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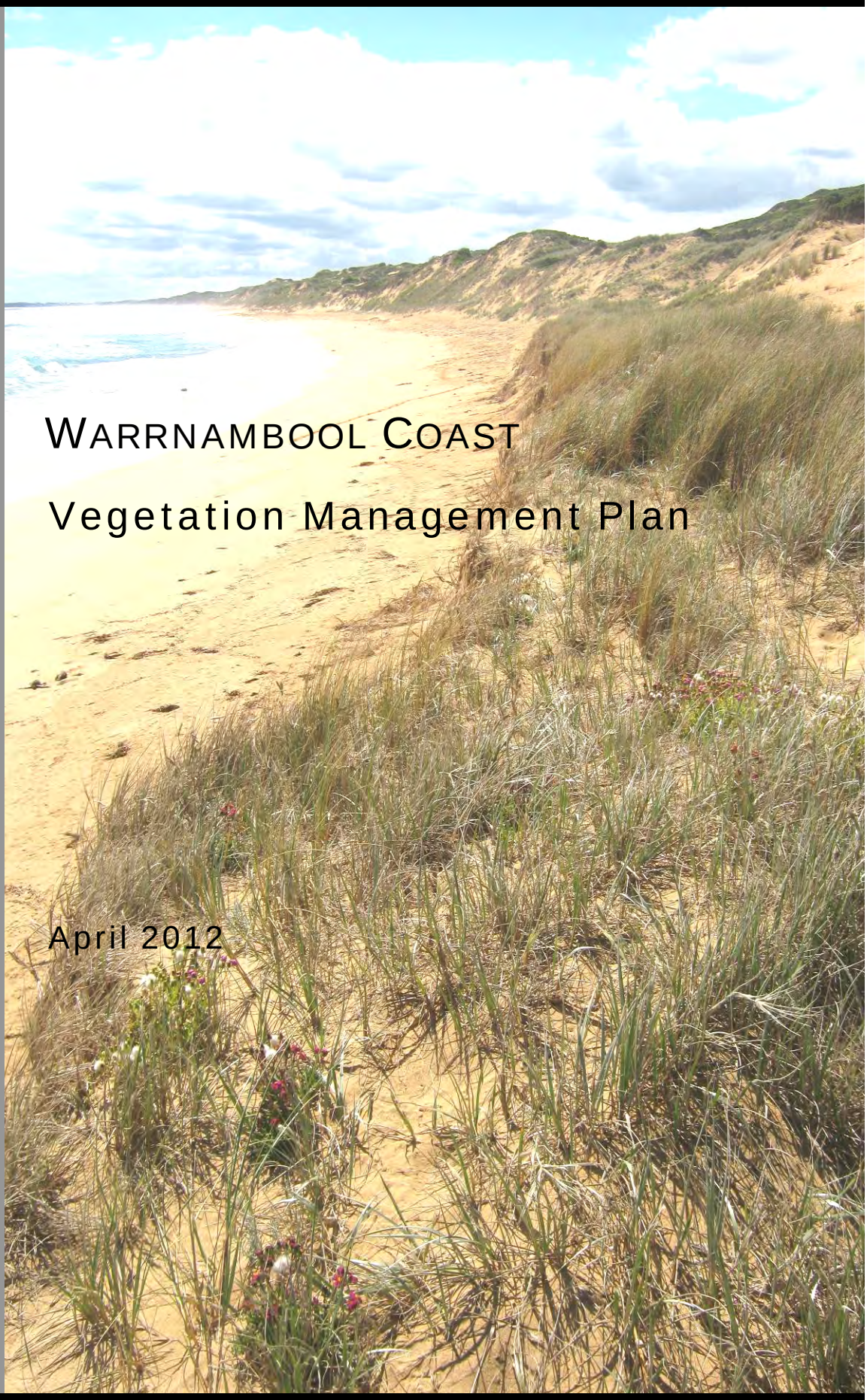

WARRNAMBOOL COAST

Vegetation Management Plan

April 2012

Natural & Cultural Heritage Consultants 38 Bertie Street (PO Box 489) Port Melbourne Victoria 3207

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RESEARCH

Plan prepared for
Warrnambool City Council

WARRNAMBOOL COAST
Vegetation Management Plan

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Prepared by

Jeff Yugovic and Shona Arber

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Melbourne:
38 Bertie Street, Port Melbourne VIC 3207
Ph: (03) 9646 9499 Fax: (03) 9646 9242
email: melbourne@biosisresearch.com.au

Sydney:
18–20 Mandible Street, Alexandria NSW 2015
Ph: (02) 9690 2777 Fax: (02) 9690 2577
email: sydney@biosisresearch.com.au

Ballarat:
449 Doveton Street North, Ballarat VIC 3354
Ph: (03) 5331 7000 Fax: (03) 5331 7033
email: ballarat@biosisresearch.com.au

Canberra:
Unit 16 / 2 Yallourn Street
Fyshwick ACT 2609
Ph: (02) 6228 1599 Fax: (02) 6280 8752
email: canberra@biosisresearch.com.au

Wollongong:
8 Tate Street, Wollongong NSW 2500
Ph: (02) 4229 5222 Fax: (02) 4229 5500
email: wollongong@biosisresearch.com.au

Wangaratta:
26a Reid Street (PO Box 943)
Wangaratta VIC 3677
Ph: (03) 5721 9453 Fax: (03) 5721 9454
email: wangaratta@biosisresearch.com.au

***BIOSIS** RESEARCH Pty. Ltd. A.B.N. 65 006 175 097*
Natural & Cultural Heritage Consultants

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ABBREVIATIONS

DEPI *Department of Environment and Primary Industries, Victoria*
EPBC *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EVC *Ecological vegetation class*
FFG *Flora and Fauna Guarantee Act 1988* (Vic.)
FIS *Flora Information System (DEPI)*

CONTENTS

SUMMARY

Introduction

Biosis Research was commissioned by Warrnambool City Council (WCC) through URS Australia to prepare a vegetation management plan (VMP) including a Native Vegetation Precinct Plan (NVPP) for the Warrnambool Coast as part of the coastal management plan (CMP) prepared by URS Australia. This vegetation management plan assesses the existing vegetation and provides WCC with a management strategy for the area.

For this plan, the Warrnambool Coast comprises all public land along the coastline within the City of Warrnambool boundary. In order to facilitate management and communication, and consistent with the coastal management plan, the Coast is divided into five management zones (or precincts), however for the purpose of this Plan (VMP) the Wild Coast and the South West Crown Land Precincts will be combined due to similar vegetation issues; therefore the precincts are as follows:

- Wild Coast and South West Crown Land — western boundary of WCC area to Merri River
- Lady Bay West — Merri River to the Flume
- Lady Bay East — the Flume to Hopkins River
- Logans Beach — Hopkins River to eastern boundary of WCC managed land

Warrnambool City Council is the delegated public land manager for Warrnambool coast on behalf of the Minister for Environment and Climate Change. Various government agencies and a number of community groups are also actively involved in the management of the Coast.

Existing Conditions

A total of 98 indigenous and 105 introduced plant species are recorded from the Warrnambool Coast by this study, indicating a diverse coastal flora.

Fifteen ecological vegetation classes are recorded and mapped for the Warrnambool coast by this study. The EVCs may be divided into three groups: dry coastal, wet coastal and freshwater wetland.

Management Issues and Actions

The Warrnambool Coast supports extensive native vegetation with significant natural, cultural, economic, educational and recreational values. A cost effective, culturally sensitive and scientific approach that engages the local community in conservation and management is recommended.

Management issues addressed in this plan include:

- Vegetation restoration
- Revegetation
- Rare species management
- Weed control
- Access and fencing
- Signage
- Vegetation height issue at the Promenade
- Pest animal management
- Horse riding
- Illegal 4WDs and motorbikes
- Planning and review
- Fire management
- Public safety

A ten year management schedule including revegetation with indicative costings is included in this plan. The management schedule is indicative. Detailed and achievable management objectives will be identified each year in response to progress and contingencies arising.

1.0 INTRODUCTION

1.1 Project background

Biosis Research was commissioned by Warrnambool City Council (WCC) through URS Australia to prepare a vegetation management plan (VMP) including a Native Vegetation Precinct Plan (NVPP) for the Warrnambool Coast as part of the coastal management plan (CMP) prepared by URS Australia.

The purpose of this plan is to assess the existing vegetation and provide Warrnambool City Council with a management strategy for the area. Over the years, Warrnambool City Council, in partnership with DEPI, other government agencies and a number of local community groups, have managed weeds and undertaken revegetation of the Coast. The Coast is a valuable resource used for conservation, camping, low-impact recreation (such as walking and cycling) and cultural activity by the local community and visitors.

Previous management plans that include part of the area are as follows:

- Management plan for the Levy's Point Coastal Reserve (1998).
  Prepared by Scenic Spectrums Pty Ltd, Glen Waverley, Victoria.
- Landscape Management Plan for the South Warrnambool Wetlands (1996).
  Prepared by Scenic Spectrums Pty Ltd in association with Ecology Australia Pty Ltd.
- Merri River Restoration Strategy (2004).
  Warrnambool City Council.
- Merri Estuary Management Plan (2008).
  Glenelg Hopkins Catchment Management Authority, Hamilton, Victoria.
- Hopkins Estuary Management Plan (2006)
  Glenelg Hopkins Catchment Management Authority, Hamilton, Victoria.

1.2 Objectives

The principles of the Victorian Coastal Strategy (DSE 2008) for coastal, estuarine and marine environment planning and management are to:

- Provide for the protection of significant cultural and environmental values.
- Undertake integrated planning and provide clear direction for the future.
- Ensure the sustainable use of natural coastal resources.
- Ensure suitable development on the coast.

Objectives for natural resource management of the Coast are to:

- Protect biodiversity, ensuring that indigenous species survive.
- Allow natural ecological processes to operate as far as possible, primarily by keeping introduced flora and fauna impacts to a minimum.
- Achieve a high level of ecologically sound on-ground management.
- Engage the community in protecting the values of the coast and increase their understanding of the role of Warrnambool City Council, DEPI and community groups in its management.
- Ensure the investment of time and effort by WCC has the greatest long-term ecological benefits.
- Consider the predicted impacts of sea level rise and climate change.

The Victorian Coastal Strategy (2008) policy for vegetation is to 'restore, rehabilitate and nurture coastal biodiversity and vegetation under regionally and locally determined priorities'. The objectives of this vegetation management plan are therefore to:

- Survey and map existing vegetation including ecological vegetation classes.
- Identify management zones including identification of significant vegetation and areas of high priority for vegetation management actions.
- Identify management issues that affect indigenous vegetation.
- Set priorities for the management of the vegetation, including weed management and revegetation.
- Provide a ten year management plan for the Coast including a revegetation implementation schedule and a weed control schedule to be used as a Native Vegetation Precinct Plan.
- Provide specific management advice for those implementing the plan.

1.3 Management area

For the purpose of this plan, the Warrnambool Coast comprises all public land along the entire length of coast within the City of Warrnambool boundary (Figure 1).

Although this management plan relates specifically to the Warrnambool Coast, it is important to consider the Coast as part of a wider network of ecological remnants along the coast. Land north of the Coast is predominantly cleared and includes the Warrnambool CBD, large areas of residential housing and agricultural land. This creates a significant physical barrier to movement of many flora and fauna species and results in high pressure such as edge effects facilitating weed invasion and overuse by humans.

Management of the surrounding area is beyond the scope of this plan; however any treatment should be sympathetic to the biodiversity values of the Coast and its importance in a wider ecological context.

In order to facilitate management and communication, and consistency with the coastal management plan, the Coast is divided into management zones as follows:

- Wild Coast & South West Crown land — Western boundary of WCC area to Merri River
- Lady Bay West — Merri River to the Flume
- Lady Bay East — the Flume to Hopkins River
- Logans Beach — Hopkins River to eastern boundary of WCC area

One section of Coast (dune) between Logans Beach and Hopkins River is on private land and is therefore not included in this plan. This plan relates to coastal Crown land managed by Council, and freehold land owned by Council.

Warrnambool City Council has primary management responsibility for the Coast. DEPI, Parks Victoria, other government agencies (e.g. Western Coastal Board, Glenelg Hopkins CMA) and a number of community groups are also actively involved in the management of the Coast.

The management area supports a wide variety of vegetation, comprising remnant vegetation, areas of revegetation, and areas of predominantly introduced vegetation including areas of open lawn for low-impact recreation, and ornamental tree and shrub plantings. There are several buildings and built facilities including the campground, life saving club, and breakwater. There are

numerous walking tracks along much of the Coast particularly at the eastern end, including within the Lady Bay and Flume areas.

Warrnambool is located within the Warrnambool Plain bioregion (DEPI website).

2.0 EXISTING CONDITIONS

The Warrnambool Coast has undergone substantial loss and modification of indigenous vegetation since European settlement. Excessive grazing (including cattle and rabbits) and excessive use of fire resulted in bare sand dunes and sand blowing into the town. Early planting to stabilise the dunes and was effective, but also introduced species which are now considered weeds e.g. Marram Grass and Coast Tea-tree (Heathcote and Maroske 1996).

2.1 Plant species

A total of 98 indigenous and 105 introduced plant species are recorded from the Warrnambool Coast by this study, indicating a diverse coastal flora. This comprises species records generated by the present study, 49 additional species from the DEPI Flora Information System (FIS) Version 2009, and four additional weed species from Carr et al. 2011 (Appendix 1).

Six recorded species are listed as rare or threatened in Victoria and accordingly have state significance (DEPI 2005). Three of these were located during the present study, while the others are old records from the Warrnambool area without precise location details (DEPI Flora Information System):

Table 1: Plant species of state significance.

Status in Victoria	Scientific name	Common name	Location
Vulnerable	*Adriana quadripartita*	Coast Bitter-bush	Occurs in Grannys Grave area
Rare	*Austrofestuca littoralis*	Coast Fescue	1900 and 1903 herbarium records Warrnambool area (FIS)
Rare	*Lachnagrostis robusta*	Salt Blown-grass	1997 herbarium record Warrnambool area (FIS)
Rare	*Pultenaea canaliculata*	Coast Bush-pea	1893 to 1904 herbarium records Warrnambool area (FIS)
Rare	*Zygophyllum billardierei*	Coast Twin-leaf	Hopkins River (this study)
Poorly known	*Stackhousia spathulata*	Coast Stackhousia	Widespread and common on rocky coastline (this study)

2.1 Non indigenous species

Coast Tea-tree *Leptospermum laevigatum* is indigenous to Victoria east of Angelsea (Lyne 1996), but not to south-west Victoria. It was recommended by Ferdinand von Mueller as part of dune revegetation in the 1880s. It has since been used in amenity planting and is extensively naturalised.

Marram Grass *Ammophila arenaria*, which originates from Europe, was also recommended by von Mueller after extensive sand drifts were created by stock grazing (Heathcote and Maroske 1996). Marram Grass builds taller dunes than the natural Hairy Spinifex *Spinifex sericeus* due to unlimited vertical as well as horizontal rhizome growth, and is thought to responsible for local extinctions of the once common grass Coast Fescue *Austrofestuca littoralis* in Victoria. Marram Grass is widely naturalised in the Warrnambool area.

Both Coast Tea-tree and Marram Grass play an important role in vegetation management along the Warrnambool Coast. While their dominance does reduce plant diversity in some areas, both species are important for erosion control and dune stabilisation. They can also provide habitat for native fauna.

2.3 Plant communities

Native vegetation in Victoria is classified into ecological vegetation classes (EVCs) by the state government (DEPI). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. There is usually only one recognised floristic community in each EVC so the terms are effectively interchangeable (as in this study). EVCs are described by EVC benchmarks on the DEPI website.

In this study, mapped native vegetation conforms to the DEPI definition of 'patch' vegetation which is vegetation, with or without trees, where native plants constitute at least 25% of total understorey plant cover, bare ground not included (DSE 2007). No EVC in this study is dominated by trees, as the scrub vegetation on the coast is technically formed by shrubs not trees, so the 25% criterion applies to the entire vegetation cover. That is, native plants provide at least 25% of total plant cover within mapped vegetation, excluding bare ground.

Fifteen ecological vegetation classes are recorded and mapped for the Warrnambool Coast by this study (Appendix 2, Figure 3). Only four of these are mapped at the scale used in the DEPI Biodiversity Interactive Map (see DEPI website). The mapping developed in this study is therefore more accurate and useful for management. The EVCs may be divided into three groups: dry coastal, wet coastal and freshwater wetland (Table 1).

Another EVC, Swamp Scrub, which is dominated by Woolly Tea-tree *Leptospermum lanigerum*, may have previously occurred along the old Merri River within the management area. This vegetation type has undergone extensive loss in the district.

It is unclear whether the historical boundary between hinterland vegetation (Grassy Woodland or Damp Sands Herb-rich Woodland) and the coastal EVCs is within the management area. Originally Drooping Sheoak extended beyond the coast into the hinterland, and some areas that now support coastal EVCs may have supported eucalypts and other non-coastal vegetation. Further research is required before planting of species outside their current range takes place.

Table 2: Summary of ecological vegetation classes.

Dry coastal	**EVC No.**	**Area**	**Management Zone**
Berm Grassy Shrubland	311	Hopkins River	Logans Beach
Bird Colony Succulent Herbland	155	Middle Island	Wild Coast and South West Crown Land
Coastal Dune Grassland	879	Scattered	All zones
Coastal Dune Scrub	160	Widespread, extensive, on deep sand	All zones
Coastal Headland Scrub	161	Widespread, on rocky limestone areas	Wild Coast and South West Crown Land , Lady Bay East, Logans Beach
Coastal Tussock Grassland	163	One area west of Warrnambool	Wild Coast and South West Crown Land
Spray-zone Coastal Shrubland	876	Rocky coast west of Warrnambool	Wild Coast and South West Crown Land
Wet coastal			
Brackish Wetland	656	Merri River estuary	Wild Coast and South West Crown Land
Coastal Saltmarsh	009	Merri River estuary	Wild Coast and South West Crown Land
Estuarine Flats Grassland	914	Merri River estuary	Wild Coast and South West Crown Land
Estuarine Reedbed	952	One area western edge of Warrnambool	Wild Coast and South West Crown

			Land
Estuarine Wetland	010	One area western edge of Warrnambool	Wild Coast and South West Crown Land
Freshwater wetland			
Aquatic Herbland	653	Merri River Wetlands	Wild Coast and South West Crown Land
Aquatic Sedgeland	308	Merri River Wetlands	Wild Coast and South West Crown Land
Tall Marsh	821	Merri River Wetlands	Wild Coast and South West Crown Land

2.4 Management zones

The management zones (Figure 2a–4f) each have characteristic EVCs, weeds, revegetation requirements and other issues.

Wild Coast and South West Crown Land

Western boundary of WCC area to the Merri River (Figure 2a-2b).

Ecological Vegetation Classes

This zone supports extensive Coastal Dune Scrub with wetland vegetation associated with the prior course of the Merri River (Merri River Wetlands): Aquatic Herbland, Tall Marsh, Estuarine Wetland and Aquatic Sedgeland.

A large area of Estuarine Wetland (EVC 010) exists just north of the sand mine and is surrounded by Coastal Dune Scrub to the east, south and west and a linear strip of Aquatic Sedgeland (EVC 308) to the north. East of the Aquatic Sedgeland are areas of Tall Marsh (EVC 821) which are intersected by smaller areas of Aquatic Herbland (EVC 653). This wetland area is poorly understood and requires detailed vegetation survey.

The well-drained rocky coast in the Thunder Point area has a mosaic of Coastal Headland Scrub and Coastal Dune Scrub over most of the area. Spray-zone Coastal Shrubland (EVC 876) and the one known example of Coastal Tussock Grassland also occur here. An area of Estuarine Wetland (EVC 010) and Estuarine Reedbed (EVC 952) occupies the historic course of the Merri River at Elliot Street north of the Thunder Point raceway.

The vegetation of the Merri River estuary is of considerable interest, with the only examples of Coastal Saltmarsh and Brackish Wetland in the study area.

Weeds

Much of the vegetation is in generally good condition with weed cover mostly low to negligible except for extensive and abundant Marram Grass on the primary dune and in less densely vegetated areas of the dune area and Sea Spurge which is conspicuous along the beach.

Weeds are problematic in the Thunder Point area, with woody weeds such Italian Buckthorn, Boxthorn, Sweet Pittosporum, Mirror Bush and (on Middle Island) Tree Mallow, and herbaceous species such as Bridal Creeper and (on Middle Island) Rodondo Creeper. Coast Tea-tree is locally dominant in this zone. Coast Wattle is native to the area, however in some areas may be out of balance with other species. Although Coast Wattle (*Acacia longifolia* subsp. *sophorae*) is 'associated with' Coastal Dune Scrub (EVC 160, DEPI) it can behave as a weed in some coastal areas. Although indigenous within some area of Warrnambool's coastline, Coast Wattle should not be the dominant species in areas shown as Coastal Dune Scrub (EVC 160), or areas of Coastal Dune Scrub / Coastal Headland Scrub (CHS) mosaic in Figures 2a, b & c, which cover extensive areas of the Wild Coast and South West Crown Land precincts. If found in areas outside CDS or CDS/CHS mosaic it may require management, subject to a planning permit if not covered by a Native Vegetation Precinct Plan in the Planning Scheme.

The estuary is essentially weed-free as salt is a good weed killer. Some isolated but conspicuous Boxthorn shrubs on the saltmarsh require removal.

Revegetation

Revegetation of Spray-zone Coastal Shrubland using Pigface growing on sand bags is not appropriate as this vegetation is naturally sparse and the result appears unnatural. Elsewhere many plantings appear to have died from drought.

Other Management Issues

An unsealed road extends west from Midfield Meats. Due to this access, weed dispersal, rubbish dumping and illegal 4WD and motorbike disturbance of the dunes are problems. African Thistle *Berkheya rigida* has recently appeared in the Levy's Point Coastal Reserve and is thought to have been carried to the area by a vehicle. Installing locked gates along the road to prevent vehicle access but still allow pedestrian access should be considered. The proposed horse trail in this area has important management implications discussed later.

Gradual erosion of the limestone cliffs is a natural process and it is therefore generally undesirable to implement measures to slow this erosion. In some areas heavy pedestrian traffic has accelerated this process and boardwalks and fenced pedestrian access have been constructed. In some areas these should be relocated away from cliff edges but attempts to slow natural erosion should be avoided.

Management of fire risk in the scrub vegetation adjacent to the water treatment plant has been identified as a concern. Warrnambool Golf Course abuts this zone. Management of the Rifle Range, the Harness Racing Club site, private land boundaries and wetlands surrounded by private land are also of concern.

Overall Biodiversity Values

This zone is a relatively intact area of the Warrnambool Coast, with many natural values including nesting Hooded Plover on the beach. It is remote and undeveloped compared to the more eastern zones which are closer to the Warrnambool city and popular recreational areas.

This zone is diverse as it includes the Merri River estuary and Middle Island with its unique (within the WCC area) Bird Colony Succulent Herbland as well as breeding colonies of Little Penguin and Short-tailed Shearwater. The presence of extensive wetlands, limestone cliffs, and Merri and Middle islands make the Thunder Point area visually and ecologically interesting.

Lady Bay West

Merri River to the Flume (Figure 2d, 3b & 4d)

Ecological Vegetation Classes

Most of the native vegetation in this area is Coastal Dune Scrub in various degrees of modification, with Coast Tea-tree being locally dominant. Brackish Wetland occurs beside the Merri River. A small area of Spray-zone Coastal Shrubland occurs seaward of the old aquarium. Coastal Headland Scrub occurs inland from the caravan park, some being associated with the rail cutting.

Weeds

This area is more disturbed than most sections and weed cover is high on some sites, particularly Coast Tea-tree. Mirror Bush is very prominent having been planted over the years as a screening plant.

Revegetation

Revegetation has been undertaken in the experimental clearing in Coastal Dune

Scrub next to The Promenade. Some of these plantings were low density and the vegetation has high weed cover as a result. Higher planting densities and erosion control measures are required for future revegetation beside The Promenade.

Other Management Issues

Some residents have requested pruning or removal of vegetation at McGennan's Carpark and along the Promenade; the two main concerns are provision of views and personal safety while walking. The management of fire risk in and adjacent to the Shipwreck Bay Caravan Park is also of concern. High seas and storm surges are eroding the dune face. Mirror bush hedge planting has also been identified as a concern.

Overall Biodiversity Values

Coastal Tea-tree dominates the structure of much of this area, providing habitat for a range of fauna, and overstorey for smaller indigenous plant species. The vegetation provides a large area of relatively undisturbed habitat in the large area between the Breakwater Road, Lady Bay, and the development area to the north. The vegetation also forms a corridor of habitat along the foreshore. There is considerable variation in the type and quality of biodiversity values in this zone.

