



WARRNAMBOOL  
CITY COUNCIL

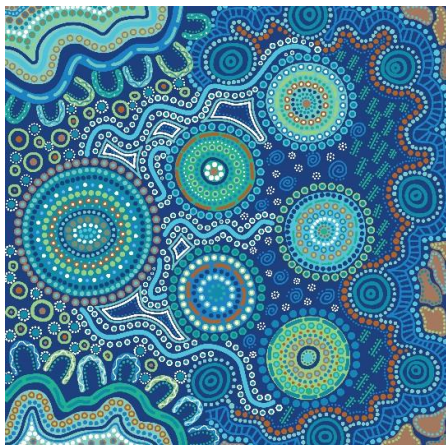


# Warrnambool Invasive Plant and Animal Framework

August 2023







*Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for country and the waterways within.*

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Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

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## ACRONYMS

Acronym	Meaning
GHCMA	Glenelg Hopkins Catchment Management Authority
MCA	Multi-Criteria Analysis
IPA	Invasive Plant and Animal
WCC	Warrnambool City Council
DEECA	Department of Energy, Environment and Climate Action
WESI	Weeds at the Early Stage of Invasion
EVC	Ecological Vegetation Communities
CPMG	Community Pest Management Group
CoM	Committee of Management
CEO	Chief Executive Officer



Middle Island, Warrnambool  
(Photo: Warrnambool City Council)

# 1 Introduction

## Scope

This document, the Warrnambool Invasive Plant and Animal Framework, considers invasive plants and animals that are, or can be, declared under the *Catchment and Land Protection Act (CaLP Act 1994)*, and that meet the definition of invasive species under the Victorian Invasive Plant and Animal Policy Framework. The definition of an invasive species is:

*'Mammals, amphibians, reptiles, birds and both terrestrial and freshwater plants, that are not indigenous to Victoria.'*

This framework deals with Invasive Plants (weeds) and Animals (IPA). Other invasive pests such as marine plants, marine algae, marine invertebrates, marine fish, freshwater fish, freshwater invertebrates, terrestrial invertebrates and pathogens are outside the scope of this framework and are commonly dealt with at a state government level. Over-abundant native species are managed under the Wildlife Act 1975 and invasive fish species are dealt with under the Fisheries Act 1995. Both are beyond the scope of this document.

## 1.1 Project Area

The project area includes the entire Warrnambool City Council (WCC) area comprising of a moderately densely populated coastal town and outlying suburbs with a population of around 35,000 people, the balance being rural agricultural. This framework covers rural and urban areas and addresses a range of IPA issues that occur within the municipality.

The actions in this framework are categorised as per the 'invasion curve' where the stage of invasion determines which actions are most beneficial at the four different stages. These four stages are:

- Prevention and preparedness
- Eradication
- Containment
- Asset Protection

Each stage has been considered independently, with actions developed and prioritised for each. The threats and impacts of invasive plants and animals were developed in consultation with key stakeholders. Actions were then developed and compared, and based on outcomes of discussion and workshop, prioritised to assist in IPA mitigation through the life of this framework.

## 1.2 Aim

The aim of the project is to produce a community developed and driven framework for the management of invasive plants and animals within WCC to secure the municipality's biosecurity into the future.

## 1.3 Objectives

The objectives of the Warrnambool Invasive Plant and Animal Framework are:

- To understand the environmental, Bio-Cultural (refer to Figure 1), social, and economic (including agricultural) values and the threat to these assets by IPA.
- To develop a list of assets and threats, and accompanying mitigation activities which can inform IPA management across the municipality over the next 5-10 years.
- To develop a tool to support decision-making concerning where to invest time and money in IPA activities in the WCC area.



- To develop activities to improve collaboration of IPA activities across stakeholders in Warrnambool and surrounds.
- To understand existing gaps in the monitoring of values and threats.

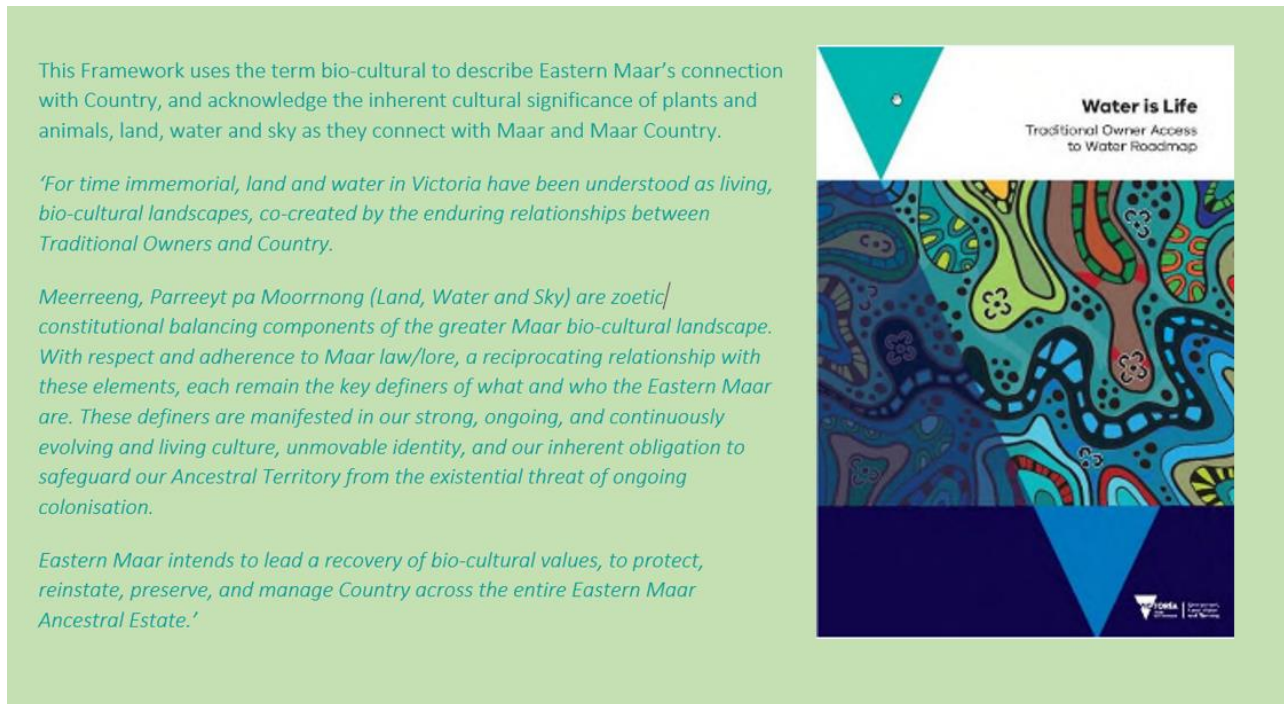


Figure 1 Eastern Maar 2022, Water is Life: Traditional Owner Access to Water Roadmap – Eastern Maar Nation Statement, State of Victoria (DEECA), p. 141-154

The following objectives were contributed by stakeholders at the IPA stakeholder workshop:

- Stop further spread.
- Educate the community on the primary source of weeds (being gardens and nurseries).
- Engage the community to raise awareness of introduced plants.
- Identify financial resourcing and collaborative funding sources.
- Coordinate the approach to invasive animal control.
- Identify key assets and threats together. Even if there’s not yet a plan to control them, they are known.
- Share information across stakeholders for actions and monitoring.
- Make use of people’s expertise.

### 1.3.1 Outcomes

A community driven IPA Framework and accompanying multi-criteria analysis tool, to guide the effective use of time, people and resources to deliver meaningful and targeted works.

## 1.4 Framework Approach

The approach is based on an Adaptive Management Framework with a life of 10 years (Figure 2), including a mid-framework evaluation scheduled for 5 years. Yearly activities should also be assessed and adapted for the following year’s activities. Adaptive Management contains the following steps:

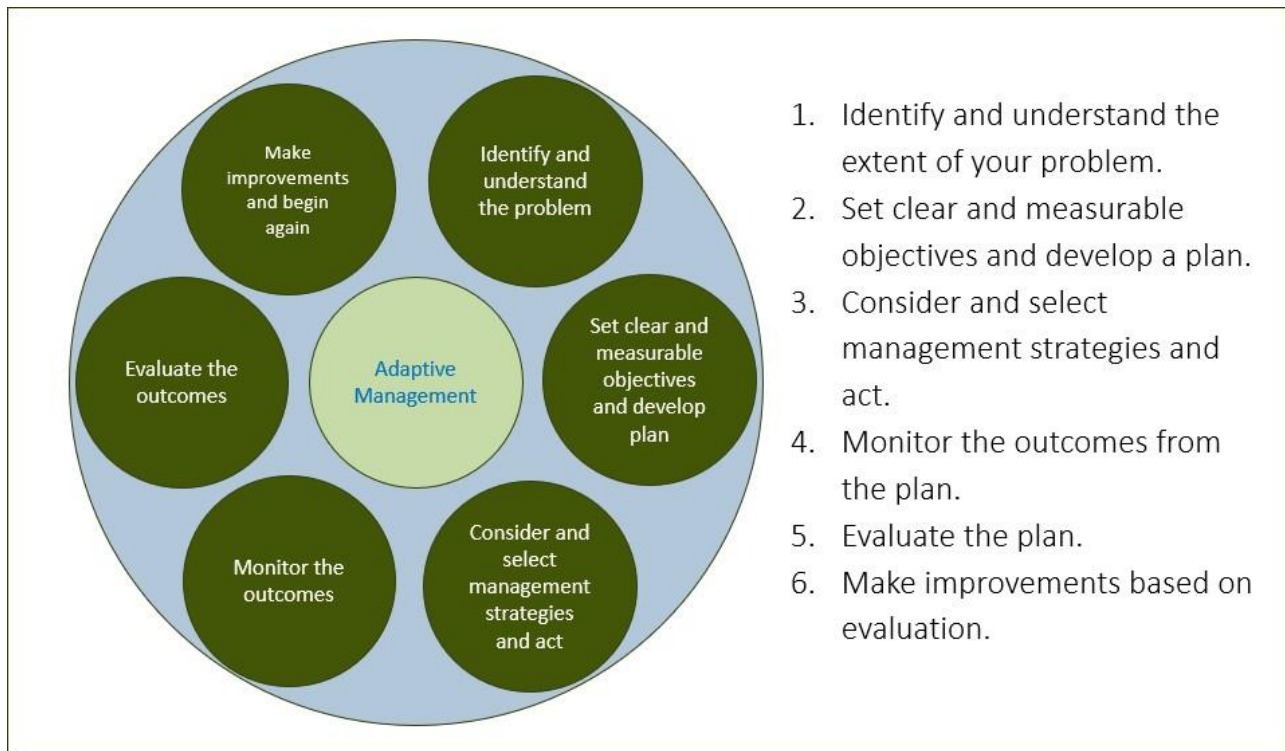


Figure 2 Adaptive management framework.

This framework works through the steps 1, 2 and 3 and provides support for a collaborative approach and monitoring. Evaluation of selected projects should take place yearly, with adaptive management actions planned for the following year. At five years, the overall IPA Framework can be evaluated and improved, and again at 10 years.

To understand the priority IPA problems in the WCC area, we conducted a background review and then interviewed stakeholders identified by WCC. From this we developed a list of assets and their key threats. Stakeholders then provided information about a variety of factors, such as the likelihood of the threat impacting on the asset, the severity of the impact, current control measures, possible control measures along with the effectiveness of the options, and the cost of the action.

We then undertook a multi-criteria analysis (MCA) of the identified threat and asset pairs to compare the cost-benefit of the IPA Actions across the WCC area. The MCA was used to identify the most cost-effective actions to assist in making decisions on where to invest time and money.

## 1.5 Management responsibilities and coordination

### 1.5.1 Existing IPA frameworks, plans and strategies

Current and relevant frameworks, plans and strategies were identified and are listed below. A brief overview of their intent is provided:

- Australian Pest Animal Strategy 2017-2027: from the Invasive Plants and Animals Committee: the main aims of the Federal Strategy are to prevent the establishment of new pest animal species, minimise the impact of established pest animals and improve coordination for the management of pest animals.
- Australian Weeds Strategy 2017-2027: outlines the roles and responsibilities for various levels of government, natural resource management groups and landholders.



