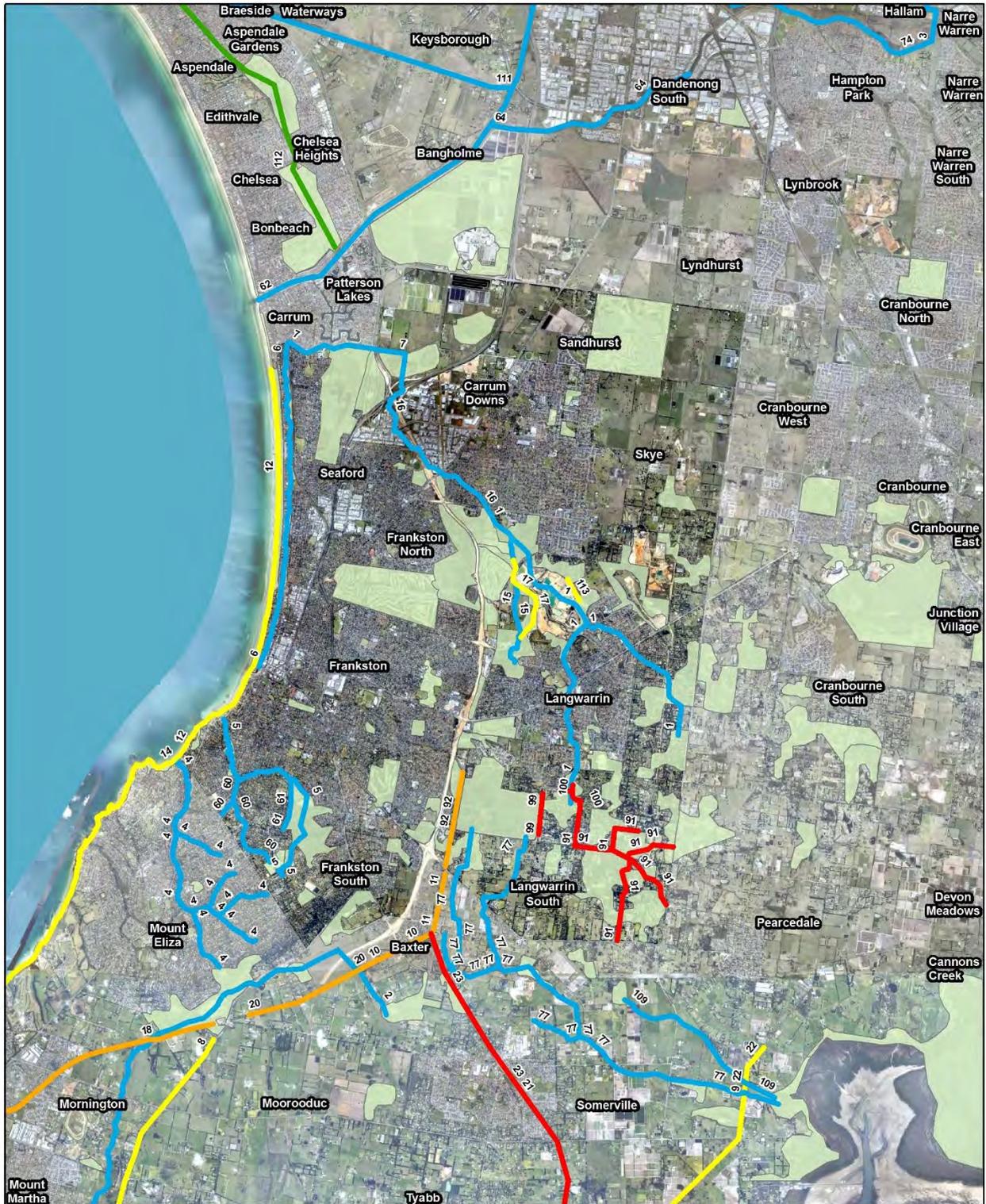
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Map 5 Existing Corridor Linkages

From *Frankston Fauna Linkages and Crossing Structure Design* [Practical Ecology, 2012]



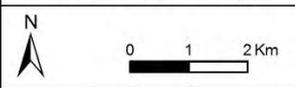
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Existing corridor linkages

- Riparian/Aquatic
- Terrestrial
- Terrestrial/Riparian
- Terrestrial-railway line
- Terrestrial-roadside
- Other linkages

*Note: corridors are labelled at start and end points

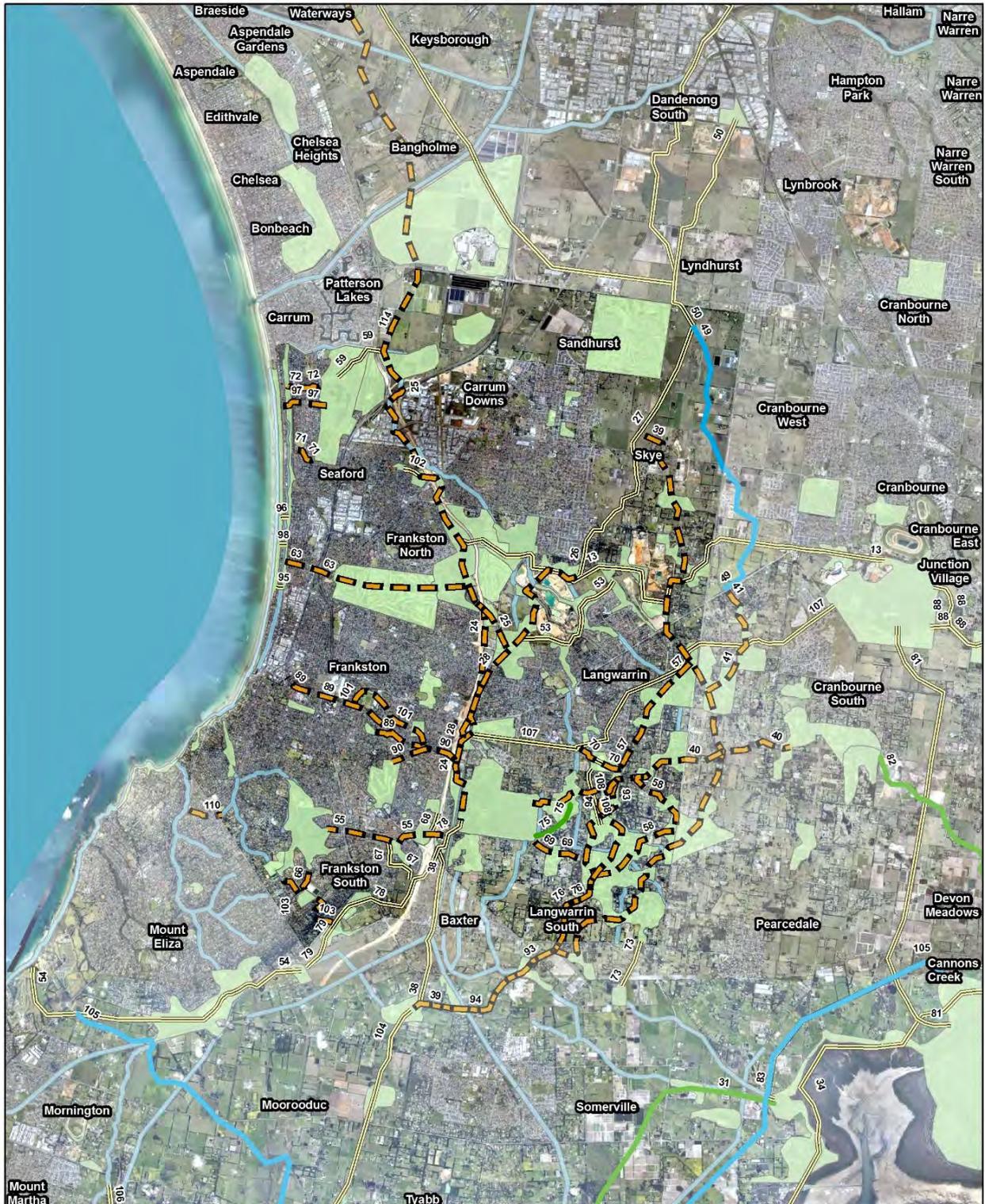
Fauna Linkages and Designs
Existing corridor linkages

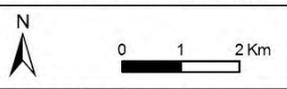


Version	02	Date	20/12/2012
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Map 6 Proposed Corridor Linkages

From *Frankston Fauna Linkages and Crossing Structure Design* [Practical Ecology, 2012]