Lady Bay East

The Flume to the Hopkins River (Figure 2e, 3c & 4e).

Ecological Vegetation Classes

Coastal Headland Scrub occurs on the elevated somewhat rocky areas with shallow soils on the inland part of the Coast including on the railway line cuttings. Towards the coast, on lower sites, is deep sand with Coastal Dune Scrub dominated by Coast Beard-heath *Leucopogon parviflorus*. There is at least one occurrence of Coastal Dune Grassland on the coast. Marram Grass is abundant on the sand dunes but Coast Beard-heath and Coast Wattle are recovering and may eventually cover the dunes with or without revegetation. Coast Wattle is expanding in the area, and is a particular concern where Thyme Rice-flower and Coast Beard-heath are regenerating.

Weeds

Weeds are generally abundant in the Flume area, especially Marram Grass. Blue Periwinkle and Cape Wattle have localised dense infestations. Sea Spurge is abundant on the primary dune between Grannys Grave and the Surf Club.

Revegetation

This zone is relatively disturbed, however a revegetation program 'reVeg the Flume' has replanted several areas as a partnership between community groups (including Warrnambool Boardriders Association and Warrnambool Coastcare Landcare Group) and WCC.

Other Management Issues

The population of an unusual form of Common Correa *Correa reflexa* is of interest and is subject to ongoing management (Marty Gent, DEPI, pers. comm.). Management of Boobialla at the Point Ritchie Car Park is an issue due to loss of sea views from the car park. The role of vegetation in managing fire risk in and adjacent to Surfside Caravan Park needs to be considered. Vegetation management has been suggested as a way to increase personal safety while using the Promenade. Rationalisation of the numerous tracks through the area would reduce disturbance. High seas and storm surges are eroding the dunes.

Overall Biodiversity Values

Biodiversity values in the disturbed sandy dunes are not as high as in the more rocky areas in the western zones, but the area still supports numerous indigenous flora species and has a large area of potential habitat.

Logans Beach

Hopkins River to the eastern boundary of WCC area (Figure 2f, 3c & 4f).

Ecological Vegetation Classes

Most of the zone supports Coastal Dune Scrub. The only examples of Berm Grassy Shrubland in the study area occur in the shelter of the Hopkins River estuary. A relatively large area of Coastal Dune Grassland is at the river mouth.

Weeds

Weeds are generally common in this zone due to its disturbed nature. Marram Grass is prevalent and Sea spurge is conspicuous on the beach. Italian Buckthorn and Mirror Bush are also present.

Revegetation

Little revegetation has occurred in this zone apart from amenity plantings around carparks.

Other Management Issues

Management of dune blowouts is an issue. Coast Wattle is repeatedly maintained near walking tracks and the road reserve by Council staff.

Overall Biodiversity Values

Biodiversity values are not as high in the Logans Beach area as in the more western zones due to the relatively disturbed nature of the area, but the area still supports numerous indigenous flora species. The area of Coastal Dune Grassland is significant.

3.0 MANAGEMENT ISSUES AND ACTIONS

The Warrnambool Coast supports extensive native vegetation with significant natural, cultural, economic, educational and recreational values. A cost effective and scientific approach that engages the community in its conservation and management is recommended. This section identifies management issues and actions that apply across all management zones and to particular zones.

A ten year management schedule with indicative costings is given in Appendix 6. Detailed and achievable annual management objectives should be identified each year (preferably in June prior to the primary weed control season) in response to rate of progress, available budget and personnel, contingencies arising and adaptive management (redefining directions, priorities and methods based on experience).

Detailed information on pest plant and animal identification and control methods is beyond the scope of this plan. There is often more than one means of controlling a target pest species. The most suitable method will depend on factors including cost, effectiveness, relevant regulations, location, accessibility, potential impacts on flora and fauna, occupational health and safety for the operator, public safety and public perception.

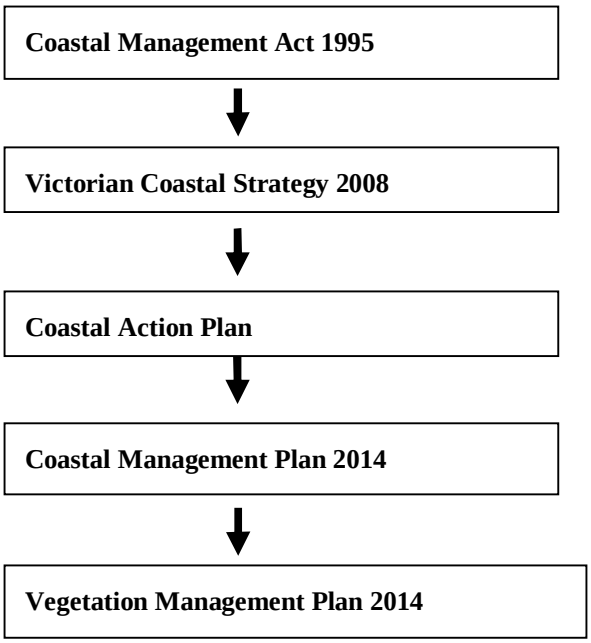
Selected management features referred to in this plan are shown in Figure 4.

3.1 Managing in accordance with policy and legislation

Vegetation management on the Victorian coast is governed by policy and legislation including the *Crown Land Reserves Act 1978, Flora and Fauna Guarantee Act 1988*, *Coastal Management Act 1995* and *Planning and Environment Act 1987*.

The Victorian Coastal Strategy (2008) was established under the *Coastal Management Act 1995*, and provides a framework for coastal management including vegetation management. This Vegetation Management Plan has been developed in accordance with the Victorian Coastal Strategy, and also the Coastal Action Plan and Coastal Management Plan.

The VMP relates to policy under the Coastal Management Act 1995 as follows:



The Victoria Planning Provisions (VPP) and Warrnambool Planning Scheme set out controls for the protection of native vegetation under the Planning and Environment Act 1987. It is the intention of WCC to develop and incorporate a Native Vegetation Precinct Plan under the Schedule to Clause 52.16 based on the *Warrnambool Coast Vegetation Management Plan* and in accordance with *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment and Primary Industries, September 2013).

3.2 Need for planning permission

Under Clause 52.17 of the Planning Scheme a planning permit is required for the removal of native vegetation, and Warrnambool City Council is not exempt from this requirement. There are a number of management actions in this plan that will require a planning permit.

Although Coast Tea-tree and Sweet Pittosporum are not indigenous to Warrnambool, they are indigenous to Victoria, so a planning permit is still required for their removal. Coast Tea-tree and Sweet Pittosporum did not originally dominate the vegetation and where they do, the vegetation may be deemed to be 'degraded treeless vegetation' which does not require an offset (DSE 2007).

Coast Wattle has been identified as a native species to the area which is demonstrating invasive properties and threating biodiversity values (Carr, Rodda and Sutton 2011). This is particularly evident in the Lady Bay East Zone. It may be necessary to lop, trim and in some cases remove Coast Wattle to protect and promote biodiversity values in areas were Coast Wattle has become the dominant shrub species, subject to the appropriate approval. This will reduce the threat Coast Wattle poses to the regeneration of Common Correa, Thyme Rice-flower and Coast Beard-heath.

Sea views from car parks, boardwalks and the promenade has been an issue raised by the community for some time. It is proposed to lop and trim native vegetation at existing viewpoints only to maintain current views of the ocean. This is to allow the community to experience a variety of coastal experiences including viewing of the ocean at specific points while retaining dune stability and protection from the elements such as shade and wind protection. In some cases this will include careful lopping and trimming of up to one third of the height or volume of native trees ensuring the health of the tree is not compromised. Boobialla, which restricts sea views at the Point Ritchie car park, is the only exception where native vegetation is proposed to be removed and replaced with lower growing ground covers for sea views. There will be appropriate offsets proposed which are to be determined through a no net loss assessment.

Vegetation, which includes native vegetation, overgrowing on the footpaths, shared paths, boardwalks, roads, structures, signs, overhead services, existing buildings and other infrastructure will be loped and trimmed to maintain line of sight and reduce risk to the public of dangerous trees and tree limbs. This will be conducted in accordance with exemptions stated in Clause 52.17-6.

In accordance with Clause 52.17 a planning permit is required to remove, destroy or lop more than a third of the height or volume of native vegetation unless it is in accordance with a current planning permit under the *Planning and Environment Act 1987* and Coastal Management Act consent under the *Coastal Management Act 1995* from DEPI.

3.3 Native Vegetation Precinct Plan

This Plan provides and strategic approach to the removal of native vegetation and identifies significant native vegetation to be protected and enhanced. In accordance with Clause 52.16 a Native Vegetation Precinct Plan may form part of a more general strategic plan. It is the intention of WCC to develop and incorporate a coast Native Vegetation Precinct Plan under the Schedule to Clause

52.16, using the *Warrnambool Coast Vegetation Management Plan* as the strategic reference document.

The introduction of a Native Vegetation Precinct Plan would be done by a planning scheme amendment and is therefore subject to approval by the Minister for Planning.

The purpose of incorporating a Native Vegetation Precinct Plan into the planning scheme is to:

- Provide a strategic approach to protect and conserve native vegetation across the management area.
- Specify the native vegetation to be protected and the native vegetation that can be removed, destroyed, lopped or trimmed.
- Ensure that areas set aside to protect native vegetation are managed to conserve ecological values in accordance with the vegetation management plan.
- Set out the works or other necessary actions required to offset the removal, destruction or lopping of native vegetation.
- Streamline the planning approvals process regarding vegetation management on the coast.

Incorporating a Native Vegetation Precinct Plan into the planning scheme (in accordance with the *Warrnambool Coast Vegetation Management Plan*) would provide a greater level of certainty, transparency and efficiency of Council's vegetation management. It regulates the removal of native vegetation and identifies significant native vegetation to be protected and enhanced. Clause 52.17 does not apply to land where a Native Vegetation Precinct Plan applies, so efficiencies will be made by Council not needing to apply for a planning permit when native vegetation lopping or removal works are conducted in accordance with the vegetation precinct plan. This reduces the risks of this document being undermined as it is clear to authorities and the public why and how vegetation is being managed. Any lopping, trimming and removal of native vegetation must be conducted by Council staff or contractors suitably qualified and appropriately trained in vegetation management.

The area a Native Vegetation Precinct Plan would apply to would be consistent with the area shown in the Warrnambool Coast Vegetation Management Plan, which comprises coastal Crown land managed by Council and freehold land owned by Council. A proposed draft amendment to the Schedule to Clause 52.16 of the Warrnambool Planning Scheme (Native Vegetation Precinct Plan), including descriptions of native vegetation to be removed, destroyed or lopped and will be prepared in accordance with Clause 52.16 of the Warrnambool Planning Scheme, including the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment and Primary

Industries, September 2013).

Figures 3a–c shows the area where native vegetation will be protected. This will be achieved by managing 458 ha of land for weed management and natural regeneration and 12 ha of land for weed management and revegetation.

Approximately 10,000 native plants will be planted annually in areas highlighted in Figure 3. These species will be indigenous and of local provenance to the relevant EVC. These revegetation works may contribute towards achieving offset requirements under the vegetation precinct to be developed to the satisfaction of the Department of Environment and Primary Industries and subject to the approval of the Responsible Authority.

The Native Vegetation Precinct Plan will avoid, minimise and offset native vegetation removal. Priority areas to protect and conserve native vegetation are identified in Figures 3a–c. Native vegetation to be removed will be minimised and proposed offsets will be quantified in the coast vegetation precinct plan and will be achieved in the areas of 'weed management and revegetation' and 'weed management and natural regeneration' in Figures 3a–c.

ACTIONS – All management zones

1. Develop a coast vegetation precinct plan in accordance with the *Warrnambool Coast Vegetation Management Plan*, clause 52.16-2 of the Warrnambool Planning Scheme and gazetted Victorian State Government vegetation management guidelines, as listed under clause 52.16-6 decision guidelines of the planning scheme.

2. Lodge an amendment with the Minister for Planning to incorporate the coast vegetation precinct plan into the Warrnambool Planning Scheme.

3. Determine offset requirements to the satisfaction of the Department of Environment and Primary Industries Victoria and the Responsible Authority.

3.4 Managing vegetation in a time of climate change

The Victorian Coastal Strategy (2008) highlights how climate change poses real and serious threats to the coast for the medium and long term: '*It is the combined effects of sea level rise, the impacts of tides, storm surges, wave processes and*

local conditions such as topography, elevation and geology that will produce climate change impacts and risks in coastal areas.'

The potential for climate change impacts on the Warrnambool coast are serious when considering the soft shoreline of Levy's, the Lady Bay and Logans Beach areas, and the low lying coastal wetlands. Vegetation management, particularly its role in dune stabilisation, will play an increasingly important role in the short, medium and long term response to climate change challenges.

As sea level rises and storm surges increase due to climate change, built infrastructure can prevent the natural migration inland of ecological communities. Dune zones of Lady Bay and the low lying coastal wetlands may be at risk of this 'biodiversity squeeze'. Vulnerable infrastructure may also need to be relocated, increasing development pressures on existing native vegetation.

ACTIONS – All management zones

4. Consider likely impacts of sea level rise and climate change in all vegetation management for the coastal area.

5. Consider the natural inland migration of vegetation communities which may occur with increased sea levels and storm surge in long-term planning.

3.5 Vegetation restoration

The areas of native vegetation (Figures 2, 3) should be managed to maintain and enhance their ecological value. It is recommended that management effort or input be increased to:

- Protect and restore indigenous flora and fauna species.
- Reduce the impacts of introduce flora and fauna when they threaten indigenous species, ecological processes or other values.
- Respond to the predicted impacts of sea level rise and climate change.
- Engage the community in protecting the native vegetation and other values of the coast, and increase their understanding of the role of WCC, DEPI and volunteer groups in management.
- Ensure the investment of time and effort by WCC has the greatest long-term ecological benefits.

Council also wishes to maintain a high standard of visual amenity on the areas of the coast with high recreational use.

Facilitation of natural regeneration

Natural regeneration is the preferred method of vegetation restoration because the plants are naturally adapted to the area, it can occur without ongoing human intervention, and the costs can be lower. Natural regeneration can be facilitated by managing weeds or other disturbances. This can create spaces that allow natural seedling recruitment or vegetative spread.

Some species such as Coast Beard-heath and Thyme Rice-flower are generally hard to grow in a nursery so their conservation largely depends on maintaining the wild populations. These and other species which already occur locally are likely to increase in abundance with facilitated natural regeneration, as is happening in the Flume area.

Supplementary planting in native vegetation

Supplementary planting (or direct seeding) within native (mapped patch) vegetation may be appropriate where there is little or no potential for natural recruitment, either where: (a) a species is site-extinct, (b) where site management over several years has not resulted in regeneration and the species is not waiting for a natural episodic event such as flood or fire, or (c) for land protection.

Supplementary planting within native vegetation should consider existing and historical conditions, and the processes in place at the site. Well-intended but inappropriate planting, even if site-indigenous, can reduce the ecological integrity of a recipient site by turning it into a plantation. Amenity landscape plantings of locally indigenous species are fine and appropriate around

infrastructure such as buildings and carparks, but plantings within the core of a reserve should consist of site re-introductions of site-extinct species, or supplementary plantings of existing species that are unable to regenerate despite sustained management efforts. Plantings of species that are not strictly site-indigenous constitute horticulture and not revegetation.

An example of a species suitable for supplementary planting within Coastal Dune Scrub and Coastal Headland Scrub is Drooping Sheoak *Allocasuarina verticillata*. According to early survey plans and historical documents this species was originally abundant. On many sites this would constitute a site re-introduction of a site-extinct species. It is essential that the correct soil provenance (coastal limestone, coastal sand etc.) is used as plantings of unknown or incorrect provenance have limited flora conservation value.

Reintroduction or expansion of understorey plants (which otherwise have very limited distributions) is also an appropriate form of supplementary planting. Warrnambool Coastcare has developed an 'Underplants' project to restore some of the small indigenous plants in the Granny's Grave area.

Attempts at supplementary planting in Spray-zone Coastal Shrubland to control erosion are not appropriate and are generally unsuccessful, as this is naturally sparse vegetation in which erosion is an important natural process.

ACTIONS – All management zones

6. Increase the management effort to
   3 persons x 5 days x 4 weeks = 60 person days per month.
7. Continue weed management in native vegetation to facilitate natural recruitment of indigenous species, refer to *Weed control* for detail.
8. Consider supplementary planting within native vegetation only after careful research, site management and observation, using the above criteria.
9. Ensure that any species used in supplementary planting is site-indigenous and of the correct provenance.
10. Replace dead Coast Tea-tree with indigenous overstorey species such as Drooping Sheoak to ensure continued woody habitat in the area near the caravan parks.

3.6 Revegetation

Revegetation is planting (or direct seeding) *in areas that are not mapped as native vegetation.* There are large areas of the coast that are dominated by introduced species, and where natural regeneration is occurring only slowly.

Revegetation allows for the reintroduction of species that have gone locally extinct, e.g. Coastal Bitter-bush and Coastal Fescue, and involves many community members in actively caring for the coast. Revegetation can create valuable habitat in a short time (particularly for birds) and eventually lead to natural regeneration as plants mature, set seed and spread. Revegetation can be costly and success rates vary greatly; it therefore needs to be justified, appropriate, planned and monitored (see Yugovic 2000, 2011).

It is noted that with sufficient weed control it is likely that the entire Coast would naturally revegetate itself over time. For example this is happening at the Flume where Coast Beard-heath *Leucopogon parviflorus* is spreading and will eventually form a scrub along with other indigenous shrubs regardless of what is planted. Revegetation may accelerate this process, but is unlikely to give the same results as self-sown natural vegetation that has undergone natural selection.

Over time, revegetation should:

- Become a self maintaining system of site-indigenous species that naturally regenerates either by seedling recruitment or vegetative spread rather than a system that relies on supplementary planting (see Yugovic 2000)
- Become an ecological buffer for patches of remnant vegetation
- Provide valuable habitat for native fauna
- Provide a range of land protection benefits such as erosion control

The abundance of some species may exceed levels that would occur naturally, mostly due to the lack of availability of other flora species that are component members of the EVC. However, as long as the species are strictly site-indigenous, the abundance of these species in revegetation is not a significant issue as they help to fill a necessary niche and prevent weed encroachment.

The major revegetation program, 'ReVeg the Flume', is a partnership between community groups including Warrnambool Boardriders Inc, Warrnambool Coastcare Landcare Group and government agencies including WCC. Appropriately, the revegetation is within predominantly introduced vegetation.

The vegetation mapping (Figure 2a- 2f) should be used to inform future revegetation planning (revegetation is outside the mapped patch vegetation). Nine zones on the revegetation map (Figure 3a- 3c) are suitable for revegetation. These areas will also form part of any offset requirements included in an Offset Management Plan, should one be required. There is also an opportunity to include revegetation sites as part of Council's Climate Change Action Plan carbon sequestration projects.

Three EVCs are suitable for revegetation:

- Coastal Dune Grassland
- Coastal Dune Scrub
- Coastal Headland Scrub

Coastal Dune Scrub and Coastal Headland Scrub occupy the large majority of the management area. Revegetation is not generally relevant to the other EVCs as they are in relatively natural condition and capable of natural regeneration.

Two EVCs which are likely to have occurred in the study area, but are no longer present, may also be appropriate for revegetation: Swamp Scrub and Damp Sands Herb-rich Woodland (EVC 3). If appropriate research is done, there may be areas identified which are suitable for revegetation of these communities.

Generally, the larger more robust plant species are most suitable for revegetation, the others being too small and unlikely to survive plant competition. Rapid growing but short lived species may also be useful as 'cover crops' to reduce weed colonisation while slower growing species establish. Species suitable for revegetation by EVC are given in Appendix 3, and a revegetation implementation schedule is given in Appendix 4.

Photo 1: Revegetation plantings are mostly dead, and were unnecessary as Coast Beard-heath is colonising, Thunder Point

Photo 2: Recent revegetation, the Flumes

The Harness Racing Club site would be suitable for revegetation with Coastal Dune Scrub and possibly one of the wetland EVCs. This will provide further opportunity to work with the community, particularly in South Warrnambool, on revegetating the area and add to the biodiversity values of the Thunder Point Coastal Reserve.

ACTIONS – All management zones

11. Ensure that all on-ground revegetation works, including site preparation, planting, direct seeking and site maintenance are carried out according to best practice techniques.

12. Ensure that revegetation is site-indigenous (correct for the EVC) and is only undertaken in predominantly introduced vegetation where there is little or no potential for natural colonisation and establishment of native vegetation.

13. Ensure that any species used in revegetation is of the correct soil provenance.

14. Maintain and improve ecological values of revegetated areas by controlling weeds and facilitating natural regeneration.

15. Establish a program to revegetate selected coastal areas.

16. Work with community groups in revegetation projects.

17. Investigate areas suitable for restoration of Swamp Scrub and Damp Sands Herb-rich Woodland.

18. Monitor impact of browsing animals (rabbits, hares, wallabies) and assess impacts on revegetation.

ACTION – Lady Bay East management zone

19. Continue the major revegetation program at the Flumes, modelled on Coastal Headland Scrub on the higher inland rocky area, and Coastal Dune Scrub on the lower deep sandy coastal dune area (Figures 2, 3).

3.7 Amenity planting

Recent amenity plantings near car parks and road reserves have successfully incorporated indigenous plants in a landscaping style. The use of environmental weeds such as gazania in amenity planting near the coast is not desirable. The current and future use of indigenous plants in landscaping promotes the use of such species in people's gardens and integrates the coast to nearby streetscapes.

Wherever possible, amenity planting should use plants of local provenance, rather than varieties which are 'horticultural' and may hybridise with local plants (e.g. *Dianella* species, *Lomandra* species). Alternatively sterile hybrids may be preferable to meet amenity objectives without affecting biodiversity values.

The site which houses the Carnival for 5 weeks of the year is an ideal location to improve amenity planting.

ACTIONS – All management zones

20. Replace inappropriate amenity planting (e.g. invasive non-natives) with indigenous species.

21. Collect propagation material from closest sites available. FFG permits are required from DEPI prior to collecting cutting material or seeds.

ACTION – Wild Coast and South West Crown Land management zone

22. Conduct amenity planting using indigenous species at Levy's car park.

ACTION – Lady Bay East management zone

23. Conduct amenity planting at the entrances to Granny's Grave and the Flume using indigenous species.

3.8 Rare plant management

Six recorded species are listed as rare or threatened in Victoria and accordingly have state significance (Table 1):

- Coast Bitter-bush *Adriana quadripartita* (vulnerable in Victoria). Structurally important shrub. Good population at Grannys Grave. Easily propagated and could be reintroduced.

- Coast Fescue *Austrofestuca littoralis* (rare in Victoria). Structurally important grass of foredunes and primary dunes. Still occurs near Levys Beach, Killarney and Port Fairy areas. Easily propagated and could be reintroduced.Salt Blown-grass *Lachnagrostis robusta* (rare in Victoria). Several other blown-grass species persist locally. Opportunistic species, no reintroduction proposed.

- Coast Bush-pea *Pultenaea canaliculata* (rare in Victoria). Has been collected from Portland and Geelong in the last 50 years. Unlikely to occur still locally. Not suitable for reintroduction.

- Coast Twin-leaf *Zygophyllum billardierei* (rare in Victoria). Population at Hopkins River should be monitored and if appropriate should be actively managed to reduce competition and facilitate spread.

- Coast Stackhousia *Stackhousia spathulata* (poorly known in Victoria). Locally common and regenerating on the coast, no particular management requirements.

A unique form of Common Correa *Correa reflexa* 'Grannys Grave' which is registered for the nursery trade is of considerable interest and is subject to ongoing management (Marty Gent, DEPI, pers. comm.). In some areas Coast Wattle is overgrowing and outcompeting the Correa and preventing seedling recruitment. Black Wallaby also graze Correa intensively. Where Coast Wattle is outcompeting and threatening the Granny's Grave Correa, Coast Wattle should be cut and left on site to reduce competition and provide some physical protection from wallaby grazing subject to gaining appropriate approvals. This approach should increase recruitment of Correa in the population.

Photo 3: *Correa reflexa* 'Grannys Grave'

ACTIONS – All management zones

24. Undertake targeted surveys for the lost plant species of state significance:

    Coast Fescue *Austrofestuca littoralis*
    Salt Blown-grass *Lachnagrostis robusta*
    Coast Bush-pea *Pultenaea canaliculata*

25. If located, monitor and manage plant species of state significance.

ACTIONS – Lady Bay East management zone

26. Monitor Coast Twin-leaf at Hopkins River and actively manage the species if necessary.

27. Monitor Coast Bitter-bush at Granny's Grave, survey foreshore for other populations, and actively manage the species if necessary.

28. Reduce competition around the Correa by physical removal of competing shrubs, followed by management to prevent excessive regeneration of competing vegetation (part of Native Vegetation Precinct Plan).

