Biodiversity Strategy
Technical Report 2016

Our natural environment
Maintaining and improving native plants and animals in Hobsons Bay

HOBSONS BAY CITY COUNCIL

Acknowledgements
June 2016

This technical report was developed by Ecology Australia Pty Ltd on behalf of and with contributions by Hobsons Bay City Council. For further information contact Hobsons Bay City Council on 9932 1000 www.hobsonsbay.vic.gov.au

Council acknowledges the people of the Greater Kulin Nation as the traditional owners of these municipal lands. Council acknowledges the legal responsibility to comply with the *Charter of Human Rights and Responsibilities Act 2006* and the *Equal Opportunity Act 2010*. The *Charter of Human Rights and Responsibilities* is designed to protect the fundamental rights and freedoms of citizens. The Charter gives legal protection to 20 fundamental human rights under four key values that include freedom, respect, equality and dignity.

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Glossary

Biodiversity	The variety of all life-forms, plants, animals, fungi, protists (including algae) and bacteria, their encoded genes, and the ecosystems of which they form a part
Bioregion	Defined geographical regions of Australia with similar climatic and geophysical characteristics, and which generally contain a suite of distinct ecosystems and species
CaLP Act	Victorian *Catchment and Land Protection Act 1994*
Conservation status	Categorisation of the threat risk to biological assets (plant and animal species, EVCs or plant communities) at a defined scale (e.g. national, state), as determined by specific criteria
Ecological Vegetation Class (EVC)	A vegetation classification described through a combination of its floristic composition, life form and ecological characteristics, and its association with particular environmental attributes. EVCs may include one or more floristic communities that occur across a biogeographic range, and have similar habitat and ecological processes operating
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Exotic	Plants, animals, fungi and other organisms that have been introduced (deliberately or accidentally) to Australia or a given area after European settlement
FFG Act	Victorian *Flora and Fauna Guarantee Act 1988*
Floristic	Of or pertaining to plant species, i.e. flora
GIS	Geographic Information System. A digital platform for creating, analysing and viewing maps and other spatially referenced data
Habitat Hectares	A measure of the quality and extent of native vegetation, incorporating attributes including presence of large trees, tree canopy health, understorey structure and diversity, weed cover and landscape context
Indigenous	Plant and animal species found naturally in pre-European Hobsons Bay
Introduced	Deliberately or accidentally brought to Australia or part of Australia, usually by human agency
IPM	Integrated Pest Management. Concurrent use of a combination of control methods to manage pest species.
IUCN	International Union for Conservation of Nature
Life form	An abbreviated description of the habit, growth form and longevity of a plant species (e.g. tree, shrub, vine, annual, submerged aquatic)
Matters	In reference to listed matters in legislation; species communities and other listed entities
Native vegetation	Species occurring naturally in Australia as part of the pre-European flora or fauna

Taxon (pl. taxa)	A species or other entity in any taxonomic rank e.g. variety, family.
VROTS	Victorian Rare or Threatened Species (advisory listed taxa)

Executive Summary

This technical report provides the analysis and discussion of scope for the development of Hobsons Bay City Council's biodiversity strategy. The strategy deals directly with the management of biodiversity.

The development of the strategy has been undertaken in three parts.

Part A – Preparation of a biodiversity discussion paper.

Part B – Preparation of this technical document to contain all of the relevant information that has guided the key decisions, policy, direction, targets and actions contained in the main strategic document.

Part C – Preparation of a Biodiversity Strategy document.

The research undertaken for this report includes the collection and analysis of information from a range of sources including biological databases, biodiversity models and mapping, technical reports, research articles, community consultation, industry stakeholder consultation, Council staff consultation and discussions with experts.

A review and update of Hobsons Bay's biodiversity existing conditions revealed 641 indigenous taxa (371 plant, 17 fish, 253 terrestrial vertebrates) that have been recorded since European occupation. In addition, 161 combined invertebrate, fungus and lichen taxa have been recorded, most of which are indigenous to Victoria or cosmopolitan. A total of 365 weed taxa and 41 non-indigenous animal taxa have been introduced to Hobsons Bay since European occupation and about 85 per cent of the municipality has been cleared of native vegetation. The remaining areas of native vegetation have been mapped or modelled within 22 Ecological Vegetation Classes, broadly grouped in Coastal Saltmarsh; Freshwater Wetlands; Brackish Wetlands; Woodlands, Scrubs and Shrublands and Grasslands. Some of these areas of native vegetation represent nationally significant (EPBC Act listed) ecological communities: *Natural Temperate Grassland of the Victorian Volcanic Plain* and *Subtropical and Temperate Coastal Saltmarsh*.

Community consultation shows that the general community value biodiversity for its conservation, recreational and intrinsic value. Opportunities have been identified to diversify community involvement in conservation activities. Private industry and other government land managers agree that joint programs including pest plant and animal control would benefit biodiversity management objectives within the municipality.

Key actions for biodiversity management over the next five years include the collection of more detailed ecological information, refining information management procedures and capability, reviewing the potential for use of further planning controls in some areas and collaborating with other land managers in an integrated pest plant and animal program.

The findings of this technical report will guide the preparation of a biodiversity strategy, which will include a vision and objectives for biodiversity management over the next 20 years.

1 Introduction

1.1 Project background

This technical report provides the analysis and discussion of scope for the development of Hobsons Bay City Council's biodiversity strategy. The strategy deals directly with the management of biodiversity.

The development of the strategy has been undertaken in three parts.

Part A – Preparation of a biodiversity discussion paper. A discussion paper was prepared following feedback from the community which highlighted a range of environmental issues as high priority. The discussion paper discusses key biodiversity issues and identifies significant biodiversity assets as well as the ongoing challenges for managing biodiversity within an urban context. The discussion paper:

- defines what the Council means by the term biodiversity
- summarises the available information on the current condition of biodiversity within the municipality, and knowledge gaps that need to be addressed to enable the Council to effectively manage biodiversity within the municipality
- includes a review of commonwealth, state and local policy and legislative requirements
- clearly articulates the benefits to the Council of a strategic plan regarding biodiversity management
- makes recommendations on the potential scope and timing of development of a biodiversity strategy

Part B – Preparation of this technical document to contain all of the relevant information that has guided the key decisions, policy, direction, targets and actions contained in the main strategic document. This technical document updates information in the Discussion Paper, about the existing conditions of biodiversity. It provides further context regarding planning matters and recommendations for priority actions.

Part C – Preparation of a Biodiversity Strategy document.

A contemporary approach to strategic management of biodiversity should consider:

- comprehensive knowledge of species populations and their distribution
- interdependence and other relationships between species
- species movement and use of the landscape
- the role and importance of species in ecosystem processes
- the types and distribution of natural systems
- the ability for species populations or biological systems to resist short or long term impacts
- the types and degree of threatening processes
- human uses of land and water
- economic opportunities and implications
- public knowledge and interactions
- use of new technology and tools for biodiversity management

1.2 Current Council programs

Council's Conservation Department manage 290 hectares of land for its conservation and biodiversity values. This land is spread across 20 conservation sites as listed in Table 1 below. Council collaborates with external agencies including the Port Phillip and Westernport Catchment Management Authority and Melbourne Water to deliver on ground working partnerships that control habitat altering weeds, revegetation and the installation of interpretation signage.

Table 1 Conservation sites within Hobsons Bay

Number	Reserve Name	Shared Management
1	Truganina Park	Parks Vic, Unmanaged Crown Land
2	Explosives Reserve	DELWP
3	Altona Coastal Park	DELWP
4	Paisley Challis	
5	Rifle Range and Jawbone Reserve	Parks Vic
6	210 Maidstone St	Offset Management Plan
7	Lot N Buffer Mound	
8	Horsburgh Dve Grassland	Offset Management Plan
9	Newport Lakes	
10	Kororoit Creek	Melbourne Water
11	Sandy Point	
12	The Spit	Port Authority
13	Cherry lake	Melbourne Water
14	Skeleton Creek	Melbourne Water
15	Altona Meadows Community Reserve	
16	Federation Trail	Unknown ownership
17	240 Maidstone Street	Hand over pending
18	Lot O Buffer Mound	Hand over pending
19	Laverton Stormwater Harvesting Wetland	Hand over pending
20	Cyril Curtain Reserve Wetland	Hand over pending

Weed management is an important technique used to protect ecological values of Hobsons Bay's conservation reserves. Noxious weeds that present the highest threat to ecological systems are primarily targeted for eradication which could include: Blanket weed, Artichoke thistle, Chilean needle grass, Fennel, African boxthorn and Spiny rush as an example. Other control efforts focus on site specific problem plants such as Buffalo grass, Couch grass, Kikuyu, mustard weed and wild oats as other examples.

Over the past seven years Council has planted 111,773 plants to revegetate and restore conservation sites. This work has been completed with the assistance of local volunteers, friends of groups, school groups and various local industry and community groups.

Council undertakes a range of community engagement activities to help promote conservation and biodiversity within the municipality.

In the financial year 2014–2015 a total of 51 friends of group events were held. Some of the activities held with these groups include bird surveys, local flora and fauna information sessions, and planting events. A further 84 community engagement sessions were undertaken with other members of the community including local industry, schools, user groups such as bike riding and gardening clubs, and different cultural groups. Engagement sessions consisted of a whole range of activities including:

- hands on activities like planting and weeding in Hobsons Bay reserves

- tours of reserves designed especially for new migrants/cultural groups to the area which helps assist them to integrate better with Hobsons Bay open spaces
- incursions and excursions for schools to broaden students' knowledge on a range of topics such as indigenous flora and fauna in their area
- promoting and supporting large scale events such as National Tree Day, Clean Up Australia Day, World Environment Day, and the state wide Summer by the Sea program

2 Methods

2.1 Review of information

The preparation of this technical document and associated strategy involved the review and summary of data from a range of sources. The sources of information are summarised in Table 2.

Table 2 Information sources use in developing the strategy

Data type	Description
Biodiversity information databases	All flora and fauna records within the municipality held in the Victorian Biodiversity Atlas: VBA_FAUNA100, VBA_FAUNA25, VBA_FLORA100, VBA_FLORA25 (DEPI 2014a). Bird distribution records from the BirdLife Australia database. *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool (DoE 2015d). Aquatic fauna records within the municipality held in the Melbourne Water fish database (Melbourne Water 2013). Atlas of Living Australia (fungi, lichens and invertebrates).
Native vegetation and biodiversity maps and models	Ecological Vegetation Class modelling (NV_2005, NV_1750) (DEPI 2014b). The Victorian Saltmarsh Study (2011). The Native Vegetation Information Management system (NVIM) (DEPI 2014c).
Hobsons Bay Biodiversity Discussion Paper	Preliminary assessment of existing conditions for biodiversity values. Components of the discussion paper have been included in this technical paper, and where necessary, information has been updated or added as required.
Flora and fauna assessment reports / data	See reference list.
Community online survey	Results from general public ranked responses to biodiversity issues.
Community Consultation workshops	Results from three community workshops held at Altona Meadows, Williamstown and Altona.
Council planners workshop	Discussion with Council statutory and strategic planners regarding planning, legislation and biodiversity.
Industry stakeholder meetings and consultation	Discussions with 27 organisations regarding management of biodiversity with and surrounding Hobsons Bay.
Meetings with experts	Discussion with key experts on specific matters e.g. threatened species distributions.

2.2 Curation of species information

Records of flora and fauna from the Victorian Biodiversity Atlas and recent ecological survey data were compiled and then curated to produce a list of plant and animal taxa for the Hobsons Bay municipal area. The objective of this process was to remove dubious or taxonomically redundant records. Particular consideration was given to the chronology and complexity of taxonomy for some records; as was the source of data, likely origin of the material attributed to records, opportunities for misidentification by the recorder and opportunities for operator errors in database entries. Subsequently, the number of taxa in raw data was reduced. For example flora records were reduced from 874 taxa to 733. Some taxa were added where they are known from the Hobsons Bay area but not previously recorded in databases or other information. The final list includes vascular and non-vascular plants, vertebrates and selected invertebrates. Nomenclature follows the Victorian Biodiversity Atlas.

2.3 Determination of species and community conservation status

Species or communities which are nationally significant are determined according to their listing as threatened under the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). Species or communities are nominated for listing and, if compliant, are then referred to the Threatened Species Scientific Committee for consideration. Draft conservation and listing advice are presented for public comment after which time the taxon is assessed for its eligibility for listing as 'threatened' by the committee. The decision of listing is then made by the Minister. Threatened taxa may be listed as either extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent (DoE 2015).

Species or communities which are state significant are determined according to their listing under the *Flora and Fauna Guarantee Act* 1988 (FFG Act) or, where relevant, the Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014d) and the Advisory List of Threatened Fauna in Victoria (DSE 2013). Species or communities are nominated for listing under the FFG Act according to specific listing criteria within the *Flora and Fauna Guarantee Regulations* 2011; broadly describing demonstrated likelihood of extinction. The Scientific Advisory Committee provides advice to the Minister and recommendations on the listing of species and communities. Advisory-listed species (DEPI 2014d, DSE 2013) are assessed against International Union for Conservation of Nature (IUCN) Red List criteria for fauna and separate criteria for flora, to determine whether species are extinct, threatened or near threatened/rare within the state. Advisory listing assists widely with conservation planning in Victoria. Advisory-listed taxa also have consideration in statutory planning, limited by reference to the lists in the Victorian Planning Provisions incorporated document *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* (DEPI 2013a).

The local (Hobsons Bay City Council municipal area) conservation status of plant and animal taxa was determined according to four categories: extinct in the wild, threatened, near threatened and least concern. An assessment was made firstly as to whether a taxon was most likely to be extinct within the Hobsons Bay municipal area. Extinct taxa may be those which have not been recorded as a wild population for more than 50 years or are known only from a site which has since been cleared of habitat. Where there was no evidence to otherwise support the local persistence of wild population, a taxon was determined as extinct in the wild. The remaining taxa were then assessed to determine which were most likely (on preliminary consideration) to meet any IUCN Red List (2012) criterion allowing a taxon to be regarded as vulnerable, endangered or critically endangered at the municipal level. In summary, the criteria concern status of threats, decline of area of occupancy and other considerations.

The criteria resulting in the outcome for each taxon were not recorded for the purposes of this assessment. Lastly, remaining taxa were assessed to determine whether they are near threatened, or those which have demonstrated decline in populations but do not plausibly meet IUCN criteria as threatened. The remaining taxa are of least concern. The resulting list is a provision list of locally threatened plant and animal taxa within the municipality.

2.4 Weed risk assessment

At a municipal level, each weed species was rated within six categories (not applicable or no risk, risk uncertain, low risk, moderate risk, high risk and very high risk), based on their risk to Freshwater Wetlands and Streams, Riparian Vegetation, Brackish Wetlands, Saltmarsh and Coastal Complex, Grassland and Escarpment Shrubland (Appendix 1). This analysis enabled those weeds with moderate risk or higher to be mapped and analysed against ecological values for high level prioritisation of weed management. Risk rating within each of the broad vegetation types was determined by expert opinion.

2.5 Mapping

Ecological Vegetation Class (EVC) maps were produced using 2005 modelled EVC extent (NV_2005), except for where more detailed on-ground mapping was available for the Victorian Saltmarsh Study (2011).

Species location data are assigned a spatial accuracy within the Victorian Biodiversity Atlas. This accuracy was considered in the curation of species records. Other species location data considered in the strategy (EcoAerial 2015) have been collected with a standard GPS and have a small error (≈7 m) associated.

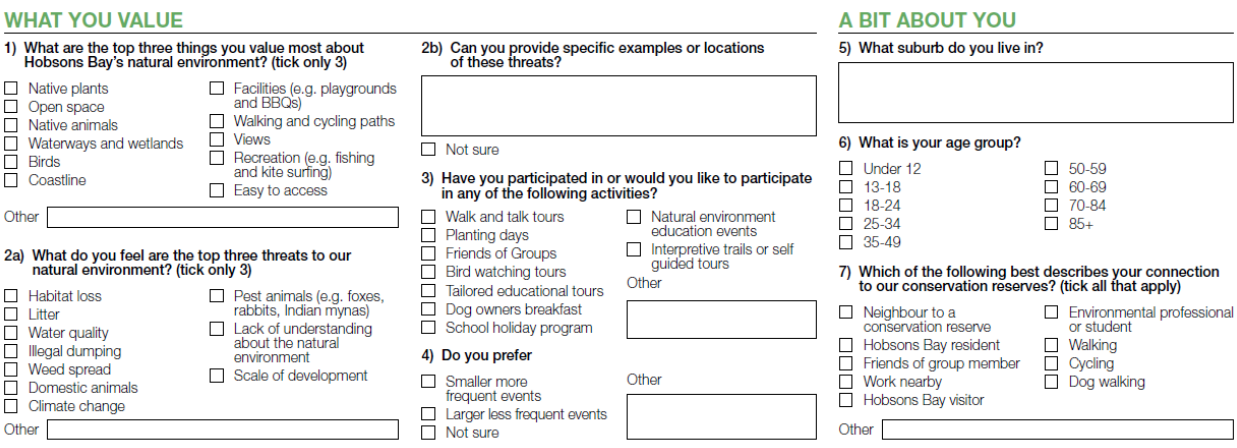
All mapping data are applied to GDA94.

2.6 Community and stakeholder consultation

Community and stakeholder consultation was undertaken by three processes: workshops, community surveys and industry stakeholder interviews.

Community surveys

A survey conducted online and via post was undertaken to identify common opinions of the public about environmental values, threats and participation in relevant activities. The survey was designed by Hobsons Bay City Council and presented at the commencement of the strategy development as follows. A total of 153 responses were received from the online survey.



WHAT YOU VALUE

1) What are the top three things you value most about Hobsons Bay's natural environment? (tick only 3)

- ☐ Native plants
- ☐ Open space
- ☐ Native animals
- ☐ Waterways and wetlands
- ☐ Birds
- ☐ Coastline
- ☐ Facilities (e.g. playgrounds and BBQs)
- ☐ Walking and cycling paths
- ☐ Views
- ☐ Recreation (e.g. fishing and kite surfing)
- ☐ Easy to access

Other

2a) What do you feel are the top three threats to our natural environment? (tick only 3)

- ☐ Habitat loss
- ☐ Litter
- ☐ Water quality
- ☐ Illegal dumping
- ☐ Weed spread
- ☐ Domestic animals
- ☐ Climate change
- ☐ Pest animals (e.g. foxes, rabbits, Indian mynas)
- ☐ Lack of understanding about the natural environment
- ☐ Scale of development

Other

2b) Can you provide specific examples or locations of these threats?

☐ Not sure

3) Have you participated in or would you like to participate in any of the following activities?

- ☐ Walk and talk tours
- ☐ Planting days
- ☐ Friends of Groups
- ☐ Bird watching tours
- ☐ Tailored educational tours
- ☐ Dog owners breakfast
- ☐ School holiday program
- ☐ Natural environment education events
- ☐ Interpretive trails or self guided tours

Other

4) Do you prefer

- ☐ Smaller more frequent events
- ☐ Larger less frequent events
- ☐ Not sure

Other

A BIT ABOUT YOU

5) What suburb do you live in?

6) What is your age group?

- ☐ Under 12
- ☐ 13-18
- ☐ 18-24
- ☐ 25-34
- ☐ 35-49
- ☐ 50-59
- ☐ 60-69
- ☐ 70-84
- ☐ 85+

7) Which of the following best describes your connection to our conservation reserves? (tick all that apply)

- ☐ Neighbour to a conservation reserve
- ☐ Hobsons Bay resident
- ☐ Friends of group member
- ☐ Work nearby
- ☐ Hobsons Bay visitor
- ☐ Environmental professional or student
- ☐ Walking
- ☐ Cycling
- ☐ Dog walking

Other

Community workshops

A Community Consultation and Engagement Plan (CCEP) was prepared to guide public workshop consultation components of the Hobsons Bay Biodiversity Strategy. The scope and goals for consultation addressed specific areas where input into the strategic planning process is sought from the broader community. General community input into the development of the strategy was sought during three public workshops (Table 3), with one each at Altona Meadows, Williamstown and Altona. Participants were invited to the workshop by public advertisement. Participants were given a 15 min overview of the purpose of the strategy and broad biodiversity values within the municipality to set the scene and encourage discussion.

The objective of the workshops was to encourage a wide range of public engagement and interest in the development of the biodiversity strategy. It was important that the workshops produced a dataset that was not biased by the opinions of Council and their contractors, while capturing input from relevant groups and individuals with an interest in biodiversity matters. The success of the meetings was measured by the number of attendees and level of input provided.

The workshop aimed to address the following broad questions:

1. What are the top priorities for biodiversity management?
2. How would the community like to be engaged in biodiversity management activities?

The range of participants aimed to be representative of the diversity of the local community, and include those that are capable of influencing, are directly or indirectly affected by, or may have an interest in shaping the development of the strategy, as well as those with specialist knowledge or experience to contribute.

Format of workshops

Table 3 Workshop program

Timing (min)	Content
10	Background to Biodiversity Strategy
10	Biodiversity values and threats
5	Instructions for workshop
30	Group workshop Set 1
10	Collate Set 1
30	Group workshop Set 2
10	Collate Set 2
	Close

An explanation of the process for recording information from the group was explained. Attendees were divided into working groups and each provided input to the same questions as follows. Workshops were attended by between eight and 20 participants.

What are the top priorities for biodiversity management?

Workshop Q1 **What is your vision for biodiversity in Hobsons Bay over the next 10 years?**	*Workshop Q2* **How can we prevent habitat loss in Hobsons Bay?**
Workshop Q3 **What are the key climate change threats to our natural environment? How can these be managed?**	*Workshop Q4* **How can pest plants and animals be effectively managed in an urban environment? What approaches should be used?**

Group workshop Set 2

How would the community like to be engaged in biodiversity management activities?

Workshop Q1 **How can community participation be diversified across age and cultural groups?**	*Workshop Q2* **Where does the community go to find out about Council activities? What formats are preferred and most accessible?**
Workshop Q3 **What education topics would be most useful and or most interesting?** **What style of event would be most useful for this topic?**	*Workshop Q4* **Where would interpretive signage provide most value? Do you have any good examples of where interpretive signage has been used elsewhere?**

Council workshops

Workshops were held with Council staff at Hobsons Bay City Council offices to discuss a range of planning and environmental management issues. Issues that were discussed in workshops included conflicts and limitations of statutory planning, influences of state policy and environmental regulation. Other information was collected regarding Council's biodiversity information management, weed and pest animal control, biosecurity, impacts from recreation, ecological burning, context of other strategies, visitor interaction, community programs, native vegetation offsets, planning overlays and climate change.

Stakeholder workshops and liaison

A workshop for government stakeholders was held at Hobsons Bay City Council offices. The workshop included participants from Brimbank City Council, Wyndham City Council, Maribyrnong City Council, Melbourne Water, City West Water and the Department of Environment, Land, Water and Planning. A separate workshop was held with Parks Victoria. Information was obtained on management practices and other considerations including:

- the management of weeds and feral animals across property boundaries
- information about threatened species populations near municipal boundaries
- intended revegetation or habitat restoration projects near municipal boundaries
- any issues for the management and protection of biodiversity that you have identified in your area

A range of other public and private organisation that influence biodiversity management within Hobsons Bay, were consulted by telephone to discuss the above points, including industries abutting conservation areas. A total of 27 organisations were consulted.

Some specialists involved with ecological surveys within Hobsons Bay were also consulted, in particular to provide clarification about threatened species records and the extent of some vegetation types.

2.7 Sites of biodiversity significance

Significance criteria

An assessment of sites of biodiversity significance is necessary to meet the objectives of the Biodiversity Strategy and inform planning and consideration of biodiversity matters which influence decision making. The approach for identifying significant sites has been tailored to the landscape, ecosystems and land use within Hobsons Bay.

Careful consideration has been given to the geographic context of significant items when determining the significance of a site. Remnant native vegetation within Hobsons Bay is much depleted and all areas remaining should be regarded with at least medium significance within the municipality. For grassland vegetation in particular, there are few successful methods for improving condition without significant cost and no practical means of increasing extent of this vegetation type.

The assessment uses property boundaries, although the process is tenure blind and does not consider management complexity or resourcing. The primary objective of the assessment is for informing planning-related risks to biodiversity, and flagging potentially significant issues for consideration in proposals and planning permit applications. The assessment can also be used for prioritisation of funding and identifying landscape-level values.

Qualifying criteria were used for identifying significant sites. Sites were assessed for their eligibility to fall within one of four significance classes; very high, high, medium or low. This approach has been used for two reasons. The first is due to the limited extent of biodiversity values within the municipality. At property level, there are large number of titles which possess minimal or, in some cases, no biodiversity values of significance. The second is to avoid developing scoring criteria which require subjective allocation of significance to values. Previous systems for identifying sites of significance have been developed for Hobsons Bay (NRE 2002, Botanicus 2010). The current assessment ensures that criteria are relevant to systems currently used for planning within Victoria. State-wide models for relative biodiversity value (e.g. NaturePrint) have not been used as they are not directly useful for determining relative biodiversity values at the municipal level.

The identification of sites is achieved by classing each site within the following classification criteria.

Threatened species, threatened communities and native vegetation are primarily considered in classifying sites of biodiversity significance. These matters indicate a site's value for containing depleted habitats or ecosystems and the need for prioritisation in planning for the likelihood of further biodiversity loss, and form the primary criteria (Table 4). A number of secondary criteria are also used for classifying significant sites. Secondary criteria consider vegetation and landscape quality variables for which there is well-founded literature on the influence of these on ecosystem resilience. Secondary criteria also consider other known biodiversity values.

Properties <1000 m^2 were excluded from medium or higher significance for the purposes of mapping the results of the assessment. This was done to remove erroneously modelled values as well as the influence of older threatened species records on areas which are now developed residential land.

National or state threat status: Criteria within this theme address species or communities (items) which are of conservation importance at national or state level. These items are threatened with extinction within their geographic context.

Ramsar site or habitat for migratory bird species: Properties within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, and other sites that are important for migratory bird species are given very high biodiversity significance.

Remnant Native Vegetation (Ecological Vegetation Classes): The presence of any remnant native vegetation, either according to models or other information. The presence of remnant native vegetation indicates areas of lower soil modification, a higher likelihood of naturally occurring habitats for fauna and persistence of ecological processes associated with the vegetation.

Hobsons Bay City Council threatened species: Species are considered if they have been assessed as plausibly threatened within the municipality under IUCN criteria.

Vegetation quality: Sites have been divided into two criteria based on modelled vegetation quality (NV2005_QUAL_CSDL, DSE (2008)); <40 site condition and >40 site condition. Sites with <40 modelled site condition score which are known or highly likely to have a site condition score >40 are given the higher significance rating.

Landscape quality: This criterion is weighted according to categories of Landscape Context value (NV2005_QUAL, CSDL, DSE (2008)). Landscape Context is the landscape component of vegetation quality assessed by the Habitat Hectares method (DSE 2004). Sites are given the highest class score which fall within a property (1–10). Landscape scores apply only to areas of modelled native vegetation.

Native vegetation patch size: This criterion is weighted according to presence of contiguous patches <2ha or >2ha. It is included to elevate significance where the combined variables of modelled landscape quality do not result in upgrading of a site's significance; however, the vegetation patch size is sufficient to provide a greater contribution to biodiversity values. The 2 ha threshold has been estimated to reflect the minimum size at which treeless vegetation (including Plains Grassland) is more resilient to impacts from weeds and edge effect. A number of spatial thresholds have been set elsewhere for considering the conservation needs of key threatened grassland species (e.g. DSE 2013c, DSE 2010). While these provide guidance for species level management, patch size thresholds for resilience of treeless communities is likely to be less. Primarily the 2ha threshold has been set to help identify significant sites for planning purposes.

Constructed habitats: The role of constructed habitats for biodiversity conservation is recognised in this criterion. It acknowledges that significant values may occur where there is no native vegetation or historical threatened species records. Constructed habitats include wetlands and substantial revegetation areas.

Recognised environmental significance: Sites that fall within the Hobsons Bay's Environmental Significance Overlay (ESO) are recognised for their ecological values and the assessment processes used to development the ESO.

Vicinity to threatened species populations: A 500 m buffer has been placed on all nationally and state threatened taxa to identify significant values of native vegetation within the immediate vicinity. This recognises the local dispersal requirements of many species and that locality records for threatened species often have positive spatial autocorrelation. It aims to add significance to land adjoining sites where threatened species are known to occur, so that similar vegetation and habitats on that land are identified for relevant values.

Table 4 Decision criteria for classifying sites of biodiversity significance

Themes	Criteria	Divisions	Biodiversity significance classes			
Primary criteria			**Very High**	**High**	**Medium**	**Low**
***Federal Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act)**	Site supports communities and/or threatened species listed under the EPBC Act (Known or highly likely to occur).	Critically endangered, endangered	✓			Remaining sites
		Vulnerable	✓			
	Site part of a Ramsar Wetland and/or supports important habitat for Migratory and/or Marine-Overfly species.	-	✓			
***Victorian Flora and Fauna Guarantee Act* 1988 (FFG Act)**	Site supports item(s) listed under the FFG Act: species and/or communities (Known or highly likely to occur)	-		✓		
Advisory Listed Flora/Fauna	Site is known to support threatened species population(s)	Threatened		✓		
		Rare or near threatened			✓	
Ecological Vegetation Class	Site contains at least some native vegetation	-			✓	
Hobsons Bay City Council threatened species	Site supports species that are threatened within Hobsons Bay	-			✓	
Secondary criteria						
Vegetation quality	The site has a modelled Site Condition score <40 or >40	<40	According to primary criteria			Remaining sites
		>40		✓		
Landscape quality	The site has a modelled Landscape Context score <10 or >10	<10	According to primary criteria			
		>10		✓		
Native vegetation patch size	Native vegetation on site is part of a contiguous patch <2 ha or >2 ha	<2 ha	According to primary criteria			
		>2 ha		✓		
Constructed habitats	Does the site contain habit which has been specifically created / constructed for conservation purposes (e.g. wetlands)?	No	According to primary criteria			
		Yes			✓	
Recognised significance	The site falls within an Environmental Significance Overlay	No	According to primary criteria			
		Yes			✓	
Vicinity to threatened species populations	Is the site within 100 m of a national or state threatened species record?	No	According to primary criteria			
		Yes			✓	

2.8 Limitations

The technical document intentionally does not include an assessment of strictly marine biota. A number of marine species also occupy estuarine habitats and/or land; however, this study is limited to those that predominantly occupy land, freshwater environments and estuarine environments.

Maps of Ecological Vegetation Classes (EVC) by State of Victoria are constructed by modelling (NV_1750 and NV_2005), and are, as such an estimate of the quantity and distribution of each EVC within the municipality. The accuracy of mapping is determined by model performance and errors in the model. Areas outside of saltmarsh mapping by the Victorian Saltmarsh Study (2011) should be used as a guide for planning purposes and development of the biodiversity strategy. It is possible that ground survey will result in differences in the distribution and number of EVCs. Other detailed mapping has been commissioned by Hobsons Bay City Council including polygons of grassland and grassy wetland on several properties. These data were not available for use in providing the estimates of extant native vegetation distribution and type.

Species records are limited by a number of factors. These include misidentifications, taxonomic limitations, age of records, spatial error in records, database entry errors and surveyor bias. These limitations were considered during the curation of species lists. In many instances, species data are entered into the Victorian Biodiversity Atlas as a defined area list, often using property boundaries to define the area. As such, the distribution of species as surveyed within the property is not represented in the VBA data. There are some implications for the outcome of the analysis of significant sites and some other analyses undertaken for this technical document.

Biodiversity values may be under-represented on private land. Some areas of private land are inaccessible due to infrastructure security or other reasons. There are areas within Hobsons Bay where biodiversity values are predicted although few records exist from these areas in ecological assessment or databases.

Almost all species information in databases comprises vascular plants and vertebrates. Other species groups are grossly under-surveyed and therefore contribute little to the development of the strategy.

3 Condition and knowledge of biodiversity

Almost all of what is known about Hobsons Bay's biodiversity concerns vertebrate animals and vascular plants. These are the larger organisms, comprising mammals, birds, reptiles, frogs, flowering plants and ferns, which together make up the minority of species diversity. Data regarding the diversity of invertebrates, fungi, lichens and non-vascular plants is absent for Hobsons Bay. Local understanding of ecosystems focuses on state-wide mapping units, Ecological Vegetation Classes, which are described primarily by their plant assemblages and landscape characteristics. The documentation and mapping of other ecosystems, and knowledge about the processes which operate within them is limited.

3.1 Flora

A total of 371 indigenous and 365 non-indigenous / naturalised plant species, sub-species, varieties and forms (taxa) (Appendix 1) have been recorded within Hobsons Bay. These figures represent the total number of taxa in databases and reports, and reflect widely accepted concepts for the separation of taxa at the time of the assessment. The vast majority of these species are forbs (herbs other than grasses, sedges or rushes) (Table 5).

Table 5 Number of indigenous taxa within each plant group / life form

Plant group / life form	Number of taxa
Trees	7
Medium / Large Shrubs	15
Small Shrubs	32
Grasses	57
Forbs	200
Climbers	4
Sedges, rushes and allies	38
Ferns and fern allies	9
Mosses	6
Liverworts	3

Naturalised species are those which have been introduced into Hobsons Bay since European occupation and have sustained populations with the capacity for ongoing recruitment and spread. Of particular interest for management are those species which spread into areas of native vegetation, or other significant areas, and are considered a threat to biodiversity.

Indigenous species are those which naturally occur within Hobsons Bay and are therefore native to the local area. Most, if not all, of these species were present around the start of European occupation and the current flora represents a subset of the pre-European flora. Due largely to the decline in extent of native vegetation, and almost entire removal of some vegetation types since European occupation, approximately 18 per cent of the flora has become extinct within the municipality (Figure 1). Furthermore, more than half of the extant indigenous flora (188 taxa) has been determined as threatened within Hobsons Bay and the remaining species are either near threatened or of least concern (Figure 1).

Following review and curation of flora information for the municipality, there are a total of 300 indigenous plant taxa which occur naturally and were extant at the time of this assessment.

3.2 Conservation status of flora at state and national level

Eight plant taxa have been recorded within Hobsons Bay, which are listed under the EPBC Act, and as such, are nationally threatened (Table 6); one critically endangered, four endangered and three vulnerable. Of these taxa, all but Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and Large-headed Fireweed *Senecio macrocarpus* are regarded as extinct within the Hobsons Bay municipal area.

Thirty seven plant taxa recorded within Hobsons Bay are listed in DEPI (2014a) as either endangered, vulnerable, rare or poorly known at state level. Those listed separately as threatened under the FFG Act 1988 include the eight nationally significant taxa plus the additional five taxa Buloke *Allocasuarina luehmannii*, Tough Scurf-pea *Cullen tenax*, Small Milkwort *Comesperma polygaloides*, Swamp Diuris *Diuris palustris* and Hairy Tails *Ptilotus erubescens*. Eight state-significant taxa are now regarded as extinct within the Hobsons Bay municipal area.

Of the EPBC Act and Advisory-listed taxa, most occupy Plains Grassland habitats, where the majority of records are also concentrated (Figure 2).

Table 6 National and/or state significant flora recorded within Hobsons Bay
CR – nationally Critically Endangered, EN – nationally Endangered, VU – nationally Vulnerable, en – state Endangered, vu – state Vulnerable, r – state Rare, k – state Poorly Known, L – Flora and Fauna Guarantee Act listed.

Scientific name	Common Name	EPBC Act	Advisory listed	FFG Act
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	en	L
Diuris basaltica	Small Golden Moths	EN	en	L
Diuris fragrantissima	Sunshine Diuris	EN	en	L
Prasophyllum suaveolens	Fragrant Leek-orchid	EN	en	L
Rutidosis leptorhynchoides	Button Wrinklewort	EN	en	L
Lepidium aschersonii	Spiny Peppercress	VU	en	L
Senecio macrocarpus	Large-headed Fireweed	VU	en	L
Thesium australe	Austral Toad-flax	VU	vu	L
Allocasuarina luehmannii	Buloke		en	L
Cullen tenax	Tough Scurf-pea		en	L
Comesperma polygaloides	Small Milkwort		vu	L
Diuris palustris	Swamp Diuris		vu	L
Ptilotus erubescens	Hairy Tails		vu	L
Podolepis linearifolia	Basalt Podolepis		en	
Coronidium gunnianum	Pale Swamp Everlasting		vu	
Dianella sp. aff. *longifolia* (Benambra)	Arching Flax-lily		vu	
Diuris behrii	Golden Cowslips		vu	
Malva preissiana s.s. (white-flowered coastal form)	Coast Hollyhock		vu	
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush		r	

Scientific name	Common Name	EPBC Act	Advisory listed	FFG Act
Avicennia marina subsp. *australasica*	Grey Mangrove		r	
Bromus arenarius	Sand Brome		r	
Geranium sp. 3	Pale-flower Crane's-bill		r	
Heterozostera tasmanica	Tasman Grass-wrack		r	
Juncus revolutus	Creeping Rush		r	
Lawrencia spicata	Salt Lawrencia		r	
Poa billardierei	Coast Fescue		r	
Salsola tragus subsp. *pontica*	Coast Saltwort		r	
Senecio campylocarpus	Floodplain Fireweed		r	
Triglochin minutissima	Tiny Arrowgrass		r	
Triglochin mucronata	Prickly Arrowgrass		r	
Tripogon loliiformis	Rye Beetle-grass		r	
Alternanthera sp. 1 (Plains)	Plains Joyweed		k	
Convolvulus angustissimus subsp. *omnigracilis*	Slender Bindweed		k	
Eleocharis pallens	Pale Spike-sedge		k	
Pelargonium littorale	Coast Stork's-bill		k	
Spirodela polyrhiza	Large Duckweed		k	
Thelymitra exigua	Short Sun-orchid		k	

3.3 Conservation status of flora at municipal level

Locally extinct species

A total of 67 plant taxa have been determined as extinct in the wild within Hobsons Bay (Figure 1, Appendix 1). The majority (44) of these taxa are forbs, most of which occupy Plains Grassland and related vegetation. Prior to European agricultural land use, such species may have been quite common in the landscape. There are fewer examples (10 species) of trees or shrubs. Buloke *Allocasuarina luehmanii* is known in database records from one site along Skeleton Creek. This tree species is now determined to be extinct within Hobsons Bay, and all other individuals are of planted origin. The same site contained at least three shrub species (Variable Sida *corrugata*, Dwarf Bluebush *Maireana humillima* and Grey Copperbur *Sclerolaena diacantha*) which are common in arid and central areas of Victoria, and more broadly.

Locally threatened species

Approximately half of the indigenous plant taxa recorded within Hobsons Bay have a high likelihood of being threatened under IUCN criteria. That is, following a preliminary assessment, they are likely to meet listing criteria of critically endangered, endangered or vulnerable within the Hobsons Bay municipal area. Similarly with the locally extinct flora, a large proportion of the threatened taxa are forbs (108), and between these two categories, all orchid species are now regarded as either threatened or extinct within Hobsons Bay. Twenty-one tree or shrub taxa are now regarded as threatened including

the nationally widespread tree River Red-gum *Eucalyptus camaldulensis,* of which there are only two records from Hobsons Bay. Further investigation may reveal that there are no wild populations remaining of this eucalypt species. The relatively large proportion of threatened flora reflects the high percentage area (85%) of native vegetation cleared since European occupation. Losses to riparian vegetation and grasslands in particular are major causes in the decline of flora species within Hobsons Bay. With the decline of grassland vegetation and its associated forbs, there are also 29 grass taxa which are now threatened. Of the handful of bryophytes records within Hobsons Bay, the moss *Gigaspermum repens* has been determined as threatened due to the decline of associated vegetation on calcareous substrates.

Locally near threatened species

A total of 75 plant taxa are near threatened within Hobsons Bay. This includes 47 species of grasses and forbs which, in the event of further clearing of habitat, would likely be determined as threatened. Some of these taxa are considered generally common in the greater Melbourne area. In Hobsons Bay, they may be seen commonly at certain sites, although reduced significantly throughout their range within the municipality.

Locally least concern species

Only 10 per cent of Hobsons Bay's flora is of least concern with regard to their conservation. This includes 37 taxa of which most have attributes to resist impacts from modification to habitat and competition with weeds. Some are species which can disperse into highly modified vegetation and areas with artificial substrates. The majority of these taxa occupy Plains Grassland, non-native pastures or waterways while a smaller number occupy coastal habitats.

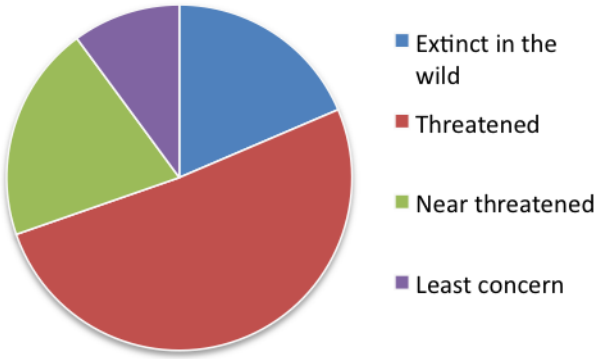


Figure 1 Proportion of indigenous flora according to the conservation status of taxa at municipal level

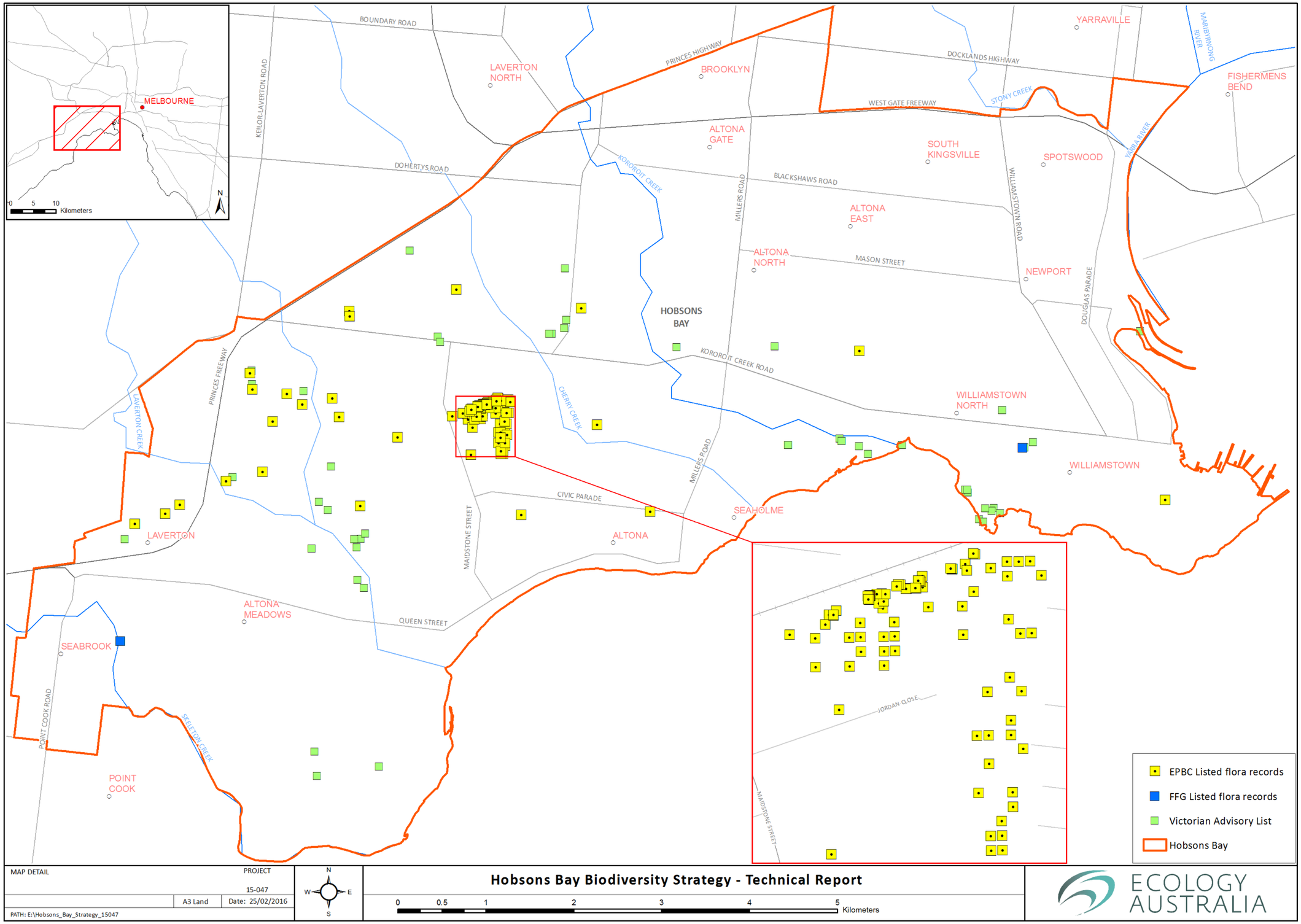


Figure 2 Distribution of records for threatened flora listed under the EPBC Act, FFG Act and/or state advisory list (DEPI 2014a).

3.4 Aquatic fauna

A total of 17 indigenous and six non-indigenous fish species have been recorded within the Hobsons Bay municipality (Appendix 1).

Due largely to the removal and extensive modification of habitat and interactions with exotic species, fauna populations have declined considerably since European occupation. For most faunal groups it is difficult to accurately determine the extent of the decline, however as an example, it is likely that approximately half of the freshwater fish species that were expected to present in waterways and wetlands at the time of European settlement (excluding the Yarra River estuary) are now extinct from the Hobsons Bay municipality (based on the Pre European Reference Condition of fish list as developed by DELWP and modified to the local scale for the purposes of this report).

Conservation status of fish at state and national level

No fish species have been recorded within Hobsons Bay that are listed under the EPBC Act. Two fish species of national significance (Dwarf Galaxias and Yarra Pygmy Perch) have not been recorded within the municipal area, but are considered likely to have been present at the time of European occupation (based on PERCH list and habitat requirements). Once additional fish species of national significance (Australian Grayling) has not been recorded; however, the persistence of this diadromous (migratory between freshwater and saltwater) fish species within the Yarra River estuary (i.e. within the eastern boundary of the municipality) can be reliably inferred by recent records of the species in the freshwater reaches of the Yarra River.

Conservation status of fish at municipal level

Of the 17 documented indigenous fish species, only five are of least concern with regard to their conservation at municipal level. Two species have been determined as extinct in the wild (River Blackfish and Pouched Lamprey), seven species are threatened with extinction and three species are near threatened. A number of these species occur within or are directly dependent upon aquatic habitats, and some of these species may have been common prior to draining of wetlands/swamps and waterway modification (hydrological alteration, re-direction, channelization) for agricultural and other land uses.

3.5 Terrestrial fauna

A total of 314 indigenous and 35 non-indigenous / exotic terrestrial vertebrate fauna taxa have been recorded within the Hobsons Bay municipality. These totals are based on species and subspecies listed in databases and reports and observations from biologists who have more recently recorded species in the municipality, but these species are yet to appear in databases (DEPI 2014a; BirdLife Australia's Bird Atlas 2015; EcoAerial 2015; Rob Gration, EcoAerial, pers. comm.). The majority of these species are birds (Table 7, Appendix 1).

Table 7 Number of terrestrial animal taxa* within each group and listed in databases and reports

Animal group	Number of Indigenous species	Number of Non-indigenous/ exotic species	Total
Birds	259	19	278
Mammals	17	8	26
Reptiles	15	3	18
Amphibians	6	0	6
Fish	17	6	23
Total	314	36	351

*Not including invertebrates.

Exotic fauna species are those that have been introduced into Hobsons Bay, or were introduced into other parts of Australia and spread into Hobsons Bay since European settlement, and have established self-sustaining populations (e.g. Red Fox, European Rabbit, Indian Myna and European Skylark).

Non-indigenous fauna species are Australian species that are not indigenous to Hobsons Bay. For example, Marbled Gecko *Christinus marmoratus* is unlikely to have occurred naturally in the area and is most likely to have been transported to the area in building materials and firewood (Peter Robertson, Wildlife Profiles, pers. comm.). Common Long-necked Turtle *Chelodina longicollis* is also thought to have been introduced and now well-established in the greater Port Phillip Region (Hamer and McDonnell 2010; Peter Robertson, Wildlife Profiles, pers. comm.). A number of native bird species have been recorded well outside of their natural range in Greater Melbourne, and these species are likely to represent aviary escapees (e.g. Australian Ringneck and Scaly-breasted Lorikeet; Loyn and Menkhorst 2011).

Indigenous species are those which naturally occur in Hobsons Bay (i.e. are native to the local area), and include resident species, but are also considered to include migratory species which regularly occur in Hobsons Bay (e.g. international migratory waders that breed in the Northern Hemisphere and spend the spring-summer in Australia).

Another group of 62 species listed in databases for Hobsons Bay are those that are collectively referred to as vagrants, nomads, rare visitors or beach-washed species. Such species have only a very small number of records in databases and in Hobsons Bay are typically well outside of their usual ranges (e.g. Arctic Tern, Arctic Jaeger, Common Diving-Petrel and Subantarctic Fur Seal).

Due largely to the removal and extensive modification of habitat and interactions with exotic species, fauna populations have declined considerably since European occupation. For most faunal groups, it is difficult to accurately determine the extent of the decline.

Based on review and curation of species records for the municipality (i.e. removing vagrant and non-indigenous/exotic species), a total of 253 indigenous fauna species occurred at the time of European Settlement.

3.6 Conservation status of fauna at state and national level

A number of the 253 indigenous fauna species that occurred at the time of European Settlement in the Hobsons Bay municipality are threatened at a national or state level.

Eleven species that have been recorded in Hobsons Bay are listed as threatened species under the EPBC Act, including four species that are critically endangered, two species that are endangered and five species that are vulnerable (Table 8, Figure 4). Of these species, Regent Honeyeater and Orange-bellied Parrot are regarded as extinct in Hobsons Bay, and Plains-wanderer is now only a very rare visitor to the municipality.

Regent Honeyeater was most likely never very common in the municipality as it typically occupies Box-Ironbark Forests and Woodlands and Box-dominated woodlands in Victoria.

The Orange-bellied Parrot occupies coastal saltmarsh and adjoining grasslands and there are two records of this species for the municipality from 2000: one from Point Cook Coastal Park and one from Cheetham Wetlands (DEPI 2014a). The population has declined in recent times to about 50 birds and the main area of occurrence in Victoria for the past three decades has been the Western Treatment Plant at Werribee and Bellarine Peninsula (Peter Menkhorst, Orange-bellied Parrot Recovery Team, pers. comm.).

The Plains-wanderer, Striped Legless Lizard and Golden Sun Moth are species of Plains Grassland habitats which have been substantially depleted across Victoria. The Plains-wanderer was formerly common in Western (Basalt) Plains Natural Temperate Grasslands, but this community has been reduced in extent by such a degree that the Plains-wanderer is now effectively extinct within the community (DoE 2015a). Striped Legless Lizard and Golden Sun Moth occupy native grassland and grassy woodland remnants and populations are highly fragmented.

Swift Parrot is a winter migrant from its breeding grounds in Tasmania. It is recorded reasonably frequently between April and September in the municipality (e.g. at Newport Lakes).

Australasian Bittern and Australian Painted Snipe are infrequent visitors to wetland habitats in the Hobsons Bay area (e.g. Cherry Lake/Kororoit Creek and Mt St Josephs Wetland, respectively).

Growling Grass Frog has declined significantly over the last 15 years at Newport Lakes. Large numbers used to bask at the lakes early this century. An individual male frog was recorded on two occasions in October 2014 (EcoAerial 2015; Rob Gration, EcoAerial, pers. comm.). Two Growling Grass Frogs were recorded along Skeleton Creek at Point Cook near Markham Way on 18 December 2012 (Ecology Australia 2013a).

Forty-four species recorded within Hobson Bay are classified as threatened in Victoria under DSE (2013) as either endangered, vulnerable, near threatened or data deficient (Table 8, Figure 4). Species listed separately as threatened under the FFG Act include the 11 species listed as threatened under the EPBC Act and an additional 15 species listed under the FFG Act.

Table 8 National and/or State significant fauna species recorded within Hobsons Bay. CR – nationally Critically Endangered, EN – nationally Endangered, VU – nationally Vulnerable, en – state Endangered, vu – state Vulnerable, nt – state Near Threatened, dd – state Data Deficient, L – Flora and Fauna Guarantee Act listed.

