

WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey and Mapping Project 2021-22

**Stages 1 - Indigenous Vegetation Cover Mapping &
Management Recommendations**

Stage 2- Orchid and Significant Flora Species mapping

Prepared for the WhiteCliffs to Cameron's Bight Foreshore Reserve
Committee of Management

February 2023



Report:	WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project		
Author	Katherine Smedley		
Fieldwork	Katherine Smedley & Gidja Walker		
Mapping	Katherine Smedley & Gidja Walker		
Flora identification	Gidja Walker		
Report Review	Gidja Walker		
Client	WhiteCliffs to Cameron's Bight Foreshore Reserve Committee of Management		
Job no:	2021_25	Sundew Contact:	0491 711 899
Date:	25 February 2023		
Cover Photograph	Spinifex (EVC 879: Coastal Dune Grassland) along the foreshore		

Acknowledgements

Max Patton Foreshore Manager

Document Versions

Version	Date	Author	Notes
1	16/03/2022	Katherine Smedley	Internal Review by Gidja Walker
2	23/03/2022	Katherine Smedley	Review by Foreshore Committee
3	25/02/2023	Katherine Smedley	Finalising report- Response to Foreshore CoM comments, and additions following Stage 2 survey results

Note

DELWP (the Department of Environment, Water, Land and Planning) formerly changed name to the Department of Energy, Environment and Climate Action (DEECA) on 1/01/2023. As the majority of this report was written prior to 1/01/2023, the references to DELWP have been retained.

© Copyright

This report is and shall remain the intellectual property of Sundew Ecological Services. This report is designed to be used exclusively by the person or organisation that commissioned it. Permission must be sought prior to reproduction of any portion of this document.

Disclaimer

Sundew Ecological Services have taken all necessary steps to ensure this document is accurate and accords with relevant Federal, State and local legislation, as well as industry best practice. Despite this, Sundew Ecological Services cannot guarantee that this document is free from error or that the advice outlined within this report will not be interpreted differently from what is intended.

Whilst all professional care has been taken, Sundew Ecological Services accepts no liability for loss or damages incurred as a result of reliance placed upon the report content, or for its use for any purpose other than that for which it was intended.

Contents

1.	INTRODUCTION	6
1.1	Study Area Description	7
2.	PROJECT METHODOLOGY	10
2.1	Flora	10
2.1.1	Significant Flora Species	10
2.1.2	Stage 2 Orchid Surveying	11
2.1.3	Weedy/Exotic Flora Species and Control Prioritisation	12
2.1.4	Limitations of Significant Flora and Weed Survey/s	12
2.2	Ecological Vegetation Classes	12
2.3	Vegetation Quality and Indigenous Cover Mapping	13
2.4	Spatial Data Collection	15
3.	RESULTS– INDIGENOUS VEGETATION MAPPING	16
3.1	2009/2021 Indigenous Vegetation Cover Mapping	16
3.2	Comparative Mapping Data– Foreshore Reserve 2009 and 2021	17
3.3	Photographs of the Vegetation Mapping Categories	18
3.4	Indigenous Vegetation Cover Mapping Data	20
4.	RESULTS: ECOLOGICAL VEGETATION CLASSES (EVCS)	21
4.1	EVC Mapping Data	21
4.2	EVC Mapping and Vegetation Disturbance/Modification in the Study Area	21
4.3	New EVC Information for the Nepean Peninsula	22
4.4	EVCs Recorded in the Study Area (2021 /22 Data)	22
4.5	Further Information on the EVC Mapping	29
4.5.1	EVC 858: Coastal Alkaline Scrub/Coastal Moonah Woodland (CMW)	29
4.5.2	Coast Tea-tree Patches in the Study Area	30
4.5.3	EVC A309: Calcareous Swale 'Grassland' (CSG)	31
4.5.4	Tools to Identify Calcareous Swale 'Grassland'	31
4.5.5	Coast Banksias and EVC A309: Calcareous Swale 'Grassland'	32
5.	RESULTS– (SIGNIFICANT) FLORA & ORCHID SPECIES	33
5.1	Stage 1 Flora Survey Data	33
5.2	Significant Flora Species	34
6.	RESULTS– WEED MAPPING	37
6.1	Weed Mapping Data	38
7.	MANAGEMENT OBSERVATIONS– GENERAL	39
7.1	Weed Management	39
7.1.1	Myrtle-leaf Milkwort (Polygala) Control	39
7.1.2	Sea Spurge along the Foreshore	40
7.1.3	Managing Italian Buckthorn	40
7.1.4	Olives Trees along the Foreshore	41
7.2	Tree Lopping/Pruning/Vandalism for Views	41
7.3	Orchid Patches and Data Management	42
7.3.1	Mapping and Monitoring Orchid Patches	42
7.3.2	Marking of Orchid Patches along the Walking Trail	43
7.3.3	Orchid Patches and Galvanised Wire	43
7.4	Large Tree Management and Inventory	43
7.5	Pressure along the Foreshore and Vegetation Management	45
7.6	Fauna and (Weedy) Habitat	46
7.7	Feral/Pest Animals– Rats/Mice	47

7.8	Photo Points/Monitoring	47
7.9	Infrastructure Impacts	48
7.10	Management of EVC A309: 'Calcareous' Swale Grassland Patches	50
7.11	Infrastructure Siting and Vegetation Impacts	51
7.12	Over-arching Mornington Peninsula Foreshore Committee	52
7.13	Training Sessions	52
8.	MANAGEMENT OBSERVATIONS- FORESHORE RESERVE	53
8.1	WhiteCliffs Campground Management Issues	53
8.1.1	Exotic Shade Trees in the Campground	53
8.1.2	Change from Wallaby Grass to Kikuyu in the Camp Sites	53
8.1.3	Sites 42 and 43	54
8.2	Beach/Sand Grooming	55
8.3	EVC 879: Coastal Dune Grassland (Spinifex versus Marram Grass)	56
8.4	Management of EVC 879: Coastal Dune Grassland Patches	58
8.5	Information Brochure for Boat Shed Owners	59
8.6	Fencing of Remnant Areas	59
8.7	Hybridisation of indigenous Carpobrotus	60
8.8	Next Box Maintenance	60
8.9	Brushcutting Practices around Infrastructure	61
8.10	Yachts stored in Spinifex/EVC 879: Coastal Dune Grassland Patches	61
8.11	Blairgowrie Yacht Club Beach	62
8.12	Foreshore Section- Adelaide Street Carpark to Blairgowrie Beach	63
9.	MANAGEMENT OBSERVATIONS- NEPEAN HIGHWAY LINEAR RESERVE	65
9.1	Management of Cherry Ballarts	65
9.2	Managing Old Moonahs and Dense Woody/Scrambling Weed Infestations	65
9.3	Kangaroo Fern Management	67
9.4	Vegetation Removal/Management in front of Private Properties	68
10.	MANAGEMENT PRIORITIES	70
11.	CONCLUSION	74
12.	REFERENCES	75
	APPENDIX 1: FLORA SPECIES LIST- INDIGENOUS	77
	APPENDIX 2: FLORA SPECIES LIST- EXOTIC	80
	APPENDIX 3: EVC A309 CALCAREOUS SWALE 'GRASSLAND' PROFILE	84
	APPENDIX 4: WEED PRIORITISATION	87
	APPENDIX 5: ECOLOGICAL VEGETATION CLASS MAPPING	88
	APPENDIX 6: INDIGENOUS VEGETATION COVER MAPPING	103

FIGURES

Figure 1.	Aerial View of WhiteCliffs to Cameron's Bight Foreshore	9
-----------	---	---

Tables

Table 1	Weed Prioritisation Categories	12
Table 2	Indigenous Vegetation Quality Mapping Categories (2009/10 & 2019)	13
Table 3	Indigenous Vegetation Cover Mapping Categories (2021 /22)	14
Table 4	Extent of Mapped Vegetation Cover	17
Table 5	Ecological Vegetation Classes within the Study Area	23
Table 6	Mapping Coast Tea-tree Patches within the Study Area	30
Table 7	Summary of Plant Species Recorded	34
Table 8	Significant Flora Species	34
Table 9	Study Area Management Actions and Priorities	70

1. INTRODUCTION

Sundew Ecological Services was contracted by the WhiteCliffs to Cameron's Bight Foreshore Reserve Committee of Management (the Foreshore CoM) to undertake indigenous vegetation cover and vegetation type mapping along the Whitecliffs to Cameron's Bight foreshore, and also along a linear strip of vegetation located on the other (southern) side of the Nepean Highway in the eastern half of the study area.

The foreshore section of the study area had been previously surveyed and mapped in 2009-2010 for vegetation quality, significant species and orchid populations (Seeds Bushland Restoration & Environmental Education, 2010). Further mapping of the foreshore section of the study area was undertaken in 2019 to re-map vegetation quality and orchid populations (Seeds Bushland Restoration, 2019).

The linear strip of vegetation located on the other (southern) side of the Nepean Highway has not been surveyed previously.

The 2009/2010 and 2019 reports and mapping have been utilised to provide background and comparative information for the current 2021/2022 data provided in this report.

The 2021/2022 project has been divided into two reporting stages:

- Stage 1- the results of the indigenous vegetation cover and vegetation type mapping undertaken in December 2021, along with management observations and/or recommendations based on the December 2021 fieldwork.
- Stage 2- further fieldwork to gather data on orchids and other significant species, and to elaborate on observations from the December 2021 fieldwork as required. The Stage 2 data will be added to the March 2022 DRAFT report in early 2023.
- The project, reporting and mapping will be finalised once all the data and mapping has been compiled into the one report and mapping database. This will be as part of the Stage 2 works in early 2023.
- A separate short report will also be prepared as part of the Stage 2 works regarding the results of the orchid survey, in early 2023.

The works undertaken for this report, and the stages they will be undertaken in, include:

Stage 1

- 1) Re-categorising the 2009/10 indigenous vegetation cover mapping data (collected by Seeds Bushland Restoration & Environmental Education), which is currently depicted as three management categories- retention, restoration and rehabilitation
- 2) Re-assessing/mapping the Ecological Vegetation Classes (EVCs) that occur within the Foreshore Reserve. This includes re-assessing the previous EVC mapping, to confirm its accuracy along the foreshore reserve, and undertaking new EVC mapping for the Nepean Highway linear reserve.
- 3) Re-surveying the indigenous vegetation cover mapping data in 2021
- 4) Providing comparative data (in hectares) that outlines the changes in the three indigenous vegetation cover categories between 2009 and the 2021 mapping.

5) Calcareous Swale Grasslands (mapping new EVC/s)

- A recent project (2021) undertaken by *Sundew* Ecological Services mapped the predicted historical and current distribution of Calcareous Swale Grasslands (CSG) for the Mornington Peninsula Shire Council, which has determined inaccuracies in existing EVC mapping for the Nepean Peninsula
- We will utilise the recently prepared CSG EVC profile to determine if there are patches of CSG in this project's study area

Stages 1 and 2

6) Compiling and mapping an inventory of significant flora species that occur along the foreshore.

7) Compiling flora (indigenous and invasive) species lists

- This would include categorising invasive/weed/exotic species according to Gidja Walker's four-tiered weed prioritisation categories (S1, S2, Keystone and Ubiquitous)

Stage 2

8) Orchid mapping

9) The provision of basic management recommendations based on observations made whilst undertaking the mapping fieldwork, and the prioritisation of management actions from highest to lowest priority.

1.1 Study Area Description

The WhiteCliffs to Cameron's Bight Foreshore study area is an approximately 5km long section of foreshore that extends westwards from the White Cliffs lookout in Rye, to Collin's Settlement Heritage Area in Sorrento. The foreshore reserve occurs along the northern perimeter of the towns/suburbs of Rye and Blairgowrie.

The overall study area is approximately 35 hectares; and includes most of the foreshore reserve (23ha of vegetation between the Nepean Highway and the beach), and a 2.6km (approx. 12ha) linear strip of vegetation on the other (southern) side of the Nepean Highway. The study area includes areas that have not been assessed previously in the 2009/10 or 2019 reports- namely the linear strip of vegetation on the southern side of the Nepean Highway.

The study area is bound by the Lime Kiln Historic Reserve/Rye Foreshore Camping Reserve to the east, and the Collin's Settlement Heritage Area/Legget Way in Sorrento to the west. Port Phillip Bay occurs along the northern edge of the study area, whilst the southern perimeter of the study area changes at St Johns Wood Road in Blairgowrie.

The southern perimeter of the eastern half of the study area occurs along the southern edge of the Nepean Highway linear strip of vegetation, which extends from WhiteCliffs lookout to St Johns Wood Road, Blairgowrie. From St Johns Wood Road to Legget Way (the western half of the study area), the Nepean Highway forms the southern perimeter of the study area.

For the purposes of this project the study area is divided into two sections, as described below:

- 1) **The foreshore reserve**- the area bound by WhiteCliffs Lookout to the east, the Nepean Highway to the south, Collin's Settlement Heritage Area/Legget Way to the west, and Port Phillip Bay to the north.

- 2) **The Nepean Highway linear reserve**- the area bound by Minnimurra Road to the east, private properties/service roads to the south, St Johns Wood Road to the west, and the Nepean Highway to the north.

Foreshore Reserve

The foreshore reserve comprises a mixture of uses and vegetation conditions including two foreshore camping areas (WhiteCliffs Foreshore Campground to the east and Cameron's Bights Campground to the west), many heritage-listed boatsheds, areas of remnant native vegetation, the Blairgowrie Yacht Squadron and Blairgowrie Marina, two boat ramps, boat trailer car parks, several public car parking areas, and a public BBQ area adjacent to Hughes Rd. The foreshore varies from approximately 15 to 125 metres wide and includes both vehicle and pedestrian access tracks, including the shared (pedestrian and bicycle) Bay Trail.

The study area is part of a continuous area of foreshore that extends along the eastern and southern sides of Port Phillip Bay. The study area is concerned with the portion of the foreshore that is managed by the WhiteCliffs to Cameron's Bight Foreshore Reserve Committee of Management.

Nepean Highway Linear Reserve

The Nepean Highway linear reserve is predominantly a linear strip of vegetation that is bisected by numerous formal roads, service roads and more informal entries into the private properties that occur along its southern perimeter.

There are also several informal parking areas and one formal parking area opposite the Tyrone Beach carpark. There is a footpath/boardwalk that runs the length of the linear reserve, located along its northern perimeter. There is a gravelled hardstand area off Johns Drive, near the WhiteCliffs Foreshore Campground. The vegetation along the linear reserve varies from intact bushland areas to heavily weed invaded areas. Many of the sensitive orchid populations managed by the Foreshore Reserve CoM are located in the linear reserve.

Figure 1 below (sourced from Google Earth Pro) presents an aerial image of the foreshore reserve from WhiteCliffs lookout, Rye in the west to Collin's Settlement Heritage Area/Legget Way, Sorrento in the east. The two study area sections are highlighted with yellow lines.



Figure 1. Aerial View of WhiteCliffs to Cameron's Bight Foreshore

2. PROJECT METHODOLOGY

The focus of the 2021-22 indigenous vegetation mapping project was to record the vegetation condition, location of significant species, high priority for control weed species, and Ecological Vegetation Classes within the foreshore and Nepean Highway linear reserves.

In addition, the 2009-10 vegetation condition mapping was re-categorised into the three indigenous vegetation condition categories outlined in Section 23.3 below, to provide comparative data with the 2021-22 vegetation condition mapping.

Other data that was collected included compiling flora (indigenous and invasive) species lists and mapping any patches of a newly described vegetation type/Ecological Vegetation Class in the Nepean Peninsula- EVC A309: Calcareous Swale 'Grassland'.

The orchid mapping will be undertaken as part of the Stage 2 works in autumn/winter of 2022.

The Stage 1 vegetation mapping fieldwork was undertaken by Gidja Walker and Katherine Smedley from the 16th to the 19th of December 2021. The foreshore and linear reserves were traversed via walking, buggy and vehicle over the four-day fieldwork period.

The stage 2 orchid and other significant flora species surveying was primarily undertaken by Gidja Walker from June to November, 2022. The orchid surveying period was extended into late Spring, due to the unseasonably wet spring.

The following methods were employed to undertake the vegetation mapping work:

2.1 Flora

A comprehensive flora survey was undertaken during the course of the vegetation mapping fieldwork in December 2021; records were made of significant flora species within the foreshore and Nepean Highway linear reserves, and observations were made regarding general vegetation management recommendations. The flora survey collected records of indigenous, native (plants native to Victoria/Australia but not indigenous to the Nepean Peninsula) and exotic species.

The Stage 2 fieldwork will add to these observations/flora lists.

The assessment of significant flora species in the study area was undertaken by Gidja Walker based on her detailed knowledge of the Mornington Peninsula and the WhiteCliffs to Cameron's Bight foreshore, and records from previous flora surveys undertaken across the Nepean Peninsula.

The flora taxonomy utilised in this report, is from either the Victorian Biodiversity Atlas (DELWP 2018) and/or VicFlora (RBGV, 2021).

2.1.1 Significant Flora Species

The significant flora species recorded within this report and its accompanying maps, have been designated as significant based on detailed knowledge of the Mornington Peninsula and Port Phillip Bay foreshore, meaning that some flora species that are commonly recorded across Victoria ie: Cherry Ballarts *Exocarpos cupressiformis* and Blackwood Wattles *Acacia melanoxylon*; have been recorded as significant as they are in low numbers along the foreshore and Nepean Highway linear reserves.

The significance ratings are based on extensive local knowledge, and also incorporate species listed as threatened under the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act or the Victorian Flora and Fauna Guarantee (FFG) Act.

The following categories have been utilised in defining significant flora species:

Category	Significant
EBPC	Conservation status under EPBC Act 1999: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant
FFG	Conservation status under FFG (Amendment) Act 2020: L: Listed, N: Nominated, I: Invalid or ineligible, R: Rejected and D: Delisted
R	Regionally Significant (as defined by Gidja Walker)
HL	High Local significance/few individuals along the foreshore and highway reserves (as defined by Gidja Walker)

2.1.2 Stage 2 Orchid Surveying

The 2022 winter/spring orchid survey data was primarily collected by Gidja Walker, through a combination of methods as outlined below. All previous orchid sites from the 2008 and 2009 data were re-visited during the 2022 winter-spring survey.

Targeted Species-specific Surveying

The existing orchid mapping data (gathered from several sources including the 2009 SEEDs data, and previous foreshore surveys by Gidja Walker) was combined into a single mapping file that contained data on previously recorded orchid species names and locations; along with some notes on surrounding vegetation and/or orchid colony population numbers. This file was the base existing orchid locational data file for the foreshore reserve, that was utilised to re-survey the areas of the foreshore where there had been previous recorded orchid sightings. This file determined that at least eight different orchid species grew within the foreshore reserve.

As different orchid species germinate at different times over the winter/spring period, it was determined that the best methodology for gathering data in the most time efficient manner, was for foreshore orchid populations near the surveyor’s home (St Andrews Beach) to be monitored. When a particular orchid species had germinated and grown to the stage where it could be confidently identified to the genus and species levels, the surveyor then travelled to the WhiteCliffs to Cameron’s Bight Foreshore Reserve and visited the locations where that species had been recorded previously. The species was then mapped, if it was present during the 2022 foreshore reserve orchid survey.

General Orchid Surveys

In addition to this targeted species-specific survey methodology, the surveyor also undertook several general walks using the random meander methodology (Cropper, 1993), through the foreshore reserve, throughout the orchid survey season, recording observations (and one new species) outside of the previous orchid location data.

Between these combinations of methods, a thorough survey of the foreshore reserve was undertaken for orchid species.

2.1.3 Weedy/Exotic Flora Species and Control Prioritisation

In both the foreshore and linear reserves, each weed/introduced species that was identified was categorised and assigned a level of priority according to its level of known risk and current status within the reserves. Factors taken into consideration were the numbers and ecology of each weed species, and site variables such as tidal influence and/or topography. Table 1 below outlines the weed prioritisation categories used.

Table 1 Weed Prioritisation Categories

Weed Prioritisation Categories	Description of each Category
Keystone (K)	Totally dominates structurally and floristically/old populations that have reached the peak of their invasion potential in a given area. <ul style="list-style-type: none"> • Many species (flora and fauna) may have become dependent on weeds. • Work slowly and systematically from highest quality areas outwards. <ul style="list-style-type: none"> • Remove mature specimens first. • Keep in mind buffers/habitat.
Small patches (S) or the only observed occurrence of a species	Of variable risk, but easiest to eliminate as they are in small numbers
S1	Highest risk and priority for control. Eliminate from the site.
S2	Moderate risk and priority for control. Eliminate from the highest quality areas first.
S3	Low risk and priority for control. Aesthetic weed, no seedlings observed
Ubiquitous species (U)	Scattered weeds of disturbed areas Hard to eliminate; look at management regimes. Eliminate in high quality areas, but of lower priority elsewhere within the site.

Weed categorisation categories provided by Gidja Walker

2.1.4 Limitations of Significant Flora and Weed Survey/s

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

- A one-off seasonal flora survey is never able to 'capture' the full suite of indigenous grassy and herbaceous species growing within a reserve.
- Whilst an additional three days of surveying will be undertaken over autumn/winter 2022, this surveying can never capture the species that may/may not flower due to seasonal and/or environmental variations (ie: extra wet year/early spring/very frosty year, etc).

With regard to these limitations, it is still considered that the majority of significant flora and weed species within the foreshore and linear highway reserves will be recorded based on the flora lists available in the previous reports and maps, and local knowledge.

2.2 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are a method of systematic organisation of plant/vegetation communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified based on its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

The Department of Environment, Land, Water and Planning (DELWP) EVC mapping was accessed to assess the EVC/s likely to occur in the study area. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with EVC benchmark descriptions.