- Weeds and Pests on Public Land ([Invasive species on public land \(environment.vic.gov.au\)](https://environment.vic.gov.au/invasive-species-on-public-land)): Provides information and tools for managing IPA in Victoria.
- Weeds at the Early Stage of Invasion ([Early invader weeds \(environment.vic.gov.au\)](https://environment.vic.gov.au/early-invader-weeds)): Provides information and tools and a manual to manage early invader weeds, including; search and detect, name and notify, assess the risk, delimit the invasion, decide the response and implement eradication.
- WCC Coastal Management Plan 2013: WCC is the Committee of Management (CoM) established under the *Crown Land (Reserves) Act 1978* to manage Warrnambool's coastline. It provides for the future use, development and management of the environmental, cultural and recreational values within the precinct.
- Green Warrnambool 2018: reflects community aspirations from the Warrnambool 2040 Community Plan.
- WCC Roadside Weeds & Pests Program Control Plan: outlines proposed treatment of roadside areas infested with Regionally Controlled Weeds and rabbits.
- Warrnambool Coast Vegetation Management Plan 2012: Identifies issues and values including weeds and pest animals. It is based on the Victorian Coastal Strategy (DSE 2008) for natural resource management. Two main invasive plant species identified are Coast Tea-tree (*Leptospermum laevigatum*) and Marram Grass (*Ammophila arenaria*).
- Wild Coast Landscape Master Plan 2021: aims to protect the natural values through restricting development.
- Moyjil Aboriginal Place Point Ritchie Conservation Management Plan 2013: provides clear direction for conservation management to protect and enhance the site.
- Glenelg Hopkins Regional Catchment Strategy: is the overarching plan for integrated catchment management.
- Catchment Management Framework (2022) from the Victorian Catchment Management Council advises the Catchment Management Authorities.
- WCC Asset Management Strategy – Trees (2020): ensuring consistency across the Council for street trees.
- Protecting Victoria's Environment – Biodiversity 2037 (Biodiversity 2037).
- Victorian Deer Control Strategy
- Invasive Plants and Animals Policy Framework (Agriculture Vic): the Victorian Government's approach to the management of existing and potential invasive species.
- Database searches included:
  - Pestsmart (Centre for Invasive Species Solutions): provides a list of those pest animals that have been recorded
  - DCCEEW – Feral Animals in Australia
  - FeralScan
  - Parks Victoria
  - DCCEEW – Protected Matters Search
  - VBA – Victorian Biodiversity Atlas
  - iNaturalist
  - DELWP - Advisory List of Environmental Weeds in Victoria
  - Atlas of Living Australia



Feral cat (Photo: Invasive Species Council)

## 1.5.2 Weed categories and statutory requirements

### Weeds of National Significance (WoNS)

The Australian Government maintains a list of Weeds of National Significance, along with threat abatement plans for several groups of weeds. Found here: [Weeds in Australia DCCEEW](#)

Information on managing these weeds can be found at [Weed profiles - Weeds Australia](#)

### State Prohibited Weeds

State prohibited weeds are the highest category of declared noxious weeds in Victoria. State prohibited weeds either:

- do not occur in Victoria, or
- are present in small numbers and can reasonably be expected to be eradicated.

Under the *Catchment and Land Protection Act 1994* (CaLP Act), it is an offence to buy, sell, display, or transport a State prohibited weed within Victoria.

The community, industry, government agencies and universities are important partners in achieving eradication. By looking out for and reporting State prohibited weeds, you can help protect Victoria from these high-risk invasive plants. Information on the current list of State Prohibited Weeds and where to report them can be found at: [State prohibited weeds in Victoria | State prohibited weeds | Weeds | Biosecurity | Agriculture Victoria](#)

### Regionally Prohibited Weeds

Regionally prohibited weeds are not widely distributed in a region but can spread further. It is reasonable to expect that they can be eradicated from a region, and they must be managed with that goal.

Landowners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land.

### Regionally Controlled Weeds

These invasive plants are usually widespread in a region. To prevent their spread, ongoing control measures are required.

Landowners, including public authorities responsible for crown land management, have the responsibility to take all reasonable steps to prevent the growth and spread of regionally controlled weeds on their land.

### Restricted weeds

This category includes plants that pose an unacceptable risk of spreading in this state and are a serious threat to another state or territory of Australia. Trade in these weeds and their propagules (either as plants, seeds or contaminants in other materials) is prohibited.

See [Consolidated lists of declared noxious weeds and pest animals | Legislation, policy and permits | Protecting Victoria | Biosecurity | Agriculture Victoria](#)

### WESI Weeds

WESI weeds are Weeds at the Early Stage of Invasion. Invasive species management, including weed management, is an integral component of any landscape or reserve scale conservation program. The benefits of a preventative and early intervention approach has been used worldwide with great success. The WESI Project was created to promote these benefits and enable Victoria to adopt this approach, with a focus on high risk invasive weeds that are in the early stage of invasion and threaten biodiversity.

Project staff work with public land and biodiversity managers anywhere in Victoria.

The WESI Project and several other weed management projects are funded by the Victorian Government through the Weeds and Pests on Public Land program

Early Invader tools and a WESI Manual can be found here: [Early invader weeds \(environment.vic.gov.au\)](http://environment.vic.gov.au)

### 1.5.3 Pest animal categories and statutory requirements

Under the *Catchment and Land Protection Act 1994* (CaLP Act) certain animals are declared as pest animals in Victoria.

These animals are, or have the potential to become, a serious threat to primary production, Crown land, the environment or community health in Victoria.

Under the CaLP Act, animal species can be declared in 1 of 4 categories:

- prohibited pest animals,
- controlled pest animals,
- regulated pest animals, or
- established pest animals.

Under the CaLP Act, prohibited, controlled, and regulated pest animals are collectively defined as restricted pest animals.

#### Restricted Pest Animals

These animals are not established in the wild in Victoria.

The importation, keeping, breeding, releasing, and trading of restricted pest animals without a permit is illegal and penalties apply.

Occurrences of restricted pest animals, in the wild or being illegally kept, should be reported to Agriculture Victoria Customer Service Centre on 136 186.

#### Established Pest Animals

These animals are established in the wild in Victoria and are a serious threat to primary production, Crown land, the environment or community health in Victoria.

Landowners have the responsibility to take all reasonable steps to prevent the spread of — and as far as possible eradicate - established pest animals on their land.

It is not possible to eradicate these pest animals from the state, therefore asset protection is the most effective approach to minimise their impact on high value assets.

### 1.5.4 The Legal Framework

This Invasive Plant and Animal Framework is based on the legal requirements of Commonwealth and State legislation. Laws and regulations that are relevant to the development of the WCC IPA Framework includes at some level, all of the following, as described by Agriculture Victoria:

- *Aboriginal Heritage Act 2006*

The *Aboriginal Heritage Act 2006* provides protection of areas with sensitive cultural heritage from control and management activities that may cause harm, particularly measures that significantly disturb the soil (such as rabbit warren ripping).

- *Agricultural and Veterinary Chemicals (Control of Use) Act 1992*

This Act describes controls on the use of chemicals and poisons.



- *Biological Control Act 1986*

This Act relates to the release of agent organisms to control target organisms.

- *Catchment and Land Protection Act 1994 and Regulations 2012*

All landowners and occupiers are responsible for managing noxious weeds and established pest animals on their land under this Act and any local laws. This Act is administered by the Victorian Government. The Victorian Catchment Management Council (VCMC) provides statutory and advisory functions, while the Catchment Management Authorities coordinate and implement invasive species activities at a regional level.

- *Conservation, Forests and Lands Act 1987*

This Act provides a framework for land management systems and is concerned with necessary administrative, financial and enforcement provisions.

- *Crown Land (Reserves) Act 1978*

The *Crown Land (Reserves) Act 1978* describes the management of Crown lands, the appointment of CoM for the reserves and considers leasing and licensing of reserves.

- *Environment Protection Act 2017*

This Act sets out a duty of care to the environment particularly in relation to use of herbicides, pesticides and baits.

- *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. This is the key overarching legislation that protects the environment from large scale impacts of invasive plants and animals. The EPBC Act 1999 provides a way for us to protect and manage nationally and internationally important plants, animals, habitats and places.

- *Fences Act 1968*

The *Fences Act 1968* sets out special provisions relating to vermin-proof fencing, such as heights, materials and best practice.

- *Firearms Act 1996*

This Act details the requirements and conditions for use of firearms in the control of invasive animals. Shooting is an approved control measure used in an integrated management strategy for pest animals.

- *Fisheries Act 1995*

The *Fisheries Act 1995* forms the legislative framework for regulation, management and conservation of Victorian fisheries, including aquatic habitats. Invasive aquatic species are out of scope for this framework.

- *Flora and Fauna Guarantee Amendment Act 2019*

This Act amends the previous *Flora and Fauna Guarantee Act 1988* (FFGA Act) to provide an updated framework for the protection of Victoria's biodiversity. The FFGA Act provides for the listing of threatened species and Ecological Vegetation Communities (EVC).

- *Impounding of Livestock Act 1994*

This Act outlines the powers of authorised persons to impound trespassing, wandering or abandoned livestock and should be considered when dealing with established pest animals such as feral pigs and goats.

- *Land Act 1958*

The *Land Act 1958* states that landholders leasing, licenced or permitted on Crown land are responsible for noxious weed and pest animal management on that land. It also outlines rules for property boundaries around some waterways.

- *Local Government Act 1989*

This Act allows local government to develop local laws relating to noxious weed and pest animal management. It details the requirements and responsibilities that fall on local government authorities concerning PP&A management.

- *National Parks Act 1975*

The *National Parks Act 1975* outlines the requirements for declaration and management of National Parks and some other types of parks and the CaLP Act stipulates that the Chief Executive Officer (CEO) of Parks Victoria is responsible for noxious weed and pest animal management in any park listed in Schedule 2 of the NP Act.

- *Parks Victoria Act 2018*

This Act establishes Parks Victoria as a body corporate not representing the Crown whose CEO has the park management responsibilities that includes IPA.

- *Planning and Environment Act 1987*

The framework for planning the use, development and protection of land in Victoria, including activities around control works for IPA.

- *Prevention of Cruelty to Animals Act 1986*

This Act makes it an offence to intentionally administer poison to or lay a bait for animals other than in line with the CaLP Act, *Wildlife Act 1975*, or *Drugs, Poisons and Controlled Substances Act 1982*.

- *Road Management Act 2004*

The Act defines freeways and arterial roads where Regional Roads Victoria is responsible for noxious weed and pest management.

- *Wildlife Act 1975*

The *Wildlife Act 1975* relates to activities around wildlife including take, destroy, dispose of, or control. Some wildlife can be declared pest animals under the CaLP Act.



### 1.5.5 Roles of key regional agencies

Table 1 outlines the roles and key areas of management for regional agencies that underpin the development of this Warrnambool IPA Framework.

Table 1. Key agencies, roles, and key areas of responsibility

Agency	Role	Key Areas
Warrnambool City Council	Coordination of Invasive Plant and Animal Framework and Actions across the WCC Council Area	All City owned and managed assets
Glenelg Hopkins Catchment Management Authority	Invasive Plant and Animal strategy, coordination and response across waterways and catchments within the WCC Area (and beyond). Links of WCC actions to priority actions across the catchment.	Waterways and riparian areas including Hopkins and Merri Rivers, Russell's Creek.
Eastern Maar Aboriginal Corporation	Cultural responsibilities to care for Country and recognized under the Victorian Aboriginal Heritage Act 2006 as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.	The Eastern Maar Aboriginal corporation is the Registered Aboriginal Party for Eastern Maar Country, which includes the whole of WCC area.
Parks Victoria	Management of Invasive Plants and Animals on Parks Victoria managed lands.	Merri Marine Sanctuary (including Middle and Merri Islands), coastal reserves.
Department of Energy, Environment and Climate Action (DEECA)	Invasive Plant and Animal strategy for public land and environmental assets	Crown land throughout the municipality

### 1.5.6 Assets in the Warrnambool City Council Area

The background review has indicated that, within the Warrnambool City Council limits, there are many places and items of considerable value. The list below has been filtered from the background review and provided a basis for further input during the workshop.

- Cultural Heritage sites
- Beach and estuary mouth habitat for nesting birds
- Middle Island for Little Penguins
- Urban corridors
- Archaeological and scientific sites
- Aquatic and marine environments, including beaches
- Native vegetation
- Wetlands
- Birds and associated habitats, especially Hooded Plover
- Threatened ecological communities
- Koala's and their habitat
- Endangered species: including Lime Fern, Red-tailed Black Cockatoo, Orange-bellied Parrot, Glenelg Spiny Cray, Variegated Pygmy Perch, Spiny Rice Flower, Austrasian Bittern and more (see Appendix A for VBA lists of threatened plants and animals in the WCC area)



- Remnant vegetation
- Geological formations
- Water birds
- Agricultural land: especially land used for dairy and horticulture production

### 1.5.7 Invasive Plant and Animal Threats – background review

Many threats to the values identified above were expressed throughout the background review. Some of these include land clearing, loss of habitat in general, lack of connectivity, erosion, inappropriate land use and development, flooding, four wheel driving, littering, fire, stock access to sensitive areas, as well as weeds and pest animals.

The background review specifically referred to the following IPA species as posing a threat to some of the values identified above:

- Willows and poplars in waterways,
- Rabbits, and
- Boxthorn in agricultural areas.

Introduced Mammals prey on intertidal animals, and prey on or disturb roosting, feeding and nesting birds and eggs (a problem at Middle Islands).

Many weed species have been identified within the Warrnambool City Council area. Of the 210 species listed from various sources, a sub-list identified as of 'Very High Risk' by the Victorian Government, Department of Environment, Land, Water and Planning (DELWP 2022) <https://www.environment.vic.gov.au/invasive-plants-and-animals/weed-risk-ratings> of weeds found within the WCC boundary can be found in the Appendices.