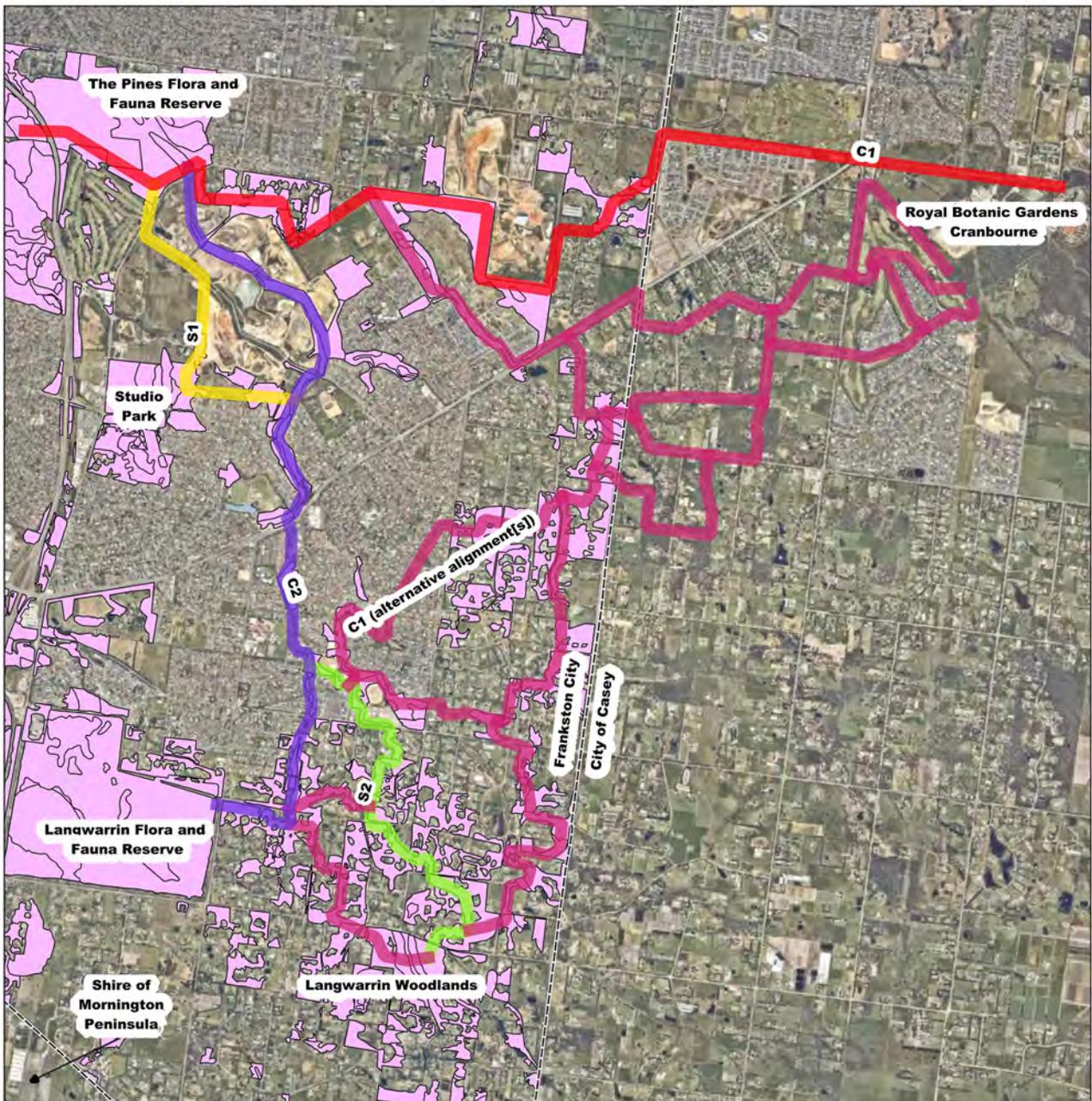
 <p>PRACTICAL ECOLOGY ecological restoration & consulting</p>	<p>Disclaimer Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.</p>	<p>Potential Corridor Types</p> <ul style="list-style-type: none"> — aquatic corridor — riparian corridor — continuous terrestrial corridor — stepping stone terrestrial corridor 	<p>Existing Linkages</p> <ul style="list-style-type: none"> patch corridor 	<p>Fauna Linkages and Designs Potential corridor linkages</p> <p>N</p>  <p>0 1 2 Km</p>	
				<p>Version 02 Date 20/12/2012</p>	

Map 7 Priority Fauna Linkages

This map depicts four fauna linkages identified for urgent implementation in *Frankston Fauna Linkages and Crossing Structure Design* (Practical Ecology 2012) overlaid on extant native vegetation (in Frankston City only) identified in this *Technical Report*.

- Extant Native Vegetation (only classified in Frankston City)
- Frankston City

- C1 = Corridor 1 (The Pines Flora and Fauna Reserve to Royal Botanic Gardens Cranbourne)
- C2 = Corridor 2 (The Pines Flora and Fauna Reserve to Langwarrin Flora and Fauna Reserve)
- S1 = Subsidiary Corridor 1 (Pines Flora and Fauna Reserve to Boggy Creek via Studio Park)
- S2 = Subsidiary Corridor 2 (Langwarrin Woodlands to Corridor C2)



Map Created: November 2020
 Paper Size: A3
 0 750 1500 m



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 Aerial Photography from Nearmap (2020).

Map 8 Habitat Corridor ESO

INSERT DESCRIPTION

Frankston City
 Extant Native Vegetation (only classified in Frankston City)

Priority Linkages

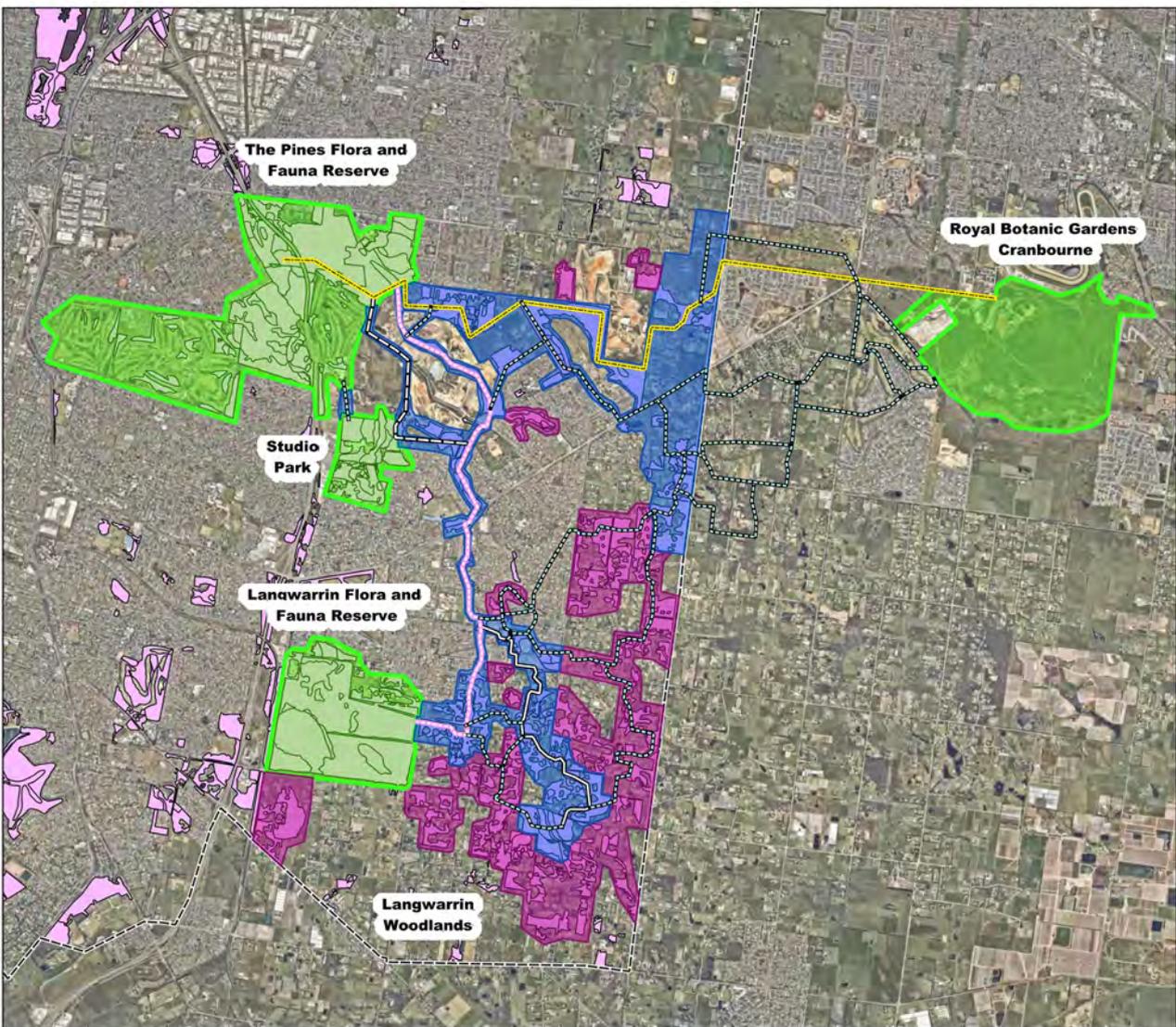
- C1
- C1 (alternative alignment[s])
- C2

Subsidiary Linkages

- S1
- S2

Urgent Habitat Corridor ESO Recommendations

- Essential Areas
- Additional Areas
- Core Areas



▲ Map Created: November 2020
 Paper Size: A3
 0 750 1500 m

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 Aerial Photography from Nearmap (2020).

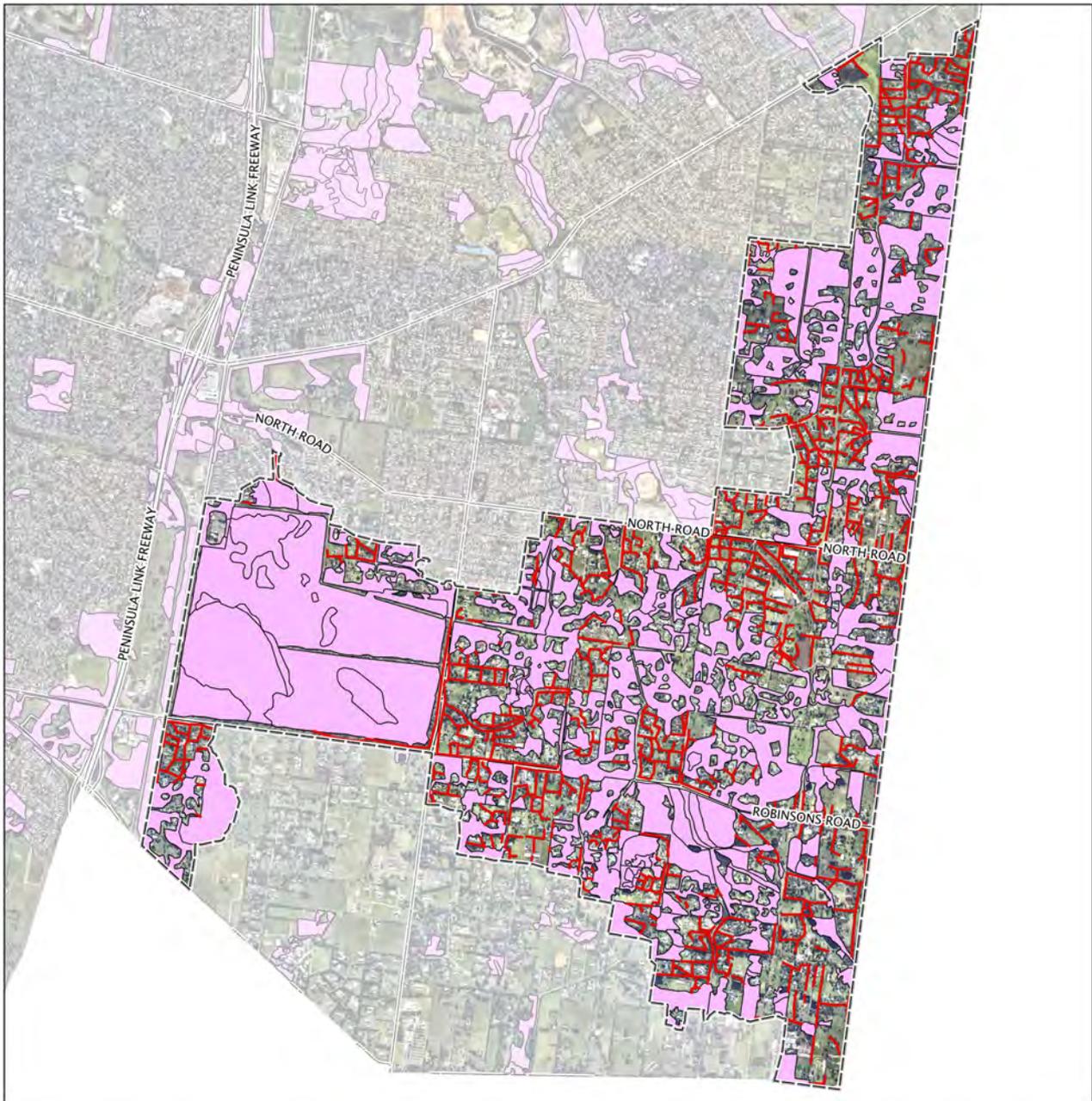
Map 9 Linear Vegetation in Langwarrin

This map depicts linear vegetation (e.g. indigenous trees, planted exotic trees or shrubs) visible in aerial photography within the 'Langwarrin Woodlands' area.