29. Include Coast Bitter-bush in revegetation programs where appropriate.

30. Reintroduce Coast Fescue using propagating material from nearby populations and monitor (Levys, Killarney).

3.9 Weed control

The management area has many weed species, some of which adversely affect biodiversity, cultural or recreational values. Although there are more weed species than indigenous plant species (Appendix 1), in many areas most of the plant cover is provided by indigenous species, and this situation appears to be relatively stable. However, certain invasive species have the potential to overrun native vegetation and these should be controlled or eradicated. A watch should be kept for the arrival of new invasive species.

Of the 105 recorded introduced plant species, 29 are priority target weeds for control programs. The recorded distribution of priority weeds within EVCs is given in Appendix 5 and the location of some localised infestations is shown in Figure 4 which includes data collected during this study and data from Carr et al. (2011).

Marram Grass is very extensive and problematic in open sandy areas. It can delay or even prevent colonisation by indigenous plants, particularly on the unnaturally high and dry dunes created by the grass, but it does not tolerate shade and tends to die out where indigenous shrubs do eventually manage to form a canopy. Coast Beard-heath is colonising much of the Marram Grass area.

All weed control requires risk hazard assessment, for example Mirror Bush on cliffs, Boxthorn which is dangerous to work on due to its spines, and Century Plants which has sap that can burn eyes. However, there are no weeds that cannot be tackled by qualified and trained personnel.

Some weeds, in particular Mirror Bush *Coprosma repens* and Rodondo Creeper *Drosanthemum candens*, are in difficult to access locations on cliffs. Control requires harness work by trained contractors and should be undertaken.

Weeds of native vegetation are referred to as environmental weeds (as opposed to agricultural weeds and horticultural weeds). Because of the sensitivity of the native vegetation, controls methods are often more particular than for other weeds. General information on environmental weed biology is in *Environmental Weed Invasions in Victoria: Conservation and Management Implications* (Carr, Yugovic and Robinson 1992), a good identification guide is *Weeds of the South East: An Identification Guide for Australia* (Richardson et al. 2011), and information on weed control techniques is in *Bush Invaders of South-East Australia* (Muyt 2001). General control methods are given in Appendix 5. Effective weed control is a technical exercise requiring knowledge and expertise, appropriate safety precautions and good supervision.

Nine species of declared noxious weeds are recorded from the Warrnambool

Coast (Appendix 1). These should be given control priority, not only because Regionally Controlled weeds require control ('all reasonable steps to prevent growth and spread') under the *Catchment and Land Protection Act 1994* (Vic.) but because they threaten the native vegetation. There are two categories of noxious weed recorded on the Warrnambool Coast:

- Regionally Controlled weeds:

  Sand Rocket *Diplotaxis tenuifolia*
  St John's Wort *Hypericum perforatum*
  African Box-thorn *Lycium ferocissimum*
  Gorse *Ulex europaeus*

  These invasive plants are usually widespread and are considered important in a particular Region. To prevent their spread, continuing control measures are required. Land owners, including WCC, have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally Controlled weeds on their land (DEPI website).

- Restricted weeds:

  Bridal Creeper *Asparagus asparagoides*
  Slender Thistle *Carduus pycnocephalus*
  Fennel *Foeniculum vulgare*
  Pampas Lily-of-the-Valley *Salpichroa origanifolia*
  Apple of Sodom *Solanum linnaeanum*

  This category includes plants that pose an unacceptable risk of spreading in this State or to other parts of Australia if they were to be sold or traded in Victoria, 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 (DEPI website).

Management of non indigenous natives

Several native species which are not indigenous to the area are well established and can behave as weeds:

Common Name	Scientific name	Geographic origin	Reference
Coast Tea-tree	*Leptospermum laevigatum*	Coastal areas east of Anglesea	Lyne 1996
Salt Paperbark (Mallee Honey-myrtle)	*Melaleuca halmaturorum*	North-west Victoria and near Portland	Spencer 1996
Sweet Pittosporum	*Pittosporum*	Gippsland east of	Walsh and Albrecht

	undulatum	Westernport Bay	1996
Coast Wattle	*Acacia longifolia* subsp. *sophorae*		

Coast Tea-tree *Leptospermum laevigatum* did not naturally occur in Warrnambool prior to European settlement, but is indigenous from about Anglesea eastwards (Lyne 1996). It was established across western coastal Victoria as a dune stabiliser and is now extensively naturalised. Coast Tea-tree provides important woody habitat and physical structure on the coast. Widespread clearing is neither desirable nor practical.

In areas where control of Coast Tea-tree is required it can be manually cut down by chain saw and mulched – at some cost. Where practicable, fallen trees can be left as habitat providing the area is not made inaccessible to management and a fire hazard. Coast Tea-tree is easily killed by fire and seedling recruitment is abundant, particularly after an autumn fire. It produces little if any seedling regrowth if burnt in *spring* – this is a major vulnerability of the species that can be exploited. It flowers in spring and produces fruit in summer, which then release all their seed to become the soil seed bank. Spring burns produce low seedling recruitment because the soil seed bank is depleted. Autumn burns promote the species as there is abundant germination from the fresh soil seed bank (Molnar et al. 1989). Pre-felling and drying out of the trees may be required to provide the necessary fuel for a planned burn.

Salt Paperbark has been inappropriately planted in damp areas and can become invasive. Staged removal of plants should occur, with all dead material being removed from site to prevent damage to sensitive wetland vegetation.

Sweet Pittosporum can outgrow most local natives and shades out smaller plants forming a monoculture. Staged removal of plants should occur. Dead material can be left on site, but all fruit should be bagged and disposed of appropriately.

As mentioned earlier, although Coast Wattle *Acacia longifolia* subsp. *sophorae* is an indigenous species within Coastal Dune Scrub 160 (CDS) (EVC 160, DPI) and is known to behave as a weed in some coastal areas. Although indigenous, Coast Wattle should not be the dominant species in areas shown as Coastal Dune Scrub (EVC 160), or areas where there is CDS and Coastal Headland Scrub (CHS) in mosaic in Figures 2a, b & c, which covers extensive areas of the Wild Coast and South West Crown Land precincts. If found in areas outside CDS or CDS/CHS mosaic it may require management, subject to a planning permit if not covered by a Native Vegetation Precinct Plan in the Planning Scheme.

Non-native woody weeds

There are 12 priority target woody weeds:

Mirror Bush	*Coprosma repens*
Hawthorn	Crataegus monogyna
Large Mediterranean Spurge	*Euphorbia characias*
African Box-thorn	*Lycium ferocissimum*
Tree Mallow	*Malva dendromorpha*
Cape Honey-flower	*Melianthus major*
Cape Wattle	*Paraserianthes lophantha*
Karo	*Pittosporum crassifolium*
Italian Buckthorn	*Rhamnus alaternus*
Sweet briar	*Rosa rubiginosa*
Apple of Sodom	*Solanum linnaeanum*
Gorse	*Ulex europaeus*

Many woody weeds provide habitat and resources (e.g. shelter, berries) for native fauna. In some areas (Levys, Merri wetlands) woody weeds provide habitat for threatened species and any proposed removal should be discussed with DEPI.

Staged removal, combined with appropriate regeneration/replanting of indigenous species should consider the local impacts on fauna. All woody weeds are likely to resprout or regenerate from seed after control works; herbaceous weeds may also establish following woody weed control. All control efforts should be monitored and, if necessary, repeated and followed by herbaceous weed control in the following 1–2 years. Woody weed control should be carefully staged and planned, and budgets should include monitoring and follow-up weed control (Yugovic and Kern 2001).

Some Mirror Bush *Coprosma repens* stumps are resprouting, indicating they had not been properly painted with herbicide. This complicates follow-up control as the many small shoots have to be cut and painted subsequently. Woody weed stumps should be treated with herbicide properly and once only. Staged removal of Mirror Bush should occur throughout the coast, particularly the caravan park as it provides a large seed source for birds to disperse widely.

Climbers

There are three priority target climber weeds:

Bridal Creeper	*Asparagus asparagoides*
Common Dipogon	*Dipogon lignosus*
Pampas Lily-of-the-Valley	*Salpichroa origanifolia*

Targeted management of all these species should be undertaken wherever they occur. The aim is eradication. They are very serious threats to native vegetation.

Herbaceous weeds

There are 21 priority target herbaceous (including grasses, non-woody, non-climber) weeds:

Agapanthus	*Agapanthus praecox*
Century Plant	*Agave americana*
Marram Grass	*Ammophila arenaria*
Marguerite	*Argyranthemum frutescens*
African Thistle	*Berkheya rigida*
Red Valerian	*Centranthus ruber*
Shade Crassula	*Crassula multicava*
Montbretia	*Crocosmia* x *crocosmiiflora*
Rodondo Creeper	*Drosanthemum candens*
Caper Spurge	*Euphorbia lathyris*
Sea Spurge	*Euphorbia paralias*
Fennel	*Foeniculum vulgare*
Gazania	*Gazania* sp.
Gladiolus	*Gladiolus* sp.
St John's Wort	*Hypericum perforatum*
German Iris	*Iris germanica*
Sicilian Sea-lavender	*Limonium hyblaeum*
Horehound	*Marrubium vulgare*
Chilean needle grass	*Nassella neesiana*
Blue Periwinkle	*Vinca major*
White Arum-lily	*Zantedeschia aethiopica*

Control of these species should be undertaken as resources allow. Control of herbaceous weeds must be prioritised to protect ecological assets and processes.

Sicilian Sea-lavender *Limonium hyblaeum* has been recorded from Middle Island and is a major weed of coastal vegetation at Port Fairy.

ACTIONS – All management zones

31. Undertake staged control of non-indigenous natives Sweet Pittosporum and Salt Paperbark (with appropriate revegetation).

32. Undertake staged control of priority non-native woody weeds.

33. Eradicate or control all non-native climbers on the Coast.

34. Control herbaceous weeds as appropriate, particularly in Lady Bay East.

35. Educate and, where appropriate, prosecute to prevent dumping of garden waste (which frequently contains weed seeds and propagules).

36. Work with government agencies, nurseries and garden clubs to remove environmental weeds from propagation and replace with indigenous or non-invasive alternatives (e.g. replace Mirror Bush with indigenous Boobialla).

37. Undertake risk hazard assessment for all weed control.

38. Implement weed hygiene (equipment, vehicles, personal) to ensure that weeds are not transported by management agencies.

39. Consider the inclusion of a weeds schedule in the Warrnambool Planning Scheme.

ACTIONS – Wild Coast and South West Crown Land management zone

40. Burn the old boxthorn pile near the Thunder Point raceway (Figure 4).

41. Remove Century Plant in Thunder Point area (Figure 4).

42. Control Bridal Creeper in Thunder Point area (Figure 4) and Hopkins Point area.

43. Control Marguerite in Thunder Point area (Figure 4).

44. Remove Sweet Pittosporum, beginning with female plants as a priority (Figure 4).

45. Remove Tree Mallow from Middle Island (ensure the similar Austral/Coast Hollyhock is not present) (Figure 4).

46. Monitor the Merri estuary and other coastal areas for Sicilian Sea-lavender *Limonium hyblaeum*.

47. Be 'weed alert' for new, emerging weed species, particularly high priority weeds. Where new species are observed, respond as quickly as practicable to prevent establishment of new weeds.

ACTIONS – Lady Bay West management zone

48. Remove all Mirror Bush from the caravan parks and carnival site through a staged program and replant with native Common Boobialla or other appropriate non-invasive or indigenous species (Figure 4).

ACTIONS – Lady Bay East management zone

49. Control Cape Wattle at the Flume (Figure 4).
50. Control Blue Periwinkle at the Flume (Figure 4).
51. Control Red Valerian at the Flume (Figure 4).
52. Control Gorse at the Flume (Figure 4).
53. Remove Sea Spurge when it occurs in new areas, particularly north of the Promenade.
54. Monitor the Flume for introduced plants. A number of serious weeds are in the area and more may establish in future.

ACTIONS – Logans Beach management zone

55. Control Marram Grass and Sea Spurge in the Coastal Dune Grassland at the Hopkins River mouth.

3.10 Fire prevention and management

A range of measures are used to manage fire risk to the public and built assets. The draft 'Integrated Municipal Fire Management Plan for the Warrnambool City Municipal District 2011' places the Warrnambool Foreshore camping area in the 'very high' fire risk category and includes a number of actions to reduce the risk of fire.

Warrnambool coastal vegetation varies from wetlands and near-bare sand which will rarely if ever burn, to dense scrub which may burn at any time of the year (Cheal 2010). Fire (or absence of fire) can alter the vegetation community in the short and long-term. The natural fire regime of the coast has been altered since European settlement. In the years following settlement repeated burning removed vegetation and destabilised the sand dunes. More recently fire has been rare because of the close proximity of built assets and effective fire-fighting.

The behaviour and effects of fire depend on the vegetation type (e.g. scrub, grassland), the timing and severity of the burn, and the history of the area (previous clearing, fire history). Within intact scrub, fires are often severe, with few unburnt refuges for fauna.

Coastal scrub vegetation should have a fire frequency of between 10 and 90 years to maintain its biodiversity (Cheal 2010). The vegetation normally recovers from fire, as most or all of the species survive, regenerate from the soil

seed bank or recolonise after fire. The relative abundance of species is different in post-fire regrowth, with some species benefiting temporarily. There may be a risk of destabilising sand dunes in some areas, and there may be significant species that need protection from fire although none are currently known. Weed species may also either be reduced, or expand, following fire.

Fire intervals of up to 90 years should have little long-term adverse impact on this vegetation and may prevent long-term (over-)domination by woody shrubs, such as Coast Wattle and Coast Tea-tree. In grassland (e.g. Marram Grass), fires are usually of low severity, leaving many unburnt patches. The Warrnambool Coast has many weed species, some of which are likely to regenerate strongly after fire (e.g. Coast Tea-tree, thistles).

Fire management on the coast is summarised in the Municipal Fire Plan, developed annually through consultation between WCC, CFA, DEPI and other stakeholders. The Municipal Fire Plan considers all the legislative obligations, including biodiversity and cultural protection. Fire management can affect coastal native vegetation management through:

- Managed fire for ecological purposes (e.g. regeneration of rare plants, weed control) – currently none of the EVCs or species are known to require burning for regeneration. Further research may indicate that ecological burning is desirable. If so, this should be incorporated in a fire management plan.

- Fuel reduction (e.g. by slashing, burning or clearing) – appropriate fuel reduction to protect key assets results in long-term reduction of fuel loads.

- Wildfire suppression (e.g. back-burning, use of machinery) – biodiversity assets (e.g. high value vegetation, threatened species) should be considered in placement of machinery etc. during suppression.

- Other (e.g. creation and maintenance of access tracks) – tracks should be located to minimise impacts on native vegetation.

Fire management is complex and prescriptions are beyond the scope of this plan.

Fire provides a unique opportunity to access and manage areas for weeds that should be taken advantage of wherever fires occur, either planned or unplanned.

Although fire within 90 years is required for the health of coastal vegetation, fuel reduction burning to protect assets and public safety can adversely affect biodiversity where it is too frequent or where there is a wind erosion risk. Careful planning necessary.

Intentional introduction of management burns in a long-unburned system with numerous built assets would require financial investment and can be logistically

difficult. Costs and management implications would need to be considered, including at least two years of follow-up weed management. Fuel level management through management burns may be appropriate in strategic areas.

In the absence of management burns, some fuel reduction may be achieved through removal of woody weeds and fallen woody debris within the vegetation. The debris referred to here is not logs on the ground, which provide valuable fauna habitat and are not a significant fire hazard. It refers to branches above the ground. These are low value fauna habitat (mainly perching habitat which is abundant anyway) and are an obstacle to management access and an OHS issue for bushcrews and most importantly a fire hazard due to height above ground.

Burning requires a significant management input, both initially and post-burn to control subsequent weed growth. Warrnambool City Council will need to plan for associated changes, such as a temporary requirement to increase staff hours for burn sites to manage any additional tasks (such as control of a mass germination of undesirable species). Any burn must be planned in consultation with the responsible authority, the Country Fire Authority and other relevant parties. Permission to conduct a burn must be obtained from the appropriate authorities and weather conditions must be suitable (no smog alert, low wind speed, suitable wind direction, at least moderate humidity etc.).

Management burns have pros and cons. Burns can be costly and logistically difficult, they can escape control lines and become wildfires that threaten lives and infrastructure, and they can cause erosion through loss of vegetation cover. On the other hand burns can control tea-tree in the very high fire risk category and there may be some benefits for plant diversity. Some species of flora and fauna will temporarily benefit from conditions in the post-fire regrowth.

Use of fire in vegetation restoration

Fire has enormous potential in vegetation restoration as it:

- provides good access, removing obstructing vegetation and woody debris,
- stimulates germination of both the indigenous seed bank (thus increasing diversity) and the introduced seed bank (which can then be eliminated),
- improves the morale of bush crews as access is easy and they know they are being more effective,
- improves the presentation of the natural area to the public in terms of tidy appearance, reduced fire hazard etc.

Fire may pose a risk to surrounding infrastructure so it needs to be expertly and effectively managed by containing it to control lines. Site preparation is essential and involves (a) creating control lines without soil disturbance, (b) pre-felling and drying woody plants to provide fuel for the fire. Weeds may proliferate

following fire so follow-up weed management for two years is essential; this involves a management cost which should be included in the overall budget allocation. Without follow-up weed control, the result of fire may be counterproductive to conservation.

While there may be contractors who conduct management burns in the Warrnambool area, the Country Fire Authority (CFA) may participate for little or no fee as the burns may be considered to be training exercises. This is the case with Mornington Peninsula Shire Council which in partnership with CFA is able to burn a larger number of reserves than it would otherwise to able to afford.

Further discussion on the use of fire as a management tool is in section 3.5 (Fire Prevention and Management).

ACTIONS – All management zones

56. Consider native vegetation values and ecological burning in the Municipal Fire Plan.

57. Ensure native vegetation values are mapped for consideration during any fire suppression.

58. Investigate the requirements for, and feasibility of, management burns to reduce fire fuel levels in strategic areas such as the surf club, caravan park and water treatment plant.

59. Plan for follow-up weed management in any areas that are burned, whether the fire was planned or not, and include this cost in budget allocations.

60. Be mindful when planning the planting of larger bushes within activity zones such as carparks or along access points that they will not cause undue fire risks or impede access or egress of vehicles in emergency situations when they mature.

61. Liaise and cooperate with DEPI and CFA in the development of the integrated fire prevention plan and for advice relating to fire prevention and management.

62. Conduct pilot plantings of Boobialla and other fire retardant species in areas such as the caravan park.

3.11 Access and fencing

There are many access points on the Coast, some of which include paved carparks and amenities (toilets, showers). The Coast has a network of well maintained pathways and boardwalks, which increase the recreational value of the area for the local community and visitors.

Defined paths provide a designated pedestrian route and discourage the formation of undefined tracks and trampling of vegetation.

Photo 4: Wide, well maintained pathway/boardwalk, Thunder Point area

Several beach access paths require upgrading including areas of pathway where crushed basalt has been used for surfacing. Locally suitable material i.e. crushed limestone should be used when resurfacing pathways. Materials should also be sourced locally where possible.

The importation of foreign geological material (gravel) onto the Coast reserve is not in keeping with conservation of the reserve. Protection of natural geology, landforms and soils is a primary aim of conservation management of natural area reserves, just as much as the protection of flora and fauna. Foreign material in the form of gravel is undesirable as it cannot be contained and will eventually spread from its original location to become incorporated into the reserve's soil profiles. Gravel spreads and needs to be reapplied whereas mulch better integrates into the substrate and stays put. Local crushed limestone is an appropriate material. Otherwise clean biodegradable mulch from tree pruning is more in keeping with the natural soil and can be less expensive and potentially more durable. Imported basalt gravel is crunchy under foot, of a colour not consistent with the local natural soil, and detracts from the visitor experience. It may also be a hazard for brush cutting beside tracks for vegetation control.

Photo 5: Pathway surfaced with basalt gravel, foreign geological material

Fencing is appropriate in some areas in order to protect vegetation from human trampling. Post and wire fencing has been widely used to define pathways and post and rail style fencing has been used along boardwalks. In the Lady Bay zone, there are instances where barb wire fencing has been used and is damaged (near the Correa location); this should be replaced with post and wire fencing as barbed wire can injure fauna and is inappropriate. Removing the bottom wire of fencing makes it easier for Black Wallaby to move through fences.

ACTIONS – All management zones

63. Monitor fences and maintain as appropriate.
64. Remove lower wire to allow Black Wallaby access where appropriate.
65. Maintain existing internal pathways as appropriate.
66. Use locally sourced materials for pathway maintenance (limestone).

ACTIONS – Wild Coast and South West Crown Land management zone

67. Remove the basalt gravel stockpile near Thunder Point.

ACTIONS – Lady Bay management zone

68. Upgrade barb wire fencing on track near Grannys Grave and remove barb wire fencing in other areas for the benefit of wildlife and aesthetics.

3.12 Signage

There is both directional and educational signage throughout the Coast, however Council has identified a need for additional directional signage to be installed (see the Coastal Management Plan, URS Australia Pty Ltd).

Educational or interpretive signage should outline the values and threats of the area, and the management practices of WCC and community groups. Signage should be well-researched, location specific, weather proof and vandal proof. This provides an opportunity for members of the community to gain an understanding of the ecological values of the reserves, and provides a means for promoting the long-term ongoing management undertaken by the Warrnambool City Council to enhance these values.

It is easy to 'oversign' an area, so signs should have specific management purposes, and be consolidated wherever possible. More remote areas (e.g. 'Wild' zone) should have minimal signage.

ACTIONS – All management zones

69. Review existing educational and interpretive signage.

70. Plan replacement and new signs that are well-researched, location specific, weather proof and vandal proof.

71. Establish a program for ongoing replacement and maintenance of educational and interpretive signage.

3.13 Vegetation height at the Promenade

The Promenade concrete path is constructed to a standard more typical of residential areas. It accesses areas ranging from heavily modified (e.g. open carparks, surf club), through tall tea-tree scrub, to relatively remote and natural dunes (near the Flume). The diverse users of the Promenade have different expectations of vegetation management:

Table 3: Expectations of Promenade

Human use	*Desirable vegetation*
Carparks with open views of Lady Bay	Mostly low vegetation
Carparks with views of Lady Bay framed by vegetation (and therefore protected from salt winds)	Tall vegetation with strip areas of low-medium vegetation that allow partial views and areas with thinned out shrubs.
Carparks without views for empty cars	Tall vegetation to screen cars from salt winds

(if visiting beach or walking)	
Walking for exercise or leisure, Bike riding for exercise or leisure	Mixture of tall vegetation for protection from strong winds and open areas for views.
	More open areas at intersections
	View-lines rather than blind corners
	Lower vegetation right beside path
Experiencing semi-natural coastal areas	Range of vegetation types, mostly indigenous species, tall and medium shrubs as habitat for birds

Warrnambool City Council has experimentally cleared and planted several strips of tea tree between the Promenade and the beach and planted them with indigenous vegetation (Photos 6, 7). The strips were generally unsuccessful because:

- Plant survival was low in some areas
- Sand blow-outs occurred
- Newly exposed vegetation was burnt off by salt winds
- The area removed was not blended into the surrounding landscape
- Weeds established in cleared areas

Photo 6: Pruned Coastal Dune Scrub (Coast Tea-tree), the Promenade.

Photo 7: Experimental clearing and revegetation, the Promenade.

Removal of scrub may destabilise the beach sand and increase sand movement across the Promenade and onto the carpark (Rosengren 2003), creating a nuisance and a maintenance requirement. Although Coast Tea-tree is unlikely to withstand storm surges, it does reduce wind erosion.

Although Coast Tea-tree is not indigenous, it does provide some habitat values and significant physical structure. Replacement with indigenous vegetation may provide improved biodiversity outcomes in the long-term (if it can be established). However, the existing vegetation does provide shelter and habitat for numerous species including the existing bird population.

Removal of large areas of tea-tree is therefore not appropriate. The Promenade area is also particularly vulnerable to coastal processes and a large investment in revegetation is not desirable in the long-term. The Promenade can provide for a range of human uses along its length such as creating a microclimate to protect users from the elements in all seasons. Zones can be developed that provide for a range of values.

ACTIONS – Lady Bay West management zone

72. Manage the Promenade to reflect the key values of each area and identify the appropriate treatment of Coast Tea-tree and other vegetation.

73. Maintain current views of the beach from carpark and pedestrian areas through annual trimming of vegetation as per the precinct plan.

74. As Coast Tea-tree ages and falls over (40–60 years), replant areas with Coastal Dune Scrub species. Include Drooping Sheoak and Common Boobialla as tall indigenous plants in areas that are zoned as having tall vegetation.