In addition, information from recent research (July 2021) undertaken by Gidja Walker and Katherine Smedley on a little described EVC (EVC A309: Calcareous Swale ‘Grassland’) that is known to occur across the Nepean Peninsula; was also utilised to inform EVC mapping within the study area.

2.3 Vegetation Quality and Indigenous Cover Mapping

Vegetation Cover mapping provides indicative data on the indigenous vegetation cover and quality in the mapped areas of bushland. The mapping assessed and categorised remnant vegetation within the foreshore and linear reserves based on the upper (canopy and shrub) and lower (groundstorey) layers.

Vegetation cover mapping provides a useful guide for determining general indigenous vegetation cover and extent across an area. This information can be extrapolated to determine management priorities, and it can also be utilised in monitoring indigenous groundstorey vegetation quality/cover across an area over time.

In addition, vegetation cover mapping can also be used for habitat connectivity planning as it provides a visual tool of the extent and ‘quality’ of remnant indigenous vegetation in an area. Vegetation cover maps provide a visual analysis of the higher and lower quality remnant indigenous vegetation in an area and depicts the areas where links/corridors between ‘higher’ quality areas could be established through revegetation works.

To undertake an assessment, both the indigenous upper (tree/shrub) and lower (groundstorey) vegetation layers within an area are considered. The amount of ‘indigenous’ versus ‘exotic’ plant cover is then considered to determine the vegetation quality/cover category.

2009-10 and 2019 Mapping

For the 2009-10 and 2019 vegetation mapping undertaken by SEEDS Bushland Restoration, a three colour-coded rating system as presented in Table 2 on the next page was utilised.

As per the project objectives, the 2009-10 mapping has been re-categorised to provide comparative data with the 2021-22 mapping. As the 2019 mapping was undertaken more recently, it was not utilised to provide comparative data. The Nepean Highway linear reserve was not mapped in 2009-10.

Table 2 Indigenous Vegetation Quality Mapping Categories (2009/10 & 2019)

Colour	Indigenous Vegetation Quality
Red	<p>Less than 30% indigenous vegetation cover</p> <p>Revegetation Area- lowest priority</p> <ul style="list-style-type: none"> • Aim to control weed seed production • May plant in high profile areas or to link higher quality areas • Still may have habitat or buffer values which weeds are providing

Colour	Indigenous Vegetation Quality
Blue	<p>30-60% indigenous vegetation cover</p> <p>Restoration Area- moderate priority</p> <ul style="list-style-type: none"> • Restore slowly • Aim to control weed population • Possible enrichment planting after allowing time for natural regeneration
Green	<p>Greater than 60% indigenous vegetation cover</p> <p>Retention areas- highest management priority</p> <ul style="list-style-type: none"> • Retain what is left • Aim to eliminate all weeds over time • No planting, allow for natural regeneration/recruitment only • Highly skilled bushland management workforce only to work in these areas- skilled in plant identification and targeted weed control works

2021-22 Mapping

Whilst the intention of the 2021-22 mapping was to re-use the same mapping categories, it was determined during the first day of fieldwork, that the categories were too broad and that they would not provide the detailed and nuanced vegetation cover data that was required to guide vegetation management along the WhiteCliffs to Cameron's Bight foreshore reserve. This was especially the case of the 'blue' category which encapsulated a very broad area of vegetation.

Therefore a more nuanced four colour-coded rating system was adopted, as presented in Table 3 below. With the four colour-coded rating system, the broad middle category of indigenous vegetation cover is split into two categories, rather than being the one category.

Table 3 Indigenous Vegetation Cover Mapping Categories (2021/22)

Colour	Indigenous Vegetation Cover
Red	<p>Less than 25% indigenous vegetation cover; Low quality</p> <ul style="list-style-type: none"> • Low diversity of indigenous vegetation • High level of weed invasion and disturbance impacts • Still may have habitat or buffer values, which weeds will be providing
Orange	<p>25-50% indigenous vegetation cover; Moderate quality</p> <ul style="list-style-type: none"> • Moderate to low diversity of indigenous vegetation • Mostly just indigenous trees and shrubs with weedy/exotic groundstorey layer • Moderate to high weed invasion
Blue	<p>50-75% indigenous vegetation cover; High quality</p> <ul style="list-style-type: none"> • High diversity of indigenous vegetation in all three vegetation layers (canopy, shrub and groundstorey) • Good level of structural integrity • Minimal to some weed invasion
Green	<p>Greater than 75% indigenous vegetation cover; Very High quality</p> <ul style="list-style-type: none"> • Very high diversity of indigenous vegetation in all three vegetation layers (canopy, shrub and groundstorey) • High level of structural integrity • Very low weed invasion

Limitations

Issues with vegetation cover mapping include the subjectivity between different assessors and the time of year in which the mapping is undertaken. The amount of recent rainfall can impact upon the extent of indigenous versus exotic groundstorey vegetation cover present- weeds generally prefer higher rainfall, whilst less rainfall can favour indigenous species cover.

2.4 Spatial Data Collection

Spatial data collection for the location/extent of native vegetation was undertaken using a handheld GPS enabled device and/or aerial imagery. GPS data and mapping has an accuracy within 1 to 5 metres. The base aerial imagery utilised is provided by Google Maps.

3. RESULTS- INDIGENOUS VEGETATION MAPPING

As outlined previously, the focus of the 2021/22 vegetation mapping project was to undertake current mapping of:

- Vegetation Cover/Quality (presented in Appendix 6)
- Ecological Vegetation Classes (presented in Appendix 5),
- Significant Flora Species, including orchids (provided in the electronic dataset/s), and
- High priority weed species (provided as part of the electronic dataset).

These maps are either presented at the back of this report, and/or as part of the separate electronic dataset. A weed prioritisation system is presented in Appendix 4.

The aim of mapping these aspects of indigenous vegetation (especially the indigenous vegetation cover), along the foreshore and linear reserves was to provide comparative data (if available) with the 2009/10 and 2019 SEEDs Bushland Restoration information. Comparative data that can be used to determine if there had been any changes in: indigenous vegetation cover and quality, the cover and abundance of significant species, and the area of each Ecological Vegetation Class; over the 10-12 year assessment period between 2009/2010 to 2021/22, as the result of on-going foreshore bushland management works.

- ❖ Section 4 discusses the EVC mapping, and Appendix 5 presents the results of the 2021 EVC mapping.
- ❖ Section 5 discusses the significant flora mapping, and the significant flora maps are presented in the accompanying separate electronic dataset.
- ❖ Section 6 discusses the weed mapping, Appendix 2 provides the weed mapping and prioritisation for control data, with the locations of high priority for control weed species provided in the accompanying separate electronic dataset.

This section provides a discussion of the indigenous vegetation cover mapping data.

A brief discussion of each of these areas of vegetation mapping, based on an analysis of the data/ maps is provided below:

3.1 2009/2021 Indigenous Vegetation Cover Mapping

Comparisons between the 2009 and 2021 vegetation cover mapping data is only available for the foreshore reserve, as 2021 is the first complete vegetation mapping dataset for the Nepean Highway linear reserve.

The indigenous vegetation cover maps are presented in Appendix 6, which divides the study area into 16 sections, with the 2009 and 2021 maps for each section presented on the one map, with one map displayed per section of the study area.

Visual comparisons between the 2009 and 2021 foreshore reserve vegetation quality mapping highlights that there has been changes in indigenous vegetation cover/quality across the foreshore, with direct comparisons across Maps 1A to 1P (indigenous vegetation Cover Mapping) depicting many changes in vegetation quality and the extent of patches.

As outlined in Section 2.3, direct comparisons are not possible as the 2009 mapping was very broad scale, whilst the 2021 mapping is more nuanced. In addition, three mapping categories were utilised in 2009, whilst four mapping categories were utilised in 2021 to provide a better breakdown of the indigenous vegetation cover across the study area.

Despite this, the mapping data presented in Appendix 6 clearly depicts changes in indigenous vegetation cover across the foreshore reserve, mostly improvements in the extent of higher cover of indigenous vegetation (blue and green mapped categories), which would be attributable to the on-going vegetation management and other general bushland management practices (eg: fencing of remnants, etc) that have occurred in the foreshore reserve since 2010.

Photographs which depict the four indigenous vegetation cover categories utilised in the 2021 vegetation mapping are provided in Section 3.3.

3.2 Comparative Mapping Data- Foreshore Reserve 2009 and 2021

An analysis in hectares of the three (2009) and four (2021) vegetation cover categories from the maps presented in Appendix 6 reveals that there has been a decrease in the amount of mapped indigenous vegetation cover across the foreshore reserve since 2009.

However, considering that the 2021 vegetation cover mapping was much more nuanced, and areas dominated by exotic vegetation (eg: roads, tracks, sand and the campgrounds) were excised from the mapping data, this decrease in overall mapped area of indigenous vegetation is not surprising.

Table 4 below presents the area (in hectares) of each mapped vegetation category in 2009 and 2021 for the foreshore reserve and the first area data for the linear reserve (2021).

Table 4 Extent of Mapped Vegetation Cover

Mapping Year	Low indigenous vegetation cover (red)	Poor to High indigenous vegetation cover (orange and blue)		Very High indigenous vegetation cover (green)	Total Area Mapped
2009	0-30%	30-60%		>60%	
Foreshore reserve	2.605ha	15.779ha		3.091ha	21.475ha
2021	0-25%	25-50%	50-75%	75-100%	
Foreshore reserve	1.72ha	4.137ha	9.248ha	1.668ha	16.772ha
orange & blue combined		13.385ha			
Linear reserve	1.201ha	6.055ha	2.775ha	0.251ha	10.282ha
FORESHORE RESERVE ONLY					
Difference between 2009 & 2021	-1.404ha	-2.394ha		-1.423ha	-4.703ha

Comparisons between 2009 & 2021 Vegetation Cover Mapping Data

Whilst visual comparisons between the 2009 and 2021 vegetation cover mapping (refer to Appendix 6), suggest there has been many changes in vegetation quality along the foreshore reserve, the data analysis presented in Table 4 indicates that the changes are minimal.

Not too much should be read into the data presented in Table 4, for the following reasons:

- The 2009 data mapping was very broad-scale and it covered 'hard surfaces and exotic dominated vegetation areas' such as the boat sheds, shared trails, campgrounds, car parks, areas of the beach and access roads within the foreshore reserve.
- In 2017, due to the advances in mapping technology and aerial imagery the 'hard surfaces and exotic vegetation dominated areas' listed above were excised from the mapped areas, which accounts for the decrease in mapped area shown on the 'Total Hectares Mapped' column of Table 4.
- The number of mapping categories was also increased in the 2021 mapping (from three to four categories), and the extent of indigenous vegetation cover mapped in each category was also altered; therefore direct comparisons between the 2009 and 2021 mapping data really isn't possible.

If further indigenous vegetation cover mapping is undertaken in both the foreshore and linear reserves in approximately 10 years (2031) and is mapped utilising the same footprint captured in Appendix 6 and using the same four indigenous vegetation cover categories presented in Section 2.3 (2021 Data) and in Appendix 6, then a more accurate data analysis should be possible.

Overall, a visual analysis between the 2009 and 2021 indigenous vegetation cover mapping presented in Appendix 6, does illustrate that there has been changes in indigenous vegetation cover/quality between the 12-year mapping periods.

3.3 Photographs of the Vegetation Mapping Categories

The images over the next pages provide examples of the different mapping categories/indigenous vegetation condition observed across the study area:

Foreshore Reserve	
	
Green- all three indigenous vegetation layers present and minimal to no weeds	Blue- all three indigenous vegetation layers present and some weeds



Orange- 25- 50% indigenous groundstorey cover, and numerous weeds



Orange- weed dominated area with some indigenous vegetation



Red- weed dominated area that is also Swamp Rat habitat



Red- weed dominated area

Nepean Highway Linear Reserve



Green- intact patches of native vegetation with only very scattered grassy weeds



Blue- intact vegetation with some weed species



Orange- weedy understorey and intact Moonah canopy layer



Red- woody and scrambling weed infested area with scattered Moonahs

3.4 Indigenous Vegetation Cover Mapping Data

The results of the indigenous vegetation cover mapping are presented in Appendix 6.

Electronic copies of the Indigenous Vegetation Cover maps will also be submitted as part of the project dataset.

4. RESULTS: ECOLOGICAL VEGETATION CLASSES (EVCs)

Whilst EVCs had previously been mapped along the foreshore (SEEDs Bushland Restoration, 2010), the 2009 EVC mapping data combined several similar EVCs into larger units, which resulted in broad scale mapping that presented only four EVC groups in large areas of the foreshore.

This mapping also included patches of exotic vegetation within the EVC mapping. From a 2021 perspective, this mapping data was very broad, it did not provide any nuances in the vegetation, and it is likely that some of it may be incorrect based on more recent vegetation information that is now available for the vegetation in the Nepean Peninsula.

Rather than try and pull apart this previous EVC mapping data, it was determined to be easier to re-do the EVC mapping as part of the 2021/22 vegetation mapping works. Re-doing the EVC mapping has also allowed more recent EVC information for the Nepean Peninsula to be incorporated into the EVC mapping, and it has provided the opportunity to divide the broad scale EVC unit, EVC 858: Coastal Alkaline Scrub; into more distinct vegetation types/EVCs based on the dominant canopy tree species present- either Moonahs *Melaleuca lanceolata subsp lanceolata*, Drooping Sheoak *Allocasuarina verticillata*, Coast Wirilda *Acacia uncifolia* or Coast Tea-tree *Leptospermum laevigatum*.

4.1 EVC Mapping Data

The unmapped areas in the EVC maps are areas that contain infrastructure or that are dominated by exotic vegetation. This includes the area in front of Cameron's Bight Jetty that was not mapped due to the landscape changes (terracing) and widespread planting, which meant that EVC mapping was not possible.

Several highly modified areas are also noted- mostly within and adjacent to the two campgrounds. These areas have been highly modified through plantings, although the 'original' EVCs can still be determined from the remaining indigenous vegetation.

The results of the EVC mapping are presented in Appendix 5.

Electronic copies of the EVCs maps will be submitted separately as part of the project dataset.

4.2 EVC Mapping and Vegetation Disturbance/Modification in the Study Area

The EVC mapping undertaken for this project has recorded and described the vegetation types/EVCs present within the study area based on observation and current knowledge. Due to previous vegetation disturbance/modification in the study area (and across the Nepean Peninsula generally), the EVCs that exist within the study area today are potentially not wholly representative of the vegetation types that occurred prior to European settlement.

An example of this previous vegetation disturbance/modification is in the section of the foreshore reserve (Tyrone foreshore) known as the "Woodland Walk" where there is an extensive stand of Moonahs that are similar in age. It is thought likely this Moonah stand has resulted from a fire event between 1890-1910, and that Moonahs may not have originally occurred as a dense woodland in that section of the foreshore.

Whilst knowledge of the previous vegetation disturbance/modification within the study area is interesting and it informs the vegetation that exists today; from a pure on-the-ground bushland management perspective it is less relevant. Of more relevance, is knowing what the current EVCs/vegetation types are and the bushland management practices that are required to conserve and enhance their values. In the end, the indigenous vegetation that currently occurs in the study area needs to be managed and conserved, or it is danger of being 'lost' through major actions such as development, or incremental actions such as weed invasion.

4.3 New EVC Information for the Nepean Peninsula

The journal articles and reports which have been utilised to inform the EVC mapping prepared as part of the 2021/22 vegetation mapping works for the foreshore and linear reserves are:

- Moxham, C, Sinclair, S, Walker, G & Douglas, I (2009) *The vegetation of the Nepean peninsula-an historical perspective*. Cunninghamia 11
- Smedley and Walker (2021). *Calcareous Swale 'Grassland' of the Nepean Peninsula: Methodology, Mapping, Results, Discussion and Recommendations*. Prepared for the Mornington Peninsula Shire Council.

Based on the information within these journal articles/reports it is clear that EVC 2: Coastal Banksia Woodland does not occur in the study area, and that the scattered remnant Coast Banksias in the study area are indicative of a 'new' EVC which has only recently been described for the Nepean Peninsula- EVC A309: Calcareous Swale 'Grassland'(Walker and Smedley, 2021) or as they occur as a component of EVC 160: Coastal Dune Scrub.

The 2021 project on *Calcareous Swale Grassland in the Nepean Peninsula* (Walker and Smedley, 2021), provides a lot of technical detail behind the 'new' EVC and its' naming. Some of the technical detail includes clarifying the 'locations' of patches of EVC 858: Coastal Alkaline Scrub and Coastal Moonah Woodland in the landscape according to contour levels and underlying geology; and the outlining the role of the disturbance driven colonising species Coast Tea-trees in the dynamic Nepean Peninsula vegetation cycle.

All of this 'new' information has been utilised to provide the revised EVC mapping for the foreshore reserve, and new EVC mapping for the Nepean Highway linear reserve.

4.4 EVCs Recorded in the Study Area (2021/22 Data)

Overall six EVCs were recorded along the foreshore and Nepean Highway linear reserves, as described over the next pages. Some nuances or differentiations between or within EVCs are also presented, that further define and describe the vegetation types/EVCs which currently exist in the study area. Additional information on the distinctions utilised in the EVC mapping for this project are provided in Section 4.5.

In the EVC descriptions/Table 5, the benchmark information provided for the EVCs are based on a combination of information from the 2004 DSE benchmarks and/or from the Mornington Peninsula Shire Council EVC descriptions that were prepared in 2002. A separate column then provides a description of these EVCs within the context of the study area.

The study area is located within the Gippsland Plain bioregion. The conservation status (CS) of each EVC according to the Mornington Peninsula EVC Profiles is also provided in Table 5, along with photographs of each EVC recorded within the study area.

Table 5 Ecological Vegetation Classes within the Study Area

EVC 160: Coastal Dune Scrub (Conservation Status; CS= Vulnerable)	
Benchmark Description (provided by DSE 2004, or Yugovic 2002)	Study Area Description
<p>Distinguished from EVC 161: Coastal Headland Scrub by the different substrate the vegetation grows upon (Yugovic 2002).</p> <p>Closed scrub to 5 m tall with occasional emergents occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds (DSE, 2004).</p>	<p>Occurs on the inland side of the primary dune and plays an important role in sand accretion and stabilisation.</p> <p>Vegetation tends to be dense, and wind pruned and is able to withstand coastal influences. It forms a buffer for the vegetation growing in the swales behind the dune system.</p> <p>It is characterised by its dense structure and is mostly dominated by Coast Tea-tree (<i>Leptospermum laevigatum</i>) or Coast Wattle (<i>Acacia sophorae</i>).</p>



Patch of EVC 160: Coastal Dune Scrub behind the WhiteCliffs campground



Coastal Dune Scrub to the west of Blairgowrie Yacht Club

**EVC 161: Coastal Headland Scrub
(CS= Vulnerable)**

Benchmark Description (provided by DSE 2004, or Yugovic 2002)

Scrub or low shrubland on steep, rocky coastal headlands often associated with cliffs exposed to the stresses of extreme salt-laden winds and salt spray from the south-west. Occurs on shallow sands along rocky sections of the coast (DES, 2004).

Scrub to 5 metres high. Located on exposed coastal bluffs and cliffs of the Mornington Peninsula, up to 100 metres inland. Salt spray and limited soil development on steeper exposed sites inhibits weeds, whilst the flatter sites at the tops of bluffs are highly susceptible to weed invasion (Yugovic, 2002).

Study Area Description

Within the study area, EVC 161: Coastal headland Scrub is limited to one area of the site- on top of the cliffs at WhiteCliffs lookout.

The vegetation on top of the lookout is exposed salt-laden winds, which has limited its growth.

The vegetation is dominated Coast Wattle, Coast Tea-tree and Coast Beard-heath *Leucopogon parviflorus*.



Coastal Headland Scrub at WhiteCliffs Lookout



Coastal Headland Scrub along the top of the WhiteCliffs Lookout cliff face

**EVC 311: Berm Grassy Shrubland
(CS= Endangered)**

Benchmark Description (provided by DSE 2004, or Yugovic 2002)

Low shrubland to 1.5 m tall occurring in sheltered coastal areas where sand deposits have formed as a result of low energy wave action (DSE, 2004).

Grows on deep sand on beaches partially protected from wind. Scattered on sandy sections of the Mornington Peninsula coastline. Scattered and uncommon, most stands are very small. Distinguished by abundant Coast Saltbush *Atriplex cinerea* (Yugovic, 2002).

Study Area Description

In the study area, this EVC occurs on the primary dune facing the Bay, in combination with EVC 160: Coastal Dune Scrub. and EVC 879 Coastal Dune Grassland.

Degraded patches of this vegetation type occur in patches on both artificial berms and those created by coastal processes.

It tends to be species poor in terms of plants species with Coast Saltbush dominating. It is important habitat for Skinks and Butterflies, and important for Coastal processes.