Common Name	Scientific Name	EPBC Act listing	State advisory listing	FFG Act listing
Plains-wanderer	*Pedionomus torquatus*	CR	cr	L
Orange-bellied Parrot	*Neophema chrysogaster*	CR	cr	L
Regent Honeyeater	*Anthochaera phrygia*	CR	cr	L
Golden Sun Moth	*Synemon plana*	CR	cr	L
Australasian Bittern	*Botaurus poiciloptilus*	EN	en	L
Swift Parrot	*Lathamus discolor*	EN	en	L
Australian Painted Snipe	*Rostratula australis*	VU	cr	L
Fairy Tern	*Sternula nereis*	VU	en	L
Striped Legless Lizard	*Delma impar*	VU	en	L
Growling Grass Frog	*Litoria raniformis*	VU	en	L
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU	vu	L
Little Bittern	*Ixobrychus minutus dubius*		en	L
Terek Sandpiper	*Xenus cinereus*		en	L
Intermediate Egret	*Ardea intermedia*		en	L
Blue-billed Duck	*Oxyura australis*		en	L
Little Egret	*Egretta garzetta nigripes*		en	L
Little Tern	*Sternula albifrons sinensis*		vu	L
Baillon's Crake	*Porzana pusilla palustris*		vu	L
Lewin's Rail	*Lewinia pectoralis*		vu	L
Eastern Great Egret	*Ardea modesta*		vu	L
White-bellied Sea-Eagle	*Haliaeetus leucogaster*		vu	L
Powerful Owl	*Ninox strenua*		vu	L
Yellow Sedge-skipper	*Hesperilla flavescens*		vu	L
Magpie Goose	*Anseranas semipalmata*		nt	L
Caspian Tern	*Hydroprogne caspia*		nt	L
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*		dd	L
Red Knot	*Calidris canutus*		en	
Curlew Sandpiper	*Calidris ferruginea*		en	
Ruddy Turnstone	*Arenaria interpres*		vu	
Black-tailed Godwit	*Limosa lapponica*		vu	

Pacific Golden Plover	*Pluvialis fulva*		vu	
Wood Sandpiper	*Tringa glareola*		vu	
Common Sandpiper	*Actitis hypoleucus*		vu	
Marsh Sandpiper	*Tringa stagnatilis*		vu	
Common Greenshank	*Tringa nebularia*		vu	
Black Falcon	*Falco subniger*		vu	
Musk Duck	*Biziura lobata*		vu	
Australasian Shoveler	*Anas rhynchotis*		vu	
Hardhead	*Aythya australis*		vu	
White-throated Needletail	*Hirundapus caudacutus*		vu	
Tussock Skink	*Pseudemoia pagenstecheri*		vu	
Emu	*Dromais novaehollandiae*		nt	
Black-faced Cormorant	*Phalacrocorax fuscescens*		nt	
Pied Cormorant	*Phalacrocorax varius*		nt	
Royal Spoonbill	*Platalea regia*		nt	
Latham's Snipe	*Gallinago hardwickii*		nt	
Pectoral Sandpiper	*Calidris melanotos*		nt	
Sooty Oystercatcher	*Haematopus fuliginosus*		nt	
Glossy Ibis	*Plegadis falcinellus*		nt	
Nankeen Night Heron	*Nycticorax caledonicus hillii*		nt	
Pacific Gull	*Larus pacificus*		nt	
Whiskered Tern	*Chlidonias hybridus javanicus*		nt	
Spotted Harrier	*Circus assimilis*		nt	
Black-eared Cuckoo	*Chalcites osculans*		nt	
Fat-tailed Dunnart	*Sminthopsis crassicaudata*		nt	

3.7 Conservation status of terrestrial fauna at municipal level

Locally extinct species

Seven species (3%) have become extinct within Hobsons Bay since European Settlement (Figure 3). Three of these are Plains Grassland species, a habitat that has been extensively cleared, including two bird and one mammal species. The remaining species include a saltmarsh inhabiting bird and a forest / woodland inhabiting bird.

Locally threatened species

Over half (149 species or 59%) of the indigenous fauna species recorded in Hobsons Bay have a high likelihood of being threatened under IUCN criteria (Figure 3). The preliminary assessment determined that these species are likely to satisfy listing criteria of critically endangered, endangered or vulnerable within the municipality. The species represent a variety of functional groups.

For avifauna, species represent Australian and international migratory shorebirds, ducks/waterfowl, piscivorous (fish-eating) waterbirds, large wading birds, terrestrial forest and woodland species, coastal saltmarsh and species of Plains Grassland. For waterbirds generally, the high proportion of threatened species is likely to be symptomatic of phenomena that operate much more broadly than Hobsons Bay, including loss and degradation of wetlands habitats on a national or international scale.

Locally-threatened mammalian species represent a nectarivorous/frugivorous bat, a ground-dwelling monotreme and an aquatic species.

A high proportion of the reptile fauna is threatened in Hobsons Bay, and this reflects the substantial losses of Plains Grassland in the municipality. Loss of Plains Grassland habitat can also be attributed to the threatened status of Common Spadefoot Toad in Hobsons Bay. However, for other threatened frog species, broader threats are likely to be the cause, such as Chytrid Fungus, predatory exotic fish species and climate change.

Initial agricultural development, followed by urban development, resulting in habitat loss, modified hydrological regimes in wetlands and streams, and potentially altered water quality are likely to have resulted in losses and declines in fish species.

Locally near threatened species

Eight fauna species recorded in Hobsons Bay are determined to be near threatened (Figure 3). These are species which have been affected by past and recent development, habitat loss, modified hydrological regimes in streams, and potentially altered water quality. A small number of birds are near threatened as a result of habitat loss (e.g. hollow-bearing trees).

Locally least concern species

Approximately one-third of Hobsons Bay fauna (87 species) is determined to be of least concern with regards to conservation status (Figure 3). These species (see Loyn and Menkhorst 2011) are:

- terrestrial species (birds, and some mammals and reptiles) that have adapted to the urban environments, including their capability of using open grassy areas or plantings in parks and gardens
- terrestrial species that have expanded their ranges into coastal (and urban) areas over the last three decades
- aquatic bird species that are represented by large/secure populations in Hobsons Bay and can utilise a variety of wetland types, including some which can use both freshwater and saline habitats and natural and artificial wetlands
- insectivorous bat species which have adapted to urban environments and are generally common throughout Greater Melbourne

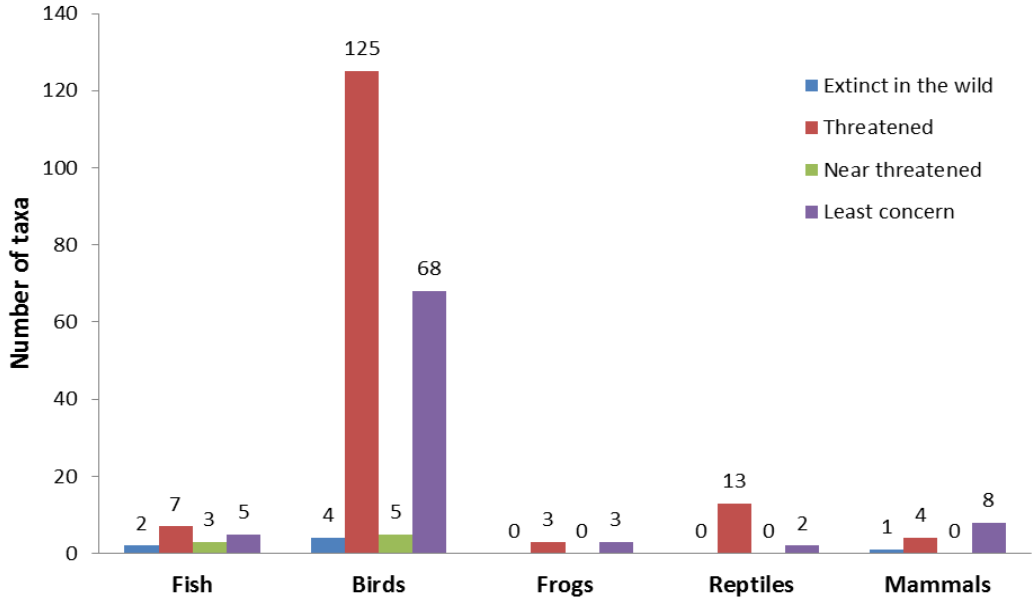


Figure 3 Proportion of indigenous fauna according to the conservation status of taxa at municipal level

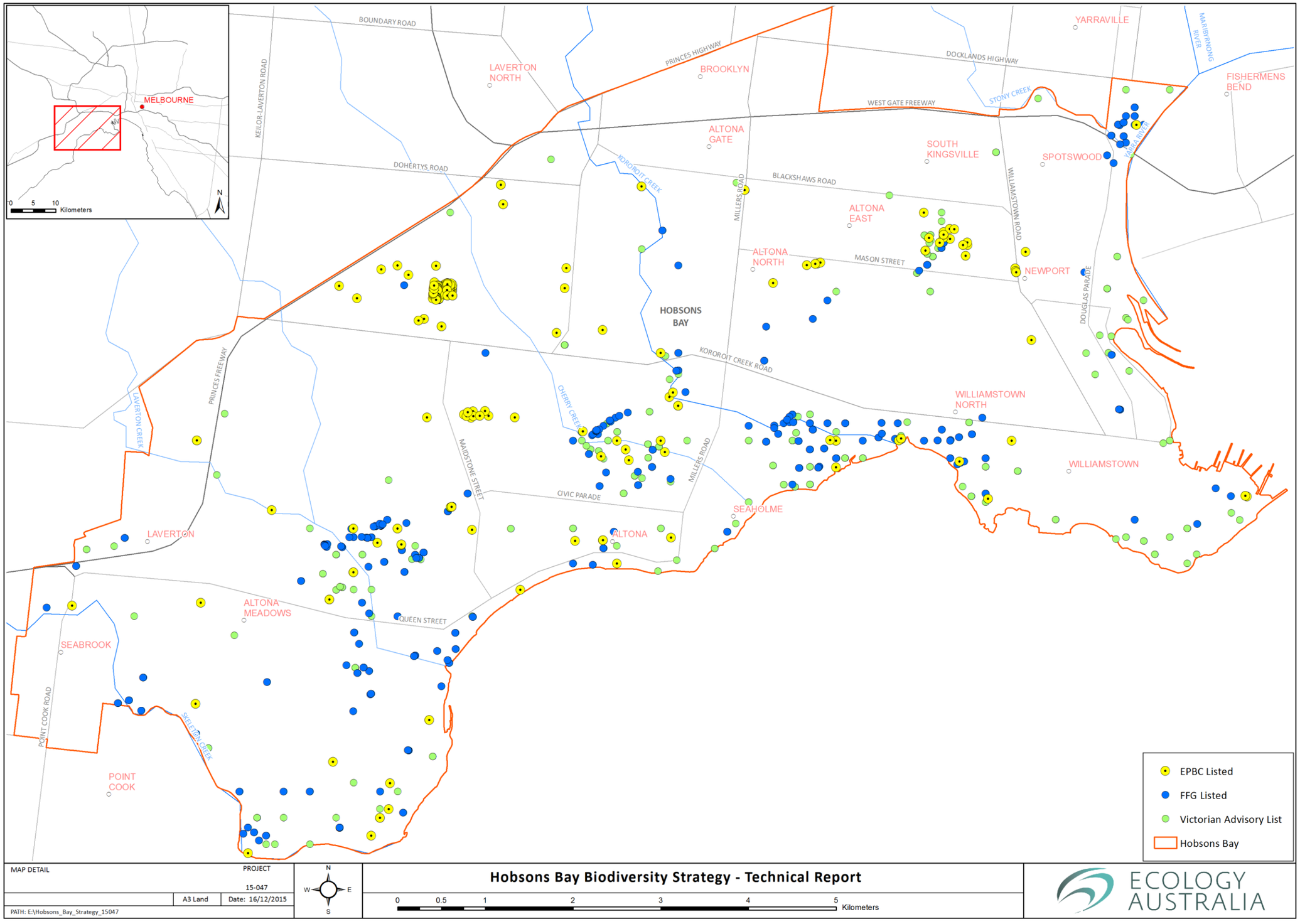


Figure 4 Distribution of records for threatened fauna listed under the EPBC Act, FFG Act and/or state advisory list (DEPI 2014a)

3.8 Other species

Database records for fungi, lichens and terrestrial/aquatic invertebrates revealed an additional 161 taxa not discussed elsewhere in this document. Those with at least genus-level determinations are listed in Appendix 1 for the purposes of providing provisional lists of these taxa for future reference. No further curation of the data or analysis of implications for the strategy is provided for these species. However, there are opportunities to invest further in research for these groups, as their lifecycle and ecophysiological responses often make them better candidates to gauge biodiversity implications of climate change and other environmental variation, compared with vascular plants and vertebrates.

3.9 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are the standard mapping unit used for native vegetation planning in Victoria. They are classified by the assemblages of plant species as well as a number of environmental variables. Hobsons Bay City Council area falls entirely within the Victorian Volcanic Plain bioregion.

The municipality supported the following EVCs or mosaics of EVCs prior to European land use (NV_1750) when all areas of the municipality contained some type of native vegetation (Figure 5). More than 90 per cent of the area of municipality was classified within four mapping units; Plains Grassland covered the greatest extent, with significant areas of Coastal Saltmarsh, Coastal Alkaline Scrub and Plains Grassland / Plains Grassy Woodland mosaic. The modelled EVCs include:

- Aquatic Herbland (EVC 653)
- Brackish Wetland (EVC 656)
- Coast Banksia Woodland (EVC 2)/ Coastal Dune Scrub (EVC 160) mosaic
- Coastal Alkaline Scrub (EVC 858)
- Coastal Saltmarsh (EVC9) aggregate
- Coastal Saltmarsh (EVC9)/ Coastal Dune Grassland (EVC 897)/ Coastal Dune Scrub (EVC 160)/ Coastal Headland Scrub (EVC161) mosaic
- Mangrove Shrubland (EVC140)
- Plains Grassland (EVC132)
- Plains Grassland (EVC132)/ Plains Grassy Woodland (EVC 55) mosaic
- Riparian Woodland (EVC641)
- Swamp Scrub (EVC53)

Based on NV_2005 and The Victorian Saltmarsh Study (2011) it is estimated that approximately 946 hectares of native vegetation remains within the municipality, which is less than 15 per cent of the 1750 extent (6352 ha). While some of the NV_1750 EVCs are represented in remnant patches at the time of this study, their occurrences are largely reduced to coastal reserves, waterways and floodplains, some areas of private property and public conservation reserves. Some EVCs are extinct or have been almost entirely cleared since 1750 including Coastal Banksia Woodland (EVC 921) and Escarpment Shrubland (EVC 895). Riparian Woodland has been reduced to small isolated remnants along the Kororoit Creek.

Extant native vegetation is mapped (Figure 4) within the following EVCs (Table 9). Names for the aggregate of EVCs within Coastal Saltmarsh are used from the Victorian Saltmarsh Study (2011) and hence several of these are not assigned an EVC number.

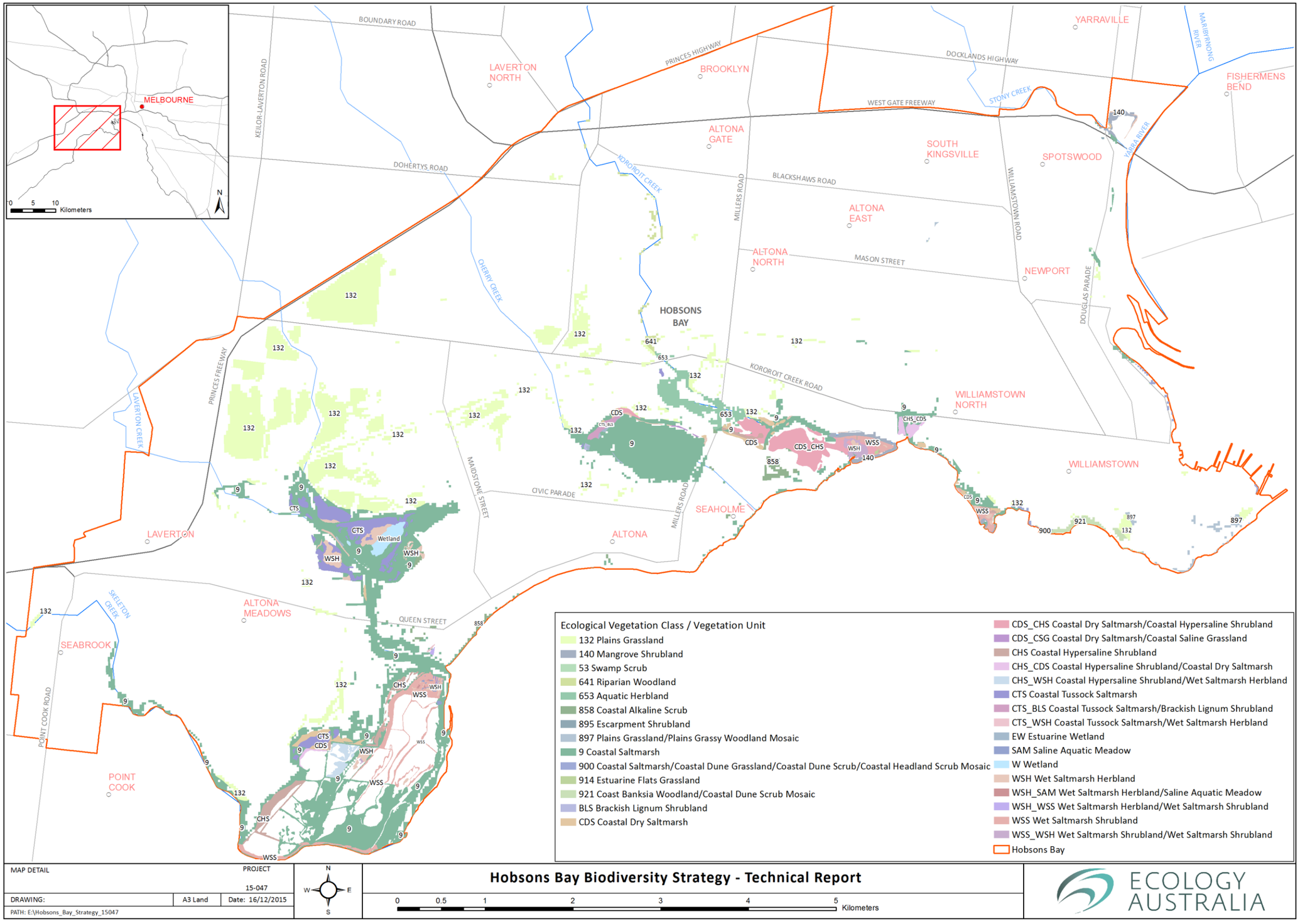


Figure 5 Extent of native vegetation types: modelled NV_2005 and Victorian Saltmarsh Study (2011) Ecological Vegetation Classes, mosaics and complexes

Table 9 Extant Ecological Vegetation Classes within Hobsons Bay

Coastal Saltmarsh aggregate	
	Description and distribution
Brackish Lignum Swamp (EVC 947)	**Distribution**: Small patches around Cherry Lake and to the north in the floodplain of Kororoit Creek. **Description**: Shrubland to 2 m tall dominated by Tangled Lignum *Duma florulenta*. A suite of low ground-cover herbaceous species occur, including some species typical of saltmarsh communities and also aquatic species which tolerate brackish conditions (Frood 2005).
Coastal Dry Saltmarsh	**Distribution**: Larger patches occur on the southern flats of Kororoit Creek within the vicinity of the bay, with smaller patches around Cherry Lake and on the western side of Cheetham Wetlands. **Description**: A low shrubland or herbfield with the often dominant species Beaded Glasswort *Sarcocornia quinqueflora*, Creeping Brookweed *Samolus repens*, Austral Seablite *Suaeda australis* and Australia Salt-grass *Distichlis disticophylla*. This EVC is subject to infrequent tidal inundation (Victorian Saltmarsh Study 2011).
Coastal Hypersaline Shrubland	**Distribution**: Extensive along the western side of Cheetham Wetlands, near the entrance of the Kororoit Creek and upstream (south of the Mobil Altona Refinery). **Description**: Occurs in areas of high salinity and includes Grey Glasswort *Tecticornia halocnemoides,* Salt Lawrencia *spicata,* Austral Seablite *and* Southern Sea-heath *Frankenia pauciflora* (Victorian Saltmarsh Study 2011). Flora species dominant in Coastal Dry Saltmarsh are also sometimes conspicuous.
Coastal Saline Grassland	**Distribution**: In small patches on the north side of Cherry Lake. **Description**: Grassland dominated by Australian Salt-grass and/or Salt Couch *Sporobolus virginicus* with other saltmarsh herbs scattered near boundary of other EVCs. This EVC when developed has low flora species diversity (Victorian Saltmarsh Study 2011).
Coastal Tussock Saltmarsh	**Distribution**: In large patches upstream of Laverton Creek, to the east of AB Shaw Reserve. In a patch also on the western side of Cheetham Wetlands. **Description**: Tall grassland or sedgeland dominated by Prickly Spear-grass *Austrostipa stipoides* and Chaffy Saw-sedge *Gahnia filum.* Common species in Coastal Dry Saltmarsh and Wet Saltmarsh Shrubland (e.g. Beaded Glasswort) are often present (Victorian Saltmarsh Study 2011). Occurs higher in the tidal reaches of saltmarsh systems.
Saline Aquatic Meadow	**Distribution**: Scattered in patches on the south side of the Laverton Creek entrance, Cheetham Wetlands. **Description**: A species-poor herbland of *Ruppia* spp. (Tassel) and *Lepilaena* spp. (Water-mat). This EVC may be subject to frequent tidal

	inundation and soils are often anaerobic (Frood 2005).
Wet Saltmarsh Herbland	**Distribution**: Scattered widely along Skeleton Waterholes Creek, the northern parts of Cheetham Wetlands, the floodplain of upper Laverton Creek, north shoreline of Cherry Lake and the west and east side of Kororoit Creek entrance. **Description**: Dominated by Beaded Glasswort, Creeping Brookweed, Shiny Swamp-mat *Selliera radicans* and Austral Seablite with a suite of other less common halophytes. This EVC is frequently inundated by tides and occupies low lying areas (Victorian Saltmarsh Study 2011).
Freshwater wetlands	
Aquatic Herbland (EVC 653)	**Distribution**: Modelled in large patches along Kororoit Creek, west of the Mobil Altona Refinery. A small area of this EVC has been mapped within rail land north of Altona Meadows (EHP 2008) and along Lower Kororoit Creek (Ecology Australia 2003). The extent of this EVC elsewhere within Hobsons Bay is uncertain. **Description**: Low herbland with a moderate diversity of forbs which tolerate periodic freshwater inundation. Dominant species include Water-milfoil *Myriophyllum* spp., Small Loostrife *Lythrum hyssopifolia*, Brown-back Wallaby-grass *Rytidosperma duttonianum*, Common Nardoo *Marsilea drummondii*, Streaked Arrowgrass *Triglochin striata* and Spike-sedges *Eleocharis* spp.
Plains Grassy Wetland (EVC 125)	**Distribution**: Uncertain. This EVC is known to occur in some small patches around Ajax Road Altona and nearby (Biosis Research 2006, 2011). **Description**: Occurs in a mosaic on gilgai soils amongst Plains Grassland. This EVC typically includes the dominant species Spike-sedges, Prickfoot *Eryngium vesiculosum*, Common Swamp Wallaby-grass *Amphibromus nervosus*, Joint-leaf Rush *Juncus holoschoenus*, Common Nardoo, Small Loostrife, Willow-herb *Epilobium billardierianum* and other herbs.
Brackish wetlands	
Brackish Wetland (EVC 656)	**Distribution**: Modelled in patch on the western side of the Yarra River. Other mapping occurs at Ajax Road, Altona (Biosis Research 2011) and along Laverton Creek north of Laverton (Biosis Research 2007). **Description**: This EVC within the region is typically dominated by Sea Rush *Juncus kraussii*, Sharp Club-sedge *Schoenoplectus pungens*, Streaked Arrowgrass, Common Reed *Phragmites australis* and a suite of less common halophytes. It typically occupies shorelines.
Estuarine Wetland (EVC 10)	Distribution: In small patches on the western side of Cherry Lake and upper section of Laverton Creek.
Woodlands, Scrubs and Shrublands	
Coastal Banksia Woodland (EVC 2)	**Distribution**: Modelled along the southern beaches of Williamstown, east of Jawbone Reserve. The extent of this EVC within Hobsons Bay is uncertain and it may be confined only to scattered shrubs or small

	patches of understorey components. Modelled in a mosaic with Coastal Dune Scrub. **Description**: Within the region, this EVC is open woodland to 12 m tall with the dominant tree Coast Banksia *integrifolia* with Coast Beard-heath *Leucopogon parviflorus,* Coast Tea-tree *Leptospermum laevigatum* and Seaberry Saltbush *Rhagodia candolleana* common understorey shrubs. A number of grass and forbs species may be dominant including halophytes, as well as Austral Bracken *Pteridium esculentum*.
Coastal Alkaline Scrub (EVC 858)	**Distribution**: Modelled in small scattered patches east of Cherry Lake and on the north side of Laverton Creek, within 1 km of the bay. According to pre1750 modelling, this EVC is much depleted within Hobsons Bay. Other occurrences known at Truganina Explosives Reserve (Ecology Australia 2002), Jawbone Reserve (HBCC 2013), Altona Coastal Park (AECOM 2013). **Description**: Within the region, a dense shrubland to 8 m tall (typically less) with dominant species including Coast Beard-heath, Coast Tea-tree, Drooping Sheoak *Allocasuarina verticillata*, Moonah *Melaleuca lanceolata*, Coast Wirilda *Acacia retinodes* var. *uncifolia*, Knobby Club-sedge *Ficinia nodosa* and a moderate diversity of grasses and forbs.
Coastal Dune Scrub (EVC 160)	**Distribution**: See Coastal Banksia Woodland. Modelled only in a mosaic with Coastal Banksia Woodland within Hobsons Bay. **Description**: Within the region, an open to closed shrubland to 3 m tall with dominant species including Coast Wattle *Acacia longifolia* subsp. *sophorae*, Seaberry Saltbush *Rhagodia candolleana*, White Correa *alba*, Knobby Club-sedge and *Sandhill Sword-sedge Lepidosperma concavum*.
Escarpment Shrubland (EVC 895)	**Distribution**: Small isolated patch modelled on south side of Stony Creek. The extent of this EVC within Hobsons Bay is uncertain. It was likely to have once occurred along parts of the Skeleton Creek escarpment and still do so in small patches. **Description**: There are few local examples from which to describe the floristics of this EVC. It is likely to have comprised the shrubs species Sweet Bursaria *spinosa*, Buloke *Allocasuarina luehmannii*, Tree Violet *Melicytus dentatus* and Black Wattle *Acacia mearnsii*. There are historical data which indicate some species more common in arid Victoria also occupied this EVC within Hobsons Bay including Dwarf Bluebush *Maireana humillima*, Wholly-fruit Bluebush *Eriochiton sclerolaenoides* and Grey Copperburr *Sclerolaena dicantha*.
Swamp Scrub (EVC 53)	**Distribution**: Modelled in small patches around Newport Park. The presence of this EVC within Hobsons Bay is uncertain. **Description**: Within the region, this EVC is invariably dominated by Swamp Paperbark *Melaleuca ericifolia* which forms a dense shrubland to 6 m tall. Beneath the canopy, there is often a moderate cover of Weeping Grass Microlaena stipoides and several other grasses and

	forbs.
Mangrove Shrubland (EVC 140)	**Distribution**: Around the entrance of Kororoit Creek and adjacent nearby shoreline. **Description**: Closed shrubland comprising *Avicennia marina* subsp. *australasica* to 3 m tall. A suite of saltmarsh species may also occur where adjoining saltmarsh communities occur.
Riparian Woodland (EVC 641)	**Distribution**: Modelled in scattered patches alongside Kororoit Creek, north of Kororoit Creek Road. **Description**: Open woodland to 15 m tall. Within the region, this EVC typically has River Red-gum *Eucalyptus camaldulensis* as the dominant canopy tree. Understorey vegetation is dominated by grasses and other herbs including Common Tussock-grass *Poa labillardierei*, and may include aquatic species such as Common Reed and Common Spike-sedge near creek banks. A low cover of shrubs including Blackwood *Acacia melanoxylon* and Sweet Bursaria is typical.
Plains Grassy Woodland (EVC 55)	**Distribution**: Modelled in small patches around Williamstown. The status of this EVC is uncertain although there are unlikely to be treed examples remaining within Hobsons Bay. **Description**: Open woodland to 15 m tall. Within the region, this EVC has grassy understorey vegetation with a plant composition similar to Plains Grassland. Small to medium shrubs including Golden Wattle *Acacia pycnantha*, Black Wattle and sheoaks *Allocasuarina* spp. are scattered. River Red-gum, some other eucalypt species and Buloke are canopy components in this EVC west of Melbourne.
Grassland	
Coastal Dune Grassland (EVC 897)	**Distribution**: Modelled in scattered patches around the Williamstown area. Most of the areas now comprises infrastructure or introduced park lawns. The presence of this EVC within Hobsons Bay is uncertain. It is modelled in a mosaic with other coastal EVCs. **Description**: Within the region, this EVC occupies foredunes where Hairy Spinifex *sericeus* is the dominant native grass. A moderate diversity of other graminoids, shrubs and succulent herbs occur including Karkalla *Carpobrotus rossii*, Knobby Club-sedge and Coast Saltbush *Atriplex cinerea*.
Estuarine Flats Grassland (EVC 914)	**Distribution**: One patch of this EVC occurs on the south side of Kororoit Creek, near the entrance to the bay. **Description**: Grassland to 1.5 m tall with a dominant component of saltmarsh flora. The flora has a strong tidal influence although some herb species occupy the higher soil horizon where there is lower salinity (Yugovic pers. comm.).
Plains Grassland (EVC 132)	**Distribution**: Plains Grassland is the most extensive EVC within Hobsons Bay. Scattered on basalt soils with larger patches in the northwest and central areas of the municipality. **Description**: Grassland to 1.5 m tall. This EVC is dominated by the

grasses Kangaroo Grass *Themeda triandra*, spear grasses *Austrostipa* spp. and wallaby grasses *Rytidosperma* spp. Kneed Spear-grass *Austrostipa bigeniculata*, Rough Spear-grass *Austrostipa scabra* and Brown-back Wallaby-grass are common. A number of common forbs species are distribution throughout Plains Grassland within Hobsons Bay. These include Sheep's Burr *Acaena echinata*, Narrow Plantain *Plantago gaudichaudii*, Grassland Wood-sorrel *Oxalis perennans* and Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*. Shrubs including Black Cotton-bush *Maireana decalvans* are uncommon. For most part, this plant composition of Plains Grassland within Hobsons Bay comprises a subset of the original grassland flora and a large number of its herbaceous flora is now regarded as locally extinct.

3.10 Threatened communities

EPBC Act listed - Natural Temperate Grassland of the Victorian Volcanic Plain

Some areas of Plains Grassland EVC within Hobsons Bay meet the definition criteria of the EPBC Act listed ecological community Natural Temperate Grassland of the Victorian Volcanic Plain. The extent of this listed community within Hobsons Bay is uncertain and only localised mapping has been undertaken as required for planning permits or offset purposes. Plains Grassland patches meet the definition of the listed community where cover of species within the genera *Themeda, Austrostipa, Rytidosperma* or *Poa* is at least 50 per cent. The cover of these perennial species may be less than 50 per cent if native forbs provide at least 50 per cent of the total vegetation cover during spring-summer. In any native composition state, the listed community is also present where the cover of non-grass weeds is less than 30 per cent of the total vegetation cover at any time of the year (TSSC 2008). Patch size thresholds also determine extent, in addition to composition and plant cover requirements. Contiguous patches smaller than 0.05ha amongst any other native vegetation patch <1ha are excluded (woody vegetation >1m tall should not exceed 5% cover). For larger patches of native vegetation, contiguous patches of the listed community must be at least 0.5ha (density of mature trees should not exceed two per hectare).

Larger patches of Plains Grassland within Hobsons Bay are likely to meet the definition of Natural Temperate Grassland of the Victorian Volcanic Plain. Examples occur within Laverton Grassland and on private property near Burns Road and Ajax Road, Altona.

EPBC Act listed - Subtropical and Temperate Coastal Saltmarsh

Most patches of EVCs within the Coastal Saltmarsh aggregate are the EPBC Act 1999 listed ecological community Subtropical and Temperate Coastal Saltmarsh, which is listed as vulnerable. This community occurs in the upper inter-tidal zones of bays, along estuaries or within near coastal low-lying areas where there is ground water connectivity. The listed community requires at least some tidal influence and there can be some inclusion of ecotone vegetation between other vegetation types. Subtropical and Temperate Coastal Saltmarsh occurs where community composition requirements are met and patches are ≥ 0.1 ha when isolated, or if smaller, then in a mosaic ≥ 0.1 ha with < 30m between each patch (TSSC

2013). Cheetham Wetlands provides an important conservation area for this listed ecological community.

EPBC Act listed - Grassy Eucalypt Woodland of the Victorian Volcanic Plain

This ecological community is a grassy woodland community with a typically very low cover of eucalypts, or in some examples, other canopy species. Locally, this community may have occurred where Plains Grassy Woodland is modelled (NV_2005), particularly in the east of the municipality. Pre-European distribution, or otherwise, of this community is difficult to confidently determine. This is because there are very few records of the likely canopy species and the area has a long history of agricultural land use. There are no extant areas currently recognised.

EPBC Act listed - Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains

Prior to industrial and residential development, low-lying plains in Altona, Altona North and Laverton would most likely have supported a greater extent of grassy wetland communities. Small patches of Plains Grassland EVC are known from the Ajax Road area in Altona, and remnant patches of this EVC partially fit within the definition of the listed community. A small number of patches at Ajax Road fit within the definition of the EPBC Act listed community (Mueck pers. comm.).

This listed community occurs on some plains which are seasonally inundated by freshwater but it does not have tidal influence or fed by a riverine system. The associated EVC Plains Grassland is commonly known from basalt-derived gilgai soils where grassy wetland and grassland communities occur in mosaic. The vegetation is treeless and a suite of grass and/or sedge species are typically common. Amongst other criteria, this community is present where isolated patches are at least 0.5ha, there is a cluster of patches with a collective area at least 0.5ha within a 5ha area, or a patch of any native vegetation of at least 1ha occurs with no less than 0.1ha of the listed community (TSSC 2012).

The presence of the listed community within Hobsons Bay is uncertain and further surveys are required to determine its status within the municipality.

FFG Act listed - Western (Basalt) Plains Grassland Community

This basalt grassland community occurs wherever Plains Grassland EVC occurs. It varies in species composition, however the floristics of Plains Grassland and the EPBC Act Natural Temperate Grassland of the Victorian Volcanic Plain are representative of this listed community. There are few thresholds other than floristic considerations to define this community and its circumscription is broad enough to include any remnant of basalt grassland within Hobsons Bay.

FFG Act listed - Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04

This listed community has affinities with the EPBC Act listed Grassy Eucalypt Woodland of the Victorian Volcanic Plain. As for Western (Basalt) Plains Grassland Community, the thresholds for presence of this woodland community are limited in their description. Remnants of this community may occur within Hobsons Bay although there are no extant examples documented.

Knowledge gaps

The major knowledge gaps in biodiversity information are considered under the following categories:

- **Surveys on private land and areas of non-native vegetation**: Some areas of private land have very little or no data associated in the Victorian Biodiversity Atlas (VBA). For example, modelling of native vegetation (NV_2005) shows that land at Burns Road Altona contains Plains Grassland. Detailed surveys on this land could add significantly to information about grassland species distribution within Hobsons Bay. Some areas of predominantly planted vegetation including Newport Lakes and Kooringal Golf Course have no flora or fauna information in the VBA. There are opportunities to target some areas of the municipality with general flora and fauna surveys, to gain a better understanding of existing conditions.
- **Distribution of Ecological Vegetation Classes**: Information about the distribution of EVCs within Hobsons Bay is mostly attributed to NV_2005; that is, the modelled extent of each EVC at 2005. This dataset suffers mostly from errors in the native vegetation extent model which is used to cut the NV_1750 EVC modelled distribution. There is a significant area of modelled native vegetation that was infrastructure (no native vegetation) in 2005 or where the vegetation has since been cleared for industrial development. Conversely some area of Plains Grassland and other vegetation are not modelled within the threshold of 1:25,000. The Victorian Saltmarsh Study (2011) provides accurate boundaries for associated EVCs, mostly along coastal areas of the municipality. At present, the status and extent of some EVCs within the municipality is unclear. Further survey work is required to accurately determine the areas of extant EVCs and their condition.
- **Distribution of EPBC Act and FFG Act listed communities**: There is very little information about the extent of listed communities within Hobsons Bay. More survey work is required to map areas of native vegetation against the relevant thresholds and definition criteria of each community.
- **Fish** - A considerable amount of information on fish communities has been collected by Melbourne Water across their management area for many years. The volume and spatial coverage of aquatic fauna records within the relevant databases is much smaller than that for terrestrial fauna, largely due to the limited opportunity to make incidental observations (most records are obtained via survey). Threat categories have been assigned on the basis of available information, in the knowledge that there is a chance that other indigenous fish species may occur that have not previously been recorded. It is unfortunately not possible to determine trends in the fish fauna from the current datasets, due to insufficient data the varying techniques and efforts used (i.e. lack of standardisation), and the lack of randomisation in site selection (ARCUE 2008, Alluvium 2010, Robinson 2014).
- **Neglected species in surveys**: Almost all of the species information in databases for the municipality represents vertebrate animals or vascular plants. These two groups of organisms together make up a smaller percentage of the total species richness for Hobsons Bay. For example, about 18 per cent of Victoria's flora is represented by non-vascular taxa although these only represent two per cent of records in Hobsons Bay. A comparable proportion to Victoria is not expected as Hobsons Bay does not contain any bryophyte rich habitats such as Cool Temperate Rainforest. However, the low percentage is a product of under-sampling. Targeting mosses, liverworts and other cryptogamic species in surveys will increase the total number of documented taxa within the municipality. There may conservatively be another 40 bryophyte taxa from grassland, riparian and saltmarsh habitats to add to the census. Insects and other invertebrates are poorly sampled within the municipality. The data available for insects are limited to a small number of threatened species. Some data on fungi and lichens have been added to species censuses in

Appendix 1, however they have gained little attention for their conservation requirements or influence on the strategy development.

Often the non-vascular flora, lichens, fungi and invertebrates are better indicators of environmental conditions, due to shorter life-cycles and other traits, although they are seldom considered in ecological surveys or research compared with other species. Considerable work could be undertaken to better document these components of biodiversity within Hobsons Bay.

3.11 Areas and values of significance

Mapping to indicate sites of biodiversity significance (Figure 6) is provided for high level planning purposes only. The mapping follows property boundaries and can be used at this scale, provided that the criteria in Table 4 are found to be still relevant for the property. In some cases, a value (e.g. threatened species) has been mapped along a boundary or small open areas on a property which are otherwise devoid of native vegetation. For land use planning purposes, the map provides a risk assessment which should be used to trigger the requirement for a proponent to provide an appropriate level of information about biodiversity with a relevant planning permit application. It is important to consider also that the significance rating uses data which, for most part, were collected over the last 50 years. The mapping does however include consideration of a range of factors relevant to planning when the dataset was prepared for classification, including when a species observation was made, species mobility, species taxonomy and spatial errors. The classification of biodiversity significance should not be used alone for guiding changes to the planning scheme and should be regarded provisional only for this purpose.

The analysis of sites of significance shows that many larger properties containing native grassland have very high significance relative to other areas within Hobsons Bay. The analysis identifies key sites including grassland east of Merton Street and west of Modal Place, Laverton North Grassland, Horsburgh Drive area and the Ajax Road area. Grassland and other biodiversity values result on high biodiversity significance sites at AB Shaw Reserve and land to its east, Cherry Lake, Altona Coastal Park, Jawbone Flora and Fauna Reserve, Newport Lakes Reserve and Cheetham Wetlands. There are also substantial areas of the municipality which have high relative biodiversity significance. These include Altona Memorial Park, land east of Modal Place, Kororoit Creek Corridor, land between Kororoit Creek and Blomberg Road, Paisley Park, land buffering the Yarra River, coastal parks at Williamstown, Kooringal Golf Course and Truganina Reserve.

Within Hobsons Bay, mixed land use comprising predominantly residential and industrial occupancy outside of open space limits opportunity to create or manage habitat corridors for connectivity between larger patches of native vegetation. Furthermore, opportunities to provide greater connectivity by habitat restoration within open space corridors are sometimes negated by conflicting constraints of land tenure, fire management, adjoining land management and maintenance of transport and other infrastructure. Considerable revegetation efforts have been undertaken to date along Kororoit Creek and other waterways. These drainage corridors are good candidates for continued landscape connectivity restoration works for a range of reasons. Corridors along creeks and other waterways:

- have established waterway management buffers
- are linked with areas of biodiversity significance in neighbouring municipalities
- bisect the municipality and often have long contiguous areas of different habitat patches

- often landscape habitat values for a large number of species, particularly birds
- are typically in public ownership and suitable for residential community interaction.

There are some areas under-utilised in restoration efforts, which have potential for improving habitat connectivity between larger Plains Grassland (Figure 6). The rail alignment east from Princes Hwy and to approximately Miller Rd (Altona) runs adjacent to and crosses large areas of very high or high biodiversity significance vegetation including land around Burns Rd, AB Shaw Reserve, Ajax Rd and the Kororoit Creek corridor. This land is for most part managed by VicTrack or their lessees. While the open space alongside the rail alignment is secure as a buffer for rail infrastructure, there are restrictions with contractors and public accessing live rail areas. This alignment would be useful for the maintenance of grassy low open vegetation, which provides useful habitat for the EPBC Act listed Golden Sun Moth, other invertebrates, reptiles, frogs and ground dwelling/foraging birds. It may also contribute further to gene flow between populations occupying larger and more diverse patches of Plains Grassland that are contiguous with the rail alignment. A limitation of the rail alignment is that the track and ballast are a likely barrier for some species and vegetation is not contiguous on the north and south side of the track, notwithstanding vegetation along waterways which pass under the rail infrastructure.

Efforts for the improvement of habitat connectivity should be directed at inland landscapes. Coastal areas generally attain connectivity via foreshore, backshore, estuarine and shallow marine zones. Shorebirds at least have the capability to move between larger coastal reserves, as do facultative estuarine fish. Providing connectivity of ecotones between estuarine and inland ecosystems by habitat restoration along waterways can further improve the condition of coastal reserve by improving water quality.

Roadside vegetation also provides connectivity between grassland patches. These areas present perhaps the greatest challenge for biodiversity management compared with riparian and rail alignment corridors. Roadside vegetation is often afforded poor statutory protection and retention of native vegetation typically receives lower priority to road safety, road improvement works, installation and maintenance of services, fire management, landscape aesthetics and—in some areas—pedestrian access.

A strategy to improve habitat connectivity and species movement between very high and high biodiversity significance areas should focus on (in order of priority):

- continuing restoration efforts within riparian areas of Kororoit Creek, Cherry Creek, Laverton Creek and Skeleton Creek
- improve native vegetation quality along the Werribee rail corridor
- improving native vegetation and habitat quality in larger coastal reserves
- improving native vegetation and habitat quality on roadsides containing Plains Grassland or similar vegetation

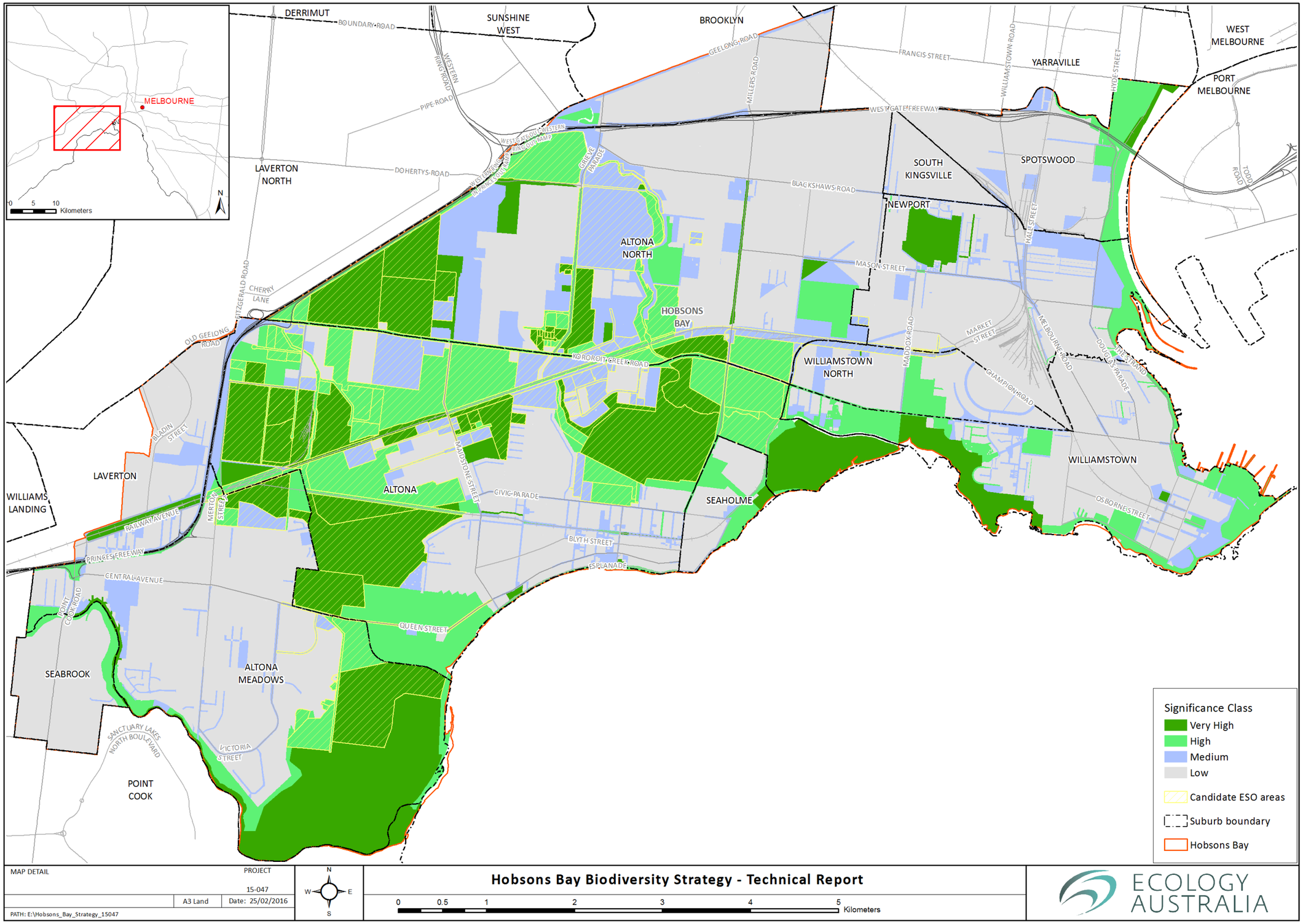


Figure 6 Property classification of biodiversity significance and candidate areas for ESO consideration

4 Pest plants

4.1 Priority areas for weed mapping and management

Weed invasion is arguably the greatest threat to terrestrial biodiversity values within Hobsons Bay and, without appropriate management weeds will continue to degrade these values over time. The rate of loss will depend on the environmental conditions of the site, the indigenous flora present, the weed flora and their management regimes. The threat of weed invasion is frequently one of several combined threats.

Currently 365 exotic plant species (weeds) have been recorded within Hobson Bay, some 50 per cent of the total flora (Appendix 1). There are doubtless other weed species not yet recorded, while additional weed species will make an appearance, species that may constitute as great a threat, or larger threat than the current suite of weeds; the weed flora is nothing, if not highly dynamic.

In such a highly modified and disturbed landscape with a history of agriculture, urbanisation and industrialisation, all reserves have a large suite of weed species which, in an ideal world, would be managed to maintain and enhance their biodiversity values. Most weed species are effectively intractable because they are so ubiquitous and abundant in the landscape with vast seed production, rapid growth rates and rapid life cycle. This mostly applies to annual and perennial herbs. If controlled or managed to reduce population levels they would rapidly recolonise the site, or another suite of weeds would take over, perhaps a greater threat than the species controlled. For the most part, except perhaps at the small-scale to protect threatened plant (e.g. orchids) or animal populations, weed species that are targeted for management (control, elimination or containment) will be robust herbaceous perennials or woody weeds (trees, shrubs and vines).

Weed management in any reserve must be based on an understanding of which biodiversity assets management is designed to protect (vegetation, flora and fauna habitat) and a contemporary inventory of the weed flora; these data are essential.

Weed control is and will remain the primary concern for vegetation and fauna managers in Hobsons Bay. Determining which areas to undertake management activities is influenced by several factors (exclusive of funding):

- history of recent weed control works within the municipality
- value of biodiversity assets
- tractability of weed control
- potential for the vegetation/fauna habitats to recover significantly to make control worthwhile (or be a bottomless pit of investment)

In addition to the above, an analysis of weed risk to broad vegetation types has been undertaken to add to strategic level considerations of where weed control resources should be focused (Figure 7).

An evaluation would follow identifying which weeds should be targeted for control, elimination or containment, and the method(s) appropriate to treat populations (physical, mechanical, herbicide or biological control), as well as prioritisation based on the threats posed, size of populations and the biology and ecology of the species.

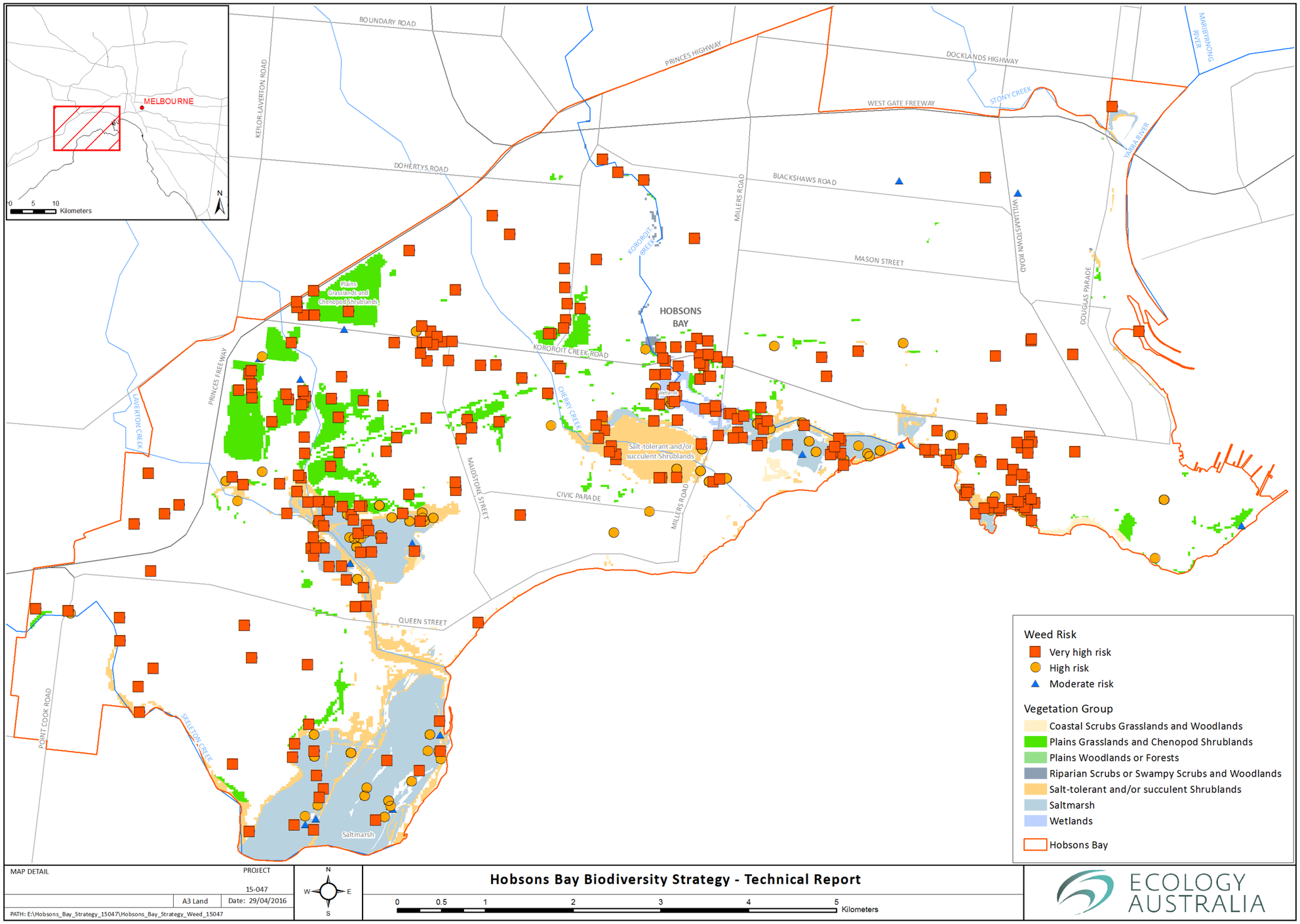


Figure 7 Moderate, high and very high risk weed species distribution

Riparian Vegetation, Freshwater Wetlands and Escarpment Shrublands have the most number of weed taxa that pose a very high risk to biodiversity values (Figure 8). Few weed species present a high or very high risk to all vegetation types; those that do include Couch *Cynodon dactylon* var. *dactylon*, Ribwort *Plantago lanceolata*, Buffalo Grass *Stenotaphrum secundatum*, Toowoomba Canary-grass *Phalaris aquatica* and Kikuyu *Cenchrus clandestinus*. Despite risks to biodiversity, tractability of these species may preclude their prioritisation for control and resource allocation. Separate to the species which present risks across a range of environments, there are species which can overwhelmingly dominate one vegetation type but still present a high risk to a large number of indigenous species. The weeds Cane Needle-grass *Nassella hyalina*, Texas Needle-grass *Nassella leucotricha*, Serrated Tussock *Nassella trichotoma*, Chilean Needle-grass *Nassella neesiana*, Galenia *pubescens*, Soft Brome *Bromus hordeaceus* and Common Onion-grass *Romulea rosea* amongst others, are species which present a high to very high risk in Plains Grassland. Conditions elsewhere are less favourable extensive development, either due to soil type, differences in nutrient availability or other reasons.