-  Langwarrin Woodlands
-  Linear Vegetation
-  Extant Native Vegetation



Extent of aerial imagery is the extent of Frankston City



Map Created: November 2020

Paper Size: A3

0 750 1500 m



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Aerial Photography from Nearmap (2020).

Map 10 Wildlife Casualty Hotspots

From *Frankston Fauna Linkages and Crossing Structure Design* [Practical Ecology, 2012]



 <p>PRACTICAL ECOLOGY ecological restoration & consulting</p>	<p>Disclaimer Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.</p>	<p>Legend</p> <ul style="list-style-type: none"> study area Freeway Major Road 	<p>Wildlife mortality/injury</p> <ul style="list-style-type: none"> High density Medium density 	<p>Fauna Linkages and Designs Wildlife mortality/injury</p>	
				<p>N</p> <p>0 1 2 Km</p> <p>Version 01 Date 06/07/2012</p>	

9 Appendix I. Significant flora records in Frankston City and surrounding LGAs

Species not recently recorded in any LGAs*
Species present in Frankston*
Species not recently recorded in Frankston, present in one or more surrounding LGAs*
Record deemed unlikely/unreliable

*Present if at least 1 record since 2000 in LGA, not recently recorded if not

Not recently recorded in LGA*	Present in LGA*
-------------------------------	-----------------

Ex - Extinct; CE - Critically Endangered; En - Endangered; Vul - Vulnerable; Aus - listed under the EPBC Act and the FFG Act; Vic - currently listed under the FFG Act; P - previously listed as threatened or poorly known in Victoria and locally significant.

Scientific name	Common name	FFG Act Listing 2021	Casey		Greater Dandenong		Frankston		Kingston		Mornington Peninsula	
			Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
Acacia uncifolia	Coast Wirilda	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	136	2020
Adriana quadripartita	Coast Bitter-bush	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	25	2018
Amphibolis antarctica	Sea Nymph	P	0	n/a	0	n/a	0	n/a	0	n/a	1	1967
Amphibromus fluitans	River Swamp Wallaby-grass	Vu Aus	4	2006	3	1993	2	2009	1	1993	4	2014
Atriplex paludosa subsp. paludosa	Marsh Saltbush	En Vic	14	2012	0	n/a	0	n/a	0	n/a	23	2018
Austrostipa rudis subsp. australis	Veined Spear-grass	En Vic	1	1999	0	n/a	0	n/a	1	1985	4	2011
Avicennia marina subsp. australasica	Grey Mangrove	En Vic	7	2012	0	n/a	1	2010	0	n/a	13	2020
Berula erecta	Water Parsnip	P	0	n/a	0	n/a	0	n/a	0	n/a	11	2011
Billardiera scandens s.s.	Velvet Apple-berry	En Vic	3	1981	0	n/a	9	2010	0	n/a	6	1990
Burnettia cuneata	Lizard Orchid	En Vic	0	n/a	0	n/a	5	2009	0	n/a	0	n/a
Caesia parviflora var. minor	Pale Grass-lily	En Vic	0	n/a	1	1900	0	n/a	0	n/a	0	n/a
Caladenia australis	Southern Spider-orchid	CE Vic	0	n/a	0	n/a	0	n/a	1	1927	1	1927
Caladenia dilatata s.s.	Green-comb Spider-orchid	CE Vic	0	n/a	0	n/a	0	n/a	0	n/a	10	1993
Caladenia flavovirens	Christmas Spider-orchid	CE Vic	1	1980	0	n/a	0	n/a	0	n/a	0	n/a
Caladenia oenochila	Wine-lipped Spider-orchid	CE Aus	0	n/a	1	1916	0	n/a	0	n/a	0	n/a
Caladenia robinsonii	Frankston Spider-orchid	CE Aus	1	2017	0	n/a	4	2009	0	n/a	24	2019
Caladenia tessellata	Thick-lip Spider-orchid	Vu Aus	0	n/a	0	n/a	0	n/a	0	n/a	1	1970
Caladenia thysanochila	Fringed Spider-orchid	Ex Vic	0	n/a	0	n/a	0	n/a	0	n/a	2	1997
Caladenia venusta	Large White Spider-orchid	En Vic	0	n/a	2	1916	0	n/a	2	1900	0	n/a
Callitriche umbonata	Winged Water-starwort	En Vic	0	n/a	1	1910	0	n/a	0	n/a	0	n/a
Cardamine moirensis	Riverina Bitter-cress	En Vic	1	1998	1	1997	0	n/a	0	n/a	0	n/a
Cardamine paucijuga s.s.	Annual Bitter-cress	P	0	n/a	0	n/a	1	2009	0	n/a	1	1982
Cardamine tenuifolia	Slender Bitter-cress	P	1	1998	0	n/a	0	n/a	0	n/a	0	n/a
Carex alsophila	Forest Sedge	En Vic	1	1980	0	n/a	0	n/a	0	n/a	0	n/a
Carex chlorantha	Green-top Sedge	En Vic	0	n/a	0	n/a	0	n/a	1	1986	0	n/a
Chiloglottis X pescottiana	Bronze Bird-orchid	En Vic	0	n/a	0	n/a	1	2016	0	n/a	2	1997
Chorizandra australis	Southern Bristle-sedge	P	0	n/a	0	n/a	4	2009	0	n/a	0	n/a
Cladium procerum	Leafy Twig-sedge	En Vic	0	n/a	2	2016	0	n/a	4	2018	7	2018
Coronidium gunnianum	Pale Swamp Everlasting	CE Vic	9	2018	0	n/a	4	2016	2	1999	0	n/a
Correa alba var. pannosa	Velvet White Correa	En Vic	0	n/a	0	n/a	0	n/a	1	1904	0	n/a
Correa reflexa var. lobata	Powelltown Correa	En Aus	1	1981	0	n/a	1	2009	0	n/a	0	n/a
Corunastylis ciliata	Fringed Midge-orchid	P	0	n/a	1	1928	1	1965	0	n/a	2	1993
Corybas aconitiflorus	Spurred Helmet-orchid	En Vic	1	1998	0	n/a	0	n/a	0	n/a	0	n/a
Corybas despectans	Coast Helmet-orchid	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	13	2011
Corybas fimbriatus	Fringed Helmet-orchid	En Vic	0	n/a	0	n/a	2	2009	1	1900	0	n/a
Corybas sp. aff. diemenicus (Coastal)	Late Helmet-orchid	CE Aus	0	n/a	0	n/a	0	n/a	0	n/a	1	2008
Craspedia canens	Grey Billy-buttons	CE Aus	5	1993	2	1993	1	2009	2	1991	1	1920
Desmodium varians	Slender Tick-trefoil	P	0	n/a	0	n/a	0	n/a	0	n/a	7	2011
Dianella amoena	Matted Flax-lily	CE Vic	7	2005	0	n/a	1	2009	0	n/a	0	n/a

Species not recently recorded in any LGAs*
Species present in Frankston*
Species not recently recorded in Frankston, present in one or more surrounding LGAs*
Record deemed unlikely/unreliable

*Present if at least 1 record since 2000 in LGA, not recently recorded if not

Not recently recorded in LGA*	Present in LGA*
-------------------------------	-----------------

Ex - Extinct; CE - Critically Endangered; En - Endangered; Vul - Vulnerable; Aus - listed under the EPBC Act and the FFG Act; Vic - currently listed under the FFG Act; P - previously listed as threatened or poorly known in Victoria and locally significant.