Berm Grassy Shrubland at the base of WhiteCliffs Lookout



Berm Grassy Shrubland near Cameron's Bight jetty

**EVC 858: Coastal Alkaline Scrub/Coastal Moonah Woodland (Listed under the State FFG Act)
(CS= Endangered)**

Benchmark Description (DSE 2004, or Yugovic 2002)	Study Area Description	Additional Notes
<p>Near-coastal, deep calcareous (alkaline) and largely stable sand dunes and swales commonly dominated by Moonah <i>Melaleuca lanceolata ssp. lanceolata</i>.</p> <p>It occurs at low elevations of 20-60 m above sea level, average annual rainfall is approximately 550- 950 mm, and it occurs on a variety of geologies and soil types. Low woodland or tall shrubland to 8 m tall, typically with a medium shrub layer, small shrub layer and sedges, grasses and herbs in the ground layer (DSE, 2004).</p>	<p>The dominant EVC in the foreshore reserve, indicated by presence of Moonah with Coast Wirilda, Thyme Rice-flower and Shade Pellitory. Patches can contain some scattered (potentially big & old) Coast Tea tree.</p> <p>Many patches are disturbed with an intact Moonah dominated canopy layer, and a partially or completely disturbed understorey. Has been mapped as 'young' CMW (Moonahs up to 150 years old), 'old' CMW (150 years, plus) & 'mixed' CMW. Refer to Section 4.5.</p> <p>In the study area, CMW has been mapped in low-lying, flat and higher elevations, which reflects the underlying dune calcarenite geology occurring below the 20m contour, combined with past disturbance that has occurred along this section of the coastline such as Sheoak removal for lime kilns and Coast Tea-tree removal to supply Melbourne bakeries and fire.</p>	<p>Whilst usually mapped in coastal areas as the same broad EVC unit (EVC 858) that applies to dense stands of a range of canopy species including Coast Tea-trees, Moonah & Drooping Sheoak, Coastal Moonah Woodland (CMW) is recognised as a distinct floristic community (Moxham at al, 2009; DSE, 2010), which generally occurs on limestone ridges and outcrops above the 20m contour level. The main distinguishing features are indicators such as Coast Wirilda, whereas Coast Wattle can occur across several EVCs.</p> <p>This distinction is recognised in the EVC mapping for this project, which has attempted to separate these vegetation communities and EVC's. Refer to Section 4.5.</p>



Young' Coastal Moonah Woodland - in the Woodland Walk along the foreshore



Old' Coastal Moonah Woodland along the foreshore



"Old' Coastal Moonah Woodland surrounded by woody/scrambling weeds in the linear reserve

**EVC 879: Coastal Dune Grassland
(CS= Endangered)**

Benchmark Description (DSE 2004, or Yugovic 2002)

Consists of grasses and halophytes (succulents) that colonise the fore dunes of ocean beaches. Soils are siliceous sands that have a very low humus content (DSE, 2004).

Distinguished by dominance by of the indigenous beach grass Hairy Spinifex *Spinifex sericeus*; habitat subject to invasion by introduced Marram Grass *Ammophila arenaria*. (Yugovic 2002).

Study Area Description

Occurs on the primary dune facing the Bay, in combination with EVC 160: Coastal Dune Scrub and EVC 311: Berm Shrubland. It is the first terrestrial vegetation barrier to the marine environment and its effects.

Primary dunes are typically colonised by indigenous species such as Coast Spinifex, Coast Salt-bush and Salt-grass; or the introduced Marram Grass and/or Sea-wheat Grass.

The species present determines the shape of the dune that will form with sand accretion. The introduced Marram grass forms a steep dune front, which later becomes undermined through wave action and collapses. The indigenous Hairy Spinifex grass produces a gentler gradient and due to its habit is ideally suited to colonizing these dune fronts.

It is also a perfect habitat for regeneration, leading to the succession into a primary dune system, supporting Coastal Dune Scrub and later, other EVCs/vegetation types depending on the substrate.

One patch (near the Blairgowrie Yacht Club) of this EVC was dominated by Strand Sedge *Carex pumila*, rather than Spinifex.

Patches of exotic Coastal Dune Grassland (dominated by Marram Grass or Sea Wheat-grass)) were not mapped as the EVC.

EVC photographs



Strip of Coastal Dune Grassland adjacent to the Adelaide Street car park



Patch of Coastal Dune Grassland (with female and male Spinifex)



Close up of Strand Sedge; growing in Coastal Dune Grassland to the west of Blairgowrie Yacht Club

EVC A309: Calcareous Swale 'Grassland' in the Nepean Peninsula (CSG); (CS= Endangered)

There is no description for this EVC in the 2002 Mornington Peninsula EVC profiles. The 2004 DSE description was determined in the recent work into this EVC (Walker and Smedley, 2021) to be riddled with errors and requiring revision. Refer to Appendix __ for the recently created EVC A309 profile.

Benchmark Description (Walker & Smedley, 2021)	Study Area Description	EVC photographs
--	------------------------	-----------------

Restricted to the lower contours (mostly below the 15m level) of the rolling dune landscape that characterises the Nepean Peninsula, inland of the primary dune system.

Found in the swales, flats, lower lying contours and 'bowls' that are often located at the bottom of, and in-between the sand dunes and limestone ridges.

It is characterised by three distinct features:

- 1) The vegetation community occurs on **calcareous** terra rossa soils
- 2) The vegetation community occurs below the 15-20m contour level in **swales**, bowls or depressions in lower-lying areas of the Nepean Peninsula
- 3) Mostly an **'open'** structured vegetation community

Several patches were recorded in the study area, which were identified by:

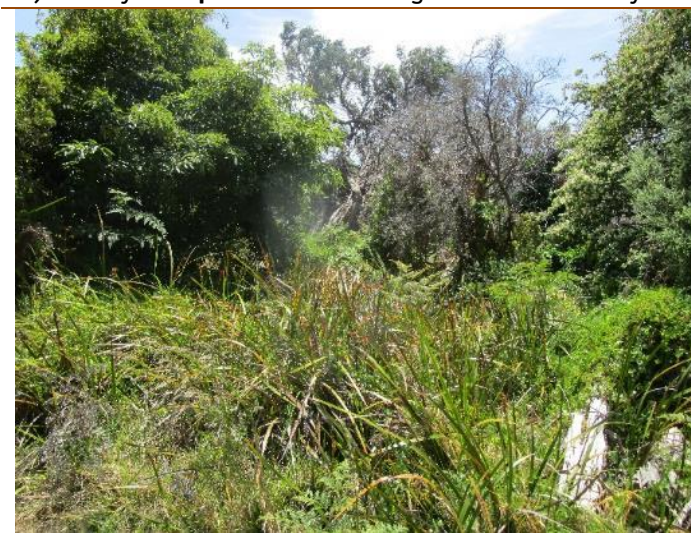
- Their location (low-lying areas)
- Their vegetation structure- open grassy/sedgy areas with some scattered or 'islands' of trees/shrubs
- The presence of the indicator and/or character flora species which have been identified for the EVC

Three types of CSG have been mapped in the study area:

1. Climax patches- dominated by indigenous grasses/sedges with an open vegetation structure
2. Early succession patches- dominated by Coast Tea-tree which has the potential to become future climax patches
3. Former CSG patches- weed dominated 'bowls' (refer to Section 4.5 for further information).



EVC A309: Calcareous Swale 'Grassland' (Patch 1)



EVC A309: Calcareous Swale 'Grassland' (Patch 4)



EVC A309: Calcareous Swale 'Grassland' (Patch 6)



EVC A309: Calcareous Swale 'Grassland' (Patch 4)

4.5 Further Information on the EVC Mapping

No further explanation is required for the vegetation patches mapped as:

- EVC 160: Coastal Dune Scrub
- EVC 161: Coastal Headland Scrub,
- EVC 311: Berm Grassy Shrubland, or
- EVC 879: Coastal Dune Grassland.

Patches of these EVCs have been mapped as per the descriptions provided in the Department of Environment, Water, Land and Planning (DELWP), formerly the Department of Sustainability and Environment (DSE), EVC benchmarks; or as per the 2002 Mornington Peninsula EVC Profiles.

Further explanations for EVC 858: Coastal Alkaline Scrub/Coastal Moonah Woodland, EVC A309: Calcareous Swale 'Grassland', and the role of Coast Tea-trees with regards to vegetation categorisation, are provided below.

4.5.1 EVC 858: Coastal Alkaline Scrub/Coastal Moonah Woodland (CMW)

EVBC 858: Coastal Alkaline Scrub is a broad EVC mapping unit that can be applied to all patches of vegetation (if the vegetation does not meet the descriptions for EVCs 160 and/or 161) across the Nepean Peninsula that contains a canopy of either Coast Tea-trees or Moonahs. This EVC can be applied to highly disturbed or more intact bushland areas, as is mapped by DELWP as the most dominant EVC occupying approximately 90% of the remaining bushland across the Nepean Peninsula.

The floristic community Coastal Moonah Woodland has been recognised as occurring in this EVC, and it is also a threatened community listed under the Victorian Flora and Fauna Guarantee (FFG) Act.

In terms of EVC mapping for this project, it was determined that **EVC 858** would be regarded as being exclusively synonymous with the FFG Act community Coastal Moonah Woodland ie using the indicators of either Moonah, Coast Wirilda, and Thyme-leaf Rice-flower (other indicators such as Shade Pellitory not being evident due to seasonality

Three 'types' of EVC 858 have been recognised and mapped in the study area:

- Young Coastal Moonah Woodland (Moonah patches up to 150 years old), and
- Old Coastal Moonah Woodland (Moonah patches greater than 150 years old).
- Mixed Coastal Moonah Woodland.

Young Coastal Moonah Woodland

Most patches of 'Young' Coastal Moonah Woodland have been mapped along the foreshore section of the study area, with a range of understorey vegetation from completely weed dominated areas to areas with a diversity of indigenous understorey species.

Most stands are uniform in age, suggesting previous disturbance events which have resulted in the mass germination and growth of Moonah seedlings at the one time.

Old Coastal Moonah Woodland

Most patches of ‘Old’ Coastal Moonah Woodland have been mapped in the Nepean Highway linear reserve section of the study area, although there are also some stands of very old Moonahs located along the foreshore.

In most parts of the linear reserve, the ‘old’ Moonah Woodland areas are dominated by an understorey of dense woody and scrambling weeds. Whilst managing these areas to conserve and enhance the old Moonahs is a priority, it is likely that the dense weedy vegetation provides habitat for a range of indigenous fauna species that could be displaced if large scale weed control works occurred. These are generally patches that require carefully planned and staged weed control and habitat replacement management works.

Mixed Coastal Moonah Woodland

Moonah patches with a mixture of both ‘young’ and ‘old’ Moonahs; that could not be easily categorised as either ‘young’ or ‘old’ patches. Often also have a mix of other species such as Coast Teatree and Coast Wirilda.

4.5.2 Coast Tea-tree Patches in the Study Area

Outside of patches of EVC 160 or EVC 161, bushland areas with Coast Tea-trees are normally mapped as EVC 858: Coastal Alkaline Scrub.

However the work undertaken for the 2021 project on *Calcareous Swale Grassland in the Nepean Peninsula* (Walker and Smedley, 2021), has resulted in some re-thinking of the EVC mapping of Coast Tea-tree in the Nepean Peninsula landscape, which is reflected in the EVC mapping presented for this project, as outlined in Table 6 below.

No patches dominated by Coast Tea-tree have been categorised as EVC 858 in the EVC mapping presented for this project. This is in-line with the technical information presented in the *Calcareous Swale Grassland in the Nepean Peninsula* project (Walker and Smedley, 2021); rather than in-line with current ecological assessment processes.

The technical information presented in the *Calcareous Swale Grassland in the Nepean Peninsula* report; is in the long process of being reviewed by the Department of Environment, Land, Water and Planning (DELWP- who’s named changed to DEECA; Department of Energy, Environment and Climate Action on the 1/01/2023). An initial review of the report has been undertaken by Steve Sinclair; Plant Ecologist (Arthur Rylah Institute for Environmental Research; Department of Energy, Environment and Climate Action).

Table 6 Mapping Coast Tea-tree Patches within the Study Area

Patch Characteristics		Ecological Vegetation Class
Location	Near the foreshore	Mapped as EVC 160: Coastal Dune Scrub
Substrate	Unconsolidated sands	
Species	Growing in association with Coast Wattle, Seaberry Saltbush, Bower Spinach	
Location	Away from the foreshore or in association with the indicator/character species listed below	Mapped as Early Succession stage of EVC A309: Calcareous Swale ‘Grassland’ .
Substrate	Terra-rosa soils	
Species	Growing in association with Common Tussock-grass, Coast Bitter-bush, Remnant Coast Banksias, and/or Scented Groundsel	
		Has the potential to become the ‘climax’ stage of EVC A309, given the correct conditions and management

4.5.3 EVC A309: Calcareous Swale 'Grassland' (CSG)

Three categories of EVC A309: Calcareous Swale 'Grassland' have been mapped:

- EVC A309: Calcareous Swale 'Grassland'- Early Succession,
- EVC A309: Calcareous Swale 'Grassland'- Climax stage, and
- Former CSG patches- mostly low-lying 'bowls' located in the Nepean Highway linear reserve that would have once contained EVC A309: Calcareous Swale 'Grassland'; but are now completely degraded/modified, dominated by weeds and often surrounded by Moonahs.
 - Also includes a large section of the Cameron's Bight campground which contains numerous Old Coast Banksias (an indicator species of EVC A309: Calcareous Swale 'Grassland'); but is very modified.

These three mapping categories recognise the stages of the EVC A309: Calcareous Swale 'Grassland' succession cycle that has been documented in the *Calcareous Swale Grassland in the Nepean Peninsula* project (Walker and Smedley, 2021).

The EVC A309: Calcareous Swale 'Grassland' succession stages recognise that due to the widespread vegetation disturbance/modification across the Nepean Peninsula since European settlement; that the open, grassy landscape that used to previously dominate the landscape has been replaced by the disturbance generated naturally colonising species Coast Tea-tree. That has been generated by late summer or autumn burning or clearing in the 1800's and early 1900's

The succession stages also recognise in many areas of the Nepean Peninsula, that the dominant Coast Tea-tree is senescing (reaching the end of its' lifecycle) and collapsing creating openings amongst bushland vegetation that given the right conditions (low weed levels, surrounding indigenous groundstorey vegetation and the presence of indicator/character species) can 'climax' into an open grassy/sedgy vegetation type that has been termed EVC A309: Calcareous Swale 'Grassland'.

Patches of Coast Tea-tree within the study area located on terra rosa soils that contain some of the indicator and character flora species that indicate the potential presence of EVC A309: Calcareous Swale 'Grassland', have been mapped as the Early Succession stage of EVC A309, as they have the potential to 'succeed' into the climax stage of EVC A309: Calcareous Swale 'Grassland'.

4.5.4 Tools to Identify Calcareous Swale "Grassland"

As part of the *Calcareous Swale Grassland in the Nepean Peninsula* project (Walker and Smedley, 2021), tools were developed that could be used to identify Calcareous Swale 'Grassland' patches. In the field, the main tools identified were:

- **Location in the landscape-** Calcareous Swale "Grassland" occurs below the 15-20m contour level
- **Soils-** Calcareous Swale "Grassland" is located on terra rosa soils in deep calcareous (alkaline) sand dunes
- **Vegetation structure-** Calcareous Swale "Grassland" has an open vegetation structure (or where this is in the process of occurring amongst collapsing Coast Tea-tree stands).

Although the data collected indicates it has a varied vegetation structure, and further work is required to succinctly define its vegetation structure.

- **Floristics**- the presence of "Indicator" species such as Coast Banksia, Poa tussocks and Bitter-bush (including Coast Tea-tree) in a patch is required, as there can be very similar adjacent EVCs/vegetation types that can only be distinguished from Calcareous Swale "Grassland" by the presence of 'Indicator' species.

As is the case with all ecological tools, these tools are a general identification tool. There are always outliers that do not fit the descriptions, and which have eventuated due to other ecological/landscape/environmental factors.

The EVC profile for EVC A309: Calcareous Swale 'Grassland' is provided in Appendix 3, which lists other tools/characteristics which can be utilised to identify patches of EVC A309: Calcareous Swale 'Grassland' (Smedley and Walker, 2021).

4.5.5 Coast Banksias and EVC A309: Calcareous Swale 'Grassland'

Coast Banksias have been recognised as an indicator species of EVC A309 and given that the study area is located on calcareous soils; the remnant Coast Banksias are indicators of current or previous patches of EVC A309: Calcareous Swale 'Grassland', or patches of EVC 160: Coastal Dune Scrub within the study area.

EVC 2: Coast Banksia Woodland is associated with deep sands, rather than calcareous soils.

As indicators of a formerly widespread and now very limited EVC within the Nepean Peninsula, all remnant Coast Banksias within the study area are considered to be a high priority for conservation and management.

5. RESULTS- (SIGNIFICANT) FLORA & ORCHID SPECIES

A flora survey was undertaken for the entire study area for Stage 1 of the project, which is presented in Appendix 1. An orchid survey was undertaken for Stage 2 of the project, the results of which are presented in a separate report.

As a component of the flora survey/s, data on significant species was also recorded. In general, planted species were not recorded unless they were deemed to be of significance due to their location or presence in the study area.

Whilst electronic data was provided as part of the 2009 dataset (SEEDs Bushland Restoration), the accompanying report did not provide much information on the data within the electronic file. Therefore the data was mostly unexplained, it was not presented in terms of management concerns/recommendations, and no legend was provided that ranked the significance of the species presented in the electronic dataset.

The 2021-22 data presents 'fresh' significant flora and orchid species data for the foreshore reserve, and new significant flora data for the linear reserve.

Refer to the separate electronic dataset for the locations of significant flora and orchid species in the study area.

5.1 Flora Survey Data

The results of the flora survey undertaken across the Foreshore and Nepean Highway linear reserves is presented in Appendices 1 and 2. The indigenous flora species are listed in Appendix 1, whilst the exotic flora species are listed in Appendix 2.

Due to plantings that have occurred along the foreshore it was not always possible to determine if some species (especially trees and/or shrubs) were remnant, or if they have been introduced/planted.

Stage 1 Results

Overall 200 plant taxa were recorded across the foreshore and Nepean Highway linear reserves. Of these species, 61 were indigenous (31%), 132 (66%) were introduced, one (1%) was a naturalised native species, and 6 were planted (or probably planted- 2%). Appendix 1 lists the indigenous (and planted) flora species; whilst Appendix 2 lists the naturalised and exotic flora species recorded within the study site.

Table 7 on the next page summarises the plant taxa recorded in the study area during the two survey stages.

Stage 2 Results

The Stage 2 winter/spring 2022 flora surveys were focused on re-surveying known orchid sites and detecting any new orchid sites. As part of the surveys, several new locations for previously recorded significant species such as Coast Twin-leaf *Roepora billardierei* and Peninsula Daisy-bush *Olearia sp 2 Morn pen*; were also mapped.

The Stage 2 surveys did not detect any new orchid species in the reserves, all orchid species recorded in 2022, had been recorded in the reserves previously.

Table 7 Summary of Plant Species Recorded

Flora Status	Stage 1 Number of Taxa	Stage 2 Number of Taxa	Comments
Indigenous vascular species	61	7	
Exotic species	132		
Naturalised native species	1		
Planted (Indigenous) Species	6		2 x species unclear if planted or indigenous
TOTAL	200	7	207 species

5.2 Significant Flora Species

A list of significant flora species recorded in the Foreshore and Nepean Highway linear reserves is provided in Table 8 below. Significant species are considered to be those listed as Federally or State threatened, plus species growing along the foreshore that are known to be of Regional and High Local significance. The ranking of Regional/Local significance flora species is based on Gidja Walkers local knowledge of remnant vegetation in the Mornington and Nepean Peninsulas.

Significant species are defined as interesting occurrences of species, or small populations of species that should be monitored and managed to encourage regeneration and/or seed collection and replanting. Significant species are not necessarily species listed as threatened under the EPBC Act or the FFG Act.

All local species growing on the foreshore are considered to be significant due to depletion of the remnant coastal vegetation along Port Phillip Bay, the on-going pressures from competing land use interests along the foreshore and on-going urban development on the opposite side of the foreshore reserve/Nepean Highway.

The location of most of the species listed in Table 8 was mapped as part of the vegetation mapping component of the project. The location of two of the FFG Act listed significant species- Wirilda Wattles *Acacia uncifolia* and Dune Wood-sorrel *Oxalis rubens*; were not mapped as they were fairly common across the study area. Both species are listed as threatened due to their restricted distribution within Victoria. In the few areas where they occur in Victoria, both species are quite common, including along the WhiteCliffs to Cameron's Bight foreshore.