75. Revegetate areas where tea-tree has been trimmed, lopped or removed from the Promenade, using Coastal Dune Scrub species while limiting the medium shrubs (Appendix 3) as per EVC densities.

76. Monitor the condition of coastal vegetation along the Promenade for the long-term effects of storm surge and sea level rise.

3.14 Pest animal management

Rabbits and hares graze native vegetation and promote the establishment and spread of weeds. Mapping and monitoring of rabbit populations are important in

providing a basis for cost effective control programs and must complement any vegetation management plan.

In the Hopkins River area, there is a need for an ongoing rabbit control program carried out by WCC staff in consultation with DEPI involving containment and control, mapping and monitoring, and appointment of contractors (Mark Doueal, DEPI, pers. comm.).

Controlling rabbits in an urban area is difficult with off-target species such as pet cats and dogs susceptible to poisoning, and shooting also proves difficult due to safety concerns. Vegetation in the Point Ritchie area and Thunder Point is suffering from the impacts of rabbits. Considering the challenges of using poison in this area, fumigation, burrow closure and harbour removal i.e. boxthorn are some of the best strategies to control the rabbit population and reduce impacts on vegetation. Warren destruction through ripping is recommended where practicable.

ACTIONS – All management zones

77. Monitor rabbits on an ongoing basis and control as appropriate through a pest animal program in consultation with DEPI.

78. Co-ordinate rabbit and fox control to reduce predation of other species.

79. Encourage landholders in coastal areas to manage pet food and compost to discourage foxes.

ACTION – Wild Coast and South West Crown Land management zone

80. Conduct fumigation, burrow closure and harbour removal of rabbit habitat in the Point Ritchie and Thunder Point areas with due care for cultural values.

3.15 Horse riding

Horse riding can cause undefined tracks, vegetation loss, erosion and most importantly, weed invasion. The cost of managing the inevitable weed invasion is borne by Council. Disturbance of Hooded Plover is a significant fauna issue outside the scope of this plan. Horse riding in the Wild Coast and South West Crown Land area is only permitted by permit process issued by Council. Parks Victoria currently allows a riding school to use the adjacent Belfast Coast Reserve. Council must work with Parks Victoria to review the current permit processes, establish a consistent approach to the permitting of horse riding in the two areas, and reduce the impact on biodiversity in the area.

ACTION – Wild Coast and South West Crown Land

81. Work with Parks Victoria and horse riding stakeholders to develop a consistent approach to horse riding to reduce biodiversity impacts.

3.16 Illegal 4WDs and motorbikes

Illegal 4WD and motorbikes disturb the vegetation and cause erosion wherever they leaves the formed tracks, and are a major issue in the Levys Point area. It can be difficult to enforce the regulations due to the remoteness of the area.

Vehicle damage destabilises the sand and may lead to dune blowouts and the creation of undefined tracks in the vegetation. Parks Victoria, Council and the Police have done extensive work to reduce impacts on land they manage near Warrnambool.

ACTION – Wild Coast and South West Crown Land

82. Work with Parks Victoria to install vehicle barrier fencing to protect vegetation being damaged by 4WDs.

83. Investigate alternative vehicle and pedestrian management scenarios in line with the Coastal Management Plan.

84. Patrol the area of unauthorised vehicle access and enforce the use of designated vehicle tracks.

3.17 Planning and review

Planning and review is essential for effective vegetation management.

ACTIONS – All management zones

85. Review the results of the current year's management actions in relation to the annual management objectives, by the end of June each year.

86. Work closely with community groups (including Coastcare), DEPI and Parks Victoria to review and plan works.

87. Prepare and implement an annual works program based on the management review, including achievable management objectives consistent with this management plan, by the end of June each year.

    Management objectives are to be specific for each management section, with emphasis on the primary weed season (June to January).

ACTION – All management zones

88. Allocate staff time and appoint contractors as appropriate for delivery of the program over the following year.

89. Support Coast Action and other community groups in seeking funding and implementing actions that are consistent with this plan.

90. Integrate vegetation management with other land management actions, such as slashing, track maintenance, infrastructure installation and maintenance, to achieve efficiencies and avoid conflicts.

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APPENDICES

APPENDIX 1

Flora of the Warrnambool Coast

Table A1.1: Flora of the Warrnambool Coast

EVCs:	
Dry coastal	
BGS	Berm Grassy Shrubland
BCH	Bird Colony Succulent Herbland
CDG	Coastal Dune Grassland
CDS	Coastal Dune Scrub
CHS	Coastal Headland Scrub
CTG	Coastal Tussock Grassland
SCS	Spray-zone Coastal Shrubland
Wet coastal	
BW	Brackish Wetland
CS	Coastal Saltmarsh
EFG	Estuarine Flats Grassland
ER	Estuarine Reedbed
EW	Estuarine Wetland
Wetland	
AH	Aquatic Herbland
AS	Aquatic Sedgeland
TM	Tall Marsh

Life forms:	
SH	Small herb
MH	Medium herb
LH	Large herb
MTG	Medium tussock graminoid
MNG	Medium non-tussock graminoid
MS	Medium shrub
SS	Small shrub
T	Tree
SC	Scrambler

Reveg = suitable for revegetation, R = recorded within EVC by present study, Gen = general record in present study not assigned to EVC (may be outside native vegetation), FIS = additional DEPI Flora Information System record

e = expected to occur within EVC

Life forms are further defined in DSE (2004)

Key to symbols in the table of status of declared weeds

S = State Prohibited, P = Regionally Prohibited, C = Regionally Controlled, R = Restricted, F = Fisheries Act Noxious Aquatic Species

	Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
	Indigenous species:																		
Reveg	*Acacia longifolia* subsp. *sophorae*	Coast Wattle	MS				✓	✓											
Reveg	*Acaena novae-zelandiae*	Bidgee-widgee	MH					e	✓						✓				
	Actites megalocarpa	Dune Thistle	MH			✓	e	e	e	✓									
Reveg	*Adriana quadripartita*	Coast Bitter-bush	MS				✓												
Reveg	*Allocasuarina verticillata*	Drooping Sheoak	T				e	e											
Reveg	*Alyxia buxifolia*	Sea Box	MS					e											FIS
Reveg	*Apium prostratum*	Sea Celery	SH		✓	✓	✓	e	e	✓		✓							
	Atriplex cinerea	Coast Saltbush	MS	✓															
Reveg	*Austrodanthonia caespitosa*	Common Wallaby-grass	MTG				✓	e											
	Austrodanthonia spp.	Wallaby Grass	MTG				✓	✓											
Reveg	*Austrofestuca littoralis*	Coast Fescue	MTG			e	e												FIS
Reveg	*Austrostipa flavescens*	Coast Spear-grass	MTG					✓											
	Azolla filiculoides	Pacific Azolla	SH														✓		
Reveg	*Beyeria lechenaultii*	Pale Turpentine-bush	SS				✓	e											
	Bolboschoenus caldwellii	Salt Club-sedge	MNG								✓								
	Calystegia sepium	Large Bindweed	LH											✓	✓				
	Carex gunniana	Swamp Sedge	MTG												✓				
Reveg	*Carpobrotus rossii*	Karkalla	SH		✓	✓	✓	✓	✓	✓									
	Centella cordifolia	Centella	SH																FIS
Reveg	*Clematis microphylla* s.l.	Small-leaved Clematis	SC				✓	✓					✓						
	Crassula helmsii	Swamp Crassula	MH													e	e	e	FIS
	Crassula tetramera	Australian Stonecrop	SH					e		✓									
Reveg	*Cynoglossum australe*	Australian Hound's-tongue	MH				✓												
	Daucus glochidiatus	Australian Carrot	SH				✓												
Reveg	*Dianella revoluta* s.l.	Black-anther Flax-lily	MNG				✓	e											
Reveg	*Dichondra repens*	Kidney-weed	SH					✓											
	Distichlis distichophylla	Australian Salt-grass	MNG						✓	✓		✓	✓	✓	✓				
	Eleocharis acuta	Common Spike-sedge	MNG												✓			✓	
	Epilobium billardierianum	Variable Willow-herb	LH			✓	e	e											
Reveg	*Ficinia nodosa*	Knobby Club-sedge	MNG			✓	✓		✓	✓		✓	✓		✓				
	Geranium retrorsum s.l.	Grassland Crane's-bill	MH																FIS

	Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
	Hemichroa pentandra	Trailing Hemichroa	SH									✓							
	Hydrocotyle laxiflora	Stinking Pennywort	MH																FIS
	Hydrocotyle sibthorpioides	Shining Pennywort	SH												✓		✓	✓	
	Hydrocotyle verticillata	Sheild Pennywort	SH																✓
	Isolepis cernua	Nodding Club-sedge	MTG											e					FIS
	Isolepis marginata	Little Club-sedge	MTG																FIS
	Juncus kraussii	Sea Rush	MNG												✓				
	Lachnagrostis billardierei s.l.	Coast Blown-grass	MTG			e	e	e	e										✓
	Lachnagrostis robusta	Salt Blown-grass	MTG				e	e											FIS
	Lepidosperma gladiatum	Coast Sword-sedge	MNG				✓												
	Leptinella longipes	Coast Cotula	SH								✓								
	Leptinella reptans s.s.	Creeping Cotula	SH																FIS
Reveg	*Leucophyta brownii*	Cushion Bush	SS						✓	✓									
Reveg	*Leucopogon parviflorus*	Coast Beard-heath	MS	✓		✓	✓	✓		✓			✓						
	Lilaeopsis polyantha	Australian Lilaeopsis	SH								✓	✓							
	Lobelia irrigua	Salt Pratia	SH												e				
	Lycopus australis	Australian Gipsywort	LH															✓	
	Microtis arenaria	Notched Onion-orchid	MTG					e											
	Microtis unifolia	Common Onion-orchid	MTG					e											
Reveg	*Muehlenbeckia adpressa*	Climbing Lignum	SC				✓	e											
Reveg	*Myoporum insulare*	Common Boobialla	MS				e	✓					✓						
	Myosotis australis	Austral Forget-me-not	LH					e	e										FIS
Reveg	*Olearia axillaris*	Coast Daisy-Bush	MS				e	e											FIS
	Oxalis exilis	Shady Wood-sorrel	MH																FIS
Reveg	*Ozothamnus turbinatus*	Coast Everlasting	MS			✓	✓												
	Parietaria debilis s.s.	Shade Pellitory	MH				e	e											FIS
Reveg	*Pelargonium australe*	Austral Stork's-bill	MH				✓	e	✓										
	Phragmites australis	Common Reed	LNG											✓		✓		✓	
Reveg	*Pimelea serpyllifolia*	Thyme Rice-flower	SS			✓	e	e	e	✓									✓
Reveg	*Poa poiformis*	Coast Tussock-grass	MTG			e	✓	e	✓	✓			✓	✓					✓
	Puccinellia stricta var. *stricta*	Australian Saltmarsh-grass	MTG										e						FIS
Reveg	*Pultenaea canaliculata*	Coast Bush-pea	MS					e											FIS
	Pultenaea tenuifolia	Slender Bush-pea	SS					✓											

	Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
	Ranunculus amphitrichus	Small River Buttercup	MH													e	e	e	FIS
	Ranunculus spp.	Buttercup	MH														✓		
Reveg	*Rhagodia candolleana*	Seaberry Saltbush	MS		✓		✓	e	✓				✓						
	Rumex bidens	Mud Dock	MH															✓	
	Rumex brownii	Slender Dock	MH				✓												
Reveg	*Sambucus gaudichaudiana*	White Elderberry	SS				e	e											FIS
	Samolus repens	Creeping Brookweed	SH								✓	✓							
	Sarcocornia quinqueflora	Beaded Glasswort	MH							✓	✓	✓							
Reveg	*Scaevola albida*	Small-fruit Fan-flower	SH					✓											
	Schoenoplectus pungens	Sharp Club-sedge	MNG								✓				✓				
	Schoenoplectus tabernaemontani	River Club-sedge	LNG													✓		✓	
	Schoenus nitens	Shiny Bog-sedge	MTG					e					e						FIS
	Selliera radicans	Shiny Swamp-mat	SH								✓	✓	e						
	Senecio biserratus	Jagged Fireweed	LH				✓												
Reveg	*Senecio pinnatifolius*	Variable Groundsel	LH		✓	✓	✓	✓	✓	✓									
	Senecio prenanthoides	Beaked Fireweed	LH																FIS
	Senecio spathulatus s.l.	Dune Groundsel	LH				e												FIS
	Sonchus hydrophilus	Native Sow-thistle	LH										✓						
	Spergularia marina s.s.	Lesser Sea-spurrey	SH																FIS
	Spergularia sp. 1	Native Sea-spurrey	MH									e	e						FIS
	Spinifex sericeus	Hairy Spinifex	MNG			✓	✓												
Reveg	*Sporobolus virginicus*	Salt Couch	MNG			e	e												FIS
Reveg	*Stackhousia spathulata*	Coast Stackhousia	SS			✓	✓	✓		✓									
	Suaeda australis	Austral Seablite	SS									e		e	e				FIS
Reveg	*Tetragonia implexicoma*	Bower Spinach	SC		✓	✓	✓	✓		✓			✓						
Reveg	*Threlkeldia diffusa*	Coast Bonefruit	MH		✓		✓	e		✓			✓						
	Triglochin alcockiae	Southern Water-ribbons	MNG													e	e	e	FIS
	Triglochin procera s.l.	Common Water-ribbons	MNG													✓	✓		
	Triglochin striata	Streaked Arrowgrass	MNG								e	✓			✓				
	Typha domingensis	Narrow-leaf Cumbungi	LNG															✓	
	Urtica incisa	Scrub Nettle	LH				e												✓
	Veronica gracilis	Slender Speedwell	MH										✓						
	Zoysia macrantha	Prickly Couch	MNG										✓						

Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
Zygophyllum billardierei	Coast Twin-leaf	SC					✓											
Introduced species:																		
Agapanthus praecox	Agapanthus					✓												
Agave americana	Century Plant						✓											
Agrostis stolonifera	Creeping Bent														e	e	e	FIS
Ammophila arenaria	Marram Grass				✓													
Anagallis arvensis	Pimpernel							✓										✓
Aphanes spp.	Piert																	FIS
Arctotheca calendula	Cape Weed						✓											
Argyranthemum frutescens	Marguerite						✓											
Asparagus asparagoides **R**	Bridal Creeper					✓	✓											
Atriplex prostrata	Hastate Orache										✓							
Avena spp.	Oat											✓						
Bellis perennis	English Daisy																	✓
Brassicaceae spp.	Crucifer						✓											
Briza minor	Lesser Quaking-grass																	✓
Bromus catharticus	Prairie Grass					✓	✓											
Bromus diandrus	Great Brome		✓	✓														
Cakile maritima	Sea Rocket																	✓
Carduus pycnocephalus **R**	Slender Thistle					e												FIS
Catapodium rigidum	Fern Grass					e	e											FIS
Centaurium spp.	Centaury								✓									
Centranthus ruber	Red Valerian					✓												
Cerastium glomeratum s.l.	Sticky Mouse-ear Chickweed					✓												
Chenopodium murale	Sowbane																	FIS
Chenopodium vulvaria	Stinking Goosefoot																	FIS
Cirsium vulgare	Spear Thistle					✓	✓							✓				
Coprosma repens	Mirror Bush						✓		✓									
Cotula coronopifolia	Water Buttons									✓	✓							
Crassula multicava	Shade Crassula																	FIS
Crocosmia x *crocosmiiflora*	Montbretia						✓											
Cynodon dactylon	Couch																	FIS
Dactylis glomerata	Cocksfoot								✓									

Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
Diplotaxis tenuifolia **C**	Sand Rocket						✓											
Dipogon lignosus	Common Dipogon						✓											
Drosanthemum candens	Rodondo Creeper			✓														
Ehrharta erecta	Panic Veldt-grass						✓											
Ehrharta longiflora	Annual Veldt-grass						✓											
Euphorbia characias	Large Mediterranean Spurge																	✓
Euphorbia lathyris	Caper Spurge																	✓
Euphorbia paralias	Sea Spurge		✓		✓	✓						✓						
Euphorbia peplus	Petty Spurge						✓											
Festuca arundinacea	Tall Fescue																	✓
Foeniculum vulgare **R**	Fennel						✓											
Galium murale	Small Goosegrass								✓									
Gazania spp.	Gazania																	✓
Gladiolus spp.	Gladiolus											✓						
Helminthotheca echioides	Ox-tongue												✓	✓				
Holcus lanatus	Yorkshire Fog																	✓
Hordeum spp.	Barley Grass			✓														
Hypericum perforatum **C**	St John's Wort																	FIS
Hypochoeris radicata	Flatweed																	
Iris germanica	German Iris					✓	✓											
Lagunaria patersonia	Pyramid Tree																	✓
Lagurus ovatus	Hare's-tail Grass		✓				✓	✓	✓									
Leontodon taraxacoides	Hairy Hawkbit																	✓
Leptospermum laevigatum	Coast Tea-tree					✓	✓											
Limonium hyblaeum	Sicilian Sea-lavender						✓											
Lobularia maritima	Sweet Alyssum																	✓
Lolium spp.	Rye Grass																	✓
Lycium ferocissimum **C**	African Box-thorn			✓		✓	✓				✓							
Malva dendromorpha	Tree Mallow			✓			✓											
Melianthus major	Cape Honey-flower																	✓
Melaleuca halmaturorum	Salt Paperbark																	✓
Melilotus indicus	Sweet Melilot			✓	✓							✓						
Myriophyllum aquaticum	Parrot's Feather														e	e	e	FIS

Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
Nasturtium officinale	Watercress																✓	
Oxalis pes-caprae	Soursob						✓											
Oxalis spp.	Wood Sorrel																	✓
Parapholis incurva	Coast Barb-grass			✓														
Paraserianthes lophantha	Cape Wattle						✓											
Pennisetum clandestinum	Kikuyu																	✓
Pittosporum crassifolium	Karo																	✓
Pittosporum undulatum	Sweet Pittosporum					✓	✓											
Plantago coronopus	Buck's-horn Plantain						✓	✓	✓									
Plantago major	Greater Plantain																	FIS
Poa annua	Annual Meadow-grass																	FIS
Polycarpon tetraphyllum	Four-leaved Allseed																	FIS
Polypogon maritimus	Coast Beard-grass																	FIS
Polypogon monspeliensis	Annual Beard-grass																	FIS
Raphanus raphanistrum	Wild Radish																	✓
Rhamnus alaternus	Italian Buckthorn						✓											
Romulea rosea	Onion Grass																	✓
Rorippa nasturtium-aquaticum	Watercress																✓	
Rumex crispus	Curled Dock																	FIS
Sagina maritima	Sea Pearlwort								✓									
Salpichroa origanifolia **R**	Pampas Lily-of-the-Valley																	✓
Senecio elegans	Purple Groundsel				✓	✓	✓											
Sherardia arvensis	Field Madder																	✓
Solanum linnaeanum **R**	Apple of Sodom																	✓
Solanum nigrum	Black Nightshade																	FIS
Sonchus asper s.l.	Rough Sow-thistle																	FIS
Sonchus oleraceus	Common Sow-thistle			✓				✓										
Sporobolus africanus	Rat-tail Grass																	✓
Stellaria pallida	Lesser Chickweed																	FIS
Stenotaphrum secundatum	Buffalo Grass		✓									✓						
Thinopyrum junceiforme	Sea Wheat-grass				e	e												FIS
Trifolium dubium	Suckling Clover																	✓
Trifolium fragiferum	Strawberry Clover																	FIS

Scientific name	Common name	Life form	BGS	BCH	CDG	CDS	CHS	CTG	SCS	BW	CS	EFG	ER	EW	AS	AH	TM	Gen
Trifolium repens	White Clover																	✓
Ulex europaeus **C**	Gorse																	✓
Vicia spp.	Vetch													✓				
Vinca major	Blue Periwinkle																	✓
Vulpia bromoides	Squirrel-tail Fescue																	FIS
Vulpia ciliata	Fringed Fescue																	FIS
Vulpia myuros	Rat's-tail Fescue																	✓
Zantedeschia aethiopica	White Arum-lily																	✓

APPENDIX 2

Ecological vegetation classes

Dry Coastal EVCs

Berm Grassy Shrubland EVC 311

Floristics/ indigenous life forms	Dominated by Coast Saltbush *Atriplex cinerea*, scattered Coast Beard-heath *Leucopogon parviflorus* may also be present.
Introduced species	Introduced species are common and include Great Brome **Bromus diandrus*, Sea Spurge **Euphorbia paralias* and Hare's-tail Grass **Lagurus ovatus.*
Structure:	Shrubland to 1.5 metres
Habitat:	Beach with low to medium wave energy
Distribution:	Hopkins River, highly localised
Related EVC:	Coastal Dune Grassland
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity; considered endangered in the adjacent Otway Plain bioregion
Status (study area):	Vulnerable
Comments:	Vegetation is generally stable unless removed by erosion

Bird Colony Succulent Herbland EVC 155

Floristics/ indigenous life forms:	Dominated by succulent creepers Bower Spinach *Tetragonia implexicoma* and Karkalla (Pigface) *Carpobrotus rossii*, and low succulent shrub Seaberry Saltbush *Rhagodia candolleana*, associated species include Sea Celery *Apium prostratum*, Variable Grounsel *Senecio pinnatifolius* and Coast Bonefruit *Threlkeldia diffusa*.
Introduced species:	Introduced species are common and include Tree Mallow **Malva dendromorpha* and Rodondo Creeper **Drosanthemum candens*
Structure:	Herbland to 0.5 metres
Habitat:	Seabird breeding colony
Distribution:	Restricted to Middle Island, highly localised
Related EVC:	None
Status (bioregion):	Vulnerable (DEPI website)
Status (study area):	Secure
Comments:	Unusual vegetation restricted to seabird colonies, brought about by high nutrient levels from bird droppings and soil disturbance from trampling and burrowing, too much so for shrub species (Yugovic 1998); Rodondo Creeper was reportedly introduced to the island by mistake, it drapes the cliffs in some sections and should be eradicated if possible

Coastal Dune Grassland EVC 879

Floristics/ indigenous life forms:	Dominated by Hairy Spinifex *Spinifex sericeus*, associated species include Dune Thistle *Actites megalocarpa*, Variable Willow-herb *Epilobium billardierianum* and Thyme Rice-flower *Pimelea serpyllifolia*.
Introduced species:	Introduced species are common and include Marram Grass **Ammophila arenaria*, Sea Spurge **Euphorbia paralias* and Purple Groundsel **Senecio elegans*
Structure:	Grassland to 0.5 metres
Habitat:	Low sand dunes on high wave energy coast
Distribution:	Scattered along coast, good example at mouth of Hopkins River (photo)
Related EVC:	None
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Status (study area):	Endangered
Comments:	May be subject to marine erosion during storm surges, largely replaced by invasive European Marram Grass **Ammophila arenaria* introduced in the late 1800s after extensive sand drifts were created by stock grazing (Heathcote and Maroske 1996), Marram Grass also builds taller dunes due to unlimited vertical as well as horizontal rhizome growth; typical habitat of the rare Coast Fescue *Austrofestuca lttoralis* which has not been recently recorded in the Warrnambool area.

Coastal Dune Scrub EVC 160

Floristics/ indigenous life forms:	Dominated by Coast Beard-heath *Leucopogon parviflorus* , associated species include Coast Wattle *Acacia longifolia* subsp. *Sophorae*, Karkalla (Pigface) *Carpobrotus rossii*, Knobby Club-sedge *Ficinia nodosa*, Coast Sword-sedge *Lepidosperma gladiatum*, Climbing Lignum *Muehlenbeckia adpressa*, Coast Tussock-grass *Poa poiformis*, Seaberry Saltbush *Rhagodia candolleana* and Bower Spinach *Tetragonia implexicoma*.
Introduced species:	Introduced species are common especially*Coast Tea-tree *Leptospermum laevigatum*, Bridal Creeper **Asparagus asparagoides*, Panic Veldt-grass **Ehrharta erecta* and Myrtle-leaf Milkwort **Polygala myrtifolia.*
Structure:	Scrub 2–6 metres
Habitat:	Coastal sand dunes
Distribution:	Widespread and extensive
Related EVC:	Coastal Headland Scrub, which can support a similar array of species though is typically located on rock or hard white sands.
Status (bioregion):	Depleted (DEPI website)
Status (study area):	Vulnerable, generally stable but weeds have the potential to smother the vegetation, particularly regeneration following fire or other disturbance

Comments:	Although Coast Wattle *Acacia longifolia* subsp. *sophorae* is indigenous to the area and associated with EVC 160, it should not be the dominant species within this EVC. Any control of Coast Wattle would be subject to a planning permit if not covered by a Vegetation Precinct Plan in the Planning Scheme. Coast Tea-tree **Leptospermum laevigatum* is indigenous to Victoria east of Angelsea (Lyne 1996), but not to south-west Victoria, recommended by von Mueller as part of dune revegetation in the 1880s and used in amenity planting, now extensively naturalised; early maps and photographs indicate Drooping Sheoak *Allocasuarina verticillata* was a dominant species of Coastal Dune Scrub prior to European settlement; foredunes are typical habitat of the rare Coast Fescue *Austrofestuca lttoralis* which has not been recently recorded in the Warrnambool area.