Scientific name	Common name	FFG Act Listing 2021	Casey		Greater Dandenong		Frankston		Kingston		Mornington Peninsula	
			Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
<i>Diuris behrii</i>	Golden Cowslips	En Vic	0	n/a	1	1916	0	n/a	0	n/a	1	2005
<i>Diuris palustris</i>	Swamp Diuris	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	1926
<i>Diuris punctata</i> var. <i>punctata</i>	Purple Diuris	En Vic	2	1905	1	n/a	10	2009	4	1998	24	2011
<i>Eleocharis macbarronii</i>	Grey Spike-sedge	P	3	2010	0	n/a	6	2009	0	n/a	0	n/a
<i>Entolasia stricta</i>	Upright Panic	P	1	1995	0	n/a	10	2016	0	n/a	0	n/a
<i>Eucalyptus carolaniae</i>	Mount Martha Bundy	CE Aus	0	n/a	0	n/a	0	n/a	0	n/a	19	2009
<i>Eucalyptus yarraensis</i>	Yarra Gum	CE Vic	2	1992	1	2015	2	2009	0	n/a	0	n/a
<i>Euphrasia collina</i> subsp. <i>muelleri</i>	Purple Eyebright	En Vic	0	n/a	0	n/a	6	1929	2	1900	23	2018
<i>Exocarpos syrticola</i>	Coast Ballart	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	2	2001
<i>Geranium solanderi</i> var. <i>solanderi</i> s.s.	Austral Crane's-bill	En Vic	0	n/a	1	n/a	0	n/a	1	1900	1	2004
<i>Glossostigma diandrum</i>	Spoon-leaf Mud-mat	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	2009
<i>Glycine latrobeana</i>	Clover Glycine	Vul Vic	0	n/a	0	n/a	1	2009	0	n/a	15	2018
<i>Halophila australis</i>	Paddle Weed	P	0	n/a	0	n/a	0	n/a	0	n/a	2	n/a
<i>Isolepis gaudichaudiana</i>	Benambra Club-sedge	Vul Vic	0	n/a	0	n/a	0	n/a	1	1991	0	n/a
<i>Juncus revolutus</i>	Creeping Rush	En Vic	4	1991	0	n/a	0	n/a	0	n/a	4	2008
<i>Lachnagrostis rudis</i> subsp. <i>rudis</i>	Rough Blown-grass	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	11	2004
<i>Lachnagrostis semibarbata</i> var. <i>filifolia</i>	Purple Blown-grass	En Vic	7	1998	0	n/a	6	2009	5	1999	0	n/a
<i>Lachnagrostis semibarbata</i> var. <i>semibarbata</i>	Purple Blown-grass	En Vic	1	2005	0	n/a	0	n/a	0	n/a	6	2005
<i>Lastreopsis hispida</i>	Bristly Shield-fern	En Vic	0	n/a	1	n/a	0	n/a	0	n/a	0	n/a
<i>Lawrenca spicata</i>	Salt Lawrenca	En Vic	3	2006	0	n/a	0	n/a	0	n/a	3	2002
<i>Limonium australe</i> var. <i>australe</i>	Yellow Sea-lavender	En Vic	10	1980	0	n/a	0	n/a	0	n/a	19	2008
<i>Lotus australis</i> var. <i>australis</i>	Austral Trefoil	P	0	n/a	0	n/a	0	n/a	0	n/a	7	2006
<i>Nicotiana suaveolens</i>	Austral Tobacco	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	10	2015
<i>Olearia asterotricha</i>	Rough Daisy-bush	En Vic	1	1914	1	n/a	0	n/a	0	n/a	0	n/a
<i>Olearia</i> sp. 2	Peninsula Daisy-bush	En Aus	0	n/a	0	n/a	0	n/a	0	n/a	7	2016
<i>Oxalis rubens</i>	Dune Wood-sorrel	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	6	2016
<i>Poa billardierei</i>	Coast Fescue	En Vic	0	n/a	0	n/a	1	2009	0	n/a	4	2010
<i>Poa halmaturina</i>	Dwarf Coast Poa	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	2016
<i>Poa labillardierei</i> var. <i>labillardierei</i> (Volcanic Plains)	Basalt Tussock-grass	P	6	2010	0	n/a	6	2011	0	n/a	6	2005
<i>Poa poiformis</i> var. <i>ramifer</i>	Dune Poa	En Vic	0	n/a	0	n/a	1	2009	0	n/a	42	2010
<i>Potamogeton australiensis</i>	Thin Pondweed	P	0	n/a	1	1904	1	1902	0	n/a	0	n/a
<i>Prasophyllum frenchii</i>	Maroon Leek-orchid	En Vic	14	2018	0	n/a	1	2009	0	n/a	2	2018
<i>Prasophyllum lindleyanum</i>	Green Leek-orchid	En Vic	0	n/a	0	n/a	3	2009	0	n/a	7	2007
<i>Prasophyllum pyriforme</i> s.s.	Silurian Leek-orchid	P	1	1932	0	n/a	0	n/a	0	n/a	1	n/a
<i>Prasophyllum spicatum</i>	Dense Leek-orchid	CE Aus	0	n/a	0	n/a	0	n/a	0	n/a	9	2009
<i>Pteris comans</i>	Netted brake	En Vic	0	n/a	1	n/a	0	n/a	0	n/a	18	1989
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	En Vic	0	n/a	0	n/a	1	1991	0	n/a	3	2018
<i>Pterostylis cucullata</i>	Leafy Greenhood	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	12	2018
<i>Pterostylis cucullata</i> subsp. <i>cucullata</i>	Leafy Greenhood	En Vic	0	n/a	0	n/a	1	1930	0	n/a	22	2019

9 Appendix I. Significant flora records in Frankston City and surrounding LGAs (continued)

Species not recently recorded in any LGAs*			*Present if at least 1 record since 2000 in LGA, not recently recorded if not								Not recently recorded in LGA*		Present in LGA*	
Species present in Frankston*														
Species not recently recorded in Frankston, present in one or more surrounding LGAs*			Ex - Extinct; CE - Critically Endangered; En - Endangered; Vul - Vulnerable; Aus - listed under the EPBC Act and the FFG Act; Vic - currently listed under the FFG Act; P - previously listed as threatened or poorly known in Victoria and locally significant.											
Record deemed unlikely/unreliable														
Scientific name	Common name	FFG Act Listing 2021	Casey		Greater Dandenong		Frankston		Kingston		Mornington Peninsula			
			Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record		
<i>Pterostylis grandiflora</i>	Cobra Greenhood	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	5	2009		
<i>Pterostylis pedoglossa</i>	Prawn Greenhood	En Vic	0	n/a	2	1931	5	2009	1	1901	0	n/a		
<i>Pterostylis tasmanica</i>	Southern Plume-orchid	P	0	n/a	0	n/a	0	n/a	1	1915	1	1979		
<i>Pterostylis *ingens</i>	Sharp Greenhood	En Vic	1	1976	0	n/a	0	n/a	1	1910	1	2004		
<i>Pterostylis *toveyana</i>	Mentone Greenhood	En Vic	0	n/a	0	n/a	6	2009	6	1919	1	1969		
<i>Pultenaea canaliculata</i>	Coast Bush-pea	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	15	2011		
<i>Ranunculus amplus</i>	Lacey River Buttercup	CE Aus	0	n/a	0	n/a	3	2009	1	2005	0	n/a		
<i>Ranunculus papulentus</i>	Large River Buttercup	P	0	n/a	1	1993	1	2009	8	2007	4	2009		
<i>Roepera billardierei</i>	Coast Twin-leaf	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	28	2018		
<i>Salsola tragus</i> subsp. <i>pontica</i>	Coast Saltwort	En Vic	0	n/a	0	n/a	0	n/a	1	1938	6	2010		
<i>Senecio glomeratus</i> subsp. <i>longifructus</i>	Annual Fireweed	Vul Vic	0	n/a	1	2003	0	n/a	1	2007	1	2006		
<i>Senecio psilocarpus</i>	Swamp Fireweed	P	1	2005	0	n/a	1	2009	0	n/a	0	n/a		
<i>Stackhousia spathulata</i>	Coast Stackhousia	P	0	n/a	0	n/a	0	n/a	0	n/a	6	2012		
<i>Stylidium dilatatum</i>	Tasman Triggerplant	P	0	n/a	0	n/a	0	n/a	0	n/a	8	2004		
<i>Thelionema umbellatum</i>	Clustered Lily	Vul Vic	2	1988	0	n/a	0	n/a	0	n/a	0	n/a		
<i>Thelymitra circumsepta</i>	Naked Sun-orchid	En Vic	5	2007	0	n/a	1	2009	0	n/a	2	1991		
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	En Vic	1	1980	0	n/a	1	2009	0	n/a	0	n/a		
<i>Thelymitra longiloba</i>	Marsh Sun-orchid	CE Vic	1	1957	0	n/a	0	n/a	0	n/a	1	1988		
<i>Thelymitra malvina</i>	Mauve-tuft Sun-orchid	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	2	1993		
<i>Thelymitra mucida</i>	Plum Orchid	P	0	n/a	0	n/a	0	n/a	0	n/a	1	2003		
<i>Thelymitra pallidiflora</i>	Pallid Sun-orchid	CE Aus	0	n/a	0	n/a	0	n/a	0	n/a	2	2005		
<i>Thelymitra reflexa</i>	Gaping Sun-orchid	CE Aus	0	n/a	0	n/a	0	n/a	0	n/a	2	2017		
<i>Thelymitra *irregularis</i>	Crested Sun-orchid	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	2	1993		
<i>Thelymitra *macmillanii</i>	Crimson Sun-orchid	Vul Vic	0	n/a	0	n/a	0	n/a	0	n/a	4	2009		
<i>Thelymitra *merraniae</i>	Merran's Sun-orchid	CE Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	1999		
<i>Triglochin minutissima</i>	Tiny Arrowgrass	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	1991		
<i>Verbena officinalis</i> var. <i>gaudichaudii</i>	Native Verbena	P	0	n/a	0	n/a	0	n/a	0	n/a	1	2003		
<i>Xanthosia leiophylla</i>	Parsley Xanthosia	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	1	1982		
<i>Xanthosia tasmanica</i>	Southern Xanthosia	En Vic	0	n/a	0	n/a	0	n/a	0	n/a	2	2014		
<i>Xerochrysum palustre</i>	Swamp Everlasting	CE Vic	9	2017	0	n/a	1	2009	3	2016	2	2018		

10 Appendix II. Significant fauna records in Frankston City and surrounding LGAs

Species not recently recorded in any LGAs*
Species potentially present in one or more LGAs*
Species present in Frankston*
Species present in one or more surrounding LGAs*

Present in LGA*	Not recently recorded in LGA*	Potential visitor to LGA*
-----------------	-------------------------------	---------------------------

*Present if records ≥ 5 and at least 1 record since 2015, potentially present if at least 1 record since 2000, not recently recorded if 0 records since 2000