*Willows are recognised as a national threat to the values of rivers. They are masters at straddling the aquatic and riparian zones and are well documented to impact river systems through their ability to extend their roots into the bed of rivers, changing flow paths, rates and the movement of water. Willow root mats create uniform channel conditions that reduce habitat for fish. Willows use significant amounts of water and reduce the number of invertebrates in the food chain. They affect water quality when they dump a heavy load of nutrients into the river system as they drop their leaves in Autumn. For the rest of the year, willows densely shade waterways, reducing the water temperatures of water, biological activity and habitat values for many native species.*

*Several species of willow occur in the region, including the crack willow (*Salix fragilis*) and weeping willow (*Salix babylonica*). Willows spread very easily as they can reproduce from broken stem fragments.*

From the Glenelg Hopkins Catchment Management Authority (GHCMA) Catchment Management Strategy - Willows – a national threat.

Weeds such as Annual Saltmarsh Aster-weed also displace native species in saltmarsh around estuary mouths and coastal wetlands.

### 1.5.8 Priority Assets in the Warrnambool City Council Area

The priority assets were identified in the council strategies, management plans and during the interviews with Warrnambool stakeholders (see Appendices for stakeholder and workshop attendee lists). This list was then refined during the stakeholder workshop and the priority assets are mapped in Figure 3.



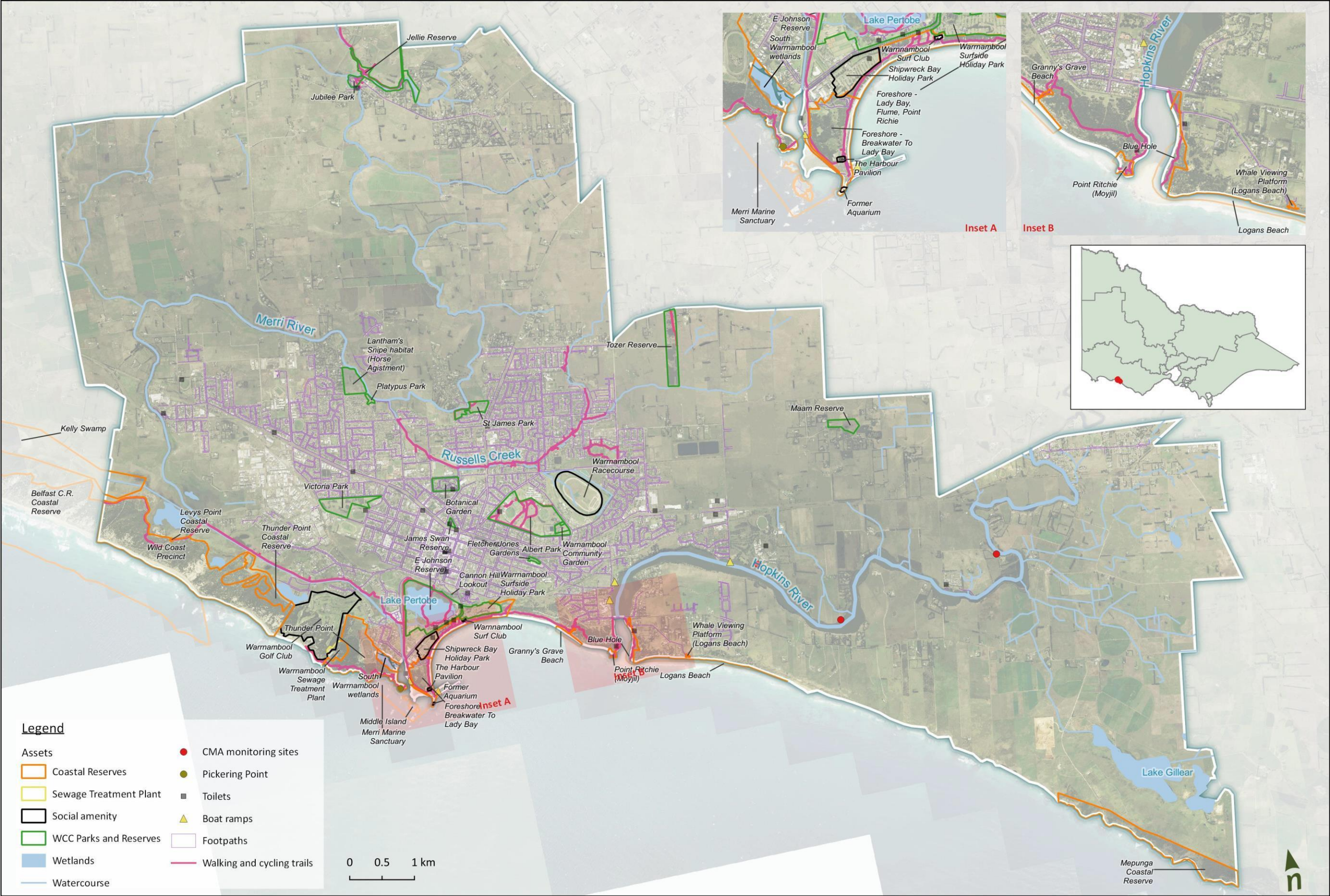


Figure 3. Priority assets in Warrnambool City Council



## 2 Assessment Approach

WCC engaged EcoFutures Consulting and Natural Capital Economics to produce this IPA Framework in order to incorporate the community needs into a workable document which can be used as a reference point for future funding and working projects.

The actions in this framework are categorised as per the 'invasion curve' where the stage of invasion determines which actions are most beneficial at the four different stages (Figure 4). From the background review and stakeholder interviews, a table was produced, containing the priority assets with their accompanying threats, and these were categorised by their stage of invasion within the Warrnambool City Council Area. The location of, and stage of invasion within the municipality for the key IPA threats, is a valuable set of information, which can be used as the baseline for this IPA Framework. Note that the stage of invasion within the WCC area is unique to the WCC area. For example, although deer are considered an invasive species widespread and abundant across many parts of Victoria, including some areas close to Warrnambool, within the WCC area itself, deer are not present, so are treated in this framework as Emerging Threats, in the Prevention part of the curve.

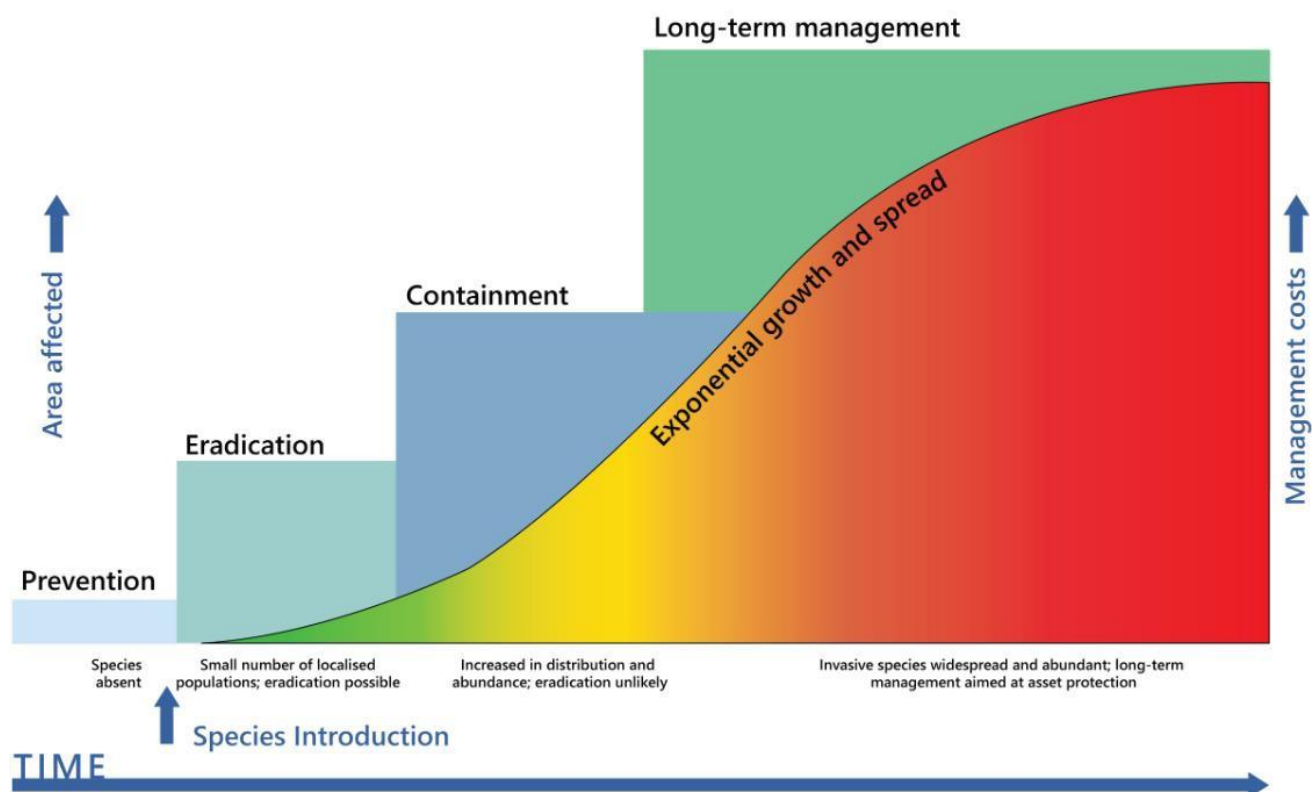


Figure 4: Invasion Curve used in a biosecurity approach to Invasive Plants and Animals ([Invasion-Curve - Invasive Species Council](#))

The four categories used to order the IPA asset/threat pairs were: Priority Weeds, Emerging Weeds, Established Pest Animals and Emerging Pest Animals. For each asset and threat, the community and government agency stakeholders provided information about:

- Stage of Invasion
- Impact rating
- Likelihood of impact occurring



- Impact type (environmental, Bio-Cultural, Social, Economic, Agricultural)
- Invasion pathway
- Current control measures
- Intensity required to make a measurable difference
- Objective of control measure
- Control Options
- Effectiveness of Control
- Cost

These threats to asset pairs were then assessed at a workshop to ensure the information was accurate and that nothing was missing.

### 2.1.1 Emerging Weeds

Agriculture Victoria's list of noxious weeds, using State Prohibited Weeds, was used to develop the list for the workshop. The Regionally Prohibited, Controlled and Restricted weeds are also listed. These lists are managed and updated by Agriculture Victoria and should be referred to when the Framework is next assessed, to ensure the list and status of weeds remains current and informs future management.

### 2.1.2 Priority Weeds

The list of Priority Weeds developed for the workshop originated from conversations with stakeholders. The current infestations and which assets they are threatening was identified. The stage of invasion of the weed, and the mitigation actions currently being taken were also identified.

### 2.1.3 Emerging Pest Animals

From discussions with stakeholders and searches of the NatureKit database, it was determined that deer and pigs, whilst present near the WCC, have not yet been recorded within the WCC area. These species have, therefore, been classified as emerging pest animals.

Other emerging pest animals, not yet found in WCC but requiring attention to ensure they do not arrive in the municipality, were taken from Agriculture Victoria's Priority Pest Animal list found here: [Priority pest animals | Pest animals | Biosecurity | Agriculture Victoria](#).

### 2.1.4 Established Pest Animals

The list of established Pest Animals considered in the workshop were identified as being well established within WCC. We interviewed stakeholders to generate a list of asset-threat pairs which were then explored further in the workshop. These pairs were then compared using the multi-criteria analysis described below.

## 2.2 Multi-Criteria Analysis (MCA)

A multi-criteria analysis (MCA) framework was developed to help assess and quantitatively compare the interventions and actions required to address IPA within the boundaries of the WCC. MCA is a decision support tool that was developed as part of a field of study called "operations research", where decision makers attempt to assess multiple options across a range of decision factors (reasons or considerations) that may have different and inconsistent assessment measures. This provides a structure for determining the relative benefits and costs of alternative actions, and to better inform prioritisation of interventions.

Prior to development of the MCA, identified assets were categorised into key categories (ecological, economic, social and cultural) and measured based on the impacts of doing nothing. These impacts can be summarised below.

- Ecological – loss of fauna and flora
- Economic – impact on productivity and tourism
- Social & Cultural – impact on amenity, recreation and First Nations interests.

The MCA was then developed to assess interventions and actions, with benefits defined as reduced negative impacts, while costs were considered as financial costs and technical effectiveness and feasibility.

Four key criterion scores were used against each option to provide an overall option score. Each individual criterion score was designated a numerical result of between 0 and 5 in association with the most accurate statement, summarised in Table 2 below.

Table 2. Scoring matrix for criteria

Score	Impact of threat on asset (in absence of control measure)	Likelihood of threat occurring	Effectiveness of control measure	Cost
0	None	None	None	None
1	Very low	Very low	Very low	Very high
2	Low	Low	Low	High
3	Medium	Medium	Medium	Medium
4	High	High	High	Low
5	Very high	Very high	Very high	Very low

As seen in Table 3 below, these criteria were classified into two categories: “risk without management” and “cost-effectiveness of control”. These criterion scores were then scaled based on weightings with respect to their identified impact on the overall score. Table 3 below presents the MCA weightings before and after stakeholder consultation, which was key in determining the relevant weightings.