Coastal Headland Scrub EVC 161

Floristics/ indigenous life forms:	Dominated by Coast Beard-heath *Leucopogon parviflorus*, associated species include Coast Wattle *Acacia longifolia* subsp. *sophorae*, Common Boobialla Myoporum insulare, Slender Bushpea *Pultanaea tenufolia*, Small-fruit Fan-flower *Scaevola albida*, Coast Stackhousia *Stackhousia spathulata* and Coast Twin-leaf *Zygophyllum billardierei* ; rarity or absence of Rounded Noon-flower *Disphyma crassifolium* is notable (the species is localised in western Victoria, but present at Port Fairy).
Introduced species:	Introduced species are common and include Cape Weed **Arctotheca calendula*, Bridal Creeper **Asparagus asparagoides*, Spear Thistle **Cirsium vulgare*, Mirror Bush **Coprosma repens* and Montbretia **Crocosmia* x *crocosmiiflora*
Structure:	Scrub 2–6 metres
Habitat:	Rocky limestone sites with little or no loose sand capping, limestone may be Tertiary (marine) or Quaternary (formed from wind-blown sand), soils formed on limestone are red-brown sandy loam
Distribution:	Widespread and extensive
Related EVC:	Coastal Dune Scrub
Status (bioregion):	Vulnerable (DEPI website)
Status (study area):	Vulnerable, generally stable but weeds have the potential to smother the vegetation, particularly regeneration following fire or other disturbance
Comments:	On sites with a shallow sand capping the vegetation is intermediate between Coastal Dune Scrub and Coastal Headland Scrub (the two EVCs forming a complex), and where deep sand occurs in small pockets Coastal Dune Scrub (on the sand) may form an intricate mosaic pattern with Coast Headland Scrub which is too detailed to map at the present scale of 1:5,000 (the two EVCs forming a mosaic); it is likely that this vegetation type was originally extensively dominated by Drooping Sheoak *Allocasuarina verticillata*

Coastal Tussock Grassland EVC 163

Floristics/ indigenous life forms:	Dominated by Coast Tussock-grass *Poa poiformis*, associated species include Cushion Bush *Leucophyta brownii*, Australian Salt-grass *Distichlis distichophylla*, Knobby Club-sedge *Ficinia nodosa* and Austral Stork's-bill *Pelargonium austral*.
Introduced species:	Introduced species are uncommon and include Hare's-tail Grass **Lagurus ovatus*, Pimpernel **Anagallis arvensis* and Common Sow-thistle **Sonchus oleraceus*
Structure:	Grassland to 0.25 metres
Habitat:	Windswept clifftop, not as exposed as Spray-zone Coastal Shrubland
Distribution:	A single isolated occurrence at the eastern end of the West Central management zone, south of the water treatment plant
Related EVC:	Coastal Headland Scrub
Status (bioregion):	Vulnerable (DEPI website)
Status (study area):	Vulnerable (one known occurrence)
Comments:	The distribution of this EVC to the west of the known occurrence is not clear, further survey is recommended

Spray-zone Coastal Shrubland EVC 876

Floristics/ indigenous life forms:	Dominated by Cushion Bush *Leucophyta brownii*, associated species include Dune Thistle *Actites megalocarpa*, Karkalla (Pigface) *Carprobrotus rossii*, Australian Salt-grass *Distichlis distichophylla*, Thyme Rice-flower *Pimelea serpyllifolia* and Beaded Glasswort *Sarcocornia quinqueflora*.
Introduced species:	Introduced species are effectively absent.
Structure:	Open shrubland to 0.5 metres
Habitat:	Highly exposed clifftops subject to salt spray and runoff erosion
Distribution:	Scattered along rocky coast
Related EVC:	
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Status (study area):	Secure
Comments:	Attempts at erosion control and planting in this vegetation are not appropriate as this zone is highly exposed and wind and water erosion and sparse vegetation are normal; fencing to exclude human foot traffic is desirable

Wet coastal EVCs

Brackish Wetland EVC 656

Floristics/ indigenous life forms:	Dominated by Salt Club-sedge *Bolboschoenus caldwellii* ± Sharp Club-sedge *Schoenoplectus pungens*, associated species include Coast Cotula *Leptinella longipes*, Australian Lilaeopsis *Lilaeopsis polyantha*, Creeping Brookweed *Samolus repens* and Shiny Swamp-mat *Selliera radicans*.
Introduced species:	Introduced species are effectively absent.
Structure:	Closed sedgeland to 0.5 metres
Habitat:	Brackish sites of variable salinity influenced by tidal water and fresh water from the Merri River
Distribution:	Merri River estuary
Related EVC:	Coastal Saltmarsh, which is adjacent
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Status (study area):	Vulnerable
Comments:	This vegetation has an annual growth rhythm, being green and vigorous in spring and summer, and brown and dormant (almost disappearing) in autumn and winter

Coastal Saltmarsh EVC 009

Floristics/ indigenous life forms:	Dominated by Beaded Glasswort *Sarcocornia quinqueflora* and Creeping Brookweed *Samolus repens*, associated species include Sea Celery *Apium prostratum*, Trailing Hemichroa *Hemichroa pentrandra*, Australian Lilaeopsis *Liliaeopsis polyantha*, Shiny Swamp-mat *Selliera radicans* and Australian Salt-grass *Distichlis distichophylla*.
Introduced species:	Introduced species are uncommon including Hastate Orache **Atriplex prostrata* and Water Buttons **Cotula coronopifolia*
Structure:	Herbland to 0.25 metres
Habitat:	Protected intertidal sites, regularly inundated by tides
Distribution:	Merri River estuary
Related EVC:	Brackish Wetland, which is adjacent
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Status (study area):	Secure
Comments:	This vegetation is regularly inundated by tidal water variably mixed with fresh water from the river; most weeds are naturally kept in check by salt

Estuarine Flats Grassland EVC 914

Floristics/ indigenous life forms :	Dominated by Coast Tussock-grass *Poa poiformis* and Knobby Club-sedge *Ficinia nodosa*, associated species include Climbing Lignum *Muehlenbeckia adpressa*, Coast Sword-sedge *Lepidosperma gladiatum*, Pale Rush *Juncus pallidus* and Annual Fireweed *Senecio glomeratus*;
Introduced species:	Introduced species Myrtle-leaf Milkwort **Polygala myrtifolia* and Pimpernel **Anagallis arvensis* have low cover
Structure:	Open to closed grassland/sedgeland to 0.5 metres
Habitat:	Slightly higher sites than saltmarsh, rarely if ever inundated and then only by brackish or fresh water during creek flood events
Distribution:	Merri River estuary
Related EVC:	No close relative in area
Conservation status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Conservation status (study area):	Vulnerable, the few stands appear stable but are susceptible to extreme high tides (which would convert the vegetation to Coastal Saltmarsh)
Comments:	Of considerable ecological interest warranting further investigation

Estuarine Reedbed EVC 952

Floristics/ indigenous life forms:	Dominated by Common Reed *Phragmites australis*, monospecific or with salt-tolerant (halophytic) understorey, associated species include Sea Rush *Juncus kraussii*, Salt Club-sedge *Bolboschoenus caldwellii*, Coast Cotula *Leptinella longipes* and Glaucous Goosefoot *Chenopodium glaucum*.
Introduced species:	Introduced species are effectively absent
Structure:	Grassland to 1.5 metres
Habitat:	Brackish wetland, requires freshwater input, close to limit of *Phragmites* salt tolerance
Distribution:	A single small isolated occurrence at Elliot Street north of the Thunder Point raceway.
Related EVC:	Tall Marsh, also dominated by Common Reed *Phragmites australis* but with a glycophytic (freshwater) understorey, can be difficult to distinguish when there is no understorey
Conservation status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity.
Conservation status (study area):	Vulnerable
Comments:	Probably originally very extensive in the estuary

Estuarine Wetland EVC 010

Floristics/ indigenous life forms:	Dominated by Sea Rush *Juncus kraussii,* monospecific or with Beaded Glasswort *Sarcocornia quinqueflora*, often with freshwater (glycophytic) species such as Common Reed *Phragmites australis,* associated species include Large Bindweed *Calystegia sepium,* Swamp Sedge *Carex gunniana*, Common Spike-sedge *Eleocharis acuta* and Shining Pennywort *Hydrocotyle sibthorpioides.*
Introduced species	Introduced species are effectively absent
Structure:	Rushland 0.5 metres
Habitat:	Brackish tidal zone, some freshwater input is necessary
Distribution:	Numerous mostly narrow stands along estuary
Related EVC:	Coastal Saltmarsh, which lacks glycophytic elements
Status (bioregion):	Depleted (DEPI website)
Status (study area):	Secure
Comments:	Further investigation of this vegetation is recommended

Freshwater wetland EVCs

Aquatic Herbland EVC 653

Floristics/ indigenous life forms:	Dominated by Common Water-ribbons *Triglochin procera* and Pacific Azolla *Azolla filiculoides*, associated species include Common Water-ribbons *Triglochin procera* and Shining Pennywort *Hydrocotyle sibthorpioides*.
Introduced species:	Introduced species are effectively absent.
Structure:	Emergent herbland to 0.5 metres
Habitat:	Largely permanent wetland
Distribution:	Two evidently artificial wetlands
Related EVC:	Aquatic Sedgeland, which is dominated by sedges
Status (bioregion):	Endangered (DEPI website)
Status (study area):	Vulnerable
Comments:	Further investigation of this vegetation is recommended

Aquatic Sedgeland EVC 308

Floristics/ indigenous life forms:	Dominated by River Club-rush *Schoenoplectus tabernaemontani*, associated species include Common Reed *Phragmites australis* and Common water-ribbons *Triglochin procera*.
Introduced species:	Introduced species are effectively absent.
Structure:	Emergent sedgeland to 1.0 metres
Habitat:	Freshwater wetland
Distribution:	Old course of Merri River
Related EVC:	
Status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Status (study area):	Vulnerable
Comments:	Species-poor vegetation dominated by one to several species of robust inundation-tolerant rhizomatous sedges, typically with culms septate or otherwise including large air-spaces, with vegetative growth extending into virtually permanent water (DEPI website)

Tall Marsh EVC 821

Floristics/ indigenous life forms:	Dominated by Common Reed *Phragmites australis*, associated species include Narrow-leaf Cumbungi *Typha domingensis*, River Club-sedge *Schoenoplectus tabernaemontani*, Common Spike-sedge *Eleocharis acuta*, Australian Gipsywort *Lycopus australis* and Mud Dock *Rumex bidens*.
Introduced species:	Introduced species are effectively absent.
Structure:	Grassland 1.5–2 metres tall
Habitat:	Freshwater wetland
Distribution:	Old course of Merri River
Related EVC:	Estuarine Reedbed, which includes halophytic species
Conservation status (bioregion):	Currently no assigned status (DEPI website), indicating extreme rarity
Conservation status (study area):	Vulnerable
Comments:	Further investigation of this vegetation is recommended

APPENDIX 3

Revegetation species

Four ecological vegetation classes (EVCs) are suitable for revegetation:

CDG	Coastal Dune Grassland
CDS	Coastal Dune Scrub
CHS	Coastal Headland Scrub
CTG	Coastal Tussock Grassland

The following species occur within these EVCs (indicated by R):

Scientific name	Common name	Life form	Source	CDG	CDS	CHS	CTG
A. longifolia subsp. *sophorae*	Coast Wattle	MS medium shrub	Warrnambool Coast		R	R	
Acaena novae-zelandiae	Bidgee-widgee	MH medium herb	Warrnambool Coast			R	R
Adriana quadripartita	Coast Bitter-bush	MS medium shrub	Warrnambool Coast		R		
Allocasuarina verticillata	Drooping Sheoak	T tree	Warrnambool Coast		R	R	
Alyxia buxifolia	Sea Box	MS medium shrub	Warrnambool Coast			R	
Apium prostratum	Sea Celery	SH small herb	Warrnambool Coast	R	R	R	R
Austrodanthonia caespitosa	Common Wallaby-grass	MTG medium tussock graminoid	Warrnambool Coast		R	R	
Austrofestuca littoralis	Coast Fescue	MTG medium tussock graminoid	Warrnambool Coast	R	R		
Austrostipa flavescens	Coast Spear-grass	MTG medium tussock graminoid	Warrnambool Coast			R	
Beyeria lechenaultii	Pale Turpentine-bush	SS small shrub	Correa site		R	R	
Carpobrotus rossii	Karkalla	SH small herb	Warrnambool Coast	R	R	R	R
Clematis microphylla.	Small-leaved Clematis	SC scrambler	Warrnambool Coast		R	R	
Cynoglossum australe	Aust. Hound's-tongue	MH medium herb	Warrnambool Coast		R		
Dianella revoluta s.l.	Black-anther Flax-lily	MNG medium non tussock graminoid	Warrnambool Coast		R	R	
Dichondra repens	Kidney-weed	SH small herb	Warrnambool Coast			R	
Ficinia nodosa	Knobby Club-sedge	MNG medium non tussock graminoid	Warrnambool Coast	R	R		R
Leucophyta brownii	Cushion Bush	SS small shrub	Warrnambool Coast				R
Leucopogon parviflorus	Coast Beard-heath	MS medium shrub	Warrnambool Coast	R	R	R	

Scientific name	Common name	Life form	Source	CDG	CDS	CHS	CTG
Muehlenbeckia adpressa	Climbing Lignum	SC scrambler	Warrnambool Coast		R	R	
Myoporum insulare	Common Boobialla	MS medium shrub	Warrnambool Coast		R	R	
Olearia axillaris	Coast Daisy-Bush	MS medium shrub	Warrnambool Coast		R	R	
Ozothamnus turbinatus	Coast Everlasting	MS medium shrub	Warrnambool Coast	R	R		
Pelargonium australe	Austral Stork's-bill	MH medium herb	Warrnambool Coast		R	R	R
Pimelea serpyllifolia	Thyme Rice-flower	SS small shrub	Warrnambool Coast	R	R	R	R
Poa poiformis	Coast Tussock-grass	MTG medium tussock graminoid	Warrnambool Coast	R	R	R	R
Pultenaea canaliculata	Coast Bush-pea	MS medium shrub	Warrnambool Coast			R	
Rhagodia candolleana	Seaberry Saltbush	MS medium shrub	Warrnambool Coast		R	R	R
Sambucus gaudichaudiana	White Elderberry	SS small shrub	Warrnambool Coast		R	R	
Scaevola albida	Small-fruit Fan-flower	SH small herb	Warrnambool Coast			R	
Senecio pinnatifolius	Variable Groundsel	LH large herb	Warrnambool Coast	R	R	R	R
Sporobolus virginicus	Salt Couch	MNG medium non tussock graminoid	Warrnambool Coast	R	R		
Stackhousia spathulata	Coast Stackhousia	SS small shrub	Warrnambool Coast	R	R	R	
Tetragonia implexicoma	Bower Spinach	SC scrambler	Warrnambool Coast	R	R	R	
Threlkeldia diffusa	Coast Bonefruit	MH medium herb	Warrnambool Coast		R	R	
Zygophyllum billardierei	Coast Twin-leaf	SC scrambler	Hopkins River			R	

APPENDIX 4

Revegetation schedule

Revegetation of the Promenade is modelled on the following EVC:

- Coastal Dune Scrub (excluding medium shrubs)

Revegetation of the Flumes is modelled on the following EVCs:

- Coastal Headland Scrub, higher inland rocky area
- Coastal Dune Scrub, lower deep sandy dune area

The species composition of EVCs is in Appendix 3.
The original distribution of EVCs can be determined by extrapolation of mapped EVC boundaries on Figures 2e, 2f.

Sites are to be prepared by glyphosate spray 6 weeks before planting, clean mulch to be applied prior to planting
Plants are to be planted at a general density of 4/m^2, numbers as follows:

	Year										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Promenade											
Coastal Dune Scrub	20000	20000	20000								
The Flume											
Coastal Headland Scrub	1000	1000	500	500	500	500	500	500	500	500	
Coastal Dune Scrub	1000	1000	500	500	500	500	500	500	500	500	

APPENDIX 5
Target weeds

Of the 105 recorded introduced plant species, 34 are considered target weeds for control programs, as follows.

The recorded distribution of target weeds within EVCs is as follows.

Refer to Appendix 1 for EVC names.

Further information on control for some species is in Muyt (2001).

Flowering times are from Richardson et al. (2011).

Note 1: Where practicable all cut material to be disposed of, either removed from site or burnt onsite
Note 2: Seedlings of all species can be controlled by manual removal

Scientific name	Common name	Flowering period	Control method	BGS	BCSH	CDG	CDS	CHS	CTG	SCS	CS	EFG	Gen
Shrubs													
Coprosma repens	Mirror Bush	Spring to summer	Cut & paint					✓		✓			
Euphorbia characias	Large Medit. Spurge	Late winter to early summer	Cut & paint										✓
Lycium ferocissimum	African Box-thorn	Spring to summer	Cut & paint		✓		✓	✓			✓		
Malva dendromorpha	Tree Mallow	Spring to summer	Cut (no paint)		✓			✓					

Scientific name	Common name	Flowering period	Control method	BGS	BCSH	CDG	CDS	CHS	CTG	SCS	CS	EFG	Gen
Melaleuca halmaturorum	Salt Paperbark		Cut & paint										✓
Melianthus major	Cape Honey-flower	Spring to summer	Cut & paint										✓
Paraserianthes lophantha	Cape Wattle	Late winter to early spring	Cut (no paint)					✓					
Pittosporum crassifolium	Karo	Late winter to spring	Cut & paint										✓
Pittosporum undulatum	Sweet Pittosporum	Late winter to spring	Cut & paint				✓	✓					
Rhamnus alaternus	Italian Buckthorn	Late autumn to spring	Cut & paint					✓					
Solanum linnaeanum	Apple of Sodom	All year	Cut & paint										✓
Ulex europaeus	Gorse	Mostly spring and autumn	Cut & paint										
Climbers													
Asparagus asparagoides	Bridal Creeper	Spring	Manual removal, spray				✓	✓					
Dipogon lignosus	Common Dipogon	Spring to summer	Cut & paint, manual removal					✓					✓
Salpichroa origanifolia	Pampas Lily	Spring to autumn											

Scientific name	Common name	Flowering period	Control method	BGS	BCSH	CDG	CDS	CHS	CTG	SCS	CS	EFG	Gen
Herbs													
Agapanthus praecox	Agapanthus	Spring to summer	Manual removal				✓						
Agave americana	Century Plant	Summer to autumn	Cut & paint					✓					
Ammophila arenaria	Marram Grass	Spring to summer	Dab, spray			✓							
Argyranthemum frutescens	Marguerite	Most of the year	Manual removal					✓					
Berkheya rigida	African Thistle	All year, mostly spring to summer	Manual removal										
Centranthus ruber	Red Valerian	Spring to summer	Manual removal				✓						
Nassella neesiana	Chilean needle grass	Flowers spring and summer	combine herbicide application with physical removal										
Crassula multicava	Shade Crassula	Mostly spring	Manual removal										FIS
Crocosmia x *crocosmiiflora*	Montbretia	Summer to early autumn	Manual removal					✓					
Drosanthemum candens	Rodondo Creeper	Spring to summer	Manual removal		✓								
Euphorbia lathyris	Caper Spurge	Late winter to summer	Manual removal										✓
Euphorbia paralias	Sea Spurge	Spring to autumn	Manual removal	✓		✓	✓					✓	

Scientific name	Common name	Flowering period	Control method	BGS	BCSH	CDG	CDS	CHS	CTG	SCS	CS	EFG	Gen
Foeniculum vulgare	Fennel	Spring to summer	Manual removal					✓					
Gazania sp.	Gazania	All year, mostly spring to summer	Manual removal										✓
Gladiolus sp.	Gladiolus	Spring	Manual removal									✓	
Hypericum perforatum	St John's Wort	Spring to summer	Manual removal										FIS
Iris germanica	German Iris	Spring	Manual removal				✓	✓					
Limonium hyblaeum	Sicilian Sea-lavender	Late summer to winter	Spray										✓
Vinca major	Blue Periwinkle	Spring to summer	Manual removal, spray										✓
Zantedeschia aethiopica	White Arum-lily	Winter to summer	Spray										✓

Photos of selected weed species

Blue Periwinkle *Vinca major*, the Flume

Bridal Creeper *Asparagus asparagoides*, Thunder Point

Cape Wattle *Paraserianthes lophantha*, the Flume

Century Plant *Agave americana*, Thunder Point

Common Dipogon *Dipogon lignosus*

Gladiolus *Gladiolus* sp., Hopkins River

Italian Buckthorn *Rhamnus alaternus*, Thunder Point

Marram Grass *Ammophila arenaria*, widespread and extensive

Mirror Bush *Coprosma repens*, common on cliffs, bird-dispersed

Tree Mallow *Malva dendromorpha*, Middle Island, bird-dispersed

Red Valerian *Centranthus ruber*, the Flume

Rodondo Creeper *Drosanthemum candens*, Middle Island

APPENDIX 6

Management schedule and costs

NOTE: Service standards and staffing levels will vary over time, conditional upon budgeting constraints and budget availability.

Numbers in cells are number of (3-person) bushcrew team days.
Cost is estimated assuming $500 per bushcrew team day.

	Year										
Objective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Cost (K$)**
Wild Coast and South West Crown Land											
Woody weed control: General	25	20	10	10	10	10	10	10	10	10	125
Woody weed control: Mirror Bush (along coast, islands)	20	20	10	10	10	10	10	10	10	10	120
Woody weed control: Tree Mallow (Middle Island)	2	2	2								6
Woody weed control: Boxthorn (estuary)	5	1									6
Woody weed control: Fennel (Thunder Point)	2	1									3
Woody weed control: Cape Honey-flower (near sand mine)	2	1									3
Climber control: General	15	15	10	10	10	10	10	10	10	10	110
Herbaceous weed control: General	10	10	10	10	10	10	10	10	10	10	100
Herbaceous weed control: Rodondo Creeper (Middle Island)	10	10	10								30
Herbaceous weed control: Rodondo Creeper (mainland)	2	1									3
Herbaceous weed control: Bridal Creeper (Thunder Point)	5	5	5	5	5						25
Herbaceous weed control: Century Plant (Thunder Point)	2	2									4
Herbaceous weed control: Marguerite (Thunder Point)	1										1
Herbaceous weed control: Iris (Thunder Point)	1										1
Remove boxthorn pile	5										5
Restoration: Estuarine Flats Grassland (estuary)	5	2	2	2	2	2	2	2	2	2	23

	Year										
Objective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Cost (K$)**
Lady Bay West											0
Woody weed control: General	10	10	10	10	10	10	10	10	10	10	100
Woody weed control: Mirror Bush (Caravan Park)	50	50									100
Woody weed control: Coast Tea-tree (Promenade)	100										100
Climber control: General	10	10	10	10	10	10	10	10	10	10	100
Herbaceous weed control: General	10	10	10	10	10	10	10	10	10	10	100
Revegetation: Promenade	50	25	10	10	10	10	10	10	10	10	155
											0
Lady Bay East											0
Woody weed control: General	15	15	10	10	10	10	10	10	10	10	110
Woody weed control: Cape Wattle (Flumes)	10	5									15
Climber control: General	10	10	10	10	10	10	10	10	10	10	100
Herbaceous weed control: General	10	10	10	10	10	10	10	10	10	10	100
Herbaceous weed control: Blue Periwinkle (Flumes)	10	5	2								17
Herbaceous weed control: Red Valerian (Flumes)	5	2	2								9
Herbaceous weed control: Montbretia (Hopkins River)	5	2									7
Revegetation: Flumes	20	20	20	20	20	10	10	10	10	10	150
Rare species management: Correa	10	2	2	2	2	10	2	2	2	2	36
											0
Logans Beach											0
Woody weed control: General	15	15	10	10	10	10	10	10	10	10	110
Climber control: General	10	10	10	10	10	10	10	10	10	10	100
Herbaceous weed control: General	15	15	10	10	10	10	10	10	10	10	110
Herbaceous weed control: Gladiolus (Hopkins River)	5	2	2	2	2						13
Herbaceous weed control: Agapanthus (Hopkins River)	1										1
Restoration: Coastal Dune Grassland (mainly weed control)	10	10	10	10	10	10	10	10	10	10	100
Total (team days)	**493**	**318**	**197**	**181**	**181**	**172**	**164**	**164**	**164**	**164**	**2198**

	Year										
Objective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Cost (K$)**
Total ($K)	**246.5**	**159**	**98.5**	**90.5**	**90.5**	**86**	**82**	**82**	**82**	**82**	**1099**

APPENDIX 7

DRAFT Native Vegetation Precinct Plan

NOTE: Appendix 7 was prepared in accordance with *Victoria's Native Vegetation – A Framework for Action* (DSE, 2003). Following the preparation of Appendix 7, 'Draft Native Vegetation Precinct Plan' the State Government replaced the abovementioned framework with the *Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI, 2013*).