Scientific Name	Common Name	Casey		Frankston		Greater Dandenong		Kingston		Mornington Peninsula	
		Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
<i>Accipiter novaehollandiae</i>	Grey Goshawk	9	27/07/2019	0	n/a	0	n/a	4	5/03/2019	15	1/11/2009
<i>Acrodipsas brisbanensis</i>	Large Ant Blue Butterfly	1	1/06/1941	0	n/a	0	n/a	0	n/a	0	n/a
<i>Actitis hypoleucos</i>	Common Sandpiper	41	28/10/2018	12	12/12/1987	62	9/03/2019	4	30/01/2007	27	18/01/2019
<i>Anseranas semipalmata</i>	Maggie Goose	2	13/04/1994	0	n/a	11	31/05/2018	211	25/04/2019	10	23/01/2008
<i>Antechinus minimus maritimus</i>	Swamp Antechinus	0	n/a	1	29/10/2007	0	n/a	0	n/a	0	n/a
<i>Anthochaera phrygia</i>	Regent Honeyeater	7	1/01/1994	0	n/a	8	12/04/2019	2	14/08/1947	0	n/a
<i>Antigone rubicunda</i>	Brolga	0	n/a	2	24/09/2009	0	n/a	1	0/01/1900	0	n/a
<i>Arctocephalus pusillus doriferus</i>	Australian Fur Seal	1	29/05/2017	5	12/05/2015	0	n/a	5	10/01/2019	70	28/06/2019
<i>Arctophoca forsteri</i>	Long-nosed Fur Seal	2	28/06/1977	1	24/05/2014	0	n/a	0	n/a	0	n/a
<i>Ardea alba</i>	Great Egret	233	9/07/2019	105	20/04/2019	149	28/04/2019	200	5/05/2019	327	13/02/2019
<i>Ardea alba modesta</i>	Eastern Great Egret	56	18/07/2019	21	17/02/2019	127	31/07/2019	629	28/07/2019	61	23/06/2019
<i>Ardea intermedia plumifera</i>	Plumed Egret	4	11/01/2019	3	30/06/2017	8	30/12/2018	15	23/09/2018	8	14/09/2011
<i>Arenaria interpres</i>	Ruddy Turnstone	3	14/04/1991	1	10/10/1982	3	25/11/2018	1	1/01/1977	79	4/07/2019
<i>Aythya australis</i>	Hardhead	318	27/07/2019	96	23/06/2019	328	30/07/2019	906	28/07/2019	342	28/07/2019
<i>Biziura lobata</i>	Musk Duck	26	16/06/2019	26	17/02/2019	145	23/06/2019	232	27/04/2019	240	21/07/2019
<i>Botaurus poiciloptilus</i>	Australasian Bittern	23	28/06/2018	22	29/08/2018	44	23/06/2019	194	19/03/2019	46	15/05/2019
<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped Heathwren	4	28/07/2019	1	10/08/2003	0	n/a	0	n/a	7	5/05/2019
<i>Calidris alba</i>	Sanderling	0	n/a	0	n/a	1	31/05/2018	2	13/01/2001	3	2/12/1987
<i>Calidris canutus</i>	Red Knot	2	10/11/2018	0	n/a	3	16/09/2018	0	n/a	7	7/12/1991
<i>Calidris ferruginea</i>	Curlew Sandpiper	21	11/01/2019	28	11/03/2019	68	7/04/2019	29	10/02/2019	89	25/12/2018
<i>Calidris melanotos</i>	Pectoral Sandpiper	0	n/a	25	31/01/2018	17	27/01/2019	67	8/02/2019	1	16/02/1997
<i>Calidris subminuta</i>	Long-toed Stint	0	n/a	13	4/03/2018	1	1/01/1973	54	28/04/2018	0	n/a
<i>Calidris tenuirostris</i>	Great Knot	0	n/a	0	n/a	0	n/a	0	n/a	2	17/09/1977
<i>Caretta caretta</i>	Loggerhead Turtle	0	n/a	0	n/a	0	n/a	0	n/a	1	10/11/1996
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	1	15/03/1963	1	22/02/2012	0	n/a	3	0/01/1900	1	12/12/1987
<i>Ceyx azureus</i>	Azure Kingfisher	1	26/09/2003	2	1/01/1994	0	n/a	1	4/02/2018	3	29/07/2008
<i>Charadrius leschenaultii</i>	Greater Sand Plover	0	n/a	0	n/a	0	n/a	0	n/a	1	29/05/1976
<i>Charadrius mongolus</i>	Lesser Sand Plover	0	n/a	0	n/a	0	n/a	0	n/a	7	1/12/1979
<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle	61	7/11/2018	16	13/08/2018	4	21/11/2016	39	26/01/2017	25	5/12/2014
<i>Chelonia mydas</i>	Green Turtle	0	n/a	0	n/a	0	n/a	0	n/a	3	4/09/2017
<i>Chlidonias hybrida</i>	Whiskered Tern	10	23/11/2018	112	20/01/2019	68	28/04/2019	252	20/01/2019	10	12/05/2019
<i>Chlidonias leucopterus</i>	White-winged Black Tern	1	22/11/2006	3	18/01/2019	18	27/01/2019	10	16/11/2005	0	n/a
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	2	23/09/1982	0	n/a	0	n/a	2	21/12/2007	3	1/12/2004
<i>Cincoloma punctatum</i>	Spotted Quail-thrush	0	n/a	1	13/03/1909	0	n/a	0	n/a	4	26/01/2020
<i>Circus assimilis</i>	Spotted Harrier	4	12/12/2004	4	29/08/2018	4	31/12/2006	2	2/02/2017	10	1/07/2019
<i>Climacteris picumnus</i>	Brown Treecreeper	1	1/01/1994	0	n/a	1	31/05/2018	0	n/a	0	n/a
<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	1	2/01/1900	0	n/a	0	n/a	1	0/01/1900	0	n/a
<i>Dasyurus viverrinus</i>	Eastern Quoll	1	0/01/1900	0	n/a	0	n/a	1	0/01/1900	0	n/a
<i>Dermodochelys coriacea</i>	Leathery Turtle	0	n/a	0	n/a	0	n/a	0	n/a	1	8/03/1994

10 Appendix II. Significant fauna records in Frankston City and surrounding LGAs (continued)

Species not recently recorded in any LGAs*		Present in LGA*		Not recently recorded in LGA*		Potential visitor to LGA*					
Species potentially present in one or more LGAs*											
Species present in Frankston*											
Species present in one or more surrounding LGAs*											
		Casey		Frankston		Greater Dandenong		Kingston		Mornington Peninsula	
Scientific Name	Common Name	Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
<i>Diomedea epomophora</i>	Southern Royal Albatross	0	n/a	0	n/a	0	n/a	0	n/a	2	3/08/1979
<i>Diomedea exulans</i>	Wandering Albatross	0	n/a	0	n/a	0	n/a	0	n/a	8	18/03/1989
<i>Dromaius novaehollandiae</i>	Emu	1	1/01/1931	0	n/a	0	n/a	1	23/01/2018	13	17/03/2019
<i>Egretta garzetta</i>	Little Egret	14	12/02/2019	13	1/11/2011	12	27/01/2019	41	6/06/2019	19	3/02/2020
<i>Emydura macquarii</i>	Murray River Turtle	0	n/a	0	n/a	0	n/a	2	12/01/2012	0	n/a
<i>Engaeus victoriensis</i>	Foothill Burrowing Crayfish	1	1/08/1962	0	n/a	0	n/a	0	n/a	0	n/a
<i>Eubalaena australis</i>	Southern Right Whale	0	n/a	1	1/08/1998	0	n/a	0	n/a	1	14/07/1984
<i>Falco hypoleucos</i>	Grey Falcon	1	1/01/1994	0	n/a	0	n/a	0	n/a	0	n/a
<i>Falco subniger</i>	Black Falcon	5	7/10/2018	6	5/02/2009	5	31/03/2019	2	17/03/2018	8	27/06/2018
<i>Galaxiella pusilla</i>	Dwarf Galaxias	114	18/04/2018	14	21/12/2010	1	3/10/2005	0	n/a	130	28/02/2019
<i>Gallinago hardwickii</i>	Latham's Snipe	216	9/10/2019	121	29/03/2019	156	10/03/2019	330	3/03/2019	292	24/12/2019
<i>Gelochelidon macrotarsa</i>	Australian Gull-billed Tern	1	28/09/2017	1	13/03/2005	0	n/a	0	n/a	1	2/09/2018
<i>Geopelia cuneata</i>	Diamond Dove	0	n/a	0	n/a	3	3/10/2009	0	n/a	1	17/09/1992
<i>Grantiella picta</i>	Painted Honeyeater	4	1/11/2007	1	21/10/2017	1	12/03/2019	0	n/a	0	n/a
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	1	14/04/1991	0	n/a	0	n/a	2	9/04/2017	221	22/07/2019
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	15	14/05/2019	13	5/01/2019	13	28/04/2019	5	9/03/2019	103	14/07/2019
<i>Halobaena caerulea</i>	Blue Petrel	0	n/a	0	n/a	0	n/a	0	n/a	5	1/10/1998
<i>Hirundapus caudacutus</i>	White-throated Needletail	59	20/03/2018	15	3/03/2019	18	31/05/2018	13	17/02/2019	123	12/03/2019
<i>Hydroprogne caspia</i>	Caspian Tern	22	19/12/2018	7	2/01/2018	48	27/01/2019	17	6/11/2018	126	3/02/2020
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	1329	1/12/2019	27	1/11/2011	4	16/11/1990	26	19/06/1989	51	1/01/2016
<i>Ixobrychus dubius</i>	Australian Little Bittern	2	21/10/2002	2	12/12/1965	0	n/a	87	29/12/2017	0	n/a
<i>Larus pacificus</i>	Pacific Gull	655	29/07/2019	77	14/07/2019	69	9/03/2019	208	21/07/2019	1116	3/02/2020
<i>Lathamus discolor</i>	Swift Parrot	14	19/04/2018	7	28/03/2019	7	18/05/2019	2	29/04/1978	18	14/04/2019
<i>Lewinia pectoralis</i>	Lewin's Rail	41	27/01/2019	11	17/05/2012	2	28/01/2007	29	16/03/2018	74	15/05/2019
<i>Lichenostomus melanops cassidix</i>	Helmeted Honeyeater	1	1/01/1983	0	n/a	0	n/a	0	n/a	0	n/a
<i>Limosa lapponica</i>	Bar-tailed Godwit	1	1/12/1979	4	23/10/1988	6	19/11/2017	5	26/12/1987	13	4/03/2019
<i>Limosa limosa</i>	Black-tailed Godwit	1	29/06/1984	5	19/05/2005	4	16/09/2018	0	n/a	2	23/03/1997
<i>Lissolepis coventryi</i>	Swamp Skink	26	1/08/2012	11	1/02/2015	0	n/a	0	n/a	134	12/08/2018
<i>Litoria raniformis</i>	Growing Grass Frog	4	4/11/1999	3	10/01/1990	6	25/10/1975	12	14/09/2006	12	1/05/2002
<i>Lophocroa leadbeateri</i>	Major Mitchell's Cockatoo	1	1/01/1994	0	n/a	1	31/05/2018	1	1/01/1979	1	1/12/1981
<i>Lophoictinia isura</i>	Square-tailed Kite	0	n/a	1	22/03/2019	0	n/a	0	n/a	1	23/01/2012
<i>Maccullochella peelii</i>	Murray Cod	0	n/a	0	n/a	0	n/a	0	n/a	2	1/01/1970
<i>Macquaria australasica</i>	Macquarie Perch	2	1/01/1970	2	0/01/1900	0	n/a	0	n/a	4	1/01/1970
<i>Macronectes giganteus</i>	Southern Giant-Petrel	0	n/a	0	n/a	0	n/a	1	1/01/1980	12	5/06/2019
<i>Macronectes halli</i>	Northern Giant-Petrel	0	n/a	2	28/09/2006	1	1/05/1976	0	n/a	18	12/07/2019
<i>Megaptera novaeangliae australis</i>	Southern Humpback Whale	0	n/a	0	n/a	0	n/a	0	n/a	4	2/07/2005
<i>Melanodryas cucullata</i>	Hooded Robin	7	1/11/2005	5	19/11/2008	6	31/05/2018	2	0/01/1900	6	1/05/1981
<i>Miniopterus schreibersii</i> GROUP	Common Bent-wing Bat	0	n/a	0	n/a	0	n/a	0	n/a	2	21/11/1989
<i>Miniopterus schreibersii oceanensis</i>	Common Bent-wing Bat (eastern ssp.)	0	n/a	0	n/a	0	n/a	0	n/a	1	12/04/1995