Table 8 Significant Flora Species

Botanical Name	Common Name	Significance			Comments
		EPBC	FFG	Regional/ Local	
<i>Acacia paradoxa</i>	Hedge Wattle			HL	Usually more common but restricted within the reserve
<i>Acacia uncifolia</i>	Wirilda Wattle		En		Indicator for CMW and found throughout foreshore reserve
<i>Adriana quadripartita glabrous form</i>	Rare Bitter-bush		En		
<i>Adriana quadripartita pubescent form</i>	Coast Bitter-bush		En		
<i>Allocasuarina verticillata</i>	Drooping Sheoak			HL	Natural and planted
<i>Alyxia buxifolia</i>	Sea Box			R	Some quite old individuals
<i>Amyema preissii</i>	Wire-leaf Mistletoe			R	Restricted to growing on Wirilda Wattles

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Botanical Name	Common Name	Significance			Comments
		EPBC	FFG	Regional/ Local	
<i>Anthosachne scabra</i>	Common Wheat-grass			HL	
<i>Austrostipa flavescens</i>	Coast Spear-grass			R	
<i>Banksia integrifolia</i>	Coast Banksia			R	
<i>Bursaria spinosa</i>	Sweet Bursaria			HL	
<i>Caladenia latifolia</i>	Pink Fairies			R	
<i>Carex pumila</i>	Strand Sedge			R	No recent records on eastern shores of Port Phillip Bay, so a significant record
<i>Carpobrotus rossii</i>	Karkalla			R	Most populations are hybridised
<i>Comesperma volubile</i>	Love Creeper			HL	
<i>Correa alba</i>	White Correa			HL	Some potentially planted?
<i>Correa reflexa</i>	Common Correa			HL	Some potentially planted?
<i>Corybas incurvus</i>	Slaty Helmet-orchid			R	
<i>Cynoglossum australe</i>	Australian Hound's-tongue			R	Usually common but appears really restricted on foreshore
<i>Cyrtostylis robusta</i>	Large Gnat-orchid			R	Documented in 2019 SEEDS report
<i>Dianella admixta</i>	Black-anther Flax-lily			HL	
<i>Dianella sp. aff. revoluta (Coastal)</i>	Coastal Flax-lily			HL	
<i>Enchylaena tomentosa</i>	Ruby Saltbush			HL	Planted
<i>Eucalyptus viminalis subsp. pryoriana</i>	Manna Gum			HL	very few on Nepean Pen, unsure if planted
<i>Exocarpos cupressiformis</i>	Cherry Ballart			R	Common regionally but not on the alkaline soils of the Nepean Peninsula
<i>Galium sp</i>	Bedstraw			HL?	Species TBD
<i>Geranium gardneri</i>	Rough Cranesbill			R	Not previously recorded on Morn Pen
<i>Hibbertia sericea</i>	Silky Guinea-flower			HL	relatively common but very few on foreshore
<i>Kennedia prostrata</i>	Running Postman			HL	relatively common but very few on foreshore
<i>Lachnagrostis billardierei subsp. billardierei</i>	Coast Blown-grass			R	
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			R	
<i>Leucophyta brownii</i>	Cushion Bush			R	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush			HL	Some planted?
<i>Melaleuca lanceolata subsp. lanceolata</i>	Moonah			R	
<i>Microsorium pustulatum subsp. pustulatum</i>	Kangaroo Fern			????	Potentially planted
<i>Microtis parviflora</i>	Slender Onion-orchid			R	Documented in 2019 SEEDS report
<i>Muehlenbeckia adpressa</i>	Climbing Lignum			R	
<i>Olearia glutinosa</i>	Sticky Daisy-bush			R	Some planted
<i>Olearia sp 2 Morn pen</i>	Peninsula Daisy-bush		r		Planted

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Botanical Name	Common Name	Significance			Comments
		EPBC	FFG	Regional/ Local	
<i>Oxalis rubens</i>	Dune Wood-sorrel		r	R	Locally common in the study area
<i>Pimelea serpyllifolia</i> <i>subsp. serpyllifolia</i>	Thyme Rice-flower			R	
<i>Poa labillardierei</i>	Common Tussock-grass			HL	
<i>Pomaderris paniculosa</i> <i>subsp. paralia</i>	Coast Pomaderris			R	Some Planted
<i>Pteridium esculentum</i>	Bracken			HL	Very restricted on Nepean Pen to CSG patches
<i>Pterostylis cucullata</i> <i>subsp. cucullata</i>	Leafy Greenhood	VU			
<i>Pterostylis pedunculata</i>	Maroonhood Orchid			R	
<i>Pultenaea tenuifolia</i>	Slender Bush-pea			R	restricted to alkaline soils but not very common
<i>Roepera billardierei</i>	Coast Twin-leaf		r		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			HL	
<i>Sambucus gaudichaudiana</i>	White Elderberry			R	Plant at least 20 years old
<i>Senecio hispidulus</i>	Rough Fireweed			HL	
<i>Senecio odoratus</i>	Scented Groundsel			HL	Indicator for CSG
<i>Spinifex sericeus- female</i>	Hairy Spinifex			HL	
<i>Spinifex sericeus- male</i>	Hairy Spinifex			HL	
Key to Significance Columns					
EPBC Act 1999 conservation status			FFG Act status (2020 Amendment)		
EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.			Cr: Critically Endangered, En: Endangered, Vu: Vulnerable, Ra: Rare.		
R	Regional		HL	High Local	
Key to Comments Columns					
CSG	Calcareous Swale Grassland		CMW	Coastal Moonah Woodland	

6. RESULTS- WEED MAPPING

High priority for control weed species were also mapped as part of the 2021 dataset.

The previous 2009/10 electronic dataset did provide a map of weed species, but the accompanying report did not discuss the data or clearly present it in terms of priority for control weed species.

All weed species recorded in the 2021/22 vegetation mapping project have been categorised in terms of their priority for control as outlined in Section 2.1.2 and Appendix 4.

132 introduced flora species were recorded within the study area during the Stage 1 assessment.
A full list of all weed species recorded is provided in Appendix 2.

Of the 132 weed species:

- 32 species are classified as S1 species, which are generally small patches of weedy species that are a priority for immediate removal, although they can be a weed species in a fragile vegetation type (such as Sea Spurge in patches of EVC 879: Coastal Dune Grassland).
- 40 species are classified as S2 weeds which should be removed but are not as high a priority as S1 weeds.
- Two species (planted eucalypts) are classified as S3 weeds which could be removed but are a very low priority.
- Three species are Keystone weed species wherever they are located in the study area, that need a long-term management approach to manage, with the emphasis being on working from high quality (green and blue) areas outwards.
- Five species are either an S1 or Keystone species depending on where they are located and the quality of the surrounding vegetation. For example scattered Sweet Pittosporums #*Pittosporum undulatum* along the foreshore reserve are S1 weeds which are a high priority to remove. However in weed infested areas of the linear reserve, they are a Keystone species which needs a long-term management approach.
- One species is either an S2 or Keystone species depending on where it is located and the quality of the surrounding vegetation.
- The remaining 42 weed species are considered to be ubiquitous; that is they are difficult to control and are not really a priority except in the green and blue mapped areas, and often relate more to track edge management practices.

Seven of the species are still be categorised- which will be dependent on the results of the Stage 2 survey in late autumn/winter 2022. There is the likelihood that further species will be added to the weed species list from the late autumn/winter 2022 survey.

Weeds vary in their ability to invade and dominate indigenous vegetation. Some will disappear if the disturbance or threatening process is removed, or management regimes are changed. Others have been growing in the foreshore and linear reserves for a long time and will require a long-term management approach. Others are new arrivals of varying risk but are the easiest to eliminate before they spread. Considerations in undertaking weed control are:

- Whether a particular plant is actually a weed?
 - Correct identification is an essential first step.
 - If you are not sure, then don't remove it.

The second consideration is:

- How long has it been there and whether it is serving a function within the ecosystem?
- Is it providing habitat for fauna, shade for groundstorey ecosystems or erosion control on a primary dune system?

The responses to these questions may then determine the type of weed control required and may help guide weed control programs.

Appendix 4 provides an example of a weed prioritisation system that can be utilised to assist in planning and prioritising weed management programs.

6.1 Weed Mapping Data

The locations of most of the S1 and S2 weeds were mapped during the fieldwork.

Electronic maps with the locations of the weeds will be submitted as part of the project dataset.

7. MANAGEMENT OBSERVATIONS- GENERAL

In conjunction with the vegetation mapping, observations were made in the foreshore and linear reserves of vegetation management concerns and/or issues. Some of these issues/concerns have been covered previously in the 2009/10 and 2019 SEEDs Bushland Restoration reports.

These management issues/concerns are outlined in Sections 8 to 10 of this report, along with brief discussion/management recommendation provided in highlighted boxes below some topics. Section 11 of this report prioritises the management issues outlined in Section 8 to 10.

7.1 Weed Management

On-going weed management will always be required in the foreshore and linear reserves; and will require an annual budget. From an ecological perspective the priorities for weed control are:

- In the green mapped/highest quality areas
- Of the S1 weed species (green and blue mapped areas, around threatened/significant species or in specific EVCs)
- Implementing integrated weed control and habitat replacement programs for the keystone weed species (green and blue areas)
- Continuing to monitor for any new weed infestations and controlling them before they can spread (green, blue, orange and red mapped areas).

Specific weed management issues noted in the study area are outlined in Sections 7.1.1 to 7.14 below.

Recommendations

- Prepare a weed management and prioritisation plan for the foreshore reserve considering the vegetation quality categories, the presence of any significant flora species, the use of the area (ie: recreation and/or conservation) and the types of weed species present and their potential impacts on the surrounding vegetation.
- For any larger-scale weed control in the orange/red mapped areas, fauna/habitat surveys should be undertaken before any weed control is planned: to understand the diversity of fauna species that may be utilising the weedy habitat, what weedy habitat structures elements are present and being utilised, and what weedy habitat structure needs to be replaced and by what indigenous species.
- Any large-scale weed control in these areas would need to be staged and would be long-term (eg: 10-20 year, or longer, program).

7.1.1 Myrtle-leaf Milkwort (*Polygala*) Control

Myrtle-leaf Milkwort *Polygala myrtifolia* (*Polygala*) dominates several weedy sections of both sections of the study area. Two issues were noted in the study area with regards to *Polygala* control:

Managing an Allelopathic Weed

Polygala leaves are allelopathic- that is they release a toxic substance from their roots, or during the decomposition of their plant matter, which can kill moss beds, and reduce their ability to resist weed re-invasion. This is a concern, as moss beds are nurseries for plants such as orchids.

As an allelopathic plant, it is best to pull smaller plants out by the roots, or cut larger plants below first side branches, and hang them from trees to let them dry out and die. Chipping the plant matter and leaving it in-situ, releases the allelopathic substances which can cause barren areas amongst indigenous vegetation, including on moss beds.

If possible, removing controlled Polygala plant matter is preferable to leaving the plants hung up to dry, it all depends on access and the amount of Polygala removed. Any weedy plant matter needs to be disposed of appropriately outside of the study area.

Polygala Removal in Different Sections of the Study Area

Whilst Polygala is a woody weed, in some situations removing it can cause greater biodiversity losses that retaining and managing it.

As a smaller woody weed, Polygala has less surface area/canopy cover than many other woody weeds. Therefore indigenous groundstorey species (that require some shade) can live and thrive under areas dominated with Polygala, as Polygala provides the micro-climate needed for these indigenous groundstorey species. In some circumstances, Polygala removal can kill the indigenous groundstorey vegetation growing beneath it, if there is little other shade available.

Polygala removal is an example of a woody weed species that requires site by site management decisions based on the light/shade requirements of any groundstorey species present, and the amount of other shade provided by adjacent indigenous trees and shrubs.

7.1.2 Sea Spurge along the Foreshore

A scattered infestation of Sea Spurge *Euphorbia paralias* was recorded in one section of the foreshore reserve from the Tyrone boat ramp to Canterbury Jetty Road. Sea Spurge can easily spread and dominate an area and degrade remnants of EVC 879: Coastal Dune Grassland.

All Sea Spurge should hand-pulled using gloves as the sap is caustic, All controlled (flowering/seeding) Sea Spurge should be removed from the foreshore, due to the amounts of seed which can germinate from plants that have been pulled and left in-situ.

Gazania *Gazania spp.* patches were also observed in this area, that are also a priority for control.

7.1.3 Managing Italian Buckthorn

Whilst Italian Buckthorns *Rhamnus alaternus* were not a main woody weed in the study area, they did still dominate some areas, and are known to spread rapidly via Blackbirds which also spread many other berry producing weeds. In these areas, potentially control could be two staged:

- 1) Firstly focusing on removal of the mature female plants first (via cut and paint or frill and fill with dilute glyphosate being careful to leave gaps between the cuts and spiral them up the trunk to avoid basal resprouting, and
- 2) Secondly targeting the male plants.

Any staging of weed control works would be dependent on the surrounding bushland and ease of access into the base of the plants, and it should be timed for flowering or pre-seed set

7.1.4 Olives Trees along the Foreshore

In areas along the foreshore young Olive tree saplings *Olea europaea* were observed growing under the power lines, where seeds had been deposited from perching birds. Any Olive tree is an S1 weed species within the study area, as Olive trees are potentially a massive future woody weed issue for large parts of Victoria.

Olive trees are a major woody weed species in the Adelaide Hills (South Australia) where they have spread from Olive groves and have colonised large areas and displaced indigenous species, as they are well-suited to hot and dry landscapes. Olives are an emerging woody weed problem in Victoria, due to the large numbers of Olive plantations that have been planted in the past decade/s. They also increase fire risk with their oily leaves

The foreshore committee should prioritise the removal of any Olive Trees, as they become as emerging management issue in bushland across the Mornington Peninsula.

7.2 Tree Lopping/Pruning/Vandalism for Views

Whilst the majority of tree/vegetation pruning was actually noted in front of private properties along the higher sections on the linear reserve, there was also some vegetation pruning along the foreshore which corresponded with the pruning in the linear reserve.



Vegetation pruned for views- looking west from 2651 Point Nepean Road



Pruning for views with large Drooping Sheoak in-situ (in front of 2747 Point Nepean Road)



Vegetation pruned for views under and around the large Drooping Sheoak



Foreshore pruning that corresponds with linear reserve pruning (& the same large Drooping Sheoak)

This is an on-going issue along coastal areas where residents value water views over biodiversity.

Recommendations

- Liaise with the local Council regarding developing an appropriate policy response for tree vandalism
- Responses could include installing large signs in the areas where trees have been vandalised or undertaking an integrated planting response of suitable local prickly shrub and overstorey species so that future tree vandalism would be more difficult.

7.3 Orchid Patches and Data Management

There are numerous orchid patches along the foreshore and linear reserves. All orchids are at least of High Local significance. These patches have been mapped several times over the years and there is a good database on their locations and the orchid species present in each patch.

Some recommendations for managing these (and other significant species) are outlined below:

7.3.1 Mapping and Monitoring Orchid Patches

Whilst there is an existing comprehensive database of the location of all known orchid patches within the study area, this needs to be complemented with effective and simple monitoring protocols. Mapping the location of threatened species is the first step in conserving and managing them. Other steps should include: monitoring and strategic/delicate weed control/bushland management as required. Planting is not recommended near orchid patches, as tubestock with its' foreign soils can be problematic for naturally occurring orchids.

Monitoring could focus on tracking the numbers of orchids that emerge and flower annually, the presence of pollinators or natural capsule formation, the extent/cover of nearby indigenous flora/vegetation/moss layers, weather/seasonal variations, management threats and on-going management works (if any) under in/around the orchid patches, and their effectiveness. This would provide the Foreshore Committee with data on the increase/decline in orchids species within the study area and could also be provided to other management committees to increase general knowledge of orchid management in coastal environments.

Monitoring should be a simple task, that is easy to repeat. The key to successful monitoring is the capture, storage and re-use of data. The use of a simple GPS enabled mapping program is recommended to capture data across the study area, where the rangers/bushland contractors can capture data on their phones and the data is then available instantly in the office.

Simple spreadsheets and biodiversity data storage/management systems are needed that:

- Follow an accepted protocol/system
- Are easy to use and access, and
- Are easy to maintain and not easy to delete/alter.

Whilst the priority is always on undertaking on-ground management works for biodiversity protection; some data management, storage and retrieval systems are vital to guide on-ground management works. Data management is also vital to support grant applications and to disseminate useful bushland management information to other foreshore committees/bushland

managers. To this end, there needs to be simple and effective systems for gathering, storing and then utilising management data.

7.3.2 Marking of Orchid Patches along the Walking Trail

For management purposes, it would assist volunteers and bushland workers/contractors if the location of significant vegetation areas/species/patches (eg: orchid species) was discretely defined on the ground, as locating these areas is difficult just with maps and/or GPS references.

Painting a simple yellow line with a number to indicate the length of the patch along the management track, or on a roadside kerb; would be a good visual reminder that you are working near/in a patch. Especially as orchids are not visible for most of the year.

7.3.3 Orchid Patches and Galvanised Wire

It has recently been documented that the moss layers surrounding caged and protected orchid colonies disappears under galvanised wire fencing, with the zinc used in galvanising causing the moss layer to die. Moss layers are critical nursery habitat for many orchids, and other newly germinating species.

If cages are utilised around orchids in the study area, there should be a shift away from utilising galvanised wire as new cages are acquired/old cages are replaced.

Recommendations

- Install discrete markers (ie: yellow lines or similar) along walking tracks, or on other nearby permanent infrastructure, to define the location of significant flora species/patches so bushland managers/workers are aware of the 'sensitivity' of these areas, especially when species are not evident (ie: summer when orchid species are dormant).
- Any future orchid cages (if utilised) should be constructed of blue steel wire, which does not have a zinc coating. It will last longer and have less impact on the surrounding vegetation.
- Consider taller cages (if utilised) that are open at the top to allow for litter fall rather than a build-up of litter on the top of the cage.

7.4 Large Tree Management and Inventory

There is an existing database (SEEDs Bushland Restoration 2009/10, 2019) of the location of many of the large/old trees along the foreshore reserve, which has been added to through this project. This project has also collated data on the large/old remnant trees in the linear reserve.

Aside from the Moonahs, the other mapped large/old trees species (Coast Banksias *Banksia integrifolia*, Drooping Sheoaks, Sweet Bursaria's and Cherry Ballarts) are indicators of the open, grassy landscape and dominant EVCs/vegetation types that dominated the Nepean Peninsula prior to European settlement of the area.

Large old trees have many values: as landscape features, the provision of shade and shelter, and they usually provide greater fauna foraging resources with more reliable flowering than smaller trees.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Whilst it is a great that there is a database of the location of large/old trees across the study area, there is little point if this information is not utilised. Without tracking these trees, it is difficult to know if the population of large trees in the reserves is stable or declining. Several threats were noted to these trees (some of which are discussed) including: excessive pruning under power lines, exposure to wind and other climatic impacts, and mowing impacts to their roots.



Large Drooping Sheoak (linear reserve)



Large Sweet Bursaria (linear reserve)



Large old Moonahs (foreshore reserve)



Grove of large old Coast Banksias (linear reserve)

It is also unclear if the existing large tree database has been utilised to guide infrastructure placement, as a walking track has been placed through the middle of an ancient grove of Moonah's in the foreshore reserve just to the east of Blairgowrie.

Considering this, preparing a Management Plan to conserve and manage these remnants, so they remain into the future, is recommended. Any *Large Tree Management Plan* should involve monitoring on an individual tree's health, plus any issues, management observations, etc. If further large/old remnant trees are observed that have not already been mapped, the locations of them should be noted and added to the mapping database.

The Foreshore Committee does have an annual arborist audit undertaken in the high-use public areas of the reserve (ie: camping grounds) which does collect tree health data.

The Large Tree map is provided as part of the electronic project dataset.

Recommendations

- Prepare a *Large/Old Remnant Tree Management Plan* that captures data on each individual tree, including:
 - Health (utilising tree canopy health parameters in habitat hectare assessments)
 - Diameter at breast height
 - Photographs, etc
 - Management issues/threats; and provide a five-year management program.
- This information can be utilised to track and manage large tree health. The data can also be used to negotiate management practices with other authorities that impact tree health and potentially leading to their decline (ie: tree pruning under the power lines).
- Utilise the *Large/Old Remnant Tree Management Plan* to guide future infrastructure development/placement in the study area.

7.5 Pressure along the Foreshore and Vegetation Management

The use and therefore management pressures on the foreshore reserve are changing. Historically Rye/Blairstown was a holiday destination. However, with the increased freeway access, these beaches are now becoming a day trip destination. Resulting in increased numbers of visitors and increases in pressure on facilities and resources (ie: amenities, car parking, rubbish removal), plus secondary pressures such as creating tracks through the vegetation, etc.

All these pressures are difficult to manage along a narrow linear strip that protects the fragile coastal environment.

Management techniques such as the installation of fencing, blocking off access tracks and planting along blocked tracks have proved to be effective strategies for managing impacts on vegetation, while also improving and increasing vegetation cover.

It is apparent that undertaking these works will be an on-going process. When available, funds should be diverted to fencing off strategic or high-use vegetation areas, as fencing has shown to be a very effective strategy for preventing trampling, blocking off 'goat tracks' and increasing vegetation cover. Care does need to be taken, as some indigenous flora species (eg: Bower Spinach) grows over fencing, making maintenance difficult in the longer term.

Recommendations

- Continue to utilise strategic fencing to define patches/blocks of vegetation, and to encourage natural bushland regeneration or to undertake supplementary planting/revegetation within areas
- Fencing can also be utilised for the vegetation behind boat sheds- fencing of larger blocks of vegetation has been done successfully at Capel Sound foreshore
- Investigate fencing materials that are more weather resistant and less likely to require maintenance- issue with Bower Spinach/indigenous vegetation growing over fencing and longer-term maintenance
- Utilise cut woody material from along the foreshore to continue to block off 'goat tracks'.

7.6 Fauna and (Weedy) Habitat

Several habitat features (tree hollows and Swamp Rat *Rattus lutreolus* habitat) were noted during the site assessments. While this is not a fauna and habitat report, there is a critical relationship between flora/vegetation and fauna and their habitat. The management of fauna habitat needs to be factored into all vegetation management works, including weed control works.

Swamp Rats are mostly utilising weedy areas which are likely covered in the weedy Pale Wood-sorrel *Oxalis incarnata* or Soursob *Oxalis pes-caprae* in the winter months, creating a dilemma between controlling weeds and potentially decreasing or losing Swamp Rat habitat/populations.

This example of the Swamp Rats highlights one of the conflicting issues in bushland management, indigenous fauna frequently utilises weeds and the structure provided by weedy vegetation as habitat- as long as the habitat niche they require is available, most fauna species will reside within and/or utilise an area regardless of whether it is dominated by bushland or weedy/exotic vegetation. Most fauna species do not differentiate between indigenous and weedy vegetation, it is humans that create the sharp divide.



Swamp Rat habitat in weedy grasses along the foreshore reserve



Dense weedy vegetation in the linear reserve that could provide good fauna habitat

Recommendations

- Management of fauna and fauna habitat should be integrated into bushland management works
- A fauna survey of species present and suitable habitat patches should be undertaken across the study area to obtain data on fauna management.
- A mapping project undertaken in the late 1990s prepared a Fauna Atlas for the Mornington Peninsula Shire Council. MPSC could be contacted for information regarding the foreshore and surrounding area as an interim fauna management/awareness measure
- Patches of fauna habitat should be mapped, and management decisions then made about whether to purposefully maintain weedy areas as habitat- if so, then buffers to control the spread of weeds need to be implemented and maintained.
- Swamp Rat habitat should be mapped and protected with logs/bollards.