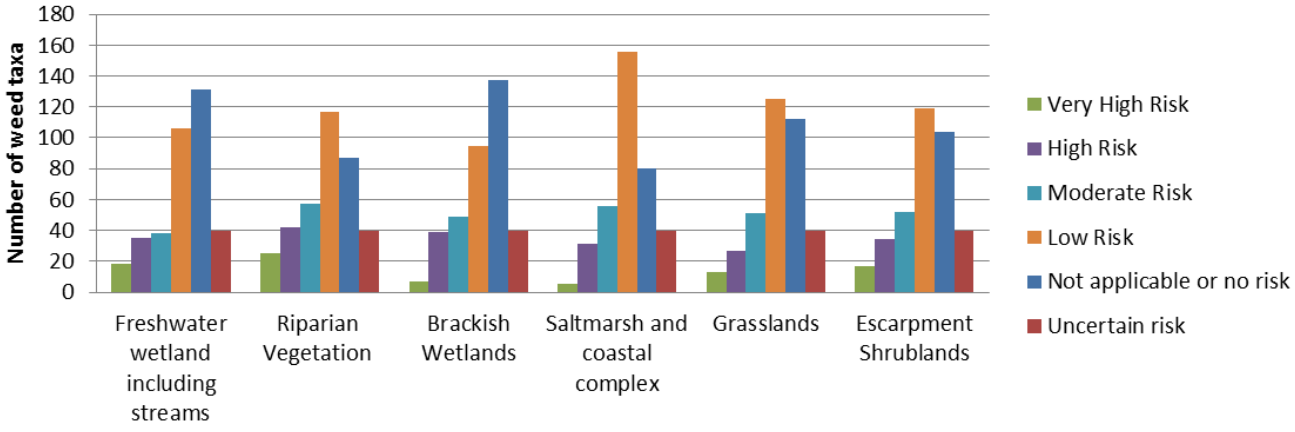


Figure 8 Proportion of Hobsons Bay's weed flora and their degree of risk to major vegetation types.

Mapping of the weed species is required to plan the control programs and to monitor its outcomes: Spot locations (GPS waypoints) of weeds, where few or concentrated individuals are involved; or for larger more diffuse populations mapped as polygons by tracking (with GPS) of the boundaries of the populations/sub-populations. These data will enable monitoring of the distribution and population status of the species in response to management. Semi-quantitative data collected on permanent plots or transects enable tracking of the weed cover. Permanent belt transects with contiguous plots are advocated in which the cover of weed species of interest is recorded. This will provide baseline data to monitor trends in cover/abundance in response to management intervention. The value of belt transects is that transects can span different vegetation types and the data are very easily recorded and analysed: permanent steel stakes mark each ends of each transect, and photopoints are also incorporated to provide a visual record of changes. The protocols of these procedures, as implemented for Parks Victoria, are as follows, in Section 4.2.

4.2 Adjoining land management risks and opportunities

Populations of many weed species owe their origin to populations of adjoining land (of various tenure) but also to populations which may be distant but are readily dispersed to the site, mainly by seed. Of particular relevance in this context is Desert Ash *Fraxinus angustifolius subsp. angustifolius* which is a major riparian weed (for example along Kororoit creek). It is also a frequent street tree (and still planted in municipalities in the catchment) and seeds are widely dispersed in the stormwater system to creeks and drainage lines.

Where such sites are identified by Council, an approach can be made to the respective land owner. From Council's viewpoint, weeds would ideally be managed to minimise risk to adjoining properties as part of a 'Good Neighbour' initiative. The cultivation of weedy species (e.g. street trees) should be avoided on all Council controlled land to minimise weed invasion on Council land, adjoining land and elsewhere in the catchment. Desert Ash is the outstanding example but any weed species listed in the *Advisory list of environmental weeds of coastal plains and heathy forest bioregions* (DSE 2009) should not be cultivated.

Industry stakeholders provide a somewhat differing response regarding weed issues compared with natural resource managers such as Melbourne Water and Parks Victoria. Industry demonstrated less knowledge about weed identification and which weeds were problematic. Several responses included concerns about thistles, which are a conspicuous component of grassland and paddocks when these areas are not treated. The spread of Serrated Tussock was also the concern of some stakeholders. Weed control methods by industry include targeted weed control as well as regular slashing of lawns or around the perimeter of larger properties. Weed control and other activities for grassland conservation objectives are undertaken on SCT Logistics land. The Altona Memorial Park regularly controls weeds on their land including thistles, Boxthorn *Lycium ferocissimum* and Feathertop *Pennisetum villosum*. The Kooringal Golf Course has a horticulturalist on staff who undertake weed management and other duties; consequently they have few weed management concerns. While Parks Victoria and Melbourne Water undertake weed control works within their land, it is clear from consultation with Council and other land managers that there are opportunities for further collaboration with these organisations. There is opportunity to organise a joint workshop with key land managers (including some private industry stakeholders) and develop a strategic approach to weed management within Hobsons Bay. This should focus on a small number of high risk species and include Serrated Tussock, Chilean Needle-grass and Artichoke Thistle.

4.3 Preventative weed management

Preventing the spread of weed seeds

The spread of weed seeds and other propagules (e.g. bulbs of Soursob, *Oxalis pes-caprae*) as contaminants on vehicles and machinery is a major issue. Chilean Needle-grass *Nassella neesiana,* for example, has occupied vast sections of the road reserve on the Geelong-Melbourne road and grass slashing is clearly implicated. Other sources of contamination are soils adhering to machinery and vehicles and landscaping materials: sand, soil, rocks and mulch. These dispersal mechanisms apply to contaminated vehicles, soil, sand, rocks, mulch and other landscaping materials entering as well as leaving sites.

Cleaning of machinery and vehicles to avoid the dispersal of weeds should be routine practice when working within areas with high biodiversity significance. Currently Council policy is to clean vehicles of obvious plant materials or soil before leaving the site. The vehicle is washed down on arrival back at the depot.

Standards for which the supplier needs to comply with should be determined, and to monitor sites where the materials have been used to determine if new weeds appear. These would be promptly controlled if detected.

Soils, rock, mulching and other landscaping materials

- Minimise the use of all such materials. This would help to mitigate the often unacceptable environmental impacts of removal in the first place (mining etc.)
- Specify to suppliers that materials must be clean and free of weeds
- Inspect the materials at their source to ascertain, if possible, that they are clean. This should be done in the autumn-spring growing season
- Monitor sites where landscaping materials have been used for six to nine months to determine if new weeds have emerged from unclean materials; implement control if appropriate

The control of dispersal of weed propagules in soil, sand and other landscaping or construction materials is much more difficult, both to know when or if the material is 'clean', or to sterilise it if it is contaminated. The latter is not a realistic option due to the lack of facilities to sterilise such material. Mulch, which frequently contains woody fruits and seeds of the plants chipped (e.g. eucalypts and Cypress *Cupressus* spp.) is a common source giving rise to small weed populations in garden beds, landscaping etc. Sterilising such material until the seeds become unviable is the preferred option rather than spreading the freshly chipped material when fruits can release viable seeds.

Given the ubiquity and abundance of weed species of concern in reserves and multiple means by which they move around the landscape, highly rigorous and elaborate wash-down procedures are unlikely to achieve highly significant benefits. Care should be taken to ensure that Council and contractor management within reserves does not contribute to the spread of high threat weeds, or those weeds which are the most costly for Council to control. These weed species include Chilean Needle-grass, Serrated Tussock, Artichoke Thistle and Galenia. While the method varies by which these species commonly spread, the removal of soil and plant material from vehicle and equipment will reduce opportunities for spread of these species into other areas of native vegetation and fauna habitat.

- Vehicles, equipment and footwear should be clean from plant material and soil prior to exiting sites where high threat weed species are documented or being treated
- Vehicles should be cleaned with a high pressure water spray immediately prior to accessing high or very high biodiversity significance sites. This should be undertaken at a car wash facility or Council depot

Phytosanitary procedures for plant pathogens are not considered necessary because the main organism this intends to guard against, Cinnamon Root-rot Fungus *Phytophthora cinnamomi*, is of minimal concern in the types of vegetation represented in Hobsons Bay.

4.4 Conclusions - weed management on Council land

1. The highest-priority biodiversity assets should receive priority attention for management. Priority should also be given where there are areas of high threat weed species which were recently spread or confined to a manageable area.

2. Council actively undertake weed control in a number of Council managed reserves. A review of these activities indicates that weed control works are focused in the right locations, although there has been little monitoring to determine the impact of treatment and to guide future management. Priorities for vegetation management are provided for particular areas in management plans (e.g. AECOM 2013). Weed control within previously recongnised sites of significance should be continued, including Cherry Lake, Truganina Explosives Reserve, Rifle Range Reserve and Altona Coastal Park. A monitoring program to determine the efficacy of weed management and to assist with prioritising future management is recommended.

3. Where ecological burning is undertaken, it is vital that weed control is undertaken within the 12 months following. This should occur regardless of the location of the burn and target species which have the potential to become dominant and persist in the longer term.

4. Sites subject to an Offset Management Plan must be monitored and managed in accordance with the plan.

5. A landscape analysis of weed risk to broad vegetation types and sites of significance indicates efforts should also focus on roadside grassland, other grassland and the Kororoit Creek Corridor (

Table 10). An integrated approach is needed to manage these priority areas across public and private land.

Table 10 Areas requiring a landscape and tenure-blind approach to weed control

Area	Comments
Kororoit Creek corridor	A number of very high risk weed species occur in the lower reaches of Kororoit Creek. There are opportunities to work with Melbourne Water and collaborate on weed control. These weeds are a threat to grassland, wetland and saltmarsh communities.
Roadsides and rail land adjacent to significant grassland sites.	The control of Chilean Needle-grass, Serrated Tussock and other high risk grassland weeds should be increased as a priority. Grassland at Burns Road and Harcourt Road are threatened by these weeds where they flourish around edges of larger grassland patches. A program of slashing and selective spraying should be developed.

5 Pest animals

5.1 Best practice pest animal management

Foxes

The detrimental impacts of fox predation on Australia's native fauna have long been recognised. Fox predation has been implicated in the decline of numerous native Australian mammals, birds and chelids (Saunders et al. 1995, Dickman 1996a). Most of the species affected have been small to medium-sized, terrestrial mammals, sometimes referred to as 'Critical Weight Range' species (Burbidge and McKenzie 1989, Short and Smith 1994, Kinnear et al. 1998).

Large-scale predator control programs around Australia, have demonstrated the benefits of fox control for small to medium sized mammals and ground-dwelling birds, which includes a number of large-scale fox control programs, in south-eastern Victoria (Catling and Reid 2003, Robley and McKenzie 2005, Murray et al. 2006, Robley et al. 2006, 2008, 2011; Coates 2008, MPWBRF 2008, Dexter and Murray 2009; DoE 2013b; Kirkwood et al. 2014; PINP 2015; PPWPCMA 2015).

Although there has been no specific research into densities of foxes within Hobsons Bay, fox densities in inner Melbourne were estimated to vary from three to 16 foxes per km^2 (Marks and Bloomfield 1999). Further, although the impacts of fox predation on fauna in Hobsons Bay are also not known, species that appear to be most at risk from fox predation in Hobsons Bay are ground-dwelling (e.g. nesting and/or foraging) birds.

Cats

Predation by cats has been linked to the early continental extinction of at least seven mammal species, as well as the island and regional extinctions of numerous other mammal and bird species (Dickman 1996a, b). Cats are also carriers of a disease called Toxoplasmosis, which can have a significant impact on native wildlife populations (Seebeck et al. 1991, Winnard and Coulson 2008).

Research into the density, distribution or population ecology of cats within Hobsons Bay and the broader region has not been undertaken. However, data on impounded cats within Hobsons Bay show that, on average, 94 per cent are unregistered and unowned. In urban or rural areas of south-eastern Australia, the home ranges of domestic cats have been estimated at between 0.4 and 7.9ha, and 1.4 and 4.5ha, respectively (Barrat 1997a, b).

The significance of cat predation on fauna in Hobsons Bay is not known. Research undertaken in Canberra suggests that predation by domestic cats can have a significant impact on wildlife, where new residential developments adjoin relatively undisturbed areas (Barratt 1997a, b). Further, programs around Australia targeting feral cats have demonstrated the benefits of cat control for small to medium sized mammals and ground-dwelling birds (e.g. PPWPCMA 2015). Species that appear to be most at risk from cat predation in Hobsons Bay are ground-dwelling birds and reptiles.

Council has 15, cage cat-traps for use in catching feral and unowned cats. These traps form part of Council's cat trap loan service.

Rabbits

Little is known regarding the density or distribution of rabbit populations and their impacts to various habitat types within the municipality. The distribution and density of rabbits within an area is thought to be influenced by soil type and land use (Williams et al. 1995). Rabbits typically require warrens and above-ground surface harbour to survive. Warrens are usually required for breeding, while above-ground harbours, such as woody weeds, pipes, rock or log piles, and debris, significantly enhance the survival of dispersing young (Bloomfield 1999a, b). Rabbits are also thought to prefer areas with deep, well-drained sandy soils that are easy to excavate.

Grazing by rabbits has had a widespread impact on Australia's native vegetation. Degradation and modification of fauna habitat is considered a major threat to a number of threatened wildlife species (DEWHA 2008a). Burrowing by rabbits creates soil disturbance and facilitates erosion, leading to increased opportunity for weed invasion. Overgrazing also reduces vegetation cover and inhibits the re-generation of understorey vegetation, which can reduce areas of suitable habitat for various wildlife species (Ecology Australia 2013b).

Rabbits can also support large populations of foxes and feral cats, for which rabbits constitute a major source of prey (Catling 1988).

Integrated Pest Management

Integrated pest management (IPM) acknowledges inter-relationships between animal and plant species, native or introduced, and the influence of environmental factors. Information on the life-cycles of pest species and their interactions with other biota is used as the basis of a management strategy, which necessarily employs a combination of techniques, to provide cost-effective control, with minimal risks to people, agricultural production, or the environment. The holistic approach is critical to ensuring a successful outcome, and to reduce the likelihood of unintended, negative consequences, particularly in environments supporting more than one pest species.

Integrated Pest Management recognises that the lethal control of one pest species can influence the distribution or abundance of another, which may have serious implications for native fauna, especially in systems where foxes, cats and rabbits form complex predator-prey relationships. The relationships between foxes, cats and rabbits are complex, not well understood and affected by various complicating, environmental factors, such as habitat type, season, food availability and rainfall. More research is required to better understand these relationships. Effective control of fox populations can significantly reduce the predation pressures upon rabbits. A depression in fox numbers, combined with a resultant increase in rabbit abundance, could indirectly impact prey species through mesopredator release, or directly, through competition or habitat degradation.

Guiding Principles

Council recognises the need for a coordinated and integrated approach to pest animal control in association with adjoining land managers. The guiding principles of any such approach are listed below.

- Predator control programs should be strategic, with regard to determining priority areas for control, the timing of control and the range of techniques to be employed

- An effective predator control program requires an integrated approach, which considers the ecology and interactions between predator and prey species, and employs the most effective, or where appropriate, combination of techniques, with minimal risks
- Monitoring and adaptive management are essential to ensuring that the most appropriate management techniques can be implemented and/or refined, and that successful outcomes are achieved
- Focussed reductions on the impacts of predation on target species (e.g. migratory shorebirds), rather than simply achieving a reduction in pest abundance is critical
- The choice of control methods must balance the efficacy of various techniques with their associated costs, risks and feasibility of implementation
- Co-ordination and capacity building across all levels of Government, and sectors of the community, including industry, land managers and landholders, is essential for the effective implementation of predator control

Pest Plant and Animal Co-ordination

Urban Landcare has considerable potential for co-ordinating pest plant and animal control. Regional programs which guide funding for each organisation are required. Urban Landcare groups work on public land in close collaboration with the public land manager, i.e. usually a local government or Parks Victoria, to undertake practical on-ground works to protect, enhance, maintain and restore local parks and reserves, many of which have significant environmental values.

There is an opportunity for Council to collaborate with industry and Parks Victoria to facilitate Urban Landcare taking a regional approach to pest plant and animal control.

Pest animal control techniques

Presented below is a range of techniques used for controlling pest animals in Victoria. The use of any such technique will be considered by Hobsons Bay in the context of cost, efficacy, public safety and the welfare of both domestic and native animals.

Foxes

- While there is public pressure/opposition to fox baiting, control should be undertaken using ‘soft-jaw’ (i.e. rubber) leg-hold or foothold traps. However, trapping is not an effective or cost-efficient control technique for large scale predator control programs (i.e. it is labour-intensive and costly as traps must be monitored at least daily for captured animals during deployment, and trapping success is generally low).
- Poison baiting is considered to be the single-most effective control method for foxes. This method may benefit from a community education program to gain community support.
- Poison baiting is usually undertaken with Sodium monofluoroacetate (1080) impregnated baits which are buried in the ground at a depth of 10 cm or more. The Victorian State Government (Agriculture Victoria) has developed information regarding the use of 1080 baits, including authorised use and distance restrictions around residential areas.

- Para-aminopropiophenone (PAPP) is a toxin which confers a number of advantages over the use of 1080, is currently being assessed for registration by the Australian Pesticides and Veterinary Medicines Authority, and could be considered for use in the future in Hobsons Bay.
- M-44 ejectors are tube-like, spring-loaded devices which are partially buried in the ground, and can be considered for use in baiting programs in the future. The above-ground component is baited with an attractant, and when pulled, propels a toxicant into an animal's mouth. M-44 ejectors are designed to significantly increase the target-specificity of poison baiting, and reduce non-target impacts. The pull-force required to activate the ejector can be set specifically to target canids and felids. Commercial deployment of ejectors will potentially allow for long-term, target-specific fox and wild dog control with minimal ongoing labour requirements.
- Fumigation of fox dens with carbon monoxide gas (CO) is best undertaken during the fox breeding season, while cubs are still confined to the den, between October and November, to destroy fox cubs in the den.
- Den fumigation is often followed by ripping with machinery, to destroy the den.
- Den fumigation and destruction offers only localised control. On a broad spatial scale, it is only effective when used in conjunction with baiting. This method is suitable for use in urban areas, and can also be used as a valuable monitoring tool, to measure fox activity and abundance in different areas, if dens are not destroyed following fumigation.
- Sectors of the community can be engaged to assist with the high effort required to locate and record dens. Engaging the community would be similar to the, "DOB in a DEN," program adopted at Phillip Island, and is a useful way of encouraging community participation and fostering ownership. Fox dens could be mapped on a Global Information System (GIS) layer, which would help to target fox control efforts. Fox baiting may be undertaken around dens, between August and November. The baits are likely to be taken back to the den by the male or vixen, so that the adult foxes, as well as cubs, are targeted.

Cats

- Management of cats requires both technical and social approaches, to minimise the impacts of stray, feral and domestic cats. Techniques available for managing cats include in-situ protection measures, such as exclusion fencing and trapping, and mechanisms which focus on ownership restrictions and responsibilities for cats. Baiting is also commonly used to manage feral cats across large areas. Baits are ground-laid rather than buried and as such, in Victoria, the use of poison baits for cats is limited due to the high risk of non-target impacts to domestic cats and native wildlife. Such methods are more appropriate for remote areas including islands and larger parks.
- Trapping is labour intensive, expensive and time consuming; and as a control method, it is only useful for localised control, or as a supplementary control measure. Trapping may be used in contexts where lethal methods for controlling cats are unacceptable, such as in environmentally sensitive sites that are near residential areas.
- Cage traps are the only traps which may be legally used for capturing cats in Victoria. They are the most humane means of capturing cats, and can be used safely near urban areas, where there is a risk of capturing domestic cats (DEWHA 2008c).

- Within Hobsons Bay, trapping may be useful for removing or controlling cats in Council conservation reserves or adjoining important habitats (e.g. Truganina Park, Truganina Explosives Reserve).
- Cat exclusion zones prohibit residents from owning cats within particular areas (i.e. new sub-divisions or suburbs). They are the most effective means of preventing predation by domestic cats, in environmentally sensitive areas, rather than simply mitigating impacts (Ecology Australia 2013b). This method specifically manages domestic cats and not feral or unowned cats. It is much easier to implement these zones in new residential areas, before they have become established, however space and opportunity for new residential sub-division within Hobsons Bay is limited. There are no current cat exclusion zones within Hobsons Bay.
- Within established residential areas, cat confinement is generally more feasible than exclusion. Confinement requires owners to confine domestic cats to their properties, either indoors or within an outdoor cat enclosure, at all times. This control measure has been promoted as an alternative to total cat exclusion zones, which may gain relatively less public support. This method specifically manages domestic cats and not feral or unowned cats.
- Cat confinement regulations can be implemented through an Order under Section 25 of the *Domestic Animals Act*, which makes it an offence for cats to be found outside of the owner's premises at any time.
- Cat curfews which only require cat owners to confine their animals at night may also provide some benefit to nocturnal mammals. However, they do not protect other species from predation, including birds and reptiles, which are mostly caught during the day.

European Rabbits

- Management options for controlling rabbit populations generally comprise poison baiting and warren fumigation and destruction.
- Poison baiting can quickly and effectively reduce rabbit numbers, when undertaken in conjunction with rabbit warren destruction. Two poisons are currently registered for the control of rabbits in Victoria: 1080 and Pindone.
- Pindone is often considered to be more suitable near urbanised areas because an antidote (Vitamin K1) is available for this toxin. Pindone is the active ingredient in commercially available, registered rabbit poisons.
- Baiting is most effective during late-summer and early-autumn, when: food is limited and rabbits increase their foraging; breeding has finished and rabbit populations substantially comprise adults; and diseases and natural causes may have reduced rabbit numbers to base levels.
- Warrens and above ground harbours are crucial resources for rabbits. Destruction of warrens and other known harbours is essential for effective control (wood and rock piles and other anthropogenic debris and woody weeds e.g. African Boxthorn.
- Fumigation of rabbit warrens is undertaken by placing tablets which generate gas, in the warren (diffusion fumigation), or by pumping a toxic gas mixture through the warren system (pressure fumigation). Fumigants currently registered for use on rabbits in Victoria are aluminium phosphide and chloropicrin. Phosphine gas is usually used for diffusion fumigation. Chloropicrin is not considered to be as humane as aluminium phosphide.

- For effective fumigation, rabbits must be in their burrows and all entrances and exits to the warren sealed air-tight. Loud noises, or dogs, can be used to drive rabbits back into their burrows.
- Prior to fumigation or destruction, burrows should be checked for any native fauna which may be opportunistically using them.
- Fumigation of warrens is labour intensive and can be expensive, but is most effective as a follow-up control technique and is suitable for inaccessible locations where ripping is not possible, and near urban areas where the use of poisons is restricted.
- Destruction of warrens by hand, or with machinery or explosives, is an essential follow-up technique to poison baiting, which prevents rabbits from re-colonising an area.
- Revegetation following warren destruction will minimise the potential for subsequent weed invasions.
- Rabbits can be netted with the assistance of trained dogs in some situations. This technique should be assessed on a case by case basis which consideration of site conditions and its integrated use with other control techniques.
- The use of ferrets for removing rabbits from warrens is a feasible control method for certain situations. Areas sensitive to use of baits or fumigation may present opportunities to use ferreting, particularly when rabbit density is low. It may also be considered where rabbit warrens are difficult to remove without further damage to biodiversity values. If rabbits are sheltering above ground then ferreting is generally not a management option. This method should be integrated with other control techniques.

5.2 Priorities for pest animal monitoring and management

In a highly modified and disturbed landscape, that has experienced a history of agricultural, urban and industrial development, and in the context of limited funds that are usually available to Council, areas for pest animal management should be prioritised. First priority areas for pest animal monitoring and management in Hobsons Bay are the areas with the highest priority biodiversity values. Second priority areas should be those where other agencies or stakeholders are already undertaking or interested in undertaking pest animal control as part of a co-ordinated and integrated approach across the region.

For fauna, the highest-priority biodiversity values/assets occur in the following Council-managed reserves:

- Truganina Park
- Truganina Explosives Reserve
- parts of Cherry Lake Reserve
- Altona Coastal Park
- Newport Lakes
- Kororoit Creek
- Skeleton Creek
- Rifle Range Reserve
- Sandy Point

There are opportunities for Hobsons Bay Council to undertake pest animal control on Council land at Truganina Park on the north side of the Parks Victoria managed Cheetham Wetlands Ramsar site, crown

land parcel and Point Cook Coastal Park. Council has commenced negotiating with Parks Victoria for a co-ordinated approach to pest animal management. These are important wetlands to protect waterbirds from predation, including international migratory waders.

There is potential for extending feral animal control to Truganina Explosives Reserve on the north side of Laverton Creek, through Kooringal Golf Course and the Melbourne Water managed Truganina Swamp, which adjoins Mt St Joseph Wetlands; these locations represent important waterbird habitats. Managers of Kooringal Golf Course have reported fox predation of waterbirds on the golf course and are also interested in collaborating with Council on joint programs for pest animal control.

There are also opportunities to undertake rabbit control in association with Melbourne Water along Kororoit Creek and extend the program downstream to Altona Coastal Park.

Fauna values have not been determined at private property on Burns Road which supports remnant Plains Grassland or in the block bounded by Merton Street, Harcourt Road and Westlink Court (i.e. south of Kororoit Creek Road and east and west of Burns Road and along Kayes Drain).

During phone interviews, a number of local industries also expressed interest in undertaking joint rabbit control with Council.

Table 101 presents the responses from the organisations contacted.

Table 11 Responses from selected industry and government stakeholders regarding pest animal control

Pest animal	Responses
Mice	Baiting stations to manage mice are used by a small number of industry groups.
Rabbits	Many of the large industry groups undertake periodic rabbit control. Rabbits cause damage to a number of assets including, bunds, lawn, garden beds and graves. Rabbits can get into drains, leaving droppings that increases pollutant loads in stormwater outlets. Recolonisation of rabbits from neighbouring properties after baiting is a serious issue. There is support for a coordinated approach to rabbit control from industrial groups and government agencies.
Foxes	Some government agencies undertake fox control on their land.

Methodology for monitoring pest animal management

Monitoring is an essential component of Integrated Pest Management (IPM) to evaluate control techniques and develop ongoing improvements to management, based on the success or otherwise of previous management actions.

Operational monitoring estimates the proportional change in the target pest animal population as a result of the control activities (Reddiex et al. 2006). Performance monitoring assesses whether or not the objectives of the program have been achieved as a result of the control activities (e.g. biodiversity enhancement). To accurately determine whether IPM is meeting its objectives, the monitoring program must measure both the responses of predator populations (i.e. operational monitoring) and prey populations (i.e. performance monitoring).

Although some fox and rabbit control is already undertaken in some parts of the study area, monitoring would ideally be undertaken prior to, as well as during, control activities. This would enable regular assessment of the program outcomes against pre-control benchmarks.

Operational monitoring

Foxes

Operational monitoring assesses the efficiency of control techniques and detects changes in the predator population. It uses data collected routinely throughout the operation of the program to assess the cost-effectiveness of management. This typically uses measures such as catch-per-unit-effort, examples of which include the fox bait uptake, number of foxes shot per hour, the number of foxes trapped per trap-days, or the numbers of dens fumigated (Ecology Australia 2013b).

For foxes, it is undertaken using bait uptake rates from bait uptake records, breeding den counts, spotlight counts, distance sampling (right angle distances of the fox from the observer), sand plots and motion-sensing cameras. Advantages and disadvantages of these techniques have been assessed and discussed by Robley et al. (2008 and 2011), Thomson et al. (2000) and Ecology Australia (2013b), amongst others. Limitations relate to the fact that some of the techniques may be inaccurate. For example, estimates of fox abundances from bait uptake may be inaccurate due to foxes caching baits and not being killed, non-target species taking baits that cannot later be identified and sub-lethal doses resulting in underestimates of foxes killed. Other techniques are time-consuming and may require repeated visits to a site, such as sand plots, breeding den counts and spotlight counts.

In Hobsons Bay, foxes have been monitored on an *ad hoc* basis, using remote-sensing cameras. This could be further developed to provide more strategic coverage in conjunction with occupancy modelling. It has more recently been shown that remote-sensing cameras can be used to monitor changes in rabbit populations (Latham et al. 2012; Ecology Australia 2013b; see below). Occupancy modelling is not discussed in this report, but is discussed in detail in Robley et al. (2011).

Thus, the use of motion-sensing cameras is recommended as an efficient and effective for measuring changes in fox abundance, especially if combined with measuring changes in rabbit abundance (see below).

Performance monitoring

Shorebirds

In Hobsons Bay, the species that appear to be most at risk from feral animal predation are ground-dwelling birds. Monitoring of ground-nesting birds should be undertaken. The Port Phillip Bay coastline provides an opportunity to monitor the abundance of ground-nesting shorebirds; this group is known to be vulnerable to predation by introduced species (Maguire 2008, Garnett et al. 2011).

Monitoring should target species that are commonly detected, to ensure that any effects of predator control are detectable. Masked Lapwings (*Vanellus miles*) have a wide habitat range, use shoreline habitats (Maguire 2008) and are recommended for monitoring. Red-capped Plovers (*Charadrius ruficapillus*) and Oystercatcher species (Sooty Oystercatcher *Haematopus fuliginosus* and Pied Oystercatcher *Haematopus longirostris*) may also be suitable for monitoring.

Monitoring should comprise annual counts of shorebirds along transect lines during the breeding season of the target species (September to December), with transects of sufficient length to have confidence in the detection of major trends in shorebird populations (see Ecology Australia 2013b).

Ground-nesting bird monitoring must collect sufficient data to enable assessment of the effectiveness of fox control for these populations including meaningful changes in the population size of the target species.

Indian Myna *Acridotheres tristis*

The Indian Myna (also known as the Common Myna) is one of the most invasive species in the world and has a long history of successful co-habitation with humans. Impacts on native biodiversity are mooted to include (from Tidemann undated; Tindall 2007; Saavedra 2009; BirdLife Australia 2011; Prasad and Christi 2014; Hastings Landcare 2015; Wetland Care Australia 2015; YIMAG 2015):

- competition for food and nesting sites with native species, including displacement of native species
- predation of the eggs and chicks of native bird species
- the potential spread of weed species

As well as impacts to biodiversity, they are mooted as being vectors of diseases of humans.

Various attempts have been made to control Indian Mynas, including the development of Myna-specific traps, poisoning and removal of nests (e.g. Tidemann undated; Tindall 2007; Saavedra 2009; BirdLife Australia 2011; Prasad and Christi 2014; Hastings Landcare 2015; Wetland Care Australia 2015; YIMAG 2015). Some programs to control Mynas have included the Regional Indian Myna Control Program in the Tween and Byron LGAs, the Minimising the Myna project in Canberra and Cairns (Australian National University), Coffs Harbour/Bellingen Indian Myna Action Group, monitoring trials conducted by Hastings Landcare (e.g. Tidemann undated; Hastings Landcare 2015; Wetland Care Australia 2015). In Melbourne, there is a group of dedicated people who formed the Yarra Indian Myna Action Group that runs workshops on trapping of mynas and co-ordinates sale of traps and a bulletin (YIMAG 2015).

It appears that control on islands may be successful at least in the short-term as long as the source of re-colonisation is removed (e.g. in the island case, boats), or the distance to sources is too great (outside the flying range) for re-colonisation.

Indian Mynas prefer foraging on short grass (e.g. mown grass and manicured lawns). However, habitat manipulation, including planting of shrubby areas in parks and gardens does not seem practical on a council-wide basis. Use of favoured exotic roost trees with dense foliage in street-scaping should be avoided (Palm trees and Conifers). Council could also encourage residents to block-off holes in eaves, rooves, etc., where mynas are nesting and/or roosting, but this may not be effective on a Council wide basis.

The Indian Myna is very widespread and abundant in Greater Melbourne, including in adjoining council areas. An attempt to control/remove mynas within Hobsons Bay is likely to create a ‘dispersal sink’, which is constantly re-colonised by mynas from adjoining areas.

It is recommended that formal trapping/removal or poisoning of mynas is not undertaken, unless it can be shown by further research that control is successful in a landscape like Hobsons Bay, where the Indian Myna is widespread and abundant in the surrounding landscape. Hobsons Bay City Council may benefit from advocating control techniques in collaboration with adjoining Councils to promote a landscape approach to reducing impacts from Indian Mynas.

5.3 Conclusions – pest animal management

1. The most effective way to manage pest animals is to have an integrated and coordinated approach amongst neighbouring land managers
2. A range of techniques for controlling pest animals is currently being used in Victoria. Cost, efficacy, public safety and domestic and native animal welfare should all be considered when deciding which techniques to use

3. Due to the resource intensity of pest animal control it is appropriate to prioritisation sites that will receive the greatest benefits from undertaking pest animal control works. First priority sites should be those areas with the highest biodiversity values. Second priority are likely to be those areas where other land managers are already undertaking control, or are interested in undertaking a co-ordinated and integrated approach to pest animal management.
4. Monitoring is essential to evaluate control techniques and the success of control programs. Pest animal control programs would benefit from having operational and performance monitoring designed into each program.
5. Electronic data collection will assist with identifying priority areas and which industry stakeholders to engage with

6 Ecological burning management

6.1 Prioritisation of areas for ecological burning

An understanding of the requirements of fire frequency and intensity for threatened grassland species is varied and, for other species, poor at best. Within Hobsons Bay, burning as a vegetation and habitat management tool is most-relevant to grassland vegetation, specifically Plains Grassland dominated by Kangaroo grass *Themeda triandra* (rather than Common Tussock-grass *Poa labillardierei*). In the event of a wildfire (an unplanned burn in other vegetation types), prompt action may be needed to avoid harm to other native vegetation and fauna habitats and there is often a need for weed management after the fire when strong weed recruitment may occur. The following review relates to Plains Grassland and the use of fire to promote biodiversity as a primary managed objective.

Some properties have been identified containing Plains Grassland that would benefit from ecological burning. Ecological burning within Hobsons Bay is undertaken infrequently due to a range of conflicting land use issues. Some local industries have expressed concern that ash and smoke pollution pose a risk to their operations or stored materials. Refineries in particular have strict safety requirements to prevent impacts to infrastructure and the community. Railways also have strict safety requirements. Prioritisation of areas for ecological burning therefore must consider these matters along with the maintenance of biodiversity values for Hobsons Bay.

Regulations by the authorities may mean that it is not possible to burn at all in certain locations, or to burn at certain time of year when most desirable (summer–autumn before autumn break).

Each method of biomass control has political, practical or logistic constraints which may be a major influence on their use or applicability. Grazing by livestock must be precisely timed, closely controlled and monitored, and carried out as pulse (or cell) grazing and implemented by highly skilled practitioners. Slashing is the *least preferred* option for biodiversity. This is because it may be damaging to vegetation among other reasons as shown in Table 11. Slashing must be done in such a way that the slashed material is removed from the site. The use of fire, apart from the perceived safety risks (of smoke and flames), carries with it the potential conflicts with fauna management: fire may be lethal to some fauna species. An emphasis in planning is often given to the requirements of threatened species; these should be considered along with broader considerations for the maintenance of ecological processes and persistence of ecological communities. While it is beyond the scope of this technical paper to review the fire requirements of grassland biota in detail, there is sufficient literature and knowledge to show that species management approaches will provide conflicting recommendations. It is thought that the Striped Legless Lizard *Delma impar* became extinct in Laverton North Grassland due to burning, and it has since been re-introduced. There is evidence that Striped Legless Lizard presence and abundance relies in part on the proximity to primary grassland patches (more natural structure and floristic composition) which have not been ploughed, with higher abundances and probability of presence recorded closer to primary grassland (Dorrough and Ash 1999). Despite this, the type of grassland has limited influence on their presence although areas with poorly draining soils decrease

likelihood of presence where underground burrows are not formed and maintained (Dorrough and Ash 1999). The influence of fire on grassland composition and structure should be secondary (for this species) to the maintenance of refuge areas for Striped Legless Lizard, within contiguous patches subjected to fire. For Golden Sun Moth *Synemon plana*, it is less important whether grassland in native or dominated by non-native stipoid grasses, or whether the grassland patch is large or small; instead the management of the vegetation is important (Richter et al. 2013) as it influences vegetation structure. Few native terrestrial mammal species occur within Hobsons Bay. While regarded as locally extinct according to IUCN criteria and for the purposes of this strategy, it is possible that Fat-tailed Dunnart *Sminthopsis crassicaudata* may be recorded again within the municipality, or in grassland areas to the north. This small marsupial has an evolutionary physiological response to fire, and can modify torpor activity in response to fire and post-fire conditions, allowing it to seek shelter if smoke is detected (Stawski et al. 2015). The Altona Skipper Butterfly benefits from some burning in Chaffy Saw-sedge *Gahnia filum* sedgeland, a habitat which is important for breeding and there are considerations for timing of burns which are relevant as such (Relf and New 2009).

There is sufficient research to demonstrate that, for grassland community resilience arguments in general, biomass reduction is important. Whatever the method of biomass reduction used it is necessary to assess the accumulation of biomass, grassland states (high, medium and low biomass), management triggers and preferred outcomes on a given site (Morgan 2015). There are considerable complexities, techniques and potential outcomes.

For the assessment of levels of biomass accumulation—that is grassland states—high, medium or low, a simple and rapid semi-quantitative technique has been developed; the 'Golf Ball Method' (Morgan 2015). Evaluation of grassland states will enable managers to identify states and the need for management triggers to manipulate those states to produce preferred outcomes (Morgan 2015).

Of crucial importance, Sharp et al. (2015) extensively discuss planning, documenting and monitoring for grassland management. All management initiatives by Hobsons Bay City Council for indigenous vegetation must embrace planning, documentation and monitoring.

Biomass reduction, particularly by prescribed burning, may have a material effect on the reduction of fuel loads and hence reduce fire risk. How soon fuel loads return to a pre-fire level (i.e. high biomass) will depend on many factors, but particularly season-to-season rainfall. Ecological (prescribed) burning probably should not be considered as part of a fuel-reduction strategy. These systems are usually highly dynamic and by no means well understood, underscoring the need for further research (Morgan 2015). Despite the highly dynamic nature of these systems, the consensus of opinion is that ecological burning for biomass reduction is important for maintaining areas of high biodiversity value. In the absence of biomass management, the flora and fauna values inherent in the Plains Grassland in Hobsons Bay will be progressively lost and will not be able to be recovered. Over the last 30 years or so the biodiversity values of Laverton North Grassland have markedly declined because of weed invasion, but also because biomass accumulation has not been adequately managed.

Biomass management is essential to maintain the structure and floristic diversity in Plains Grassland vegetation. With increased biomass, plant diversity often declines and when it remains high for extended periods; declines are thought to be permanent (Morgan 2015).

There are three means by which biomass can be reduced, by: burning, livestock grazing, and slashing. The following table from Morgan (2015) summarises biomass control methods applicable to *Themeda* dominated Plains Grassland.

Table 11 Impacts of management activity on biomass, native species, introduced species.

	Burning	Livestock grazing	Slashing
Impact on biomass	Removal of all vegetation cover including litter; exposed soil results.	Selective removal of grasses and forbs depending on palatability; no significant exposure of soil unless over-grazed.	All erect material removed; amount of bare ground produced depends on whether slashed biomass is left on site.
Impact on native species	Impact depends on season of burn because season affects fire intensity and heterogeneity.	Risk of trampling / compaction of habitat or species. Usually results in loss of tall erect herbaceous species and dominance by short perennial grasses.	If undertaken too frequently can minimise seed maturation of native species limiting natural regeneration. Taller species are disadvantaged and in general drop out of slashed sites. Slashed biomass can result in death of plants underneath and replacement by introduced species.
Impact on introduced species	Generally low but spring fires can be used to reduce abundance of annual species.	High grazing pressure results in dominance by annual introduced species. Soil disturbance can result in invasion of introduced species.	Very difficult to control the spread of weed species by mowers and other machinery.
Ability to control biomass removal	Maximum bare ground exposure until plants regrow, response is usually quick.	Can control how much is removed by moving stock.	Cutting is generally no lower than 10 cm to minimise loss of regenerative parts of native plants.

It is clear that the use of fire is by far the best method of biomass reduction—at optimum timing—to maintain biodiversity, rather than stock grazing or slashing. The highest quality, and most biodiverse, Plains Grassland on the Victorian Volcanic Plain were historically burnt annually in January by the rail authorities and fire brigades (Stuwe & Parsons 1977, Morgan and Williams 2015, Carr unpubl. data). At this time the flora had mostly seeded and many species, including lilies and orchids were in summer dormancy. These management regimes are a thing of the past.

The following points from Morgan and Williams (2015) summarise fire and fire responses in the grassland flora.

- Frequent fires can maintain native plant diversity by reducing shoot competition for light (the result of biomass accumulation).
- Burning is unlikely to lead to a decline in plant species richness or density.
- Native perennials (there are very few native annuals) avoid summer fires by being dormant; they resprout after fire.
- Grassland composition may change appreciably between fires.
- Long inter-fire intervals can lead to local extinction of inter-tussock forbs and increase the frequency and cover of exotics, e.g. thistles and pasture grasses that take advantage of nutrient-rich litter.
- Fire regimes maintain or increase plant diversity in highly productive *Themeda* grasslands that have a history of fire.
- Extinction rates of the indigenous flora have been greatest where fire frequencies have declined in recent decades.
- Grassland fires appear to have little direct impact on soil chemistry, and physical changes to soils appear to be largely mediated by exposure to sunlight.

The ecological benefits of burning are summarised by Morgan (2015) from Lunt & Morgan (2002). Fire in productive grasslands:

- removes biomass of the dominant grasses such as Themeda. This, importantly, improves light penetration and allows less competitive species such as inter-tussock forbs and subdominant grasses, to co-exist with the more competitive C4 grasses that contribute most of the biomass in grasslands (Morgan 1988).
- does not cue germination of (the majority of) inter-tussock species. Most forbs have transient soil seed banks (i.e. seeds live for less than 12 months), and rather than fire cueing the germination for seeds, these species primarily recover after fire by vegetative re-sprouting from stolons, rhizomes, tubers and bulbs (Morgan 1999).
- promotes flowering of forbs, geophytes and grasses in the spring following a burn (Lunt 1994). This pulse of flowering leads to lots of seed, which then leads to seedling regeneration in autumn if rainfall is sufficient.

It can be concluded that plant diversity in productive grasslands benefits from frequent disturbance from fire. Fire frequencies of 1–5 years appear to be appropriate for management of *Themeda*-dominated native grasslands.

6.2 Existing ecological burning practices

There have been few ecological burns within Hobsons Bay over the last 10 years (Table 12).

Table 12 Documented history of ecological burning for Hobsons Bay

Location	Date / Summary
Horsburgh Drive Grassland, Altona North	Hobsons Bay City Council - two burns prior to May 2014. Two thirds was burnt one year and the remaining one third the next. An additional burn took place on 1 May 2015.
Horsburgh Drive Grassland, Altona North	Hobsons Bay City Council: May 2016
Laverton Nth Grassland Reserve	Henderson (1996): April1996 – experimental plots, extent of burning unknown.
Laverton Nth Grassland Reserve	DEPI: 25 March 2015, 23 ha burnt.
Laverton Nth Grassland Reserve	Lunt and Morgan (1999): March 1980, March 1983, March 1985, February 1987, 1990, March 1995. These burns applied to one area, while other areas were only burnt in March 1995.
Maidstone Street Grasslands	Hobsons Bay City Council: April 2013
Maidstone Street Grasslands	Hobsons Bay City Council: May 2016
Newport Lakes	Hobsons Bay City Council: April 2009, April 2011
Rifle Range Reserve	Hobsons Bay City Council: April 2011
Spicer Street Grassland (Henry Drive)	Hobsons Bay City Council: April 2011, May 2013
Trafalgar Avenue Altona Meadows	Hobsons Bay City Council: April 2011 (100m x 20m)
Truganina Explosives Reserve	Hobsons Bay City Council: April 2008, March 2010, April 2011, April 2011

6.3 Recommended ecological burning practices

Grassland patches within Hobsons Bay are fragmented and isolated from other areas of native vegetation. Most grassland areas within the municipality are bounded to the north by the Princes Freeway which is a significant barrier to dispersal of some species. Beyond this to the north, other areas of grassland occur including larger patches than those found within Hobsons Bay. Patches within Hobsons Bay adjoin largely residential and industrial land. Their management regarding fire should therefore, be considered in this context. Burns should be avoided which remove vegetation over any patch in its entirety. Due to small size of most areas, burns should be limited to one quarter to one third of the total reserve area, and these areas should be rested for one to two years before burning again. For some reserves, a management plan prepared by an ecological expert may direct otherwise. For example, under the current offset management of Horsburgh Drive Grassland, the reserve is burnt at least annually. One burn is limited to approximately one third and the remaining two thirds is burnt in other years. Boundaries of burn patches may overlap somewhat (e.g. 20m) to create greater complexity in vegetation structure and composition within reserves. While variability as such should be maintained, it is preferable that the majority of grassland vegetation has moderate cover and biomass levels of perennial grasses at all times.

Council have only a limited number of grassland areas under their management where burning can be used as a management tool. Those previously burnt in Table 12 make up the majority of the area where ecological burning would be preferred.

There has been a preference for late autumn to early winter burns, due to safer conditions at this time of year. Some consideration should be given to burning opportunistically in late spring or early summer. This may promote greater variability in the recruitment preference of some native species over others. It is recommended that burning occasionally outside of autumn to winter is done where safe to do so. Considerations should also be given to the reproductive requirements of threatened species; to ensure that recruitment success is promoted and not hindered by burning.

The overriding opinion in literature regarding grassland burning is that frequent burning and perennial grass biomass are important considerations. At least, native plant composition appears not to be adversely affected by frequent burning and that a more open perennial grass structure is beneficial for greater plant diversity. Planning will need to consider the responses of threatened species in addition to general considerations of plant composition and relative cover of weeds versus native species. The small and fragmented spatial arrangement of many grassland reserves emphasises further that priority be given to the fate of threatened species population following fire. It is highly recommended that threatened species values are reviewed prior to all proposed ecological burns, and that the burn plan explores the present distribution, population information and implications prior to approving burns. Grassland areas may be prioritised for burning using the following guide:

- **High Priority** - Areas of grassland with no record or evidence of fire within the last 10 years.
- **Medium priority –** Grassland burnt 3–10 years ago and cover of perennial native grasses >75 per cent total cover within patch.
- **Low priority –** Grassland burnt <3 years ago OR cover of perennial native grasses <75 per cent total cover within patch.
- **Rest from burning** – Area burnt within the last year or contiguous area within the same patch burnt within the last year.

6.4 Consideration of the EPBC Act

Impacts to EPBC Act listed matters should be considered when planning controlled burns. Where there is uncertainty about exempt activities, a referral may be made to the Minister, to determine whether approval is required (DSEWPaC 2010a). However, fire is recognised as a natural ecological process in Plains Grassland and an inappropriate fire regime, including absence of fire, is considered a threat to some matters (e.g. DEWHA 2009b). However, actions leading to significant impacts also may include changes to fire regime in some cases (DEWHA 2009b). A summary of significant impact thresholds for relevant matters is provided in Table 13, to guide decision-making with regard to referrals and general implications for impacts to nationally significant species and communities. General guidelines on significant impacts to matters of national environmental significance (DoE 2013) should be reviewed in addition to Table 14 below.

Table 13 Considerations for burning and impacts to matters of national environmental significance.

Matter	Reference	Area thresholds and other considerations for impacts
Natural Temperate Grassland of the Victorian Volcanic Plain	DoE 2013	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will: • reduce the extent of an ecological community. • fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines. • adversely affect habitat critical to the survival of an ecological community. • modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns. • cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting. • cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: –assisting invasive species, that are harmful to the listed ecological community, to become established, or –causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological

Matter	Reference	Area thresholds and other considerations for impacts
		community which kill or inhibit the growth of species in the ecological community, or • interfere with the recovery of an ecological community.
Golden Sun Moth	DEWHA (2009a)	For large or contiguous habitat: area (>10 ha), habitat loss, degradation or fragmentation >0.5 ha. Small or fragmented habitat area (<10 ha), any habitat loss, degradation or fragmentation. Regarding habitat connectivity – fragmentation of a population through the introduction of a barrier to dispersal.
Striped Legless Lizard	DSEWPaC (2010b)	0.5 ha minimum patch size for medium to long term habitat and population viability. The patch area supports predominantly tussock-forming grass species. Considerations about affecting critical habitat, causing spread of invasive species and introducing disease also require consideration amongst other matters.
Spiny Rice-flower	DEWHA (2009b)	Any fragmentation of a population. Loss of >5 individuals. Loss of any individuals from any population which occurs on the edge of the Spiny Rice-flower's current known distribution.
Basalt Diuris, Sunshine Diuris, Fragrant Leek-orchid, Button Wrinklewort, Large-headed Fireweed, Austral Toadflax	-	No specific threshold. See DoE (2015).

7 Climate change

7.1 Potential Impacts of Climate Change

Potential impacts of climate change on key habitat and species, are given context by the Bureau of Meteorology (BOM) and CSIRO summary projections for 2030 and 2070, outlined in the Climate Change Adaption Plan 2030–2070 (Hobsons Bay City Council 2014). These projections are based on a range of emissions scenario. That is, Representative Concentration Pathways (RCP) of between 4.5 and 8.5 (see Spatial Vision 2014, Whelton 2015). The implications for key climate variables (Table 14) include an increase in average temperate and greater fluctuation in rainfall.

Table 14 Predicted climate trends

Climate Variables	Summary of Change
Temperature	• Increase in average temperature • Increase in days over 35°C
Seal Level Rise	• Continuing rise in sea level in the range of 20–50 cm by 2070
Rainfall	• Decrease in annual rainfall mostly in winter and spring • Very large fluctuations
Extreme Events	• Increase in extreme rainfall events and storm surges • Increase drought periods (higher temperature and evaporation rates)

In lay terms, and under conditions of RCP 4.5 (i.e. mid-range scenario) Melbourne's climate in 2050 would be comparable to that of towns well north of the Dividing Range, e.g. Wangaratta, and in 2090 several hundred kilometres north, e.g. Wagga Wagga in south western NSW (CSIRO: Climate Analogues website (http://www.climatechangeaustralia.gov.au).

While there is clearly variability around predicted change, and precisely how this may play-out for Hobsons Bay (Melbourne), there is however certainty that there will be change in ecosystems drivers that have obvious implications for biodiversity, notably:

- decreased water availability
- increased drought
- sea level rise

The framework for assessing the impacts of these changes on biodiversity has been reasonably well established and applied at the ecosystem (e.g. Spatial Vision 2014) and species level (Garnett and Franklin 2015). The framework is centred on the following concepts (see Figure 9):

Table 15 Framework for assessing impact of climate changes to biodiversity

Exposure	The degree to which an ecosystem or species is exposed to climate variables e.g. coastal wetlands have a high exposure to sea level rise.
Sensitivity	The sensitivity to change e.g. will climate change push a system or species beyond its physiological limit or competitive envelope?
Adaptive Capacity	Refers to how well a system or species can adapt to the climate variables to which it is exposed.
Potential Impact	Refers to the impact of climate change on a system or species.
Vulnerability	Indicates the overall susceptibility of a system or species based on potential impact and intrinsic adaptive capacity.