*Present if records ≥ 5 and at least 1 record since 2015, potentially present if at least 1 record since 2000, not recently recorded if 0 records since 2000

Species not recently recorded in any LGAs*
Species potentially present in one or more LGAs*
Species present in Frankston*
Species present in one or more surrounding LGAs*

Present in LGA*
Not recently recorded in LGA*
Potential visitor to LGA*

*Present if records ≥ 5 and at least 1 record since 2015, potentially present if at least 1 record since 2000, not recently recorded if 0 records since 2000

Scientific Name	Common Name	Casey		Frankston		Greater Dandenong		Kingston		Mornington Peninsula	
		Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
Mirounga leonina	Southern Elephant Seal	0	n/a	0	n/a	0	n/a	1	7/05/2001	1	30/05/2001
Mugilogobius platynotus	Flatback Mangrove Goby	7	5/12/2000	0	n/a	0	n/a	0	n/a	0	n/a
Nannoperca obscura	Yarra Pygmy Perch	0	n/a	0	n/a	4	26/02/1983	0	n/a	0	n/a
Neophema chrysgaster	Orange-bellied Parrot	0	n/a	2	15/06/1986	0	n/a	1	1/01/1977	3	7/04/1987
Neophema pulchella	Turquoise Parrot	1	22/10/1982	0	n/a	0	n/a	0	n/a	0	n/a
Ninox connivens	Barking Owl	1	24/09/2005	0	n/a	0	n/a	0	n/a	4	13/07/2017
Ninox strenua	Powerful Owl	8	18/06/2020	4	19/09/2018	2	25/12/2016	1	19/05/1995	91	24/06/2020
Numenius madagascariensis	Eastern Curlew	13	14/04/1991	2	16/02/1985	4	1/05/2019	2	1/11/1990	114	3/02/2020
Numenius phaeopus	Whimbrel	1	14/10/1984	0	n/a	1	1/01/1973	1	1/01/1977	12	20/11/2010
Nycticorax caledonicus	Nankeen Night-Heron	50	31/07/2019	10	15/01/2018	23	13/05/2019	92	17/02/2019	56	26/01/2019
Oreoica gutturalis	Crested Bellbird	0	n/a	0	n/a	1	31/05/2018	0	n/a	0	n/a
Ornithorhynchus anatinus	Platypus	1	24/03/2008	1	11/04/1979	0	n/a	0	n/a	1	6/10/2008
Oxyura australis	Blue-billed Duck	343	11/05/2019	75	1/05/2019	333	23/07/2019	662	28/07/2019	165	29/02/2020
Pachyptila turtur	Fairy Prion	0	n/a	1	6/10/1908	0	n/a	1	1/01/1980	23	5/06/2019
Pedionomus torquatus	Plains-wanderer	0	n/a	0	n/a	0	n/a	0	n/a	1	27/06/1925
Pelagodroma marina	White-faced Storm-Petrel	0	n/a	0	n/a	0	n/a	1	1/01/1980	2	18/03/1989
Pelecanoides urinatrix	Common Diving-Petrel	0	n/a	0	n/a	0	n/a	2	1/08/1985	10	1/10/1998
Pezoporus wallicus	Ground Parrot	0	n/a	1	0/01/1900	0	n/a	1	0/01/1900	1	0/01/1900
Phalacrocorax fuscescens	Black-faced Cormorant	1	17/09/1977	2	1/01/1994	1	1/07/1975	1	2/03/2008	142	15/07/2019
Phalacrocorax varius	Pied Cormorant	127	16/05/2019	34	20/03/2019	48	7/05/2019	192	20/07/2019	471	22/07/2019
Phoebastria palpebrata	Light-mantled Sooty Albatross	0	n/a	0	n/a	0	n/a	0	n/a	1	13/05/2015
Physeter macrocephalus	Sperm Whale	0	n/a	0	n/a	0	n/a	0	n/a	7	4/02/1972
Platalea regia	Royal Spoonbill	204	24/04/2019	153	25/05/2019	156	23/06/2019	471	31/05/2019	401	3/02/2020
Plectrotarsus gravenhorstii	Caddisfly	0	n/a	0	n/a	0	n/a	2	1/12/1915	1	26/12/1981
Plegadis falcinellus	Glossy Ibis	2	15/07/2017	21	25/05/2019	19	10/02/2019	39	3/04/2017	2	24/04/1986
Pacific Golden Plover		4	1/12/1990	8	18/09/2005	11	16/09/2018	3	22/11/1987	7	17/11/2018
Pluvialis squatarola	Grey Plover	0	n/a	0	n/a	0	n/a	1	1/01/1977	5	4/12/2005
Polytelis anthopeplus	Regent Parrot	0	n/a	0	n/a	1	2/06/1914	1	10/02/2008	0	n/a
Polytelis swainsonii	Superb Parrot	0	n/a	0	n/a	2	28/01/2010	0	n/a	0	n/a
Pomatostomus temporalis	Grey-crowned Babbler	8	26/08/1995	3	1/01/1988	5	30/07/1984	26	15/06/2002	61	1/09/2002
Porzana pusilla	Baillon's Crake	49	27/01/2019	20	13/02/2010	26	27/01/2019	87	19/11/2018	24	2/12/2018
Prototroctes maraena	Australian Grayling	1	4/12/1985	0	n/a	0	n/a	0	n/a	0	n/a
Pseudemoia rawlinsoni	Glossy Grass Skink	2	1/10/2011	0	n/a	0	n/a	0	n/a	18	7/01/2018
Pseudomys novaehollandiae	New Holland Mouse	3	1/01/1976	8	12/03/1984	0	n/a	0	n/a	18	13/07/1972
Pseudophryne semimarmorata	Southern Toadlet	17	24/06/2014	21	21/05/2018	1	15/06/1989	2	24/04/1990	80	22/04/2015
Pteropus poliocephalus	Grey-headed Flying-fox	2	9/03/2014	4	10/03/2016	6	13/04/2019	9	5/04/2018	6	29/04/2010
Pyrrholaemus sagittatus	Speckled Warbler	4	1/01/1994	0	n/a	1	0/01/1900	0	n/a	2	14/04/1909
Rostratula australis	Australian Painted-snipe	1	28/11/1976	2	25/02/1993	3	25/11/2000	4	9/12/2008	0	n/a
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	0	n/a	1	1/04/1909	0	n/a	0	n/a	0	n/a

10 Appendix II. Significant fauna records in Frankston City and surrounding LGAs (continued)

Species not recently recorded in any LGAs*		Present in LGA*		Not recently recorded in LGA*		Potential visitor to LGA*					
Species potentially present in one or more LGAs*											
Species present in Frankston*											
Species present in one or more surrounding LGAs*											
		Casey		Frankston		Greater Dandenong		Kingston		Mornington Peninsula	
Scientific Name	Common Name	Records	Last record	Records	Last record	Records	Last record	Records	Last record	Records	Last record
<i>Sminthopsis leucopus</i>	White-footed Dunnart	0	n/a	2	22/02/2012	0	n/a	0	n/a	68	26/01/2020
<i>Spatula rhynchotis</i>	Australasian Shoveler	90	21/05/2019	134	4/07/2019	214	25/06/2019	630	25/07/2019	217	29/02/2020
<i>Stagonopleura guttata</i>	Diamond Firetail	2	1/01/1994	0	n/a	1	0/01/1900	2	4/04/1990	1	17/04/1908
<i>Sterna striata</i>	White-fronted Tern	0	n/a	3	1/01/1994	0	n/a	2	20/10/2010	30	13/07/2019
<i>Sternula albifrons</i>	Little Tern	1	1/11/2018	0	n/a	1	1/07/1975	0	n/a	6	8/01/2018
<i>Sternula nereis</i>	Fairy Tern	2	20/09/1975	0	n/a	2	31/05/2018	0	n/a	27	29/06/1991
<i>Stictonetta naevosa</i>	Freckled Duck	7	21/05/2019	10	4/02/2019	129	23/06/2019	230	23/06/2019	172	19/07/2019
<i>Stiltia isabella</i>	Australian Pratincole	0	n/a	0	n/a	0	n/a	0	n/a	1	1/01/1954
<i>Stipiturus mallee</i>	Mallee Emu-wren	0	n/a	0	n/a	1	31/05/2018	0	n/a	0	n/a
<i>Synemon plana</i>	Golden Sun Moth	1	0/01/1900	0	n/a	0	n/a	0	n/a	0	n/a
<i>Synoicus chinensis</i>	King Quail	0	n/a	0	n/a	0	n/a	1	0/01/1900	1	1/01/1977
<i>Temognatha sanguinipennis</i>	Jewel Beetle	1	4/08/2017	0	n/a	0	n/a	0	n/a	0	n/a
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	0	n/a	0	n/a	0	n/a	0	n/a	20	8/06/2019
<i>Thalassarche cauta</i>	Shy Albatross	0	n/a	1	1/01/1994	0	n/a	1	1/01/1980	26	25/09/2018
<i>Thalassarche chrysoloma</i>	Grey-headed Albatross	0	n/a	0	n/a	0	n/a	0	n/a	1	3/08/1979
<i>Thalassarche melanophris</i>	Black-browed Albatross	0	n/a	1	1/01/1994	1	13/09/1952	1	7/06/2010	83	25/07/2019
<i>Thinornis cucullatus</i>	Hooded Plover	0	n/a	0	n/a	0	n/a	0	n/a	1972	22/07/2019
<i>Todiramphus pyrrophygius</i>	Red-backed Kingfisher	0	n/a	0	n/a	0	n/a	1	3/10/1993	0	n/a
<i>Tringa brevipes</i>	Grey-tailed Tattler	2	15/02/1992	1	18/10/1987	2	18/10/1987	0	n/a	7	10/02/1990
<i>Tringa glareola</i>	Wood Sandpiper	2	1/12/1980	22	20/04/2019	21	20/01/2019	136	10/02/2019	1	30/01/2003
<i>Tringa nebularia</i>	Common Greenshank	16	10/11/2018	53	11/03/2019	43	30/04/2019	47	2/02/2009	54	20/11/2010
<i>Tringa stagnatilis</i>	Marsh Sandpiper	2	27/11/2004	23	11/03/2019	16	16/09/2018	37	26/05/2018	4	2/05/1992
<i>Turnix pyrrhotorax</i>	Red-chested Button-quail	0	n/a	0	n/a	0	n/a	1	15/02/2000	0	n/a
<i>Turnix velox</i>	Little Button-quail	0	n/a	0	n/a	0	n/a	1	0/01/1900	0	n/a
<i>Tursiops australis</i>	Burrunan Dolphin	0	n/a	0	n/a	0	n/a	1	8/02/2013	3	21/06/2020
<i>Tyto novaehollandiae</i>	Masked Owl	1	1/01/1961	0	n/a	0	n/a	0	n/a	0	n/a
<i>Varanus varius</i>	Lace Monitor	0	n/a	1	1/01/1973	0	n/a	1	9/08/1977	4	2/02/2012
<i>Xenus cinereus</i>	Terek Sandpiper	0	n/a	0	n/a	0	n/a	1	1/01/1977	2	1/01/1977