7.7 Feral/Pest Animals- Rats/Mice

While managing the impacts of feral/pest animals is difficult, especially in a long linear reserve, their impacts need to be considered.

The impacts from one group of pest animals are often less considered than others- rats and mice. Rats are known to predate on other fauna (baby birds, skinks, small lizards and potentially amphibians), plus they eat seedlings. They generally have more impacts than are often factored into bushland management. It is likely that in areas with more humans (and hence rubbish) there is likely to be a higher rat/mouse population.

There is some data on Council programs to control rats/mice in other areas of the Mornington Peninsula shire (Mothers Beach). An issue arising from the Mothers Beach baiting program was the need to target exotic rats/mice, not indigenous species (ie: Swamp Rats).

While it is not known if they are a management issue along the foreshore, they will be present; and their potential impacts should be considered. It is also likely they are also spreading seed along the foreshore- which could be good for indigenous species, but problematic for weed species.

7.8 Photo Points/Monitoring

To capture data on the management of certain areas in the foreshore and linear reserves the introduction of basic monitoring is recommended via the use of photo points and potentially collecting basic cover/abundance data at the photo points. Ideally data should be collected seasonally, or at least annually in the same season/month. To ensure consistent data capture a capped star picket should be installed in the corner of each photo point and the same camera utilised to capture the photo point, which should also be taken at the same repeatable height (at the top of the star picket) and angle.

Cover/Abundance Data

To collect basic cover/abundance data, 10m x 10m or 20m x 20m quadrats need to be established at the photopoints, with the capped star picket forming one corner of the quadrat. The quadrat needs to be measured out with a tape measure and photos collected at each of its four corners. Cover abundance data should be collected on all groundstorey (below knee height) flora species present (indigenous and exotic), and the extent of bare ground, leaf litter, logs, bryophytes/lichen, etc. Groundstorey plants includes young/germinating woody species.

The cover/abundance scales are based upon modified Braun-Blanquet scales, as outlined below.

Cover Value	Cover of Foliage/Branch	Number of Individuals
+	<5%	<10 individuals
1	<5%	Many individuals
2	5 - 25%	Any number
3	25 - 50%	Any number
4	50 - 75%	Any number
5	75- 100%	Any number

If large logs or log piles are present in any quadrats, these should be noted as a component of the data collection.

Cover/abundance data is collected to gather data on changes in vegetation composition (predominantly plant diversity and indigenous versus exotic species cover) over time resulting from revegetation and bushland management works. It is simple data to collect that can be used to justify grant and other external funding applications. It is easier to justify the effectiveness of on-going bushland/vegetation management works if there is monitoring data to back up the results of the works.

Photopoints

Photopoints should be utilised for areas that contain threatened species, are in very good, good, moderate and/or poor condition, are the focus of restoration/revegetation programs, or are considered a priority to manage. Capped star pickets should be located in areas that are not clearly visible to reduce the likelihood of them being removed. All star picket locations should be GPSed and mapped.

Potential areas to monitor could include:

- All the mapped patches of EVC 879: Coastal Dune Grassland
- All the mapped patches of EVC A309: Calcareous Swale 'Grassland'
- The three known Cherry Ballarts *Exocarpos cupressiformis*
- Areas with old Moonahs, or other large/old remnant trees eg: Drooping Sheoaks *Allocasuarina verticillata* or Sweet Bursaria *Bursaria spinosa*.
- Around orchid populations, or
- Areas with on-going or proposed bushland restoration/management works.

Recommendations

- Utilise the vegetation quality mapping to determine appropriate areas to undertake vegetation monitoring.
- Install a capped star picket at one corner of the monitoring plot and utilise the star picket as the photo point and to delineate a corner of any monitoring plots.

7.9 Infrastructure Impacts

Infrastructure in the form of numerous bus stops has been built adjacent to the study area as part of the bus route along the Nepean Highway. Some of the major bus stops have shelters and have resulted in vegetation removal/loss, whilst the minor bus stops are marked on the Nepean Highway. Power poles occur along the northern edge of the Nepean Highway, which is the southern edge of the foreshore reserve.

Impacts from this infrastructure were noted for the length the study area as discussed below:

Infrastructure Impacts- Foreshore Reserve

Impacts (cut, damaged and/or removed vegetation) were observed around road signs and the bus stops along the foreshore reserve. Most of the impacts were noted along the Point Nepean Roadside of the reserve. While it is other authorities causing these impacts to maintain their infrastructure, they are causing impacts to assets within the reserve.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

While this is always going to be an issue in a narrow linear reserve located next to a major road, a value needs to be placed on vegetation, so that Committees who manage vegetation have negotiating power with other authorities so the impacts can be minimised and works undertaken in a more sensitive manner.

Power-line Maintenance- Foreshore Reserve

Maintenance of the power lines along the Nepean Highway is having an impact on the trees/shrubs that are growing under the power lines. The tops of them are being chopped off, and the pruning is not undertaken in a sensitive manner. While this is being undertaken by the power authority, it is impacting on vegetation and larger trees/s assets in the foreshore reserve.

Considering that the foreshore committee has an annual weed control and bushland management budget, the value of the bushland assets being maintained by the committee needs to be considered by other authorities undertaking works that have impacts within the reserve.

There were also vegetation pruning issues around boat sheds that have power connected.



Pruned trees under power connection to a boat shed



Power line pruning impacts



Power line pruning impacts



Power line pruning impacts

It is unclear what negotiating ability the Committee would have (if any) with regard to the pruning works; but establishing a Large Tree Inventory would provide data on the number of large trees being impacted, which could be evaluated against the number of trees within the reserves to quantify the extent and significance of the impacts. This type of data can be utilised to potentially negotiate for more sensitive pruning or monetary compensation for vegetation impacts.

Recommendations

- Establish the Large Tree Inventory for use as a potential negotiating tool with the power (and other) authorities
- Consider discussing (with the power authority) how to manage the pruned material- can it be used by the Foreshore Committee, or should it all be removed by the power authorities?
- Methods for valuing bushland vegetation assets (in the eyes of external authorities such as power companies) need to be established, in conjunction with other bushland management committees.

7.10 Management of EVC A309: 'Calcareous' Swale Grassland Patches

Approximately eight patches of the recently described EVC A 309: Calcareous Swale 'Grassland' were recorded in both the foreshore and linear reserves.

Whilst a separate management plan should be prepared to manage the patches of this 'newly recorded EVC, there are some basic management considerations with regards to these patches:

- They can contain a variety of vegetation structures, depending on the whether any Coast Tea-trees within the patch are still young or whether they are senescing and collapsing.
- No trees/shrubs should be planted in these patches, or within a 2-5m wide buffer around these patches- they are a naturally open vegetation type
- As a recently described EVC, information is still being investigated/considered regarding the structure and other features of the EVC, therefore there is little to no management information publicly available for Calcareous Swale 'Grassland' patches
- No planting in general should occur in these patches, until more management and other information is available on them
- The EVC still needs to be reviewed and 'accepted' by the Department of Environment, Land, Water and Planning (DEWLP).
- Other issues to consider include: how to manage different types of weeds within the context of a grassy EVC type, what indigenous plants should be encouraged to spread via bush regeneration methods, and what should/should not be planted within and near Calcareous Swale 'Grassland' patches.

The mapped patches also contain a diversity of weed species which present some complexities with regards to weed control and maintenance of the existing open vegetation structure.

The issue of Coast Tea-tree collapse/decline in the Nepean Peninsula is also strongly correlated with Calcareous Swale 'Grassland' management and needs to be considered.

Recommendations

- Prepare a *Management Plan for the Calcareous Swale 'Grassland' patches* recorded in the study area, that provides general management directions, but also specifically documents: the flora species (indigenous and exotic), percentage cover for each species, type of vegetation structure, and management threats for each patch.

- Any Management Plan should provide both general and specific management actions for each identified patch.

7.11 Infrastructure Siting and Vegetation Impacts

All future infrastructure development and siting (undertaken by the foreshore committee and external agencies) should consider the vegetation quality in the proposed area and the direct and indirect impacts of siting infrastructure in an area.

Infrastructure decision making needs to consider the direct and indirect impacts to native vegetation (and habitat) associated with the decision. The location of a walking track through the middle of a grove of ancient Moonah trees is an example of previous decision made in the absence of native vegetation considerations.

If there are vegetation loss/impacts associated with the installation of any infrastructure, then it needs to be assessed against Clause 52.17 in the MPSC Planning Scheme; as all native vegetation removal requires a planning permit. An ecological assessment will need to be undertaken, planning permit application made and offsets paid if the native vegetation removal is approved by Council/DELWP.



Vegetation and woody weed removal for power pole installataion - corner of St Johns Wood Road



Walking track through a grove of ancient Moonahs (or potentially one mutli-stemmed Moonah)- Near Revell Street

As the Foreshore Committee has invested in indigenous vegetation cover mapping, it should be readily available in printed format in the depot offices (along with information on large old trees, significant flora species and weeds, etc) and it should be used on a regular basis as part of all decision-making process.

Recommendations

- Print out large (A3 plus) copies of the vegetation maps produced for this project and place them in the depot/office.
- Incorporate the use of the maps and the indigenous vegetation information they provide into all future decision making within the study area.

7.12 Over-arching Mornington Peninsula Foreshore Committee

This is the fourth vegetation mapping project that has been undertaken in the last five or so years along sections of the Mornington Peninsula foreshore by Gidja Walker and Katherine Smedley. The four projects have been at:

- The Balcombe Estuaries, Mount Martha (2020)
- The Dromana foreshore (2021)
- The Capel Sound foreshore (2018), and most recently
- The WhiteCliffs to Cameron's Bight foreshore (2022).

Whilst each of these foreshore areas has distinct features and biodiversity values, some coastal vegetation and foreshore management generalities have been noted across all four areas.

If there is not an existing larger 'umbrella' organisation/group for the foreshore committees that occur along the back and front beaches of the Mornington Peninsula, then establishing such a group to discuss management ideas and issues would be a useful forum for disseminating and sharing coastal management issues.

Recommendations

- If not already existing, consider establishing a larger 'umbrella' organisation/group for all the Mornington Peninsula foreshore management committees.

7.13 Training Sessions

To facilitate the use and development of the vegetation data provided in this report, a couple of workshops on suitable methods of weed control and the use of the vegetation maps and overlays is recommended for the Foreshore Committee, in-house and/or contracted bushland managers and volunteers.

Recommendations

- Investigate running 1-2 workshops to cover the purpose and data contained within this report so that it can be utilised as a 'living' document/mapping layer that can be added to over time
- Undertake 1-2 weed removal techniques workshops, which also introduce the vegetation mapping and the areas of higher versus lower vegetation quality, for weed/bushland managers/contractors employed to undertake work within the foreshore reserve.

8. MANAGEMENT OBSERVATIONS- FORESHORE RESERVE

The following management observations relate to the foreshore section of the study area.

8.1 WhiteCliffs Campground Management Issues

Some of the management issues observed at the WhiteCliffs campground are management issues that also apply across the study area- such as weed management and vegetation impacts caused by access tracks to the beach. The following are specific issues noticed in and around the WhiteCliffs campground:

8.1.1 Exotic Shade Trees in the Campground

There are several exotic trees species in the campground that provide shade between camp sites. The main issue is that some of these trees are highly invasive species (eg: Desert Ash **Fraxinus angustifolia*).

Over time a staged tree replacement program is required that eliminates invasive trees species from the campground in favour of suitable indigenous tree species (eg: Drooping Sheoak or Coast Banksia) or non-invasive exotic species.



Exotic Desert Ash shade trees - WhiteCliffs Camp Ground



Indigenous Drooping Sheoak shade trees- WhiteCliffs Camp Ground

8.1.2 Change from Wallaby Grass to Kikuyu in the Camp Sites

Previously most of the camp sites had a cover of indigenous Wallaby Grasses *Rytidosperma spp.*, which are hard wearing tussock grasses that require no watering over summer.

At some stage, the exotic Kikuyu grass **Cenchrus clandestinum* was planted/encouraged to replace the Wallaby Grass. Kikuyu is an invasive species, and the use of it in the camp sites has resulted in spraying around the edges of the camp sites to prevent the Kikuyu 'escaping' the sites and growing in the adjacent vegetation.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Along with regular mowing, herbicide spraying is also required to maintain the camp sites and surrounding indigenous vegetation. Spraying can result in off-target plant damage (from spray drift), and once Kikuyu invades indigenous groundstorey vegetation it needs to be hand-weeded, as it intertwines with indigenous grasses and cannot easily be removed.



Sprayed edge between camp site & adjacent vegetation- WhiteCliffs Camp Ground



Kikuyu invading adjacent indigenous vegetation- WhiteCliffs Camp Ground

8.1.3 Sites 42 and 43

The two western most camp sites can only be accessed through a narrow track between groups of trees/vegetation on either side of the track. Damage was observed to the trees on both sides of the track due to caravans using the site and the narrow access available.



Narrow access to sites 42 & 43- WhiteCliffs Camp Ground



Bollards protecting vegetation in the campground - WhiteCliffs Camp Ground

Vegetation damage was also noted in several other sites, mostly from caravans. Vegetation damage was also caused by the pruning required to provide access into some of the camp sites.



Caravan trying to access sites 42/43- with the vehicle hitting the vegetation opposite the site (WhiteCliffs Camp Ground)



Pruned and damaged vegetation on the side of the narrow access point- WhiteCliffs Camp Ground

Recommendations

- Install bollards to protect vegetation around camp sites
- Consider making sites 42 & 43 (tent) camping only to eliminate caravans having to negotiate the narrow access point to these two sites or impose a size limit on caravans that can utilise the sites.
- Re-consider the use of Kikuyu as the grass species for camping sites and investigate the use of indigenous alternatives such as re-instating local Wallaby Grass species and Kidney Weed *Dichondra repens*.
- Slowly replace exotic shade trees in the campground (as they fail) with suitable shady indigenous species

8.2 Beach/Sand Grooming

Beach/sand grooming is undertaken by the Council during the summer months to remove rubbish and needles from the beach. Whilst not a foreshore committee practice, the works are having impacts on the foreshore vegetation, especially to vegetation growing along the beach- and to EVC 879: Coastal Dune Grassland.

The beach grooming impacts/damages/removes coastal vegetation, reduces biota in the sand and cuts into the vegetation/sand creating ledges.

Beach grooming is occurring adjacent to patches of EVC 879: Coastal Dune Grassland/Spinifex, which is a an EVC with limited distribution along the Mornington Peninsula, and that is mostly highly weed invaded (by the exotic Marram and/or Sea Wheat *Thinopyrum junceiforme* Grasses).

Investigations of how to protect patches of EVC 879: Coastal Dune Grassland in areas of beach grooming need to be investigated and discussed with Council.



Beach grooming



Straight edges and ledge created by beach grooming

Beach grooming did not occur in the northern areas of the study Area (beyond Tyrone Beach carpark) due to storm water drains, lack of access for the machinery and the groynes. It was noticed that the dune vegetation grew quite close to the edge of the water in areas beyond where the beach grooming occurred.

Recommendations

- Investigate methods for 'protecting' patches of EVC 879: Coastal Dune Grassland in the areas where beach grooming occurs
- Liaise with Council about the protection measures, and the beach groomers avoiding the protection measures or certain areas/vegetation patches along the foreshore.

8.3 EVC 879: Coastal Dune Grassland (Spinifex versus Marram Grass)

The primary dune facing the Bay along the length of the foreshore, consists of areas of exotic dune grassland, dominated by the invasive Marram Grass **Calamagrostis arenaria* and Sea Wheat-grass; and areas of indigenous dune grassland dominated by the indigenous (Hairy) Spinifex Grass *Spinifex sericeus*. Areas of indigenous dune grassland are mapped as EVC 879: Coastal Dune Grassland

Whilst the exotic Marram Grass and Sea Wheat-grass stabilise dunes and provides some habitat, they displace indigenous dune grassland species. Large extents of Marram Grass and Sea Wheat-grass are a major problem with conserving and managing indigenous dune grassland along foreshores, and if the balance of dune grasslands shifts from the indigenous Spinifex Grass to the exotic grasses it is an almost impossible management task to restore the balance, without ongoing large amounts of funding, and having to also address other coastal management issues such as erosion during storm events.

In comparison with other foreshore areas along the Mornington Peninsula (the Dromana and Capel Sound foreshores), the WhiteCliffs to Cameron's Bight foreshore has extensive areas of indigenous dune grassland, with approximately one quarter to a third of the dune grassland present being dominated by the indigenous Spinifex Grass. Only one small patch of Spinifex Grass/indigenous dune grassland exists along the Capel Sound foreshore (mapped in 2017), whilst no patches were recorded along the Dromana foreshore (mapped in 2020).

Considering this, the presence of indigenous Dune Grassland is significant within the study area, and all indigenous dune grassland patches should be a priority for management to control and eliminate Marram Grass and Sea Wheat-grass in the patches, and to establish buffer areas adjacent to the patches, where the spread of Marram Grass and Sea Wheat-grass is also controlled and then eliminated.

History of Marram Grass and Sea Wheat-grass in Victoria

Marram Grass was introduced at Port Fairy in 1883, to stabilise the dunes that were moving inland. Since then, it has been planted from translocated stolons along much of the Victorian coastline to stabilise the dunes. Sea Wheat-grass was first recorded in Australia in the 1920s where it was presumed to have come from Ballast and became widely planted or accidentally spread along the coast. Both grasses now dominate large areas of Victoria's coastline. The introduction of these grasses has slowly displaced indigenous dune grassland species; and has resulted in changes to dune formation by creating a steep dune profile in the case of Marram or a fine even lawn in the case of the Sea Wheat-grass, rather than the more variable gently undulating foredune environment created by indigenous species.

As with most plant introductions, the negative effects of the introduction were not immediately apparent, and current foreshore managers are now left with the problem of how to manage such widespread plants, located in such a sensitive environment.

Management of Marram Grass and Sea Wheat-grass

Although Marram Grass and Sea Wheat-grass dominate many areas of the foreshore reserve, to remove them would leave the foredune open to erosion particularly during/after storm surge events. Due to its structure, people using the beach tend to avoid it, which does provide an opportunity for other primary coloniser and secondary coloniser species to regenerate amongst it.

One way to manage areas of exotic dune grassland that only contain the exotic Marram Grass or Sea Wheat-grass, is via the "nursery" approach, where sticks of seed laden Coast Tea Tree and Coast Wattle are placed over the infestation, which with time will result in natural regeneration (the timing of any track pruning works to coincide with this activity would be a good approach). Once these species have started to establish, direct seeding of Coast Banksia is possible, and the Marram Grass will slowly be shaded out overtime. Other succulent species such as Seaberry Saltbush and Bower Spinach will also recolonise. This process has been observed to happen naturally in other areas, such as Seaford foreshore (pers obs G Walker).

In areas dominated by the indigenous Spinifex Grass, the shading method will not work, as shading would also impact the growth of the Spinifex. In these areas, the exotic Marram Grass needs to be eliminated via weeding/seed head pruning to outcompete the Marram Grass cover over time. Other indigenous EVC 879: Coastal Dune Grassland species such as Knobby Club Rush, Salt Grass and Karkalla could also be planted to outcompete the Marram Grass.

Recommendations

- Manage all mapped patches of EVC 879: Coastal Dune Grassland/Spinifex to control Marram Grass and Sea Wheat-grass in/around the patches and encourage the spread of Spinifex
- Number and monitor each Coastal Dune Grassland patch, take monitoring photos from specified points (photopoints) in one to several areas in each patch at least once a year, and collect flora species cover/abundance data for all indigenous/exotic species and the extent of bare sand, etc within each patch annually

- This will provide baseline data to monitor whether patches are increasing/decreasing in area and quality, and it will also provide data on the effectiveness of any management works
- Consider a 'Marram Grass replacement' program in several areas of the foreshore by utilising the 'nursery' method outlined above, by planting small clumps of Spinifex; and then manage these planted areas to increase the extent of Spinifex, and slowly reduce the Marram Sea Wheat-grass cover
 - Either method would have to be monitored to determine whether the programs are successful in reducing Marram Grass and Sea Wheat-grass, and increasing indigenous species, cover
 - For any replacement works, keep records of the species utilised and numbers installed, to determine if some species are more successful at colonising than others.
 - Undertaking either method will likely be a long-term management project.

8.4 Management of EVC 879: Coastal Dune Grassland Patches

As already outlined, patches of EVC 879: Coastal Dune Grassland within the study area are a high priority for management due to their scarceness along the bayside of the Mornington Peninsula.

The patches require a separate management plan that considers how to best manage the patches in the context of issues such as:

- Managing boat storage
- Controlling the spread of Marram Grass
- Managing access tracks through the patches
- Beach/sand grooming near the patches
- Potential enrichment planting, and with what species
- Managing the Strand Sedge **Carex pumilio* patch of EVC 879
- How to manage a vegetation patch along a beach front that is susceptible to tidal movements and surges during storm events, etc.

The plan should also consider the longer-term management of Marram Grass/Sea Wheat-grass dominated patches and how to restore them to indigenous vegetation types.

Recommendations

- Prepare a *Coastal Dune Grassland Management Plan*.

8.5 Information Brochure for Boat Shed Owners

During the fieldwork, a variety of vegetation management treatments around the boat sheds were noted. Some owners did not appear to 'touch' the surrounding vegetation, whilst other owners were actively spraying and killing the vegetation surrounding their sheds.



Boat sheds with high cover of surrounding indigenous vegetation



Boat shed with no surrounding indigenous groundstorey vegetation cover

It appeared that generally the higher the level of owner intervention towards the vegetation surrounding the boat sheds, the higher the level of weed invasion, the lower the surrounding mapped vegetation quality, and the greater the risk of foredune erosion during storm surge events. This issue occurs around all boat sheds along the Mornington Peninsula, it is not specific to the WhiteCliffs to Cameron's Bight foreshore.