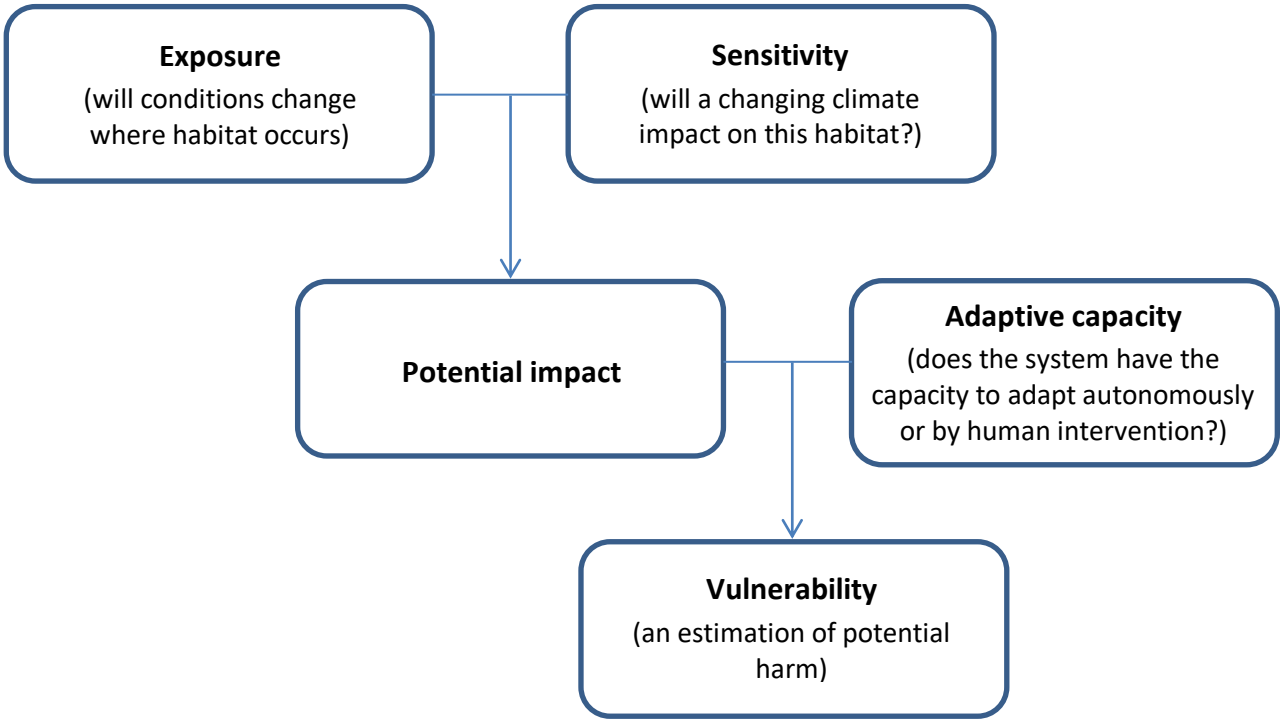


Figure 9 Vulnerability to Climate Change: Assessment Framework

This framework can be applied to the major habitats and key species or guilds in Hobsons Bay (Table 16). The analysis is high level and relative (low, medium, high), but nonetheless directs attention to the most vulnerable components. The major habitats described for this purpose include:

- Terrestrial – referring to remnants and notably native grasslands
- Inland wetlands – includes the major waterbodies e.g. Cherry Lake and Newport Lakes
- Streams – namely Kororoit, Skeleton, Stoney and Laverton Creeks
- Estuaries – associated with the above streams
- Coastal wetlands and beaches – including remnant saltmarsh, Cheetham Wetlands, tidal mudflats and sandy beaches.

Table 16 Potential vulnerability of key habitats to climate change

Habitat Type	Potential Exposure	Sensitivity	Impact	Adaptive Capacity	Vulnerability
Terrestrial (Grasslands)	Moderate • increased temperature • reduced rainfall	Moderate	Moderate	Moderate • potentially favour C4 grasses (*Themeda*) • potentially reduce perennial and annual exotic grasses	Moderate
Inland Wetlands	High • reduced rainfall • reduced runoff • decline in groundwater	High	High	Low • reduced in extent	High
Streams	High • reduced rainfall • decline in groundwater contribution • extreme floods	High	High	Low • on-going trend towards intermittent, ephemeral systems with episodic flood events • reduced longitudinal connectivity	High
Estuaries	High • reduced catchment flows • sea level rise	High	High	Low • trend towards more marine systems • limited capacity to retreat inland	High
Coastal Wetlands and Beaches	Very High • sea level rise • altered geomorphology	Very High	Very High	Low • potential loss of system with limited capacity to migrate inland	Very High

For species level vulnerability, taxa or guilds characteristic of the major habitats have been assessed. At this level Sensitivity can more readily be assigned to a number of attributes (following Garnett and Franklin 2015):

- specialisation limits capacity to adapt, namely habitats / food types / climate envelope
- low genetic diversity limits capacity to evolve, indicative of population size
- slow life history limits capacity to adapt, i.e. longer-lived and low reproductive rate
- dispersal capacity – ability to 'close' gaps in habitat

These attributes are useful in explaining why some species or guilds are more vulnerable than others, and while assessed in detail by Garnett and Franklin (2015), they are treated as 'high level' descriptors in Table 17.

Table 17 Potential vulnerability of key species and guilds to climate change

Habitat Type	Key species/Guilds	Potential exposure	Sensitivity	Impact	Adaptive Capacity	Vulnerability
Terrestrial (Grasslands)	Striped Legless Lizard	Moderate	Low – Moderate	Moderate	Potentially Low • specialised • small population • poor dispersal • slow life history	Moderate
	Golden Sun Moth	Moderate	Low – Moderate	Moderate	Moderate • specialised • poor dispersal • rapid life history • Observation: state population expanded during millennium drought	Moderate
Inland Wetlands	Waterbirds	High	Moderate	High	Moderate • high dispersal • larger populations • more generalist	Moderate
	Frog assemblages	High	High	High	Low • limited dispersal • generalists • critical breeding habitat impacted	High
Streams	Common Galaxias	High	Moderate	Moderate	Moderate • large populations • rapid life history • estuarine dependent • dispersal between systems	Moderate

Habitat Type	Key species/Guilds	Potential exposure	Sensitivity	Impact	Adaptive Capacity	Vulnerability
	Flat-headed Gudgeon	High	High	High	• Low • freshwater dependent • no dispersal between systems	High
Estuaries	Crakes and Rails	High	Moderate	Moderate	Moderate • reasonable dispersal • small populations • long life history	Moderate
Coastal Wetlands and Beaches	Migratory shorebirds	Very High	Moderate	High	Moderate • high dispersal • global-scale habitats and threats	Moderate
	Beach-nesting shorebirds	Very High	Very High	Very High	Low • specialised nest sites • small populations	Very High

This broad analysis of habitats and associated species and guilds suggests the following:

- all major habitats within Hobsons Bay are vulnerable to climate change
- there is an increasing scale of likely impact on biodiversity illustrated by the following:

Lowest ——————————————————— **Highest** →

Grasslands – Inland Wetlands – Streams – Estuaries – Coastal Wetlands

- within each habitat type there is likely to be differential responses from component species depending on their sensitivity to change and their capacity to adapt;

Possible predictions (Table 18) for the major habitat types include changes to the floristic composition and boundaries of native vegetation types.

Table 18 Habitat types and associated impacts from predicted climate trends

Habitat	Predicted
Terrestrial – grasslands	– 'drier' version with possibly more favourable conditions for Kangaroo Grass (C4). – however the observed abundance of wallaby and spear grasses (C3) during millennium drought (1997 - 2009) may suggest otherwise. – Change in area of occupancy for threatened species and reduction for some.
Inland Wetlands	– reduced extent, and groundwater input may be critical to persistence.
Streams	– increasing trend to intermittent flows and reduced longitudinal connectivity.
Estuaries	– potentially transformed into marine embayments, with actual estuarine conditions very limited in extent and dependent on topography of upstream reaches.
Coastal Wetlands and Beaches	– potential loss of existing habitats with very limited capacity to migrate inland. – could reform to some extent in existing estuaries.

7.2 Recommended strategies, considerations

Most literature on mitigating the impacts of climate change on terrestrial systems refer to the tenets of increasing patch size, improving connectivity and reducing current stressors, (e.g. Lindenmayer et al. 2014, Lunney and Hutchings 2012, Stefan 2009). For coastal systems subject to sea level rise and associated geomorphological change, the focus has been on the capacity to migrate inland, and within a timeframe that allows systems to re-establish (Victorian Saltmarsh Study 2011, Saintilan and Rogers 2013).

These principals are at the core of developing resilience in ecosystems and are potentially most feasible in rural or undeveloped landscapes, tenure issues notwithstanding. They are of course applicable also to urban environments, although clearly constrained by the extent of development. Areas reserved for conservation are often a by-product of development rather than a planned network of connected reserves, and offer limited flexibility in arrangement and extent. Climate change is a substantive and pervasive issue for all municipalities, and the limitations imposed by the dominance of residential, commercial and industrial zones is likely to prove a very significant constraint on the capacity to mitigate the effect of the changing climate.

While similar constraints apply to Hobsons Bay, Table 19 provides adaptive strategies that could be considered for each of the major habitats. Each strategy has a feasibility rating to indicate real-world practicability.

Table 19 Potential adaptive strategies for key habitats

Habitat	Suggested strategy	Feasibility
Terrestrial (Grasslands)	• Control current high threats • Maximise patch size for offset sites and/or purchase • Establish adaptive management program • Consider assisted dispersal for key species	High Medium Very High Medium
Inland Wetlands	• Investigate groundwater as a supplementary water source • Investigate use of stormwater drainage to divert and/or direct run-off • Control current threats	Low Low Low
Streams	• Remove in-stream barriers • Reduce other current threats • Control further encroachment (e.g. via overlay controls in the planning scheme) • Maintain groundwater systems • Establish adaptive management program	Low Low High Medium Very Low
Estuaries	• Protect / expand upstream buffers to facilitate inland migration • Establish adaptive management program • Control current threats	High Very Low Low
Coastal Wetlands and Beaches	• Investigate impact of coastal fortification on ability to maintain some habitat e.g. waders and shorebirds • Consider strict conservation controls over retained / constructed habitat • Increase protection of estuaries (as above) • Investigate protective capacity of mangroves • Reduce current threats • Establish adaptive management program	Low Low 3 2 2 1

8 Land use planning

8.1 Council's obligations as a planning authority and responsible authority

In Victoria, the *Planning and Environment Act 1987* (P&E Act) provides the legislative basis for controls over land use and development.

Planning schemes, derived from the 'template' of the Victorian Planning Provisions (VPP) set out policies, strategies and controls for each municipality.

In the case of Hobsons Bay, most of the municipality is subject to the Hobsons Bay Planning Scheme. Land use and development in the section under the authority of the Port of Melbourne is controlled by the Port of Melbourne Planning Scheme.

Planning schemes set out:

- state and local policies that guide decisions on land use and development
- use and development that is allowed without a permit
- use and development that requires a permit
- prohibited use and development

All Victorian planning schemes include state-wide requirements that seek to protect native vegetation, and each planning scheme can also contain complementary controls and other provisions to recognise natural environmental values (including those contributing to biodiversity).

From the perspective of biodiversity management, Council has two key roles under the P&E Act.

It is (in most cases) the *Planning Authority* responsible for preparing and processing amendments to the Hobsons Bay Planning Scheme, for submission to the Minister for Planning for approval. Such planning scheme amendments can include changes to the local planning policy framework, changes to the application of zones and overlays to land in the municipality, and changes to the schedules to zones, overlays, particular provisions and general provisions. The Port of Melbourne Planning Scheme is administered by the Minister for Planning.

Council is also the *Responsible Authority* for administering the Hobsons Bay Planning Scheme. In this role Council is responsible for:

- determining whether development and/or use requires approval
- assessing and determining planning permit applications, and other consents required under the P&E Act (and imposing conditions on any approval granted)
- monitoring and enforcing compliance with the Planning Scheme

Council decisions on permit applications and other matters under the P&E Act may also be subject to review by VCAT.

Council can also enter into legally binding agreements with a landowner to formalise requirements that apply to a particular piece of land. These agreements are entered into under Section 173 of the P&E Act. Section 173 agreements are recorded on the title of a property and set out the obligations of the parties (generally Council and the landholder, but can also include other parties).

The agreements are negotiated on a property by property basis, run with the land, and apply to successive owners, unless the agreement is modified or ended.

8.2 Council's obligations as a land owner and manager

Council in its role as landowner and manager is required to comply with the P&E Act and Planning Scheme, including securing approvals where these are required, and adhering to conditions of approval.

It is also required to comply with the relevant provisions of State and Commonwealth legislation. Other key legislation relevant to biodiversity management is summarised below. Section 3 of this document details instances where rare or threatened species occur in Hobsons Bay.

Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to matters of 'national environmental significance', including Ramsar Wetlands, listed threatened species and ecological communities, listed migratory and marine overfly species and Commonwealth Marine Areas. It applies to both public and private land.

If proposed works or actions have the potential to significantly impact listed matters, the proponent (regardless of whether it is Council, an individual, corporation or other entity) is obliged to refer proposed actions to the Commonwealth Environment Minister.

The Commonwealth Department of the Environment (DoE) decides whether there will be a significant impact and if it needs to be a 'controlled action' and requires a formal assessment under the EPBC Act.

The Commonwealth can intervene to modify or block an action if it deems this necessary for the protection of a species or community of national significance.

Flora and Fauna Guarantee Act 1988

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists flora and fauna species and ecological communities that are recognised to be rare or threatened in Victoria. It also identifies threatening processes (e.g. loss of hollow-bearing trees) and flora that require protection (i.e. protected flora).

Protected flora include those species listed as threatened under the Act, plant taxa that belong to listed communities and plant taxa that are not threatened, but require protection for other reasons (e.g. from over-collection). A FFG Act permit is required to remove protected flora from public land.

For all planning permits affecting public land, Council planning should consider whether the FFG Act has been appropriately considered in the submission, including whether a permit has been sought to remove protected or listed taxa.

Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) provides a legislative framework for the management of land, including the control of declared noxious weeds and pest animals. Each Catchment Management Authority (CMA) region within Victoria has a designated list of declared noxious weeds. The control of these declared weeds by the landholder is enforceable under the CaLP Act.

Council, where it is a landholder, is required to take all reasonable steps to prevent the growth and spread of listed weed species. For some species, a land owner must eradicate these species.

8.3 Impact of areas of state industrial significance on biodiversity

The current metropolitan planning strategy Plan Melbourne includes the industrial areas of Altona North, and land along Kororoit Creek Road Altona in the Western Industrial Precinct. This precinct is of

State industrial significance and contains some of Victoria's largest petroleum, chemical and manufacturing industries. These industries are in some cases of National importance.

The local planning policies in the Hobsons Bay Planning Scheme recognise that the industries exert a key influence on the municipality.

The planning scheme seeks to facilitate their continued operation and growth, by including the land in appropriate zones and protecting them from encroachment by sensitive uses (such as housing).

Within Hobsons Bay there are eight industries that are deemed to be a Major Hazard Facility (MHF) under the Occupational Health and Safety Regulations 2007 (VIC), and the application of Special Use Zone 4 restricts the maximum allowable number of people working within designated buffers in proximity to some of these facilities.

The industrial areas are categorised as 'core' and 'secondary' areas, as shown in the following extract from the Strategic Framework Plan (Figure 10) (Municipal Strategic Statement, Clause 21.02 of the Hobsons Bay Planning Scheme).

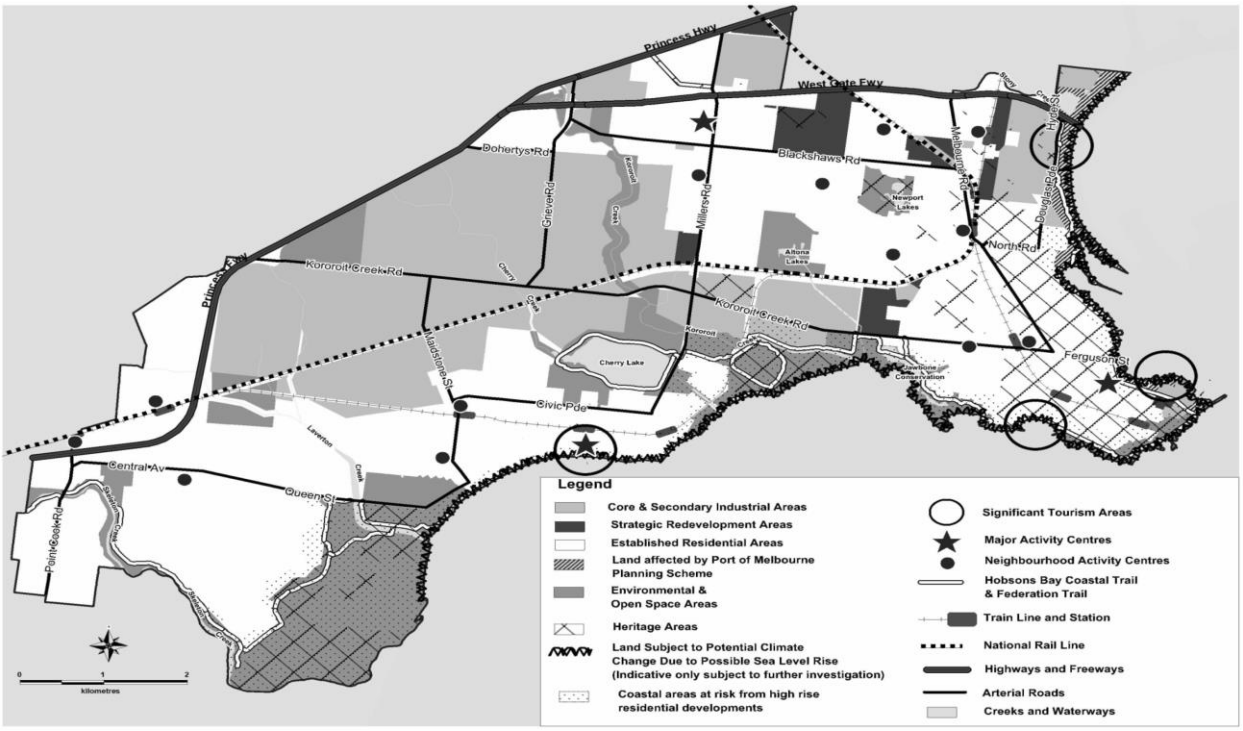


Figure 10 Strategic Framework Plan Clause 21.02 Hobsons Bay Planning Scheme (under revision)

The significant sites map (Figure 6) corresponds for most part to the intent of the Strategic Framework Plan. Further consideration is required where land use within Core and Secondary Industrial Areas conflict with native grassland and other biodiversity conservation objectives. Further consideration is also required to appropriate planning tools that would benefit Council in meeting its environmental and development policies.

8.4 Planning and other controls over areas of biodiversity significance

8.4.1 Scope and structure of the planning scheme

Planning schemes in Victoria follow the structure established in the P&E Act and the VPPs. The Hobsons Bay Planning Scheme (and Port of Melbourne Planning Scheme) is structured into the following key parts.

- The *State Planning Policy Framework* (SPPF): which sets out statewide policies and strategies for land use and development. The framework applies to all planning schemes in Victoria.
- The *Local Planning Policy Framework* (LPPF): which includes a broad vision and strategies for Hobsons Bay (the Municipal Strategic Statement), underpinned by policies for the municipality. This framework is prepared specifically for Hobsons Bay. There are at present no "stand alone" biodiversity policies; however, biodiversity conservation is referred to in a number of the policies in the scheme. The framework includes at clause 21.02-5 the Strategic Framework Plan which identifies (amongst other things) a number of areas of biological and environmental significance. Clause 21.05 *Environment* elaborates upon how Council intends to protect and conserve the biodiversity of open space and watercourses as habitat for indigenous flora and fauna. 21.05-2 describes how Council proposes to protect and enhance the environmental values and significant features of the coast; to manage, conserve, and enhance the diversity of land and marine ecosystems; and ensure that development near the coast protects the environmental and landscape values of the coast.
- *Zones*: which each set out the intended purpose of land (for example for public land, residential, commercial areas and so on) and requirements for use and development. A zone, selected from the available suite in the Victoria Planning Provisions is applied to each parcel of land in Hobsons Bay. The provisions in each zone are standardised across Victoria, however in some instances there is the opportunity to customise aspects through the use of schedules to the zone. The Special Use Zone (SUZ) is one example, as discussed below.
- *Overlays*: which provide supplementary controls over the development and in some cases the use of land (for example identifying land of particular environmental significance, landscape significance, environmental condition that might impact on its development).
- *Particular provisions*: which describe the requirements for specific types of use or development. Examples include requirements for protection of native vegetation, car parking, private tennis courts, land subdivision, multi dwelling developments, residential buildings of five or more storeys, bushfire management requirements, etc.

8.4.2 State Planning Policy Framework (SPPF)

The SPPF is standardised within all planning schemes across the State. The relevant provisions once gazetted are automatically part of the Hobsons Bay Planning Scheme and Port of Melbourne Planning Scheme.

The SPPF includes policies on settlement, environmental and landscape values, environmental risks, natural resource management, built environment and heritage, housing, economic development, transport, and infrastructure.

The framework is subject to periodic review by the State. Council (and other interested parties across Victoria) usually have the opportunity to provide input into any changes to the framework. A formal planning scheme amendment is required for any changes to the SPPF, and the Minister for Planning is the planning authority for such amendments.

8.4.3 Local Policy Planning Framework (LPPF)

The LPPF provides Council with the opportunity to articulate its vision, strategies and guidelines for implementation of biodiversity conservation.

Importantly the local framework describes the rationale for the application of zones and overlays, and assists Council (and VCAT) with guidance when making decisions about planning permit applications for the use or development of land.

The framework is relied upon also by Council and the State government for guidance on the assessment of proposals to rezone land, or to change overlays or other planning controls that apply to a particular piece of land.

The local planning policy framework provides Council with an important opportunity to set out the key issues relating to biodiversity conservation, Council's vision for conservation and enhancement of biodiversity, and the actions that it proposes to take to manage these issues, through the application of controls in the planning scheme.

8.4.4 Application of the policies

For the planning scheme policies to have effect on land use and development, these need to flow through to controls in the relevant zones and overlays.

The policy guidance in the SPPF and LPPF only becomes relevant when either a planning permit is triggered for a specific use or development (via the zoning, overlays, or particular provisions), or Council is considering an amendment to the planning scheme.

In either of those circumstances, the policies in the planning scheme can be taken into account by Council when deciding whether or not to support a proposal.

8.4.5 Zones and their implications for biodiversity management

All zones and overlays share a common 'purpose' being to implement the state and local planning policy frameworks.

If the state and/or local policies in the planning scheme identify and address biodiversity, this can be brought into the assessment of a proposal in the zone (if a planning permit is required). In those circumstances, biodiversity considerations will be weighed up having regard also to the range of other policies in the planning scheme.

Public Park and Recreation Zone (PPRZ)

The purpose of the PPRZ includes implementing the state and local planning policy frameworks, recognising areas for public recreation and open space, protecting and conserving areas of significance where appropriate, and providing for commercial uses where appropriate.

Public Conservation and Resource Zone (PCRZ)

The purpose of the PCRZ includes implementing the state and local planning policy frameworks, protecting and conserving the natural environment and natural processes for the historic, scientific, landscape, habitat or cultural values; providing facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes; and providing for appropriate resource-based uses.

Special Use Zone (SUZ)

The SUZ in addition to implementing State and Local planning policies, designates land for a particular use or development.

The specific purpose of the zone is set out in each schedule to the SUZ. There are five separate schedules in the Hobsons Bay Planning Scheme, and these are as follows:

SUZ1-Private sports grounds and community establishments

SUZ2-Petroleum refinery area

SUZ3-Petrochemical complex area

SUZ4-Altona special industrial area

SUZ5-Marine engineering area

Each of these schedules calls for consideration of landscaping, and in some cases (e.g. SUZ3) the schedule specifies minimum widths of perimeter landscaping. In most cases the principal purpose of the landscaping is to provide screening and beautification.

It is notable that Schedule 4 (Altona special industrial area) addresses explicitly the mitigation of potential impacts on biodiversity values in grasslands on adjacent public land. The zone for this area specifies minimum development setbacks from the designated grassland areas, and requires referral of proposals to the State Government (DELWP).

Urban Floodway Zone (UFZ)

The UFZ, in addition to implementing state and local planning policies, identifies waterways, major flood paths, drainage depressions and high hazard areas within urban areas which have the greatest risk and frequency of being affected by flooding.

The zone seeks to maintain the free passage and temporary storage of floodwater, minimise flood damage and ensure that development is compatible with flood hazard, local drainage conditions and the minimisation of soil erosion, sedimentation and silting. The zone also seeks to protect water quality and waterways as natural resources.

8.4.6 Overlays

The VPPs include a number of planning scheme overlays that can be used to address biodiversity conservation and/or enhancement.

The following overlays are relevant to the management of biological values and may assist with implementing the biodiversity strategy.

Environmental Significance Overlay (ESO)

The ESO is used to identify areas where the development of land may be affected by environmental constraints, and to ensure the development is compatible with identified environmental values.

An ESO must include a schedule that contains a statement of environmental significance and describes the environmental objective to be achieved.

At present the Hobsons Bay Planning Scheme contains one schedule to the ESO.

Schedule 1 (ESO1) *Kororoit Creek Corridor Protection* applies to land along Kororoit Creek, generally in a 30m wide corridor (with variations to take into account topography and other features) and includes objectives and guidelines on:

- ecological systems
- landscape character
- open space and access
- views and visual features
- built form

Under ESO1, a planning permit is required to construct a building or fence, alter the existing or natural topography of land, remove topsoil, remove vegetation (with exemptions for removal of weeds that have been listed in ESO1, and some other proposals) and for subdivision.

Significant Landscape Overlay (SLO)

The SLO is used to identify, conserve and enhance the character of a significant landscape. It is relevant where vegetation is identified as an important contributor to the character of an area.

The schedule to the overlay must include a statement of the nature and key elements of the landscape, and the landscape character objective to be achieved.

The SLO introduces a requirement for a planning permit for the removal destruction or lopping of vegetation that is identified in the schedule to the overlay, and can also require a permit for buildings and works where this assists with vegetation protection.

There are at present no SLOs in the Hobsons Bay Planning Scheme.

Vegetation Protection Overlay (VPO)

The VPO can provide protection to significant native (and exotic) vegetation including individual trees, stands of trees, or areas of significant vegetation.

The purpose of the VPO includes implementing the state and local planning policy frameworks; protection of areas of significant vegetation; ensuring that development minimises the loss of vegetation; preserving existing trees and other vegetation; recognising areas of special significance, natural beauty, interest and importance; maintaining and enhancing habitat and habitat corridors for indigenous fauna; and encouraging the regeneration of native vegetation.

A planning permit is required to remove, destroy or lop any vegetation that is identified in the schedule to the overlay (noting that a number of exemptions apply). The overlay must include a statement of the nature and significance of the vegetation to be protected, the vegetation protection objectives to be achieved, the permit requirements, and guidelines to be followed when deciding whether to grant a permit.

The VPO does not address requirements for buildings, works or subdivision.

There are at present no VPOs in the Hobsons Bay Planning Scheme.

Design and Development Overlay (DDO)

The DDO sets out requirements for the design of buildings and works. It can include requirements for building setbacks, building height, plot ratio, landscaping, the design of fences and any other requirements relating to the design or built form of new development.

The Hobsons Bay Planning Scheme currently contains 11 separate schedules to the DDO, responding to specific design requirements.

The main focus of the DDO schedules is on the character and aesthetics of built form, landscape presentation, protection and enhancement of important view lines, and protection and enhancement of the amenity of public spaces (including by minimising overshadowing and impacts from wind tunnelling by buildings).

The planning outcome of the DDO may add strength to the benefits of open space where biodiversity values are also present. The objectives of the DDO can also consider biodiversity conservation objectives of the Council by use of landscaping for both amenity and habitat values.

Native vegetation precinct plans

Clause 52.16 *Native vegetation precinct plan* in the Planning Scheme sets out planning controls over native vegetation removal in cases where a native vegetation precinct plan has been prepared and

incorporated into the planning scheme. In those circumstances, clause 52.16 takes precedence over clause 52.17.

The overall intent is to provide controls over native vegetation removal, tailored to the conditions and requirements of a defined area. The plan can be prepared as a standalone document, or alternatively form part of a plan that addresses a range of other issues for a precinct. Examples of such plans include precinct structure plans, outline plans, or development plans.

The native vegetation precinct plan must:

- specify the purpose of the plan
- specify the area to which the plan applies
- specify the native vegetation which can be removed, destroyed or lopped
- specify the native vegetation to be protected
- set out the works, payments or other actions necessary to offset the removal, destruction or lopping of native vegetation
- relate the need for the works, payments or other actions to the proposed removal, destruction or lopping of native vegetation in the area
- provide for the procedures for the collection of any payments

A native vegetation precinct plan may include any other information necessary to achieve the purpose and effective implementation of the plan.

There are at present no native vegetation precinct plans incorporated into the Hobsons Bay Planning Scheme.

Native vegetation provisions

Clause 52.17 *Native Vegetation* in the Planning Scheme sets out permit requirements for the removal of native vegetation. The clause has the following purpose:

> *To ensure permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. This is achieved through the following approach.*
>
> - *Avoid the removal of native vegetation that makes a significant contribution to Victoria's biodiversity.*
> - *Minimise impacts on Victoria's biodiversity from the removal of native vegetation.*
> - *Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.*
>
> *To manage native vegetation to minimise land and water degradation.*
>
> *To manage native vegetation near buildings to reduce the threat to life and property from bushfire.*

The native vegetation controls trigger the requirement for a planning permit for removal of native vegetation. Some native vegetation removal is allowable without a planning permit. The full list of exemptions (and clarification of any conditions or requirements that apply) is set out in the table in clause 52.17-7 of the Planning Scheme.

Key exemptions of relevance to Hobsons Bay are:

- land with an area of less than 0.4ha (apart from roads, which are not automatically exempt)
- some vegetation removal from Crown land

- removal of dead vegetation having a diameter of less than 40cm measured at 1.3m above ground level
- emergency works
- the construction or maintenance of an existing building or one approved prior to September 2008 (apart from fences, or vegetation more than 10m from the building)
- a combined 4m wide clearing along fences between properties in separate ownerships
- fire protection works
- maintenance of grasses (to a minimum height of at least 100 mm)
- works required to comply with land management or land use condition notices under the Catchment and Land Protection Act 1994
- removal of planted vegetation (except where the planting was funded under a public program that did not anticipate harvesting of the vegetation)
- some maintenance of existing railways and railway access roads
- some regrowth (less than 10 years old), subject to conditions
- some vegetation removal required to maintain road safety
- some removal for maintenance of utility installations
- vegetation removal to provide access to a property from a road (subject to various conditions including specifying a maximum allowable extent of clearing)

The native vegetation controls allow an exemption for the removal of weeds, if the weeds have been listed in a separate schedule in the planning scheme. At present, no weeds have been specified in Hobsons Bay.

Decision guidelines for native vegetation removal

When deciding whether or not to grant a planning permit for native vegetation removal, Council is required to take into account:

1. the contribution that the vegetation makes to Victoria's biodiversity (based on an assessment of the condition and extent of the vegetation, and the biodiversity value of the vegetation, including whether it is important habitat for rare or threatened species)
2. whether the removal of native vegetation is defined as being in the low, moderate or high risk-based pathway, as defined in the *Permitted clearing of native vegetation –Biodiversity assessment guidelines* (DEPI 2013a).

The purpose of the *Guidelines* is to guide how impacts on biodiversity should be considered when assessing an application for a permit to remove native vegetation (DEPI 2013a).

The planning system manages the impacts on biodiversity from native vegetation removal using a risk-based approach.

The Guidelines determine the risk of the clearing to Victoria's biodiversity; with relatively minor impacts requiring less assessment and moderate or high impacts needing more rigorous assessment.

Applications are assigned a risk-based pathway of 'low', 'moderate' or 'high' depending on the 'extent risk' and the 'location risk'.

The *Native Vegetation Information Management* (NVIM) system developed by DEPI is used to determine the risk-based pathway of the clearing (DEPI 2014c). This is based on DELWP's modelling of location risk for the site in conjunction with the extent of proposed native vegetation removal.

If it is in the low risk pathway, a biodiversity assessment report can be generated using the NVIM interactive tool and a habitat hectare assessment is not needed (losses are based on modelled scores).

The biodiversity assessment report is then submitted to the Responsible Authority (Council, or VCAT on appeal) with the Clause 52.17 application, for assessment.

If the vegetation proposed for removal is in a moderate or high risk pathway, then a map with the extent of proposed clearing and a habitat hectare assessment needs to be provided to DELWP. The Department will produce a *Biodiversity Impact and Offset Requirements Report* outlining the required offsets. This report is then provided to the Responsible Authority with the Clause 52.17 application.

Under Clause 52.17, the permit application must also provide a statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised, as well as provide an offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation. All applications require the clearing to be offset by way of protecting other areas of native vegetation, or revegetation in part.

For all risk pathways, offsets must be secured before the permitted native vegetation is removed (DEPI 2013a).

The State context of these controls need appropriate consideration when evaluating impacts to biodiversity within Hobsons Bay. The controls are intended only to mitigate impacts to biodiversity at State level, by using an appropriate planning response varying from approval with some kind of offset to a refusal to issue a planning permit.

There are models and other data provided within the Native Vegetation Information Management System (http://nvim.depi.vic.gov.au/) which allow a proponent to determine whether their native vegetation clearing will have a significant impact on Victoria's biodiversity.

The Biodiversity Assessment Guidelines have been designed to assess the impacts to biodiversity at a state level and not a municipal level. As such, there can be some limitations on their effectiveness when used at a municipal level. The guidelines apply only to biodiversity considerations relating to native vegetation removal addressed in Clause 52.16 and 52.17 of the planning scheme. Other planning controls are required to protect biodiversity at different scales.

As identified below there are clear limitations with relying solely on the planning permit triggers in clause 52.16 and 52.17 to manage all impacts to biodiversity.

- Assessments under the Guidelines are weighted towards impacts to Victorian rare or threatened species (listed in the State's advisory lists). Impacts are determined for most part by the relative impact to a species' habitat elsewhere in the state. For High Risk Pathway applications only, the Responsible Authority may consider other information about threatened species on a site when determining significant impacts to Victoria's biodiversity (DELWP 2015). Decision making under the Guidelines is in the context of Victoria and not Hobsons Bay. Some populations of state threatened species may be locally significant, or significant within the greater Melbourne area, although their loss would not otherwise trigger refusal of the permit or generate an offset.
- Habitat models provided for State threatened species have an inherent weakness. There is a high probability that a State rare or threatened species will be present within grassland remnants, and that some of these are not within areas modelled as habitat.
- Clearing controls under Clause 52.17 apply only to land which, together with all contiguous land in one ownership, has an area of more than 0.4 ha. There are also a number of permit exemptions. In the case of Hobsons Bay, the remnant grasslands have in many cases

biodiversity significance, and some smaller areas of grassland and other native vegetation (which would be exempt from the 52.16 and 52.17 provisions) may contain significant values.

This technical report identifies biodiversity values within Hobsons Bay, including those which are significant at national, state or local level. In some cases there are populations of species which are threatened within Hobsons Bay and clearly in decline elsewhere on the Victorian Volcanic Plain although not yet considered threatened at state level. It is appropriate therefore that any planning controls addressing biodiversity management should consider measures to mitigate impacts on National and State biodiversity values, in addition to local values. It should also consider the extent of decline in biodiversity values within Hobsons Bay and the importance of extant species and communities for adding resilience to values in adjoining municipalities and within the Victorian Volcanic Plain bioregion.

Existing use and development

A number of the threats to biodiversity values identified in the studies prepared to date arise from uses or developments that are pre-existing, and/or would not trigger the requirement for a planning permit.

Examples of these threats include:

- the effects of noise emissions
- the use of public open space by dogs
- management of drainage discharges from private land
- the potential spread of environmental weeds from private landscaping into reserves with conservation values

Planning provisions are not retrospective by nature and there is limited scope for existing or new planning provisions to have any effect over the existing development or use of land, irrespective of whether the development or use has impacts on biodiversity values.

There might also be instances where use, development, or landscaping is occurring contrary to conditions under which the approval was granted. For example, where stormwater discharge is not operating in accordance with an approved stormwater management plan, or environmental weeds have been planted in the place of indigenous species shown on a landscape plan.

In these circumstances, consideration can be given to enforcing the original conditions of approval.

8.5 Gaps in current controls on significant areas

Upon review of current planning controls and the analysis of biodiversity significance (Figure 6), there is an opportunity to define a new ESO to control planning in some other parts of Hobsons Bay. The most pressing argument for an additional ESO is to control inappropriate land use on land containing native (basalt) grassland. Native grassland is afforded protection in some circumstance under the state Biodiversity Assessment Guidelines (DEPI 2013a) and the EPBC Act. The limitations of these to clearing controls are discussed in Section 8.4 above. In summary, there is a need to provide protection for grassland not representing the EPBC Act listed ecological community, or grassland for habitat with state threatened species where state-wide models have failed to identify the site's values for these species. An ESO should therefore, require that assessments and reporting for a planning permit application document the extent and quality of native vegetation, as well as the extent and quality of threatened species habitats and populations of these species. Survey guidelines should be drafted which consider the seasonal requirements for survey and accepted methods to best determine whether a threatened species will be impacted. The ESO could also consider the local conservation status of other species with

further assessment using IUCN criteria. For example, Knox City Council's planning scheme requires consideration under an ESO, of the impacts to locally threatened plant species. The proponent in this case may be required to provide an argument for how these species will be offset if cleared e.g. in revegetation or landscaping. There is less need for an ESO within coastal areas of the municipality as most of the high value biodiversity sites are protected by Ramsar listing, reservation for biodiversity conservation or waterway management (Parks Victoria and Melbourne Water managed) or other planning control relating to coastal values.

At the current level of assessment, it is recommended that an ESO be used to provide greater security of higher quality basalt grassland within Hobsons Bay. Presently there is insufficient information about the extent and quality of native grassland within the municipality on which to prioritise boundaries for an ESO. Information is largely based on modelling and has an associated error built in to the mapping. Properties which are identified in the future by more detailed assessment should be defined and summarised in the schedule to the ESO, and shown on planning maps. Until then, candidate properties which meet criteria to qualify for very high biodiversity significance—while including modelled Plains Grassland—are shown in Figure 6. These provisional ESO properties capture the vast majority of higher quality basalt grassland values within the municipality.

Properties listed in Appendix 3 are high priority candidate sites for an ESO. A comprehensive review is required of actual values to provide validation of the modelled and historical data contributing to the assessment of significant sites.

Statement of environmental significance

A draft statement of environmental significance for native grassland values within Hobsons Bay may be based on the following example:

> *Hobsons Bay contains significant areas of native grassland communities on both public and private land. They form part of approximately 15% of native vegetation which is remaining within Hobsons Bay; and their condition has declined since European occupation due to a range of land use activities and influence from threatening processes such as weed invasion. Collectively within Hobsons Bay, these grasslands provide habitat for at least eight flora species and three fauna species that are nationally threatened (EPBC Act) and strongly dependant on grassland areas for habitat. Larger patches of grassland also represent the EPBC Act-listed ecological community Natural Temperate Grassland of the Victorian Volcanic Plain. Apart from their national significance, native grasslands provide habitat for several state listed flora and fauna species as well as those which are now regarded as locally extinct or threatened with local extinction.*
> *Hobsons Bay contains Laverton North Grassland which is well documented for its biodiversity values, and there are other examples of remnant grassland around Laverton and Altona area. The conservation of soil and embedded basalt rock structure is of vital importance for the persistence of species which occupy these environments. Biogeographically they represent the south-eastern extent of basalt grassland within Victoria and as such, the eastern range limit of several species. The management of these grassland areas that includes conservation objectives is important for the resilience of and connectivity with other grassland areas within the region, including other significant sites in adjoining municipalities.*

8.6 Biodiversity offsets

Victorian Permitted Native Vegetation Clearing regulations and Biodiversity Guidelines

In December 2013 a planning scheme amendment was gazetted to introduce the Victorian

Government's Reforms to Victoria's Native Vegetation Permitted Clearing Regulations. The objective for the regulations is: *no net loss in the contribution made by native vegetation to Victoria's biodiversity* (DEPI 2013a).

The new Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines (the Guidelines (DEPI 2013a) have been incorporated into the Victorian Planning Provisions and all planning schemes in Victoria. These Guidelines replace Victoria's Native Vegetation Management – A framework for Action (NRE 2002).

The purpose of the Guidelines is to guide how impacts on biodiversity should be considered when assessing an application for a permit to remove, lop or destroy native vegetation, specifically under Clause 52.16 and 52.17 of the planning scheme (DEPI 2013a). The planning system manages the impacts on biodiversity from native vegetation removal using a risk-based approach. Applications are assigned a risk-based pathway of low, moderate or high depending on the extent and location of the proposed clearing. If a permit is granted, native vegetation offsets are required. Below is a summary of the offset requirements under Victoria's Permitted Clearing Regulations; it addresses: the types of offsets, offset requirements, site eligibility for offsets, and measuring the extent of offsets achievable.

Types of offsets

Under the Guidelines, biodiversity offsets are required to deliver gain in the contribution to Victoria's biodiversity that is equivalent to the loss from the native vegetation removed. This gain is achieved through a strategic approach that aims to maximise benefits to biodiversity by:

- *directing offsets to areas that are strategically important for biodiversity*
- *ensuring that offsets provide protection for the most important habitat for [Victorian] rare or threatened species, when these are significantly impacted* (DEPI 2013a)

Biodiversity offsets are therefore divided into Specific or General Offsets.

1. Specific Offset: Are required when the removal of native vegetation is considered to have a significant impact on habitat for a specific rare or threatened species. The offset must compensate for the removal of that particular species' habitat.
2. General Offset: When the removal of native vegetation is not considered to have a significant impact on the habitat of a particular rare or threatened species, a General Offset is required. A General Offset requires that the contribution to Victoria's biodiversity made by the offset be equal to the loss of the contribution to Victoria's biodiversity from the removal of native vegetation. The vegetation and habitat attributes of the offset do not need to match closely those attributes of the native vegetation to be removed.

Offset requirements (like-for-like)

A potential offset site must fulfil the offset requirements for General and/or Specific Offsets. For General Offsets the site must have the following attributes.

1. Vicinity – be located within the same Catchment Management Authority boundary or municipal district as the vegetation to be removed
2. Minimum Strategic Biodiversity Score - The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed (DEPI 2013a)

For Specific Offsets the site must support suitable habitat for the rare or threatened species that a Specific Offset is required for. Habitat suitability is determined using Habitat Importance Maps held by the Department of Environment, Land and Water Planning (DELWP). These maps are based on modelled data only and they indicate the importance of locations as habitat for rare or threatened species. A site can potentially support Specific Offsets for a number of rare or threatened species, as well as General Offsets.

Site eligibility for offsets

In addition to the above offset requirements, a site must also fulfil the following criteria to be eligible as an offset.

- Land tenure – all Freehold Land is potentially eligible and Crown Land is eligible if it is implemented under the Integrity framework for Crown land offsets. This framework has not yet been released but will specify the circumstances where Crown land can be used as an offset. Both potential Freehold and Crown Land must also fulfil the requirements below
- Current and future land use – an area of native vegetation will be eligible as an offset if there are no current and future land use(s) identified that are incompatible with managing native vegetation for conservation. Incompatible current and future land use relevant to Council could include:
    - fuel reduction activities that involve removing logs and leaf litter and clearing or trimming native vegetation
    - infrastructure easements
    - areas identified for other uses that are incompatible with managing vegetation for conservation e.g. recreational activates that may compromise the native vegetation and offset, such as horse riding, sporting activities, picnic areas, playgrounds
    - use of established tracks for horse riding, vehicles and bikes. New tracks within the offset area would also not be permitted
    - other ongoing land uses that may degrade vegetation or restrict improvement (DEPI 2013b)
- Existing offsets or agreements – native vegetation will be eligible if it is not part of an existing native vegetation offset, or is not subject to a current agreement under an incentive or grant program where the requirements are equivalent to the requirements to achieve an offset
- Threats to native vegetation condition – native vegetation is eligible if significant threats can be adequately managed. This includes high levels of nutrient run-off, uncontrollable or potential for increased salinity or erosion, significant invasion by pest animals, extensive dieback or other plant diseases, and disturbance regimes incompatible with the offset objectives e.g. flooding and fuel reduction burning (DEPI 2013b)
- Security – must be legally binding. It can be achieved via one of three means - registering a security agreement to the title of the land; entering into a formal agreement with a statutory body that is approved by DELWP; or transferring freehold land to a Crown Land conservation reserve
- Minimum management actions – the landowner must agree to the minimum management actions outlined in the Gains Scoring Manual (DEPI 2013a), which is then outlined in a 10-year Management Plan and forms part of the security agreement
- Revegetation – is only permitted for offset low-risk clearing applications. For revegetation to be eligible it needs to meet the requirements and minimum planting standards outlined in the Gain Scoring Manual

Measuring quantity of offsets

Offsets achievable within a site are measured in gains. Gain is the *predicted improvement in the contribution to Victoria's biodiversity made by native vegetation at a site due to active management and increased security of the native vegetation* (DEPI 2013a).

Gain is determined by combining site (Site Gain) and landscape scale information (either strategic biodiversity score or habitat importance score determined by modelling) to get an overall measure of predicted improvement in a site's contribution to Victoria's biodiversity (this is measured in Biodiversity Equivalence Units).

Site Gain is available where the commitments are higher than the landowner's current legal management responsibilities (duty of care). Site Gain can include four types of gain: prior management, security, maintenance and improvement gains. All the above Gains are available on Freehold Land, but on Crown Land only security and improvement gains are available. Gains achievable within an area of native vegetation are determined based on a site assessment by a qualified assessor, or for first party general offsets, modelled site gain data can be used.

To determine total gains (Biodiversity Equivalence Units) achievable within a site, site data (spatial data and Site Gains) are submitted to DWELP and run through the biodiversity models (landscape scale information). The resulting offset report outlines the extent of General and/or Specific offsets achievable.

EPBC Act Offset policy

EPBC offsets are considered when residual impacts (i.e. impacts after avoidance and mitigation measures have been implemented) are likely to have a significant impact on a protected matter listed under the EPBC Act.

EPBC offsets must directly contribute to the ongoing viability of the protected matter impacted by the proposed action, and deliver an overall conservation outcome that improves or maintains the viability of the protected matter compared to what is likely to have occurred if neither the action or the offset had taken place (DSEWPaC 2012). As such, the offset must be tailored to the attribute of the protected matter that is being impacted (i.e. demonstrate like for like).

- For a listed threatened species, this means offsetting the attribute that is impacted e.g. if foraging habitat is lost, then creation, or protection or management of foraging habitat needs to make up the offset. In addition, if there is loss of habitat then the offset site as a minimum must support the same quality habitat or habitat that can be managed/improved to meet the standard that was impacted
- For loss of an ecological community the offset site must support the community of the same quality or can be managed so the quality is at least the same as that impacted
- When the protected matter is the whole of the environment (nuclear actions, proposals involving the Commonwealth, actions that affect Commonwealth areas and the Great Barrier Reef Marine Park), offsets must be targeted to the aspect of the environment that is being impacted so as to directly compensate for the impact (DSEWPaC 2012)

There is some potential to deviate from the above like-for-like rules if the proposed offset can achieve a

better outcome for the species being impacted e.g. if the offset provides nesting habitat instead of foraging habitat because this will provide a better conservation outcome to the species being impacted. Whether the different offset is suitable is up to the discretion of the Department of the Environment. However, offsets cannot be traded across protected matters e.g. offsets for the loss of habitat for a threatened species cannot be offset with the protection of habitat a different threatened species.

In addition to the like for like requirements above, EPBC offsets must also consider the following issues.

- Timing - Offsets must be timely and should be established either before or at the same time as the proposed impact (DSEWPaC 2012)
- Vicinity – there is a preference for offsets to be located as close as possible to the site of impact
- Existing offsets or agreements - Offsets must deliver a conservation gain for the impacted protected matter, and that conservation gain must be new, or additional to what is already required by the current duty of care or to any environmental planning laws at any level of government. This requirement would generally exclude using a piece of land already set aside for conservation or using a site that is already unable to be built upon due to zoning laws (DSEWPaC 2012). However, if an offset is required for a proposed action under both state and federal government, one site can be used for both as long as the offsets can be fulfil both offset requirements. Environmental offsets must also be additional to what has been paid for under other schemes or programs on a pro rata basis
- Security – all offsets, either on private land or public land, need to be adequately secured, for at least the duration of the proposed impact
- Monitoring and reporting – The success of the offset needs to be undertaken using clear measures of determining success, so that management can be altered if the required outcomes are not being achieved. Annual reporting to the Department of Environment is required

An Offset Assessment Guide has been developed to assist with determining if a site can potentially fulfil an EPBC offset requirements. It is located on the Department of Environment's website. (https://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy)

Hobsons Bay City Council Offsets

There are a number of similarities in the requirements for offsets under Victoria's Native Vegetation Permitted Clearing Regulations (VNVPCR) and the EPBC Act. A summary of these offset requirements is presented in Table 20. Before considering whether to take on an offset, Council must be prepared and suitably resourced to fulfil the requirements of that offset. Listed below are the factors to consider when assessing whether or not to provide offsets.

- **The Land Tenure** - Under the VNVPCR site gains on Public Land are limited to security and improvement gains. As a result larger areas of native vegetation need to be managed to achieve an offset, compared to Freehold Land where all types of gains are available. As such, the funding required to manage the offset will be also need to be greater.
- **Land use** – All State and Federal offsets require the offset area to be set aside for conservation. Therefore if the site is being used for other purposes e.g. recreational activities, fuel reduction, the land manager must forgo these land uses. To separate an offset area from other areas, fencing may be required.
- **Funding and resources required** – All VNVPCR and most EPBC offsets must be secured and managed for perpetuity. Council will need the funding and resources (either contractors and/or staff) to maintain and manage the offset site for the longer-term. This cost varies greatly based

on the vegetation being managed, the quality of the vegetation, and the management issues for each site.

- **Type of offset and potential to sell offsets** – the type of offsets whether General and/or Specific offsets can be achieved within the site and whether the site can also offer EPBC offsets could potentially affect the ability to sell third-party offsets. It is possible that Specific and EPBC Offsets are hard for permit holders to find and therefore more highly sought after.

The above factors may also influence whether the Council are willing to offer Third party (offsets impacts for someone else) and/or First party offsets (offsetting Council impacts). The ability to sell third party offsets depends on the price of the offset and the supply and demand of the offsets in question. BushBroker (DEPI 2013d) have identified factors that need to be considered when determining the price of an offset. These and additional factors relevant to Council include:

- costs associated with developing the price, site assessment and management agreements, as well as overall project management
- cost of developing a management plan
- labour costs for implementing the management actions in the ten-year Management Plan and management commitments in perpetuity
- labour or consultant costs associated with monitoring the site and providing relevant reports
- cost of materials associated with each activity, such as fencing materials, herbicides, plants or seed supplies, tree guards and baits
- purchase or hire of equipment to undertake activities such as weed spraying or fencing
- hire of contractors to undertake activities or provide advice on matters such as pest animal or weed control, fencing and supplementary planting
- the risks of a major event such as drought, flood or fire over the period of the agreement, and the implications of these on the ability to meet the Offset Targets
- the risk of new and emerging threats and possible required management to address these
- costs associated with permanently protecting the site, including future opportunity costs
- insurance for the site (such as fence replacement)

Offsets undertaken by Council provide a means of improving biodiversity values for the municipality. The Maidstone Street Grasslands and Horsburgh Drive Grassland are already providing Native Vegetation Offsets (Hobsons Bay City Council 2014). Hobsons Bay City Council owns a few additional sites that could potentially be used for offsets. There is also the potential to acquire freehold land in the future, where all site gains are potentially available under Victorian Permitted Clearing Regulations. If Council wish to pursue the option of achieving offsets within Council owned land, sites should be prioritised, based on their biodiversity assets and manageability.

Managing new offsets

There may also be opportunities for Council to take-on new offsets. A decision tree

Figure 11) provides guidance on when new sites could be considered and takes into consideration:

- whether an offset has been approved and is guaranteed for a given site. For example land is transferred to Council ownership and the site has been set aside to fulfil an approved offset (guaranteed offset) versus Council have an opportunity to purchase land supporting remnant vegetation which could potentially be used for offsets in the future (non-guaranteed offset)
- site values measured in terms of supporting, or having the potential to support threatened species and the condition of the vegetation
- viability and manageability of the offset which includes factors such as patch size, connectivity and weed cover (refer Section 2.7)
- offset (gains) achievable as presented within Victoria's Native Vegetation Gain Manual (DEPI 2013b) which is largely affected by site condition and land tenure
- the potential to sell non-guaranteed offsets once the land is in Council ownership

It should be noted that vegetation communities (EVCs) are not a factor influencing the decision process. This is because EVCs are no longer a key driver for native vegetation offsets within Victoria. Furthermore, the majority of the sites will be on freehold land that is most likely to support threatened ecological communities (both state and nationally); largely those related to Plains Grassland and to a lesser extent Plains Grassy Woodland EVCs. All these remnants are considered important for protection within the municipality. Their suitability as offsets is therefore determined by factors such as additional site values (e.g. presence of threatened species), viability, manageability, and sellability.

Sellability of non-guaranteed offsets will be affected by price and the uniqueness of the offsets being offered. The Decision Tree recognises that much of the offsets will be within Plains Grassland or Plains

Grassy Woodland, which are inherently more expensive to manage (e.g. BushBroker trading history under the former Native Vegetation Framework regularly sold Plains Grassland and Plains Grass Woodland offsets at $200k - $250k per habitat hectare). The cost of offsetting (per unit area) will therefore be high. With the Victorian offset market no longer driven by EVCs the potential to sell offsets or credits will therefore lie in the uniqueness of the offset (i.e. specific offsets or EPBC offsets for a listed item) as well as the manageability and the viability of the offset. General offsets (which require no like-for-like requirements for EVC or threatened species) are likely to be purchased elsewhere.

While most offsets would be Freehold land, the decision tree also recognises that there may be times where land is transferred to Council from another public land manager and these sites could be offered as third-party offsets. Following Victoria's Native Vegetation Gains Guide (DEPI 2013b), gains achievable on public land are approximately half that on freehold land, therefore a greater area needs to be managed *(c.f* freehold land) to achieve an offset target. As such the patch size threshold for potential offsets on public land is greater.