Table 3. Weightings for MCA criteria

Criteria category	Criteria	Weighting before consultation	Weighting after consultation
Risk without management	Impact of threat on asset (in absence of control measure)	25%	31%
	Likelihood of threat occurring	25%	25%
Cost-effectiveness of control	Effectiveness of control measure	25%	23%
	Cost	25%	21%
Total	100%	100%	100%

Scaled scores were then aggregated for each option to provide a total weighted result, with 0 being the lowest score and 5 being the highest. These weighted MCA scores could then be ranked in order of actions within each threat category, these being priority weeds, emerging weeds, established animals and emerging animals.

## 2.3 Priority Actions

The input tables for the Multi-Criteria Analysis were developed over the course of the project. First, through phone interviews with stakeholders, then through stakeholder input at the workshop and, finally, through re-calibration of the impacts to assets to reflect their National, State, Regional and Local importance (see Appendices for stakeholder and workshop attendee lists). Once we had the outputs of the MCA from the input tables at the workshop, we realised that an important calibration was missing – the importance of the loss of the asset on a National, State, Regional or Local level, which meant that we applied the impact rating as follows:

- Loss of the asset has National or International implications to the population, species or other value – Impact Rating: Very High
- Loss of the asset has State-wide or Regional implications to the population, species or other value – Impact Rating: High
- Loss of the asset has local implications to the population, species or other value – Impact Rating: Medium

This ensured that assets are ranked more truly in comparison to each other and that Nationally and Internationally important projects, such as the Middle Island penguins and shearwaters and the Maremma guardian dogs made it onto the Top 20 list.

We have presented the results of the Multi-criteria Analysis in the series of tables below

The first table (Table 4) ranks the top twenty asset/threat pairs with their control measures. This allows comparison of Invasive Plant and Animal control actions, considering the likelihood and scale of the impact of the threat to the asset, the effectiveness of the control measures and the cost.

Tables 5 - 8 show the top fifteen asset/threat pair actions (or all if less than 15 in that category) within their individual categories, Emerging Weeds, Priority Weeds, Emerging Pest Animals and Established Pest Animals. This provides further information within the categories for a more complete picture of the IPA situation within the Warrnambool City Council. Further discussion of the nuances of the results are found in each section.

A sensitivity analysis was also conducted, removing the cost of actions from the Multi-criteria Analysis. Further discussion is provided in section 2.4 on what this tells us about the importance of the asset.

### 2.3.1 Overall Results

#### The Top Five Actions

1. The top 20 overall results reveal that removing Marram Grass sits at the top of the table. This is because the loss of the asset (beach nesting birds) has National or International significance, and the actions are expected to be relatively low cost.
2. Second on the list is surveillance and prevention to keep feral pigs out of the WCC Area, the impact rating is high, and the cost of the action is very low.
3. Number three is Cape Beach Daisy removal from all high-quality beach nesting bird sites, again due to the significance of the asset and the relatively low cost of the action.
4. Surveillance and prevention of Restricted Pest Animals (not yet established in Victoria) comes in at number four.
5. Targeted fox control at beach nesting bird sites at the critical (nesting) time of year comes in at number five, due again to the National/International importance of the asset. Since fox control is already occurring in areas surrounding Middle Island at a similar time, this could be expanded to include adjacent beach-nesting bird sites.



### Actions 6 - 10

6. Surveillance and detection actions for keeping feral deer out of the WCC area comes in at number six, due to the impact rating and low cost of the action.

7. Action number seven is Calici virus release at all assets threatened by rabbits. The action falls at number seven due to the relatively low cost and high effectiveness of the action and is not at the top due to the amalgamation of all projects, making it a little more costly. However, it is a very worthwhile investment, especially for social amenity sites currently affected by rabbit damage.

8. Integrated fox control at Kelly Swamp is ranked number eight, due to the International significance and critically endangered status of the Australasian Bittern population. Although the cost of the action is high, the impact of the loss of Australasian Bittern at any site may have catastrophic outcomes for the species.

9. Action number nine is Sea Wheat Grass affecting all high-quality beach nesting bird habitat. This is a relatively inexpensive action protecting a value of national significance (beach-nesting birds), which ranks it highly.

10. Action 10 is removal of Squirting Cucumber reported as localised infestations at Lake Pertobe, with relatively little work to contain the infestations, which ranks the effectiveness as high.

### Actions 11 – 15

11. Action 11 is fox control on farms, which has high effectiveness and if integrated with other fox control programs can improve the overall reduction of the population.

12. Action 12 removes Sea Spurge from dune sites using a biological control (fungus), which is lower cost and highly effective.

13 & 14. Action 13 Willow removal on the Merri and Hopkins Rivers protects nationally important plants and animals and is highly effective, the only reason it is lower on the list is the cost. The same is true for Gorse in Upper Russell's Creek and other locations (Action 14).

15. Ranked at 15 is a program with a suite of actions to reduce the impacts of domestic and semi-owned cats on urban and peri-urban wildlife including eliminating supplementary feeding, desexing, registering and containing domestic cats and more (see table).

### Actions 16 - 20

16. Ranked at 16 is blackberry removal from rivers and streams, which, like Gorse and Willow have state-wide Community Pest Management Group's (CPMG) which can be drawn upon for collaboration of actions across the region. Groups include Victorian Blackberry Taskforce, Victorian Gorse Taskforce, Victorian Rabbit Action Network, Victorian Serrated Tussock Working Party.

17. Ranked 17 is the use of Maremma Dogs to protect internationally significant populations of Little Penguins and Short-tailed Shearwaters on Middle Island. Although this project is expensive, the impact of the loss of these species has International significance, not only due to their biodiversity value, but also social and economic values – this project is internationally recognised, both in ecological and research communities as well as by people across the world.

18. Ranked 18 is prevention and eradication of infestations when they occur, of Alligator Weed. The potential impact is high, and the action is low cost and effective.

19. Number 19 is integrated fox control, with a program to involve the private landholders surrounding the reserve, at Maam Reserve. This wetland has high biodiversity and Bio-Cultural value. Although the project would be costly, the value of the reserve's fauna has state significance (potentially national).

20. Ranked twenty is the use of guardian dogs and fencing to protect lambs and free-range chickens on Farms. These methods for protecting assets might be more expensive than fox control, but also might be more effective.

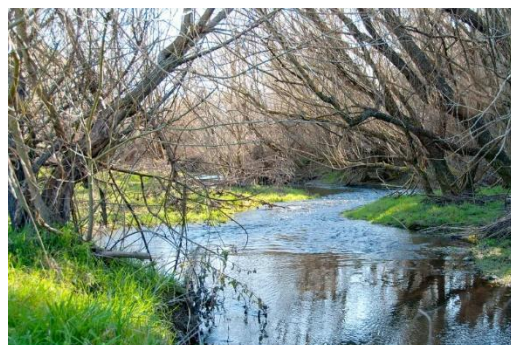
Table 4: Top 20 Pest Plant and Animal Actions

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Priority weeds	Marram Grass <i>Calamagrostis arenaria</i>	All high-quality beach nesting bird sites	Asset-based Protection	Hand removal (must remove rhizomous mats), herbicide spot spraying	4.6
Emerging animal	Feral Pig	Riparian vegetation and wetlands, Small native animals, eggs, invertebrates	Prevention and Eradication when infestations occur	Surveillance and prevention	4.1 - 4.6
Priority weeds	Cape Beach Daisy <i>Arctotheca populifolia</i>	All high-quality beach nesting bird sites (e.g., Levy's and Shelly beach)	Containment	Hand removal, herbicide spot spraying	4.4
Emerging animal	Other emerging animals	NA _NA	Prevention and Eradication when infestations occur	Surveillance and prevention. Keep abreast of the current threats on this list and their invasion status.	4.4
Established animal	European Fox	All high-quality beach nesting bird sites. Mouth of Hopkins, Granny's grave, whale platform. Levy's beach shelly beach. 3-4 breeding pairs of hooded.	Asset-based Protection	Targeted poison baiting, targeted poison ejectors, targeted trapping of problem fox(es), other methods in development.	4.3
Emerging animal	Deer	Native vegetation structure, competition with native herbivore	Prevention and Eradication when infestations occur	Surveillance and prevention	4.3
Established animal	European Rabbit	All locations	Asset-based Protection	Calici Virus. Integrated approach with Parks, DEECA, Moyne	4.2
Established animal	European Fox	Kelly Swamp – including Australasian Bittern (Critically Endangered)	Asset-based Protection	Reduce fox numbers during vulnerable life stages (e.g., breeding) Poison baiting or ejectors, trapping. Work with Moyne Shire and PV, Rail Trail, and Private Landholders to coordinate. Coordinating and participating. Depends on getting landholders on-board.	4.1
Priority weeds	Sea Wheat Grass <i>Thinopyrum junceiforme</i>	All high-quality beach nesting bird sites	Containment	Hand removal, herbicide spot spraying	4.1
Priority weeds	Squirting Cucumber <i>Ecballium elaterium</i>	Localised infestations reported by public (Lake Pertobe)	Containment	Hand pulling and surveillance. Community education could increase efficacy of surveillance	4.1
Established animal	European Fox	Farms - Chickens	Asset-based Protection	Guardian dogs or alpacas, fox drives (shooting), poison baiting, poison ejectors	4.1
Priority weeds	Sea Spurge <i>Euphorbia paralias</i>	Dune sites (e.g., Logan Beach and Blue Hole)	Containment	Fungus release	4.1
Priority weeds	Willow <i>Salix spp.</i>	Merri and Hopkins Rivers (e.g., St James Park on Merri)	Containment	herbicide, mulching, biological control, and surveillance	4.0

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Priority weeds	Gorse <i>Ulex europaeus</i>	Upper Russells Creek, Rowas Lane, Merri riverbanks, roadsides, paddocks.	Containment	Best to use sustained, multi-pronged approach including mulching, grubbing and mechanical removal, cultivation/rotary hoeing, and chemical control.	4.0
Established animal	Feral Cat/Unowned domestic cats	Across the municipality	Asset-based Protection	Eliminate supplementary feeding, desex and register domestic cats, contain domestic cats, enhanced adoption of kittens, trapping and ethical euthanasia of excess cats, effective monitoring	4.0
Priority weeds	Blackberry <i>Rubus anglocandicans</i>	Rivers (e.g., upstream along the Merri), creeks, native bush, ditches, agricultural land	Asset-based Protection	Hand pulling, herbicide, mulching, biological control and surveillance	4.0
Established animal	European Fox	Middle Island	Asset-based Protection	Guardian dogs during nest season, targeted fox control (baiting, den fumigation, pest ejectors (when available)) in surrounding areas to reduce predation on birds landing on land (or on the island when guardian dogs not present)	4.0
Emerging Weeds	Alligator Weed	Waterways	Containment	Prevention and eradication when infestations occur	3.9
Established animal	European Fox	Maam Reserve and other locations in the WCC	Asset-based Protection	Fox proof fences, Guardian animals, high intensity poison baits or ejectors (not possible in urban settings), trapping. Need to get the neighbours on-board - involve private landholders. Precinct-wide control.	3.9
Established animal	European Fox	Farms - Lambs	Asset-based Protection	Maremma Dogs, fox proof fencing	3.8



Alligator Weed (*Alternanthera philoxeroides*) (Photo GHCMA)



Black willow (*Salix nigra*) (Photo: Tanya Doody/CSIRO)

### 2.3.2 Emerging Weed Actions

The list of Emerging Weeds was derived from Victoria's Noxious Weeds List, which includes State Prohibited Weeds and Regionally Prohibited, Restricted and Controlled Weeds. We used their status in the Glenelg-Hopkins Catchment to rate their potential impact and likelihood, rating the effectiveness of the action of Prevention and Surveillance as very high and the cost as low. The list of emerging weeds is always evolving, and therefore up to dating the list of weeds and their invasion status in the WCC and surrounds is important. Very good information on weeds can be found at: [Weeds | Biosecurity | Agriculture Victoria](#) including invasion pathways, updated lists, and methods to reduce risks.

Table 5: Top 15 actions in the emerging weeds category.

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Emerging weeds	Alligator weed	Waterways	Prevention and Eradication when infestations occur	Surveillance and early detection	3.9
Emerging weeds	Horsetail	Wetlands and waterways	Prevention and Eradication when infestations occur	Surveillance and early detection	3.7
Emerging weeds	Giant knotweed	Riverbanks and disturbed sites	Prevention and Eradication when infestations occur	Surveillance and early detection	3.7
Emerging weeds	Blackberry	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.7
Emerging weeds	Willows	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.7
Emerging weeds	Bear-skin fescue	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.7
Emerging weeds	<i>Lagarosiphon</i>	Lakes, dams, wetlands	Prevention and Eradication when infestations occur	Surveillance and early detection	3.6
Emerging weeds	Water hyacinth	Warm, slow moving nutrient rich waterways	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	Japanese knotweed hybrid	Riverbanks and disturbed sites	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	Poverty weed	Agriculture and environment	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	African Daisy	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5



Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Emerging weeds	African Feather Grass	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	Bathurst burr	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	Boneseed/Bitou Bush	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5
Emerging weeds	Bridal Creeper	0.0	Prevention and Eradication when infestations occur	Surveillance and early detection	3.5

### 2.3.3 Priority Weed Actions

The list of Priority Weeds was developed through phone interviews with stakeholders and the likelihood and intensity of impact, and the effectiveness and cost of measures calibrated. Again, to calibrate the impact of the threat, we rated the importance of the loss of the asset on a National, State, Regional or Local level, which meant that we applied the impact rating as follows:

1. Loss of the asset has National or International implications to the population, species, or other value – Impact Rating: Very High
2. Loss of the asset has State-wide or Regional implications to the population, species, or other value – Impact Rating: High
3. Loss of the asset has local implications to the population, species, or other value – Impact Rating: Medium

The top action is removal of Marram Grass at all high-quality beach nesting bird sites to provide space to nest (this was also the top overall action). The effectiveness of this action is not completely known but was estimated as high; however, the action rates highly as the asset is of National/International significance and the action would be relatively low cost (using volunteers).