Recommendations

- Liaise with Council and the Boat Shed Owners Association regarding the development of a vegetation management policy surrounding the boat sheds
- Produce a brief brochure that clearly describes and demonstrates appropriate vegetation management; with visual imagery to clearly depict 'good' versus 'bad' vegetation management practices surrounding the boat sheds.

8.6 Fencing of Remnant Areas

During the fieldwork, it was noted that the remnant vegetation was of higher quality between the camping areas and beach where it was fenced off and access points were defined.

The one issue with fencing is that it makes it more difficult for ground dwelling fauna to access the vegetation. Therefore there needs to be a balance between fencing and ground dwelling fauna management; which is why this management technique is only recommended for high use areas, until there is information available on the impacts of coastal vegetation fencing on fauna.

Recommendations

- Continue fencing of remnant patches (prioritising green and blue mapped areas) located within the camping areas, and between the camping areas and the beach.
- Once these are all fenced, consider continuing fencing of remnants in all high use areas of

the foreshore (ie: near toilet blocks, car parks, boat ramps, etc).

- Undertake research into the impacts of coastal vegetation fencing on ground-dwelling fauna.

8.7 Hybridisation of indigenous *Carpobrotus*

The indigenous *Carpobrotus* species is Karkallo *Carpobrotus rossii*. There are two exotic forms which are common along coastal areas in the Mornington Peninsula:

- Hottentot Fig *Carpobrotus edulis*, and
- Angled Pigface *Carpobrotus aequilaterus*

These two exotic species started as nursery plants that were planted in coastal gardens (as the indigenous species), and as they were also then mistakenly planted along foreshores.

Both species have cross pollinated with the indigenous species, and now the hybridised species is more common than the indigenous species- which is becoming rare along many foreshores.

There is a need to remove all the exotic and hybrid species along affected foreshores before the indigenous species becomes locally extinct.

Capel Foreshore is in the process of mapping all their *Carpobrotus* patches, and then removing the weedy/hybrid species. In conjunction with the removal works, they are also taking divisions off the indigenous plants and planting the divisions in the areas where they are removing exotic/hybrid plants. In doing this, they are slowly shifting the balance from weedy/hybrid *Carpobrotus* species to indigenous species. They are also creating a source of the indigenous species that can then be utilised in adjacent foreshore reserves. This initiative is a great opportunity for skill and knowledge sharing activity between foreshore committees.

Recommendations

- Investigate undertaking a similar *Carpobrotus* management program to that being undertaken by Capel Foreshore Committee.

8.8 Next Box Maintenance

There are several nest boxes in the foreshore reserve, mostly noticed in the Cameron's Bight campground. It has been well documented that nest boxes require frequent monitoring and maintenance, which has become more difficult with regulations on working from heights and insurance requirements.

Recommendations

- If regular monitoring and maintenance of nest boxes cannot be achieved, then they should be removed as they fall into disrepair.
- If they are removed, they need to first be checked for the presence/use by indigenous fauna species.

8.9 Brushcutting Practices around Infrastructure

The use of brushcutting to manage vegetation around some areas of the reserve (eg: car parks, tracks and boat ramps) was noted.

Whilst brush cutting is a good management tool to reduce/contain the seeding and spread of weedy grasses, the use of brush cutting could be refined to also be used to reduce the spread of exotic groundstorey vegetation and increase the spread of indigenous grasses.

Recommendations

- Continue brushcutting but identify the exotic versus indigenous grass species in areas to be brushcut.
- Brushcut the weedy grasses prior to seed set, but brushcut around the indigenous grasses so they can set seed and the seed can drop to germinate and slowly colonise the area.

8.10 Yachts stored in Spinifex/EVC 879: Coastal Dune Grassland Patches

Small boats being stored in the fore dunes was observed along the length of the foreshore reserve. A boat storage area was also observed near the Cameron's Bight jetty. From the look of some of these boats (with sand deposited over them and vegetation growing around them), it had been a while since they had been moved.



Boats stored amongst Spinifex/EVC 879: Coastal Dune Grassland



Cameron's Bight jetty boat storage area

Many of these boats were stored amongst the indigenous Spinifex Grass in patches of EVC 879: Coastal Dune Grassland. Vegetation has also re-colonised around the Cameron's Bight jetty boat storage infrastructure.

In Marram Grass areas the presence of these boats is not considered as major issue, unless Marram Grass seed gets trapped in and spreads from moving these boats around.

However, in patches of EVC 879: Coastal Dune Grassland, which have been identified as a high priority for management due to their scarceness along the bayside of the Mornington Peninsula, the presence of these boats is problematic and needs to be addressed as part of the management of patches of EVC 879: Coastal Dune Grassland.

Recommendations

- Consider how to manage this issue, prioritising removing boats in area of EVC 879: Coastal Dune Grassland.
- Liaise with Mornington Peninsula Shire Council on how to manage this issue, starting from high priority foreshore vegetation areas and moving outwards.

8.11 Blairgowrie Yacht Club Beach

The beach to the west of the Blairgowrie yacht Club is quite sheltered and contains different ecological values to the remainder of the foreshore reserve.

The patches of EVC 879: Coastal Dune Grassland in this area are dominated by the indigenous Strand Sedge, which is a new/recent record of the species along the eastern side of Port Philip Bay. As a new/recent record the patch of Strand Sedge is significant.



Looking east along the Blairgowrie Yacht Club beach



Coastal Dune Grassland with boats stored in it, and Strand Sedge growing in the foreground - Blairgowrie Marina Beach



Sweet Melilot with Coastal Dune Grassland in the foreground- Blairgowrie Marina Beach



Large pipe stored in the Coastal Dune Grassland, with Sweet Melilot and Coastal Dune Grassland/Strand Sedge - Blairgowrie Marina Beach

Numerous pieces of infrastructure (a large section of pipe) and boats were also stored along this section of foreshore in the patch of EVC 879: Coastal Dune Grassland.

As the area does not have sand/beach grooming this has allowed foredune vegetation to extend almost to the edge of the shoreline in sections.

There is a large infestation of the weedy Sweet Melilot **Melilotus indicus* adjacent to EVC 879: Coastal Dune Grassland, which needs to be managed to reduce its' spread and slowly eliminate it. The Melilot should be brushcut annually before it seeds to reduce seed set.

Recommendations

- Manage/brushcut the Melilot annually to reduce its spread
- Remove the pipe if it can be done with minimal impacts
- Manage the Coastal Dune Grassland patch, including addressing boat storage in the grassland.

8.12 Foreshore Section- Adelaide Street Carpark to Blairgowrie Beach

There is very narrow section of foreshore between Adelaide Street and Revell Street. Between Revell Street and Blairgowrie Beach there are numerous patches of foreshore vegetation and a grove of Moonahs, which is potentially one multi-stemmed ancient Moonah.

A dirt walking track has been created through this section of the foreshore, which is impacting the vegetation, and could result in major damage to the grove of Moonahs in the longer-term.

It is unclear why there is a track in such a narrow strip of vegetation, as it has resulted in vegetation loss. There is a clear and well-formed walking track less than 20m to the south of the foreshore reserve (on the other side of the Nepean Highway), and people can walk on the beach.

The track is narrow and eroding in areas due to the vegetation impacts, which means it is consuming management resources in being maintained. There is also the potential that the path is undercutting the stone beach retaining wall. If the track is not closed then lots of work needs to be done to secure and monitor existing vegetation, to ensure it is not compromised by the Bay Trail alignment.



Temporary fencing been installed to try and manage foreshore erosion due to walking track and vegetation impacts



Track through Moonah grove resulting in root damage to tree/s and limbs being pruned- near Revell Street

Recommendations

- Close off this section of track, or undertake on-going management works to secure and monitor existing vegetation, to ensure it is not compromised by the Bay Trail alignment
- Management methods to limit root degradation while maintaining the track need to be explored for this and other sections of the study area
- Use the mapping data provided in this project (and also undertake ground-truthing) to re-align any beach access points from the Nepean Highway to the beach, in areas with lower quality vegetation/no large trees
- Block existing track with fallen/pruned branches
- Fallen timber/branches will provide a nursery/micro-climate for shrub/climbers to germinate in and grow around/under
- Re-locate the track through the Moonah grove and rehabilitate the area
- Seaberry Saltbush and Bower Spinach tubestock can be planted in areas to speed up restoration

9. MANAGEMENT OBSERVATIONS- NEPEAN HIGHWAY LINEAR RESERVE

The following management observations relate to the linear reserve section of the study area.

9.1 Management of Cherry Ballarts

Three Cherry Ballarts *Exocarpos cupressiformis* were recorded in this section of the study area. Cherry Ballarts are Regionally significant, as they are rare on the alkaline soils of the Nepean Peninsula. No Cherry Ballarts were recorded along the foreshore reserve.

Due to the rarity of this species in the study area, a special management zone should be implemented around each tree:

- Instigate a 10m 'buffer' around each tree
- No planting within the buffer
- No herbicide use in the buffer
- Hand-weeding only

Cherry Ballarts are a species that 'parasites' off a host plant, so any works surrounding these trees need to be very carefully undertaken to avoid impacting the host plant. There is the potential that the host plant could include exotic grass species.

Recommendations

- Implement the management buffers zones around the three Cherry Ballarts
- Implement suggested management actions and very careful weeding, if required
- Undertake monitoring of the Cherry Ballarts- their on-going health and the impact of any management actions.

9.2 Managing Old Moonahs and Dense Woody/Scrambling Weed Infestations

There are several sections of the linear reserve which are dominated by weeds and are not a high priority for management. In these areas, some recognition of the existing ecological/biodiversity values is required, so that at least these values can be maintained.

A key issue within the study area, is the areas with large/old Moonahs that are completely choked with woody and scrambling weeds, that have been mapped as 'red' in the indigenous groundstorey cover mapping. These Moonahs will eventually be eliminated if there isn't a focus to at least manage and maintain the Moonahs. There is also some scattered indigenous groundstorey plants (eg: Seaberry Saltbush, Bower Spinach and Coast Flax-lily) in these areas (less than 5-10% cover).

In these areas, as the exotic vegetation is almost completely replacing the indigenous vegetation structure, they will likely contain populations of indigenous fauna species (eg: Swamp Rats) that will easily be displaced if weed control is not staged and does not include a habitat replacement program.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Management of these areas needs to be carefully staged and planned to maintain the existing values, slowly reduce the extent of weed cover, and replace the habitat structure. If Bower Spinach or Seaberry Saltbush are present, then this could be as simple as placing some light branches over these to create structure for them to grow on

One suggestion is to micro-map these areas, mapping all indigenous plants and then slowly working out from each plant controlling the weeds and creating buffers around them



Dense weed smothered vegetation with remnant Moonahs



Weed infested Moonah Woodland

The numerous weed species include Sweet Pittosporum, Cotoneaster **Cotoneaster spp.*, Cape Ivy **Delairea odorata*, English Ivy **Hedera helix*, Soursob and exotic grasses- all of these are serious environmental weeds.

Recommendations

- Select one weed infested area to begin the weed control process
- Undertake fauna surveys/habitat mapping to determine what habitat values need to be managed and replaced with indigenous vegetation
- Micro-map remnant vegetation (trees and any scattered groundstorey plants)
- Create 2-5m wide buffers around 25-50% of indigenous plants (number of buffers to be determined by extent of indigenous vegetation/plants present)
- Maintain 'weeded' buffers and monitor for any signs of regeneration, or consider planting Seaberry Saltbush or other robust indigenous species to in-fill gaps, and start the slow process of shifting the vegetation from being dominated by exotic to indigenous species
- Focus should be on conserving highest indigenous vegetation values and working outwards
- Likely to take 20-40 years of slow and staged works

9.3 Kangaroo Fern Management

One Kangaroo Fern *Microsorium pustulatum* subsp. *pustulatum* was recorded growing in the linear reserve. It is likely planted, as the species tends to grow in fern gullies (such as at Endeavour Gully, Red Hill). It is an epiphytic fern which grows on another plant but is not parasitic.

Whilst it is likely planted, it should be managed (which it already appears to be), as it would be a significant species if it was naturally occurring.

The area around the Kangaroo Fern is being managed and weed species removed. Care needs to be taken not to clear too much or open up the surrounding vegetation too much and make the area surrounding the fern too open and sunny. It does need some shade, but it also can't be smothered by weeds.

As it is located near/under power lines, some sort of barrier needs to be installed to define the area as a 'no go' zone during any power line pruning and/or maintenance works.



Kangaroo Fern



Cleared vegetation in front of Kangaroo Fern



Kangaroo Fern (red arrow) at base of pruned Moonah under power lines (green arrow).

Recommendations

- Continue management around Fern, and try and determine if remnant or planted
- Install barrier to define area as a 'no go' zone for future pruning works
- Liaise with the power authority about the 'no go' zone

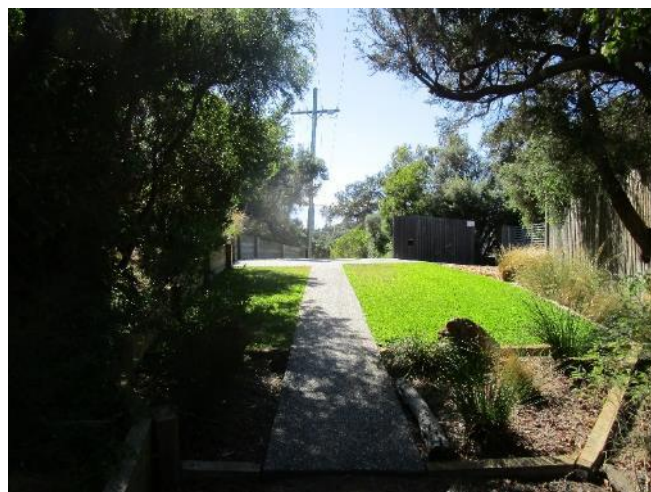
9.4 Vegetation Removal/Management in front of Private Properties

All along the linear reserve, residents have created indents into the vegetation to park cars, create tracks and store boats/caravans. This practice is slowly 'eating into' the vegetation and has the potential to threaten any significant flora/fauna species that maybe present near the indentations.

All indentations should be assessed, and bollards installed in areas with higher quality vegetation or very old trees to manage and conserve these values and to prevent further creep.



Caravan storage in an area of higher quality vegetation



Paved and landscaped section of the linear reserve



Track cut through vegetation



Car parking area dominated by Wallaby Grass-mapped as 'blue' indigenous groundstorey cover

Whilst most of the vegetation creep areas are weed dominated, there was a few open/grassy spaces near one of the Calcareous Swale 'Grassland' patches where the opening up has created Wallaby Grass dominated areas that were mapped 'blue' in the indigenous groundstorey cover mapping.

Without a continued management presence, it is going to be difficult to manage this issue, especially as the land between the linear reserve and private residences seems like 'no mans' land in many sections of the linear reserve.

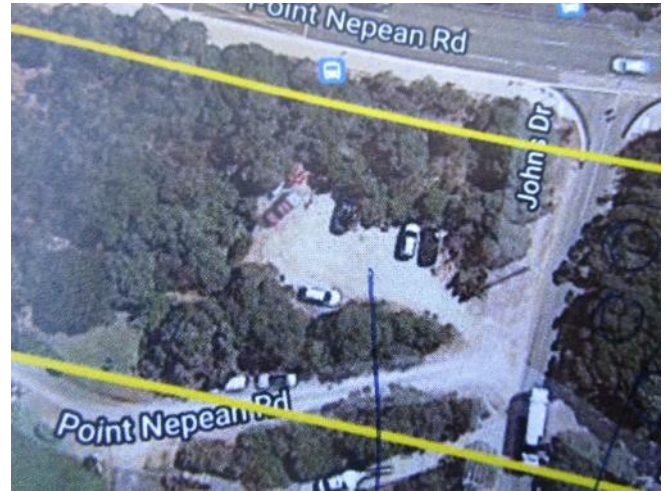
There was one hardstand area off Johns Drive that was located near the WhiteCliffs campground. As many cars park along the Nepean Highway in this section, it did seem that placing bollards around the edge of the hardstand area (to protect the vegetation) could create a potential off-road car parking area, and an overflow parking area for the campground, that would reduce

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

pressure to park along the Nepean Highway. It is unclear who created the hardstand area and if it is still utilised. This would need to be investigated.



Old hardstand area off Johns Drive



Aerial view of hardstand area off Johns Drive

Recommendations

- Investigate the potential for the hardstand area to be utilised as an off-Highway parking area
- Assess the vegetation 'creep' areas and install bollards to protect significant vegetation/old trees
- Create a semi-regular foreshore management presence/patrol of the linear reserve to deter further vegetation removal/creep.

10. MANAGEMENT PRIORITIES

Table 5 below lists the management observations/issued discussed in Sections 8 to 10 and prioritises each issue according to whether it is considered to be a High, Medium or Low priority. The Table also lists whether each management issue is on-going or a one-off action.

This information is provided to assist the Foreshore Committee in implementing the recommendations made within this report.

Table 9 Study Area Management Actions and Priorities

Management Issue	Specific Issues/Recommendations	Priority	Type of Action
General Management Observations/Actions			
Weed Control	Polygala control	M	On-going
	Sea Spurge removal	H	On-going
	Italian Buckthorn	H	On-going
	Olive Trees	H	On-going
	Prepare a weed management and prioritisation plan	H	One-off
	For any larger-scale weed control in the orange/red mapped areas, undertake fauna/habitat surveys	M-H	One-off and on-going
	Selective mowing of exotic grasses pre-seed set	H	On-going
Tree Lopping/Pruning/Vandalism for Views	Liaise with the local Council regarding developing an appropriate policy response for tree vandalism	L	One-off and on-going
Orchid Patches and Data Management	Mapping and Monitoring Orchid Patches	H	On-going
	Marking of Orchid Patches along the Walking Trail	M	One-off
	Orchid Patches and Galvanised Wire	H	One-off
Large Tree Management and Inventory	Prepare a <i>Large/Old Remnant Tree Management Plan</i>	H	One-off
	Utilise the <i>Large/Old Remnant Tree Management Plan</i> to guide future infrastructure development/placement in the study area.	M-H	On-going
Pressure along the Foreshore and Vegetation Management	Utilise strategic fencing to define patches/blocks of vegetation, to encourage bushland regeneration or to undertake supplementary planting within areas	M	On-going
	Investigate fencing materials that are more weather resistant and less likely to require maintenance	M	One-off and on-going
	Utilise cut woody material from along the foreshore to continue to block off ‘goat tracks’.	M	On-going
Fauna and (Weedy) Habitat	Continue integrating management of fauna and fauna habitat into bushland management works	H	On-going
	undertake fauna survey of species present and suitable habitat patches to obtain data on fauna management	M-H	One-off
	Liaise with MPSC on any Fauna Atlas data relevant to the study area	M	One-off
	Map fauna habitat patches as part of on-going management works	M-H	On-going
	Map and protect Swamp rat habitat	H	On-going

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Management Issue	Specific Issues/Recommendations	Priority	Type of Action
Feral/Pest Animals- Rats/Mice	No recommendations, just awareness	N/a	N/a
Photo Points/Monitoring	Utilise vegetation quality mapping to determine appropriate areas for vegetation monitoring	M-H	On-going
	Install capped star pickets at each monitoring plot	M-H	One-off
Infrastructure Impacts	Establish the Large Tree Inventory for use as a potential negotiating tool with the power (and other) authorities	H	One-off and on-going
	Consider discussing (with the power authority) how to manage the pruned material for use by Foreshore Committee	M-H	On-going
	Investigate methods to value bushland assets with regards to impact by other authorities- in conjunction with other bushland management committees	M-H	One-off and on-going
Management of EVC A309: 'Calcareous' Swale Grassland Patches	Prepare a <i>Calcareous Swale 'Grassland' Management Plan</i>	H	One-off
Infrastructure Siting and Vegetation Impacts	Print out large (A3 plus) copies of the vegetation maps produced for this project and place them in the depot/office.	H	One-off
	Incorporate the use of the maps and the indigenous vegetation information they provide into all future decision making within the study area.	H	On-going
Over-arching Mornington Peninsula Foreshore Committee	If not already existing, consider establishing a larger 'umbrella' organisation/group for all the Mornington Peninsula foreshore management committees.	M-H	One-off and on-going
Training Sessions	Investigate running 1-2 workshops on this report so that it can be utilised as a 'living' document/mapping laye	M-H	One-off
	Undertake 1-2 weed removal techniques workshops, which also introduce the vegetation mapping and the areas of higher versus lower vegetation quality, for weed/bushland managers/contractors employed to undertake work within the foreshore reserve	M-H	One-off
Foreshore Reserve Management Observations/Actions			
WhiteCliffs Campground Management Issues	Install bollards to protect vegetation around camp sites	M-H	On-going
	Slowly replace exotic shade trees in the campground (as they fail) with suitable shady indigenous species	M	On-going
	Change from Wallaby Grass to Kikuyu in the Camp Sites	M	On-going
	Consider making sites 42 & 43 (tent) camping only or impose a size limit on caravans that can utilise the sites.	H	One-off
Beach/Sand Grooming	Investigate methods for 'protecting' patches of EVC 879: Coastal Dune Grassland in the areas where beach grooming occurs	H	On-going