Once a site is considered as potentially suitable for Council to take on, it then needs to be determined if the site meets the offset requirements and eligibility criteria outlined above (for Victoria's Native Vegetation Permitted Clearing Applications and/or EPBC Act offsets). For sites where offsets are not guaranteed this would require some due diligence to determine the potential for achieving Specific Offsets and/or the presence of EPBC-listed species or communities (refer also Table 20 Offset types and criteria).

Lastly, it should be ensured that the security of the offset site is realistic to achieve the management objectives. The management of state native vegetation offsets and EPBC Act offsets is conservation driven. That is, the primary management objective of the land is to promote conservation of species and their communities. These management objectives may be in conflict with various other land use considerations:

- The expectations of the broader community for use of the land
- The requirements for buffers, easements and access
- The alignment of adjacent land use planning and implications for ongoing persistence of associated threats to the offset site

Table 20 Offset types and criteria

Offset type	Like-for-like requirements	Additional requirements						Site assessment of offset area	Timing of offset	Potential to overlap with EPBC Act offsets
		Security	Land Use	Existing offsets or agreements	Management	Management plan	Monitoring and reporting			
Biodiversity Assessment Guidelines – General	• Located within same municipality or Catchment Management Authority • Strategic biodiversity score of offset area to be at least 80% of that being removed.	Yes	• No incompatible land use.	• No existing offsets • Over and above existing agreement.	• Must fulfil the management requirements outlined in the Gains Guide (DEPI 2013b).	Yes	Yes	• Not required for first party offsets • Required (Site Gains) for third party offsets.	• Offset site secured prior to removal of native vegetation.	• Yes potential to offset Ecological Communities and listed species not recognized in modelling but confirmed to be present onsite.
Biodiversity Assessment Guidelines – Specific	• Supports habitat (as determined by habitat importance modelling only) for the rare or threatened species requiring offsetting.	Yes	• No incompatible land use.	• No existing offsets • Over and above existing agreement.	• Must fulfil the management requirements outlined in the Gains Guide (DEPI 2013b).	Yes	Yes	• Yes - for assessment of Site Gains and management issues.	• Offset site secured prior to removal of native vegetation.	• Yes, only if site assessment to determine the protected matter is present and meets the quality requirements.
EPBC Act protected matters	• Supports habitat or ecological community of the protected matter being impacted. • Quality is equal to, or better, than that being removed. • Attribute for the threatened species protected is the same as the attribute being impacted.	Yes	• No incompatible land use.	• Generally not allowed. Must be over and above existing offset or agreement.	• Maintain or improve condition of the viability of the protected matter.	Yes	Yes	• Yes. Suitability of site (presence of protected matter and quality) determined by site assessment.	• Before or at the same time as the proposed impact.	-

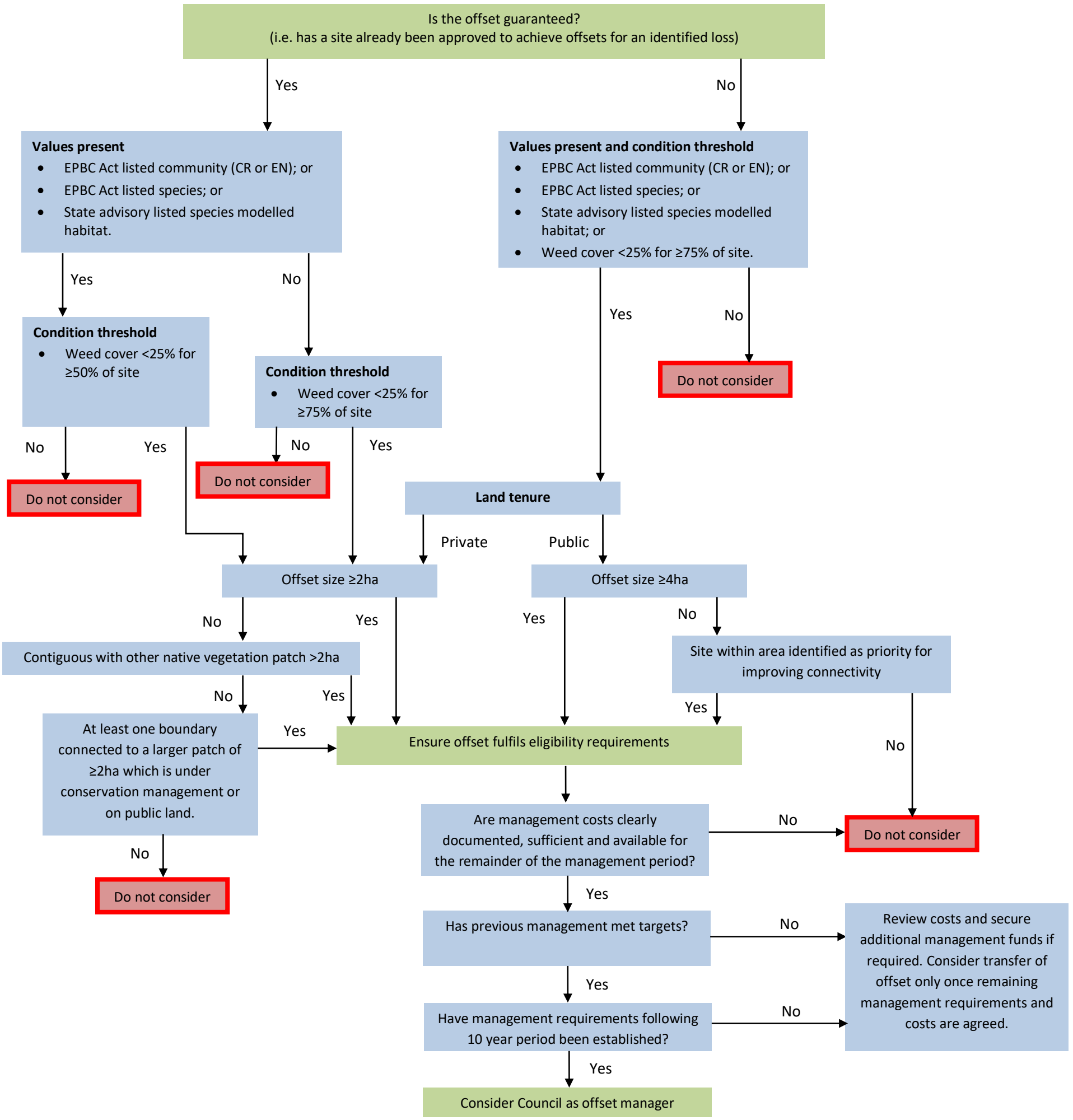


Figure 11 Decision criteria to guide feasibility of offsetting native vegetation within Hobson Bay.

9 Recreation and biodiversity management

9.1 Social and economic value of conservation areas

The benefits of conservation areas go beyond just protecting biodiversity values, they also provide important economic, social and cultural benefits to people (DEWNR 2011). CSIRO has estimated the value of Australia's ecosystems, its air, water, forests, flora and fauna at greater than $1,300 billion per year. For example, protected wetlands and water catchments purify the water we drink; forests and vegetation filter and oxygenate the air (Department of Environment website 2015).

Social and economic benefits of conservation areas to Hobsons Bay municipality include:

- Safe-guarding natural systems that provide people with essential services such as clean air, soil and water. In particular, conservation areas are essential in protecting our water resources in times of drought and with ongoing pressures from climate change
- storing carbon. Much of our stored carbon is located in protected areas. Retaining and enhancing carbon sinks is important to all ecosystem services
- providing significant benefits to primary industries by protecting habitat that supports native insects, which pollinate crops, and birds and bats, which control pests and vermin (DEWNR 2011)
- protecting resources for scientific research and education. Conservation areas provide an important source of data to inform us on how our biodiversity is responding to changes in the environment. This information is essential for determining future management decisions
- providing areas for recreation and tourism. In 2009, the nature-based tourism sector contributed over $33 billion to the Australian economy, with greater than 28 million visitors taking part in nature-based activities (Department of Environment website 2015)
- providing direct and indirect economic benefits to communities through employment and the provision of services associated with biodiversity management, recreation and tourism (Department of Environment website 2015, DEWNR 2011)
- helping to maintain Aboriginal connections to the land by protecting culturally significant values (DEWNR 2011)
- improving physical health by providing inspiring places for exercise (Department of Environment and Natural Resources 2011). Many of the people who responded to the Hobsons Bay Public Open Space survey indicated they used open space areas for exercise (walking and cycling) (Thompson Berrill Landscape Design 2014)
- strengthening the community i.e. by bringing the community together, contributing to local knowledge and pride of place and heritage, and providing opportunities for contribution to community action through volunteer work (DEWNR 2011)
- enhancing mental health and wellbeing. This was reflected within Hobsons Bay City Council Open Space Survey. Sixty-three per cent of people who responded to the survey indicated the main reason why they visited the open space areas was to relax and unwind (Thompson Berrill Landscape Design 2014). The most frequently visited areas were the foreshore reserves

  The importance of natural areas on mental health and wellbeing has been subject to much research. According to the World Wildlife Fund (2010) research has demonstrated that:
  - there are some known beneficial physiological effects that occur when humans encounter, observe or otherwise positively interact with animals, plants, landscapes or wilderness

- natural environments foster recovery from mental fatigue and are restorative
- when given a choice people prefer natural environments (particularly those with water features, large old trees, intact vegetation or minimal human influence) to urban ones, regardless of nationality or culture
- the majority of places that people consider favourite or restorative are natural places, and being in these places is recuperative
- people have a more positive outlook on life and higher life satisfaction when in proximity to nature (particularly in urban areas)
- exposure to natural environments enhances the ability to cope with and recover from stress, cope with subsequent stress and recover from illness and injury
- observing nature can restore concentration and improve productivity
- having nature in close proximity, or just knowing it exists, is important to people regardless of whether they are regular 'users' of it. (From WWF 2010 - Vital Sites – the contribution of protected areas to human health Pg. 37)

9.2 Impacts of recreational land use on biodiversity

A small number of recreational activities have been identified (Table 21) as having an impact or potential impact to biodiversity values within Hobsons Bay.

Table 21 Recreational activities and potential impacts to biodiversity

Recreational activities	Potential impacts
Fishing	Injury to wildlife from discarded fishing line. Pollution of waterways from discarded bait bags. Disturbance to shorebird behaviour.
Kite surfing	Damage to shoreline vegetation. Disturbance to shorebird behaviour.
Four wheel driving / Mountain bike riding / Trail bike riding	Damage to vegetation and fauna habitats (e.g. at Truganina Park). Creation of new tracks and fragmentation of vegetation patches.
Dog walking	Access and damage to mudflats and associated habitats. Disturbance to shorebird behaviour.
Wildlife collecting	Removal of individuals from wild populations e.g. Cunninghams Skink.
Bird feeding	Increase carrying capacity of some species. Health implications due to changes in diet. Changes to animal behaviour e.g. foraging.
Horses	Damage to soil structure and native plants. Spread of weeds.

While there is evidence of impacts of recreational activities on biodiversity, these are seldom monitored. There is opportunity to determine the level of impact where a recreational activity is suspected of being a high threat to biodiversity, so that this information can guide management. Data are needed to determine the magnitude of impact.

9.3 Encroachment from urban and industrial land into natural areas

Conservation areas on public land which abuts residential and industrial zones can sometimes be the subject of encroachment. Encroachment includes to extension of adjoining land use into the public land in one way or another. Examples within Hobsons Bay include the extension of mown areas for domestic use or fire mitigation, the extension of gardens or vegetable growing areas, storage of equipment or materials and the dumping of waste materials.

The dumping of garden material over fences and into adjoining areas of public land has the potential to spread weeds or even introduce new weed species into the municipality. Some weed material in garden waste may establish where dumped although not readily spread by its own means into native vegetation. There is potential, however, for a broad range of species to establish where dumped and then reproduce by seed or vegetative parts, and spread further, becoming a management issue. In many cases dumped garden material includes weedy species (e.g. fast growing and easily propagated) which is why the material is removed from domestic gardens in the first place. Mower clippings are often dumped into areas of native vegetation with the misconceived idea that this will be beneficial for the vegetation. Dumping of any garden or lawn material into native vegetation invariably results in the spread of some weed material.

Encroachment into natural areas appears to be a localised issue within Hobsons Bay. Most natural areas, with the notable exception of waterways, have a considerable buffer between residential land and adjacent values, and the impacts to biodiversity as such are uncertain. Encroachment from industrial areas is perhaps more likely to impact on biodiversity as many industrial areas directly adjoin native grassland. The type of encroachment is also different to residential land with storage of material, dumping of fill, and temporary use of reserve areas for parking etc. more likely to result in loss of native vegetation and spreading of weeds.

Melbourne Water has introduced a program (Our Space Your Place) where the public are able to apply to use Melbourne Water's land for community activities. These include establishing community gardens and vegetation planting. There is opportunity to also explore the feasibility of this type of program on Council land through the Open Space Strategy. However, as this type of program is less relevant to industrial land it may be more practical to inform both industrial land managers and owners of implications under the EPBC Act and the grassland values which Council are trying to manage.

9.4 Snakes in the Hobsons Bay environment

There are a variety of snakes that naturally occur in Hobsons Bay including Little Whip snake, White-lipped snake and Tiger snake. All species of native snakes are protected under the Wildlife Act 1975 which states that it is illegal to disturb or to destroy protected wildlife.

Snakes fulfil a vital role in the proper functioning of an ecosystem whereby they fill the niche of a middle-order predator.

Council undertakes routine maintenance within recreational reserves and open space areas which helps reduce the presence of snakes.

9.5 Possums

There are two species of possum that are common to Hobsons Bay. The Common Ring-tail Possum is a small possum that nests in shrubs and eats fruit and flowers. Occasionally, Ring-tails can damage urban gardens but generally are not a problem to most residents. The Brush-tail Possum is a larger possum

that can be boisterous and take up residence in house roofs, if the opportunity is there e.g. loose tiles and gaps. Both species will occupy possum boxes specifically designed for them in preference to houses. Relocation of possums can cause problems because most suitable habitat is already occupied and the displaced possum will not be able to find a suitable home.

10 Stakeholder engagement

10.1 Community survey results

A total of 153 people responded to the community survey.

Respondents were from:

Altona	20.3%
Altona Meadows	10.5%
Altona North	1.3%
Brooklyn	0%
Laverton	1.3%
Newport	11.8%
Seabrook	3.9%
Seaholme	2.6%
South Kingsville	2.6%
Spotswood	2.6%
Williamstown	24.2%
Other (not specified or neighbouring areas)	19%

Question one asked the community to rate the top three things they value most about Hobsons Bay's natural environment. The things the community value most about the natural environment are:

Walking and cycling paths	51.6%
Wetlands and waterways	51%
Coastline	43.1%
Native plants	41.2%
Open space	37.3%
Native animals	25.5%
Birds	21.6%
Facilities (e.g. playgrounds and BBQs)	11.1%
Easy to access	9.2%
Views	5.2%
Recreation (e.g. fishing and kite surfing)	3.9%

Additional comments provided by participants include:

Lots of space, generally clean
We really value Newport Lakes
Coastline preservation is critical
Native plants and animals and recreation and view actually all of the above points
Trees are important
The dog beach is important
Power lines interfere with street trees, it would be good to see them go underground
Seats and picnic tables are important

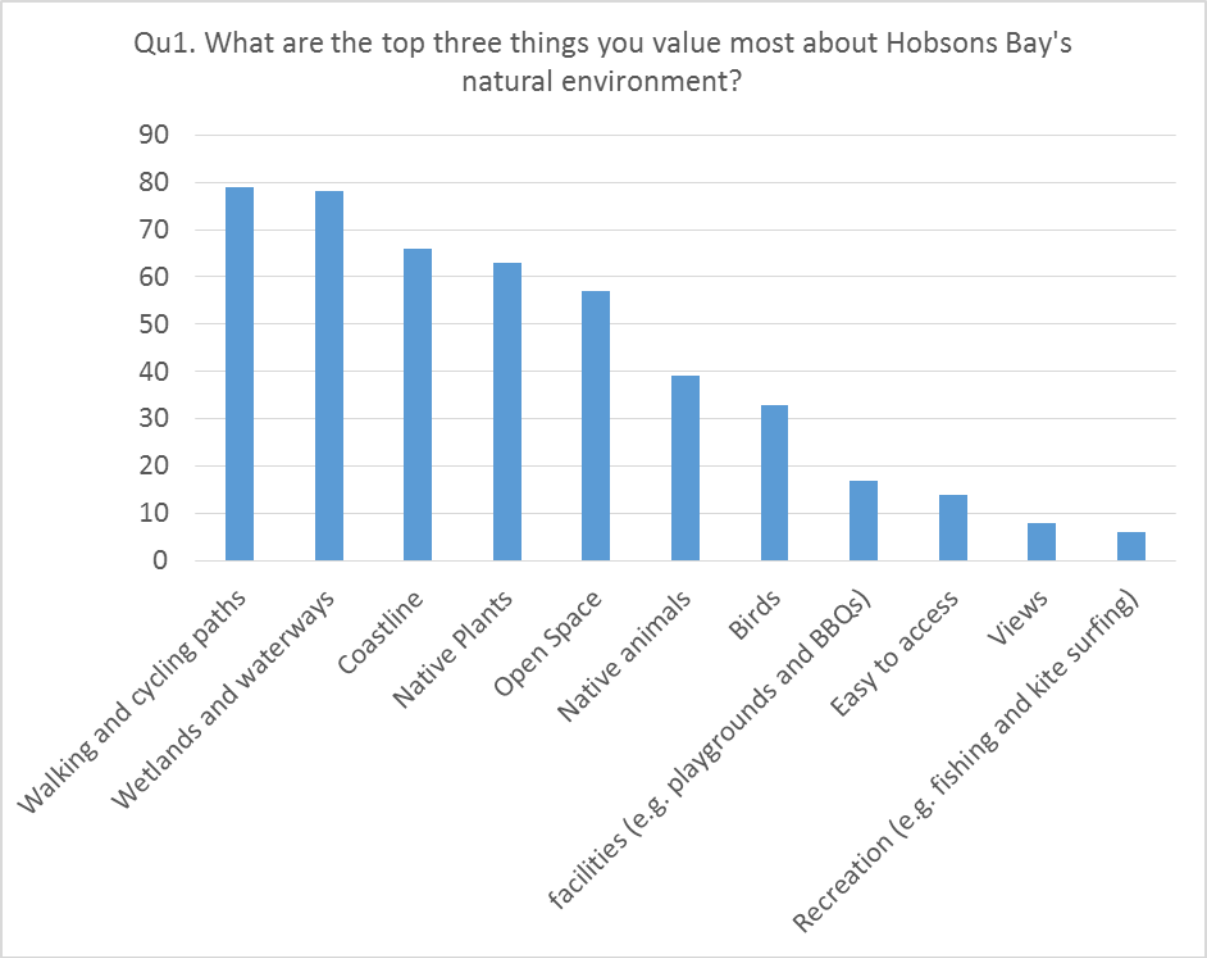


Figure 122 Community survey question 1 responses – What are the top three things you value most about Hobsons Bay's natural environment?

The strong response for walking and cycling paths suggests that what the community value most about biodiversity is being able to interact with it.

Question two asked the community to rate the top three things they see as threats to our natural environment. The responses are:

Habitat loss	55.6%
Scale of development	41.2%
Lack of understanding about the natural environment	39.2%
Litter	34%
Climate change	32%
Pest animals (e.g. foxes, rabbits, Indian mynas)	30.1%
Illegal dumping	15.7%
Weed spread	15.7%
Domestic animals	15.7%
Water quality	10.5%

Additional comments provided by participants include:

Concern about pollution from industry
Noise from boats and jet skis

Loss of trees and biodiversity due to decreasing back yards
Lack of engagement with the natural environment
All of the threats
Altona foreshore - spearfishing, abalone and urchin collection from zoned areas - pipi and sand worm collection
Motor bikes through bush reserve
Climate change - rising sea levels, increased urban heat island effect, rising temperatures impacts on ecology
Knowledge- people are unsure what to recycle, what animals live in their council, beach cleanliness and impacts to coastal ecology
The cats stalking native animals and birds in our parks
Dogs on coastal reserves / bird habitat
Foxes in the explosives reserve, also at the rifle range park near houses.
Rabbits are everywhere.
Western Volcanic and Basalt Plains grasslands are being decimated
I believe people dump rubbish at Alt Coastal Park due to lack of understanding about natural environment
Litter at Truganina park wetlands; drain pipe Corner Merton and Victoria Streets; Jawbone Marine Sanctuary; the whole coastline
Very little green space in some suburbs (in both public and private land)

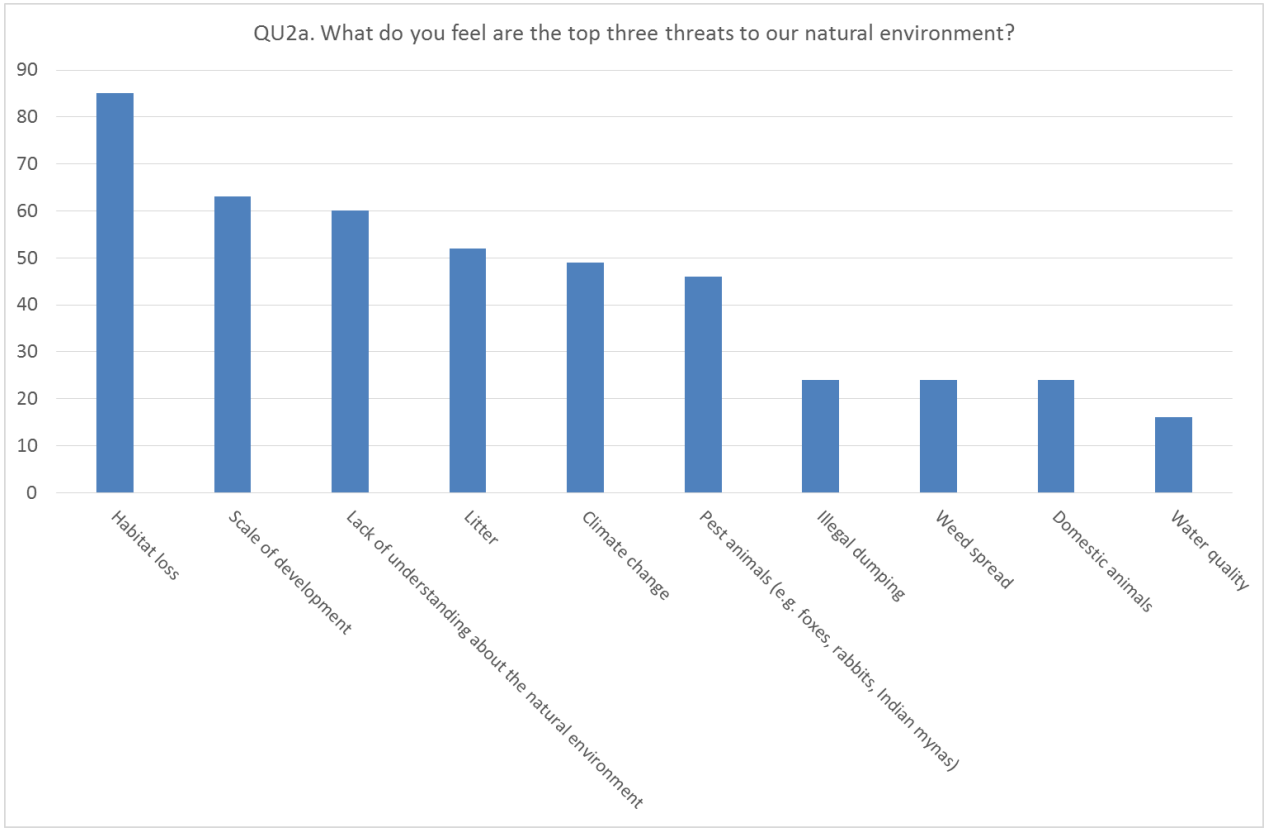


Figure 13 Community survey question 2 responses – What do you feel are the top three threats to our natural environment?

Question 3 asked the community to list the community engagement events that they have been or would like to be involved in. The responses are:

Planting days	58.8%
Natural environment education events	54.9%
Walk and talk tours	53.6%
Friends of groups	42.5%
Bird watching tours	39.9%
Interpretive trails or self-guided tours	37.9%
Tailored educational tours	17%
School holiday program	15%
Dog owners breakfast	9.2%

Additional comments provided by participants include:

Clean up Australia Day
Indigenous info / talks

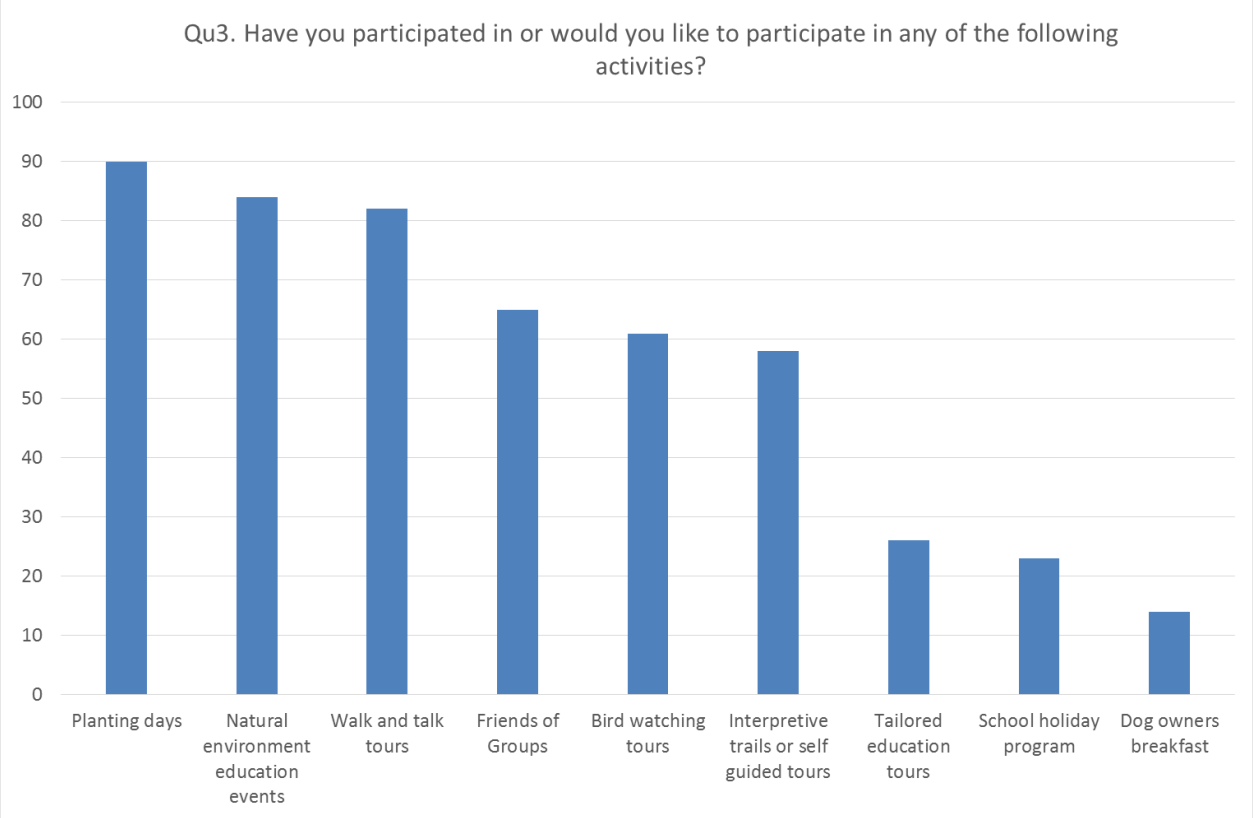


Figure 134 Community survey question 3 responses – Have you participated in or would you like to participate in any of the following activities?

There were some noticeable difference in the type of activity different age groups were interested in participate in. The main differences as shown in figure 15 to figure 20 are:

- There was high interest in self-guided tours and interpretative trails from the 25 to 34 age group and moderate interest from all other age groups

- There was low interest in participating in friends of group events from the under 35s, moderate interest in the 35 to 50 age group and high interest from the 50+ age group
- There was high interest in bird watching from the under 25s, particularly from school aged children. Interest in bird watching was low to moderate for the 25 to 60 age group and high for the over 60s.
- Planting days and natural environment education events were high for all groups.

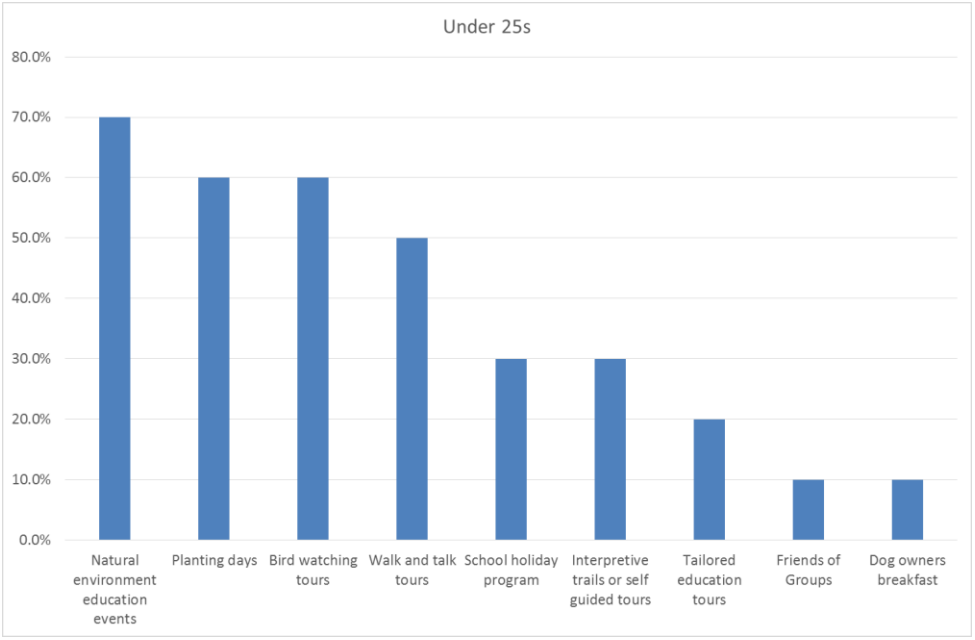


Figure 145 Community survey question 3 responses for under 25s – Have you participated in or would you like to participate in any of the following activities?

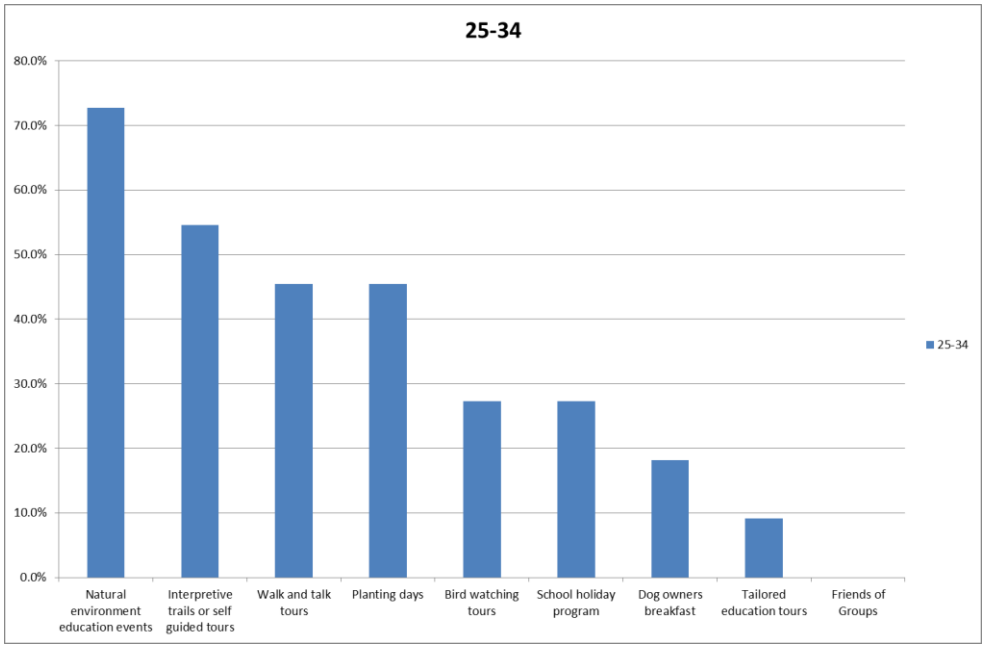


Figure 156 Community survey question 3 responses for 25-34 – Have you participated in or would you like to participate in any of the following activities?

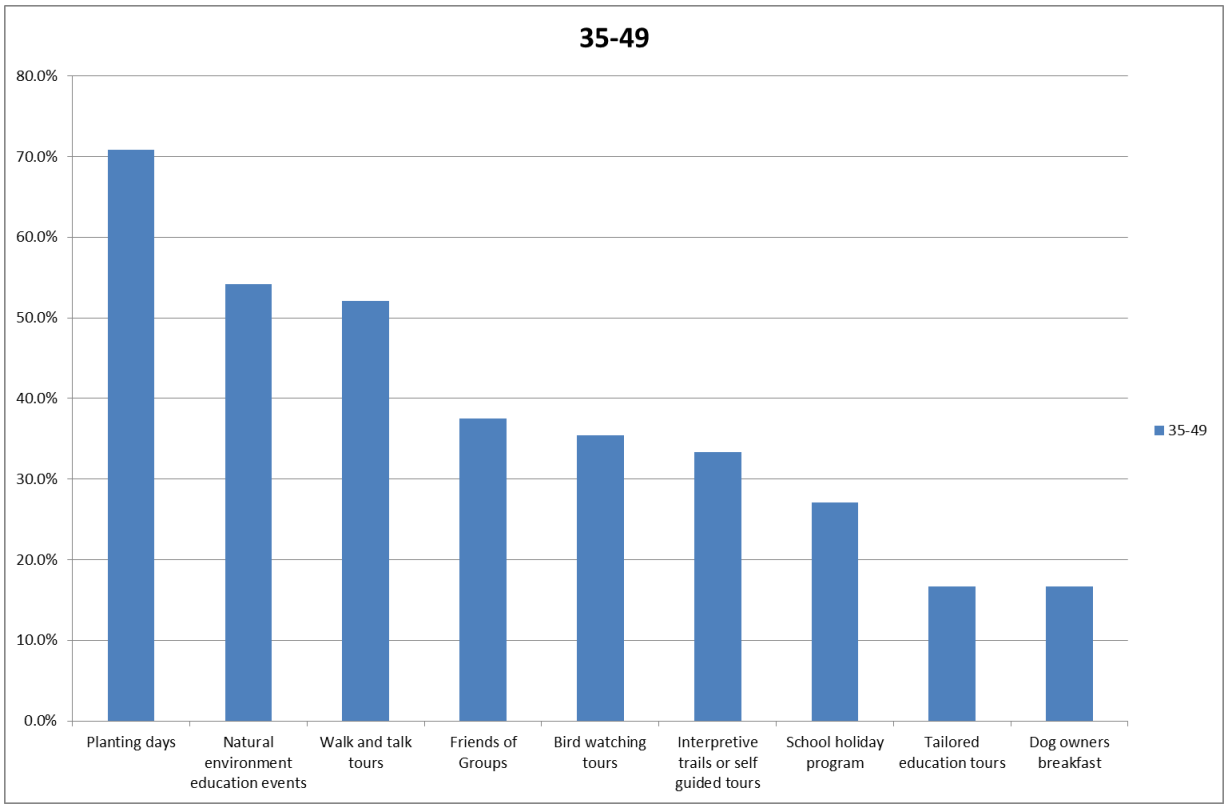


Figure 167 Community survey question 3 responses for 35-49 – Have you participated in or would you like to participate in any of the following activities?

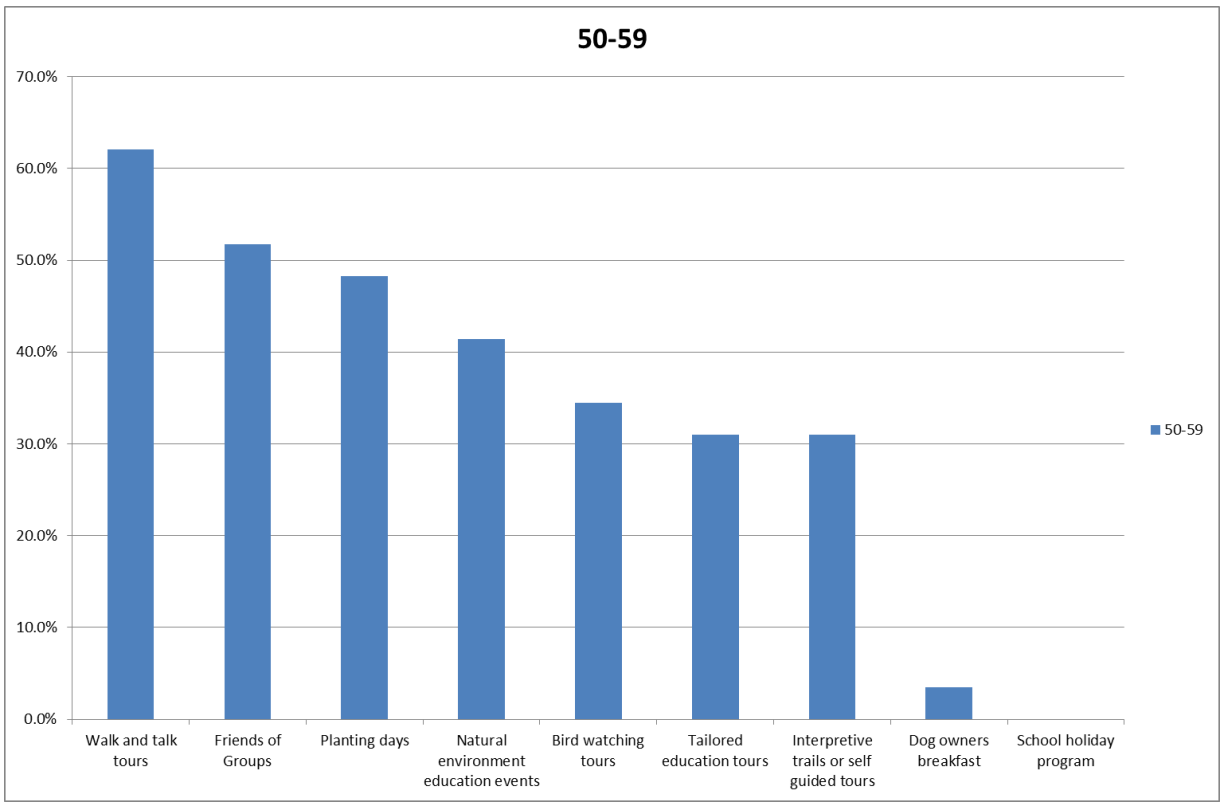


Figure 178 Community survey question 3 responses for 50-59 – Have you participated in or would you like to participate in any of the following activities?

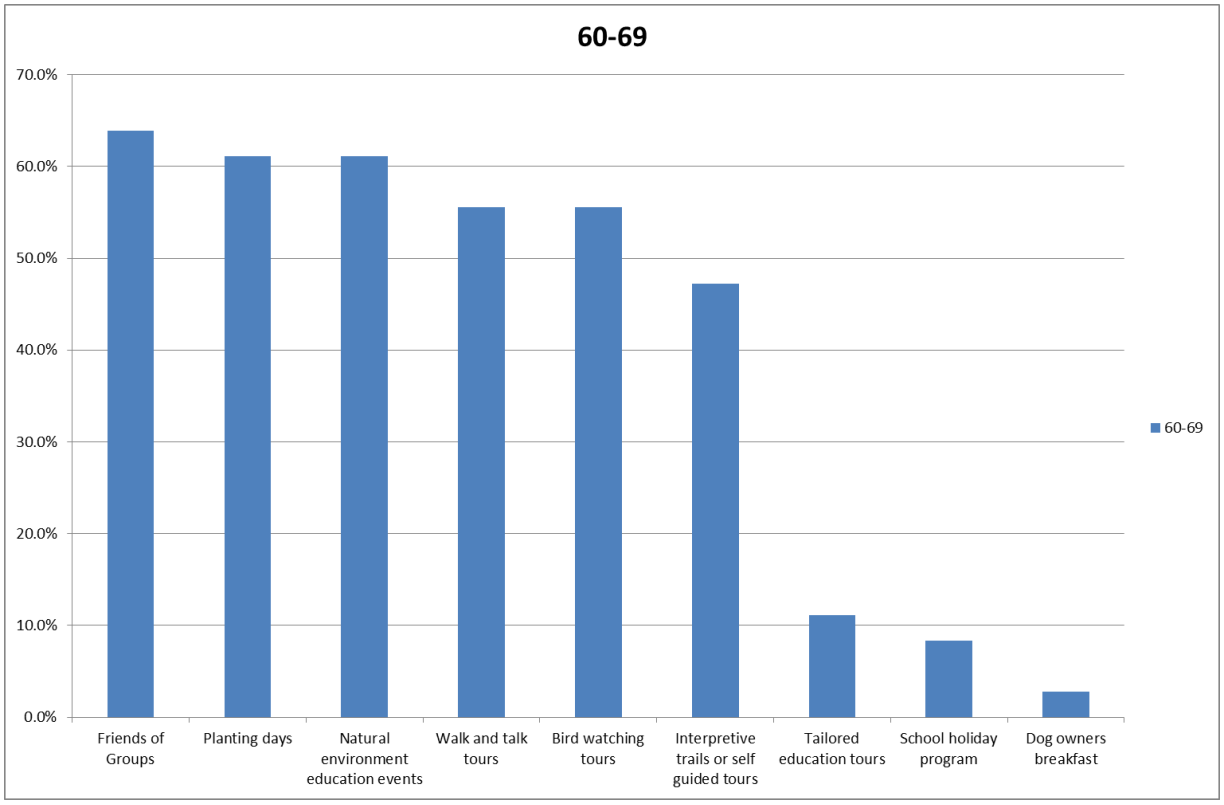


Figure 189 Community survey question 3 responses for 60-69 – Have you participated in or would you like to participate in any of the following activities?

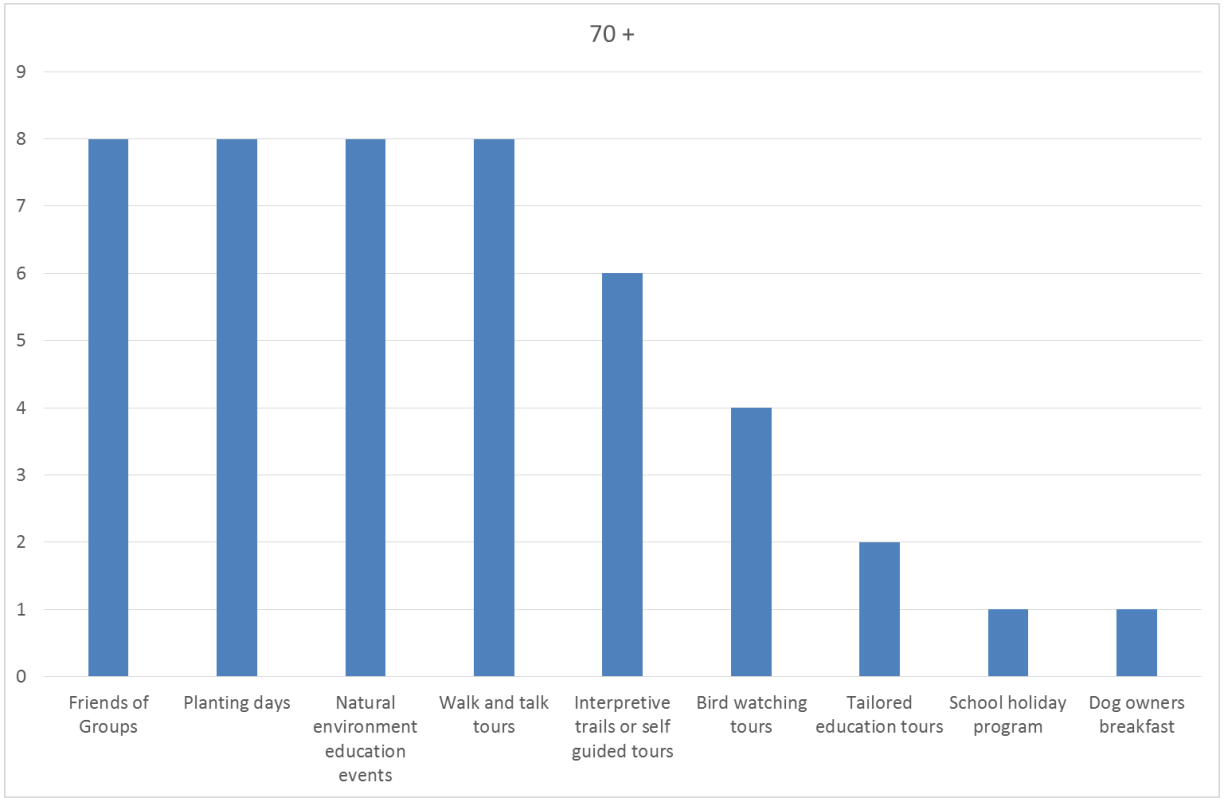


Figure 20 Community survey question 3 responses for over 70s – Have you participated in or would you like to participate in any of the following activities?

Preference for event size was influenced by whether or not a respondent was a member of a Friends of Group as shown in table 22 and figure 21.

Event size and frequency	Friends of members	Everyone else
smaller more frequent	81.0%	57.5%
larger less frequent	7.1%	23.6%
Not sure	9.5%	15.1%
a variety	2.4%	3.8%

Table 21 Community survey question 4 responses – event frequency preferences

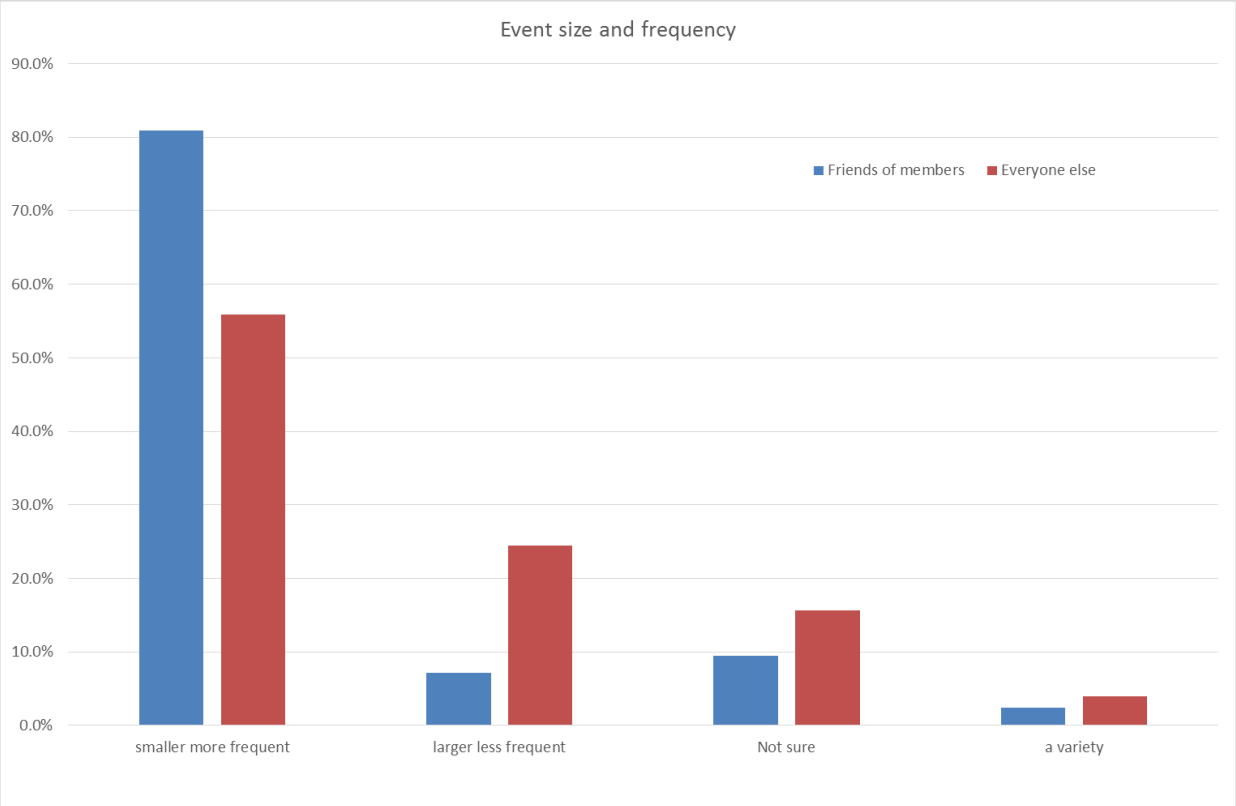


Figure 22 Community survey question 4 responses – Event frequency preferences

10.2 Community workshop results

The community were asked to provide feedback on eight questions at community consultation workshops held at Altona Meadows, Williamstown and Altona. The summary of responses according to local area is provided in the following. The results as recorded by the community are provided in Appendix 2. The responses have been summarised and analysed for consideration in strategy development.

What is your vision for biodiversity in Hobsons Bay over the next 10 years?

Summary of community response: The vision for biodiversity in Hobsons Bay should be based around the preservation of what is left— extant native vegetation, habitats and species populations— with emphasis on creating greater awareness of biodiversity and collaboration amongst the general population. The vision should also encompass landscape considerations such as connectivity and mitigating impacts from threats. A commitment is required for adequate resourcing into the future, as well as the need to monitor conditions. The vision should also consider security and protection of resources by planning and other mechanisms.

How can we prevent habitat loss in Hobsons Bay?

Summary of community response: Responses to this question were varied. The major themes included reviewing the legal framework and the pros and cons of legal versus other management options. The contribution of urban development to habitat loss was a common concern of the community as was the impacts of weeds. It was identified that some on-ground works are required including revegetation, establishment of native gardens, ecological burning and litter management. The main approach suggested for prevention of habitat loss was to increase education and awareness about the issues.

What are the key climate change threats to our natural environment? How can these be managed?

Summary of community response: The community raised a number of issues associated with climate change including impacts to coast from sea level rise, changes in species distribution changes to fire / drought / flooding, changes to soil conditions and impacts to marine life. Management options were limited and some comments were made about the difficulty in identifying actions which will mitigate against climate change impacts. The issues of better education were again identified. On-ground intervention options included planting indigenous species with greater drought tolerance, planting more trees in urban areas, review buffers along waterways and implementing solutions that help rainwater and stormwater soak into the soil instead of running off.

How can pest plants and animals be effectively managed in an urban environment? What approaches should be used?

Summary of community response: There was a strong response regarding pest animals. Some feedback was given on the merits of revegetation to displace pest plants. The importance was raised of collaborative control programs between agencies, which integrate chemical and non-chemical methods. The appropriate approach to effective pest plant and animal management was varied between groups. Community members advocated for additional spraying of pest plants but wanted to know the herbicides were being used safely. Some community members advocated additional poisoning of pest animals despite the community's perceived risks associated with baiting. Some workshop attendees argued shooting over the use of baiting.

Responsible pet ownership was identified as an issue with the suggestion of cat curfews and increases to animal registration to assist with pest management costs. The community agreed that dogs should be kept on leashes in areas of high conservation value and that enforcement was required to ensure this was taking place.

Education and awareness was also identified as important for increasing support and action for the protection of the natural environment.

How can community participation be diversified across age and cultural groups?

Summary of community response: Methods to diversify input from different cultures include providing promotional materials in different languages, promoting particular activities to some groups over others (e.g. gardening), increasing access to events, provide materials to social and sporting clubs and fostering ownership and stewardship programs.

The main response to age diversification was to increase promotion of biodiversity activities to schools. This includes identifying elements of biodiversity which most appeal to younger people and designing programs around these e.g. interaction with native fauna and involvement with tree planting. Participants were not aware of the extent of existing school programs run by Council and were unsure how to engage young adults and school leavers.

The potential for cross marketing at other community events and with other social groups was also identified.

Where does the community go to find out about Council, conservation activities? How would you like to find out about Council conservation activities?

Summary of community response: Most forms of media were identified as sources of information for finding out about activities. Participants emphasised combinations of printed material and website sources including local newspapers and Council calendar of events. Despite identifying these options as places where community members want to get information, a significant portion of participants had not been aware that the consultation workshops had been placed in both local papers and on the Council calendar of events. Many participants had actually found out about the consultation workshops by word of mouth or Council events they had attended. Several groups mentioned that community notice boards were important for finding information. Web sources included not only Council's website, but the website of friends groups and other conservation groups as well as Facebook. Participants noted that not everyone thinks of Council's Facebook page as a place to find events. Facebook users often go to local community run pages that promote local events and would like to see Council events promoted here too.

Most participants gave positive feedback on council's Ranger Ramblings as a source of up to date information on events and issues. The idea was raised to increase awareness about Ranger Ramblings and Council's website. The community suggested that activities could be further promoted at tourist information centres, Council offices, at public transport stops and on radio. In summary, a range of sources are currently used for finding out about activities and there may be some opportunities to target different sections of the community with other forms of advertising.

What education topics would be most useful and or most interesting? What style of event would be most useful for this topic?