*Present if records ≥ 5 and at least 1 record since 2015, potentially present if at least 1 record since 2000, not recently recorded if 0 records since 2000

11 Appendix III. Community consultation results

11.1 Community conservation groups

11.1.1 Data gaps

Point Raised ^{Source} (Sources: ¹ FBAP Workshop, ² FBAP Survey, ³ CCC Survey)

The extent of koala habitat and their population size in Langwarrin South and Lower Sweetwater Creek is unknown

There is a lack of community knowledge around how indigenous and native ecosystems function, and some lack of respect for reserves

There has been extensive bird survey monitoring since 2004, with data in the Bird Atlas, however there is less monitoring data for other fauna

Long term surveys of species is required throughout Frankston City

11.1.2 Management drivers

Point Raised ^{Source} (Sources: ¹ FBAP Workshop, ² FBAP Survey, ³ CCC Survey)

The need to improve the overall quality and diversity of indigenous vegetation in reserves and parks to support local flora and fauna that are in decline ¹

The need to protect trees and increase tree cover on public and private land for fauna and bird habitat ¹

The fact that 70 per cent of koala habitat is on private land, therefore important to engage and educate with landowners to protect and increase tree coverage ¹

Protecting the last amount of remnant vegetation for indigenous flora and fauna ¹

Creation and preservation of wildlife corridors, healthy waterways and intact parcels of large vegetation to increase connectivity for wildlife ¹

Management of pest plants and animals to preserve and improve the quality of indigenous vegetation in reserves and parks ¹

Increase in Indian Mynas and Noisy Miners and reduction of smaller native bird species due to loss of vegetation from increased house density ¹

Ability for the bush to naturally recruit and maintain itself without dependency from Friends groups and contractors ¹

Council declaration of a Climate Emergency ¹

Protecting the 4,500 hectares of Frankston Green Wedge as a green wedge into the future ¹

Healthy waterways are key strongholds for climate change ¹

An average of 67 per cent of respondents use foreshores, bushlands, wetlands and recreational parks in Frankston City Council predominantly for the experience of being in nature ²

71 per cent of respondents stated they were 'Extremely concerned' with the impacts of climate change on plants and animals ²

82 per cent of respondents stated it is 'extremely important for Frankston City Council to ensure protection of the natural environment through all its activities' ²

The condition of our foreshores, waterways and wetlands have slightly improved over the past 10 years (78 per cent and 57 per cent agree respectively FBAP), therefore it is important to preserve and continue to improve these areas ²

Over half respondents thought Frankston City Council could improve on the consideration of environmental impacts from proposed developments and awareness and planning for climate change (FBAP) ²

Point Raised ^{Source} (Sources: ¹ FBAP Workshop, ² FBAP Survey, ³ CCC Survey)

The overall level of concern about climate change among survey respondents can be described as high ³

The top climate change concern was a loss of biodiversity/flora and fauna, vegetation and habitat ³

The most important area for Council to work in to address climate change is biodiversity and urban forests (planting more trees and creating more local green spaces for city greening and cooling) ³

11.1.3 Issues

Point Raised ^{Source} (Sources: ¹ FBAP Workshop, ² FBAP Survey, ³ CCC Survey)

Fragmentation of vegetation from over-development and subdivision has seen remnant vegetation and hollowed trees removed reducing habitat for hollow nesting fauna and birds e.g. Coastal Banksias in Seaford ¹

Open Space Policy and uplift of lower storey has seen some important understory habitat and connectivity for small birds like Spine bills and Scrub Wrens and insects ¹

Increased use of lighting, both residential and at sport facilities, has a detrimental impact on biodiversity. An increased use of artificial turf and manufactured play surfaces is also detrimental to biodiversity ¹

Climate change increasing drought-affected vegetation (e.g. Common Heath) and in turn seeing die back and higher prevalence of weeds ¹

Poor crossing networks across Peninsula Link- created a wildlife barrier ¹

Increased human recreation usage of green spaces and parks due to COVID-19 has seen more disruption to wildlife and degrades habitat e.g. Bike jumps, goat tracks and litter ¹

Threats from feral species and pest animals like foxes, European bees and domestic pets in reserves damaging habitat and negatively impacting native wildlife ¹

Threats from invasive weedy grasses and woody weeds that are taking over good quality bushland ¹

Private landowners and developers removing vegetation and trees which reduces koala habitat ¹

Threatened or protected plants and orchids risk being removed through location tagging on plant ID platforms e.g. Australian Plant Atlas and i-Naturalist ¹

Lack of natural recruitment in Lower Sweetwater Creek due to mulching, weedy grasses, asparagus fern and no digging from Southern Brown Bandicoot (SBB) ¹

Reduction in numbers of SBB, Echidnas, Snakes, Antechinus, Swamp rats ¹

Street trees being replaced by non-indigenous or sometimes even non-native species e.g. The introduction of Palms and Norfolk Island Pines ¹

Council Permits and Planning Department approving removal of trees and fences that impede wildlife movement ¹

Lack of funding for environmental work, Rangers and nursery workers ¹

Decreased water quality in waterways from erosion and poor riparian vegetation ¹

The amount of vegetation being removed from private property and for development has gotten worse (61 per cent agree) over the past 10 years, which has negatively impacted biodiversity corridors (45 per cent agree) and native wildlife habitat (49 per cent agree) and spread more environmental weeds and pest animals (46 per cent agree) ²

11.1.4 Opportunities

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife habitats are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Identify private properties with high habitat value and work with them to protect and manage vegetation	Better training for contractors in indigenous flora and fauna	Contact Melbourne Water to discuss utilising water easements as biodiversity corridors	Habitat box projects to support ageing parrot populations and decreasing kookaburra populations	Importance of ensuring the GWMP gets approved as adopted
Encourage community engagement of all ages to get involved with local reserve or parks e.g. Scouts and guides, rotary clubs, Landcare network	Koala be marked as a flagship species	Increase indigenous planting on nature strips – perhaps street challenges	Replace Council's street tree planting of non-indigenous/non-native with indigenous trees for resilience in dryer climates and retention of water	Tighter planning schemes in place to reduce removal of trees, e.g. Greater protection of Coastal Banksias in Seaford
Enhanced maintenance and promotion of natural assets to increase tourism and enhance Frankston's coastal image as a desirable destination	Determine priority areas and species of weeds e.g. Grassy weeds at Lower Sweetwater Creek and Sweet Pittosporum and Sallow wattle in PV managed parks	Fauna passes, culverts, wildlife bridges, connectivity for wildlife. Specifically Peninsula link and Moorooduc (net cross overs and glider poles)	Collaboration between residents and Council to significantly increase the amount of trees and indigenous vegetation planted on both public and private land	Create a centralised record sightings platform on i-naturalists to collate existing and new data
Recognising George Pentland Botanic Gardens' potential to be an educational space to teach public about different EVC types, advice on planting, identifying flora and linking it to Frankston Environmental Friends Network (FEFN)	Continued funding and resourcing of environmental program and events like 'Gardens for Wildlife,' School planting days, Teacher Enviro Network (TEN), Greening our Future	Better understory vegetation management by Council. Utilise open spaces for indigenous plantings instead of mowed grass	Prioritising tree planting in areas that experience increased urban heat and high pedestrian use	Continued monitoring of tree canopy cover and changes in land use on public and private land, in conjunction with the Urban Forest Action Plan
Education directed to bike groups and youth groups around importance of protecting vegetation and impacts of bike jumps and litter	Greater enforcement from compliance team around litter dumping, illegal wood collection and removal of trees from reserves and parks.	Council to harness unused pockets of land or open green spaces to plant out with indigenous vegetation and trees		Collaborate with adjoining councils to avoid isolated populations

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife habitats are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Work with real estate agents and new residents to give home owners an environment package to inform on surrounding environment and how to care for it. Include resources on Gardens for Wildlife, Friends and other environmental groups, environmental weeds, reserves, etc	A 24hr cat curfew and enforcement of on-lead dog areas and education on why these measures are important.	Limit urban sprawl and focus development in already developed areas		Better collaboration and communication with Parks Vic in Frankston Res. And Langwarrin Flora and Fauna Reserve
Guidelines and restrictions on commercial and recreational activities in reserves so users understand the impact these activities can have	Continued growth and advocacy for FEFN and wildlife carers. Continued encouragement of younger members, retirees, unemployed and mental illness	Strengthening the protection of identified wildlife corridors, strategically planning for new corridors and investing in purchase of land for protection of habitat, wildlife corridors and revegetation		Create a vision for Frankston City to be a coastal town that has high conservation values and leader in biodiversity protection and climate change action
Increase opening times and capacity at the Indigenous Nursery. Include information on Friends Groups and educational activities/workshops	Reduce plastic signs throughout parks as leads to litter			Consistent penalties for people removing vegetation and vandalising natural assets
Increased Ranger presence and education activities at Reserves during times of high use such as weekends and holidays	Rate reduction or grants to incentivise conservation works on private property			Develop a 'Sense of Place' specific for Frankston featuring indigenous flora and fauna
Follow up planting days with a 'Wow, look at it now' type activity	Discourage planting of environment weeds in private properties while encouraging removal in those properties adjacent to natural reserves			Improve and promote monitoring of key species