Other important Priority Weed actions involve removing or limiting small infestations to protect key assets. This list can support the WCC and community in choosing and collaborating on weed projects and can form the basis for works in the next few years.

This list of Priority Weed actions was developed by the selected stakeholders and does not include the full list of important weeds in the Warrnambool City Council area. The aim here was to reduce the list to a workable number of projects within the framework. There will be other weeds which will become a priority in the Warrnambool City Council Area over the coming years. Many of these weeds appear in the input tables (in a spreadsheet that accompanies this Framework) for this MCA but did not make it into the top 15 actions. Others are listed in Appendix A1.1. Agriculture Victoria keeps updated lists on weeds across Victoria at [Weeds | Biosecurity | Agriculture Victoria](#).

Table 6: Top 15 actions in the priority weeds category

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Priority weeds	Marram Grass <i>Calamagrostis arenaria</i>	All high-quality beach nesting bird sites	Asset-based Protection	Hand removal (must remove rhizomous mats), herbicide spot spraying	4.6
Priority weeds	Cape Beach Daisy <i>Arctotheca populifolia</i>	All high-quality beach nesting bird sites (e.g., Levy's and Shelly beach)	Containment	Hand removal, herbicide spot spraying	4.4
Priority weeds	Sea Wheat Grass <i>Thinopyrum junceiforme</i>	All high-quality beach nesting bird sites	Containment	Hand removal, herbicide spot spraying	4.1
Priority weeds	Squirting Cucumber <i>Ecballium elaterium</i>	Localised infestations reported by public (Lake Pertobe)	Containment	Hand pulling and surveillance. Community education could increase efficacy of surveillance	4.1
Priority weeds	Sea Spurge <i>Euphorbia paralias</i>	All high-quality beach nesting bird sites (e.g., Logan Beach and Blue Hole)	Containment	Fungus release	4.1
Priority weeds	Willow <i>Salix</i> spp.	Merri and Hopkins Rivers (e.g., St James Park on Merri)	Containment	herbicide, mulching, biological control, and surveillance	4.0
Priority weeds	Gorse <i>Ulex europaeus</i>	Upper Russells Creek, Rowas Lane, Merri riverbanks, roadsides, paddocks.	Containment	Best to use sustained, multi-pronged approach including mulching, grubbing and mechanical removal, cultivation/rotary hoeing, and chemical control.	4.0
Priority weeds	Blackberry <i>Rubus anglocandicans</i>	Rivers (e.g., upstream along the Merri), creeks, native bush, ditches, agricultural land	Asset-based Protection	Hand pulling, herbicide, mulching, biological control, and surveillance	4.0
Priority weeds	Chilean Needle Grass <i>Nassella neesiana</i>	Albert Park	Containment	Hand pulling, herbicide and surveillance. Community education could increase efficacy of surveillance	3.8
Priority weeds	Blue periwinkle	0.0	Asset-based Protection	Mechanical	3.8
Priority weeds	Water couch	0.0	Asset-based Protection	Mechanical	3.8
Priority weeds	African Boxthorn <i>Lycium ferocissimum</i>	Rivers (e.g., upstream along the Merri), creeks, native bush, agricultural land	Asset-based Protection	Cutting and dabbing, physical removal, herbicide, mulching, biological control and surveillance	3.8
Priority weeds	English Ivy <i>Hedera Helix</i>	Victoria Park native and other vegetation	Containment	Cut a small gap in stem near base - plants will die. Herbicide spray iv on ground.	3.8
Priority weeds	Italian Buckthorn <i>Rhamnus alaternus</i>	Victoria Park, Hopkins River mouth (east side)	Containment	Hand pulling, herbicide, physical removal	3.8

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Priority weeds	Hemlock Conium maculatum	Russells Creek, Merri riverbanks	Asset-based Protection	Hand pulling, herbicide, mulching, biological control for site prep/amenity, and surveillance	3.7

### 2.3.4 Emerging Pest Animal Actions

Through stakeholder interviews, Feral Pig and Deer were assessed as 'not present' within the WCC Boundary. However, they are present near Warrnambool and therefore surveillance and eradication when incursions occur is an important action in the framework. DEECA's Strategic Management Prospects (NatureKit) has assessed the habitat in the WCC area as suitable for both species, therefore keeping an eye on where deer and pigs occur in the region is important in keeping them out of the WCC.

We merged all Restricted Pest Animals (not yet established in Victoria) into one action of surveillance and prevention. This list can be found at [Priority pest animals | Pest animals | Biosecurity | Agriculture Victoria](#) where further information on the species is available, including their invasion pathways and where to report sightings.

Table 7: There were 6 actions in the emerging pest animal category. These are ranked in priority order in the table below.

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Emerging animal	Feral Pig	Riparian vegetation_NA	Prevention and Eradication when infestations occur	Surveillance and prevention	4.6
Emerging animal	Feral Pig	Wetlands_NA	Prevention and Eradication when infestations occur	Surveillance and prevention	4.6
Emerging animal	Other emerging animals	NA_NA	Prevention and Eradication when infestations occur	Surveillance and prevention. Keep abreast of the current threats on this list and their invasion status.	4.4
Emerging animal	Feral Pig	Small native animals, eggs, invertebrates_NA	Prevention and Eradication when infestations occur	Surveillance and prevention	4.4
Emerging animal	Deer	Native vegetation structure, competition with native herbivores_NA	Prevention and Eradication when infestations occur	Surveillance and prevention	4.3
Emerging animal	Feral Pig	Agricultural land_NA	Prevention and Eradication when infestations occur	Surveillance and prevention	4.1

### 2.3.5 Established Pest Animal Actions

The top 15 actions for established pest animals involve Foxes, Rabbits, and Feral Cats. The top action is asset-based protection, timed and targeted for greatest impact at high quality beach nesting bird sites. This rates highly due to the impact to a Nationally Threatened group of birds. Fox control is already carried out around Middle Island to support the protection of Little Penguins and Shearwaters on the islands and could be expanded to include beach nesting bird sites during nesting season. The Middle Island fox control action rates sixth on the list of priorities in the Established Pest Animal section, due to the cost of all actions involved (Maremma Dog program and associated fox control), however, one of the challenges of the Multi-Criteria Analysis is distinguishing the value of local assets within a national and international context. The Middle Island project may be in a league of its own in the IPA activities in the WCC area, due to the Nationally/Internationally important Little Penguin and Shearwater colony, the international reputation and success of the project and the associated Bio-Cultural, social, and economic benefits of this world-class, asset-based protection project.



Rabbit (*Oryctolagus cuniculus*)  
(Photo: Agriculture Victoria)

Controlling rabbits using Calici virus across all rabbit infested sites rates second on the list, due to the combination of the impacts and the low cost and high effectiveness of the action.

Activities around reducing the impacts of domestic, semi-owned and feral cats across the municipality is listed relatively highly. This may include education of the public around supplementary feeding of wild cats, by-laws enforcing the containment of domestic cats and other measures to reduce the amount of domestic and semi-wild cats across the landscape.

Other activities include fox control programs to protect and array of assets, including Australasian Bitterns at Kelly's Swamp, on Farms, Middle Island, Maam Reserve and wetlands, marshes, and estuaries. Since foxes threaten a wide variety of assets across Warrnambool, a multi-stakeholder, cross-tenure program could be considered which would combine actions where possible.

Other pest animals may become problematic over time, and it is worth staying abreast of Victoria's Priority Pest Animals at [Priority pest animals](#) | [Pest animals](#) | [Biosecurity](#) | [Agriculture Victoria](#) .



Table 8: Top 15 actions in the established animal category.

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Established animal	European Fox	All high-quality beach nesting bird sites. Mouth of Hopkins, Granny's grave, whale platform. Levy's beach shelly beach. 3-4 breeding pairs of hooded.	Asset-based Protection	Targeted poison baiting, targeted poison ejectors, targeted trapping of problem fox(es), Trials of dog urine being tested as fox deterrent by Birdlife Australia (attracted not deterred). Soft-jaw trapping? Shooting? Blood trails to bring foxes in to be shot.	4.3
Established animal	European Rabbit	All locations	Asset-based Protection	Calici Virus. Integrated approach with Parks, DEECA, Moyne.	4.2
Established animal	European Fox	Kelly's Swamp (Australasian Bittern)	Asset-based Protection	Reduce fox numbers during vulnerable life stages (e.g., breeding) Poison baiting or ejectors, trapping. Work with Moyne Shire and PV, Rail Trail and Private Landholders to coordinate. Coordinating and participating. Depends on getting landholders on-board.	4.1
Established animal	European Fox	Farms	Asset-based Protection	Guardian dogs or alpacas, fox drives (shooting), poison baiting, poison ejectors	4.1
Established animal	Feral Cat/Unowned domestic cats	Across the municipality	Asset-based Protection	Eliminate supplementary feeding, desex and register domestic cats, contain domestic cats, enhanced adoption of kittens, trapping and ethical euthanasia of excess cats, effective monitoring	4.0
Established animal	European Fox	Middle Island	Asset-based Protection	Guardian dogs during nest season, targeted fox control (baiting, den fumigation, pest ejectors (when available)) in surrounding areas to reduce predation on birds landing on land (or on the island when guardian dogs not present)	4.0
Established animal	European Fox	Maam Reserve and other locations in WCC	Asset-based Protection	Fox proof fences, Guardian animals, high intensity poison baits or ejectors (not possible in urban settings), trapping. Need to get the neighbours on-board - involve private landholders. Precinct-wide control.	3.9
Established animal	European Fox	Farms	Asset-based Protection	Maremma Dogs, fox proof fencing	3.8
Established animal	European Fox	Wetlands, marshes, estuaries	Asset-based Protection	Reduce fox numbers during vulnerable life stages (e.g., breeding) Poison baiting or ejectors. Identify dens and fumigate. Difficult to find dens in high density vegetation. Need landscape-wide fox control	3.7
Established animal	European Fox	All native vegetation sites, especially where woodland EVCs are present	Asset-based Protection	Reduce fox numbers during vulnerable life stages (e.g., breeding) Poison baiting or ejectors	3.7

Category	Threat	Asset/Site	Stage of invasion	Control measure	Weighted score
Established animal	Feral Cat/Unowned domestic cats	Native vegetation, parks, backyards, riparian, coastal dunes. Especially Levi's Point	Asset-based Protection	Cage trapping, Felixer (ejector under development) public land. Containing domestic cats - change to by-laws.	3.7
Established animal	Feral Cat/Unowned domestic cats	Anywhere where fires occur	Asset-based Protection	Cage trapping, Felixer (ejector under development)	3.6

## 2.4 Sensitivity analysis

To test how sensitive the priority actions were to the weighting of each criterion, the weightings were revised to remove the cost criterion and equally reallocate the weighting for cost to the remaining three criteria. This essentially shows how results would be prioritised if cost was not a concern.

The table below shows the top 10 actions that would be prioritised if cost was not considered. Marram grass control remains the highest priority. Fox control and emerging weeds moving up the priority order, as well as some established weeds such as willow. If new, cheaper control measures are identified, action on these threats could be reconsidered.

Table 9: Sensitivity Analysis - Top ten actions with Cost removed.