Summary of community response: Responses about useful education topics were widely varied with the one repeated feedback being that participants would like to know about their local environment. A common theme was identified that more education about species could be valuable and that younger audiences and families should be a priority. This was due to the belief that if individuals were engaged in the natural environment at a young age they would stay interested for life.

Activities identified included guided and self-guided tours providing education about local flora and fauna, birds, marine life, threatened species and weeds. It was also suggested to link educational

activities with other events and to promote programs run by other groups e.g. Melbourne Water's frog census. Participants felt that there was a strong link between environment and community health.

Participants preferred different event styles depending on what type of event they were interested in. Ideas provided include events/activities focused at children and youth, displays, further enabling friends groups to run events and tree planting events.

Where would interpretive signage provide most value? Do you have any good examples of where interpretive signage has been used elsewhere?

Summary of community response: The community suggested a number of sites where signage could be added for greater interpretation of biodiversity values. The localities reflected the local focus of individuals and groups participating in the workshops. Specific locations identified included Trafalgar Grassland, Truganina Park, Truganina Explosives Reserve, Cherry Lake, Laverton Creek, Jawbone Flora and Fauna Reserve, Paisley-Challis Wetlands, Kororoit Creek, Newport Lakes, APEX Reserve, Maidstone Street Grassland and Altona Coastal Park. The community identified signs at Doug Grant Reserve, Pier Street Alley (mural), Coles Williamstown (mural), Newport Lakes, Laverton Creek (bird sign), Werribee Park, Stony Water Backwash and on beach areas. No criticism was given on existing signs and some comments were received on the high quality of existing Council signage. Some suggestions for additional signage outside of conservation areas included information shelters, at schools and shopping centres. The use of other interpretive material was suggested including digital signage containing QR codes, and sculptures**.**

11 Integration with other relevant strategies

It is intended that the biodiversity strategy directs actions specifically concerning biodiversity values. Other aspects of Council's environmental management, e.g. environmental engagement, are directed by other strategies and policies (Table 23). Other Council strategies and policies may deal with biodiversity issues in part, or provide recommendations which affect biodiversity in one way or another. The biodiversity strategy should complement other Council strategies and care has been taken to avoid conflict between the biodiversity strategy and related strategies.

Table 223 Context of other relevant strategies and policies.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
Hobsons Bay Climate Change Adaptation Plan 2013–2018	To define Council's position and outline the plans and strategies that will prepare the municipality (infrastructure, programs and services) for the impacts of climate change. Sit under the umbrella of the Environment Strategy. • Provide an overarching document that clearly articulates the Council's role and proactive approach for preparing for the impacts of climate change; • Identify practical actions that the Council is proposing to take to prepare for identified climate risks; and Provide a vehicle to seek community feedback on the Council's commitment to climate change adaptation. Identifies risks and mitigation/adaptation strategies for: • Flooding • Storm surge • Increased temperatures Reduced rainfall	In addition to the above, Council climate change polices have been reviewed for the Strategy. Risks to biodiversity and associated habitat, as well as 'adaptation actions' outlined in the policies have been considered within the Strategy.
Hobsons Bay Climate Change Policy 2013	Provides a framework for council to address the municipality's susceptibility to the impacts of climate change through mitigation and adaptation strategies. Sits beneath Council's Environment Strategy. The objectives are to: • Provide a strategic framework for the Council to manage its climate change vulnerability using a combination of adaptation and mitigation strategies; • Reduce the environmental impacts and operating costs of all Council operations and	Consideration for potential impacts of climate change on biodiversity values has formed a key part of the biodiversity strategy. The strategy provides recommendations for the management of biodiversity and land planning that can be achieved locally and considers the impacts of climate change.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
	minimise fuel consumption while reducing corporate energy use and achieving zero net greenhouse gas emissions by 2020; • Undertake actions to reduce the community's greenhouse gas emissions and lead the community towards achieving zero net greenhouse gas emissions by 2030 by providing opportunities for public engagement, education and action; and Respond to the risks of climate change to Council assets and services and assist the community to be more resilient to the effects of climate change.	
Hobsons Bay Community Engagement Framework	To provide a Framework for delivering Council's Community Engagement Policy. This Policy defines Council's commitment to the community and outlines the community engagement principles that drive Council's engagement practices. The policy applies to all forms of engagement by Councillors', officers and consultants acting on behalf of Council including: • The planning, delivery and evaluation of any community engagement activity; • Engagement with the community regarding issues, proposals and Council decisions such as projects, strategies, plans, programs or service delivery; • Engagement with key groups in the community; and Internal engagement within the organization.	Community consultation for the project has been undertaken prior to the development of the Strategy. This had involved: • Three community workshops to provide the community an opportunity to be briefed on the Strategy and its objectives, and to determine what the community feel are the priority areas for biodiversity management and how they would like to be involved in management activities. • A workshop was held with Council staff involved in the management of biodiversity was undertaking following the community consultation. Findings from the workshops were presented in a report and incorporated into the Biodiversity Strategy, and has informed the Strategy outcomes and recommendations.
Hobsons Bay Community Health and Wellbeing Plan 2013 - 2017	To 'protect, improve and promote public health and wellbeing' by investing in Council assets and initiatives that foster physical, social and community wellbeing; collaboration with stakeholders to provide necessary services; and ongoing monitoring of the success of the Plan. • Supporting the wellbeing of children and young people. • Advocating for accessible public transport throughout the municipality.	The implications of recommendations in this technical report consider the objectives of the Community Health and Wellbeing Strategy.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
	• Ensuring the Council assets and infrastructure are well managed and maintained in accordance with community needs. • Promoting and protecting our open space, biodiversity and environment. • Ensuring land use planning and development is appropriate and in line with community values. • Improving our communication and actively engaging with community. • Supporting the sustainability of economic development and growth of business across the municipality. • Advocating for and ensuring the availability of affordable housing throughout the municipality.	
Hobsons Bay Council Plan 2013 - 2017	The Council Plan is a key strategic document to guide Council's work in creating a better future for the Hobsons Bay community. The plan describes the Council's goals for the next four years and how Council will measure our success as we plan, deliver and advocate for the services and infrastructure that will achieve a healthy, connected and sustainable future in Hobsons Bay.	A key priority in the Plan is promoting and protecting open space, biodiversity and environment. As part of the plan's goals, Council prepared a discussion paper in 2015 on the then proposed Biodiversity Strategy.
Hobsons Bay Council Volunteers Policy	Objectives: • State Council's commitment to volunteerism. • Define the term Council Volunteer for the purpose of this policy. Define a system for volunteer management.	Environmental volunteers were encouraged to attend the community consultation workshops to provide feedback on priority areas for management and how the community can be involved in the management (refer above for more detail).
Hobsons Bay Domestic Animal Management Plan	Objectives: • Document current processes and practices under the City of Hobsons Bay's animal management responsibilities; • Increase compliance with the Domestic Animals Act 1994; • Increase pet owners' knowledge of the principles of responsible pet ownership and enhancing community safety and awareness; • Assist the Bureau of Animal Welfare to achieve its stated objectives of reducing the numbers of dogs and cats being euthanased;	The Strategy provides recommendations on the management domestic animals in order to protect biodiversity values. In particular, it supports the Domestic Animal Management Plan in developing responsible ownership and community awareness.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
	• Maximise the numbers of dogs and cats that are registered in the Hobsons Bay municipality; • Minimise the harmful effect of domestic pets on the population of native birds, mammals and reptiles; • Take into account community views on animal management matters; and Comply with the relevant provisions of the *Domestic Animals Act 1994*.	
Hobsons Bay Economic Development Strategy 2015-2020	The Hobsons Bay Economic Development Strategy outlines the key themes and objectives that will guide Council's work in supporting the short and long term growth of the local economy. Aimed at achieving a long-term vision for Hobsons Bay, this strategy reflects Council's ongoing commitment to addressing the needs of the local business community, attracting new and diverse investment and delivering increased economic and social benefit to the city.	The Economic Development Strategy identified key areas for economic growth, Hobsons Bay's core industrial area. The strategy outlines the types of development which will be the focus within zones of the municipality. The Biodiversity Strategy and associated technical document provide information which can be considered for land use planning for economic growth and ecologically sustainable development.
Hobsons Bay Environmental Engagement Strategy 2013 - 2018	Developed in order to provide clear goals and a framework for developing and carrying out environmental engagement programs based on best practice in environmental sustainability and education and community feedback. Aims to improve and promote environmental engagement across the broader community. Objectives: 1. To identify key environmental issues of concern to Council staff and the local community and provide various community engagement opportunities which respond to these issues in a meaningful, positive and constructive way. To achieve this Council have three goals: 'Goal 1: Reach new audiences' 2. Improving the broader community's knowledge and appreciation of the environment through environmental engagement programs and activities. 'Goal 2: Strengthen community capacity' 3. Improved environmental outcomes through harnessing the work already carried out by	The Biodiversity Strategy will address Council's approach to community engagement, based on the Environmental Engagement Strategy and results of community consultation undertaken during the preparation of this technical document.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
	community groups and individuals; engaging those that have an interest but are not currently participating in environmental activities. 'Goal 3: Build and integrated approach to engagement Improving consistency in delivery of programs; improved environmental outcomes through community participation in environmental programs; and better distribution of funding and resources.	
Hobsons Bay Industrial Land Management Strategy 2008	The objectives of the strategy are: • To provide clear direction in relation to the future use and development of industrial land in Hobsons Bay over the next 15 years and to set the foundation for continued development beyond that point. • To better understand the likely demands on the City's industrial land resources. • To audit and assess the suitability and desirability of the City's industrial land • resources (supply) to meet future industrial market demands, provide • employment, and achieve State and Local Planning objectives. • To identify current issues and potential future pressures, needs and opportunities. • To decide whether any land currently zoned industrial is better suited to achieve • urban consolidation and provide for additional housing or commercial growth. • To decide how to best support the growth, and manage the impacts of industrial • development, and provide employment opportunities. To ensure industrial development makes a positive impact on the amenity and environment in Hobsons Bay.	Key strategies from the Industrial Land Management Strategy include to provide a high standard of amenity and environmentally sustainable design, and consideration of any significant native flora protection where identified. A key recommendation from the strategy is to improve the amenity, appearance and environmental performance of industrial areas. The Biodiversity Strategy will assist to identify the value relevant to environmental performance in the Industrial Land Management Strategy.
Living Hobsons Bay: An Integrated Water Management Plan 2014–2019	This plan is a part of the Council's Sustainability Framework and outlines Council's proposed management of water resources over a five year period. It also defines how progress is measured. Improve biodiversity by 'reducing peak stormwater flows' through 'investing in best practice stormwater management': • Reduce the amount of pollutants entering waterways • Mimic natural hydrology • Improve water quality Allow migration of fauna up and down waterways.	The integrated water management plan supports the development of the Biodiversity Strategy and its objectives directly support the protection and enhancement of ecosystems.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
Hobsons Bay Management of Dogs in Public Places	To effectively implement measures that will control dogs in public places.	Supports the policy of no off lead areas near conservation areas. Refer also to Domestic Animal Management Plan.
Hobsons Bay Open Space Strategy (draft)	To further improve the park networks in order to: • Contribute to a sense of wellbeing • Provide a diversity of landscape and recreational experiences • Encourage people to participate and be proud • Provide a linked system of Public Open Space • Encourage native flora and fauna to flourish • Work together to improve the shared environment • Protect the rich cultural heritage Incorporate environmentally sustainable design into the parks.	The Open Space Plan has been reviewed to identify recreational land use of Council owned or managed land that supports conservation values. It also has identified recreational activities that are a threatening process for significant species, communities or ecological services. In addition strategy has identified recreational activities which are appropriate for the given values and provides general information about potential human health benefits of conservation areas.
Brimbank Biodiversity Strategy 2012–2022	A ten year Strategy that outlines how the Council aims to protect and enhance the flora, fauna and remnant habitat of the municipality. Four key sections: Protect biodiversity • Planning • Complying with state and federal legislation • Improve landholders and managers awareness of biodiversity Adaptive management • Monitor results from previous actions and continually update and improve methods Biodiversity connectivity • Improve the physical and functional connectivity of land to create continuous habitat Engage and promote biodiversity Promote awareness and appreciation of biodiversity values in order to foster a desire to protect natural assets within the community.	Brimbank's biodiversity strategy is directly relevant in its scope and purpose. Brimbank is a neighbouring Council and shares common biodiversity values. Their grassland vegetation and significant value are comparable to Hobsons Bay. The implications of Brimbank's strategy have been given high priority for consideration in developing this technical report.
Wyndham Biodiversity Policy	A policy that forms part of the Environment and Sustainability Strategy 2011-2015. Identifies opportunities for conservation and improvement of the natural environment and	The policy has been reviewed for ideas and context, particularly with regard to engaging the community

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
2014	the management of threats. 'Enhance' - Management of natural assets to improve local flora, fauna and ecosystems 'Plan' – 'focus on strategic conservation gains in planning and decision making and long term resilience of biodiversity in a changing environment and climate.' 'Educate' - 'An educated and engaged community will value, support and protect the conservation of local biodiversity ' Partner - 'Sustained partnerships will maximise conservation outcomes within Wyndham and the wider region' Monitor, Learn and Adapt: 'Monitoring, Evaluation, Reporting and Improvement (MERI) is integral to ensure that management regimes are effective and benefiting biodiversity'	and planning.
DELWP Melbourne Strategic Assessment	A strategy that outlines two initiatives implemented to conserve biodiversity within Melbourne's growth corridors – 'Conservation strategies' and 'Time-stamping project'. Conservation strategies • Biodiversity Conservation Strategy for Melbourne's Growth Corridors • Sub-regional Species Strategy for the Growling Grass Frog • Sub-regional Species Strategy for the Golden Sun Moth. Time-stamping project Data and maps used to calculate offset requirements of native vegetation for urban development within Melbourne's growth corridors.	This technical report involved the review of the conservation objectives and technical information within the Biodiversity Conservation Strategy and sub-regional strategies. These documents apply to land within Melbourne's strategic assessment area. Relevant planning considerations in these documents are regarding grassland ecosystems in Melbourne's west and comparable values to those within Hobsons Bay. The areas affected also have biological connectivity with Hobsons Bay.
DELWP Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site – Strategic Management Plan	The primary purpose of the Strategic Management Plan is to facilitate conservation and wise use of the site so as to maintain, and where practical restore, the ecological values for which it is recognised as a Ramsar wetland. This will be achieved by implementing Site Management Strategies under each of the key objectives (derived from the Strategic Directions Statement). The Strategic Management Plan provides management agencies and stakeholders with an appropriate management framework and the necessary information to ensure that decisions regarding land use and development, and ongoing management are made with full regard for wetland values in environmental, social and economic.	The Strategic Management Plan has been considered for its implications on Council's management action affecting shorebirds and other related coastal values.

Policy/Strategy	Purpose and key objective(s)	Relevance to Biodiversity Strategy
DELWP Protecting Victoria's Environment – Biodiversity 2036 (draft)	The strategy outlines the direction for biodiversity management within Victoria. It is a 20 year plan that is aimed at stopping the decline in Victoria's biodiversity. The methods identified for achieving this are: • To help people connect to nature so that more people share in its benefits and contribute to a healthy environment • To increase understanding of the environments value to our economy and society • Securing funding for on ground actions to turn around the legacy of biodiversity decline • Better, smarter management of biodiversity • Leading by example and monitoring and reporting on progress This strategy will be supported by a review of key legislation including the Fauna and flora Guarantee Act and the native vegetation clearing regulations.	This strategy outlines the state context for the management of biodiversity and may result in legislative changes relevant to land use planning.

12 Threats and opportunities to biodiversity management

12.1 Identification of threats

Following consultation between Hobsons Bay City Council and stakeholders, and the general background review there are five main types of threats to biodiversity management identified (Table):

- Change to ecological processes
- Lack of knowledge and information management
- Ineffective planning controls
- Insufficient resourcing
- Vandalism of natural assets

The biodiversity of Hobsons Bay is dependent heavily on two landscape level natural ecological processes, which have either changed significantly in the last 50 years, or have the potential to change with climate variation. The resilience of Plains Grassland communities and the recruitment of their component species are dependent on periodic burning. While burning remains a conflict with a range of other land uses within Hobsons Bay, the absence of this natural disturbance is a very high threat to the resilience of Plains Grassland areas which still persist. If current management practices of infrequent fire events continue within Hobsons Bay, there is a high risk that additional Plains Grassland species will become locally extinct. Apart from fire, coastal systems (in particular Coastal Saltmarsh and Mangrove Shrubland), are dependent on tidal processes including frequency, recession, depth and duration of tidal inundation. The conservation of ecological processes is equally, if not more important, than conservation measures directed at individual species.

Meeting Council's biodiversity policy objectives requires technical expertise across a range of disciplines and monitoring programs to be funded over annual budgets. The actions required to prevent high threats to biodiversity should be prioritised. At present, Hobsons Bay City Council has sufficient data on the state of biodiversity to appropriately consider value in resource allocation, however the data are poorly managed and not available for analysing. Actions that mitigate the loss of areas of occupancy of species and communities can be prioritised, and further data collection and analysis to guide these actions undertaken.

The ongoing collection and analysis of biodiversity information is crucial for guiding its management. For example, while potentially beneficial to grassland communities to undertake ecological burning, without data associated to analyse the losses and gains, the opportunities to direct management are not gained. It is recommended that existing monitoring under Offset Management Plans be reviewed and a monitoring framework be considered for areas subject to ecological burning.

Table 234 Key threats and opportunities for consideration in biodiversity management actions.

Threat	Implications for biodiversity	Opportunities and actions
Ecological processes		
Absence of natural disturbance events	• Reduction in species diversity • Local extinction • Reduced area of some fauna habitats	• Undertake more ecological burning in Plains Grassland • Identify areas where re-instatement of seasonal freshwater inundation may benefit recruitment of wetland species.
Knowledge and information management		
Insufficient GIS capability and ecological monitoring	• Limited capacity to monitor vegetation changes and changes in other spatial variables.	• Set up a spatial database; develop data collection procedures and resource analyst. • Contribute information annually about the state of biodiversity, for policy guidance and resource allocation. • Analyse management success and identify threatening processes. • Better assess planning permit applications for their implications to biodiversity.
Planning controls		
Ineffective planning controls	• Statutory limitations on avoiding impacts to some ecological values. • Further loss of biodiversity by inappropriate land clearing.	• Use Environmental Significance Overlay to protect some values in addition to existing overlay. • Provide additional training to planners on relevant context of the planning scheme, Biodiversity Assessment Guidelines, EPBC Act and other policy/legislation.
Resourcing		
Insufficient funding	• Limited capacity for pest management • Lack of data collection and monitoring • Lack of community engagement.	• Review high priority actions arising from development of the biodiversity strategy and prepare budgets for approved actions. • Set up a program in consultation with an ecologist to monitor native vegetation extent, quality and threatened species information, on an ongoing basis. • Review other sources of funding and resources and allocation to biodiversity management by Council and its residents. • Development of branding, marketing and promotion material and associated resources.
Vandalism of natural assets	• Removal of key habitat such as mature trees with hollows from conservation areas. • Lack of community appreciation for habitat value.	• Permit requirements are currently in place for the removal of trees unless exemptions apply. • Review of enforcement and educational practices and opportunities.

12.2 Biodiversity Information Management

Information about biodiversity values within Hobsons Bay must be accessible and current. Visions and objectives for management are ineffectual if there are no data to gain an adequate understanding of existing condition. Management of such data requires sufficient resources and new data are required periodically to monitor trends.

While Council currently collect a range of data regarding biodiversity values, there are opportunities to formalise the way in which biodiversity information is collected and managed. An efficient means of doing such is by storing, accessing and analysing data within a spatial database. A spatial database combines spatial data with attribute information about the features or items stored in the database. The benefits of managing biodiversity information this way are numerous and include:

- maintaining current information about native and pest species distribution
- maintaining a chronological record of environmental works
- querying and analysing data to identify threats and management priorities
- using electronic data collection and syncing field devices with Council servers
- mapping biodiversity information for reports
- integrating biodiversity information with Council's other spatial data
- sharing biodiversity information with other land managers and the community

Geographic Information Systems (GIS) and associated technology for biodiversity management is well tested globally and there are regularly new tools being developed. Council's GIS can be used to establish a spatial database containing a catalogue of Council's biodiversity information. The information can then be analysed against planning information and linked to references to inform statutory planners and environmental managers. There are opportunities to better record information in databases about weed control and other works being undertaken by staff and contractors. At the time of this review, there was no effective use of GIS for biodiversity management by Council. No consideration has been made regarding other Council data management protocols as it is anticipated that these are existing e.g. security, licencing and government policy.

The following example (Figure 19) demonstrates the structure of data collection and management within a spatial database.

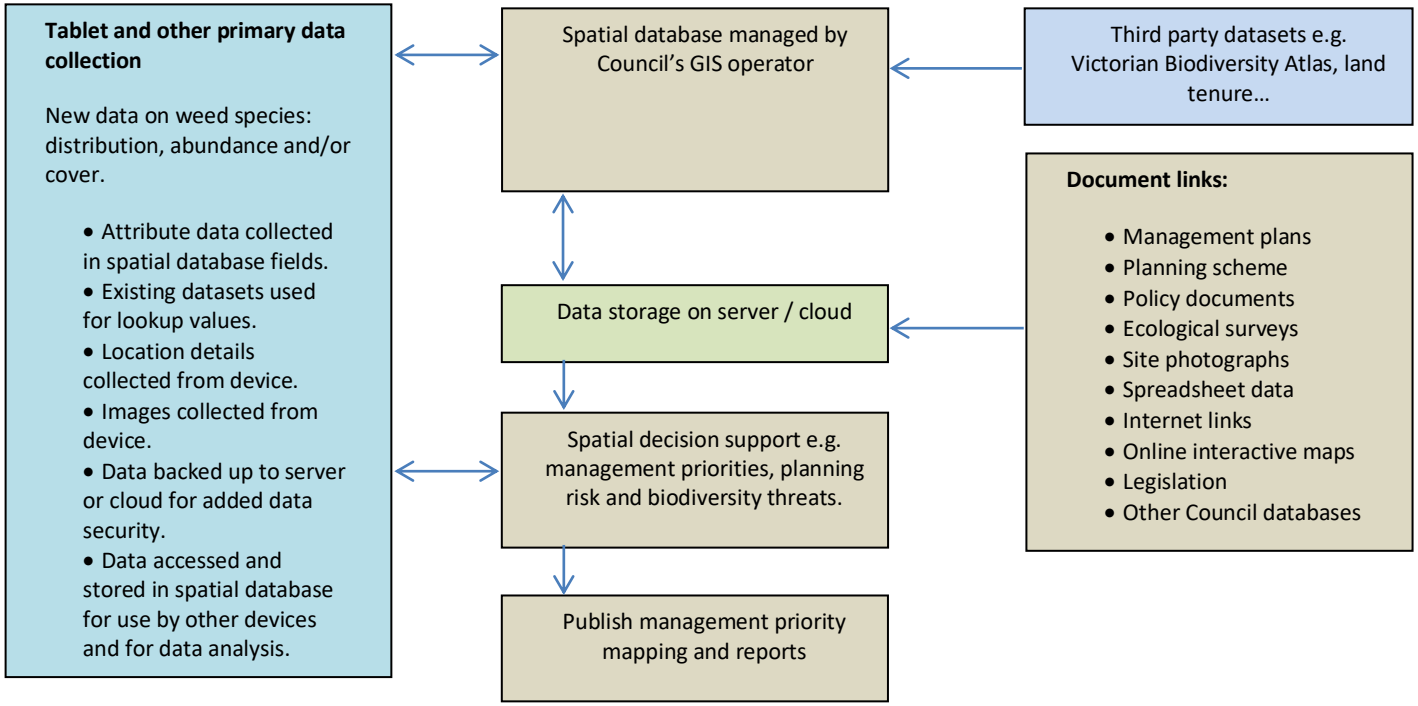


Figure 19 Information management and spatial database framework

13 Opportunities for the enhancement of biodiversity

13.1 Improving conditions for resilience of biodiversity

There are a number of definitions for resilience, the one adopted here follows the State of the Environment's Biodiversity report (2011), that is '*the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks'*. A system can no longer be resilient once a threshold or tipping point has been reached (i.e. the system changes into a different state altogether (Thompson et al 2009)). For biodiversity this threshold or tipping point is often unknown and it's not till after it has been reached that it is recognized. However, we do have an understanding of pressures that can affect a system's ability to be resilient. Sustainable management allows for some of these pressures to be better controlled so that the system has the potential to recover, particularly after pressures that cannot be controlled (at least at a local scale) have occurred (e.g. climate change).

Loss of resilience results in a regime shift, often to a state of the ecosystem, that is undesirable and irreversible (Thompson et al 2009). It is therefore important that biodiversity is maintained and ecosystem resilience is retained (Thompson et al 2009). Within Hobsons Bay City Council, resilience can be improved within Council owned or managed public open space by maintaining and managing biodiversity values, in particular managing key threats (pressures). All of these threats are anthropogenically driven and many are outside an ecosystems' and species' ability to adapt (State of the Environment 2011). These threats and associated management recommendations have been addressed within the Biodiversity Strategy Discussion paper (Hobson Bay City Council 2014) and this Biodiversity Strategy. They are also summarized below:

- Land clearing and encroachment – recommendations include:
    - Ensuring areas supporting conservation values within open space are adequately protected and secured for the future. These sites should be not developed, used sensitively for recreation, or unnecessarily disturbed (e.g. no new tracks, no off-road vehicle access).
    - If the opportunity arises, increase the size of existing reserves if neighbouring freehold land becomes available and supports desirable biodiversity values.
    - Educate the public on the values being protected. Ensure there is signage that outlines what is being protected and the activities that are prohibited within the parks and reserves.
- Invasion by pest plants and animals:
    - Ensure adequate management of pest animals and plants are being undertaken within areas supporting biodiversity values and also adjoining areas. This management must be targeted to each species, and no accidental damage to indigenous flora and fauna should occur.
    - Monitoring pest plant and animal levels and success of management to inform future management.
    - Machinery and equipment entering areas supporting biodiversity values are to be clean and free of weed propagules.
- Lost or out of balance disturbance regimes:
    - In urban environments natural disturbance regimes, which form a key role in the maintenance of biodiversity values, are lost or become unbalanced e.g. fire, grazing by native animals and natural flooding events. Council therefore need to ensure they actively manage the reserves to compensate for this. Management is therefore

tailored around the vegetation community being protected, and requires monitoring to determine the type and timing of management. Within the Hobsons Bay municipality this is particularly an issue in Grasslands where control of vegetation biomass is essential for the maintenance of structure, function and diversity. Management actions to control biomass would need to consider the flora and fauna species present, the condition of the vegetation, and the time since biomass was previously controlled or disturbed.

Management of the public open space needs to be adaptive. Monitoring is required to ensure the management actions in place are working and to identify new and emerging threats. If threats are not being adequately managed, the management needs to be reviewed and adapted.

Communication and education with other stakeholders and landowners on the protection of biodiversity values is also important for improving resilience. Awareness and education of the key threats to biodiversity and their management can assist in bringing a community-wide approach to protecting biodiversity. In particular, joint management programs such as pest weed and animal control, with neighbouring public land managers (e.g. Melbourne Water, Parks Victoria), will be an important factor in determining the overall success of protecting the biodiversity within the Shire.

Environmental Planning Overlays can also be used to protect biodiversity outside of the open space areas (see Land use planning).

13.2 Council collaboration with other land managers

Discussion with other stakeholders revealed that there is a willingness to collaborate further with other land managers. There were no objections amongst industry who participated in the consultation to proposals to undertake joint pest management programs, community engagement programs or other activities which promote biodiversity. Council may liaise with Parks Victoria about involvement and support for existing programs aimed at coastal and shorebird awareness. For example, guided bird walks attached to *Summer Sounds* or similar events can further involve Parks Victoria.

Opportunities for weed and pest animal management are discussed under the relevant headings. The conclusion from summarising all sources of information is that Council collaboration with other land managers should be heavily focused on pest plant and animals management. Collaboration should include monitoring and not just limited to treatment activities. Indicators of control impacts should be determined and then monitored within monitoring sites on Council, Parks Victoria and Melbourne Water land. Apart from other pest control works on Council land, collaborative efforts should focus on the Kororoit Creek corridor, Cheetham Wetlands and surrounds and Laverton North Grassland and surrounds.

These works would build on and fill gaps in the existing collaboration programs. Existing collaboration programs supported by Council include:

- Greening the West: in collaboration with City West Water, local western councils and the Victorian Government.

  Works to positively impact the health status, climate and environment of Melbourne's west by increasing the tree canopy cover and vegetation through its suburbs.

- Summer by the sea: in partnership with Parks Victoria, CoastCare Victoria and the Victorian Government.

  Promotes responsible pet ownership and awareness of shorebirds through the annual Dog's Breakfast event.

  Educates the broader community about wading birds through the annual Cheetham wetland tours and wildlife displays.

- Coastal Processes project: in partnership with the Association of Bayside Municipalities.

  This project is developing and testing a framework that helps identify and assess adaptation pathways for changing inundation risks in urbanised coastal areas.

13.3 Protection of shore birds and migratory birds

In coastal areas, shorebird habitats are often popular for human activities, especially recreation. Furthermore, human disturbance is most frequent during the same period when internationally migratory shorebirds are visiting Australia (October to April). Disturbance impacts can be particularly important to shorebirds in coastal areas which attract large numbers of visitors. The sensitivity to disturbances varies between species (e.g. Antos et al. 2007; Weston et al. 2009 2012; DSE 2011; Glover et al. 2011).

Disturbance stimuli to shorebirds include, but are not limited to, disturbance by humans and domestic dogs, walkers, horse riders, vehicles, aircraft, boats, wind-surfing, etc. (e.g. Weston and Elgar 2005 and 2007; Maguire 2008; Weston et al. 2009; Garnett et al. 2011). Responses by birds include permanent or temporary displacement from preferred habitats, reduced parental care resulting in exposure of chicks and eggs to predation and thermal extremes, disruption from foraging activities, reduced energy intake and increased energy expenditure associated with fleeing. Responses may also be behavioural or physiological, with the behavioural response discernible sometime after the physiological response commences which is not discernible (Dowling and Weston 1999; Weston and Elgar 2005 and 2007; Maguire 2008; Weston et al. 2009, 2012; Garnett et al. 2011; Glover et al. 2011).

Disturbance to shorebirds and waterbirds, in general, is considered to be a threat in Hobsons Bay. At Cheetham Wetlands, this is mainly caused by dogs being off-lead and no enforcement to encourage people to keep dogs on leads (Bernie McCarrick, Parks Victoria, pers. comm.). Dogs walked off-leash, are also apparent at Altona Coastal Park, Rifle Range Reserve, the entrance of Laverton Creek, Truganina Park and Cherry Lake (TBLD 2006; Aecom 2013).

At Cheetham Wetlands, which is off-limits to the public, 21% of the 574 ha wetland experienced human intrusions during a study undertaken between December 2004 and April 2005 by Antos et al. (2007). There was a significant association between the distance from the residential edge of the wetlands and the occurrence of landward intrusions into the wetlands. The most common activity was dog walking, with all dogs being recorded off-leash. In general, dog walking off the leash has been found to be a severe and disproportionate source of disturbance to shorebirds (Weston and Elgar 2005; Antos et al. 2007). The implications of further residential development resulted in the prediction that nearly 50% of the periphery of wetlands would be unavailable to shorebirds due to future disturbance associated with the development. Therefore, 'buffer creep' would result in high

quality foraging areas becoming unavailable to shorebirds. 'Buffer creep' describes the situation where the effective separation distance between incompatible activities and a wetland is accidentally moved in space while the physical extent of the buffer remains unchanged (Antos et al. 2007; Weston et al. 2009). Therefore, and despite a buffer being in place, the area available to shorebirds is effectively reduced.

In order to protect important shorebird habitats, educational/engagement programs are important for encouraging people to care for the environment and alter their behaviour, including the containment of dogs on lead (Bernie McCarrick Parks Victoria, pers. comm.).

Parks Victoria is leading bird walks as part of the Summer Sounds Festival to engage and educate the community about the importance of wetlands and wetland fauna (Bernie McCarrick Parks Victoria, pers. comm.). Interpretative signage may also assist in this regard. Council could implement an education program at important wetlands in the municipality (e.g. Altona Coastal Park, Cheery Lake Reserve and Rifle Range Reserve).

A 'dogs on-leash' or a total dog exclusion policy should be investigated at particular wetlands, and enforce fines where this is disobeyed. The exclusion of the public from some important parts of wetlands may be necessary for the wetlands to retain their integrity, especially where nearby lower quality conservation wetlands may provide for recreational opportunity (Antos et al. 2007).

Screen planting should also be investigated as this may prevent easy access and discourage intrusion into important wetlands (Antos et al. 2007).

13.1 Connectivity of native vegetation and fauna habitats

The opportunity to reserve or create habitat corridors within Hobsons Bay is limited in some systems; particularly grasslands and freshwater wetlands (see Section 3.11). Riparian corridors of major waterways benefit from protection afforded for other values, such as water flow management and flood mitigation. Resources may continue to be invested to improve the habitat quality and variability of these corridors. Coastal areas are also afforded protection for a range of reasons, in the planning scheme and elsewhere, and are presently represented by some of the larger reserves where natural variation in vegetation type and habitats is maintained. Native grassland areas are the most challenging for maintaining or improving connectivity between important sites.

The opportunities to create and maintain corridors are limited. Roadside reserves offer some potential for providing connectivity between sites, however they are limited in their capacity for protection and management primarily for conservation objectives. There is also potential to undertaken grassland restoration activities along rail corridors, as these areas undergo little traffic from the general public. Management of rail corridors for this purpose also has some difficulty due to safety considerations and the requirement to collaborate with the relevant authorities. Grassland restoration within rail corridors would however require the exclusion of woody weeds and other shrubs / trees which are less desirable within close proximity to active lines.

Of particular importance is the retention of larger grassland patches within Hobsons Bay. These patches allow enough space to limit the impacts of edge effect, increase carrying capacity for fauna populations and maintain natural variability and soil surface topography.

Figure 5 shows the extent of native vegetation throughout the municipality. The upstream reaches of Kororoit Creek, Cherry Creek, Laverton Creek, Skeleton Creek and Kayes Drain have no remnant vegetation modelled. There are clear opportunities for addition to existing revegetation in these areas to be undertaken in accordance with the priorities of the Melbourne Water Waterway Management Activity Plan. Council may liaise with Melbourne Water to prioritise restoration works within Hobsons Bay's creeks. The objective of these works should take opportunity to utilise natural corridors with reliable and consistent tenure and planning regulation amongst surrounding mixed land use, to increase the area of different habitat types and the quality of remnant habitats within these areas. Kororoit Creek and Cherry Creek are contiguous with larger, near coastal area with relatively higher biodiversity values within Hobsons Bay; these include Cherry Lake and estuarine vegetation at Altona Coastal Park. Further restoration of riparian habitats upstream of these areas will increase the area of native vegetation and potential increase movement of fauna along these waterways. The type of revegetation should be guided by the broad vegetation types within each landscape. There are also opportunities to increase shrub cover along some waterways where native vegetation is removed or significantly modified. Escarpment vegetation along creeks may have had higher shrub cover at the time of early agricultural development. Revegetation of the upstream reaches of these creeks within the municipality would provide habitat connectivity benefits mostly to waterbird and riparian terrestrial bird species, but also to frog, reptile, fish (through water quality) and the native Rakali/Water Rat.

Open Space along the creeklines can be used for this purpose and it would be beneficial for Council to liaise with Melbourne Water and Friends of Groups, such as the Friends of Lower Skeleton Creek, regarding the revegetation of habitat corridors (also see TBLD 2006). There is further opportunity to work with adjoining Councils, to improve habitat connectivity within the region and across Council boundaries. The objectives of ESO1 are the most appropriate to be considered in prioritising management effort as these are shared with Brimbank City Council for land use planning associated with Kororoit Creek.

14 Conclusions

14.1 Strategic considerations

Community consultation shows that the protection and retention of existing natural areas, particularly our coastal areas, grasslands and waterways, is very important to the Hobsons Bay community. Implementing a strategy that delivers on the objective of no further loss to biodiversity requires an accurate understanding of what biodiversity values remain. This information also needs to be regularly updated as new data becomes available.

This strategy enables the development of new and existing approaches to the management of natural values. The following sections detail some areas that have been highlighted for Hobsons Bay City Council to further investigate and to develop programs to enable effective management of identified natural values present in the municipality.

14.2 Priority one directions

The establishment of a spatial database for the management of Council's biodiversity information

Purpose: To develop electronic systems for collection, storage and use of environmental data maintained regularly maintained and updated by Council.

This could be split into three parts including:

- an analysis of existing requirements to determine the data to be collected e.g. what are the existing requirements for grant reporting and program measurement
- electronic capture of historic data e.g. current management plans and investigations, state datasets
- electronic capture of field data. This should consider what the important factors to be measured are

An Environmental Significance Overlay should be investigated for some areas of the municipality containing high biodiversity values

The identified values on these properties are most at risk of illegal or accidental removal during development activities. A new ESO for this purpose may be restricted to properties containing patches or remnants of the EVC Plains Grassland that are identified as having very high biodiversity significance in Figure 6; to provide planning triggers and protection of native grassland. Properties listed in Appendix 3 are high priority candidate sites for an ESO. A comprehensive review of current values is necessary to provide validation of the modelled and historical data contributing to the assessment of significant sites.

In the event an offset site is transferred to Council and prior to transfer, a detailed evaluation should be made of the management costs for the 10-year management period, or balance of remaining time within that period

The costs should be covered in full by the party transferring the offset to Council, and paid to Council in full upon transfer of the land. Land value is excluded from consideration when

calculating offset management costs although CPI is considered, as well as ongoing costs. Payment for offset management responsibility must cover on ground works, project management, community consultation, monitoring and materials costs. The total costs will depend on the requirements of an Offset Management Plan.

Weed management on Council land

The highest-priority biodiversity assets should receive priority attention for management. Priority should also be given where there are areas of high threat weed species which were recently spread or confined to a manageable area. Priorities for weed species to be targeted include Weeds listed under CALP Act, habitat transforming weeds in areas of high significance, new and emerging weed infestations. Some naturalised species will not be targeted.

Monitoring should be undertaken of the effect of weed control in Council reserves, to determine the impact of treatment and to guide future management. Weed control within previously recognised sites of significance should be continued, including Cherry Lake, Truganina Explosives Reserve, Rifle Range Reserve and Altona Coastal Park.

Develop a program of prescribed burning for ecological outcomes in grassland reserves

Prescribed burning is generally required in the management plans for offset sites. A risk assessment involving industry stakeholders is required. Burning in grassland areas is constrained by surrounding land use and the conditions required to burn whilst accommodating those constraints. E.g. burning on northerly or westerly wind conditions in order to avoid disruption to industry. Other considerations for a risk assessment are the species present and timing of the year to accommodate lifecycle requirements.

Constraints to burning in relation to fauna may dictate whether there is no burning in a reserve, mosaic burning or small scale burning. These determinations would be made on a site-by-site basis and may vary. A monitoring procedure should be prepared which allows data to be collected consistently on the effects of ecological burning within Hobsons Bay. Monitoring should allow for analysis of changes in plant composition, populations of threatened species and weed cover abundance as a priority. Any burn planning must include allocations for follow up weed control.

14.3 Priority two directions

Collaboration with neighbouring land managers

In many cases weed and pest animal control is only cost effective if neighbouring land managers take a collaborative approach to their management. During public consultation, a number of neighbouring land managers indicated their support for taking collaborative action. A collaborative weed and pest animal control program could be considered for development between Council, Parks Victoria, Melbourne Water, adjoining Councils and interested private industry with the objective to reduce impacts of high threat species on areas of biodiversity significance.

Review of Council's events and public awareness programs

A review of Council's public awareness program should include the current resources dedicated to community engagement. There are 50+ friends groups and 80+ community, industry and school events relevant to biodiversity management within Hobsons Bay. Areas of engagement where community awareness needs to be strengthened should be identified and tailored towards better promotion and education of values. This may include greater awareness in locations where different land uses abut, such as recreational and conservation activities and greater awareness, and greater ownership of shorebird habitat.

Fauna habitat connectivity

A short plan should be prepared with the objective to improve habitat connectivity and species movement, focusing in order of priority on:

- improving native vegetation and habitat quality in larger coastal reserves.
- continuing restoration efforts within riparian areas of Kororoit Creek, Cherry Creek, Laverton Creek and Skeleton Creek in partnership with Melbourne Water.
- Along linear corridors such as roadsides and railway lines in collaboration with private landholders

Shorebird habitat management

Monitoring and community engagement should continue within important shorebird habitat to minimise off-leash dog access or other impacts caused by recreational activities within conservation areas. The conservation of shorebird habitat should be promoted across a range of community events and via social media opportunities.

Monitoring of ground-nesting birds.

The Port Phillip Bay coastline provides an opportunity to monitor the abundance of ground-nesting shorebirds.

Collaboration with other government agencies and community groups is required in order to successfully resource any monitoring program. There are opportunities for community groups and local residents familiar with the bird species to become involved.

Pest animal management

An integrated approach is required in line with the state policy that involves a regional approach to pest animal control across land tenure. For example, pest animal control at Truganina Park could include up to five state government agencies.

Priority areas for pest animal management are:

- Truganina Park
- Truganina Explosives Reserve
- Cherry Lake Reserve
- Altona Coastal Park
- Newport Lakes
- Kororoit Creek

- Skeleton Creek
- Rifle Range Reserve

Weed management on non-Council land

A landscape analysis of weed risk to broad vegetation types and sites of significance indicates efforts should also focus on roadside grassland, other grassland and the Kororoit Creek Corridor. An integrated approach is needed to manage these priority areas across public and private land. Consultation with other land managers and community groups should focus on controlling these threats.

Outside of high priority Council reserves, weed control should focus on:

- Council managed land abutting the Kororoit Creek corridor
- roadsides adjacent to significant grassland vegetation e.g. Ajax Rd and Laverton Grassland

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Appendices

Appendix 1. Flora and fauna census

Appendix 2. Community consultation responses

Appendix 3. Candidate properties for consideration of an Environmental Significance Overlay

Appendix 1 Flora and fauna census

Abbreviations
All categories available under relevant lists below are included, with abbreviations used in the following tables.

EPBC Act status	State advisory list status - flora	State advisory list status - fauna	CaLP Act listing	FFG Act listed	Hobsons Bay status*
EX - Extinct **CR** – Critically endangered **E** – Endangered **V** – Vulnerable **CD** – Conservation dependent	**Flora** **x** – extinct **e** – endangered **v** – vulnerable **r** – rare **k** – poorly known	**Fauna** **ex** – Extinct **rx** – Regionally extinct **ew** – Extinct in the wild **cr** – Critically endangered **en** – endangered **vu** – vulnerable **nt** – near threatened **dd** – data deficient	**R** – Regionally restricted **C** – Regionally controlled **P** – Regionally prohibited	**L** - Listed	**EW** – Extinct in the Wild **Thr** – Threatened (critically endangered, endangered or vulnerable) **NT** – Near Threatened **LC** – Least Concern

* Assessments have not been made for fungi, lichens or invertebrates.

Plant taxa indigenous to Hobsons Bay

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Asterella drummondii	Asterella (liverwort)	NT			
Barbula calycina	Common Beard-moss	LC			
Chiloscyphus semiteres	Common Crestwort (liverwort)	LC			
Didymodon torquatus	Beard Moss	NT			
Fossombronia pusilla	Fossombronia (liverwort)	NT			
Gigaspermum repens	Pineapple Moss	Thr			
Grimmia laevigata	Salt and Pepper (Moss)	NT			
Pleuridium nervosum	Earth Moss	NT			
Polytrichum juniperinum	Juniper Haircap (Moss)	LC			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Acacia mearnsii	Black Wattle	NT			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Acacia melanoxylon	Blackwood	Thr			
Acacia paradoxa	Hedge Wattle	NT			
Acacia pycnantha	Golden Wattle	NT			
Acaena echinata	Sheep's Burr	NT			
Acaena ovina	Australian Sheep's Burr	NT			
Actites megalocarpus	Dune Thistle	NT			
Alisma plantago-aquatica	Water Plantain	LC			
Allocasuarina littoralis	Black Sheoak	Thr			
Allocasuarina luehmannii	Buloke	EW		L	en
Allocasuarina verticillata	Drooping Sheoak	Thr			
Alternanthera denticulata	Lesser Joyweed	NT			
Alternanthera sp. 1 (Plains)	Plains Joyweed	Thr			k
Amphibromus neesii	Southern Swamp Wallaby-grass	NT			
Amphibromus nervosus	Common Swamp Wallaby-grass	NT			
Angianthus preissianus	Salt Angianthus	Thr			
Anthosachne scabra	Common Wheat-grass	Thr			
Apalochlamys spectabilis	Showy Cassinia	EW			
Aphanes australiana	Australian Piert	Thr			
Apium annuum	Annual Celery	NT			
Apium prostratum subsp. *prostratum*	Sea Celery	Thr			
Arthropodium fimbriatum	Nodding Chocolate-lily	EW			
Arthropodium minus	Small Vanilla-lily	Thr			
Arthropodium sp. 3 (aff. strictum)	Small Chocolate-lily	Thr			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Arthropodium strictum	Chocolate Lily	Thr			
Asperula conferta	Common Woodruff	LC			
Asperula scoparia subsp. *scoparia*	Prickly Woodruff	NT			
Asperula subsimplex	Water Woodruff	Thr			
Atriplex australasica	Native Orache	EW			
Atriplex cinerea	Coast Saltbush	LC			
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush	Thr			r
Atriplex semibaccata	Berry Saltbush	LC			
Atriplex suberecta	Sprawling Saltbush	Thr			
Austrostipa aristiglumis	Plump Spear-grass	Thr			
Austrostipa bigeniculata	Kneed Spear-grass	LC			
Austrostipa curticoma	Short-crown Spear-grass	Thr			
Austrostipa elegantissima	Feather Spear-grass	EW			
Austrostipa flavescens	Coast Spear-grass	NT			
Austrostipa gibbosa	Spurred Spear-grass	Thr			
Austrostipa oligostachya	Fine-head Spear-grass	Thr			
Austrostipa rudis	Veined Spear-grass	Thr			
Austrostipa scabra subsp. *falcata*	Rough Spear-grass	NT			
Austrostipa setacea	Corkscrew Spear-grass	Thr			
Austrostipa stipoides	Prickly Spear-grass	LC			
Austrostipa stuposa	Quizzical Spear-grass	EW			
Avicennia marina subsp. *australasica*	Grey Mangrove	NT			r
Azolla filiculoides	Pacific Azolla	LC			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Batrachium trichophyllum	Water Fennel	EW			
Bolboschoenus caldwellii	Salt Club-sedge	LC			
Bolboschoenus medianus	Marsh Club-sedge	Thr			
Bothriochloa macra	Red-leg Grass	Thr			
Brachyscome dentata	Lobe-seed Daisy	Thr			
Brachyscome lineariloba	Hard-head Daisy	EW			
Brachyscome paludicola	Woodland Swamp-daisy	Thr			
Bromus arenarius	Sand Brome	EW			r
Bulbine bulbosa	Bulbine Lily	Thr			
Bursaria spinosa subsp. *spinosa*	Sweet Bursaria	Thr			
Caesia calliantha	Blue Grass-lily	Thr			
Calocephalus citreus	Lemon Beauty-heads	NT			
Calocephalus lacteus	Milky Beauty-heads	Thr			
Calotis anthemoides	Cut-leaf Burr-daisy	Thr			
Calotis scabiosifolia	Rough Burr-daisy	Thr			
Calystegia sepium subsp. *roseata*	Large Bindweed	Thr			
Carex appressa	Tall Sedge	Thr			
Carex breviculmis	Common Grass-sedge	NT			
Carex inversa	Knob Sedge	LC			
Carex pumila	Strand Sedge	Thr			
Carex tereticaulis	Poong'ort	NT			
Carpobrotus rossii	Karkalla	NT			
Cassinia sp. aff. *arcuata* (Midlands)	Drooping Cassinia	Thr			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Cassytha glabella f. *dispar*	Slender Dodder-laurel	EW			
Centipeda cunninghamii	Common Sneezeweed	NT			
Centrolepis polygyna	Wiry Centrolepis	EW			
Cheilanthes austrotenuifolia	Green Rock-fern	Thr			
Cheilanthes sieberi subsp. *sieberi*	Narrow Rock-fern	Thr			
Chenopodium glaucum	Glaucous Goosefoot	Thr			
Chloris truncata	Windmill Grass	NT			
Chrysocephalum apiculatum	Common Everlasting	Thr			
Chrysocephalum sp. 1	Plains Everlasting	Thr			
Clematis microphylla	Small-leaved Clematis	NT			
Comesperma calymega	Blue-spike Milkwort	EW			
Comesperma defoliatum	Leafless Milkwort	EW			
Comesperma polygaloides	Small Milkwort	EW		L	vu
Convolvulus angustissimus subsp. *omnigracilis*	Slender Bindweed	NT			k
Coprosma quadrifida	Prickly Currant-bush	EW			
Coronidium gunnianum	Pale Swamp Everlasting	Thr			vu
Corybas incurvus	Slaty Helmet-orchid	EW			
Cotula australis	Common Cotula	LC			
Cotula vulgaris var. *australasica*	Slender Cotula	EW			
Craspedia glauca spp. agg.	Common Billy-buttons	EW			
Crassula colorata var. *acuminata*	Dense Crassula	Thr			
Crassula decumbens var. *decumbens*	Spreading Crassula	LC			
Crassula helmsii	Swamp Crassula	NT			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Crassula sieberiana	Sieber Crassula	NT			
Crassula tetramera	Australian Stonecrop	Thr			
Cullen tenax	Tough Scurf-pea	Thr		L	en
Cuscuta tasmanica	Golden Dodder	Thr			
Cycnogeton procerum (broad erect leaf variant)	Common Water-ribbons	Thr			
Cymbonotus preissianus	Austral Bear's-ear	EW			
Cynoglossum australe	Australian Hound's-tongue	Thr			
Cynoglossum suaveolens	Sweet Hound's-tongue	EW			
Cyperus gunnii subsp. *gunnii*	Flecked Flat-sedge	Thr			
Daucus glochidiatus	Australian Carrot	EW			
Deyeuxia quadriseta	Reed Bent-grass	Thr			
Dianella admixta	Black-anther Flax-lily	Thr			
Dianella brevicaulis	Small-flower Flax-lily	Thr			
Dianella sp. aff. *longifolia* (Benambra)	Arching Flax-lily	Thr			vu
Dichanthium sericeum subsp. *sericeum*	Silky Blue-grass	Thr			
Dichelachne crinita	Long-hair Plume-grass	NT			
Dichondra repens	Kidney-weed	LC			
Dillwynia cinerascens	Grey Parrot-pea	Thr			
Disphyma crassifolium subsp. *clavellatum*	Rounded Noon-flower	LC			
Distichlis distichophylla	Australian Salt-grass	LC			
Diuris basaltica	Small Golden Moths	EW	EN	L	en
Diuris behrii	Golden Cowslips	EW			vu
Diuris fragrantissima	Sunshine Diuris	EW	EN	L	en

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Diuris palustris	Swamp Diuris	EW		L	vu
Dodonaea viscosa subsp*. cuneata*	Wedge-leaf Hop-bush	Thr			
Drosera hookeri	Sundew	Thr			
Duma florulenta	Tangled Lignum	NT			
Dysphania pumilio	Clammy Goosefoot	Thr			
Einadia nutans subsp*. nutans*	Nodding Saltbush	LC			
Elatine gratioloides	Waterwort	Thr			
Eleocharis acuta	Common Spike-sedge	NT			
Eleocharis pallens	Pale Spike-sedge	NT			k
Eleocharis pusilla	Small Spike-sedge	Thr			
Eleocharis sphacelata	Tall Spike-sedge	Thr			
Enchylaena tomentosa var*. tomentosa*	Ruby Saltbush	LC			
Enteropogon acicularis	Spider Grass	EW			
Epilobium billardierianum subsp*. billardierianum*	Smooth Willow-herb	NT			
Epilobium billardierianum subsp*. cinereum*	Grey Willow-herb	NT			
Epilobium billardierianum subsp*. intermedium*	Variable Willow-herb	NT			
Epilobium hirtigerum	Hairy Willow-herb	LC			
Eragrostis brownii	Common Love-grass	Thr			
Eragrostis infecunda	Southern Cane-grass	EW			
Eragrostis parviflora	Weeping Love-grass	Thr			
Eriochiton sclerolaenoides	Woolly-fruit Bluebush	EW			
Erodium crinitum	Blue Heron's-bill	Thr			
Eryngium ovinum	Blue Devil	Thr			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Eryngium vesiculosum	Prickfoot	Thr			
Eucalyptus camaldulensis	River Red-gum	Thr			
Euchiton involucratus	Star Cudweed	NT			
Euchiton japonicus	Creeping Cudweed	Thr			
Euchiton sphaericus	Annual Cudweed	NT			
Euphorbia drummondii spp. agg.	Flat Spurge	Thr			
Eutaxia microphylla var. *diffusa*	Spreading Eutaxia	EW			
Eutaxia microphylla var. *microphylla*	Common Eutaxia	Thr			
Ficinia nodosa	Knobby Club-sedge	LC			
Frankenia pauciflora var. *gunnii*	Southern Sea-heath	NT			
Gahnia filum	Chaffy Saw-sedge	LC			
Geranium potentilloides	Soft Crane's-bill	Thr			
Geranium retrorsum	Grassland Crane's-bill	NT			
Geranium solanderi	Austral Crane's-bill	Thr			
Geranium sp. 2	Variable Crane's-bill	Thr			
Geranium sp. 3	Pale-flower Crane's-bill	Thr			r
Geranium sp. 5	Naked Crane's-bill	Thr			
Glycine tabacina s.s.	Variable Glycine	Thr			
Goodenia gracilis	Slender Goodenia	EW			
Goodenia heteromera	Spreading Goodenia	Thr			
Goodenia humilis	Swamp Goodenia	EW			
Goodenia pinnatifida	Cut-leaf Goodenia	NT			
Goodenia pusilliflora	Small-flower Goodenia	Thr			