Appendix 7 will assist in the preparation of the coast Native Vegetation Precinct Plan to be included in the Schedule to Clause 52.16 of the Warrnambool Planning Scheme, however will be amended to be in accordance with *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI, 2013) and clause 52.16-6 decision guidelines in the Warrnambool Planning Scheme.

Warrnambool Coast
Native Vegetation Precinct Plan

This is the Warrnambool Coast Native Vegetation Precinct Plan listed under the Schedule to Clause 52.16 of the Warrnambool Planning Scheme. The removal, destruction or lopping of native vegetation in accordance with this Native Vegetation Precinct Plan does not require a permit provided conditions and requirements specified in this Native Vegetation Precinct Plan are met.

The Warrnambool Coast Native Vegetation Precinct Plan applies to all land shown in Figure 1 of the Vegetation Management Plain.

1. Purpose

The purpose of the Warrnambool Coast Native Vegetation Precinct Plan is to:

- Specify the native vegetation to be protected and the native vegetation that can be removed, destroyed or lopped.
- Ensure that areas set aside to protect native vegetation are managed to conserve ecological values in accordance with the Warrnambool Precinct Structure Plan.
- Ensure that the removal, destruction or lopping of native vegetation specified to be protected is consistent with conserving the ecological values of these areas and is in accordance with the three-step approach to net gain as set out in *Victoria's Native Vegetation Management – a Framework for Action*, DSE 2002.
- Set out the works or other necessary actions required to offset the removal, destruction or lopping of native vegetation.
- Streamline the planning approvals process through a landscape approach to native vegetation protection and management.

2. Native Vegetation to be protected

The native vegetation to be protected is shown in Maps 2 (vegetation) and 3 (weed management and revegetation areas) of the Vegetation Management Plan. It consists of all native vegetation that is not to be removed, destroyed or lopped as per Tables 1 and 2 of this Precinct Plan.

The native vegetation shown on the maps as to be retained will not be removed. The vegetation is protected because a landscape wide approach to retention and removal of native vegetation has been adopted in the preparation of this Native Vegetation Precinct Plan rather than a site by site approach. Decisions relating to removal of certain individual trees and/or areas of native vegetation have been made in a holistic manner taking into account scattered trees and areas of native vegetation which are proposed to be protected. The ad hoc removal of native vegetation which is identified as to be protected may undermine the holistic and landscape wide

approach to the preparation of this Native Vegetation Precinct Plan.

3. Native Vegetation that can be Removed, Destroyed or Lopped

The native vegetation described in Tables 1 and 2 and shown as native vegetation that can be removed in Map 1 can be removed, destroyed or lopped, subject to the requirements and conditions set out below as allowed under Clause.52.16.

Table 1: Habitat zones which can be removed

Property Number	Property Address (including Title Number)	Habitat Zone (this should be a unique number for each habitat zone and link to Map 2)	EVC No. and initials	Size (ha)
NA	Macdonald Street	1a, 2a	160 CDS	0.075
NA	Pickering Point Car Park	1b, 2b	160 CDS	0.005
NA	Thunder Point Car Park	1c, 1d	160 CDS	0.035
NA	Point Ritchie Car Park	3	160 CDS	0.023

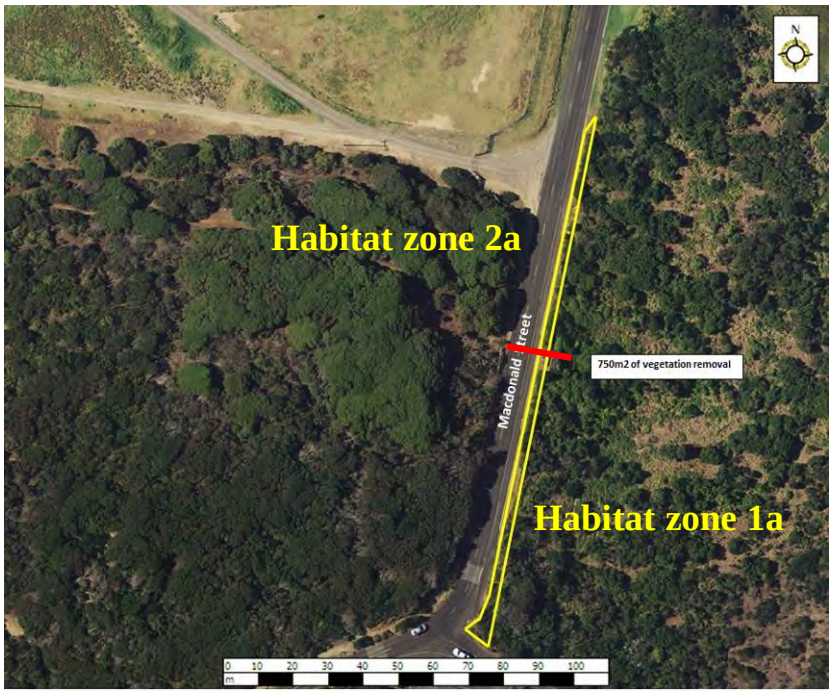
The native vegetation shown in the following Table 2 and on the following Maps 1–f will not be removed. It will be lopped (or pruned) or have selected shrubs removed. There is little or no habitat hectare loss, so pruning zones are identified rather than habitat zones for which habitat hectares would be calculated. Since a permit is still required under clause 52.17, this lopping (or pruning) is included in this Precinct Plan.

Table 2: Areas which can be lopped (pruned)

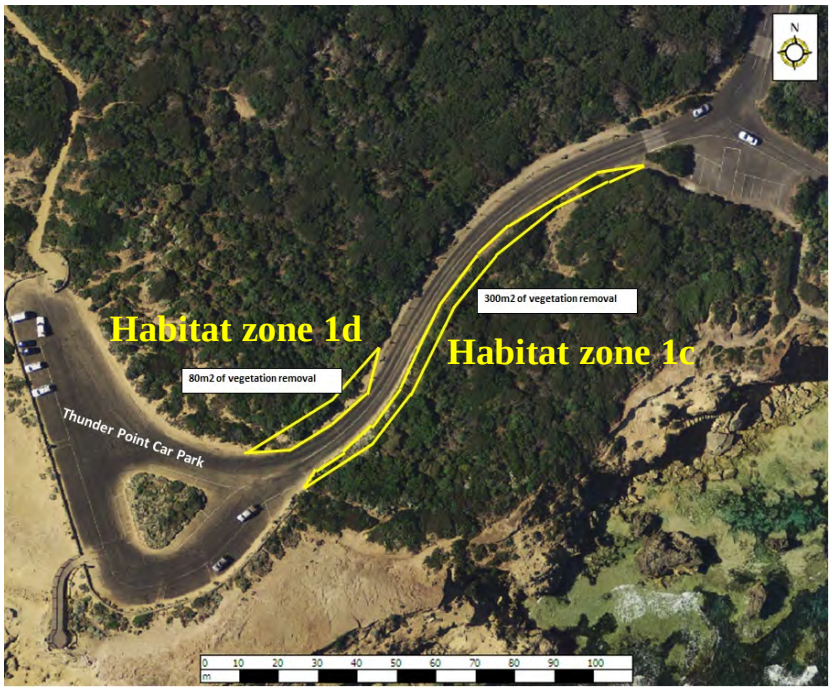
Property Number	Property Address (including Title Number)	Habitat Zone (this should be a unique number for each habitat zone and link to Map 2)	EVC No. and initials	Size (ha)
NA	Pickering Point Car Park	Pruning Zone A	160 CDS	0.012
NA	The Promenade	Pruning Zone B	160 CDS	0.1
NA	Grannys Grave	Pruning & shrub removal Zone C	160 CDS	0.1

4. NVPP Map 1: Native Vegetation to be Protected and Removed

Map 1a. Macdonald Street



Map 1b. Thunder Point carpark



Map 1c. Pickering Point carpark

Map 1d. The Esplanade

Map 1e. Grannys Grave

Map 1f. Point Ritchie carpark

5. Offset Calculations

This section should identify the works, payments or other actions necessary to offset the removal, destruction or lopping of native vegetation as required by Clause 52.17 as applicable.
Table 3 should be used as appropriate.

Table 3: Offset requirements for Habitat Zones for native vegetation which can be removed

Property Number	Property Address (including Title Number)	Habitat Zone	EVC No. & name	Conservation Significance	Loss (Habitat hectares)	Net Gain Multiplier	Gain Target (Habitat hectares) Offset to be achieved
NA	Macdonald Road	1a	160 CDS	High	0.0099	1.5	0.0149
NA	Macdonald Road	2a	160 CDS	Medium	0.0306	1	0.0306
NA	Pickering Point Car Park	1b	160 CDS	High	0.002	1.5	0.003
NA	Pickering Point Car Park	2b	160 CDS	Medium	0.001	1	0.001
NA	Thunder Point Car Park	1c	160 CDS	High	0.0198	1.5	0.0297
NA	Thunder Point Car Park	1d	160 CDS	High	0.0033	1.5	0.005
NA	Point Ritchie Car Park	3	160 CDS	Medium	0.0094	1	0.0094
Total					0.076		0.0935

6. Requirements

The following requirements apply:

- Coast Tea-tree as well as Coast Wattle will be removed in the Granny's Grave Correa area.
- Supplement planting of understorey species in the Grannies Grave Correa area will be considered, working with community to improve understanding, capacity and ownership.
- Removal of vegetation in the Grannies Grave Correa will use a staged approach.

- Fire risk assessment will be undertaken for trimmed limbs remaining in situ. If branches are left in situ pruning/removing will be undertaken after summer to minimise perceptions of fire risk to the public.
- Offsets will be fully grown before removal of vegetation for habitat value ie Boobialla at Point Ritchie.

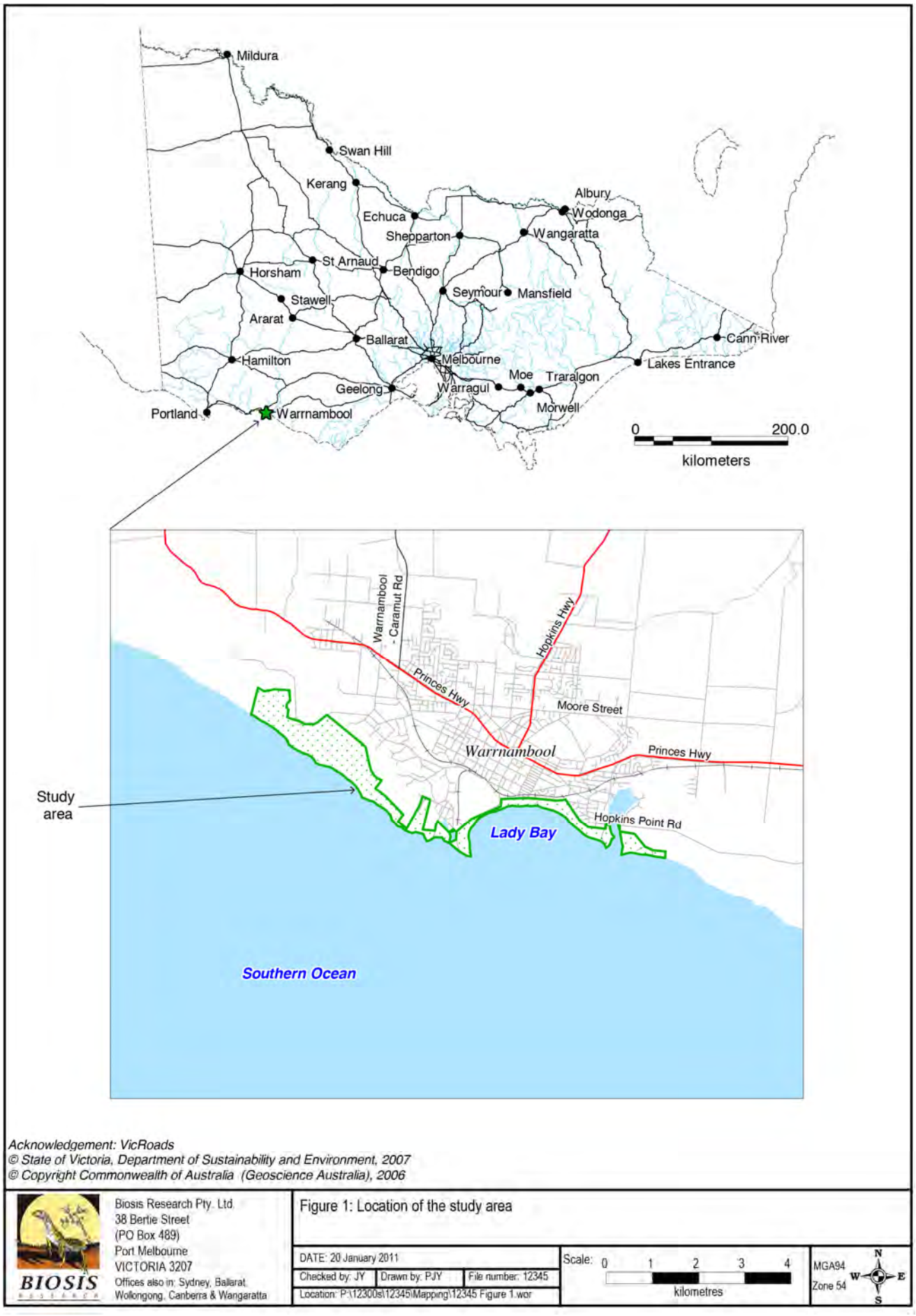
7. Conditions

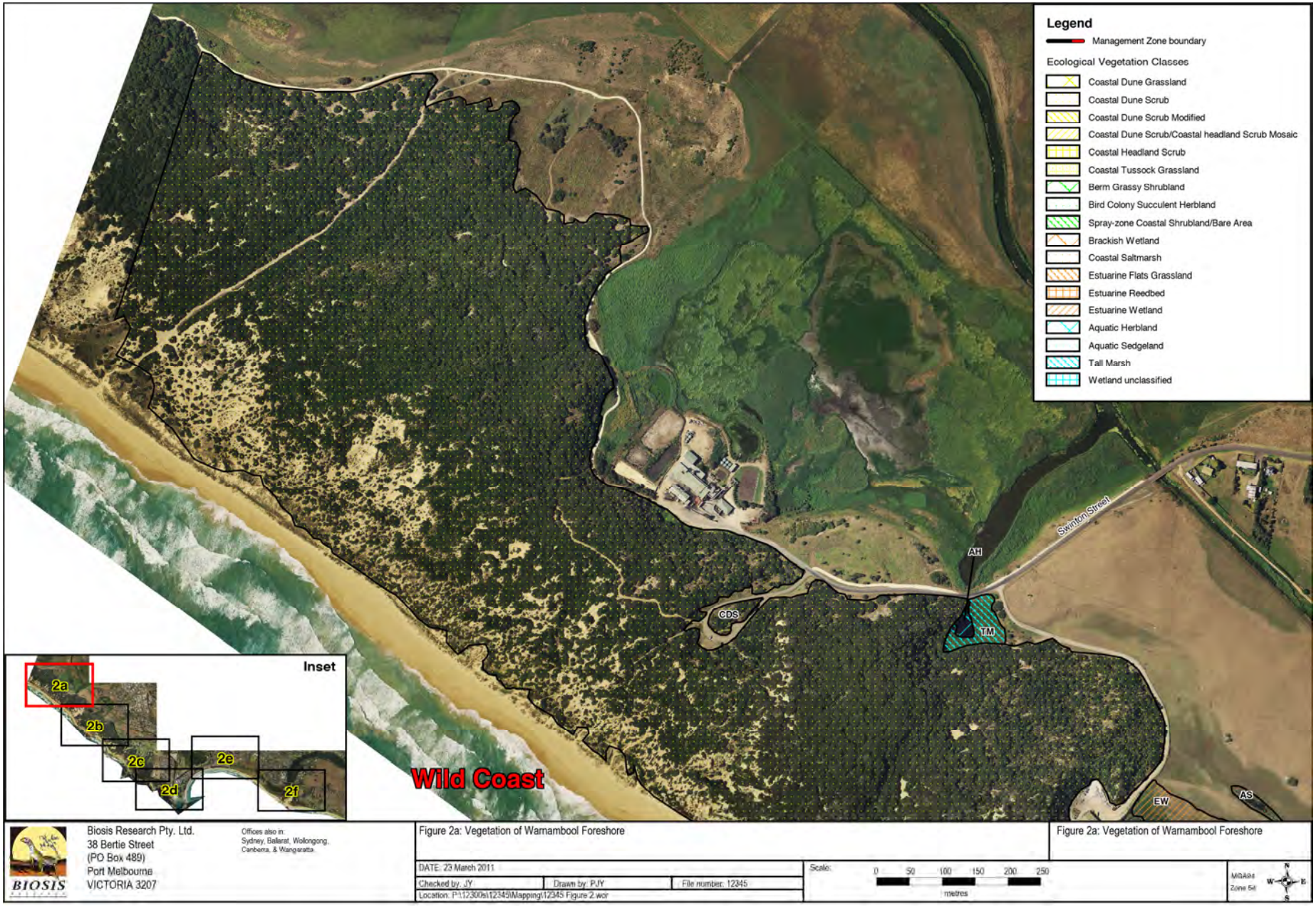
The following conditions apply from the gazettal of the Native Vegetation Precinct Plan:

- This Native Vegetation Precinct Plan ceases to authorise any removal, destruction or lopping of any native vegetation after 1 July 2018. However, this Native Vegetation Precinct Plan will continue to protect vegetation identified in the plan to be retained.
- All earthworks must be undertaken in a manner that will minimise soil erosion and adhere to Construction Techniques for Sediment Pollution Control, EPA, 1991 and appropriate weed hygiene implemented.
- Only indigenous plants of local provenance may be used in revegetation works of conservation areas.
- Water run-off must be designed to ensure that native vegetation to be protected is not compromised.
- Any native vegetation to be removed (in accordance with this Native Vegetation Precinct Plan) must be clearly marked on site to the satisfaction of the Responsible Authority whilst works are being undertaken within the vicinity.
- Prior to the removal, destruction or lopping of any native vegetation within any given property (based on the property number in Map 1 of the Native Vegetation Precinct Plan) offsets must be provided, and a legal agreement entered into, in relation to all of the native vegetation within that property which this Native Vegetation Precinct Plan allows to be removed, destroyed or lopped, to the satisfaction of the Secretary to the Department of Sustainability and Environment. In determining the offset to be required in relation to any property, the Secretary to the Department of Sustainability and Environment will seek to give effect to Victoria's Native Vegetation Management: A Framework for Action and will be guided by the offsets identified in Table 3, in relation to the relevant vegetation authorised to be removed.
- All construction stockpiles, fill and machinery must be placed away from areas supporting native vegetation and drainage lines to the satisfaction of the responsible authority and appropriate weed hygiene implemented.

FIGURES

Figure 1 Location, Warrnambool Coast




Legend
Management Zone boundary
Ecological Vegetation Classes
Coastal Dune Grassland
Coastal Dune Scrub
Coastal Dune Scrub Modified
Coastal Dune Scrub/Coastal headland Scrub Mosaic
Coastal Headland Scrub
Coastal Tussock Grassland
Berm Grassy Shrubland
Bird Colony Succulent Herbland
Spray-zone Coastal Shrubland/Bare Area
Brackish Wetland
Coastal Saltmarsh
Estuarine Flats Grassland
Estuarine Reedbed
Estuarine Wetland
Aquatic Herbland
Aquatic Sedgeland
Tall Marsh
Wetland unclassified
Swinton Street
AH
CDS
TM
EW
AS
Wild Coast
Inset
2a
2b
2c
2d
2e
2f
Biosis Research Pty. Ltd.
38 Bertie Street
(PO Box 489)
Port Melbourne
VICTORIA 3207
Offices also in:
Sydney, Ballarat, Wollongong,
Canberra, & Wangaratta
Figure 2a: Vegetation of Warrnambool Foreshore
DATE: 23 March 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 2.wor
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metres
MGA94
Zone 54
Figure 2a: Vegetation of Warrnambool Foreshore

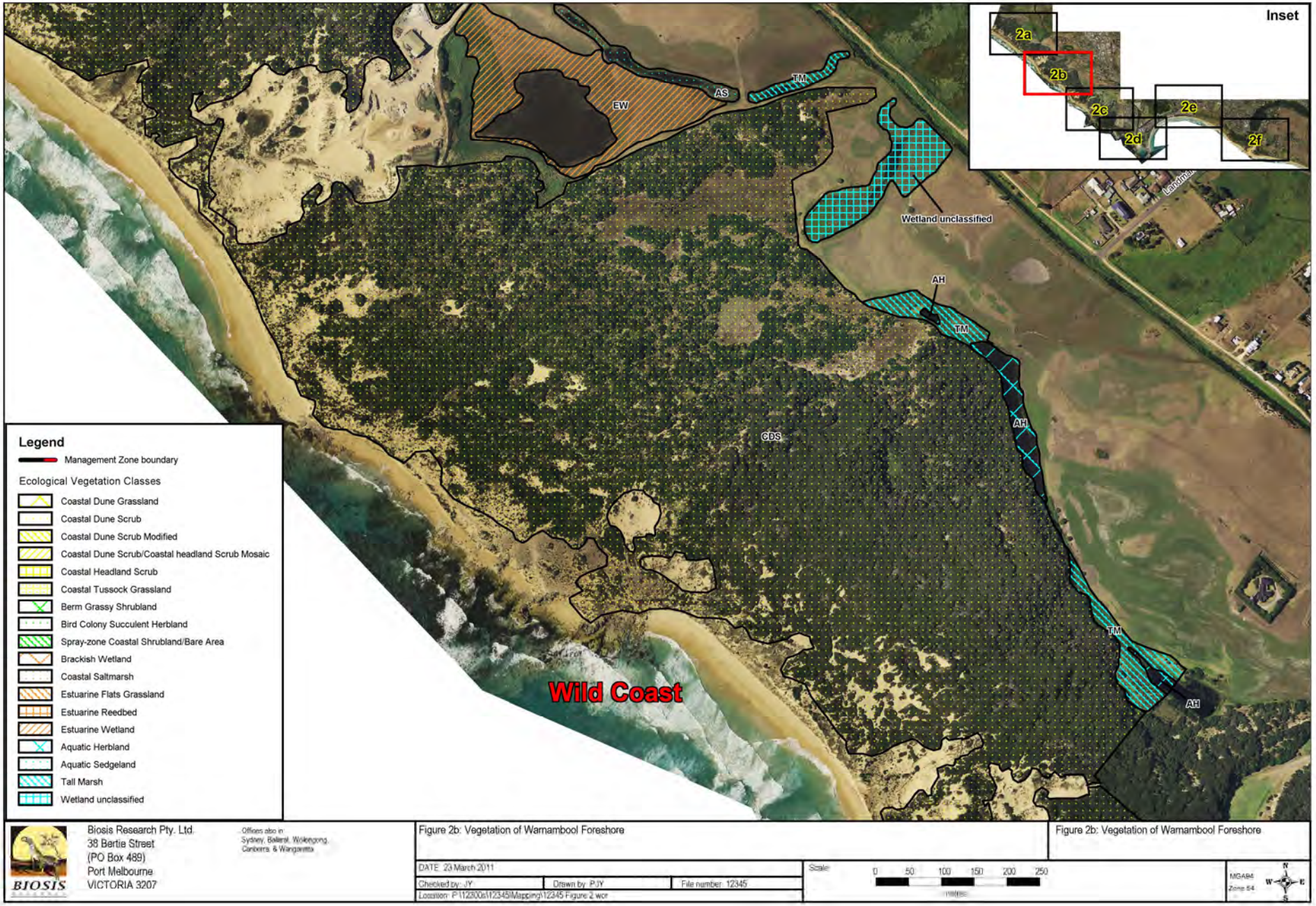
Inset
2a
2b
2c
2d
2e
2f
EW
AS
TM
Wetland unclassified
AH
TM
AH
CDS
TM
AH
Wild Coast
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Figure 2b: Vegetation of Warrnambool Foreshore
DATE: 23 March 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 2.wor
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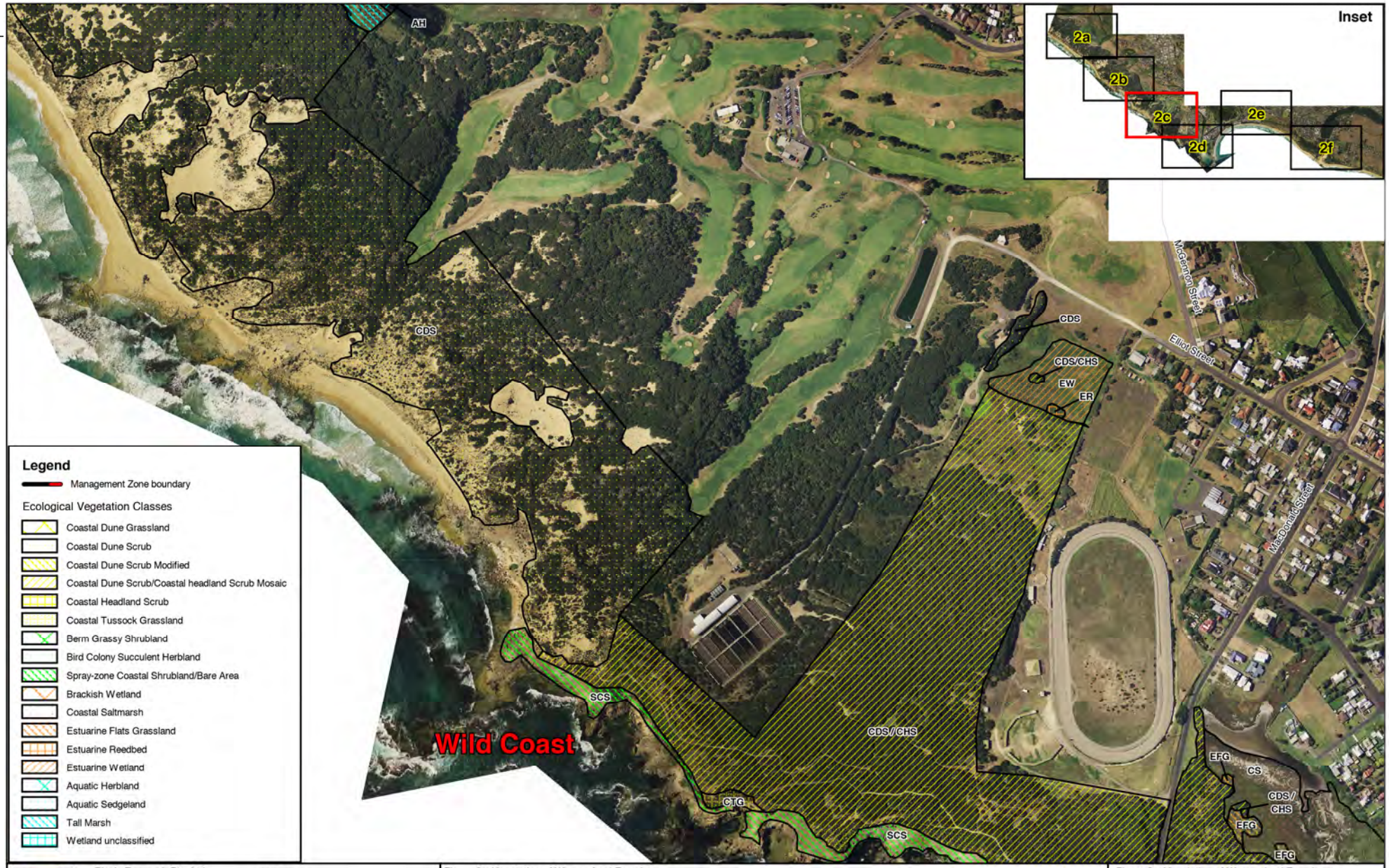
Metres
MGA84
Zone 54
N
W
E
S
Figure 2b: Vegetation of Warrnambool Foreshore