Category	Threat	Asset/Site	Stage of invasion	Control measure
Priority weeds	Marram Grass Calamagrostis arenaria	All high-quality beach nesting bird sites	Asset-based Protection	Hand removal (must remove rhizomous mats), herbicide spot spraying
Established animal	European Fox	All high-quality beach nesting bird sites. Mouth of Hopkins, Granny's grave, whale platform. Levy's beach shelly beach. 3-4 breeding pairs of hooded.	Asset-based Protection	Targeted poison baiting, targeted poison ejectors, targeted trapping of problem fox(es). Soft-jaw trapping? Shooting? Blood trails to bring foxes in to be shot.
Emerging weeds	Alligator weed	Waterways	Prevention and Eradication when infestations occur	Surveillance and early detection
Established animal	European Fox	Middle Island	Asset-based Protection	Guardian dogs during nest season, targeted fox control (baiting, den fumigation, pest ejectors (when available)) in surrounding areas to reduce predation on birds landing on land (or on the island when guardian dogs not present)

Category	Threat	Asset/Site	Stage of invasion	Control measure
Established animal	European Fox	Kelly's Swamp	Asset-based Protection	Reduce fox numbers during vulnerable life stages (e.g., breeding) Poison baiting or ejectors, trapping. Work with Moyne Shire and PV, Rail Trail, and Private Landholders to coordinate. Coordinating and participating. Depends on getting landholders on-board.
Priority weeds	Cape Beach Daisy <i>Arctotheca populifolia</i>	All high-quality beach nesting bird sites (e.g., Levy's and Shelly beach)	Containment	Hand removal, herbicide spot spraying
Priority weeds	Willow <i>Salix</i> spp.	Merri and Hopkins Rivers (e.g., St James Park on Merri)	Containment	herbicide, mulching, biological control and surveillance
Emerging weeds	Horsetail	Wetlands and waterways	Prevention and Eradication when infestations occur	Surveillance and early detection
Emerging weeds	Giant knotweed	Riverbanks and disturbed sites	Prevention and Eradication when infestations occur	Surveillance and early detection
Emerging weeds	Blackberry	0	Prevention and Eradication when infestations occur	Surveillance and early detection



Blackberry leaves and fruit  
(Photo: Weeds Australia)



Giant Knotweed (*Fallopia japonica*)  
(Photo Agriculture Victoria)

### 3 Collaboration

Collaboration and effective partnerships are key to the success of the IPA management framework. Collaboration is increasingly necessary to resolve and tackle issues. In the context of Warrnambool IPA management, it is an important practice to engage with other key government agencies, Traditional Owners, community, and volunteer groups to achieve specific outcomes for Warrnambool City Council. Effective collaboration leverages on the capacity, agility, and strong networks of people to support solutions and promote innovative ideas. Figure 5 highlights the types of collaboration and partnerships available. The degree of difficulty and scale of impact or outcome increases when stakeholders or key players are empowered to implement decision making.

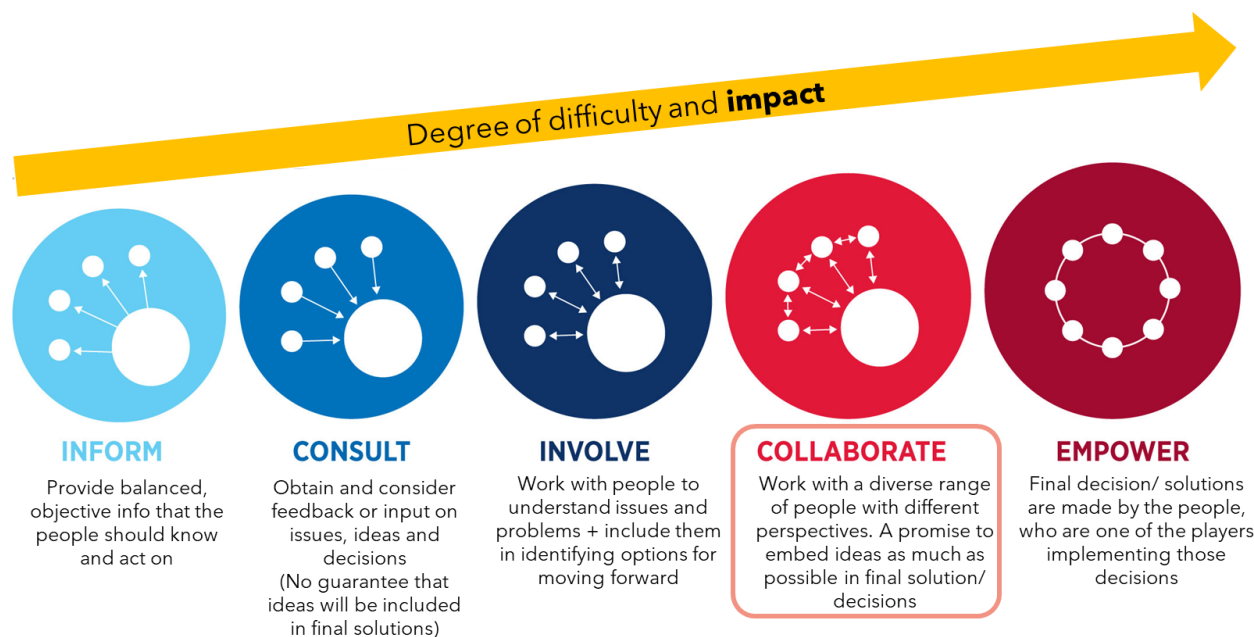


Figure 5. Level of difficulty and impact based on increasing levels of collaboration.

Some examples of current partnerships that operate well within the WCC are, as highlighted in the stakeholder workshop:

- Collaboration between BirdLife Australia and WCC environmental officers to communicate about events and issues
- Strong communication with most Landcare groups, facilitations and other agencies, e.g., community consultations, responsiveness, and
- National Tree Day with Warrnambool Coastcare Landcare Network to benefit common goals

The workshop highlighted several opportunities to facilitate effective collaboration in IPA control across WCC. These are described below in Table 10.

Table 10 Pathways for effective partnerships with WCC

Pathways for effective partnerships	Description
Providing opportunities for collaboration	<ul style="list-style-type: none"> <li>• Identify appropriate level of collaboration (Figure 5)</li> <li>• Identify stakeholder / set up working group.</li> <li>• Identify regular collaboration opportunities through projects and consultations with stakeholders.</li> <li>• Establish collaboration pathways</li> </ul>



Pathways for effective partnerships	Description
Community understanding	<ul style="list-style-type: none"> <li>• Agreed understanding of the aims and objectives of IPA management</li> <li>• Agreed roles and responsibilities.</li> <li>• Identify champions in each stakeholder group to drive the process.</li> <li>• Agreed communication pathways</li> </ul>
Regular communication	<ul style="list-style-type: none"> <li>• Organise a routine stakeholder / working group meeting.</li> <li>• Discuss common issues, projects and goals.</li> <li>• Discuss and coordinate ongoing collaboration.</li> <li>• Adaptive manage collaboration needs</li> </ul>
Data sharing	<ul style="list-style-type: none"> <li>• Consolidate knowledge and data into a system for sharing.</li> <li>• GIS mapping database</li> </ul>

### 3.1.1 Community understanding of regional IPA management.

The stakeholder workshop highlighted the need for a common understanding of the aims and objectives of IPA management and the role and responsibilities in which each stakeholder group can partake. This can be achieved through setting up a strong structure that clearly outlines the roles and responsibilities of Council and other stakeholders, conducting community and stakeholder forums to discuss common issues, projects and goals, and regular communication. Other actions might include:

1. Using the Snap, Send, Solve app, an app used by WCC to provide community members with a way to report issues, more broadly across IPA monitoring and activities.
2. Identifying the key weed spread pathways and conducting IPA information sessions with the community (e.g., working with nursery owners to educate the public on garden plants which are also invasive weeds),
3. Collaborating with the GHCMa on regional programs, such as willow management along the rivers, and
4. Coordinating community involvement across the various Landcare groups, Field Naturalists and others.

### 3.1.2 Effective partnerships for coordinated IPA management

Effective partnerships and regular communication to ensure there is ongoing collaboration across the groups through a routine stakeholder meeting. Stakeholders at the workshop proposed the forming of an IPA group, which would meet on a regular basis to collaborate on planning shared programs, monitoring key assets and threats, delivering invasive plant and animal works, and more.

An issue highlighted at the workshop was the governance around continued responsibility of weed management after revegetation planting. The three-year commitment was thought to preclude small community groups from undertaking revegetation projects. On the other hand, if plants are planted and not cared for, then the survival rate is low, which leads to failure of the planting project. It was concluded that the WCC should re-evaluate the policy, looking for ways to both ensure plantings are successful and that it is possible for volunteer groups to undertake revegetation projects.

## 4 Monitoring

Monitoring of invasive plant and animal activities is important for a variety of reasons including:

1. Measuring success, for example:
  - Condition of asset or health of population you are protecting,
  - Prevalence and location of threats,
  - Area under effective management, and/or
  - People involved in pest plant and animal works.
2. Triggering management actions, for example, notification from member of the public of an emerging weed.
3. Reporting on programs and grants and applying for funding.

An array of monitoring is occurring in Warrnambool City Council Area, as outlined in Table 11.

Workshop attendees identified collaborative monitoring across the WCC and stakeholders as a priority. There are several tools available to facilitate this. A combination of current apps and actions can help to facilitate monitoring of some of the assets and threats. These include but may not be limited to:

1. WCC's Snap, Send, Solve App – already in use but could be expanded.
2. PestSmart's [FeralScan](#) – a community pest animal recording and reporting tool.
3. VBA Go – record native species directly to the Victorian Biodiversity Atlas and NatureKit.
4. iNaturalist ([A Community for Naturalists · iNaturalist](#)) to record native and non-native species and crowd-source the identification of them.
5. Report an unusual or unknown weed online at Agriculture Victoria or by calling 1 800 084 881.
6. Birdlife Australia's Birddata and programs (e.g., Beach Nesting Birds and others) and/or Ebird.

Other specialist monitoring may be required to supplement the monitoring already occurring, such as fox scat monitoring by Canidae Development, camera monitoring and others.

The development of a Monitoring Plan could be part of a collaborative IPA group across the municipality.



Hooded Plovers – beach nesting birds  
(Photo: Parks Victoria)

Table 11: Monitoring activities including aims, effectiveness and needs not currently being met, contributed by workshop attendees held in April 2023

Organisation	Threat	Threat description	Asset	Asset description	What is the aim of your monitoring program	How effective has the monitoring program been?	Any monitoring needs that are currently not met
Warrnambool City Council	Weed	Emerging weeds (Squirting cucumber, Sicilian sea lavender)			To reduce the spread of emerging weed species and eliminate them from localised presence	Because of localised small outbreaks for both squirting cucumber and Sicilian sea lavender, we can monitor the spread + containment easily as locations are easily accessible	We have not surveyed for other outbreaks beyond the sites we are aware of. Perhaps a widespread survey could be conducted to assess breakout presences of these weeds across the municipality
Warrnambool City Council	Weed and pest animals	Protecting penguin colony from predations	Yes	Protecting all built and natural asset classes	To reduce fox population and impact on penguin colony and shearwaters. Removal of noxious weeds to minimise habitat for rabbits and the like, prevent spread through municipality. Rabbit control works to prevent population increase + damage to natural areas and assets	Fox population has been to stabilise current numbers. Rabbit population is hard to determine, but it would only be keeping numbers from growing significantly. Weed eradication is random other than high profile areas depending on resources	Fox population eradication has not been as effective as expected. Rabbit eradication is only holding numbers as not effective reducing numbers. Weed eradication is stable.
Warrnambool City Council	Weed	Weeds (mainly woody), foxes			Understanding occurrence, density, success of removal etc. Developing mapping app for weeds, engage with Canidae for foxes	Mapping app is still in early stages of use, there isn't a full understanding of how it works and how to use the information. Information collected hasn't been placed onto council's mapping system yet. Work from Canidae gives us a great understanding of fox activity in study area	Would be great to have an understanding of what flora and fauna we have. In particular, rare and threatened species. Would be great to have a connection with other stakeholders' data

Organisation	Threat	Threat description	Asset	Asset description	What is the aim of your monitoring program	How effective has the monitoring program been?	Any monitoring needs that are currently not met
Warrnambool Field Naturalists Club	Weed	Introduced weeds	Yes	Grassland Reserve in Albert Park, Warrnambool	Only just begun end of 2022 to weed the small, fenced area and members (particularly Shirley Duffield) has monitored and listed weeds present in the reserve prior to weeding	Will be known over time. Many/most of a list of grasses and weeds were removed but effect on numbers will be seen in Spring 2023. Monitoring has included native species within the reserve, e.g., orchids, lilies (report to Justin H). Previous butterfly survey was also undertaken	Wider scale monitoring of Albert Park for remnant native vegetation and distribution of the range of weeds likely to impact on the Grassland Reserve
Warrnambool City Council	Weed and pest animals	Rabbits/Weed control	Yes	Holiday Parks	Control the rabbit population and deadly nightshade	Prior to summer, we baited and bombed burrows with moderate success but numbers have bounced back plus! Eradicate by extraction	Cannot bait rabbit in summer due to high patronage. Continued vigilance to limit the spread and educate staff re: control
Canidae development	Fox	Fox			1. To monitor fox activity over the course of baiting program. 2. To determine high activity area prior to baiting program	Bait take has increased over the years. Survey demonstrated reduce(d) activity over baiting period	1. Cost prohibits scat analysis for DNA and diet analysis. 2. Ongoing monitoring would give clear changes to behaviour through season and years
Warrnambool Field Naturalists Club	Weeds	Weeds (Chilean needle grass, St John's wort, Cocksfoot, wild sage)	Yes	Small grass reserve (Albert Park)	To eradicate listed weeds from small reserve area	Not very - in early stages as yet	Yes, Effects of herbicide on wild sage - difficult liaising with sprayer to know when action taken). More dedication to this matter!