Scientific name	Common Name	Hobsons Bay Conservation Status	EPBC Act listing	FFG Act listing	Advisory listing
Haloragis aspera	Rough Raspwort	NT			
Haloragis heterophylla	Varied Raspwort	NT			
Helichrysum luteoalbum	Jersey Cudweed	LC			
Hemichroa pentandra	Trailing Hemichroa	Thr			
Heterozostera tasmanica	Tasman Grass-wrack	Thr			r
Hornungia procumbens	Oval Purse	Thr			
Hydrocotyle capillaris	Thread Pennywort	EW			
Hydrocotyle laxiflora	Stinking Pennywort	Thr			
Hypericum gramineum spp. agg.	Small St John's Wort	NT			
Hypoxis glabella var. *glabella*	Tiny Star	Thr			
Imperata cylindrica	Blady Grass	NT			
Isoetopsis graminifolia	Grass Cushion	Thr			
Isolepis cernua var. *cernua*	Nodding Club-sedge	NT			
Isolepis cernua var. *platycarpa*	Broad-fruit Club-sedge	Thr			
Isolepis inundata	Swamp Club-sedge	NT			
Isolepis marginata	Little Club-sedge	Thr			
Isolepis victoriensis	Victorian Club-sedge	Thr			
Juncus australis	Austral Rush	Thr			
Juncus bufonius	Toad Rush	NT			
Juncus flavidus	Gold Rush	LC			
Juncus holoschoenus	Joint-leaf Rush	NT			
Juncus homalocaulis	Wiry Rush	Thr			
Juncus kraussii subsp. *australiensis*	Sea Rush	NT			

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Juncus pallidus	Pale Rush	NT			
Juncus procerus	Tall Rush	Thr			
Juncus revolutus	Creeping Rush	Thr			r
Juncus semisolidus	Plains Rush	Thr			
Juncus subsecundus	Finger Rush	LC			
Lachnagrostis aemula	Leafy Blown-grass	Thr			
Lachnagrostis billardierei subsp. *billardierei*	Coast Blown-grass	Thr			
Lachnagrostis filiformis	Common Blown-grass	LC			
Lawrencia glomerata	Clustered Lawrencia	Thr			
Lawrencia spicata	Salt Lawrencia	Thr			r
Lemna disperma	Common Duckweed	NT			
Lepidium aschersonii	Spiny Peppercress	EW	VU	L	en
Lepidosperma concavum	Sandhill Sword-sedge	EW			
Lepilaena bilocularis	Small-fruit Water-mat	Thr			
Lepilaena cylindrocarpa	Long-fruit Water-mat	Thr			
Lepilaena preissii	Slender Water-mat	Thr			
Leptinella reptans	Creeping Cotula	Thr			
Leptorhynchos squamatus	Scaly Buttons	NT			
Leptorhynchos tenuifolius	Wiry Buttons	EW			
Leptospermum lanigerum	Woolly Tea-tree	EW			
Leucophyta brownii	Cushion Bush	Thr			
Levenhookia dubia	Hairy Stylewort	Thr			
Lilaeopsis polyantha	Australian Lilaeopsis	Thr			

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Limosella australis	Austral Mudwort	Thr			
Linum marginale	Native Flax	NT			
Lobelia irrigua	Salt Pratia	EW			
Lobelia pedunculata	Matted Patria	Thr			
Lobelia pratioides	Poison Lobelia	Thr			
Lomandra effusa	Scented Mat-rush	EW			
Lomandra filiformis subsp. *coriacea*	Wattle Mat-rush	EW			
Lomandra longifolia subsp. *longifolia*	Spiny-headed Mat-rush	Thr			
Lomandra micrantha	Small-flower Mat-rush	EW			
Lysiana exocarpi	Harlequin Mistletoe	EW			
Lythrum hyssopifolia	Small Loosestrife	LC			
Maireana decalvans	Black Cotton-bush	Thr			
Maireana humillima	Dwarf Bluebush	EW			
Malva preissiana s.s. (white-flowered coastal form)	Coast Hollyhock	EW			vu
Malva weinmanniana	Australian Hollyhock	Thr			
Marsilea costulifera	Narrow-leaf Nardoo	Thr			
Marsilea drummondii	Common Nardoo	Thr			
Marsilea hirsuta	Short-fruit Nardoo	Thr			
Melicytus dentatus	Tree Violet	Thr			
Mentha diemenica var. *diemenica*	Slender Mint	Thr			
Microlaena stipoides var. *stipoides*	Weeping Grass	LC			
Microtis unifolia	Common Onion-orchid	Thr			
Mimulus repens	Creeping Monkey-flower	Thr			

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Minuria leptophylla	Minnie Daisy	Thr			
Myoporum insulare	Common Boobialla	Thr			
Myoporum parvifolium	Creeping Myoporum	EW			
Myriocephalus rhizocephalus	Woolly-heads	Thr			
Myriophyllum muelleri	Hooded Water-milfoil	Thr			
Myriophyllum verrucosum	Red Water-milfoil	Thr			
Ophioglossum lusitanicum	Austral Adder's-tongue	EW			
Oxalis exilis	Shady Wood-sorrel	Thr			
Oxalis perennans	Grassland Wood-sorrel	LC			
Ozothamnus turbinatus	Coast Everlasting	Thr			
Panicum decompositum var. *decompositum*	Native Millet	Thr			
Panicum effusum	Hairy Panic	Thr			
Pelargonium australe	Austral Stork's-bill	Thr			
Pelargonium littorale	Coast Stork's-bill	EW			k
Pelargonium rodneyanum	Magenta Stork's-bill	EW			
Pentapogon quadrifidus var. *quadrifidus*	Five-awned Spear-grass	Thr			
Persicaria decipiens	Slender Knotweed	LC			
Phragmites australis	Common Reed	LC			
Pilularia novae-hollandiae	Austral Pillwort	EW			
Pimelea curviflora var. 1	Curved Rice-flower	Thr			
Pimelea glauca	Smooth Rice-flower	Thr			
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	Thr	CR	L	en
Plantago gaudichaudii	Narrow Plantain	Thr			

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Plantago varia	Variable Plantain	Thr			
Poa billardierei	Coast Fescue	Thr			r
Poa labillardierei	Common Tussock-grass	NT			
Poa morrisii	Soft Tussock-grass	Thr			
Poa poiformis var. *poiformis*	Coast Tussock-grass	LC			
Poa rodwayi	Velvet Tussock-grass	Thr			
Poa sieberiana var. sieberiana	Grey Tussock-grass	NT			
Podolepis linearifolia	Basalt Podolepis	Thr			en
Portulaca oleracea	Common Purslane	LC			
Potamogeton ochreatus	Blunt Pondweed	NT			
Prasophyllum suaveolens	Fragrant Leek-orchid	EW	EN	L	en
Ptilotus erubescens	Hairy Tails	EW		L	vu
Ptilotus macrocephalus	Feather Heads	Thr			
Ptilotus nobilis	Mulla Mulla	EW			
Ptilotus spathulatus	Pussy Tails	Thr			
Puccinellia perlaxa	Plains Saltmarsh-grass	Thr			
Puccinellia stricta	Australian Saltmarsh-grass	NT			
Pycnosorus chrysanthes	Golden Billy-buttons	EW			
Pycnosorus globosus	Drumsticks	EW			
Rhagodia candolleana subsp. *candolleana*	Seaberry Saltbush	NT			
Rhodanthe anthemoides	Chamomile Sunray	EW			
Rhodanthe pygmaea	Pygmy Sunray	EW			
Rumex bidens	Mud Dock	Thr			

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Rumex brownii	Slender Dock	NT			
Rumex dumosus	Wiry Dock	Thr			
Ruppia megacarpa	Large-fruit Tassel	Thr			
Ruppia polycarpa	Many-fruit Tassel	Thr			
Rutidosis leptorhynchoides	Button Wrinklewort	EW	EN	L	en
Rytidosperma auriculatum	Lobed Wallaby-grass	NT			
Rytidosperma caespitosum	Common Wallaby-grass	Thr			
Rytidosperma carphoides	Short Wallaby-grass	Thr			
Rytidosperma duttonianum	Brown-back Wallaby-grass	NT			
Rytidosperma erianthum	Hill Wallaby-grass	Thr			
Rytidosperma fulvum	Copper-awned Wallaby-grass	NT			
Rytidosperma indutum	Shiny Wallaby-grass	Thr			
Rytidosperma pilosum	Velvet Wallaby-grass	Thr			
Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass	LC			
Rytidosperma setaceum var. *setaceum*	Bristly Wallaby-grass	LC			
Salsola tragus subsp. *pontica*	Coast Saltwort	Thr			r
Samolus repens var. *repens*	Creeping Brookweed	NT			
Sarcocornia blackiana	Thick-head Glasswort	Thr			
Sarcocornia quinqueflora subsp. *quinqueflora*	Beaded Glasswort	NT			
Scaevola albida	Small-fruit Fan-flower	EW			
Schoenoplectus pungens	Sharp Club-sedge	Thr			
Schoenoplectus tabernaemontani	River Club-sedge	NT			
Schoenus apogon	Common Bog-sedge	NT			

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Schoenus nitens	Shiny Bog-sedge	NT			
Sclerolaena diacantha	Grey Copperburr	EW			
Sclerolaena muricata	Black Roly-poly	Thr			
Sebaea albidiflora	White Sebaea	Thr			
Sebaea ovata	Yellow Sebaea	Thr			
Selaginella uliginosa	Swamp Selaginella	EW			
Selliera radicans	Shiny Swamp-mat	NT			
Senecio biserratus	Jagged Fireweed	Thr			
Senecio campylocarpus	Floodplain Fireweed	Thr			r
Senecio glomeratus subsp. *longifructus*	Fireweed	NT			
Senecio halophilus	Salt Groundsel	Thr			
Senecio macrocarpus	Large-headed Fireweed	Thr	VU	L	en
Senecio quadridentatus	Cotton Fireweed	LC			
Senecio runcinifolius	Tall Fireweed	Thr			
Senecio squarrosus	Fireweed	Thr			
Sida corrugata	Variable Sida	EW			
Solanum laciniatum	Large Kangaroo Apple	Thr			
Solenogyne dominii	Smooth Solenogyne	Thr			
Solenogyne gunnii	Hairy Solenogyne	EW			
Sonchus hydrophilus	Native Sow-thistle	Thr			
Spergularia marina	Salt Sand-spurrey	Thr			
Spergularia tasmanica	Sand-spurrey	Thr			
Spinifex sericeus	Hairy Spinifex	Thr			

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Spirodela polyrhiza	Large Duckweed	Thr			k
Sporobolus virginicus	Salt Couch	Thr			
Stackhousia subterranea	Plains Stackhousia	Thr			
Stuckenia pectinata	Fennel Pondweed	NT			
Suaeda australis	Austral Seablite	NT			
Tecticornia arbuscula	Shrubby Glasswort	NT			
Tecticornia halocnemoides subsp. *halocnemoides*	Grey Glasswort	Thr			
Tecticornia pergranulata subsp. *pergranulata*	Blackseed Glasswort	Thr			
Tetragonia implexicoma	Bower Spinach	NT			
Tetragonia tetragonioides	New Zealand Spinach	Thr			
Teucrium racemosum	Grey Germander	EW			
Thelymitra exigua	Short Sun-orchid	Thr			k
Themeda triandra	Kangaroo Grass	NT			
Thesium australe	Austral Toad-flax	EW	VU	L	vu
Threlkeldia diffusa	Coast Bonefruit	Thr			
Tricoryne elatior	Yellow Rush-lily	Thr			
Triglochin minutissima	Tiny Arrowgrass	EW			r
Triglochin mucronata	Prickly Arrowgrass	Thr			r
Triglochin striata	Streaked Arrowgrass	NT			
Tripogon loliiformis	Rye Beetle-grass	Thr			r
Triptilodiscus pygmaeus	Common Sunray	Thr			
Typha domingensis	Narrow-leaf Cumbungi	LC			
Typha orientalis	Broad-leaf Cumbungi	NT			

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Velleia paradoxa	Spur Velleia	Thr			
Veronica gracilis	Slender Speedwell	Thr			
Veronica serpyllifolia	Thyme Speedwell	Thr			
Vittadinia cuneata var. *cuneata*	Fuzzy New Holland Daisy	Thr			
Vittadinia gracilis	Woolly New Holland Daisy	EW			
Wahlenbergia communis	Tufted Bluebell	Thr			
Wahlenbergia luteola	Bronze Bluebell	Thr			
Wahlenbergia multicaulis	Branching Bluebell	Thr			
Walwhalleya proluta	Rigid Panic	NT			
Wilsonia backhousei	Narrow-leaf Wilsonia	EW			
Wilsonia humilis	Silky Wilsonia	Thr			
Wilsonia rotundifolia	Round-leaf Wilsonia	Thr			
Wolffia australiana	Tiny Duckweed	Thr			
Wurmbea dioica subsp. *dioica*	Early Nancy	EW			
Zostera muelleri	Dwarf Grass-wrack	Thr			
Zygophyllum sp.	Twin-leaf	N/A			

Weeds

Scientific Name	Common Name	Freshwater wetland including streams	Riparian	Brackish Wetlands	Saltmarsh and coastal complex	Grasslands	Escarpment shrublands	
Acacia baileyana	Cootamundra Wattle	NA	LR	NA	NA	LR	LR	
Acacia karroo	Karoo Thorn	NA	LR	NA	NA	LR	LR	
Acacia saligna	Golden Wreath Wattle	NA	MR	NA	MR	HR	HR	
Acetosella vulgaris	Sheep Sorrel	NA	LR	NA	NA	LR	LR	
Agapanthus praecox subsp. *orientalis*	Agapanthus	NA	LR	NA	LR	LR	LR	
Agathosma apiculata	Garlic Buchu	U	U	U	U	U	U	
Agave americana	Century Plant	NA	NA	NA	LR	LR	LR	
Agrostis capillaris	Brown-top Bent	NA	MR	NA	NA	MR	MR	
Agrostis stolonifera	Creeping Bent	HR	HR	NA	NA	NA	NA	
Aira caryophyllea subsp. *caryophyllea*	Silvery Hair-grass	NA	NA	NA	NA	LR	LR	
Aira cupaniana	Quicksilver Grass	NA	NA	NA	NA	LR	LR	
Aira elegantissima	Delicate Hair-grass	NA	NA	NA	NA	LR	LR	
Allium triquetrum	Angled Onion	VHR	VHR	NA	NA	NA	NA	R
Allium vineale	Crow Garlic	NA	NA	MR	NA	HR	HR	
Alternanthera philoxeroides	Alligator Weed	VHR	VHR	NA	NA	NA	NA	
Amaranthus albus	Stiff Tumbleweed	NA	LR	NA	LR	LR	LR	
Amaranthus deflexus	Spreading Amaranth	NA	LR	NA	LR	LR	LR	
Amaranthus muricatus	Rough-fruit Amaranth	NA	LR	NA	LR	MR	LR	
Amaranthus powellii	Powell's Amaranth	NA	LR	NA	LR	LR	LR	
Amaranthus viridis	Green Amaranth	NA	LR	NA	LR	LR	LR	
Amaryllis belladonna	Belladonna Lily	NA	NA	NA	LR	NA	LR	

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Ammophila arenaria	Marram Grass	NA	NA	NA	LR	NA	NA	
Anthoxanthum odoratum	Sweet Vernal-grass	HR	MR	NA	NA	NA	MR	
Apium graveolens	Celery	MR	MR	MR	MR	NA	NA	
Arctotheca calendula	Cape weed	LR	LR	NA	LR	MR	HR	
Arenaria serpyllifolia subsp. *serpyllifolia*	Thyme-leaved Sandwort	NA	NA	NA	LR	LR	LR	
Artemisia verlotiorum	Chinese Wormwood	VHR	VHR	NA	NA	NA	NA	
Asphodelus fistulosus	Onion Weed	NA	LR	NA	MR	MR	MR	R
Aster subulatus	Aster-weed	MR	MR	HR	HR	NA	NA	
Atriplex patula	Spear Orache	LR	LR	HR	HR	NA	NA	
Atriplex prostrata	Hastate Orache	MR	MR	HR	HR	NA	NA	
Avena barbata	Bearded Oat	LR	LR	LR	LR	VHR	YHR	
Avena fatua	Wild Oat	LR	LR	LR	LR	HR	HR	
Avena sativa	Oat	NA	NA	NA	NA	LR	NA	
Avena sterilis	Sterile Oat	LR	LR	LR	LR	LR	LR	
Avena sterilis subsp. *ludoviciana*	Sterile Oat	LR	LR	LR	LR	LR	LR	
Ballota nigra subsp. *foetida*	Black Horehound	U	U	U	U	U	U	
Berkheya rigida	African Thistle	NA	NA	NA	HR	HR	HR	
Beta vulgaris subsp. *maritima*	Wild Beet	LR	MR	HR	HR	NA	NA	
Brachypodium distachyon	False Brome	NA	LR	NA	LR	MR	MR	
Brassica fruticulosa	Twiggy Turnip	NA	HR	NA	MR	HR	HR	
Brassica nigra	Black Mustard	U	U	U	U	U	U	
Brassica rapa	White Turnip	NA	NA	NA	NA	LR	LR	

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Briza maxima	Large Quaking-grass	NA	MR	NA	LR	HR	HR	
Briza minor	Lesser Quaking-grass	LR	LR	LR	NA	NA	NA	
Bromus alopecuros	Mediterranean Brome	U	U	U	U	U	U	
Bromus catharticus var. *catharticus*	Prairie Grass	HR	HR	HR	LR	NA	NA	
Bromus diandrus	Great Brome	MR	MR	MR	HR	HR	HR	
Bromus hordeaceus subsp. *hordeaceus*	Soft Brome	MR	MR	MR	MR	HR	HR	
Bromus madritensis	Madrid Brome	U	U	U	U	U	U	
Bromus rubens	Red Brome	U	U	U	U	U	U	
Cakile maritima subsp. *maritima*	Sea Rocket	NA	NA	NA	LR	NA	NA	
Capsella bursa-pastoris	Shepherd's Purse	NA	NA	NA	LR	LR	LR	
Carduus pycnocephalus	Slender Thistle	MR	MR	LR	LR	MR	MR	
Carduus tenuiflorus	Winged Slender-thistle	MR	MR	LR	LR	LR	LR	
Carex divisa	Divided Sedge	HR	HR	HR	LR	LR	LR	
Carpobrotus aequilaterus	Angled Pigface	NA	NA	NA	MR	NA	LR	
Carthamus lanatus	Saffron Thistle	NA	NA	NA	NA	HR	HR	C
Cenchrus clandestinus	Kikuyu	VHR	VHR	VHR	VHR	VHR	VHR	
Centaurea calcitrapa	Star Thistle	NA	NA	NA	NA	LR	LR	P
Centaurea melitensis	Malta Thistle	NA	NA	NA	NA	LR	LR	
Centaurium erythraea	Common Centaury	LR	LR	LR	LR	LR	LR	
Centaurium tenuiflorum	Slender Centaury	LR	LR	LR	LR	NA	NA	
Cerastium glomeratum	Sticky Mouse-ear Chickweed	LR	LR	LR	LR	LR	LR	
Chamaecytisus palmensis	Tree Lucerne	LR	MR	LR	LR	LR	LR	

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Chenopodium album	Fat Hen	MR	MR	LR	LR	LR	LR	
Chenopodium macrospermum	Red-stem Goosefoot	LR	LR	MR	MR	NA	NA	
Chenopodium murale	Sowbane	LR	LR	LR	MR	LR	LR	
Chloris gayana	Rhodes Grass	LR	LR	LR	LR	LR	LR	
Chrysanthemoides monilifera subsp.	African Boneseed	LR	MR	LR	LR	LR	MR	
Cicendia quadrangularis	Square Cicendia	NA	NA	LR	LR	LR	NA	
Ciclospermum leptophyllum	Slender Celery	LR	LR	LR	LR	LR	LR	
Cirsium vulgare	Spear Thistle	HR	HR	HR	MR	HR	HR	C
Conium maculatum	Hemlock	HR	HR	NA	NA	NA	NA	C
Convolvulus arvensis	Common Bindweed	NA	LR	NA	NA	LR	LR	
Conyza bonariensis	Flaxleaf Fleabane	LR	LR	LR	LR	LR	LR	
Conyza parva	Small Fleabane	U	U	U	U	U	U	
Conyza sumatrensis var. *sumatrensis*	Tall Fleabane	MR	MR	MR	LR	LR	MR	
Coprosma repens	Mirror Bush	HR	HR	HR	HR	LR	MR	
Cortaderia selloana	Pampas Grass	HR	HR	HR	HR	NA	NA	
Cotoneaster glaucophyllus var. *serotinus*	Large-leaf Cotoneaster	LR	MR	LR	LR	LR	MR	
Cotoneaster pannosus	Velvet Cotoneaster	LR	LR	LR	LR	LR	MR	
Cotula coronopifolia	Water Buttons	HR	LR	HR	LR	NA	NA	
Crassula natans var. *minus*	Water Crassula	LR	NA	NA	NA	NA	NA	
Crataegus monogyna	Hawthorn	LR	MR	LR	NA	NA	LR	C
Crocosmia X crocosmiiflora	Montbretia	MR	HR	NA	NA	NA	NA	
Cucumis myriocarpus subsp. *leptodermis*	Paddy Melon	NA	NA	NA	LR	NA	LR	

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Cupressus macrocarpa	Monterey Cypress	NA	LR	NA	LR	NA	NA	
Cupressus sempervirens	Mediterranean Cypress	NA	LR	NA	LR	LR	LR	
Cuscuta epithymum	Common Dodder	U	U	U	U	U	U	
Cuscuta planiflora	Small-seed Alfalfa-dodder	NA	NA	NA	MR	NA	NA	
Cynara cardunculus subsp. *flavescens*	Artichoke Thistle	NA	HR	NA	HR	HR	HR	C
Cynodon dactylon var. dactylon	Couch	HR	HR	HR	HR	HR	HR	
Cynosurus echinatus	Rough Dog's-tail	NA	LR	NA	NA	MR	MR	
Cyperus eragrostis	Drain Flat-sedge	MR	LR	MR	LR	NA	NA	
Cyperus rotundus	Nutgrass	LR	MR	LR	NA	NA	NA	
Dactylis glomerata	Cocksfoot	MR	HR	HR	HR	VHR	VHR	
Datura stramonium	Common Thorn-apple	LR	LR	NA	NA	NA	NA	
Daucus carota	Carrot	LR	LR	NA	NA	NA	NA	
Dianella callicarpa	Flax-lily	LR	LR	LR	LR	NA	NA	
Dimorphotheca pluvialis	Cape Marigold	U	U	U	U	U	U	
Diplotaxis muralis	Wall Rocket	LR	MR	LR	LR	LR	LR	
Diplotaxis tenuifolia	Sand Rocket	LR	LR	LR	MR	LR	LR	
Dipsacus fullonum	Wild Teasel	NA	LR	NA	NA	NA	NA	C
Dittrichia graveolens	Stinkwort	LR	LR	MR	LR	LR	LR	C
Dysphania ambrosioides	Mexican Tea	LR	LR	LR	LR	NA	NA	
Dysphania multifida	Scented Goosefoot	U	U	U	U	U	U	
Ecballium elaterium	Squirting Cucumber	NA	NA	NA	LR	LR	LR	
Echinochloa crus-galli	Barnyard Grass	MR	LR	LR	LR	NA	NA	

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Echium plantagineum	Paterson's Curse	LR	LR	LR	MR	MR	MR	C
Echium vulgare	Viper's Bugloss	U	U	U	U	U	U	C
Ehrharta calycina	Perennial Veldt-grass	NA	NA	NA	HR	NA	NA	
Ehrharta erecta var. *erecta*	Panic Veldt-grass	LR	VHR	LR	LR	MR	VHR	
Ehrharta longiflora	Annual Veldt-grass	LR	MR	LR	LR	HR	HR	
Eichhornia crassipes	Water Hyacinth	VHR	MR	NA	NA	NA	NA	
Eleusine tristachya	American Crows-foot Grass	NA	NA	NA	NA	LR	LR	
Elytrigia pungens	Sea Couch-grass	NA	NA	NA	VHR	NA	NA	
Elytrigia repens	English Couch	HR	HR	HR	LR	NA	NA	
Epilobium ciliatum	Glandular Willow-herb	LR	LR	LR	NA	NA	NA	
Epilobium hirsutum	Great Willow-herb	VHR	HR	HR	NA	NA	NA	
Eragrostis cilianensis	Stink Grass	NA	NA	NA	NA	LR	LR	
Eragrostis curvula	African Love-grass	NA	NA	NA	NA	VHR	VHR	
Eragrostis mexicana	Mexican Love-grass	NA	NA	NA	LR	LR	LR	
Eragrostis minor	Smaller Stink-grass	U	U	U	U	U	U	
Eragrostis pilosa	Soft Love-grass	U	U	U	U	U	U	
Erodium botrys	Big Heron's-bill	NA	NA	NA	NA	HR	HR	
Erodium cicutarium	Common Heron's-bill	NA	NA	NA	NA	HR	HR	
Erodium malacoides	Oval Heron's-bill	NA	NA	NA	NA	HR	HR	
Erodium moschatum	Musky Heron's-bill	NA	NA	NA	LR	MR	MR	
Eucalyptus botryoides	Southern Mahogany	LR	LR	LR	LR	LR	LR	
Eucalyptus cladocalyx	Sugar Gum	NA	MR	NA	NA	MR	MR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Euphorbia dendroides	Tree Spurge	NA	NA	NA	LR	NA	NA	
Euphorbia helioscopia	Sun Spurge	U	U	U	U	U	U	
Euphorbia peplus	Petty Spurge	LR	LR	LR	LR	LR	LR	
Festuca arundinacea	Tall Fescue	HR	HR	HR	HR	NA	NA	
Foeniculum vulgare	Fennel	LR	MR	LR	MR	MR	HR	R
Fraxinus angustifolia subsp. *angustifolia*	Desert Ash	VHR	VHR	HR	MR	LR	MR	
Fumaria bastardii	Bastard's Fumitory	LR	MR	LR	LR	LR	LR	
Fumaria capreolata	White Fumitory	LR	MR	LR	LR	LR	LR?	
Fumaria densiflora	Dense-flower Fumitory	U	U	U	U	U	U	
Fumaria muralis subsp. *muralis*	Wall Fumitory	U	U	U	U	U	U	
Galenia pubescens var. *pubescens*	Galenia	NA	MR	MR	HR	HR	HR	
Galenia secunda	Galenia	U	U	U	U	U	U	
Galium aparine	Cleavers	MR	HR	LR	LR	MR	HR	
Galium divaricatum	Slender Bedstraw	NA	LR	NA	LR	LR	LR	
Galium murale	Small Goosegrass	NA	LR	NA	LR	LR	LR	
Gamochaeta purpurea	Purple Cudweed	LR	LR	NA	NA	LR	LR	
Gazania linearis	Gazania	HR	HR	HR	MR	VHR	VHR	
Genista linifolia	Flax-leaf Broom	MR	HR	MR	HR	MR	VHR	
Genista monspessulana	Montpellier Broom	MR	VHR	MR	HR	MR	VHR	
Geranium dissectum	Cut-leaf Crane's-bill	LR	MR	LR	LR	LR	LR	
Geranium molle	Dove's Foot	LR	MR	LR	LR	LR	LR	
Gladiolus undulatus	Wild Gladiolus	VHR	VHR	VHR	MR	NA	NA	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Glaucium flavum	Yellow Horned-poppy	NA	NA	NA	LR	NA	NA	
Glyceria declinata	Manna Grass	MR	MR	NA	NA	NA	NA	
Hainardia cylindrica	Common Barb-grass	NA	NA	NA	MR	NA	NA	
Hedera helix	English Ivy	MR	HR	LR	LR	NA	MR	
Heliotropium europaeum	Common Heliotrope	LR	LR	LR	LR	LR	MR	
Helminthotheca echioides	Ox-tongue	HR	HR	MR	LR	MR	MR	
Hirschfeldia incana	Buchan Weed	NA	NA	NA	LR	LR	LR	
Holcus lanatus	Yorkshire Fog	HR	HR	MR	NA	MR	MR	
Hordeum hystrix	Meditteranean Barley-grass	LR	LR	MR	MR	NA	NA	
Hordeum leporinum	Barley-grass	LR	LR	MR	MR	MR	MR	
Hordeum marinum	Sea Barley-grass	NA	LR	MR	HR	NA	NA	
Hypochaeris glabra	Smooth Cat's-ear	NA	NA	NA	LR	LR	LR	
Hypochaeris radicata	Flatweed	LR	LR	LR	LR	MR	MR	
Ipheion uniflorum	Spring Star-flower	U	U	U	U	U	U	
Isolepis levynsiana	Tiny Flat-sedge	LR	LR	LR	LR	NA	NA	
Juncus acutus subsp*. acutus*	Spiny Rush	VHR	VHR	VHR	VHR	NA	NA	C
Juncus articulatus subsp*. articulatus*	Jointed Rush	HR	HR	HR	LR	NA	NA	
Juncus capitatus	Capitate Rush	LR	LR	LR	LR	NA	NA	
Kickxia elatine	Hairy Toadflax	LR	LR	LR	LR	LR	LR	
Lactuca saligna	Willow-leaf Lettuce	LR	LR	LR	LR	LR	LR	
Lactuca serriola	Prickly Lettuce	MR	MR	MR	LR	MR	MR	
Lagunaria patersonia subsp*. patersonia*	Pyramid Tree	MR	MR	MR	HR	LR	LR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Lagurus ovatus	Hare's-tail Grass	NA	NA	NA	LR	NA	NA	
Lampranthus tegens	Little Noon-flower	NA	NA	MR	MR	NA	NA	
Leontodon rhagadioloides	Leontodon	NA	NA	NA	LR	MR	MR	
Leontodon taraxacoides subsp. *taraxacoides*	Hairy Hawkbit	LR	LR	LR	MR	NA	NA	
Lepidium africanum	Common Peppercress	LR	LR	LR	LR	LR	LR	
Lepidium didymum	Lesser Swine-cress	LR	LR	LR	LR	LR	LR	
Lepidium draba	Hoary Cress	MR	MR	MR	LR	LR	LR	C
Lepidium virginicum	Virginian Peppercress	U	U	U	U	U	U	
Ligustrum vulgare	European Privet	NA	LR	NA	NA	NA	LR	
Lilaea scilloides	Lilaea	LR	LR	NA	NA	NA	NA	
Linaria pelisseriana	Pelisser's Toad-flax	NA	NA	NA	NA	LR	LR	
Linum trigynum	French Flax	NA	NA	NA	NA	LR	LR	
Linum usitatissimum	Flax	NA	NA	NA	NA	NA	NA	
Lolium loliaceum	Stiff Rye-grass	U	U	U	U	U	U	
Lolium multiflorum	Italian Rye-grass	LR	LR	NA	NA	NA	NA	
Lolium perenne	Perennial Rye-grass	LR	LR	LR	NA	NA	NA	
Lolium perenne x rigidum	Perennial Rye-grass x Wimmera	U	U	U	U	U	U	
Lolium rigidum	Wimmera Rye-grass	LR	LR	LR	MR	MR	MR	
Lolium temulentum	Darnel	U	U	U	U	U	U	
Lotus corniculatus	Bird's-foot Trefoil	NA	NA	NA	NA	NA	NA	
Lycium ferocissimum	African Box-thorn	LR	MR	LR	MR	MR	MR	
Lysimachia arvensis	Pimpernel	LR	LR	MR	MR	LR	LR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Lysimachia vulgaris	Yellow Loosestrife	U	U	U	U	U	U	
Malva arborea	Tree Mallow	LR	LR	MR	MR	LR	LR	
Malva nicaeensis	Mallow of Nice	LR	MR	MR	MR	MR	MR	
Malva parviflora	Small-flower Mallow	LR	MR	MR	LR	MR	MR	
Malva pseudolavatera	Cretan Hollyhock	U	U	U	U	U	U	
Marrubium vulgare	Horehound	LR	LR	LR	MR	MR	HR	C
Matricaria matricarioides	Rounded Chamomile	U	U	U	U	U	U	
Medicago lupulina	Black Medic	LR	LR	LR	LR	LR	LR	
Medicago minima	Little Medic	LR	LR	LR	MR	LR	LR	
Medicago polymorpha	Burr Medic	MR	MR	MR	MR	LR	MR	
Medicago truncatula	Barrel Medic	NA	NA	NA	LR	LR	MR	
Melaleuca armillaris subsp*. armillaris*	Giant Honey-myrtle	HR	HR	HR	MR	NA	NA	
Melilotus albus	Bokhara Clover	LR	LR	LR	LR	NA	NA	
Melilotus indicus	Sweet Melilot	MR	MR	MR	MR	NA	NA	
Melilotus siculus	Mediterranean Melilot	NA	NA	NA	MR	NA	NA	
Mentha pulegium	Pennyroyal	VHR	HR	HR	MR	NA	NA	
Mercurialis annua	Annual Mercury	U	U	U	U	U	U	
Mesembryanthemum crystallinum	Common Ice-plant	NA	NA	MR	MR	NA	NA	
Modiola caroliniana	Red-flower Mallow	MR	MR	MR	LR	NA	LR	
Moraea lewisiae	Golden Iris	NA	NA	NA	NA	MR	NA	
Moraea miniata	Two-leaf Cape-tulip	U	U	U	U	U	U	
Moraea setifolia	Thread Iris	NA	NA	NA	NA	LR	NA	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Myriophyllum aquaticum	Parrot's Feather	VHR	VHR	NA	NA	NA	NA	
Nassella hyalina	Cane Needle-grass	NA	NA	NA	LR	VHR	VHR	
Nassella leucotricha	Texas Needle-grass	NA	NA	NA	LR	VHR	VHR	
Nassella neesiana	Chilean Needle-grass	NA	VHR	HR	HR	VHR	VHR	
Nassella trichotoma	Serrated Tussock	NA	VHR	HR	HR	VHR	VHR	C
Nasturtium officinale	Watercress	HR	VHR	NA	NA	NA	NA	
Nicotiana glauca	Tree Tobacco	NA	LR	NA	LR	NA	LR	
Oenothera stricta subsp. *stricta*	Common Evening-primrose	NA	NA	NA	LR	NA	NA	
Oncosiphon suffruticosum	Calomba Daisy	U	U	U	U	U	U	
Opuntia ficus-indica	Barbary Fig	NA	MR	NA	MR	MR	MR	
Opuntia monacantha	Drooping Prickly-pear	NA	HR	NA	NA	LR	HR	
Oxalis bowiei	Bowie Wood-sorrel	U	U	U	U	U	U	
Oxalis pes-caprae	Soursob	NA	VHR	NA	VHR	VHR	VHR	R
Oxalis purpurea	Large-flower Wood-sorrel	NA	NA	NA	MR	MR	MR	
Papaver hybridum	Rough Poppy	NA	NA	NA	LR	LR	LR	
Papaver somniferum	Opium Poppy	NA	NA	NA	NA	NA	NA	
Parapholis incurva	Coast Barb-grass	NA	NA	HR	VHR	NA	NA	
Parapholis strigosa	Slender Barb-grass	NA	NA	HR	HR	NA	NA	
Parentucellia latifolia	Red Bartsia	NA	NA	NA	NA	LR	LR	
Parentucellia viscosa	Yellow Bartsia	LR	LR	LR	NA	NA	NA	
Paronychia brasiliana	Whitlow Wort	U	U	U	U	U	U	
Paspalum dilatatum	Paspalum	HR	HR	HR	LR	LR	LR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Paspalum distichum	Water Couch	VHR	VHR	VHR	LR	NA	NA	
Pastinaca sativa	Parsnip	NA	LR	LR	NA	NA	NA	
Pentameris airoides subsp*. airoides*	False Hair-grass	NA	NA	NA	NA	LR	LR	
Persicaria maculosa	Redshank	LR	LR	LR	NA	NA	NA	
Petrorhagia dubia	Velvety Pink	NA	NA	NA	NA	LR	LR	
Petrorhagia spp.	Pink	NA	NA	NA	NA	LR	LR	
Phalaris aquatica	Toowoomba Canary-grass	VHR	VHR	VHR	HR	VHR	VHR	
Phalaris minor	Lesser Canary-grass	MR	MR	MR	LR	LR	LR	
Phalaris paradoxa	Paradoxical Canary-grass	NA	LR	LR	LR	NA	NA	
Phoenix canariensis	Canary Island Date-palm	HR	HR	HR	LR	LR	LR	
Phyla canescens	Fog-fruit	HR	HR	HR	HR	NA	NA	
Phytolacca octandra	Red-ink Weed	LR	LR	LR	LR	LR	LR	
Pinus halepensis	Allepo Pine	NA	NA	NA	LR	NA	LR	
Pinus radiata var. radiata	Radiata Pine	LR	LR	LR	LR	LR	LR	
Piptatherum miliaceum	Rice Millet	NA	MR	NA	NA	MR	NA	
Piptochaetium montevidense	Uruguayan Rice-grass	NA	NA	NA	NA	NA	NA	
Pittosporum undulatum	Sweet Pittosporum	HR	HR	HR	HR	LR	HR	
Plantago bellardii	Silky Plantain	NA	NA	NA	LR	LR	NA	
Plantago coronopus subsp*. commutata*	Buck's-horn Plantain	MR	MR	MR	HR	MR	MR	
Plantago coronopus subsp*. coronopus*	Buck's-horn Plantain	MR	MR	MR	HR	MR	MR	
Plantago lanceolata	Ribwort	HR	HR	HR	HR	HR	HR	
Plantago major	Greater Plantain	MR	MR	MR	LR	NA	NA	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Poa annua	Annual Meadow-grass	LR	LR	LR	LR	LR	LR	
Poa bulbosa	Bulbous Meadow-grass	NA	NA	NA	LR	LR	LR	
Poa infirma	Early Meadow-grass	U	U	U	U	U	U	
Poa pratensis	Kentucky Blue-grass	MR	MR	MR	LR	LR	LR	
Polycarpon tetraphyllum	Four-leaved Allseed	LR	LR	LR	LR	LR	LR	
Polygala monspeliaca	Annual Milkwort	U	U	U	U	U	U	
Polygonum aviculare	Hogweed	LR	LR	LR	LR	LR	LR	
Polypogon monspeliensis	Annual Beard-grass	MR	MR	HR	HR	NA	NA	
Prunus cerasifera	Cherry Plum	HR	HR	HR	LR	MR	MR	
Prunus cerasifera 'Nigra'	Purple-leaf Cherry-plum	HR	HR	HR	LR	HR	HR	
Prunus persica	Peach	NA	LR	NA	LR	LR	LR	
Puccinellia fasciculata	Borrer's Saltmarsh-grass	NA	NA	MR	MR	NA	NA	
Quercus robur	English Oak	LR	LR	NA	NA	NA	LR	
Ranunculus muricatus	Sharp Buttercup	MR	MR	MR	LR	NA	NA	
Ranunculus repens	Creeping Buttercup	HR	HR	MR	NA	NA	NA	
Ranunculus sceleratus subsp. *sceleratus*	Celery Buttercup	HR	HR	HR	LR	NA	NA	
Raphanus raphanistrum	Wild Radish	LR	LR	LR	LR	LR	LR	
Raphanus sativus	Common Radish	U	U	U	U	U	U	
Rapistrum rugosum	Giant Mustard	MR	HR	MR	MR	MR	VHR	
Reseda alba	White Mignonette	U	U	U	U	U	U	
Reseda lutea	Cut-leaf Mignonette	U	U	U	U	U	U	
Reseda luteola	Weld	NA	LR	NA	LR	LR	MR	

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Rhagodia spinescens	Hedge Saltbush	NA	NA	NA	LR	LR	LR	
Rhamnus alaternus	Italian Buckthorn	NA	NA	NA	HR	NA	MR	
Ricinus communis	Castor Oil Plant	LR	MR	LR	NA	NA	NA	
Romulea minutiflora	Small-flower Onion-grass	NA	NA	NA	LR	LR	LR	
Romulea rosea var. *australis s.s.*	Common Onion-grass	LR	LR	LR	MR	VHR	HR	
Rosa rubiginosa	Sweet Briar	MR	VHR	LR	LR	VHR	VHR	C
Rostraria cristata	Annual Cat's-tail	NA	NA	NA	NA	LR	LR	
Rubus anglocandicans	Common Blackberry	VHR	VHR	VHR	LR	HR	VHR	
Rumex conglomeratus	Clustered Dock	HR	HR	HR	LR	LR	LR	
Rumex crispus	Curled Dock	HR	HR	HR	LR	LR	LR	
Rumex obtusifolius subsp. *obtusifolius*	Broad-leaf Dock	LR	LR	LR	LR	LR	LR	
Rumex pulcher subsp. *pulcher*	Fiddle Dock	LR	LR	LR	LR	LR	LR	
Sagina apetala	Common Pearlwort	NA	NA	NA	LR	NA	NA	
Sagina procumbens	Spreading Pearlwort	NA	NA	NA	LR	NA	NA	
Salix X fragilis nothovar. *fragilis*	Willow	VHR	VHR	NA	NA	NA	NA	
Salix Xsepulcralis nothovar. *sepulcralis*	Willow	VHR	VHR	NA	NA	NA	NA	
Salvia verbenaca	Wild Sage	NA	LR	NA	LR	LR	MR	
Schinus molle	Pepper Tree	NA	MR	NA	LR	LR	MR	
Scorzonera laciniata	Scorzonera	LR	LR	MR	MR	LR	LR	
Sedum praealtum subsp. *praealtum*	Shrubby Stonecrop	NA	LR	NA	LR	LR	LR	
Senecio angulatus	Climbing Groundsel	NA	LR	NA	MR	LR	LR	
Senecio pterophorus	African Daisy	NA	NA	NA	LR	LR	LR	C

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Senecio vulgaris	Common Groundsel	LR	LR	LR	LR	NA	LR	
Setaria parviflora	Slender Pigeon Grass	MR	MR	MR	LR	LR	LR	
Setaria verticillata	Whorled Pigeon-grass	U	U	U	U	U	U	
Silene gallica	French Catchfly	NA	NA	NA	LR	LR	LR	
Silene nocturna	Mediterranean Catchfly	NA	NA	NA	LR	LR	LR	
Silene vulgaris subsp. *vulgaris*	Bladder Campion	NA	NA	NA	LR	NA	NA	
Silybum marianum	Variegated Thistle	MR	HR	LR	LR	MR	HR	C
Sisymbrium irio	London Rocket	NA	NA	NA	NA	MR	LR	
Sisymbrium officinale	Hedge Mustard	U	U	U	U	U	U	
Sisymbrium orientale	Indian Hedge-mustard	U	U	U	U	U	U	
Solanum elaeagnifolium	Silver-leaf Nightshade	NA	NA	NA	NA	LR	LR	
Solanum linnaeanum	Apple of Sodom	NA	NA	NA	MR	MR	MR	C
Solanum nigrum	Black Nightshade	LR	LR	LR	LR	LR	LR	
Soliva sessilis	Jo Jo	U	U	U	U	U	U	
Sonchus asper	Rough Sow-thistle	MR	MR	MR	MR	MR	MR	
Sonchus oleraceus	Common Sow-thistle	MR	MR	MR	MR	MR	MR	
Spergula arvensis	Corn Spurrey	NA	NA	NA	LR	LR	LR	
Spergularia media	Coast Sand-spurrey	NA	NA	LR	LR	NA	NA	
Spergularia rubra	Red Sand-spurrey	NA	NA	LR	LR	NA	NA	
Sporobolus africanus	Rat-tail Grass	NA	MR	LR	MR	MR	MR	
Stachys arvensis	Stagger Weed	NA	LR	NA	NA	LR	LR	
Stellaria media	Chickweed	LR	LR	LR	LR	LR	LR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Stenotaphrum secundatum	Buffalo Grass	HR	HR	HR	HR	HR	HR	
Suaeda baccifera	Berry Seablite	NA	NA	NA	MR	NA	NA	
Taraxacum officinale spp. agg.	Garden Dandelion	LR	LR	LR	LR	LR	LR	
Taraxacum Sect. *Erythrosperma*	Garden Dandelion	LR	LR	LR	LR	LR	LR	
Thinopyrum junceiforme	Sea Wheat-grass	NA	NA	NA	HR	NA	NA	
Tradescantia fluminensis	Wandering Jew	HR	VHR	MR	LR	LR	MR	
Tragopogon porrifolius subsp. *porrifolius*	Salsify	LR	LR	LR	LR	LR	LR	
Tribolium acutiflorum	Tribolium	LR	LR	LR	MR	MR	LR	
Trifolium angustifolium var. *angustifolium*	Narrow-leaf Clover	LR	LR	LR	LR	MR	MR	
Trifolium arvense var. *arvense*	Hare's-foot Clover	LR	LR	LR	LR	MR	MR	
Trifolium campestre var. *campestre*	Hop Clover	LR	LR	LR	LR	LR	LR	
Trifolium dubium	Suckling Clover	LR	LR	LR	LR	MR	MR	
Trifolium fragiferum var. *fragiferum*	Strawberry Clover	MR	MR	MR	MR	NA	NA	
Trifolium glomeratum	Cluster Clover	LR	LR	LR	LR	MR	MR	
Trifolium lappaceum var. *lappaceum*	Burdock Clover	U	U	U	U	U	U	
Trifolium repens var. *repens*	White Clover	VHR	VHR	HR	LR	LR	LR	
Trifolium scabrum	Rough Clover	LR	LR	LR	LR	MR	MR	
Trifolium striatum	Knotted Clover	LR	LR	LR	LR	MR	MR	
Trifolium subterraneum	Subterranean Clover	LR	LR	LR	LR	MR	MR	
Triticum aestivum	Wheat	NA	NA	NA	NA	NA	NA	
Typha latifolia	Lesser Reed-mace	HR	HR	NA	NA	NA	NA	
Ulex europaeus	Gorse	HR	VHR	HR	MR	HR	VHR	

Scientific Name	**Common Name**	**Freshwater wetland including streams**	**Riparian**	**Brackish Wetlands**	**Saltmarsh and coastal complex**	**Grasslands**	**Escarpment shrublands**	
Ulmus spp.	Elm	LR	LR	LR	NA	NA	LR	
Urtica urens	Small Nettle	LR	LR	LR	LR	LR	LR	
Vellereophyton dealbatum	White Cudweed	LR	LR	LR	LR	LR	NA	
Verbascum thapsus subsp. *thapsus*	Great Mullein	NA	NA	NA	LR	NA	LR	R
Vicia sativa subsp. *nigra*	Narrow-leaf Vetch	LR	MR	MR	MR	HR	HR	
Vicia sativa subsp. *sativa*	Common Vetch	LR	MR	MR	MR	HR	HR	
Vicia tetrasperma	Slender Vetch	LR	LR	LR	LR	MR	MR	
Vinca major	Blue Periwinkle	HR	VHR	M	LR	MR	HR	
Viola odorata	Common Violet	NA	HR	NA	NA	LR	LR	
Vulpia bromoides	Squirrel-tail Fescue	LR	LR	MR	MR	HR	HR	
Vulpia fasciculata	Dune Fescue	NA	NA	NA	MR	NA	NA	
Vulpia muralis	Wall Fescue	LR	LR	MR	MR	HR	HR	
Vulpia myuros	Rat's-tail Fescue	LR	LR	MR	MR	HR	HR	
Vulpia myuros f. *megalura*	Fox-tail Fescue	LR	LR	MR	MR	MR	MR	
Watsonia meriana var. *bulbillifera*	Bulbil Watsonia	HR	HR	HR	LR	LR	LR	
Xanthium spinosum	Bathurst Burr	LR	LR	LR	NA	NA	NA	C
Zantedeschia aethiopica	White Arum-lily	VHR	VHR	VHR	NA	NA	NA	

Aquatic fauna (vertebrates)

Scientific name	Common Name	Hobsons Bay Conservation Status	Origin	EPBC Act listing	FFG Act listing	Advisory listing
Acanthopagrus butcheri	Black Bream	Thr				
Afurcagobius tamarensis	Tamar Goby	NT				
Aldrichetta forsteri	Yellow-eye Mullet	LC				
Anguilla australis	Southern Shortfin Eel	LC				
Arenigobius bifrenatus	Bridled Goby	Thr				
Atherinosoma microstoma	Smallmouthed Hardyhead	NT				
Favonigobius lateralis	Southern Longfin Goby	LC				
Gadopsis marmoratus	River Blackfish	EW				
Galaxias maculatus	Common Galaxias	LC				
Galaxias truttaceus	Spotted Galaxias	Thr				
Geotria australis	Pouched Lamprey	EW				
Hyperlophus vittatus	Sandy Sprat	Thr				
Mordacia mordax	Shorthead Lamprey	Thr				
Nannoperca australis	Southern Pygmy Perch	Thr				
Philypnodon grandiceps	Flathead Gudgeon	LC				
Pseudogobius olorum	Bluespot Goby	Thr				
Retropinna semoni	Australian Smelt	NT				
Carassius auratus	Goldfish		*			
Cyprinus carpio	European Carp		*			
Gambusia holbrooki	Eastern Gambusia		*			
Perca fluviatilis	Redfin		*			
Salmo trutta	Brown Trout		*			

Scientific name	Common Name	Hobsons Bay Conservation Status	Origin	EPBC Act listing	FFG Act listing	Advisory listing
Tinca tinca	Tench		*			

Scientific name	Common Name	Hobsons Bay Conservation Status	Origin	EPBC Act listing	FFG Act listing	Advisory listing
Cherax destructor	Common Yabby	LC				
Paratya australiensis	Freshwater Shrimp	LC				

Terrestrial fauna (vertebrates)

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	LC				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Thr				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Acanthiza lineata	Striated Thornbill	V				
Acanthiza nana	Yellow Thornbill	Thr				
Acanthiza pusilla	Brown Thornbill	LC				
Acanthiza reguloides	Buff-rumped Thornbill	Thr				
Acanthorhynchus tenuirostris	Eastern Spinebill	LC				
Accipiter cirrhocephalus	Collared Sparrowhawk	Thr				
Accipiter fasciatus	Brown Goshawk	Thr				
Accipiter novaehollandiae	Grey Goshawk	V			L	vu
Acrocephalus stentoreus	Clamorous Reed Warbler	LC				
Actitis hypoleucos	Common Sandpiper	Thr				vu
Alisterus scapularis	Australian King-Parrot	V				
Anas castanea	Chestnut Teal	LC				
Anas gracilis	Grey Teal	LC				
Anas rhynchotis	Australasian Shoveler	Thr				vu
Anas superciliosa	Pacific Black Duck	LC				
Anhinga novaehollandiae	Darter	LC				
Anseranas semipalmata	Magpie Goose	Thr			L	nt
Anthochaera carunculata	Red Wattlebird	LC				
Anthochaera chrysoptera	Little Wattlebird	LC				
Anthochaera phrygia	Regent Honeyeater	EW		CR	L	cr
Anthus novaeseelandiae	Australasian Pipit	Thr				
Apus pacificus	Fork-tailed Swift	Thr				
Aquila audax	Wedge-tailed Eagle	Thr				
Ardea ibis	Cattle Egret	Thr				
Ardea intermedia	Intermediate Egret	Thr			L	en