Inset
2a
2b
2c
2d
2e
2f
AH
CDS
CDS
CDS/CHS
EW
ER
McGannon Street
Elliot Street
MacDonald Street
SCS
Wild Coast
CDS / CHS
CTG
SCS
EFG
CS
CDS / CHS
EFG
EFG
Legend
Management Zone boundary
Ecological Vegetation Classes
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Coastal Dune Scrub
Coastal Dune Scrub Modified
Coastal Dune Scrub/Coastal headland Scrub Mosaic
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Berm Grassy Shrubland
Bird Colony Succulent Herbland
Spray-zone Coastal Shrubland/Bare Area
Brackish Wetland
Coastal Saltmarsh
Estuarine Flats Grassland
Estuarine Reedbed
Estuarine Wetland
Aquatic Herbland
Aquatic Sedgeland
Tall Marsh
Wetland unclassified
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Figure 2c: Vegetation of Warnambool Foreshore
DATE: 23 March 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 2.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
Figure 2c: Vegetation of Warnambool Foreshore


CDS / CHS
CTG
SCS
EFG
CS
CDS / CHS
EFG
EFG
CDS / CHS
Stanley Street
BW
BW
Percoba Road
CDS
CDS
CDS
CDSM
CDS
CDSM
CDSM
CDS
CDS
CDSM
Wild Coast
Lady Bay West
SCS
BCSH
SCS
SCS
BCSH
Legend
Management Zone boundary
Ecological Vegetation Classes
Coastal Dune Grassland
Coastal Dune Scrub
Coastal Dune Scrub Modified
Coastal Dune Scrub/Coastal headland Scrub Mosaic
Coastal Headland Scrub
Coastal Tussock Grassland
Berm Grassy Shrubland
Bird Colony Succulent Herbland
Spray-zone Coastal Shrubland/Bare Area
Brackish Wetland
Coastal Saltmarsh
Estuarine Flats Grassland
Estuarine Reedbed
Estuarine Wetland
Aquatic Herbland
Aquatic Sedgeland
Tall Marsh
Wetland unclassified
Inset
2a
2b
2c
2d
2e
2f
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Figure 2d: Vegetation of Warnambool Foreshore
DATE: 3 August 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 2.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
Figure 2d: Vegetation of Warnambool Foreshore

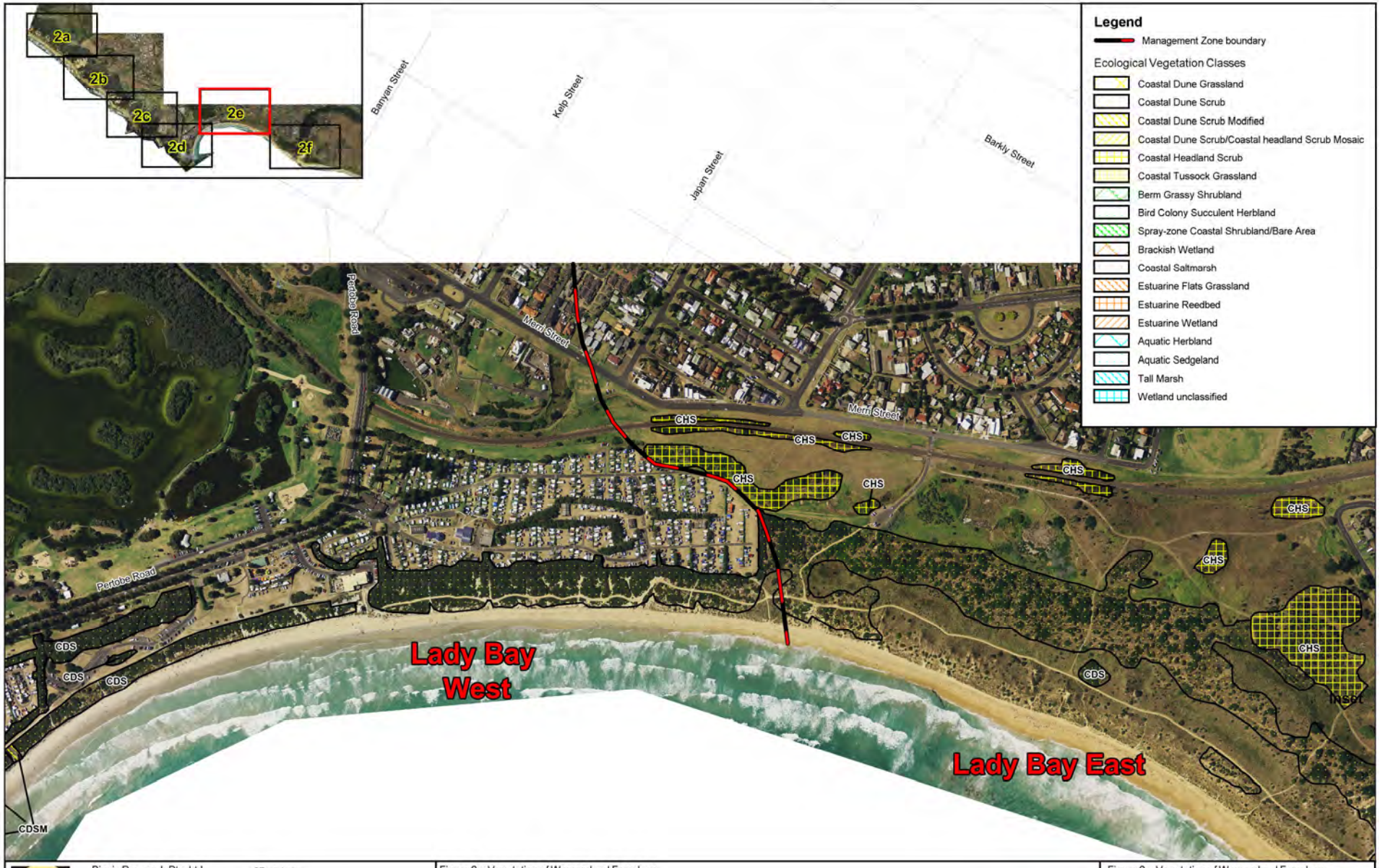
2a
2b
2c
2d
2e
2f
Banyan Street
Kelp Street
Japan Street
Barkly Street
Legend
Management Zone boundary
Ecological Vegetation Classes
Coastal Dune Grassland
Coastal Dune Scrub
Coastal Dune Scrub Modified
Coastal Dune Scrub/Coastal headland Scrub Mosaic
Coastal Headland Scrub
Coastal Tussock Grassland
Berm Grassy Shrubland
Bird Colony Succulent Herbland
Spray-zone Coastal Shrubland/Bare Area
Brackish Wetland
Coastal Saltmarsh
Estuarine Flats Grassland
Estuarine Reedbed
Estuarine Wetland
Aquatic Herbland
Aquatic Sedgeland
Tall Marsh
Wetland unclassified
Pertobe Road
Merri Street
CHS
CDS
CDSM
Lady Bay West
Lady Bay East
Inset
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Figure 2e: Vegetation of Warnambool Foreshore
DATE: 3 September 2012
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300\ti\12345\Mapping\12345 Figure 2.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
W
E
S
Figure 2e: Vegetation of Warnambool Foreshore

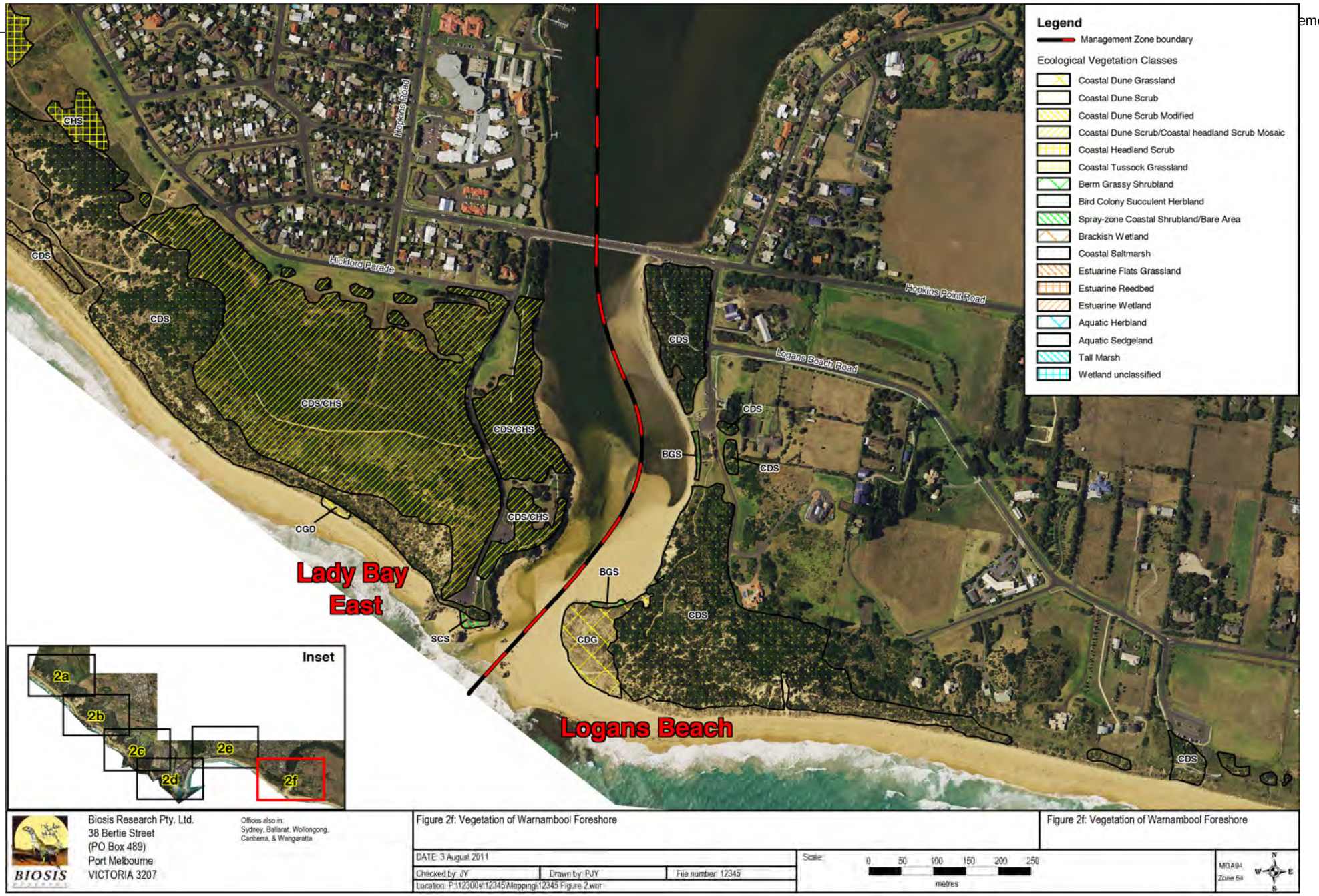
Legend
Management Zone boundary
Ecological Vegetation Classes
Coastal Dune Grassland
Coastal Dune Scrub
Coastal Dune Scrub Modified
Coastal Dune Scrub/Coastal headland Scrub Mosaic
Coastal Headland Scrub
Coastal Tussock Grassland
Berm Grassy Shrubland
Bird Colony Succulent Herbland
Spray-zone Coastal Shrubland/Bare Area
Brackish Wetland
Coastal Saltmarsh
Estuarine Flats Grassland
Estuarine Reedbed
Estuarine Wetland
Aquatic Herbland
Aquatic Sedgeland
Tall Marsh
Wetland unclassified
Hickford Parade
Hopkins Road
Hopkins Point Road
Logans Beach Road
CHS
CDS
CDS/CHS
BGS
CGD
SCS
CDG
Lady Bay East
Logans Beach
Inset
2a
2b
2c
2d
2e
2f
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Figure 2f: Vegetation of Warnambool Foreshore
DATE: 3 August 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 2.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
W
E
S

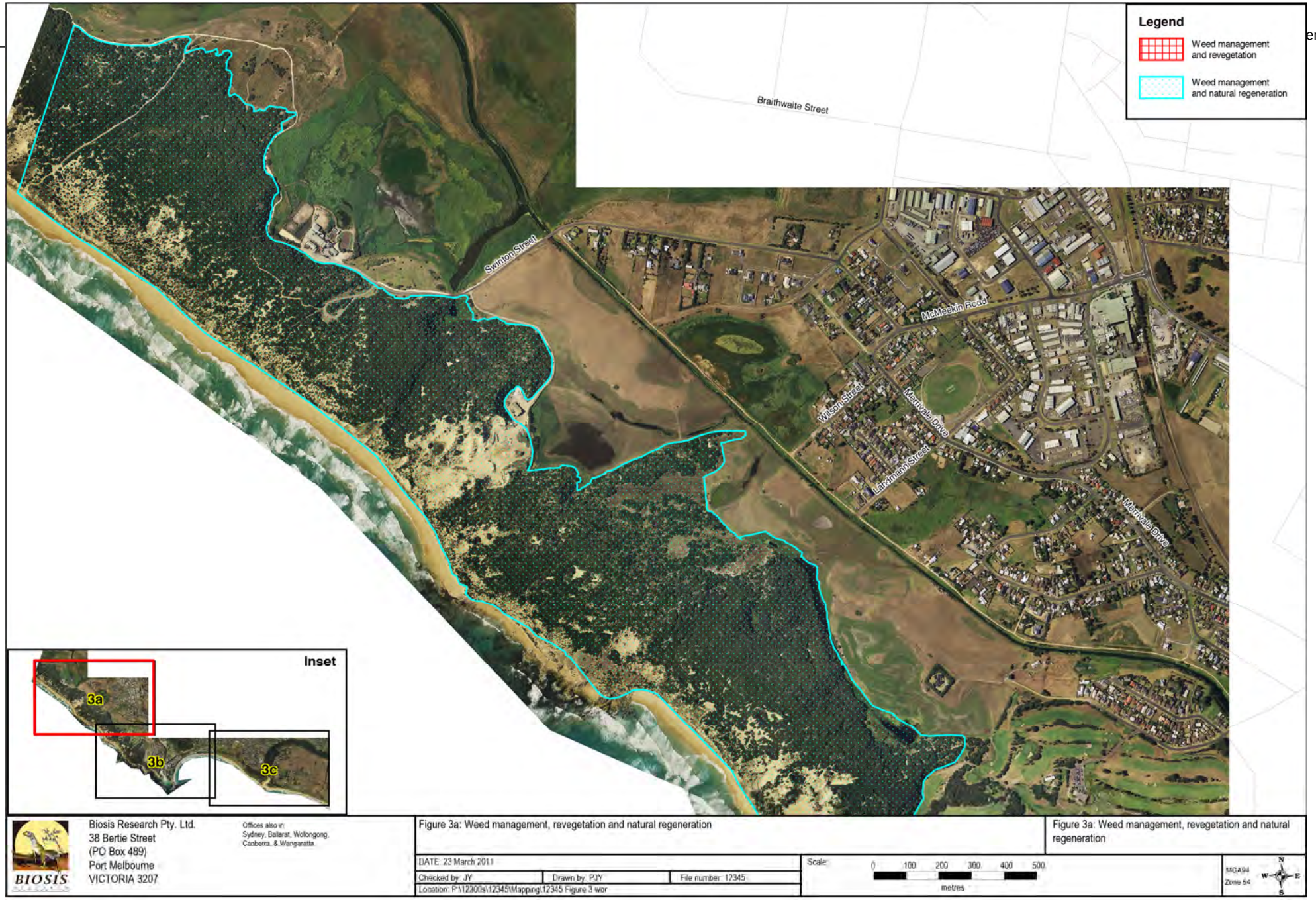
Legend
Weed management and revegetation
Weed management and natural regeneration
Braithwaite Street
Swinton Street
McMeekin Road
Wilson Street
Merrivale Drive
Lanyminni Street
Merrivale Drive
Inset
3a
3b
3c
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Figure 3a: Weed management, revegetation and natural regeneration
DATE: 23 March 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 3.wor
Scale:
0 100 200 300 400 500
metres
MGA94
Zone 54
N
W
E
S
Figure 3a: Weed management, revegetation and natural regeneration

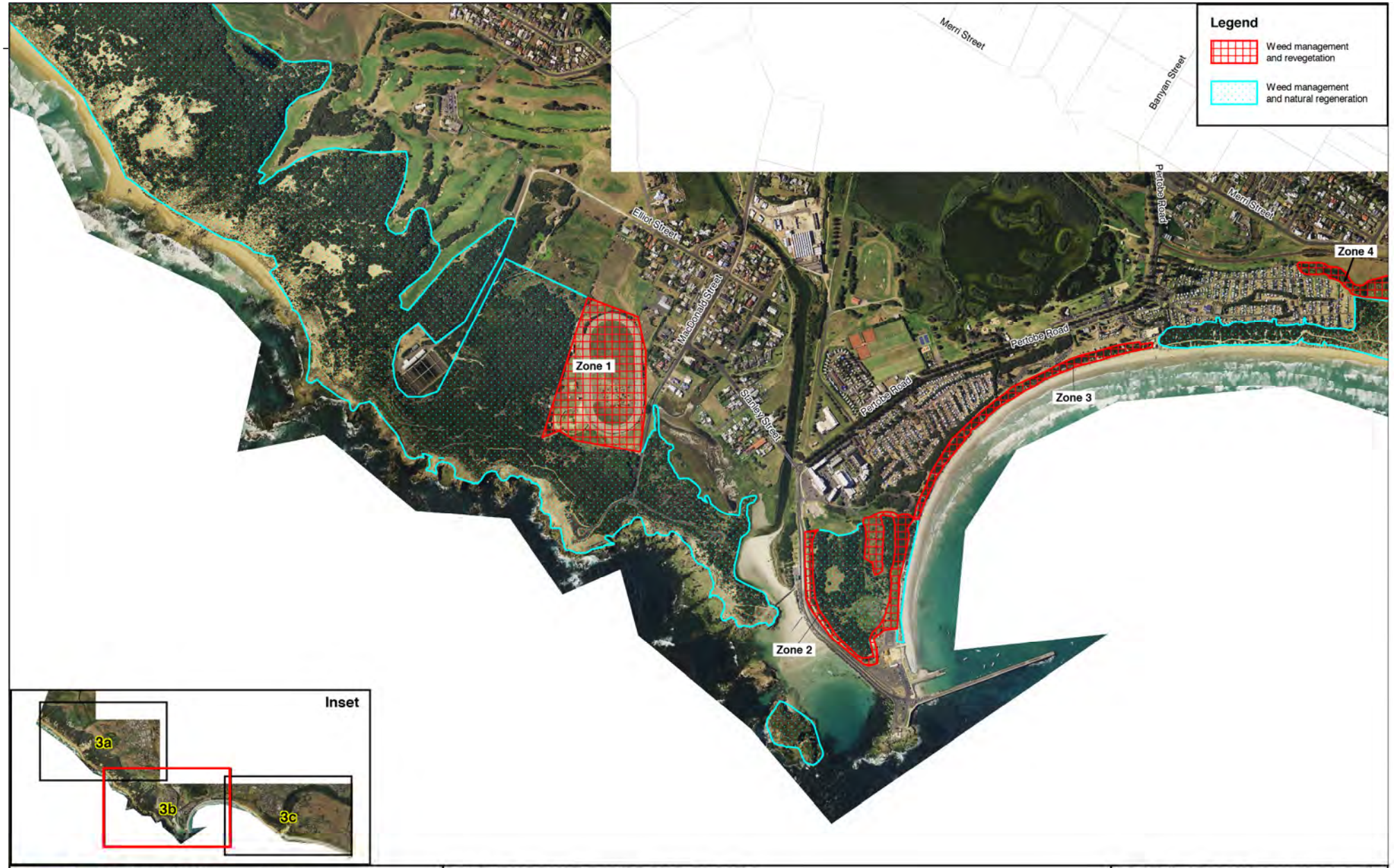

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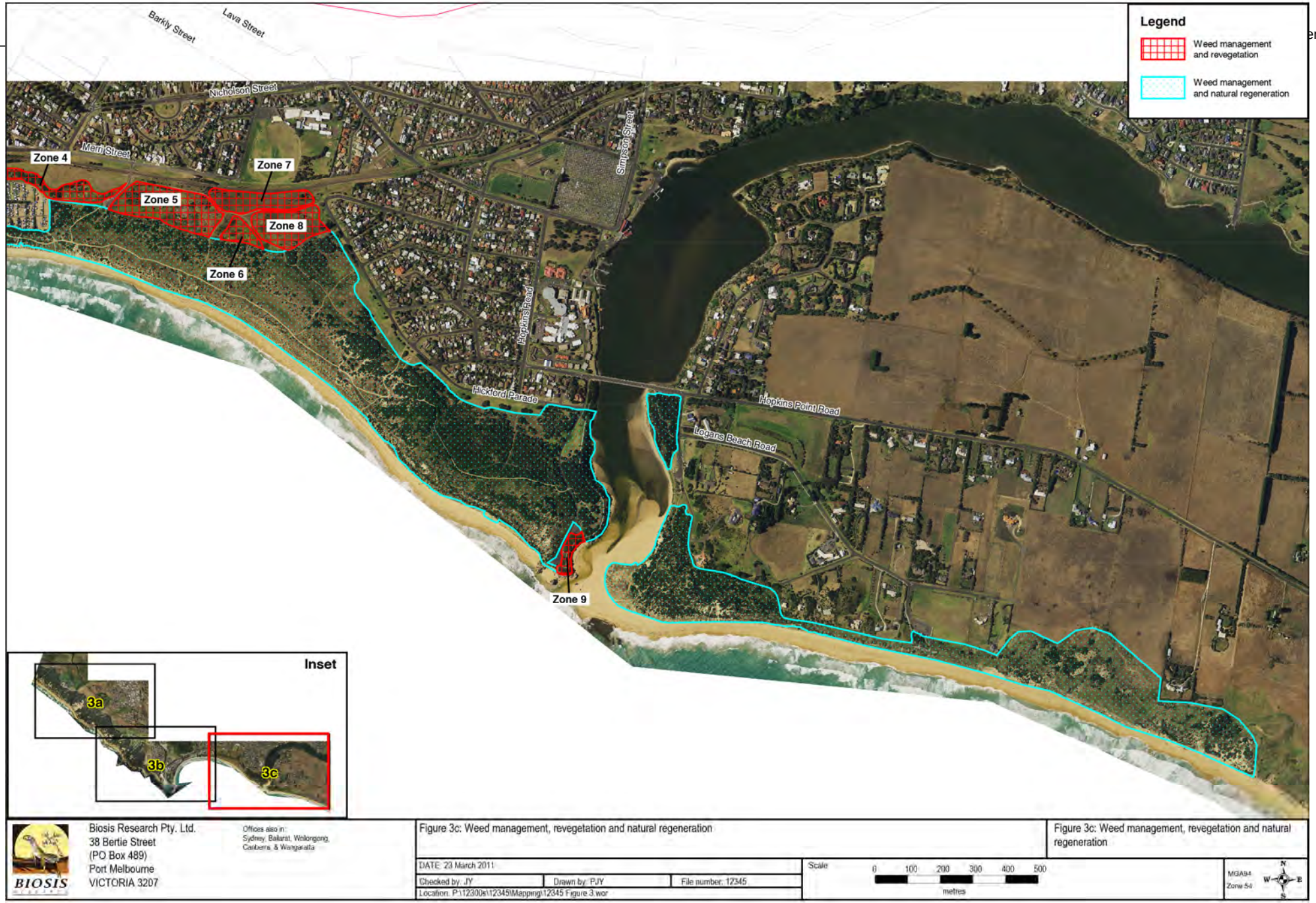
Figure 3b: Weed management, revegetation and natural regeneration