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Management Issue	Specific Issues/Recommendations	Priority	Type of Action
	Liaise with Council about the protection measures, and beach groomers avoiding the protection measures or certain areas/ vegetation patches along the foreshore.	H	On-going
EVC 879: Coastal Dune Grassland (Spinifex versus Marram Grass)	Manage all mapped patches of EVC 879: Coastal Dune Grassland/Spinifex to control Marram Grass and encourage the spread of Spinifex	H	On-going
	Number and monitor each Coastal Dune Grassland patch, take monitoring photos, and collect flora species cover/abundance data and the extent of bare sand, etc within each patch annually	H	On-going
	Consider a 'Marram Grass replacement' program in several areas of the foreshore by utilising the 'nursery' method	M-H	On-going
Information Brochure for Boat Shed Owners	Liaise with Council & Boat Shed Owners Association re: developing a boat shed vegetation management policy	M	One-off and on-going
	Produce a brochure that clearly describes and demonstrates appropriate vegetation management practices surrounding the boat sheds.	M	One-off
Fencing of Remnant Areas	Continue fencing remnant patches (prioritising green and blue mapped areas) located within the camping areas, & between camping areas and the beach.	M	On-going
	Consider continuing fencing of remnants in all high use areas of the foreshore (ie: near toilet blocks, car parks, boat ramps, etc).	M	On-going
	Undertake research into the impacts of coastal vegetation fencing on ground-dwelling fauna	M-H	One-off and on-going
Hybridisation of indigenous Carpobrotus	Investigate undertaking a similar Carpobrotus management program to that being undertaken by Capel Foreshore Committee.	H	On-going
Next Box Maintenance	If regular monitoring and maintenance of nest boxes cannot be achieved, then they should be removed as they fall into disrepair.	M	One-off
	If they are removed, they need to first be checked for the presence/use by indigenous fauna species.	H	One-off
Brushcutting Practices around Infrastructure	Brushcut weedy grasses to reduce seed set, but brushcut around indigenous grasses so they can set seed, germinate and slowly colonise an area.	H	On-going
Management of EVC 879: Coastal Dune Grassland Patches	Prepare a <i>Coastal Dune Grassland Management Plan</i>	H	One-off
Yachts stored in Spinifex/EVC 879: Coastal Dune Grassland Patches	Consider how to manage this issue, prioritising removing boats in area of EVC 879: Coastal Dune Grassland.	M-H	One-off and on-going
	Liaise with MPSC on how to manage this issue, starting from high priority foreshore vegetation areas and moving outwards	M-H	On-going

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Management Issue	Specific Issues/Recommendations	Priority	Type of Action
Blairgowrie Yacht Club Beach	Manage/brushcut the Melilot annually to reduce its spread	H	On-going
	Remove the pipe if it can be done with minimal impacts	H	One-off
	Manage the Coastal Dune Grassland patch, including addressing boat storage in the grassland.	H	On-going
Foreshore Section- Adelaide Street Carpark to Blairgowrie Beach	Close off this section of track	H	One-off
	Use the mapping data (and undertake ground-truthing) to re-align any beach access points from the Nepean Highway to the beach, in areas with lower quality vegetation/no large trees	H	One-off
	Block existing track with fallen/pruned branches	H	On-going
	Rehabilitate track through the Moonah grove	H	One-off
	Plant Seaberry Saltbush and Bower Spinach tubestock to speed up restoration	M-H	
Nepean Highway Linear Reserve Management Observations/Actions			
Management of Cherry Ballarts	Implement the management buffers zones around Cherry Ballarts	H	One-off and on-going
	Implement suggested management actions and very careful weeding, if required	H	On-going
	Undertake monitoring of the Cherry Ballarts	H	On-going
Managing Old Moonahs and Dense Woody/Scrambling Weed Infestations	Select one weed infested area to begin the weed control process	L-M	One-off and on-going
	Undertake fauna surveys/habitat mapping to determine habitat values to be managed and replaced with indigenous vegetation	L-M	One-off and on-going
	Micro-map remnant vegetation (trees and any scattered groundstorey plants)	L-M	One-off and on-going
	Create 2-5m wide buffers around 25-50% of indigenous plants (number of buffers to be determined by extent of indigenous vegetation/plants present)	L-M	On-going
	Maintain 'weeded' buffers and monitor for any signs of regeneration, or consider planting Seaberry Saltbush or other robust indigenous species to in-fill gaps	L-M	On-going
Kangaroo Fern Management	Continue management around Kangaroo Fern	H	On-going
	Try and determine if remnant or planted	H	One-off
	Install barrier to define area as a 'no go' zone for future pruning works	M-H	One-off
	Liaise with the power authority about the 'no go' zone	M-H	On-going
Vegetation Removal/Management in front of Private Properties	Investigate the potential for the hardstand area to be utilised as an off-Highway parking area	L-M	One-off
	Assess vegetation 'creep' areas & install bollards to protect significant vegetation/old trees	L-M	On-going
	Create a semi-regular foreshore management presence/patrol of the linear reserve to deter further vegetation removal/creep.	H	On-going
Hard stand area off Johns Drive	Formalise unofficial parking area with bollards to protect the surrounding vegetation	M	One-off

11. CONCLUSION

The 2021/22 WhiteCliffs to Cameron's Bight Foreshore (and linear reserve) mapping project was undertaken to document and map the current quality and extent of bushland vegetation in these reserves, including State, Regional and High Locally significant flora species, and the most problematic weed invasions. The report also provides management observations and recommendations that apply across the foreshore and linear reserves within the study area.

The 2021/22 Mapping Dataset was created on Google My Maps to provide a tool that could be utilised in the field by the Foreshore Management Committee and its contractors to provide ready access to up-to-date data wherever they are working in the reserves.

One purpose of the project was to provide comparative data to gauge the success of the previous 10-12 years of bushland management and rehabilitation works. Due to different data collection methods, the comparative data provided is limited in scope.

There is an accompanying electronic mapping dataset to this report, which contains the:

- EVC mapping (also provided in this report in Appendix 5)
- Indigenous vegetation Cover mapping (also provided in this report in Appendix 6)
- Significant Flora species locations (electronic data only)
- High priority for control weed location (electronic data only)
- Large remnant trees (electronic data only).

Along with the management recommendations, the vegetation mapping project provides current vegetation data for the WhiteCliffs to Cameron's Bight study area- the Foreshore and Nepean Highway linear reserves.

12. REFERENCES

- DELWP (2018) *NatureKit*. Department of Environment, Land, Water and Planning. Government of Victoria. Accessed via: <https://maps2.biodiversity.vic.gov.au/Html5viewer/index.html?viewer=NatureKit>
- DELWP (2018) *Ecological Vegetation Class (EVC) Benchmarks*. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks>
- DELWP (2018) *Victorian Biodiversity Atlas* Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <https://vba.dse.vic.gov.au>
- DELWP (2018) *Native Vegetation Information Management system (NVIM)*. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <https://nvim.delwp.vic.gov.au/>
- DELWP (undated). *Characteristics of Threatened Communities - Flora and Fauna Guarantee Act 1988*.
- DELWP (2021). *Flora and Fauna Guarantee Act 1988 - Threatened List*. Department of Environment, Land, Water and Planning, Government of Victoria.
- Department of Sustainability and Environment (2004). *EVC Benchmark 858: Coastal Alkaline Scrub*.
- DSE (2004) *EVC/Benchmark for Vegetation Quality Assessment. EVC 309: Calcareous Swale Grassland*. Department of Sustainability and Environment, Melbourne.
- DSE (2010). *A Field Guide to Coastal Moonah Woodland in Victoria*.
- Kristine Faye James (2012). *Gaining New Ground: *Thinopyrum junceiforme*, A Model of Success Along the South-eastern Australian Coastline*. <https://digital.library.adelaide.edu.au/dspace/bitstream/2440/80586/8/02whole.pdf>
- Mornington Peninsula Shire Council (2021). *Bridgewater Bay Area - Vegetation Map*
- Mornington Peninsula Ecological Vegetation Class Profiles*. Prepared for Mornington Peninsula Shire by Jeff Yugovic.
- Moxham, C, Sinclair, S, Walker, G & Douglas, I (2009) *The Vegetation of the Nepean Peninsula-an Historical Perspective*. *Cunninghamia* 11
- Moxham C, Turner V, Walker G & Douglas I (2010). *28 years of vegetation change (1978–2006) in a calcareous coastal dune system*. *Cunninghamia*. 11(4) 445-456
- Moxham C & Turner V (2006). *The Effects of Fire on Calcareous Dunes Vegetation in Coastal South-eastern Australia*. unpublished Arthur Rylah Institute.
- SEEDS Bushland Restoration & Environmental Education (2010). *GPS/Google Earth as a management tool for mapping orchid populations, Significant Vegetation and Vegetation Quality: Whitecliffs to Cameron's Bight Foreshore Reserve, Mornington Peninsula, 2009-10*.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping
Project

SEEDS Bushland Restoration (2019). *Whitecliffs to Cameron's Bight Foreshore Reserve Report brief –Vegetation Quality assessment and Orchid Observations.*

Smedley (2022). *Bridgewater Bay (Blairgowrie) Habitat Corridors Mapping.* Prepared for the Nepean Conservation Group

Smedley and Walker (2021). *Calcareous Swale 'Grassland' of the Nepean Peninsula: Methodology, Mapping, Results, Discussion and Recommendations.* Prepared for the Mornington Peninsula Shire Council.

Smedley and Walker (2021). *Dromana Foreshore: Vegetation Quality Assessment (Quality, EVCs, Significant Flora & Weed Species).* Prepared for the Dromana Foreshore Committee of Management

Smedley and Walker (Revised Version July 2018). *Capel Sound Foreshore: 2017 Vegetation Benchmark Report (Quality, EVCs and Significant Flora Species).* Prepared for the Capel Sound Foreshore Committee of Management

APPENDIX 1: Flora Species List- Indigenous

The flora list is divided into species recorded during the Stages 1 and 2 survey periods.

The orchid species that are known to occur in the study area have been listed under the Stage 2 list, as they were not observed during the December 2021 survey.

The key to the Origin and Significance columns is provided at the end of the table.

Origin	Botanical Name	Common Name	Significance	
			FFG	EPBC
Stage 1 Survey Species (December 2021)				
	<i>Acacia longifolia</i> subsp. <i>sophorae</i>	Coast Wattle		
	<i>Acacia paradoxa</i>	Hedge Wattle		
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee		
	<i>Adriana quadripartita</i> (pubescent form)	Coast Bitter-bush	E	
	<i>Adriana quadripartita</i> s.s. (glabrous form)	Rare Bitter-bush	E	
	<i>Allocasuarina verticillata</i>	Drooping Sheoak		
	<i>Alyxia buxifolia</i>	Sea Box		
	<i>Amyema pendula</i>	Drooping Mistletoe		
	<i>Amyema preissii</i>	Wire-leaf Mistletoe		
	<i>Atriplex cinerea</i>	Coast Saltbush		
	<i>Austrostipa flavescens</i> (open & closed forms)	Coast Spear-grass		
P	<i>Austrostipa stipoides</i>	Prickly Spear-grass		
	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia		
P	<i>Beyeria lechenaultii</i>	Pale Turpentine Bush		
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Sweet Bursaria		
	<i>Carex pumila</i>	Strand Sedge		
	<i>Carpobrotus rossii</i>	Karkalla		
	<i>Clematis microphylla</i> /? <i>decipiens</i>	Small-leaved Clematis		
	<i>Comesperma volubile</i>	Love Creeper		
	<i>Correa alba</i>	White Correa		
	<i>Correa reflexa</i>	Common Correa		
	<i>Cynoglossum australe</i>	Australian Hound's-tongue		
	<i>Dianella brevicaulis</i>	Small-flower Flax-lily		
	<i>Dianella</i> sp. aff. <i>revoluta</i> (Coastal)	Coast Flax-lily		
	<i>Dichondra repens</i>	Kidney-weed		
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower		
	<i>Distichlis distichophylla</i>	Australian Salt-grass		
	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	Wedge-leaf Hop-bush		
	<i>Elymus scaber</i> var. <i>scaber</i>	Common Wheat-grass		
P	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush		
	<i>Eucalyptus viminalis</i> subsp. <i>pryoriana</i>	Coast Manna-gum		
	<i>Exocarpos cupressiformis</i>	Cherry Ballart		
	<i>Ficinia nodosa</i>	Knobby Club-sedge		

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Origin	Botanical Name	Common Name	Significance	
			FFG	EPBC
	<i>Galium spp.</i>	Bedstraw		
	<i>Geranium gardneri</i>	Rough Cranesbill		
	<i>Hibbertia sericea s.l.</i>	Silky Guinea-flower		
	<i>Kennedia prostrata</i>	Running Postman		
	<i>Lachnagrostis billardierei subsp. billardierei</i>	Coast Blown-grass		
	<i>Lepidosperma gladiatum</i>	Coast Sword-sedge		
	<i>Leptospermum laevigatum</i>	Coast Tea-tree		
	<i>Leucophyta brownii</i>	Cushion Bush		
	<i>Leucopogon parviflorus</i>	Coast Beard-heath		
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		
	<i>Melaleuca lanceolata subsp. lanceolata</i>	Moonah		
?P	<i>Microsorium pustulatum subsp. pustulatum</i>	Kangaroo Fern		
	<i>Muehlenbeckia adpressa</i>	Climbing Lignum		
	<i>Myoporum insulare</i>	Common Boobialla		
	<i>Olearia axillaris</i>	Coast Daisy-Bush		
	<i>Olearia glutinosa</i>	Sticky Daisy-bush		
?P	<i>Olearia sp. 2</i>	Peninsula Daisy-bush	E	
	<i>Oxalis rubens</i>	Dune Wood-sorrel		r
	<i>Pimelea serpyllifolia subsp. serpyllifolia</i>	Thyme Rice-flower		
	<i>Poa labillardierei</i>	Common Tussock-grass		
P	<i>Poa poiformis</i>	Coast Tussock-grass		
	<i>Pomaderris paniculosa subsp. paralia</i>	Coast Pomaderris		
	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed		
	<i>Pteridium esculentum</i>	Austral Bracken		
	<i>Pultenaea tenuifolia</i>	Slender Bush-pea		
	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush		
	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		
	<i>Rytidosperma racemosum</i>	Stiped Wallaby-grass		
	<i>Sambucus gaudichaudiana</i>	White Elderberry		
	<i>Senecio hispidulus s.l.</i>	Rough Fireweed		
	<i>Senecio odoratus var. odoratus</i>	Scented Groundsel		
	<i>Spinifex sericeus</i>	Hairy Spinifex		
	<i>Tetragonia implexicoma</i>	Bower Spinach		
	<i>Threlkeldia diffusa</i>	Coast Bonefruit		
	<i>Roepera billardierei</i>	Coast Twin-leaf	E	
Stage 2 Survey Species				
	<i>Caladenia latifolia</i>	Pink Fairies		
	<i>Corybas incurvus</i>	Slaty Helmet Orchid		
	<i>Cyrtostylis robusta</i>	Large Gnat or Mosquito Orchid		
	<i>Microtis parviflora</i>	Slender Onion-orchid		
	<i>Microtis spp.</i>	Onion Orchid		

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Origin	Botanical Name	Common Name	Significance	
			FFG	EPBC
	<i>Pterostylis cucullata subsp. cucullata</i>	Leafy Greenhood	E	V
	<i>Pterostylis pedunculata</i>	Maroonhood Orchid		
Key to Significance Columns				
EPBC Act 1999 conservation status EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.			FFG Act status (2020 Amendment) Cr: Critically Endangered, En: Endangered, Vu: Vulnerable, Ra: Rare.	
Key to Origin Column				
P	Planted	P?	Presumed to be planted	

APPENDIX 2: Flora Species List- Exotic

#- naturalised species are included in this list

*- exotic species (origin outside of Australia)

Origin	Botanical Name	Common Name	Weed Status/Risk	Comments
#	<i>Acacia longifolia subsp. longifolia</i>	Sallow Wattle	S1	
*	<i>Acanthus mollis</i>	Bear"s Breech	S2	
*	<i>Acer negundo</i>	Box Elder	S1	
*	<i>Agapanthus praecox subsp. orientalis</i>	Agapanthus	S2	
*	<i>Agave americana</i>	Century Plant	S2	
*	<i>Agonis flexuosa</i>	Willow Myrtle	S2	
*	<i>Allium triquetrum</i>	Three-corner Garlic	?K	
*	<i>Aloe maculata</i>	Soap Aloe	S2	
*	<i>Aloe sp</i>	Aloe	S2	
*	<i>Aeonium arboreum</i>	Tree Aeonium	S2	
*	<i>Arctotheca calendula</i>	Cape Weed	U	
*	<i>Artemisia sp</i>	Wormwood	S2	
*	<i>Arum italicum</i>	Italian Cuckoo-pint	S2	
*	<i>Arundo donax</i>	Giant Reed	S2	
*	<i>Asparagus aethiopicus</i>	Sprengeri Fern	S1	
*	<i>Asparagus asparagoides</i>	Bridal Creeper	S1/K	
*	<i>Asparagus scandens</i>	Asparagus Fern	S1	
	<i>Asteraceae spp.</i>	Composite	?	
*	<i>Avena barbata</i>	Bearded Oat	U	
*	<i>Billardiera fusiformis</i>	Bluebell Creeper	S1	
*	<i>Briza maxima</i>	Large Quaking-grass	U	
*	<i>Briza minor</i>	Lesser Quaking-grass	U	
*	<i>Bromus catharticus</i>	Prairie Grass	U	
*	<i>Bromus diandrus</i>	Great Brome	U	
*	<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome	U	
*	<i>Cakile maritima ssp. maritima</i>	Sea Rocket	U	
*	<i>Calamagrostis arenaria</i>	Marram Grass	K	
*	<i>Carpobrotus aequilaterus</i>	Angled Pigface	S1	
*	<i>Casuarina spp.</i>	Sheoak	S2	Can undermine infrastructure
*	<i>Casuarina glauca</i>	River Oak	S2	Can undermine infrastructure
*	<i>Catapodium rigidum</i>	Fern Grass	U	
*	<i>Centaureum spp.</i>	Centaury	U	
*	<i>Cenchrus clandestinus</i>	Kikuyu	S2	
*	<i>Chlorophytum comosum</i>	Spider Plant	S2	
*	<i>Chrysanthemoides monilifera</i>	Boneseed	S1	

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Origin	Botanical Name	Common Name	Weed Status/Risk	Comments
*	<i>Cirsium vulgare</i>	Spear Thistle	U	Disturbance regenerated
*	<i>Coleonema pulchellum</i>	Pink Diosma	S2	
*	<i>Conyza spp.</i>	Fleabane	U	
*	<i>Coprosma repens</i>	Mirror Bush	S1	
*	<i>Cordyline australis</i>	New Zealand Cabbage-tree	S2	
*	<i>Cortaderia selloana</i>	Pampas Grass	S1	
*	<i>Cotoneaster pannosus</i>	Velvet Cotoneaster	S1	
*	<i>Cotoneaster spp.</i>	Cotoneaster	S1	
*	<i>Crassula tetragona subsp. robusta</i>	Shrubby Crassula	S2	
*	<i>Crocsmia X crocosmiiflora</i>	Montbretia	S1	
*	<i>Cupressus sp</i>	Cypress	S2	
*	<i>Cynodon dactylon var. dactylon</i>	Couch	U	
*	<i>Dactylis glomerata</i>	Cocksfoot	U	
*	<i>Delairea odorata</i>	Cape Ivy	S2	
*	<i>Dimorphotheca fruticosa</i>	Trailing African Daisy	S2	
*	<i>Diplotaxis tenuifolia</i>	Sand Rocket	S2	
*	<i>Dipogon lignosus</i>	Common Dipogon	S1	
*	<i>Echium candicans</i>	Pride of Madeira	S2	
*	<i>Ehrharta calycina</i>	Perennial Veldt-grass	S1	
*	<i>Ehrharta erecta var. erecta</i>	Panic Veldt-grass	K	
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass	U	
*	<i>Erigeron karvinskianus</i>	Seaside Daisy	S2	
P	<i>Eucalyptus gomphocephala</i>	Tuart	S3	
P	<i>Eucalyptus leucoxydon</i>	Yellow Gum	S3	
*	<i>Euphorbia characias</i>	Mediterranean Spurge	S2	
*	<i>Euphorbia paralias</i>	Sea Spurge	S1	Biocontrol agent being developed
*	<i>Euphorbia peplus</i>	Petty Spurge	U	
*	<i>Felicia petiolata</i>	Blue Felicia	S2	
*	<i>Foeniculum vulgare</i>	Fennel	S1	
*	<i>Fraxinus spp.</i>	Ash	S2	
*	<i>Fumaria spp.</i>	Fumitory	U	
*	<i>Genista linifolia</i>	Flax-leaf Broom	S1	
*	<i>Gladiolus undulatus</i>	Wild Gladiolus	S1	
*	<i>Hakea drupacea</i>	Sweet Hakea	S2	
*	<i>Hedera helix</i>	English Ivy	S1	
*	<i>Helminthotheca echioides</i>	Ox-tongue	U	Higher risk in wetlands due to impact on frogs
*	<i>Holcus lanatus</i>	Yorkshire Fog	U	
*	<i>Hordeum spp.</i>	Barley Grass	U	
*	<i>Hypochoeris radicata</i>	Cat's Ear	U	