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Ardea modesta	Eastern Great Egret	Thr			L	vu
Ardea pacifica	White-necked Heron	LC				
Arenaria interpres	Ruddy Turnstone	Thr				vu
Artamus cyanopterus	Dusky Woodswallow	LC				
Artamus leucorynchus	White-breasted Woodswallow	V				
Artamus personatus	Masked Woodswallow	V				
Artamus superciliosus	White-browed Woodswallow	V				
Aythya australis	Hardhead	Thr				vu
Biziura lobata	Musk Duck	Thr				vu
Botaurus poiciloptilus	Australasian Bittern	Thr		EN	L	en
Cacatua galerita	Sulphur-crested Cockatoo	LC				
Cacatua sanguinea	Little Corella	LC				
Cacatua tenuirostris	Long-billed Corella	LC				
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC				
Calamanthus fuliginosus	Striated Fieldwren	Thr				
Calidris acuminata	Sharp-tailed Sandpiper	Thr				
Calidris alba	Sanderling	V				nt
Calidris canutus	Red Knot	Thr				en
Calidris ferruginea	Curlew Sandpiper	Thr				en
Calidris melanotos	Pectoral Sandpiper	Thr				nt
Calidris melanotus X ferruginea	Cox's Sandpiper	Thr				
Calidris ruficollis	Red-necked Stint	Thr				
Calidris subminuta	Long-toed Stint	V				nt
Calidris tenuirostris	Great Knot	V			L	en
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	Thr				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Cereopsis novaehollandiae	Cape Barren Goose	Thr				
Ceyx azureus	Azure Kingfisher	V				nt
Charadrius bicinctus	Double-banded Plover	Thr				
Charadrius leschenaultii	Greater Sand Plover	V				cr
Charadrius mongolus	Lesser Sand Plover	V				cr
Charadrius ruficapillus	Red-capped Plover	Thr				
Charadrius veredus	Oriental Plover	Thr				
Chenonetta jubata	Australian Wood Duck	LC				
Chlidonias hybridus javanicus	Whiskered Tern	Thr				nt
Chlidonias leucopterus	White-winged Black Tern	V				nt
Chroicocephalus novaehollandiae	Silver Gull	LC				
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	LC				
Chrysococcyx lucidus	Shining Bronze-Cuckoo	NT				
Chrysococcyx osculans	Black-eared Cuckoo	Thr				nt
Cincloramphus cruralis	Brown Songlark	Thr				
Cincloramphus mathewsi	Rufous Songlark	Thr				
Circus approximans	Swamp Harrier	Thr				
Circus assimilis	Spotted Harrier	Thr				nt
Cisticola exilis	Golden-headed Cisticola	LC				
Cladorhynchus leucocephalus	Banded Stilt	Thr				
Colluricincla harmonica	Grey Shrike-thrush	Thr				
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC				
Corvus coronoides	Australian Raven	V				
Corvus mellori	Little Raven	LC				
Coturnix pectoralis	Stubble Quail	Thr				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Coturnix ypsilophora australis	Brown Quail	Thr				
Cracticus torquatus	Grey Butcherbird	LC				
Cuculus pallidus	Pallid Cuckoo	Thr				
Cygnus atratus	Black Swan	LC				
Dacelo novaeguineae	Laughing Kookaburra	Thr				
Dendrocygna eytoni	Plumed Whistling-Duck	V				
Dicaeum hirundinaceum	Mistletoebird	Thr				
Dicrurus bracteatus	Spangled Drongo	V				
Dromaius novaehollandiae	Emu	EW				
Egretta garzetta nigripes	Little Egret	Thr			L	en
Egretta novaehollandiae	White-faced Heron	LC				
Elanus axillaris	Black-shouldered Kite	Thr				
Elseyornis melanops	Black-fronted Dotterel	Thr				
Eolophus roseicapilla	Galah	LC				
Eopsaltria australis	Eastern Yellow Robin	Thr				
Epthianura albifrons	White-fronted Chat	Thr				
Erythrogonys cinctus	Red-kneed Dotterel	Thr				
Eudynamys orientalis	Eastern Koel	LC				
Eudyptula minor	Little Penguin	V				
Eurystomus orientalis	Dollarbird	V				
Falco berigora	Brown Falcon	Thr				
Falco cenchroides	Nankeen Kestrel	Thr				
Falco longipennis	Australian Hobby	Thr				
Falco peregrinus	Peregrine Falcon	Thr				
Falco subniger	Black Falcon	Thr				vu

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Falcunculus frontatus	Crested Shrike-tit	Thr				
Fulica atra	Eurasian Coot	LC				
Fulmarus glacialoides	Southern Fulmar	V				
Gallinago hardwickii	Latham's Snipe	Thr				nt
Gallinula tenebrosa	Dusky Moorhen	LC				
Gallinula ventralis	Black-tailed Native-hen	LC				
Gallirallus philippensis	Buff-banded Rail	Thr				
Gelochelidon nilotica macrotarsa	Gull-billed Tern	V			L	en
Geopelia cuneata	Diamond Dove	V				nt
Geopelia placida	Peaceful Dove	Thr				
Gerygone olivacea	White-throated Gerygone	V				
Glossopsitta concinna	Musk Lorikeet	LC				
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	Thr				
Glossopsitta pusilla	Little Lorikeet	Thr				
Grallina cyanoleuca	Magpie-lark	LC				
Grus rubicunda	Brolga	V			L	vu
Gymnorhina tibicen	Australian Magpie	LC				
Haematopus fuliginosus	Sooty Oystercatcher	Thr				nt
Haematopus longirostris	Pied Oystercatcher	Thr				
Haliaeetus leucogaster	White-bellied Sea-Eagle	Thr			L	vu
Haliastur sphenurus	Whistling Kite	Thr				
Hieraaetus morphnoides	Little Eagle	Thr				
Himantopus himantopus	Black-winged Stilt	NT				
Hirundapus caudacutus	White-throated Needletail	Thr				vu
Hydroprogne caspia	Caspian Tern	Thr			L	nt

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Ixobrychus minutus dubius	Little Bittern	Thr			L	en
Lalage sueurii	White-winged Triller	LC				
Larus dominicanus	Kelp Gull	LC				
Larus pacificus pacificus	Pacific Gull	LC				nt
Lathamus discolor	Swift Parrot	Thr		EN	L	en
Lewinia pectoralis pectoralis	Lewin's Rail	Thr			L	vu
Lichenostomus chrysops	Yellow-faced Honeyeater	LC				
Lichenostomus fuscus	Fuscous Honeyeater	V				
Lichenostomus leucotis	White-eared Honeyeater	V				
Lichenostomus melanops	Yellow-tufted Honeyeater	V				
Lichenostomus ornatus	Yellow-plumed Honeyeater	V				
Lichenostomus penicillatus	White-plumed Honeyeater	LC				
Lichenostomus virescens	Singing Honeyeater	LC				
Limicola falcinellus	Broad-billed Sandpiper	Thr				
Limosa haemastica	Hudsonian Godwit	Thr				
Limosa lapponica	Bar-tailed Godwit	Thr				
Limosa limosa	Black-tailed Godwit	Thr				vu
Malacorhynchus membranaceus	Pink-eared Duck	LC				
Malurus cyaneus	Superb Fairy-wren	LC				
Manorina melanocephala	Noisy Miner	LC				
Manorina melanophrys	Bell Miner	Thr				
Megalurus gramineus	Little Grassbird	LC				
Melithreptus brevirostris	Brown-headed Honeyeater	Thr				
Melithreptus lunatus	White-naped Honeyeater	LC				
Microcarbo melanoleucos	Little Pied Cormorant	LC				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Microeca fascinans	Jacky Winter	Thr				
Milvus migrans	Black Kite	Thr				
Mirafra javanica	Horsfield's Bushlark	Thr				
Morus serrator	Australasian Gannet	Thr				
Myiagra cyanoleuca	Satin Flycatcher	V				
Myiagra inquieta	Restless Flycatcher	V				
Myiagra rubecula	Leaden Flycatcher	V				
Myzomela sanguinolenta	Scarlet Honeyeater	V				
Neochmia temporalis	Red-browed Finch	Thr				
Neophema chrysogaster	Orange-bellied Parrot	EW		CR	L	cr
Neophema chrysostoma	Blue-winged Parrot	Thr				
Ninox novaeseelandiae	Southern Boobook	Thr				
Ninox strenua	Powerful Owl	Thr			L	vu
Numenius madagascariensis	Eastern Curlew	V				vu
Numenius phaeopus	Whimbrel	V				vu
Nycticorax caledonicus hillii	Nankeen Night Heron	Thr				nt
Ocyphaps lophotes	Crested Pigeon	LC				
Oriolus sagittatus	Olive-backed Oriole	Thr				
Oxyura australis	Blue-billed Duck	Thr			L	en
Pachycephala olivacea	Olive Whistler	V				
Pachycephala pectoralis	Golden Whistler	LC				
Pachycephala rufiventris	Rufous Whistler	Thr				
Pachyptila turtur	Fairy Prion	V		VU		vu
Pardalotus punctatus	Spotted Pardalote	LC				
Pardalotus striatus	Striated Pardalote	LC				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Pedionomus torquatus	Plains-wanderer	EW		CR	L	cr
Pelagodroma marina	White-faced Storm-Petrel	V				vu
Pelecanoides urinatrix	Common Diving-Petrel	V				
Pelecanus conspicillatus	Australian Pelican	Thr				
Petrochelidon ariel	Fairy Martin	Thr				
Petrochelidon neoxena	Welcome Swallow	LC				
Petrochelidon nigricans	Tree Martin	Thr				
Petroica boodang	Scarlet Robin	Thr				
Petroica goodenovii	Red-capped Robin	Thr				
Petroica phoenicea	Flame Robin	Thr				
Petroica rodinogaster	Pink Robin	LC				
Petroica rosea	Rose Robin	NT				
Phalacrocorax carbo	Great Cormorant	Thr				
Phalacrocorax fuscescens	Black-faced Cormorant	Thr				nt
Phalacrocorax sulcirostris	Little Black Cormorant	LC				
Phalacrocorax varius	Pied Cormorant	Thr				nt
Phalaropus lobatus	Red-necked Phalarope	V				
Phaps chalcoptera	Common Bronzewing	LC				
Phaps elegans	Brush Bronzewing	Thr				
Philemon corniculatus	Noisy Friarbird	V				
Philomachus pugnax	Ruff	V				
Phylidonyris albifrons	White-fronted Honeyeater	V				
Phylidonyris melanops	Tawny-crowned Honeyeater	V				
Phylidonyris novaehollandiae	New Holland Honeyeater	LC				
Phylidonyris pyrrhoptera	Crescent Honeyeater	V				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Platalea flavipes	Yellow-billed Spoonbill	Thr				
Platalea regia	Royal Spoonbill	Thr				nt
Platycercus elegans	Crimson Rosella	Thr				
Platycercus eximius	Eastern Rosella	Thr				
Plegadis falcinellus	Glossy Ibis	Thr				nt
Pluvialis dominica	American Golden Plover	Thr				
Pluvialis fulva	Pacific Golden Plover	Thr				vu
Pluvialis squatarola	Grey Plover	V				en
Podargus strigoides	Tawny Frogmouth	LC				
Podiceps cristatus	Great Crested Grebe	LC				
Poliocephalus poliocephalus	Hoary-headed Grebe	LC				
Porphyrio porphyrio	Purple Swamphen	LC				
Porzana fluminea	Australian Spotted Crake	Thr				
Porzana pusilla palustris	Baillon's Crake	Thr			L	vu
Porzana tabuensis	Spotless Crake	Thr				
Psephotus haematonotus	Red-rumped Parrot	NT				
Ptilonorhynchus violaceus	Satin Bowerbird	V				
Puffinus gavia	Fluttering Shearwater	V				
Puffinus tenuirostris	Short-tailed Shearwater	V				
Recurvirostra novaehollandiae	Red-necked Avocet	Thr				
Rhipidura albiscarpa	Grey Fantail	LC				
Rhipidura leucophrys	Willie Wagtail	LC				
Rhipidura rufifrons	Rufous Fantail	V				
Rostratula australis	Australian Painted Snipe	Thr		VU	L	cr
Sericornis frontalis	White-browed Scrubwren	LC				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Smicrornis brevirostris	Weebill	V				
Stercorarius parasiticus	Arctic Jaeger	V				
Stercorarius pomarinus	Pomarine Jaeger	V				
Sterna hirundo	Common Tern	Thr				
Sterna paradisaea	Arctic Tern	V				
Sterna striata	White-fronted Tern	V				nt
Sternula albifrons sinensis	Little Tern	Thr			L	vu
Sternula nereis nereis	Fairy Tern	Thr		VU	L	en
Stictonetta naevosa	Freckled Duck	V			L	en
Strepera graculina	Pied Currawong	LC				
Strepera versicolor	Grey Currawong	V				
Tachybaptus novaehollandiae	Australasian Grebe	LC				
Tadorna tadornoides	Australian Shelduck	Thr				
Taeniopygia guttata	Zebra Finch	LC				
Thalassarche cauta	Shy Albatross	V		VU	L	vu
Thalasseus bergii	Crested Tern	LC				
Threskiornis molucca	Australian White Ibis	Thr				
Threskiornis spinicollis	Straw-necked Ibis	Thr				
Todiramphus sanctus	Sacred Kingfisher	NT				
Trichoglossus haematodus	Rainbow Lorikeet	LC				
Tringa brevipes	Grey-tailed Tattler	V			L	cr
Tringa glareola	Wood Sandpiper	Thr				vu
Tringa nebularia	Common Greenshank	Thr				vu
Tringa stagnatilis	Marsh Sandpiper	Thr				vu
Turnix varius	Painted Button-quail	Thr				

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Turnix velox	Little Button-quail	Thr				
Tyto alba	Eastern Barn Owl	Thr				
Vanellus miles	Masked Lapwing	LC				
Vanellus tricolor	Banded Lapwing	Thr				
Xenus cinereus	Terek Sandpiper	Thr			L	en
Zoothera lunulata	Bassian Thrush	Thr				
Zosterops lateralis	Silvereye	LC				
Acridotheres tristis	Indian Myna (also Common Myna)		*			
Alauda arvensis	European Skylark		*			
Alectoris chukar	Chukar Partridge		*			
Anas platyrhynchos	Northern Mallard		*			
Anser anser	Domestic Goose		*			
Barnardius zonarius zonarius	Australian Ringneck		*			
Carduelis carduelis	European Goldfinch		*			
Carduelis chloris	European Greenfinch		*			
Columba livia	Rock Dove		*			
Nymphicus hollandicus	Cockatiel		*			
Passer domesticus	House Sparrow		*			
Passer montanus	EurasianTree Sparrow		*			
Pavo cristatus	Indian Peafowl		*			
Streptopelia chinensis	Spotted Turtle-Dove		*			
Streptopelia risoria	Barbary Dove		*			
Sturnus vulgaris	Common Starling		*			
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet		*			
Turdus merula	Common Blackbird		*			

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Turdus philomelos	Song Thrush		*			

Scientific Name	Common Name	Hobsons Bay status	Origin	EPBC Act	FFG Act	Advisory listed
Arctocephalus tropicalis	Subantarctic Fur Seal	NA		VU		
Chalinolobus gouldii	Gould's Wattled Bat	LC				
Chalinolobus morio	Chocolate Wattled Bat	LC				
Hydromys chrysogaster	Water Rat	Thr				
Hydrurga leptonyx	Leopard Seal	NA				
Lobodon carcinophagus	Crabeater Seal	NA				
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC				
Phascolarctos cinereus	Koala	NA				
Pseudocheirus peregrinus	Common Ringtail Possum	LC				
Pteropus poliocephalus	Grey-headed Flying-fox	Thr		VU	L	vu
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	Thr			L	dd
Sminthopsis crassicaudata	Fat-tailed Dunnart	EW				nt
Tachyglossus aculeatus	Short-beaked Echidna	Thr				
Tadarida australis	White-striped Freetail Bat	LC				
Trichosurus vulpecula	Common Brushtail Possum	LC				
Vespadelus darlingtoni	Large Forest Bat	LC				

Vespadelus vulturnus	Little Forest Bat	LC				
Canis lupus	Dingo & Dog (feral)		*			
Felis catus	Cat		*			
Lepus europeaus	European Hare		*			
Mus musculus	House Mouse		*			
Oryctolagus cuniculus	European Rabbit		*			
Rattus norvegicus	Brown Rat		*			
Rattus rattus	Black Rat		*			
Vulpes vulpes	Red Fox		*			

Scientific Name	**Common Name**	**Hobsons Bay status**	**Origin**	**EPBC Act**	**FFG Act**	**Advisory listed**
Acritoscincus duperreyi	Eastern Three-lined Skink	Thr				
Amphibolurus muricatus	Jacky Lizard	Thr				
Ctenotus robustus	Large Striped Skink	Thr				
Delma impar	Striped Legless Lizard	Thr		VU	L	en
Drysdalia coronoides	White-lipped Snake	Thr				
Egernia cunninghami	Cunningham's Skink	Thr				
Lampropholis guichenoti	Garden Skink	LC				
Lerista bougainvillii	Bougainville's Skink	Thr				
Liopholis whitii GROUP	White's Skink	Thr				
Niveoscincus metallicus	Metallic Skink	Thr				
Notechis scutatus	Tiger Snake	LC				
Parasuta flagellum	Little Whip Snake	Thr				
Pseudemoia pagenstecheri	Tussock Skink	Thr				vu
Pseudonaja textilis	Eastern Brown Snake	Thr				
Tiliqua scincoides	Common Blue-tongued Lizard	Thr				

Chelodina longicollis	Eastern Snake-necked Turtle		*			dd
Christinus marmoratus	Marbled Gecko		*			
Emydura macquarii	Murray River Turtle		*			vu

Scientific Name	**Common Name**	**Hobsons Bay status**	**Origin**	**EPBC Act**	**FFG Act**	**Advisory listed**
Crinia signifera	Common Froglet	LC				
Neobatrachus sudellae	Common Spadefoot Toad	Thr				
Litoria raniformis	Growling Grass Frog	Thr		VU	L	en
Limnodynastes dumerilii dumerilii	Pobblebonk Frog	LC				
Litoria ewingii	Southern Brown Tree Frog	Thr				
Limnodynastes tasmaniensis	Spotted Marsh Frog	LC				

The origin of each taxon is not provided for the following.

Scientific Name	**Common Name**	**EPBC Act listing**	**FFG Act listing**	**Advisory listing**
Celaenia excavata	Bird Dropping Spider			
Corasoides australis	Australian Labyrinth Spider			
Cyclosa fuliginata	Spider			
Holconia sp.	Huntsman			
Lycosa sp.	Spider			
Misgolas sp.	Spider			
Nephila edulis	Australian Golden Orb-weaving			
Ornithonyssus bacoti	Rat Mite			

Sidymella trapezia	Trapezium Crab Spider			
Steatoda grossa	Cupboard Spider			
Venatrix esposica	Spider			

Scientific Name	**Common Name**	**EPBC Act listing**	**FFG Act listing**	**Advisory listing**
Austrochloritis victoriae	Southern Hairy Red Snail			
Cantareus aspersa	Brown Gardensnail			
Cochlicella barbara	Potbellied Helicellid			
Lehmannia nyctelia	Striped Field Slug			
Salinator fragilis	Snail			
Theba pisana	White Italian Snail			

Scientific Name	**Common Name**	**EPBC Act listing**	**FFG Act listing**	**Advisory listing**
Abantiades labyrinthicus	Moth			
Adelium pustulosum	Beetle			
Agrotis infusa	Bogong Moth			
Agrotis munda	Brown Cutworm			
Allelidea viridis	Insect			
Anax papuensis	Australian Emperor			
Anthela nicothoe	Urticating Anthelid			
Anthela ocellata	Anthelid			
Apis (Apis) mellifera	Honey Bee			

Scientific Name	Common Name	EPBC Act listing	FFG Act listing	Advisory listing
Athetis tenuis	Moth			
Austrolestes annulosus	Damselfly			
Austrolestes leda	Wandering Ringtail			
Boreoides subulatus	Wingless Soldier Fly			
Caedicia simplex	Common Garden Katydid			
Cafius sabulosus	Beetle			
Calodera inaequalis	Beetle			
Chaetogonopteron	Fly			
Chauliognathus lugubris	Plague Soldier Beetle			
Chrysolarentia	Moth			
Chrysolarentia decisaria	Tunbridge Looper Moth			
Ciampa sp.	Moth			
Clania ignobilis	Faggot Case Moth			
Clivina australasiae	Beetle			
Clivina planiceps	Beetle			
Cosmodes elegans	Green Blotched Moth			
Culex (Culex) australicus	Australian House Mosquito			
Culex (Culex) globocoxitus	Mosquito			
Daveyia mira	Beetle			
Delexocha ochrocausta	Moth			
Dindymus versicolor	Harlequin Bug			
Diplacodes bipunctata	Wandering Percher			
Doratifera oxleyi	Painted Cup Moth			
Drymaplaneta communis	Common Shining Cockroach			
Ectropis sp.	Moth			
Ericeia sobria	Moth			

Scientific Name	Common Name	EPBC Act listing	FFG Act listing	Advisory listing
Eutrichopidia latinus	Moth			
Gynoplistia sp.	Crane Fly			
Heoclisis fundata	Heoclisis			
Hesperilla flavescens flavescens	Yellow Sedge-skipper / Altona		L	vu
Heteronympha merope	Common Brown			
Hippodamia variegata	Spotted Amber Ladybird			
Homalictus (Homalictus) niveifrons	Bee			
Homalictus (Homalictus) punctatus	Bee			
Hyalarcta huebneri	Leaf Case Moth			
Hyalarcta nigrescens	Ribbed Bagworm			
Hydrophilus (Hydrophilus) albipes	Water Scavenger Beetle			
Iridomyrmex rufoniger	Tufted Tyrant Ants			
Ischnura aurora	Aurora Bluetail			
Isopteron triviale	Beetle			
Italochrysa insignis	Lacewing			
Laccotrephes (Laccotrephes) tristis	Toe-Biter			
Lamprima aurata	Golden Stag Beetle			
Lasioglossum (Chilalictus) bicingulatum	Bee			
Lasioglossum (Chilalictus) lanarium	Bee			
Lasioglossum (Chilalictus)	Bee			
Lasioglossum (Chilalictus) mundulum	Bee			
Leptacinus sp.	Beetle			
Leptorussa darlingtoni	Caddisfly			
Leucania uda	Moth			
Limnoxenus zealandicus	Beetle			
Lipotriches (Austronomia) australica	Bee			

Scientific Name	Common Name	EPBC Act listing	FFG Act listing	Advisory listing
Lyctus discedens	Small Powderpost Beetle			
Mandalotus longicollis	Weevil			
Melobasis nervosa	Beetle			
Myrmecia desertorum	Ant			
Myrmecia nobilis	Ant			
Myrmecia simillima	Ant			
Mythimna (Pseudaletia) convecta	Common Armyworm			
Naupactus leucoloma	White-fringed Weevil			
Netelia sp.	Wasp			
Neumichtis nigerrima	Black Turnip Moth			
Neumichtis saliaris	Green Cutworm			
Opodiphthera eucalypti	Emperor Gum Moth			
Orgyia australis	Painted Pine Moth			
Oxytelus parumpunctatus	Beetle			
Papilio (Eleppone) anactus	Dainty Swallowtail			
Paralastor sp.	Wasp			
Pararguda nasuta	Moth			
Paropsis atomaria	Tortoise Leaf Beetle			
Persectania ewingii	Moth			
Phaleria sp.	Beetle			
Phoracantha semipunctatus	Longicorn Beetle			
Pieris rapae	Cabbage White Butterfly			
Porrostoma (Porrostoma) rhipidium	Lycid Beetle			
Procirrus dolichoderes	Beetle			
Promethis nigra	Beetle			
Proteuxoa atra	Moth			

Scientific Name	Common Name	EPBC Act listing	FFG Act listing	Advisory listing
Proteuxoa capularis	Moth			
Proteuxoa cyanoloma	Moth			
Proteuxoa microspila	Moth			
Proteuxoa sanguinipuncta	Moth			
Rhyzobius ventralis	Black Lady Beetle			
Rybaxis harti	Beetle			
Saragus catenulatus	Beetle			
Sepedophilus activus	Beetle			
Sepedophilus australis	Beetle			
Spilosoma canescens	Dark-spotted Tiger Moth			
Spodoptera exigua	Lesser Armyworm (Moth)			
Synemon plana	Golden Sun Moth	CR	L	cr
Tapeigaster luteipennis	Fungus Fly			
Taractrocera papyria papyria	White Grassdart			
Tenebrio molitor	Flour Beetle			
Theclinesthes serpentatus	Chequered Blue			
Theclinesthes serpentatus serpentatus	Saltbush Blue Butterfly			
Thyreocephalus chloropterus	Beetle			
Thyreus nitidulus	Neon Cuckoo Bee			
Tigrioides alterna	Moth			
Trictena atripalpis	Bardee Grub			
Uraba lugens	Gumleaf Skeletonizer			
Vanessa kershawi	Australian Painted Lady			
Xanthagrion erythroneurum	Red & Blue Damsel			
Zermizinga sinuata	Lucerne Looper			

Fungi and lichens

The origin and conservation status of each taxon are not provided for the following.

Scientific Name	Common Name
Agaricus bernardii	Agaricus
Agaricus campestris	Agaricus
Agaricus xanthodermus	Yellow Stainer
Agrocybe putaminum	Acrocybe
Aseroe rubra	Anemone Fungus
Bovista aestivalis	Bovista
Caloplaca flavovirescens	Orange Lichen
Calvatia cyathiformis	Calvatia
Chlorophyllum brunneum	Chorophyllum
Clathrus ruber	Red Cage
Clitocybe sp.	Clitocybe
Coprinus comatus	Coprinus
Cyathus olla	Field Bird's Nest
Geastrum triplex	Collared Earthstar
Gymnopilus junonius	Spectacular Rustgill
Hebeloma sp.	Hebeloma
Hypholoma sp.	Hypholoma
Ileodictyon sp.	Ileodictyon
Lepiota sp.	Lepiota
Leratiomyces ceres	Laratiomyces
Lyophyllum sp.	Lyophyllum
Marasmius sp.	Marasmius
Melanoleuca sp.	Melanoleuca
Mycenastrum corium	Mycenastrum
Parasola plicatilis	Pleated Inkcap
Pholiota sp.	Pholiota
Pisolithus sp.	Pisolithus
Protubera canescens	Protubera
Psathyrella sp.	Psathyrella
Psilocybe subaeruginosa	Psilocybe
Schizophyllum commune	Common Porecrust
Scleroderma cepa	Scleroderma
Serpula sp.	Serpula
Stemphylium sp.	Stemphylium
Stemphylium sp.	Stemphylium
Stropharia aurantiaca	Redlead Roundhead
Tubaria sp.	Tubaria
Uromyces polycnemi	Uromyces
Volvariella sp.	Volvariella
Xanthoparmelia	Xanthoparmelia Lichen
Xanthoria sp.	Orange Wall Lichen

Appendix 2 Community workshop responses

Community workshop data are provided in the following.

What is your vision for biodiversity in Hobsons Bay over the next 10 years?

Laverton Group 1

- What is here now is still here in years to come.
- Wish what was here 100 years ago was still here.
- We keep paying the price for decisions made years ago. We don't want this to happen again.
- Visionary – the local more aware now.
- Set a social awareness goal for 10 years' time.
- Explosives reserve, great as is, but needs (to be) nurtured because it is a very significant habitat area.
- Laverton Creek mouth. New land mass (sandbank) needs to be protected. It is very significant for bird life. Cheetham Wetlands is becoming smaller and expanding the significance of Laverton Creek mouth.
- More ownership required from land owners and corporations. Need a more co-ordinated effort.

Laverton Group 2

- Greater awareness of biodiversity generally, into schools and kindergartens.
- Greater preservation of grasslands.
- Slowing expansion of development into grassland.
- A clear strategy for the management of parks and wetlands.
- More publicity about biodiversity in newspapers and other media, more information, information on how the environment is being impacted.
- Like the new boards introducing the flora and fauna.
- Balance of making people aware of grasslands while leaving areas for the exclusion and the protection of grasslands.
- Greater connectivity, wildlife corridors.

Williamstown Group 1

- Maintain existing biodiversity and improve.
- Increase biodiversity awareness.
- Co-operation and collaboration with other management agencies/stakeholders
- Mitigation of threats.

Williamstown Group 2

- Healthy, viable, sustainable.
- Valued by residents and stakeholders.
- That council has a long-term commitment and plan for biodiversity.
- That biodiversity management is sufficiently funded.
- That support for community and friends groups is provided and linked.
- Short and medium objectives.
- Continue to look for opportunities to expand our conservation and open spaces. e.g. corridors and new opportunities for parkland.
- Ensured survival of existing species.

Williamstown Group 3

- Preserving our habitat and open space.

- Investment in ground staff (conservation team).
- More and dispersed species mapping.
- Greater access to local species information
    - Which ones need more care
    - Greater public awareness of threats (plant and animal).
- Greater investment in pest species eradication.

Williamstown Group 4

- Don't want to lose any more native plants and animals.
- More street trees required – natives.
- More natives in parklands.
- Do we want big trees if they're not indigenous?
- More indigenous grasses etc. on nature strips.
- Look at rezoning heavy industrial areas which abut parklands and creeks.
- Reinstate creeks.

Altona Group 1

- Make it better than it is today.
- A greater awareness.
- A greater appreciation.

Altona Group 2

- Better than today.
- Greater awareness and appreciation.
- Reserve expansion
    - Improve marine protection (PV)
    - Develop offset sites.
- Protection of connectivity.
- Greater setback (planning issues).
- Monitoring.
- Protection and monitoring – through measurement.
- Marine protection improved – advocacy with Parks Victoria.
- Development Offset to occur within HBCC.
- Preserve existing.
- HBCC communication with community on value of biodiversity.
- Value of conservation management for conservation.
- Protection of waterway corridors and connectivity across landscape.
- Greater setbacks in planning around connections and corridors.
- Preserving/improving habitat in general – parks.

2. How can we prevent habitat loss in Hobsons Bay?

Laverton Group 1

- More weed control.
- More coordination between land owners to help week control e.g. PV, Hobsons Bay City Council and Melbourne Water.
- Replant areas where there has been disturbance / development.
- Check legal framework
    - Who has the responsibility, will, liability?
- What laws need looking at / changed?
- There are laws but not enough enforcement e.g. Boxthorn is noxious, should be removed but is not enforced.
- Prioritise where funding is directed. Need maximum value for money.
- Are legal solutions to problems realistic?

- Council need to be tougher with developers, (avoid) making short term decisions that have a long term impact.

Laverton Group 2 – not submitted

Williamstown Group 1

- Planning enforcement.
- Development (controlling/sustainable).
- Review planning scheme and evaluate overlays/zoning.
- Change high value sites to include conservation protection mechanisms.
- Incentives for protection on private land
    - Financial
    - Non-financial.
- Lack of significant penalties.
- Improve referral processes/communication with other stakeholders.

Williamstown Group 2

- Plant indigenous trees where possible.
- Maintain existing habitat and green spaces. Keep what we have.
- Systematic weed monitoring and control. Better targeting of herbicides.
- Co-ordinate with other authorities who own and manage land e.g. VicTrack.
- Education for community to increase awareness of what they can do to stop habitat loss.

Williamstown Group 3

- Educate people - great public awareness of valued species.
- No pest plants being sold by plant nurseries - greater awareness by Bunnings etc.
- More corporate social responsibility and education of industry to preserve grasslands.
- Concern about losing grasslands to new developments.
- Educating children.
- Encourage small native gardens at schools.
- Litter management.

Williamstown Group 4

- Shoot developers - perception that developers plan the future of Hobsons Bay, not residents.
- Rule that a percentage of house land is kept for gardens/plants. If it already exists it is not enough or not enforced.
- Cut the grass less often in our open spaces.
- More enforcement of dogs on leads in dog lead areas.
- Keep dogs out of the water where there is bird habitat.
- More education for everybody - school age upwards.
- More education of recreational users e.g. fishermen.

Altona Group 1

- Do something to alleviate the potential loss of coastline because of rising sea levels.
- Limit development.
- Put in more plants.
- Get more community members involved.
- Undertake more ecological burns to help promote native grassland.
- Approach land owners and developers to include more reserves in their property.
- Secure existing areas.
- More education.
- Greater awareness.

Altona Group 2

- Education about important biodiversity.
- Planning covenants – industrial and residential.
- High quality offsets – connected and valuable areas conserved.
- Protection of private open space.
- Street trees – value as habitat plus social value.
- Create new and improve exiting reserves.

3. What are the key climate change threats to our natural environment? How can these be managed?

Laverton Group 1

- How will plants survive? What do they need e.g. water requirements.
- Need more info on plants to assist the planter.
- Hotter and drier weather.
- Issues with genetic variation.
- Sea level rise impacts – could lose our coastline.
- Not much we can do to stop sea level rise.

Laverton Group 2

- Reduced infiltration of rain into the ground was a concern but not really sure of a solution.
- More trees in urban areas
    - More advanced when planted so they survive better.
- Issues with trees disappearing from Bruce Combin Reserve.

Williamstown Group 1

- Sea level rises.
- Drought.
- Flooding.
- Council to consider more ethical investment.
- Managing threats to habitat
    - Pest plants and animals
    - Maintain connectivity.

Williamstown Group 2

- Sea level rise.
- Fire.
- Drought.
- Flood.
- Extreme weather conditions.
- Reduce greenhouse gas emissions.
- Plant indigenous plants that will survive.
- Education about how everyone can play a role to reduce climate change.
- School education programs.
- Work with local business and industry to support community initiatives.

Williamstown Group 3

- Reduce Directly Connected Imperviousness, increase infiltration, Water Sensitive Urban Design.
- Greater protection of permeable areas in the planning scheme (residential, commercial and industrial).
- Monitor water table and manage infiltration to prevent the substrate drying out.
- More trees in urban areas.

Williamstown Group 4

- Loss of shoreline.
- Plants - are the ones we are planting going to be suitable in 10 - 100 years' time?
- Water temperature in bay will affect marine life.
- Loss of large areas on our shoreline with conservation value.
- Plan for what will grow in 10 –100 years' time, not now.
- Plant grassland species in conservation zones.
- Keep/increase shade trees in our streets.
- Compulsory acquisition of land along creek edge to create buffer zone.
- Look at planning along the coastline - allow more conservation areas.

Altona Group 1

- Rising sea levels causing loss of coastline.
- Storm damage – flood.
- Drought or diminished water supply effecting natural grasslands/wetlands etc.
- More weeds – do we have the resources to control weeds? – important for reducing habitat loss.
- More animal/insect pests are likely to be around – how do we manage these? Resources?

Altona Group 2

- Coastal inundation
    - Increase natural barriers i.e. mangroves
    - Setback requirements in areas upstream of coast for species migration to dry land – plan for retreat.
- Managing storm water better though planning.
- Mimicking natural flows of stormwater.
- Remove other threats so there is space for species retreat.
- Experiment with revegetation to deal with temperature increase.
- Managing increase in urban heat through appropriate revegetation.

4. How can pest plants and animals be effectively managed in an urban environment? What approaches should be used?

Laverton Group 1

- Comes down to money. Only so much we can do.
- More ability to bait required.
- There is a high level of perceived risk of baiting / pest control.
- More fencing for rabbits if we cannot bait.
- There are regional approaches that should be undertaken e.g. cat curfew or blanket ban on cats in certain areas.
- Vegetation we have lost – maybe we could try and re-introduce it. More variety.
- Need more monitoring i.e. it is a problem.

Laverton Group 2

- Pest plants – poison.
- More information to the community on what not to plant.
- More information on why food should not be left out for the animals
    - Litter issues with plastic bags.
- More volunteers to look after protected areas.
- Managing feral animals with poison.
- Rabbits are an issue.

Williamstown Group 1

- Co-operation with multiple stakeholders.
- More investment in control of pests.

- Over-arching strategy with defined goals, responsible authorities identified, co-ordinated approach led by council.
- Source funding for von-going management - long-term funding.
- Awareness.
- Enforcement officers.

Williamstown Group 2

- Education about pest plants.
- Encourage responsible pet ownership (e.g. spaying cats).
- Manage feral cats.
- Promote and assist animal rescue organisations e.g. BADGAR.
- Work with universities and research organisations to keep up with the latest control methods.
- Co-ordinate management efforts.
- Support community groups to educate others and play an education role.
- Provide funding for management.
- Rotation of herbicides (to prevent weed resistance).

Williamstown Group 3

- Holistic approach to managing feral animals.
- Citizen science used to help manage pest plants and animals - need to train people up.
- Responsible pet ownership
    - Cat runs should be compulsory
    - No cats out at night
    - Feral animals should be put down.
- People who cause the problem should pay for the cost of fixing that problem.

Williamstown Group 4

- Cat curfew.
- Enforce dog on lead laws.
- Raise pet registration fees to provide more income for pest animal control.
- Capture and remove rabbits and foxes humanely.
- Mynahs/Starlings etc - look at controlling them.
- Ravens?
- Weed control - pinpoint areas that can be controlled in an environmentally friendly way (non-chemical).
- More education on weed identification and control.
- Use friends groups for more weed control.

Altona Group 1

- Greater awareness in the community - need the community to take a more proactive approach.
- Enforcement and monitoring.
- Education - 'Plant me instead' promotion to encourage community to plant appropriate species.
- More communication through 'rates notices, dog registration, Pelican News, website, radio etc.
- More creative projects in parks. Make it interesting and create interest.

Altona Group 2

- Encourage planting of local natives.
- Pest eradication (shooting, not baiting) of foxes, rabbits, mynah birds.
- Pest management staff, and resourcing within council.
- Investigate non-poisonous pest control - plants (along with other methods).

- Enforce dog-off leash and investigate contained off-leash areas to prevent access to protected areas.
- Cat curfews - controlled trapping and enforcing of cat control.

5. How can community participation be diversified across age and cultural groups?

Laverton Group 1

- Appreciation of open space is greater if you grow up with it. In urban areas, if residents have grown up in the countries where the open spaces we have don't exist then it's hard for them to appreciate what we have.
- Need more people to appreciate.
- Need the word to get around other cultures to get them to appreciate it.
- Use different plats (platforms?) to make it more interesting.
- Engage cultural groups who are known to be interested in gardening etc.
- Age – hard to get young people interested. Does it matter if we don't get the younger people?
- The education part is the important part. Do things to make it enjoyable for younger people.

Laverton Group 2

- Build on current education / school program and invite them out to family planting / education days.
- Need to expose young people to nature so that they have an appreciation of it (particularly with diminishing backyards).
- Make people more aware of what has been spotted where.
- More information on the volunteer groups.

Williamstown Group 1

- Council support for community groups is strong.
- Insufficient resourcing to target schools.
- School groups to attend environmental events.
- Long-term funding for education officer/community liason.
- Specific and recurrent funding for friends groups.

Williamstown Group 2

- More literature.
- Use different languages.
- Use varied social media.
- Ensure older community members can get to events.
- Try to tap into potentially unrepresented groups e.g. older, different cultural groups.
- Go to multicultural groups.
- Bridge with council community Development Team to reach a broader audience.
- Consider targeting multicultural groups that are a step past 'New arrivals' and getting established. They may value another social life.
- Try to get community members with 'more time on their hands' e.g. the unemployed.

Williamstown Group 3

- Have conservation activities specifically targeted to cultural groups.
- Encourage cultural groups to participate and take ownership of specific areas.
- Events such as cheese and wine festival should have information available on how people can participate in conservation events.
- Information in different languages.
- During big planting days promote further activities.

Williamstown Group 4

- Run these sessions in school and other community groups - find out their opinions.
- Show young children grasslands.
- Do tree/grass plantings in schools.
- Give away free indigenous plants.

Altona Group 1

- Start in schools and preschools – educate.
- Emphasise ownership, stewardship and responsibility in citizenship.
- Community should be made to give something back, e.g. sporting clubs using reserves. and making money have to do some community service in reserves.
- Encourage / mandate community members to give back to parks.
- Council offer more grants to projects that achieve environmental goals.
- More face-to-face with different cultural groups.
- Identify cultural groups (e.g. language and church groups), then contact them.
- Festival to encourage more interest in environment, e.g. run an event at a coastline reserve to highlight coastal issues.

Altona Group 2

- Education and communication.
- Youth group events.
- Challenges for high school students.
- Enviro boot camps? Green gym – digging holes, moving logs.
- Resourcing council staff who promote and advocate for natural resources.
- Promotion of relaxation events.

6. Where does the community go to find out about Council, conservation activities? How would you like to find out about Council conservation activities?

Laverton Group 1

- Advertise in rate notices. Put calendar in rate notices.
- Council website.
- Friends group website.
- Newsletter – quarterly.
- Paper.
- Ranger Ramblings.
- Calendar in rates notice.
- Calendar on website.
- Quarterly newsletter.
- Local paper.
- Individual friends group website / calendar.
- Volunteer opportunities on HBCC website. Have links to groups. Provide funding to group to keep their website updated.

Laverton Group 1

- Library, website, local newspapers, Facebook.
- Signage in activity centres of what events are coming up (community notice boards)
- Facebook – Altona I live there, Altona Meadows Residents, Seaholm, Altona, Williamstown residents.
- Like the open days Parks run.

Williamstown Group 1

- Attend council meetings.
- Newsletter (bi-monthly).

- Website - difficult to navigate through information on web - issue for council.
- Community calendar.
- Find it easier to target particular council officers for information (e.g. Andrew).
- Need for increased lead times to advertise activities/events.
- Ranger ramblings need to be promoted through bi-monthly newsletter.
- Friends group website.
- Local paper.
- Diversify the means of advertising
    - Newsletters, newspaper, social media, website
    - Networking.
- Social media important to reach out to particular groups.
- Volunteers - share information liason/network.

Williamstown Group 2

Where

- Ranger ramblings.
- Libraries.
- Community noticeboards.
- Council website.
- Community centres.
- Social and cultural clubs (across cultures and age).

How

- Local newspapers.
- Annual expo.
- Noticeboards at railway stations.
- Bus stops / Adshel.
- Provide opportunity to marketing students.
- Sports clubs, pubs and pokies.

Williamstown Group 3

- Noticeboards - would like to have other languages.
- Local paper, library, council (current).
- Calendar of events - digital and printed.
- Facebook.
- Signs on how to join ranger ramblings.
- Would like community noticeboards (like the one they used to have in Pier Street near the park).

Williamstown Group 4

- Natural history museum in Werribee.
- Ranger Ramblings.
- Online/internet.
- Facebook.
- Noticeboards in parks.
- Around Williamstown.
- HBLL website.

How would you like to find out?

- Tourist information centre.
- Inside main council offices.
- Post on Facebook with weekly updates of upcoming events.

Altona Group 1

- Local papers.
- Community newsletter.

- Email - possibly put all rate payers on email list.
- Direct phone.
- Church.
- Signage connected with the venue and activity, e.g. explosives reserve Story Time.
- Communicate in different languages.
- Community centres.
- Library.
- Calendar of events - hard copy and online.
- In business/corporate newsletters - good for staff to see what their business supports
- Radio.
- Senior citizens community centres.

Altona Group 2

- Ranger ramblings, Facebook, word of mouth, Twitter, Rates notice, Hobsons Bay Quarterly.
- Website - page dedicated to enviro events.
- Social media.
- Easily read, navigable calendar online.

7. What education topics would be most useful and or most interesting? What style of event would be most useful for this topic?

Laverton Group 1

- Local flora and fauna.
- Separate tours to reserves about flora and fauna.
- Heritage tours / talks about the area.
- Pest animals may not be an interesting topic for volunteers.

- Walks and talks.
- Kids events.
- Free bbq.
- Free plants.
- Teacher engagement.
- Wildlife displays – hands on.

Laverton Group 2

- Boardwalk with interpretive signage in grasslands. What flowers etc are nearby (similar to Pt Cook Wetlands and Warrnambool Wetlands Walk).
- Education about dumping of weeds and waste.
- Education about not feeding the birds.
- Issues with hard rubbish collection not including mattresses and tyres (hence illegal dumping). Not everyone has access a trailer.

- Like bird watching events.
- Walk and talk about local plants and animals.
- More information for kinder and school staff so that they can run education events with their students.
- Relaxation nature events for busy people.

Williamstown Group 1

- Need for a biodiversity officer.
- Threatened species
    - Frogs/bats - increased community interest for more iconic species.
- Marine - fish counts/sea-grass monitoring.

- Management issues - mitigating threats.

- Walk and talk – events.
- Incorporate novel/fun activities to attract youth.
- Utilising Council's youth network to attract young people to conservation activities.

Williamstown Group 2

Education topics

- Environment and health.
- Climate change.
- Weed identification.
- Native plant and animal identification.
- Healthy and organic food.
- Animal welfare in context of native animals - this attracts younger community.

Events

- Targeting animals – youth.
- Events at local locations to attract locals.
- Sustaining assistance to friends groups.
- Hold seasonal activities in appropriate locations - e.g. coastal events in summer.
- Piggy-back on other activities.

Williamstown Group 3

- Family events.
- Junior bird watching.
- Animal zoo and planting day e.g. talk about what you need to plant to attract lizards followed by a planting event.
- What lives here (Newport Lakes, Altona Coastal Park).
- Roving experts to talk to people about what exists locally.
- Plant your own native seed.
- Promote Melbourne Water frog census.
- Open day at the native plant nursery that promotes what you should plant to attract native species.

Williamstown Group 4

Topics

- Tree planting.
- Responsible citizens.
- Littering.
- Birds - swans etc.
- Flora and fauna.

Events

- Street theatre.
- Theatre in schools.
- Story telling in schools, libraries and open spaces.
- School tree plantings.
- Advertising seniors' events on radio.
- Citizen science web page.

Altona Group 1

- Weeds.
- Edible Weed Walk.
- Citizen Science Program – look for rare /interesting species.
- Train volunteers to assist other volunteers.
- I spy books e.g. a litter hunt tick off the litter.

- Use of plastic – more litter education in schools.

Altona Group 2

- Birdwalks with rangers.
- Summer by the sea type events.
- Connected with other enjoyable events e.g. Dogs breakfasts, movies in the park, environmental film screenings (Art in Public Places projector bike) .
- Natural history promotion – 'what was here, what is here'.
- Capacity to research their local habitats.
- Migration of shorebirds festival.
- Sustainable living festival.

Events

- Grassland walks.
- Small groups.
- PowerPoint talks with nice pictures of grassland flowers to get people to like them.
- Pond dipping.
- Annual larger event bringing together interested parties.

8. Where would interpretive signage provide most value? Do you have any good examples of where interpretive signage has been used elsewhere?

Laverton Group 1

- Where kids can't spray it.
- Trafalgar grassland has a nice sign, pity about the grassland.
- Truganina Park – flora and fauna interpretive sign
- Signs around Cherry Lake are damaged.
- Laverton Ck sign is great.
- Like every sign they see as long as they are not damaged.
- Don't normally see bad signs. Any sign is a good sign.

Laverton Group 2

- See annotated map.

Williamstown Group 1

- Replacement of updating of existing signage
    - Jawbone
    - Paisley-Challais.
- New signage required
    - Kororoit Creek - revegetation before/after
    - Cunningham's Skink - no location information.
- Good example - Doug Grant Reserve interpretative bird signage
    - Newport Lakes
    - Laverton Creek - bird signage.
- Signage to promote community group involvement/awareness raising.
- Signage on high activity trails - recognise values in places where people visit.

Williamstown Group 2

- Local libraries.
- Target hot spots for pest animals etc.
- Timely signage.
- Rotation of signs.

Good examples

- Newport Lakes.
- 'Before' and 'after' signs - document change.
- Stony Creek Backwash
- Werribee Park
    - Nature West building
    - Community garden area.

Williamstown Group 3

- Cardwell QLD - Stencil pictures of animals in the concrete with information.
- Suggest asking university and TAFE students what would be effective.
- Jawbone has new signs but the plants are gone - please fix.
- Website with walks, where to start and where to finish (what you will find).
- Great that council is doing this strategy and we hope great stuff comes out of it (don't get bogged down).

Williamstown Group 4

- Depends on what we are trying to achieve.
- Don't put too many words on the signs.
- Wetland signage behind Williamstown footy ground
    - What is it trying to achieve
    - What you might see.
- Incorporate historical features in our signage.
- More directional interpretive signage directing them to where we want them to go.
- How do we help the swift parrot?
    - Plant more trees for Swift Parrots.

Altona Group 1

- Information shelters.
- Near dog bag dispensers.
- Near dog training centre.
- Beach.
- Get ideas from other councils.
- Industries.
- Creeks and rivers noticeboards.
- Bunnings.
- Shopping centres – less vandalism.
- All schools.
- Possibly graffiti art.

Examples

- Bird sign at Doug Grant Reserve.
- Mural at Pier street Alley.
- Mural near Coles in Williamstown.
- Laneways in the city.
- Surf Coast Shire – Take home 3 campaign i.e. pick up 3 pieces of litter when you leave the beach. Signs on bins etc.
- Science works.
- ACMI – Technicolour signs.

Altona Group 2

- QR codes included on signage.

- Entrances to conservation areas – APEX park, Altona Coastal, Truganina Park, Explosives Reserve, Maidstone Street Grassland.
- Environmental trails through Hobson's Bay
    - Signage
    - Bike parking along trails to encourage shopping and walking
    - GPS trails
    - Geocaching activities.
- Lost Melbourne App – historical images that overlay existing images.
- Creating webpages specifically for local natural resources i.e. Truganina, Altona Coastal, APEX area.
- Digital maps for visitors.
- Promotion of shorefront through enviro friendly events like sculpture exhibitions/competitions.
- Increase staffing and resourcing within council to support and promote initiatives
- Ecological conversion
    - Promoting human inter-connectedness with local landscape (people, animals and plants).
- Indigenous history – education perspective.
- Promotion of indigenous learning.

Appendix 3 Candidate properties for consideration of an Environmental Significance Overlay

PFI	UFI	parcel typ	Modelled native vegetation	Ramsar site	EPBC Act listed flora	EPBC Act listed fauna	FFG Act listed flora	FFG Act listed fauna	State advisory threatened flora	State advisory rare flora	State advisory threatened fauna	State advisory near threatened fauna	Hobsons Bay threatened flora	Hobsons Bay threatened fauna	Vegetation quality >40/75	Landscape context >10/25	Native vegetation patch >2ha	Environmental Significance Overlay existing	National or state threatened flora within 100 m	National or state threatened fauna within 100 m	LOCALITY
3458936	503181450	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes	ALTONA
422933419	503181458	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
422594333	503181451	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
210045699	503181452	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
210045638	503181453	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
422594334	503181454	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
422933420	503181459	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
205633559	414282198	Amalgamated	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes	ALTONA
150472802	414281403	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	Yes	No	Yes	No	ALTONA
202357668	415666848	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	No	ALTONA
151270610	415668012	Property	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	ALTONA
151270610	415668012	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No	Yes	No	ALTONA

PFI	UFI	parcel typ	Modelled native vegetation	Ramsar site	EPBC Act listed flora	EPBC Act listed fauna	FFG Act listed flora	FFG Act listed fauna	State advisory threatened flora	State advisory rare flora	State advisory threatened fauna	State advisory near threatened fauna	Hobsons Bay threatened flora	Hobsons Bay threatened fauna	Vegetation quality >40/75	Landscape context >10/25	Native vegetation patch >2ha	Environmental Significance Overlay existing	National or state threatened flora within 100 m	National or state threatened fauna within 100 m	LOCALITY
202357683	415667299	Property	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	Yes	No	ALTONA
218303405	415667301	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	No	ALTONA
219009575	415667300	Property	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	Yes	No	ALTONA
3458817	415666484	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	ALTONA
151254726	415666120	Property	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	No	No	Yes	No	Yes	No	ALTONA
4106502	495757323	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
172519163	489768005	Property	Yes	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	No	ALTONA
420271435	481799783	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	ALTONA
420271560	481643896	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
217106133	481643897	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA
207830004	415668703	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	ALTONA
220548075	491168353	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	ALTONA
420271411	495245977	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	ALTONA
421247926	495245978	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	ALTONA
215298132	415668040	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	Yes	ALTONA MEADOWS

PFI	UFI	parcel typ	Modelled native vegetation	Ramsar site	EPBC Act listed flora	EPBC Act listed fauna	FFG Act listed flora	FFG Act listed fauna	State advisory threatened flora	State advisory rare flora	State advisory threatened fauna	State advisory near threatened fauna	Hobsons Bay threatened flora	Hobsons Bay threatened fauna	Vegetation quality >40/75	Landscape context >10/25	Native vegetation patch >2ha	Environmental Significance Overlay existing	National or state threatened flora within 100 m	National or state threatened fauna within 100 m	LOCALITY
4229446	497709148	Property	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	ALTONA MEADOWS
4617117	414276651	Property	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA NORTH
4229238	414276944	Property	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	ALTONA NORTH
4090471	414273399	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	ALTONA NORTH
221240140	503185245	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	ALTONA NORTH
218409108	503185247	Property	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA NORTH
421247787	503185248	Property	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	ALTONA NORTH
422202153	500960883	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes	ALTONA NORTH
4130709	498767377	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes	ALTONA NORTH

PFI	UFI	parcel typ	Modelled native vegetation	Ramsar site	EPBC Act listed flora	EPBC Act listed fauna	FFG Act listed flora	FFG Act listed fauna	State advisory threatened flora	State advisory rare flora	State advisory threatened fauna	State advisory near threatened fauna	Hobsons Bay threatened flora	Hobsons Bay threatened fauna	Vegetation quality >40/75	Landscape context >10/25	Native vegetation patch >2ha	Environmental Significance Overlay existing	National or state threatened flora within 100 m	National or state threatened fauna within 100 m	LOCALITY
422307975	498767379	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes	ALTONA NORTH
4090469	504681856	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	ALTONA NORTH
212478382	504681858	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	No	Yes	No	No	No	No	Yes	Yes	ALTONA NORTH
221817582	504681859	Property	Yes	No	No	Yes	No	Yes	No	No	Yes	No	No	Yes	No	No	No	No	Yes	Yes	ALTONA NORTH
4275854	495243919	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	ALTONA NORTH
220903192	495243920	Property	Yes	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	ALTONA NORTH