Organisation	Threat	Threat description	Asset	Asset description	What is the aim of your monitoring program	How effective has the monitoring program been?	Any monitoring needs that are currently not met
GHCMA	Weed and pest animals	Waterways - flora and fauna	Yes	Weeds, urban expansion, domestic stock	To reduce threats associated with degrading environmental condition. Monitoring includes: 1) Stock access to waterways 2) Pest plants i.e., willows across rivers 3) native flora and fauna monitoring 4) fish, macroinvertebrates, eDNA, social 5) Branching into expanded scope i.e., long term visions, nutrients etc *Other CMA projects exist other than my own e.g., estuary watch, IWM, instream habitat etc	Continued projects + monitoring Increase in stock exclusion fencing/limiting stock access Merri River 6-7 years, Brucknells Creek 2-3 years, Hopkins continued. Wildly effective across 100s of kms/properties Increase in fish numbers and conditions	Opportunity for more nutrients and stormwater monitoring. Collaborating GIS and weed layers, eDNA emerging
Warmambool Coastcare Landcare network	Fox	Fox threat - middle island (in conjunction with WCC)			To reduce threat of foxes on little penguin population	Successful over a number of years, but interrupted recently through lack of access to island	Access to island for volunteers, program expected to resume soon
Friends of Victoria Park	Weeds	English Ivy and Mediterranean Buckthorn	Yes	Victoria Park	To enable pest species to be removed	Some reduction in spread of these two weeds	

## 5 Limitations

This Framework was developed through a collaborative process involving key stakeholders across the Warrnambool City Council Area. It is as complete as possible, however, there are likely to be other stakeholders who were unintentionally not consulted in this round. Eight submissions received through the public consultation phase of forming the Framework have highlighted some inadequacies. All suggestions from these submissions have either been incorporated in the final Framework or will be considered for future rounds.

The tools used to generate the lists of invasive plants and animals can be incomplete and out-dated. These tools are also often aimed at the whole state, are generated using modelled data, and can therefore not be completely aligned with the on-ground situation.

The calibration of the Multi-Criteria Analysis was thoughtfully completed, however, there may be other ways to weight the categories that would fine tune the outcomes. To address this as best as possible, weightings were determined collectively at the stakeholder workshop. Regardless, the MCA output is meant to guide decision-making, not to determine it, and there may be other factors which are more important in choosing which actions to engage in that were not included in the analysis.

Some of the threat/asset rows in the input tables (which were drawn into the MCA) were not complete. We either did not have enough information to complete them, or they were added in the final stages and not addressed at the workshop. We thought it important to include them for completeness. More complete calibration of these rows may change their ranking in the MCA, and this could be considered in the next round of this Framework.



Photo: Warrnambool City Council

# Appendices

## Appendix A

Outputs from VBA Introduced Species Report for WCC Area



## A.1. Output from VBA Introduced Species Report for WCC Area

Table 12: VBA Extract - Threatened Plants WCC Area

Scientific Name	Common Name	FFG Act	VICADV List	First Year Observed	Last Year Observed	Record Number	EPBC Act Status
<i>Pultenaea canaliculata</i>	Coast Bush-pea	Endangered	Rare	1893	1904	7	
<i>Amphibromus sinuatus</i>	Wavy Swamp Wallaby-grass	Endangered	Vulnerable	2010	2010	1	
<i>Scaevola calendulacea</i>	Dune Fan-flower	Endangered	Vulnerable	1895	1895	1	
<i>Dianella callicarpa</i>	Swamp Flax-lily	Endangered	Rare	2012	2014	4	
<i>Poa billardierei</i>	Coast Fescue	Endangered	Rare	1900	1998	6	
<i>Prasophyllum viretrum</i>	Basalt Leek-orchid	Critically Endangered	Endangered	2019	2019	2	
<i>Roepora billardierei</i>	Coast Twin-leaf	Endangered	Rare	2000	2000	2	
<i>Adriana quadripartita</i>	Coast Bitter-bush	Endangered	Vulnerable	1902	1940	2	
<i>Lepidium hyssopifolium</i> s.s.	Basalt Peppercress	Endangered	Endangered	1872	1872	2	Endangered
<i>Senecio glomeratus</i> subsp. <i>longifructus</i>	Annual Fireweed	Vulnerable	Rare	2010	2010	1	
<i>Exocarpos syrticola</i>	Coast Ballart	Endangered	Rare	2008	2008	1	
<i>Caladenia brachyscapa</i>	Short Spider-orchid	Extinct	Presumed extinct	1959	1959	1	Extinct
<i>Lachnagrostis robusta</i>	Salt Blown-grass	Endangered	Rare	1997	1997	1	
<i>Dianella longifolia</i> var. <i>grandis</i> s.l.	Glaucous Flax-lily	Critically Endangered		2000	2000	1	
<i>Melaleuca armillaris</i> subsp. <i>armillaris</i>	Giant Honey-myrtle	Endangered	Rare	2018	2018	1	



Table 13: VBA Extract Threatened Animals in WCC Area

Scientific Name	Common Name	FFG Act	VICADV List	EPBC Act	First Year Observed	Last Year Observed	Record Number
<i>Thinornis cucullatus</i>	Hooded Plover	Vulnerable		Vulnerable	2017	2019	211
<i>Lissolepis coventryi</i>	Swamp Skink	Endangered			1965	2018	10
<i>Lissolepis coventryi</i>	Swamp Skink	Endangered		Endangered	1965	2018	10
<i>Engaeus sericatus</i>	Hairy Burrowing Crayfish	Vulnerable			2008	2008	5
<i>Biziura lobata</i>	Musk Duck	Vulnerable	Vulnerable		1951	2019	48
<i>Spatula rhynchotis</i>	Australasian Shoveler	Vulnerable	Vulnerable		1951	2019	52
<i>Ornithorhynchus anatinus</i>	Platypus	Vulnerable	Vulnerable		1962	2022	26
<i>Eubalaena australis</i>	Southern Right Whale	Endangered	Critically endangered		1971	2021	912
<i>Anseranas semipalmata</i>	Magpie Goose	Vulnerable	Near threatened		1960	2019	63
<i>Thinornis cucullatus</i>	Hooded Plover	Vulnerable	Vulnerable		1978	2020	90
<i>Hydroprogne caspia</i>	Caspian Tern	Vulnerable	Near threatened		1977	2000	15
<i>Lewinia pectoralis</i>	Lewin's Rail	Vulnerable	Vulnerable		1970	1999	6
<i>Oxyura australis</i>	Blue-billed Duck	Vulnerable	Endangered		1951	2018	7
<i>Megaptera novaeangliae australis</i>	Southern Humpback Whale	Critically Endangered	Vulnerable		1985	2020	17
<i>Tringa nebularia</i>	Common Greenshank	Endangered	Vulnerable		1960	2006	42
<i>Egretta garzetta</i>	Little Egret	Endangered	Endangered		1978	2018	4
<i>Miniopterus orianae bassanii</i>	Southern Bent-winged Bat (southern ssp.)	Critically Endangered	Critically endangered		2002	2021	10
<i>Aythya australis</i>	Hardhead	Vulnerable	Vulnerable		1951	2019	36
<i>Arctophoca forsteri</i>	Long-nosed Fur Seal	Vulnerable	Vulnerable		2016	2020	4
<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable	Vulnerable		1951	2005	7
<i>Stictonetta naevosa</i>	Freckled Duck	Endangered	Endangered		1951	2018	8
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable		1963	2022	12

Scientific Name	Common Name	FFG Act	VICADV List	EPBC Act	First Year Observed	Last Year Observed	Record Number
<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered	Endangered		1992	1992	2
<i>Arenaria interpres</i>	Ruddy Turnstone	Endangered	Vulnerable		1971	2000	6
<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable	Vulnerable		1960	1960	1
<i>Ardea alba modesta</i>	Eastern Great Egret	Vulnerable	Vulnerable		2017	2019	18
<i>Sternula nereis</i>	Fairy Tern	Critically Endangered	Endangered		2017	2017	1
<i>Balaenoptera musculus</i>	Blue Whale	Endangered	Critically endangered		1887	2011	5
<i>Dermochelys coriacea</i>	Leathery Turtle	Critically Endangered	Critically endangered		2004	2004	1
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Critically Endangered	Endangered		1951	2019	10
<i>Actitis hypoleucos</i>	Common Sandpiper	Vulnerable	Vulnerable		1978	2018	8
<i>Tringa stagnatilis</i>	Marsh Sandpiper	Endangered	Vulnerable		1985	1994	3
<i>Thalassarche cauta</i>	Shy Albatross	Endangered	Vulnerable		1953	2000	2
<i>Ixobrychus dubius</i>	Australian Little Bittern	Endangered	Endangered		1995	1995	2
<i>Pluvialis fulva</i>	Pacific Golden Plover	Vulnerable	Vulnerable		1960	1960	1
<i>Euastacus armatus</i>	Murray Spiny Crayfish	Threatened	Near threatened		2014	2014	1
<i>Accipiter novaehollandiae</i>	Grey Goshawk	Endangered	Vulnerable		1960	2018	6
<i>Macronectes giganteus</i>	Southern Giant-Petrel	Endangered	Vulnerable		1987	1987	1
<i>Dasyurus viverrinus</i>	Eastern Quoll	Endangered (Extinct in Victoria)	Regionally extinct		1900	1900	1
<i>Numenius phaeopus</i>	Whimbrel	Endangered	Vulnerable		1960	1960	1
<i>Neophoca cinerea</i>	Sea-lion	Endangered			1997	2007	2
<i>Rostratula australis</i>	Australian Painted-snipe	Critically Endangered	Critically endangered		1995	1995	1

Scientific Name	Common Name	FFG Act	VICADV List	EPBC Act	First Year Observed	Last Year Observed	Record Number
<i>Litoria raniformis</i>	Growling Grass Frog	Vulnerable	Endangered		1961	1972	11
<i>Ninox connivens</i>	Barking Owl	Critically Endangered	Endangered		1960	1960	1
<i>Falco subniger</i>	Black Falcon	Critically Endangered	Vulnerable		1951	1951	1
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	Critically Endangered	Critically endangered		1979	2005	3
<i>Limosa lapponica</i>	Bar-tailed Godwit	Vulnerable			1991	1999	3
<i>Limosa limosa</i>	Black-tailed Godwit	Critically Endangered	Vulnerable		1999	1999	1
<i>Ardeotis australis</i>	Australian Bustard	Critically Endangered	Critically endangered		1878	1878	1
<i>Nannoperca obscura</i>	Yarra Pygmy Perch	Vulnerable	Vulnerable		2007	2017	9
<i>Thalassarche chrysostoma</i>	Grey-headed Albatross	Endangered	Vulnerable		1957	1957	1
<i>Tringa glareola</i>	Wood Sandpiper	Endangered	Vulnerable		2019	2019	1
<i>Ardea intermedia plumifera</i>	Plumed Egret	Critically Endangered	Endangered		1990	1999	2
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Endangered	Vulnerable		2000	2000	1
<i>Sternula albifrons</i>	Little Tern	Critically Endangered	Vulnerable		2017	2017	1

## A.1.1. Weed list WCC Area

Table 14: VBA Extract - Weed List WCC Area

VBA Taxon ID	Scientific Name	Common Name
502966	<i>Acetosella vulgaris</i>	Sheep Sorrel
500139	<i>Agave americana</i>	Century Plant
500153	<i>Agrostis capillaris</i>	Brown-top Bent
500160	<i>Agrostis stolonifera</i>	Creeping Bent
500164	<i>Aira caryophyllaea subsp. caryophyllaea</i>	Silvery Hair-grass
500165	<i>Aira cupaniana</i>	Quicksilver Grass
500167	<i>Aira praecox</i>	Early Hair-grass
501399	<i>Aizoon pubescens</i>	Galenia
902095	<i>Allium sphaerocephalon</i>	Round-headed Leek
505165	<i>Alternanthera philoxeroides</i>	Alligator Weed
500236	<i>Anthoxanthum</i>	Sweet Vernal-grass
500255	<i>Arctotheca calendula</i>	Cape Weed
503718	<i>Arctotheca populifolia</i>	Beach Daisy
500274	<i>Asparagus</i>	Bridal Creeper
500318	<i>Atriplex prostrata</i>	Hastate Orache
500341	<i>Avena fatua</i>	Wild Oat
508098	<i>Avena spp.</i>	Oat
502420	<i>Bellardia latifolia</i>	Red Bartsia
500384	<i>Bellis perennis</i>	English Daisy
500388	<i>Berkheya rigida</i>	African Thistle
508148	<i>Brassica spp.</i>	Turnip
500496	<i>Briza minor</i>	Lesser Quaking-grass
500498	<i>Bromus catharticus</i>	Prairie Grass
500500	<i>Bromus diandrus</i>	Great Brome
500501	<i>Bromus hordeaceus</i>	Soft Brome
502022	<i>Buglossoides arvensis</i>	Corn Gromwell
500520	<i>Cakile edentula</i>	American Sea Rocket
500521	<i>Cakile maritima subsp. maritima</i>	Sea Rocket
500205	<i>Calamagrostis arenaria</i>	Marram Grass
500574	<i>Callitriche stagnalis</i>	Common Water- starwort
500620	<i>Carduus</i>	Slender Thistle
500687	<i>Catapodium rigidum</i>	Fern Grass
502451	<i>Cenchrus clandestinus</i>	Kikuyu
502453	<i>Cenchrus longisetus</i>	Feathertop
502450	<i>Cenchrus</i>	Swamp Foxtail-grass
500702	<i>Centaureum erythraea</i>	Common Centaury
500705	<i>Centaureum tenuiflorum</i>	Slender Centaury
500710	<i>Centranthus ruber</i>	Red Valerian
500719	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed
500721	<i>Cerastium</i>	Mouse-ear Chickweed
500736	<i>Chenopodium album</i>	Fat Hen
500746	<i>Chenopodium murale</i>	Sowbane