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife habitats are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Better engagement with Traditional owners and promotion of aboriginal land management through signage and aboriginal guided walks	Frankston City Council should also strengthen planning requirements and regulations for new developments with a focus of retaining vegetation and minimising environmental impact. Protect Green Wedge Zones and environmental overlays for future generations			
Develop a Frankston Environmental centralised hub for information, queries etc.	Reduce amount of litter in our reserves and waterways through signage and enforcement			
Frankston City Council can best protect and enhance biodiversity by providing grants for community groups to work on environmental projects that address biodiversity decline	Frankston City Council can best support residents in understanding and protecting biodiversity by providing advice and incentives to help people improve natural habitat on their properties and reduce biodiversity threats			
Education and removal of environmental weeds on private property and encouraging indigenous species especially adjoining to nature reserves				

11.2 Government agencies and other organisations

11.2.1 Data gaps

Point Raised
What is the per cent of native vegetation left in Frankston City?
Southern Brown Bandicoot (SBB) presence and threats in Frankston City
Follow up on the installation of the Peninsula Llink wildlife crossing
Access and collate Frankston City Council road kill data from community and Mornington Peninsula Shire Council (MPSC), investigate MPSC wildlife underpasses effectiveness
Investigation of herbicide usage in Frankston City
Effectiveness of different methods as alternatives to herbicide weed suppression methods
Current comprehensive list of flora and fauna in Frankston City Council
Loss or lack of local knowledge from changing contractors and Council staff
Inconsistent reporting in Council and sharing of data
Micro-biodiversity data
There is a lack of integrated biodiversity knowledge in planning and permit decisions

11.2.2 Management drivers

Point Raised
Simultaneous conservation and fire management efforts to reduce fuel loads that are predominately weeds
Connectivity for wildlife between bushland areas and waterways
Creation of underpasses and wildlife crossings to reduce amount of wildlife being killed on roads
Greater engagement and stronger partnerships with Traditional owners and Bunurong Land Council and reduce barriers to cultural burning practices
Protecting vegetation and conservation efforts on private property from landowners
Better community health and food security
Appropriate development for biodiversity protection
Community education and engagement with biodiversity and appropriate fuel management
Collaboration between stakeholders for wide scale biodiversity planning and connectivity

11.2.3 Issues

Point Raised
Political issues affecting changes to Green Wedge Management Plan and urban growth boundaries
Lack of consistent and uniformed Council reporting and continuation of staff knowledge
Inconsistencies in approaches to planning policies and permits - concerns that planning permit conditions not being enforced

Point Raised
Zoning conflicts resulting in development in vegetated areas and degraded land undeveloped
Climate change poses liability risk for developments and conservation efforts
Removal of bushland for bushfire overlay requirements
Frequent and hot planned burns in small reserves impacting SBB habitat
Inappropriate development e.g. Subdividing in bushfire or flood areas
First party offsets make local offsetting difficult
Disengaged broader community
Lack of consultation and engagement with Bunurong Land Council
High weedy fuel loads on private property
Lack of cooperation between key agencies for collective management of biodiversity

11.2.4 Opportunities

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife corridors are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Promoting and supporting Landcare as a community platform to share knowledge and engage landowners example of success in MPSC	Monitoring, measuring micro biodiversity with follow up conservation efforts – e.g. cryptogamic layers in DSHR and reintroduction of fungal biodiversity to soil	Frankston City Council to investigate MPSC approach to reducing road kill at Tootgarook Swamp and Browns Road	Dedicated Community Fireguard within Council to hold community and individual sessions with high risk landowners like Langwarrin woodlands	Climate change lawyer to examine and make recommendations on zoning and appropriate development
Grant and incentives scheme for landowners and subsidies on land management plans	Collaboration with CFA/FRV for a CFA biodiversity program – fire management and biodiversity priorities working symbiotically			Consistent centralised monitoring framework and reporting structure to ensure the efficient flow of knowledge and data between agencies and Council staff
Investigate and create successful MPSC educational resources and workshops like pollinator trail	Gardens for wildlife program in Schools			Analysis effectiveness of alternatives to herbicides e.g. manual, mass plantings for suppression – re-drawing boundaries for weed control – core areas, brushcutting

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife corridors are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Education on private property about weed and fire risks	National tree day 2021 – entirely solarisation			Stronger cooperation between stakeholders, especially between councils (CCC, MPSC, CoD) VicRoads, CMAs and State gov. to have a collective biodiversity plan with regular meetings and catch ups; bioregion collaboration, sharing of threats and knowledge, integrated pest animal large scale across peninsula, joint grant funding
Dedicated Community Fireguard within Council community and individual sessions with high risk landowners				
Linking biodiversity with health promotion through connecting residents with access to locally grown food				
Examine Knox City Council model of engaging community with environment				
Targeted campaigns to disengaged schools and areas				
A virtual national park for areas that are ecologically connected				

11.3 Frankston City Council staff

11.3.1 Data gaps

Point Raised
Identify unsealed roads so biodiversity issues are highlighted and assessed before roads are developed
Need layer in GIS for planted vegetation versus remnant vegetation
Internal processes identifying sensitive sites early in projects, ensure project implementation plans have environmental assessment, improvements in information flow
How well are native vegetation regulations being enforced and implemented- need for review on high value private land
Identify percentage of native vegetation outside the Green Wedge Zone and identify in which zones/overlays
Map and document water flow courses

11.3.2 Management drivers

Point Raised
Community education
Appropriate planning controls
Incorporating biodiversity considerations into planning framework
Adequate funding for on ground management
Preservation of flora and fauna for future generation
Enhance and enrich environment for community enjoyment
Resilience against climate change
Acquiring and protecting high conservation private land
Science based goals - 30 per cent of EVC protected and restoration
Growing prevalence of weeds and pests
200 registered cultural sensitive sites- need for registered Aboriginal party consultation
Climate change projections and planning
Long term funding for environmental projects and reserves
Financial incentives for land owners for conservation efforts
Council's two new proposed offset sites in Frankston City- Studio Park and Wittenberg
Undeveloped road reserves providing habitat corridors
Promotion of Frankston flora and fauna species e.g. Micro bat and powerful owl surveys and positive conservation efforts
Protect foreshore and other high conservation sites
Biolinks between key habitat areas
Reduce wildlife road kill

11.3.3 Issues

Point Raised
Development and urban growth fragmenting and reducing biodiversity
Degradation and loss of habitat on private property
Conflicting biodiversity and planning priorities
Removal of trees
Loss of flora diversity
Waste in environment
Lack of available land for revegetation and conservation efforts
Ongoing maintenance cost of revegetation sites
Lack of resources and funding
Natural areas viewed as resource not a valuable asset to protect
Lack of understanding for ecosystems and individuals lifestyle impacts
Lack of support or awareness of biodiversity
Fragmentation of habitat from developers clearing vegetation
Perceived cost/benefit of developing versus preserving land
Zoning conflicts resulting in development in vegetated areas and degraded land un-developed
Removal of quality bushland for bushfire overlay requirements
Lack of funding and resources
Climate Change - coast likely to be inundated by 2100
High visitation and misuse of reserves by bush kinders have resulted in degradation of some sites
Difficulty engaging youth in volunteer days and environmental groups
Consistency throughout whole of Frankston City Council
Keeping offsets within Frankston City Council and requirements for new offset within Frankston City Council sites too restrictive
Langwarrin South and Frankston becoming isolated with little wildlife corridors
Some EVCs restricted to private land
Westernport Highway upgrade posing a risk for vegetation and wildlife

11.3.4 Opportunities

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife corridors are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
Partnerships with educational institutions and community groups – similar program to Green Army, Citizen science programs	Incentive schemes or rate rebates for landholders to retain and improve habitat values- examine Yarra City Council ribbons of green program	Increasing undergrowth and replanting of open space	Council planting resilient species adaptable to impacts climate change	Link BAP with other Council strategies, urban design, plans and policies e.g. 10 year long term infrastructure plan crossed referenced with BAP
Increased capacity of indigenous nursery offering discounted and free plants	Council land acquisition of conservation properties for protection of vegetation and offsets	Revegetation of Melbourne Water easements for habitat and community experience	Minimum amount of green space for new developments, support for Green Buildings	Council with clear direction and unanimous stance on climate and biodiversity objectives
More all ability access paths in reserves	Measurable goals e.g. restore x hectares	Protect wetland and improve water availability and quality – leaving open drains for animals	Low maintenance climate resilient plantings (woodymeadow. unimelb.edu.au)	Greater consultation with registered Aboriginal party (BLC)
Written agreements or policy with bush kinder and childcare centres 'nature play guidelines' – see Darebin C for example	Species management plans for threatened and endangered species and sufficient resourcing	Investigation into a Halls Rd bio link		Partner with DELWP, State Gov, Parks Vic, Education, business, volunteers groups, Aboriginal and Torres Strait population.
Public awareness campaign to minimise impacts in reserves and wildlife with electronic signage, speed monitoring and social media e.g. koala	Ecological restoration and habitat corridor plan and goals	Working with VicRoads for the creation of more fauna crossings and consideration of future developments effects on biodiversity		Simplified and consistent data collection and storage which is easy to access and understand
Dedicated Council education officers to work with schools and kinder to develop programs with schools about biodiversity and waste minimisation	Continue funding and resourcing of Gardens for Wildlife	Repurpose old quarry as a park or gardens		Ensure that planning zones and urban growth boundary and BPA are shown on biodiversity mapping
QR codes in reserves and parks with links to information on animals and plants	Opportunities in Langwarrin South to create linear wetland links	Installation of more habitat boxes in residential areas		

Theme				
Our community is connected with nature	Biodiversity is protected and enhanced	Wildlife corridors are connected	Biodiversity is resilient to climate change	Council's data is comprehensive
More funding for social media like Frankston City Council Enviro Facebook page	Strategic approach to managing wildlife in residential areas	Develop a drainage strategy through identifying natural depression in landscape – opportunities to develop wetlands, culverts under road/ natural depressions, conservation on water courses through private property		Proactive ambitious environmental planning
Community panel and other consultation with Nairn Marr Djambana have identified having a nature trail with explanation of indigenous plants and how these are / were used, and their cultural importance	Representations to the state the offset system is too restrictive. Investigate DELWP 'off-loading' Crown-land to Council for offset opportunities	Establish corridors on perimeters of reserves such as Jubilee Park etc.		
Investigation into 'Social pinpoint' to improve citizen science data and community engagement				
Harness the potential of Frankston as an eco-tourism destination				
Individual events instead of ongoing events that require less commitment				
Enhance George Pentland Botanic Garden potential as an education resource and to show case Frankston's EVC				
Collaborate with mental health providers and Frankston Hospital				



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