DATE: 23 March 2011
Checked by: JY | Drawn by: PJY | File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 3.wor

Scale: 0 100 200 300 400 500 metres

MGA94 Zone 54

Figure 3b: Weed management, revegetation and natural regeneration


Legend
Weed management and revegetation
Weed management and natural regeneration
Barkly Street
Lava Street
Nicholson Street
Merri Street
Simpson Street
Hopkins Road
Hickford Parade
Hopkins Point Road
Logans Beach Road
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Inset
3a
3b
3c
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Canberra, & Wangaratta
Figure 3c: Weed management, revegetation and natural regeneration
DATE: 23 March 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 3.wor
Scale
0 100 200 300 400 500
metres
MGA94
Zone 54
N
W
E
S
Figure 3c: Weed management, revegetation and natural regeneration

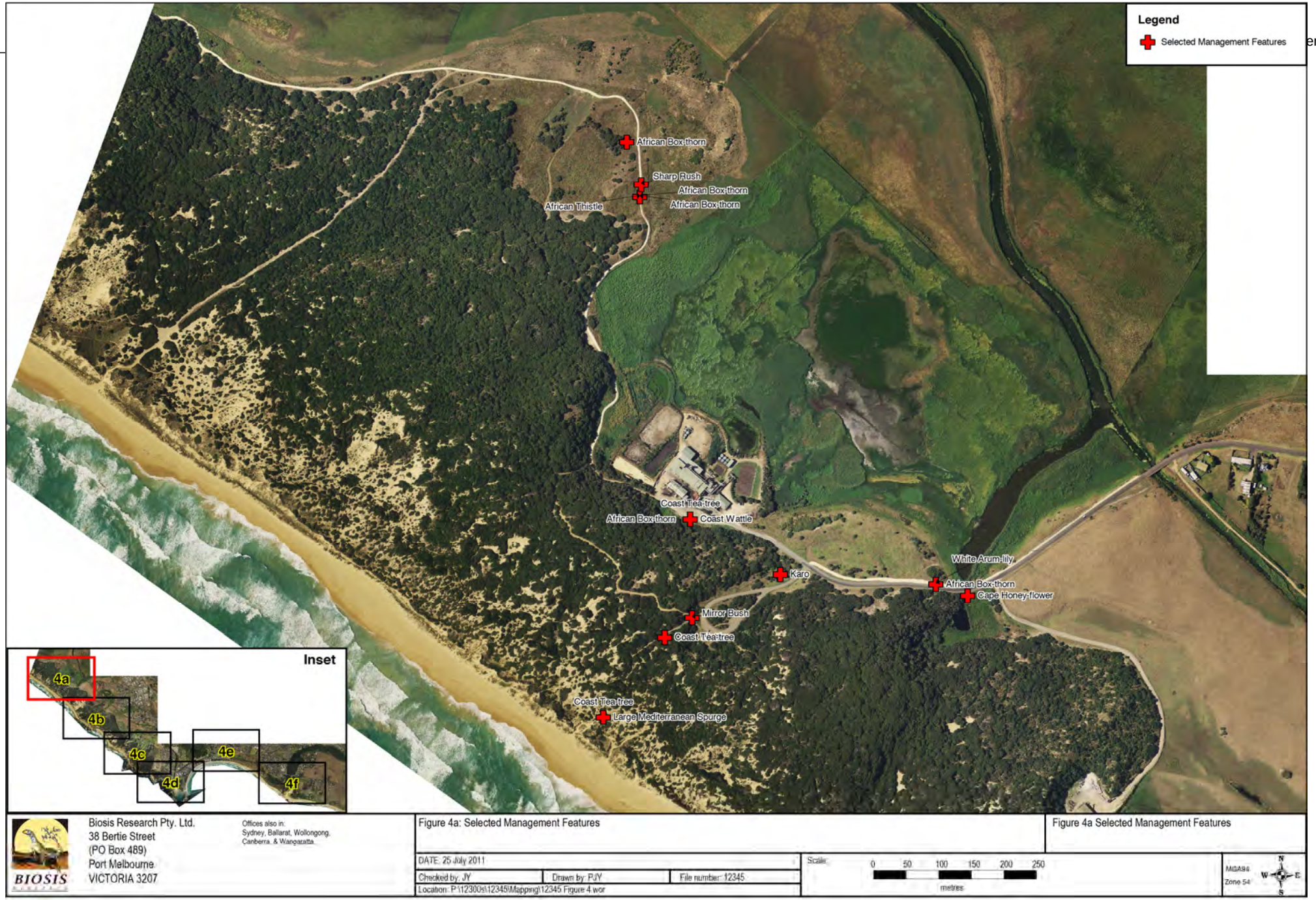
Legend
Selected Management Features
African Box-thorn
Sharp Rush
African Box-thorn
African Box-thorn
African Thistle
Coast Tea-tree
African Box-thorn
Coast Wattle
White Arum-lily
Karo
African Box-thorn
Cape Honey-flower
Mirror Bush
Coast Tea-tree
Coast Tea-tree
Large Mediterranean Spurge
Inset
4a
4b
4c
4d
4e
4f
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Figure 4a: Selected Management Features
Figure 4a Selected Management Features
DATE: 25 July 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 4.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
W
E
S

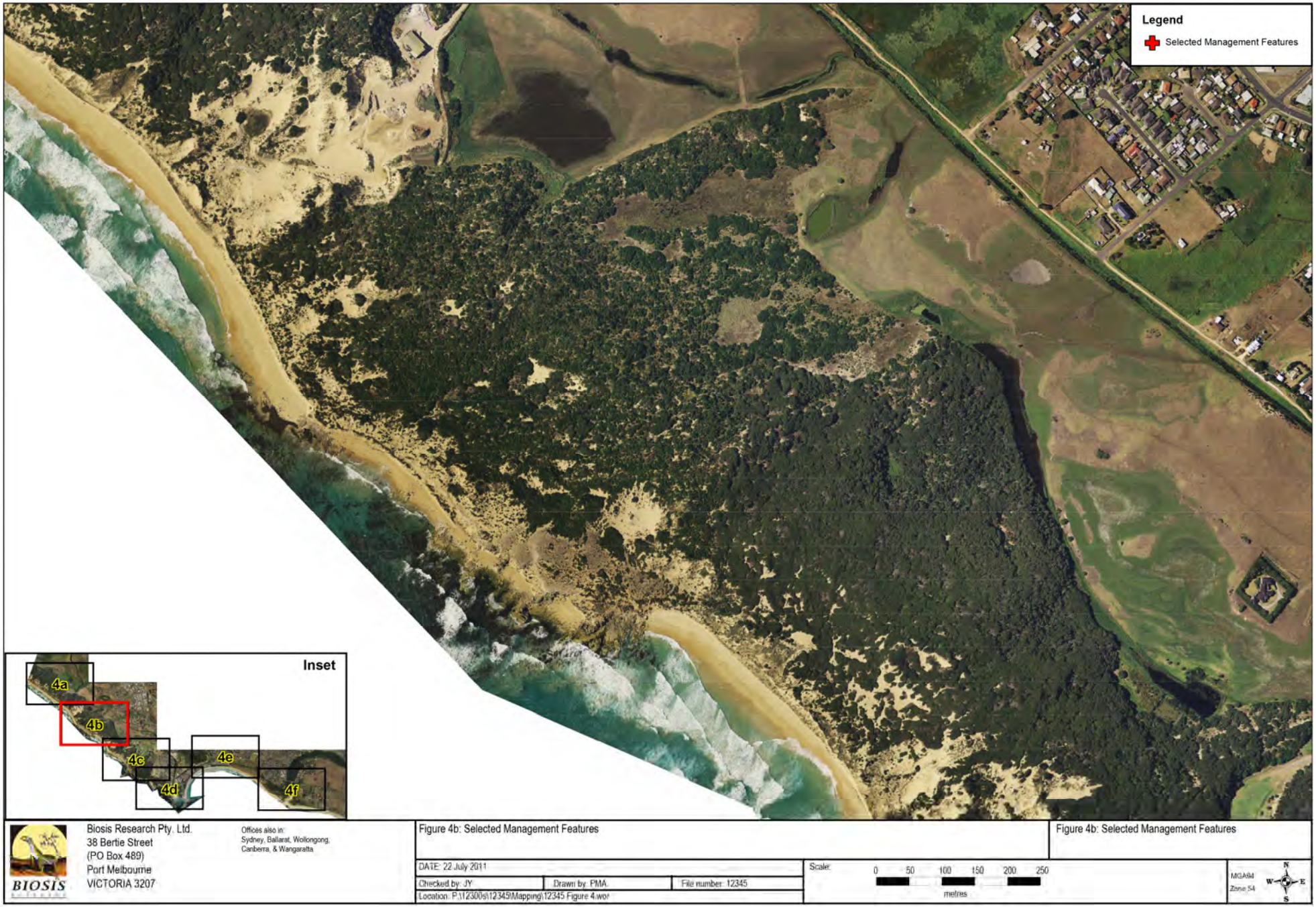
Legend
Selected Management Features
Inset
4a
4b
4c
4d
4e
4f
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Figure 4b: Selected Management Features
DATE: 22 July 2011
Checked by: JY
Drawn by: PMA
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 4.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
W E
S
Figure 4b: Selected Management Features

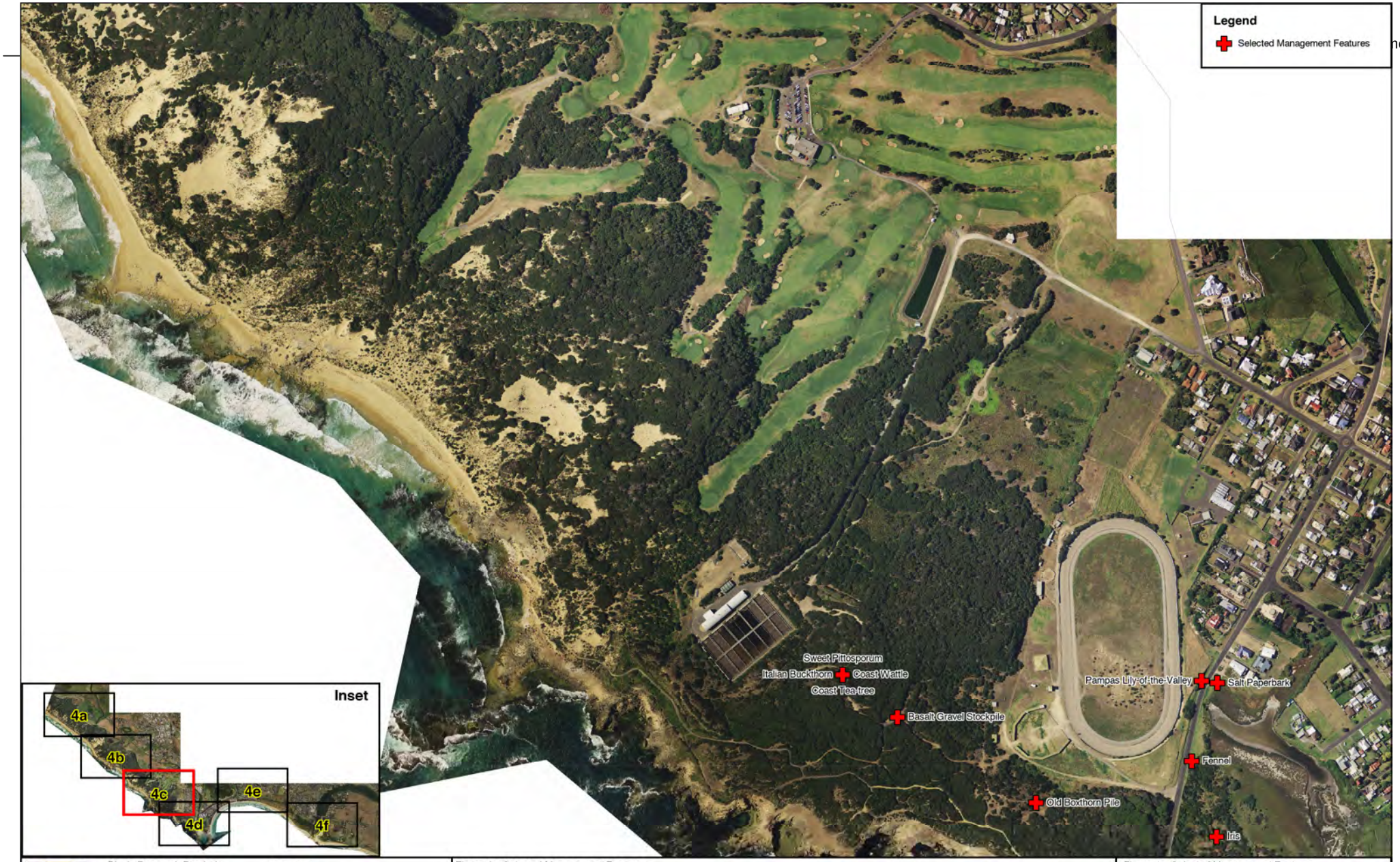
Legend
Selected Management Features
Sweet Pittosporum
Italian Buckthorn
Coast Wattle
Coast Tea-tree
Basalt Gravel Stockpile
Pampas Lily-of-the-Valley
Salt Paperbark
Fennel
Old Boxthorn Pile
Iris
Inset
4a
4b
4c
4d
4e
4f
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Figure 4c: Selected Management Features
DATE: 3 August 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 4 wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
S
W
E
Figure 4c: Selected Management Features


Legend
Selected Management Features
Sweet Pittosporum
Italian Buckthorn
Coast Wattle
Coast Tea-tree
Basalt Gravel Stockpile
Pampas Lily-of-the-Valley
Salt Paperbark
Fennel
Old Boxthorn Pile
Iris
Century Plant
Fennel
Pelargonium
Pampas Lily-of-the-Valley
Italian Buckthorn
Bridal Creeper
Italian Buckthorn
Century Plant
Marguerite
Century Plant
Century Plant
Tree Mallow
Rodondo Creeper
Inset
4a
4b
4c
4d
4e
4f
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Figure 4d: Selected Management Features
Figure 4d: Selected Management Features
DATE: 3 August 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 4.wor
Scale
0 50 100 150 200 250
metres
MGA94
Zone 55

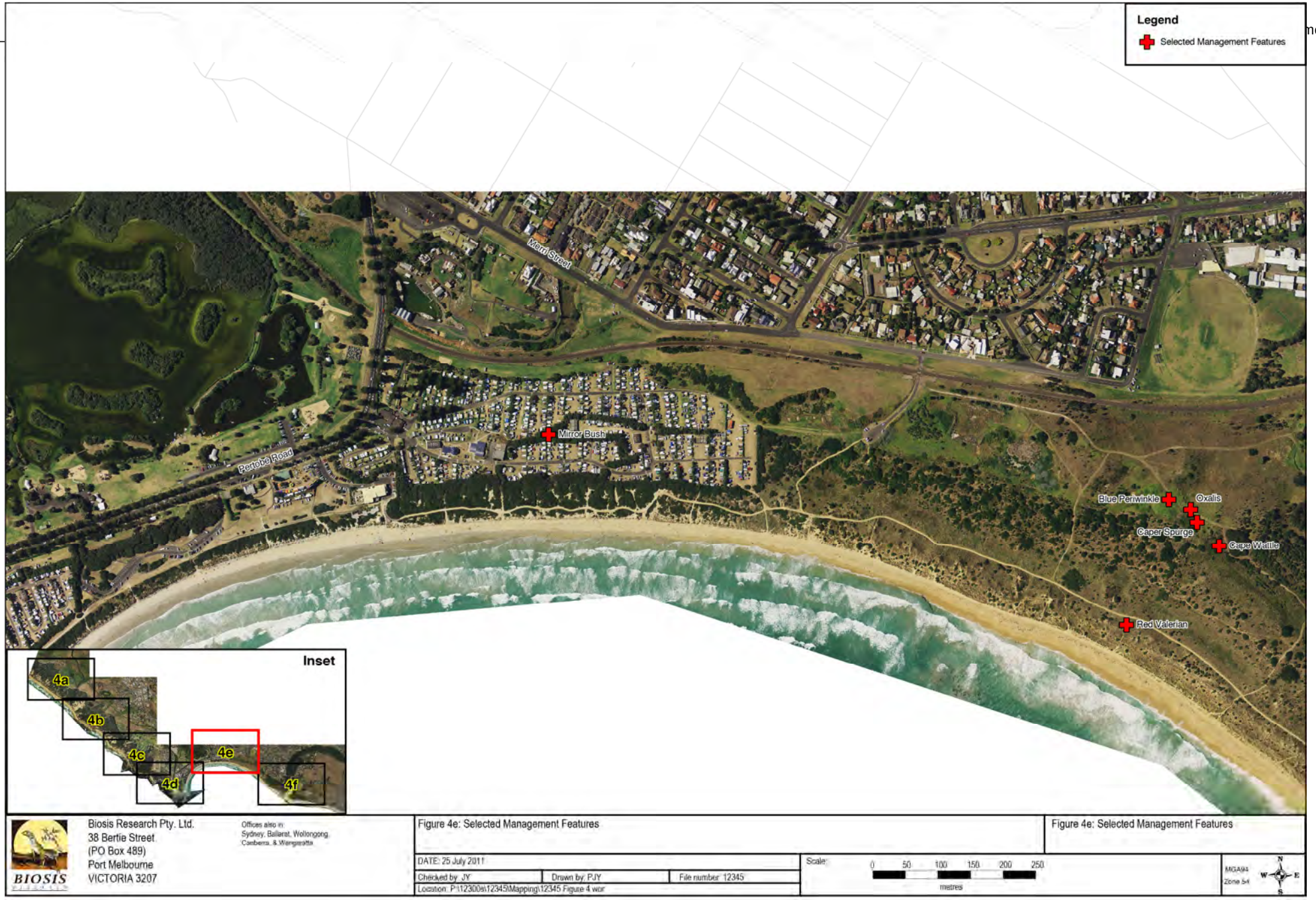
Legend
Selected Management Features
Merri Street
Mirror Bush
Perfobs Road
Blue Periwinkle
Oxalis
Caper Spurge
Cape Wattle
Red Valerian
Inset
4a
4b
4c
4d
4e
4f
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Figure 4e: Selected Management Features
DATE: 25 July 2011
Checked by: JY
Drawn by: PJY
File number: 12345
Location: P:\12300s\12345\Mapping\12345 Figure 4.wor
Scale:
0 50 100 150 200 250
metres
MGA94
Zone 54
N
W
E
S

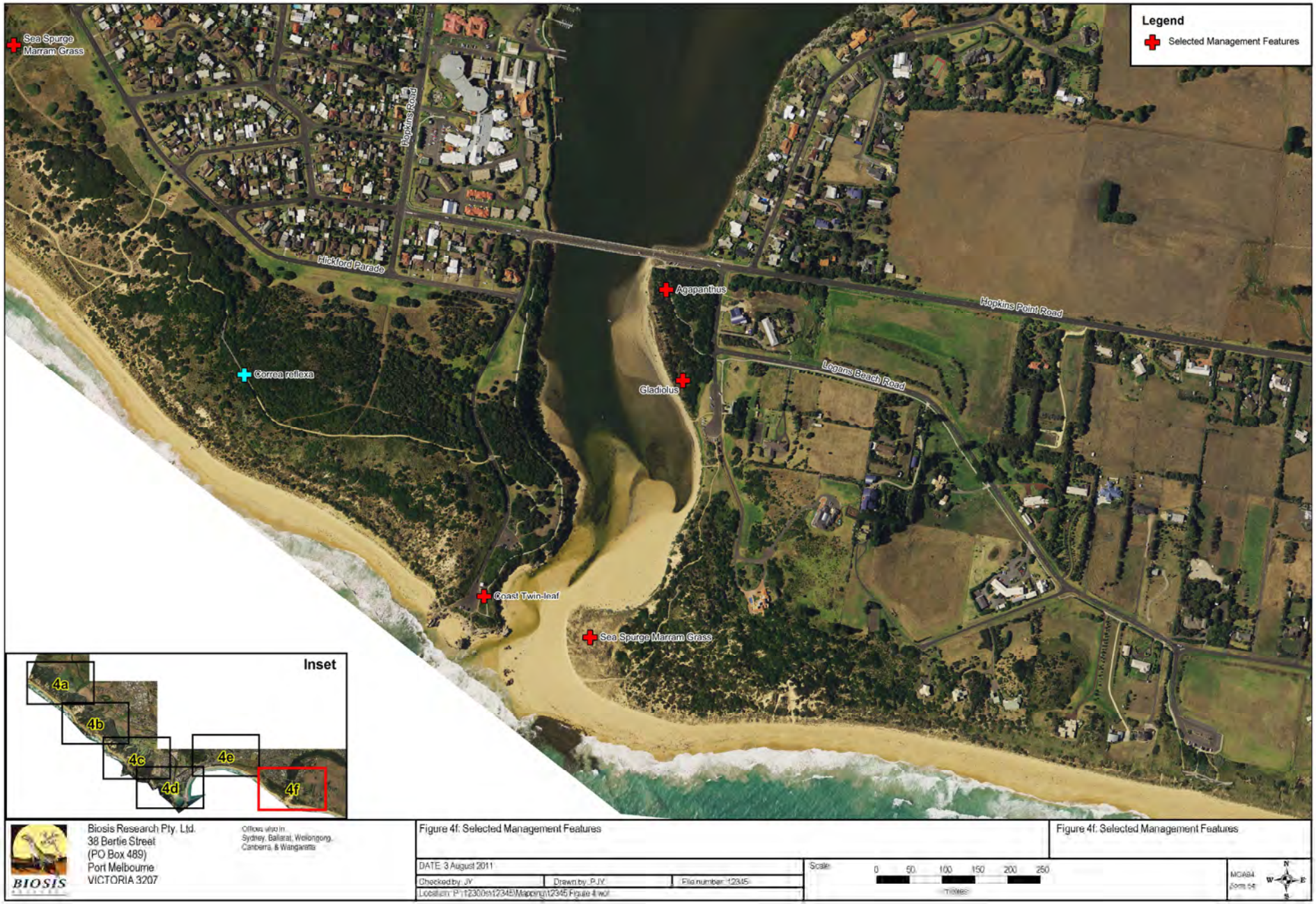

Figure 4f: Selected Management Features