VBA Taxon ID	Scientific Name	Common Name
500776	<i>Cicendia filiformis</i>	Slender Cicendia
500781	<i>Cirsium arvense</i> var. <i>arvense</i>	Perennial Thistle
508238	<i>Cirsium</i> spp.	Thistle
500782	<i>Cirsium vulgare</i>	Spear Thistle
500803	<i>Conium maculatum</i>	Hemlock
500823	<i>Coprosma repens</i>	Mirror Bush
500825	<i>Cortaderia selloana</i> subsp. <i>selloana</i>	Pampas Grass
500848	<i>Cotula coronopifolia</i>	Water Buttons
505186	<i>Crassula multicava</i> subsp. <i>multicava</i>	Shade Crassula
500867	<i>Crataegus monogyna</i>	Hawthorn
504554	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
500918	<i>Cyperus eragrostis</i>	Drain Flat-sedge
500948	<i>Dactylis glomerata</i>	Cocksfoot
503148	<i>Danthonia decumbens</i>	Heath Grass
500986	<i>Datura stramonium</i>	Common Thorn-apple
501065	<i>Diploaxis muralis</i>	Wall Rocket
501066	<i>Diploaxis tenuifolia</i>	Sand Rocket
501070	<i>Dipsacus fullonum</i>	Wild Teasel
505483	<i>Disa bracteata</i>	South African Orchid
503696	<i>Drosanthemum</i>	Rodondo Creeper
501123	<i>Echium plantagineum</i>	Paterson's Curse
501128	<i>Ehrharta erecta</i>	Panic Veldt-grass
501129	<i>Ehrharta longiflora</i>	Annual Veldt-grass
500812	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane
501329	<i>Euphorbia helioscopia</i>	Sun Spurge
501332	<i>Euphorbia peplus</i>	Petty Spurge
507711	<i>Festuca gautieri</i>	Bear-skin Fescue
501370	<i>Foeniculum vulgare</i>	Fennel
508446	<i>Freesia</i> spp.	Freesia
501380	<i>Fumaria capreolata</i>	White Fumitory
501412	<i>Galium murale</i>	Small Goosegrass
501417	<i>Gaudinia fragilis</i>	Fragile Oat
501422	<i>Genista</i>	Montpellier Broom
501426	<i>Geranium dissectum</i>	Cut-leaf Crane's-bill
501599	<i>Hedera helix</i> s.l.	English Ivy
501636	<i>Heliotropium</i>	Common Heliotrope
502511	<i>Helminthotheca</i>	Ox-tongue
501692	<i>Holcus lanatus</i>	Yorkshire Fog
515430	<i>Hordeum marinum</i>	Sea Barley-grass
501744	<i>Hypericum perforatum</i> subsp. <i>veronense</i>	St John's Wort
501748	<i>Hypochaeris radicata</i>	Flatweed
500936	<i>Isolepis levynsiana</i>	Tiny Flat-sedge
501802	<i>Juncus acutus</i> subsp. <i>acutus</i>	Spiny Rush
501806	<i>Juncus articulatus</i>	Jointed Rush
501864	<i>Lagurus ovatus</i>	Hare's-tail Grass

VBA Taxon ID	Scientific Name	Common Name
508643	<i>Lavandula spp.</i>	Lavender
501895	<i>Leontodon saxatilis subsp. saxatilis</i>	Hairy Hawkbit
502013	<i>Linaria vulgaris</i>	Common Toad-flax
502028	<i>Lobularia maritima</i>	Sweet Alyssum
502036	<i>Lolium perenne</i>	Perennial Rye-grass
502060	<i>Lotus subbiflorus</i>	Hairy Bird's-foot Trefoil
502061	<i>Lotus uliginosus</i>	Greater Bird's-foot Trefoil
502078	<i>Lycium ferocissimum</i>	African Box-thorn
500223	<i>Lysimachia arvensis</i>	Pimpernel
505170	<i>Lysimachia arvensis var. arvensis</i>	Scarlet Pimpernel
502118	<i>Malus pumila</i>	Apple
502121	<i>Malva nicaeensis</i>	Mallow of Nice
502122	<i>Malva parviflora</i>	Small-flower Mallow
503858	<i>Malva sylvestris</i>	Tall Mallow
502123	<i>Marrubium vulgare</i>	Horehound
502140	<i>Medicago polymorpha</i>	Burr Medic
502161	<i>Melilotus indicus</i>	Sweet Melilot
502171	<i>Mentha spicata</i>	Spearmint
501695	<i>Moraea flaccida</i>	One-leaf Cape-tulip
502252	<i>Myriophyllum</i>	Parrot's Feather
503282	<i>Nassella neesiana</i>	Chilean Needle-grass
502948	<i>Nasturtium officinale</i>	Watercress
502336	<i>Onopordum acanthium subsp. acanthium</i>	Scotch Thistle
502387	<i>Oxalis pes-caprae</i>	Soursob
502418	<i>Parapholis incurva</i>	Coast Barb-grass
502423	<i>Parietaria judaica</i>	Wall Pellitory
502430	<i>Paspalum dilatatum</i>	Paspalum
502431	<i>Paspalum distichum</i>	Water Couch
502476	<i>Phalaris aquatica</i>	Toowoomba Canary- grass
502496	<i>Phleum pratense</i>	Timothy Grass
502539	<i>Pinus radiata</i>	Radiata Pine
502372	<i>Piptatherum miliaceum</i>	Rice Millet
505830	<i>Pisum sativum</i>	Garden Pea
502553	<i>Plantago coronopus</i>	Buck's-horn Plantain
502561	<i>Plantago lanceolata</i>	Ribwort
502562	<i>Plantago major</i>	Greater Plantain
502580	<i>Poa annua s.l.</i>	Annual Meadow-grass
502606	<i>Poa pratensis</i>	Kentucky Blue-grass
502622	<i>Polycarpon</i>	Four-leaved Allseed
502624	<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort
503954	<i>Polygonum arenastrum</i>	Wireweed
502639	<i>Polypogon maritimus var. subspathaceus</i>	Coast Beard-grass
502640	<i>Polypogon</i>	Annual Beard-grass
508918	<i>Polypogon spp.</i>	Beard Grass
502757	<i>Prunella vulgaris</i>	Self-heal

VBA Taxon ID	Scientific Name	Common Name
508936	<i>Prunus</i> spp.	Prunus
502917	<i>Raphanus</i>	Wild Radish
502932	<i>Rhamnus alaternus</i>	Italian Buckthorn
508994	<i>Romulea</i> spp.	Onion Grass
502950	<i>Rosa rubiginosa</i>	Sweet Briar
502952	<i>Rubus fruticosus</i> spp. agg.	Blackberry
502969	<i>Rumex conglomeratus</i>	Clustered Dock
502970	<i>Rumex crispus</i>	Curled Dock
502974	<i>Rumex pulcher</i> subsp. <i>pulcher</i>	Fiddle Dock
502992	<i>Salpichroa origanifolia</i>	Pampas Lily-of-the- Valley
503027	<i>Schinus molle</i>	Pepper Tree
503105	<i>Senecio elegans</i>	Purple Groundsel
503113	<i>Senecio jacobaea</i>	Ragwort
503132	<i>Senecio vulgaris</i>	Common Groundsel
503138	<i>Sherardia arvensis</i>	Field Madder
503156	<i>Silybum marianum</i>	Variegated Thistle
503163	<i>Sisyrinchium</i>	Striped Rush-leaf
503178	<i>Solanum linnaeanum</i>	Apple of Sodom
503183	<i>Solanum nigrum</i> s.l.	Black Nightshade
503203	<i>Sonchus asper</i> s.l.	Rough Sow-thistle
503204	<i>Sonchus oleraceus</i>	Common Sow-thistle
503208	<i>Sparaxis bulbifera</i>	Harlequin Flower
503211	<i>Sparganium erectum</i> subsp. <i>stoloniferum</i>	Branching Bur-reed
503226	<i>Sporobolus africanus</i>	Rat-tail Grass
503253	<i>Stellaria pallida</i>	Lesser Chickweed
503260	<i>Stenotaphrum</i>	Buffalo Grass
500297	<i>Symphyotrichum</i>	Aster-weed
528546	<i>Tinca tinca</i>	Tench
503417	<i>Tragopogon porrifolius</i> subsp. <i>porrifolius</i>	Salsify
503424	<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover
503427	<i>Trifolium dubium</i>	Suckling Clover
503428	<i>Trifolium fragiferum</i> var. <i>fragiferum</i>	Strawberry Clover
503429	<i>Trifolium glomeratum</i>	Cluster Clover
504012	<i>Trifolium resupinatum</i> var. <i>resupinatum</i>	Shaftal Clover
509161	<i>Trifolium</i> spp.	Clover
503442	<i>Trifolium tomentosum</i> var. <i>tomentosum</i>	Woolly Clover
504006	<i>Tropaeolum majus</i>	Nasturtium
503471	<i>Ulex europaeus</i>	Gorse
503494	<i>Verbascum thapsus</i> subsp. <i>thapsus</i>	Great Mullein
503502	<i>Veronica arvensis</i>	Wall Speedwell
503511	<i>Veronica persica</i>	Persian Speedwell
503518	<i>Vicia sativa</i>	Common Vetch
509217	<i>Vicia</i> spp.	Vetch
503544	<i>Vulpia bromoides</i>	Squirrel-tail Fescue
509223	<i>Vulpia</i> spp.	Fescue

VBA Taxon ID	Scientific Name	Common Name
500140	<i>X Agropogon littoralis</i>	Perennial Beard-grass



# Appendix B

## Stakeholders and Workshop Attendees



# Stakeholders

Warrnambool City Council provided a list of stakeholders, who were consulted over the course of the development of the framework. In the first round of consultation, phone interviews identified assets and threats. In the second round, these assets and threats, as well as effectiveness and cost control actions were generated, discussed and calibrated. Collaboration and monitoring were also discussed by the stakeholders at the workshop. The list of stakeholders and workshop attendees is provided here.

## B.1. Stakeholders consulted in the development of this framework

Stakeholders
WCC Working Group - Acting Coordinator Sustainability & Natural Environment
WCC Manager Sustainability and Compliance
WCC Working Group - Manager Strategy & Development
WCC Working Group - Manager Infrastructure Services
WCC Working Group - Coordinator Municipal Operations
WCC Working Group - Supervisor Environment Playgrounds & Coastal Maintenance
WCC Working Group - Team Leader Parks, Gardens & Environment
WCC Manager of Recreation and Culture
WCC Service Manager, Visitor Economy
Glenelg Hopkins Catchment Management Authority
Eastern Maar Aboriginal Corporation – Healthy Country Manager
Eastern Maar Aboriginal Corporation
Parks Victoria - Area Chief Ranger
Birdlife Australia - Coastal Birds Project Officer
Canidae Development - Managing Director
Bligh Vegetation Management - Owner Manager
Basalt to Bay Landcare Network - Network Facilitator
Warrnambool Coastcare Landcare Network - President
Friends of Victoria Park
Friends of Victoria Park

Stakeholder	Stakeholder Type
	Russells Creek Landcare
	Friends of Harris on Merri
	Australian Plants Society, Warrnambool & District - President
	Local Citizen Scientist - Author of Environmental Weeds of Warrnambool
	Making a Difference (MAD) for the Merri
	Warrnambool Field Naturalists Club
	Network Facilitator, Warrnambool Coastcare Landcare Network

## B.2. Workshop Attendees

Organisation	Role
WCC	Natural Environment Officer, Natural Environment & Sustainability
WCC	Working Group - Coordinator Municipal Operations
WCC	Supervisor Environment, Playgrounds & Coastal Maintenance
WCC	Service Manager, Visitor Economy
EcoFutures	Senior Ecologist
EcoFutures	Environmental Scientist
NCEconomics	Natural Capital Economist
Glenelg Hopkins Catchment Management Authority	Senior Waterways Officer
Eastern Maar Aboriginal Corporation	Healthy Country Manager
Eastern Maar Aboriginal Corporation	Traditional Owner
Birdlife Australia	Coastal Birds Project Officer
Warrnambool Coastcare Landcare Network	Network Facilitator
Author of Environmental Weeds of Warrnambool	Naturalist and Author
Friends of Victoria Park	Member
Warrnambool Field Naturalists Club	Member
Warrnambool Field Naturalists Club	Member
Canidae Development	Owner/Manager
Parks Victoria	Area Chief Ranger