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Origin	Botanical Name	Common Name	Weed Status/Risk	Comments
*	<i>Lagunaria patersonia</i>	Pyramid Tree	S2	Seed pods hazardous
*	<i>Lagurus ovatus</i>	Hare's-tail Grass	U	
*	<i>Leontodon taraxacoides subsp. taraxacoides</i>	Hairy Hawkbit	U	
*	<i>Leucanthemum × superbum</i>	Shasta Daisy	S2	
*	<i>Ligustrum lucidum</i>	Large-leaf Privet	S1	
*	<i>Ligustrum spp.</i>	Privet	S1	
*	<i>Lolium spp.</i>	Rye Grass	U	
#	<i>Lomandra spp. (planted narrow cultivar)</i>	Mat-rush	S1	Potential to hybridise
*	<i>Lycium ferocissimum</i>	African Box-thorn	S1	
*	<i>Lycium sp</i>		?	
*	<i>Medicago spp.</i>	Medic	U	
*	<i>Melaleuca armillaris subsp. armillaris</i>	Giant Honey-myrtle	?S1	can hybridise with Moonah
*	<i>Melaleuca nesophila</i>	Showy Honey-myrtle	?S1	Can hybridise with Moonah
*	<i>Melianthus major</i>	Cape Honey-flower	S2	
*	<i>Melilotus indicus</i>	Sweet Melilot	S1/U	S1 at Blairgowrie Yacht Club beach
*	<i>Melilotus alba</i>	Melilot	S2	
*	<i>Olea europaea</i>	Olive	S1	
*	<i>Ophiopogon spp</i>	Mondo Grass	?	
*	<i>Oxalis incarnata</i>	Pale Wood-sorrel	S1/K	
*	<i>Oxalis pes-caprae</i>	Soursob	S1/K	
*	<i>Parapholis incurva</i>	Coast Barb-grass	U	
*	<i>Pelargonium X domesticum</i>	Regal Pelargonium	S2	
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	U	
*	<i>Phormium tenax</i>	New Zealand Flax	S2	
*	<i>Piptatherum miliaceum</i>	Rice Millet	S1	
*	<i>Pittosporum sp NZ</i>	Karo?	?S2	
*	<i>Pittosporum undulatum</i>	Sweet Pittosporum	S1/K	
*	<i>Plantago coronopus</i>	Buck's-horn Plantain	U	
*	<i>Plantago lanceolata</i>	Ribwort	U	
*	<i>Plantago major</i>	Greater Plantain	U	
*	<i>Plectranthus? ciliatus</i>	African Spur-flower	S2	
*	<i>Poa annua</i>	Annual Meadow-grass	U	
*	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	U	
*	<i>Polygala myrtifolia var. myrtifolia</i>	Myrtle-leaf Milkwort	S1	
*	<i>Prunus spp.</i>	Prunus	S2	
*	<i>Rhamnus alaternus</i>	Italian Buckthorn	S1	
*	<i>Romulea rosea</i>	Onion Grass	U	
*	<i>Rostraria cristata</i>	Annual Cat's-tail	U	
*	<i>Rumex conglomeratus</i>	Clustered Dock	S2	
*	<i>Securigera varia</i>	Crown Vetch	S1	

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Origin	Botanical Name	Common Name	Weed Status/Risk	Comments
*	<i>Senecio angulatus</i>	Climbing Groundsel	S2	
*	<i>Senecio elegans</i>	Purple Groundsel	S1	Hybridises with indigenous Senecios
*	<i>Silene nocturna</i>	Mediterranean Catchfly	U	
*	<i>Silene vulgaris</i>	Bladder Campion	S1	
*	<i>Solanum linnaeanum</i>	Apple of Sodom	S1	
*	<i>Sonchus oleraceus</i>	Common Sow-thistle	U	
*	<i>Sporobolus africanus</i>	Rat-tail Grass	S1/K	
*	<i>Stenotaphrum secundatum</i>	Buffalo Grass	S2/K	
*	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass	K	
*	<i>Tradescantia fluminensis</i>	Wandering Tradescantia	S1	
*	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover	U	
*	<i>Trifolium dubium</i>	Suckling Clover	U	
*	<i>Tropaeolum majus</i>	Nasturtium	S2	
*	<i>Vicia sativa</i> subsp. <i>sativa</i>	Common Vetch	U	
*	<i>Vinca major</i>	Blue Periwinkle	S2	
*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	U	S1 in orchids or indig grasslands
*	<i>Vulpia</i> spp.	Fescue	U	S1 in orchids or indig grasslands
*	<i>Zantedeschia aethiopica</i>	White Arum-lily	S2	
Key to Weed Status				
K	Keystone	S1	High priority- level 1	
S2	Medium priority	S3	Lower priority	
U	Ubiquitous			

APPENDIX 3: EVC A309 Calcareous Swale 'Grassland' Profile

Structure	<p>Open grassland/sedgeland to an open woodland community</p> <p>Can contain 'islands' of trees/shrubs amongst the open grassland/sedgeland</p> <p>Can also be grassland/sedgeland emerging amongst stands of collapsing Coast Tea-tree</p> <p>Variations between grassland or sedgeland are dependent on moisture and aspect</p>
Environment	<p>Located on terra rossa (red soil) soils in deep calcareous (alkaline) sand dunes. Refer to profile in the General Notes section below</p> <p>Mostly located below the 15m contour level, in the swales/bowls/depressions at the bottom of the sand dunes, or in the flatter, lower-lying areas across the Nepean Peninsula</p> <p>Can occur up to the 20m contour level- although the 15-20m level can be an eco-tone between EVC A309: Calcareous Swale 'Grassland' and EVC 858: Alkaline Coastal Scrub</p>
Pre-1750 distribution	Historically a widespread open woodland/grassland community across the Nepean Peninsula. (Predicted to have once occupied approximately 38% of the Nepean Peninsula)
Present distribution	Highly localised- estimated to be between 50-100 hectares remaining (or approximately 1% of the Nepean Peninsula)
Peninsula Status	Endangered
Bioregional Status	Endangered (for the patch of EVC 309 recorded at Wilsons Promontory)
Nearest relative	<ul style="list-style-type: none"> EVC 858: Coastal Alkaline Scrub, including the Coastal Moonah Woodland floristic community within EVC 858 EVC 2: Coast Banksia Woodland (floristically similar with some of the same character species, but occurs on different geologies)
Adjacent EVCs	<ul style="list-style-type: none"> EVC 12: Wet Swale Herbland EVC 160: Coastal Dune Scrub EVC 161: Coastal Headland Scrub EVC 858: Coastal Alkaline Scrub, including the Coastal Moonah Woodland floristic community within EVC 858
Typical Site/s	Offset site at St Andrews Beach Recreation Reserve Point Nepean National Park- Cemetery and Wilsons Folly (These are High quality sites/examples of the EVC)

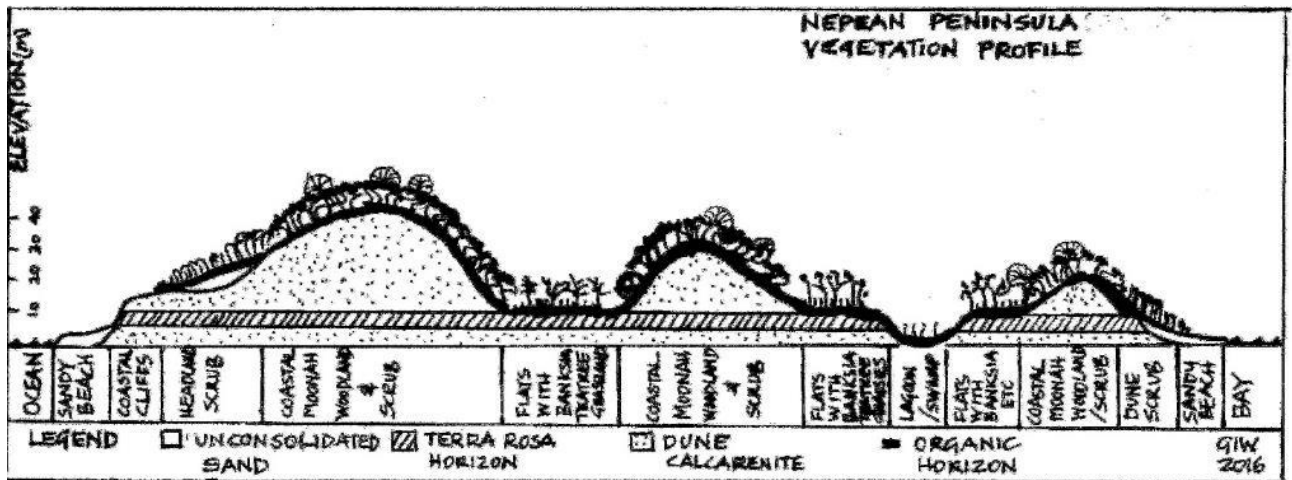
General Notes

- 1) This EVC profile recognises that the vegetation type Calcareous Swale Grassland, is probably similar in characteristics to the one recorded patch of EVC 309 in Wilsons's Promontory, and as such should be assigned a similar EVC name and number.
- 2) The **letter A** has been placed at the front of the EVC number, to define the EVC as a **provisional name and number**. This is as per conventions for new EVCs (or EVCs that require revision), that have yet to be formally recognised by the Department of

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping Project

Environment, Water, Land and Planning (DELWP), and whose descriptions may be subject to future change (DELWP, 2016)

- 3) If EVC 309 is used to describe the Calcareous Swale Grassland vegetation type in the Nepean Peninsula, then the current DEWLP EVC/Benchmark description requires revision.
- 4) The term grassland has been retained in the EVC name; however it is written with quotation marks to emphasise that the term 'Grassland' infers an open grassy vegetation type that can have some open woodland/shrubland components, rather than always being a true grassland (open with less than 5% tree/shrub cover) community.
- 5) The three indigenous flora species described as invaders of EVC 309 at Wilsons Promontory (Coast Tea-tree, Silky Guinea-flower and Drooping Sheoak), in the Gippsland Plain Bioregion EVC Benchmark; have been identified as Indicator or Character species that do occur in the EVC in the Nepean Peninsula.
- 6) Further fieldwork and research are required to define the expected number of species and percentage cover of lifeform categories for EVC A309
- 7) Further research is also required to define the vegetation structure observed across Calcareous Swale 'Grassland' sites.
- 8) EVC A309 is located on Terra rosa soils in deep calcareous (alkaline) sand dunes. Refer to profile below for topography and soils
- 9) A profile of vegetation across the Nepean Peninsula is provided below:



Major Species

Whether a flora species is an Indicator or Character species for the EVC is indicated below

Indicator Species

An 'Indicator' species is a species that is generally specific to an EVC, or a floristic community. These species tend to have more specific habitat requirements and consequently occur in fewer communities.

When comparing two floristic communities, indicator species help to delineate the boundary or ecotone between communities.

Character Species

A 'Character' species is a species that consistently and frequently occurs in a particular floristic community.

These species can be ubiquitous across a study area and therefore maybe shared with other floristic communities.

Stage 1- WhiteCliffs to Cameron's Bight Foreshore Reserve: Vegetation Survey & Mapping
Project

EVC A309 Flora Species List		Indicator or Character Species
Trees		
<i>Acacia uncifolia</i>	Wirilda Wattle	C
<i>Allocasuarina verticillata</i>	Drooping Sheoak	C
<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	I
<i>Leptospermum laevigatum</i>	Coast Tea-tree	I or C (TBD)
<i>Pomaderris paniculosa</i> subsp. <i>paralia</i>	Coast Pomaderris	C
Shrubs		
<i>Adriana quadripartita</i> s.l.	Coast Bitter-bush	I
<i>Leucopogon parviflorus</i>	Coast Beard-heath	C
<i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i>	Thyme Rice-flower	C
<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>	Seaberry Saltbush	C
Grasses		
<i>Austrostipa flavescens</i> *	Coast Spear-grass	C*
<i>Ficinia nodosa</i>	Knobby Club-sedge	I
<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat Grass	I
<i>Imperata cylindrica</i>	Blady Grass	I
<i>Lachnagrostis billardierei</i> subsp. <i>billardierei</i>	Coast Blown-grass	C
<i>Lepidosperma gladiatum</i>	Coast Sword sedge	C
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	I
<i>Poa labillardierei</i>	Common Tussock-grass	C
<i>Poa poiformis</i>	Coast Tussock-grass	I
<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass	C
<i>Themeda triandra</i>	Kangaroo Grass	I
Groundcovers		
<i>Acaena novae-zelandiae</i>	Bidgee-widgee	I
<i>Cynoglossum australe</i>	Aust H-tongue	C
<i>Dichondra repens</i>	Kidney-weed	C
<i>Hibbertia sericea</i> s.l.	Silky Guinea-flower	C
<i>Oxalis rubens</i>	Dune Wood-sorrel	C
<i>Senecio odoratus</i>	Scented Groundsel	I
Ferns		
<i>Pteridium esculentum</i> ssp. <i>esculentum</i>	Austral Bracken	I? (TBD)
Climbers, parasites		
<i>Clematis microphylla</i> s.l.	Small-leaved Clematis	C
<i>Tetragonia implexicoma</i>	Bower Spinach	C
<i>Rubus parvifolius</i>	Small-leaf Bramble	I
Mosses/Algae		
TBD	CSG Moss Species 1	I
TBD	Water Crystal Algae Species 1	C
* Herbarium query - there are possibly two forms of <i>Austrostipa flavescens</i> in the Nepean Peninsula, one of which may have been introduced in the early 1900's from King Island. The fine form is commonly found in Coastal Moonah Woodland, whilst the coarse form seems to be more associated with EVC A309.		

APPENDIX 4: WEED PRIORITISATION

STATUS / RISK	CHARACTERISTICS	MANAGEMENT STRATEGY	EXAMPLES	PRIORITY	MEASURE OF SUCCESS	WORKPLAN NEEDS
Keystone weeds						
K	historical-introduced a long time ago = dominates both structurally & floristically	work slowly and systematically from high quality areas out	Polygala at Pt Nepean: habitat for bandicoots & buffer against grassy weed invasion. Pine, Pittosporum	Long-term management required - consider Biocontrol	%population contained (no propagules produced)males or young still present	vegetation quality mapping overlaid with weed distribution map to help prioritise site
	has potentially become habitat for indigenous species	maintain habitat and buffer areas remove mature fruiting individuals first (females)			% area eliminated (some seedling regeneration)	calendar of works based on species life cycle, site, control methods & skills/resources
					% area eliminated (no/little seedling regeneration)	Skilled supervision required for high quality areas
Small Patch Weeds – Of variable risk but easiest to eliminate						
S1 – HIGH	High Risk weeds	Eliminate across the site	Dolichos pea, Bridal Creeper	Highest Priority –	Number of high risk species eliminated from the site	GIS of weed distributions & densities/size of population
	Weeds that hybridise and pollute gene pools		Karamu, Mahogany, Wattles, Pigface			
	Weeds that are known to be difficult to eradicate once established		Oxalis, Gladiolus MPSC control of Chilean Needle Grass			
	Weeds that are directly hazardous to wildlife on site (&/or stock in eg Landcare situation)		Ox-tongue lethal for frogs			
	Weeds that are allelopathic (ie produce chemicals which inhibit other species)		Vulpia spp Pittosporum			
S2 – Mod	Weeds that spread vegetatively	Eliminate from high quality areas first	Kikuyu (except in grasslands) Succulents; Ivy; Wandering Trad	moderate risk, moderate priority in high quality sites	Species contained and cover reducing on high quality retention sites	skilled supervision required for high quality sites Vegetation quality map
S3 – Low	Species that are long lived few if any seedlings observed May have been planted in the past	Lowest priority no action needed	West Australian Flowering Gum	Lowest priority		
Ubiquitous Weeds	Scattered Weeds of disturbed areas	Hardest to eliminate / look at management regime to reduce seed production	Many from Daisy Family eg Sow Thistle, Cat's Ear, some annual grasses	Low priority except in the highest quality retention sites or to protect threatened species	Highest quality and threatened species sites maintained weed free	Need to be able to identify disturbance regenerated indigenous species some of which are our rarest species eg Bitterbush, Hollyhock Roly Poly
		Eliminate in High quality retention sites- low priority else where		ongoing management of eg track edges	Management regimes adapted to reduce weed seed production	Calendar of works based on understanding of ubiquitous species life cycle
KEY: K=Keystone weeds; S=Small Patch Weeds of variable risk S1=High Risk, S2=Moderate Risk, S4=Low Risk; U=Ubiquitous Weeds						
Copyright 2017 Gidja Walker May 2017						

APPENDIX 5: ECOLOGICAL VEGETATION CLASS MAPPING

MAP 1A- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (<i>Sundew Ecological Services</i>)		

MAP 1B- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1C- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

EVC 160: Coastal Dune Scrub	EVC 161: Coastal Headland Scrub	EVC 311: Berm Grassy Shrubland	EVC 879: Coastal Dune Grassland
EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland	EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland	EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland	EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'	EVC A309: CLIMAX Calcareous Swale 'Grassland'	EVC A309: FORMER? Calcareous Swale 'Grassland'	EVC 858: Coastal Alkaline Scrub- Sheoak Woodland

Map Date: 20/03/2022 Created by: Katherine Smedley (Sundew Ecological Services)

MAP 1D- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1E- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1F- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)















Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1G- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1H- ECOLOGICALVEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland

Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)
----------	------------	------------	--

MAP 11- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1J- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1K- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1L- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (<i>Sundew Ecological Services</i>)		

MAP 1M- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 1N- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (Sundew Ecological Services)		

MAP 10- ECOLOGICAL VEGETATION CLASS MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)



Legend

	EVC 160: Coastal Dune Scrub		EVC 161: Coastal Headland Scrub		EVC 311: Berm Grassy Shrubland		EVC 879: Coastal Dune Grassland
	EVC 858: YOUNG Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: OLD Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: MIXED AGE Coastal Alkaline Scrub/Coastal Moonah Woodland		EVC 858: HIGHLY MODIFIED Coastal Alkaline Scrub/Coastal Moonah Woodland
	EVC A309: EARLY SUCCESSION Calcareous Swale 'Grassland'		EVC A309: CLIMAX Calcareous Swale 'Grassland'		EVC A309: FORMER? Calcareous Swale 'Grassland'		EVC 858: Coastal Alkaline Scrub- Sheoak Woodland
Map Date	20/03/2022			Created by	Katherine Smedley (<i>Sundew Ecological Services</i>)		

APPENDIX 6: INDIGENOUS VEGETATION COVER MAPPING

MAP 1A- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1B- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1C- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1D- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1E- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1F- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1G- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)

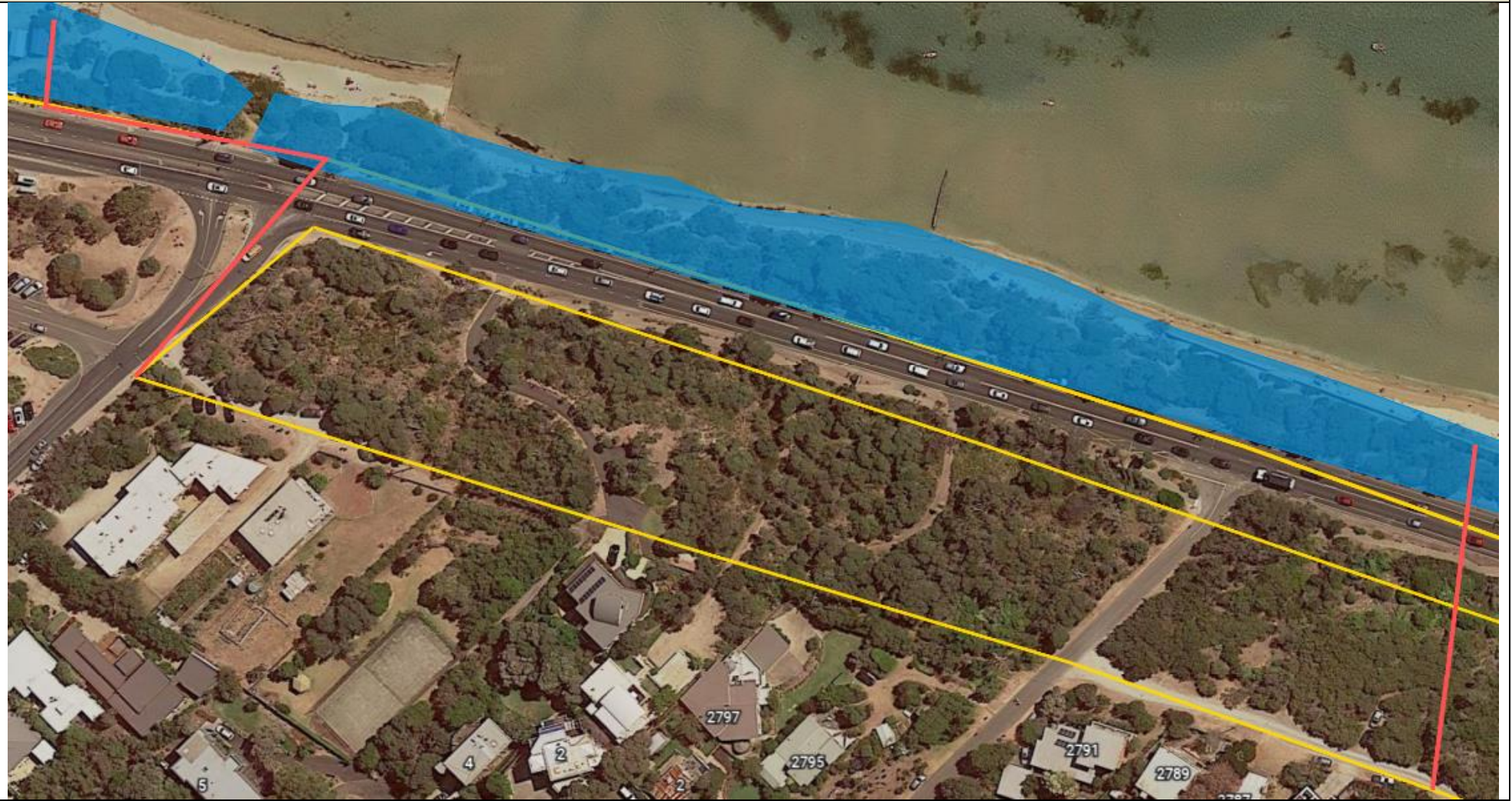


Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1H- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

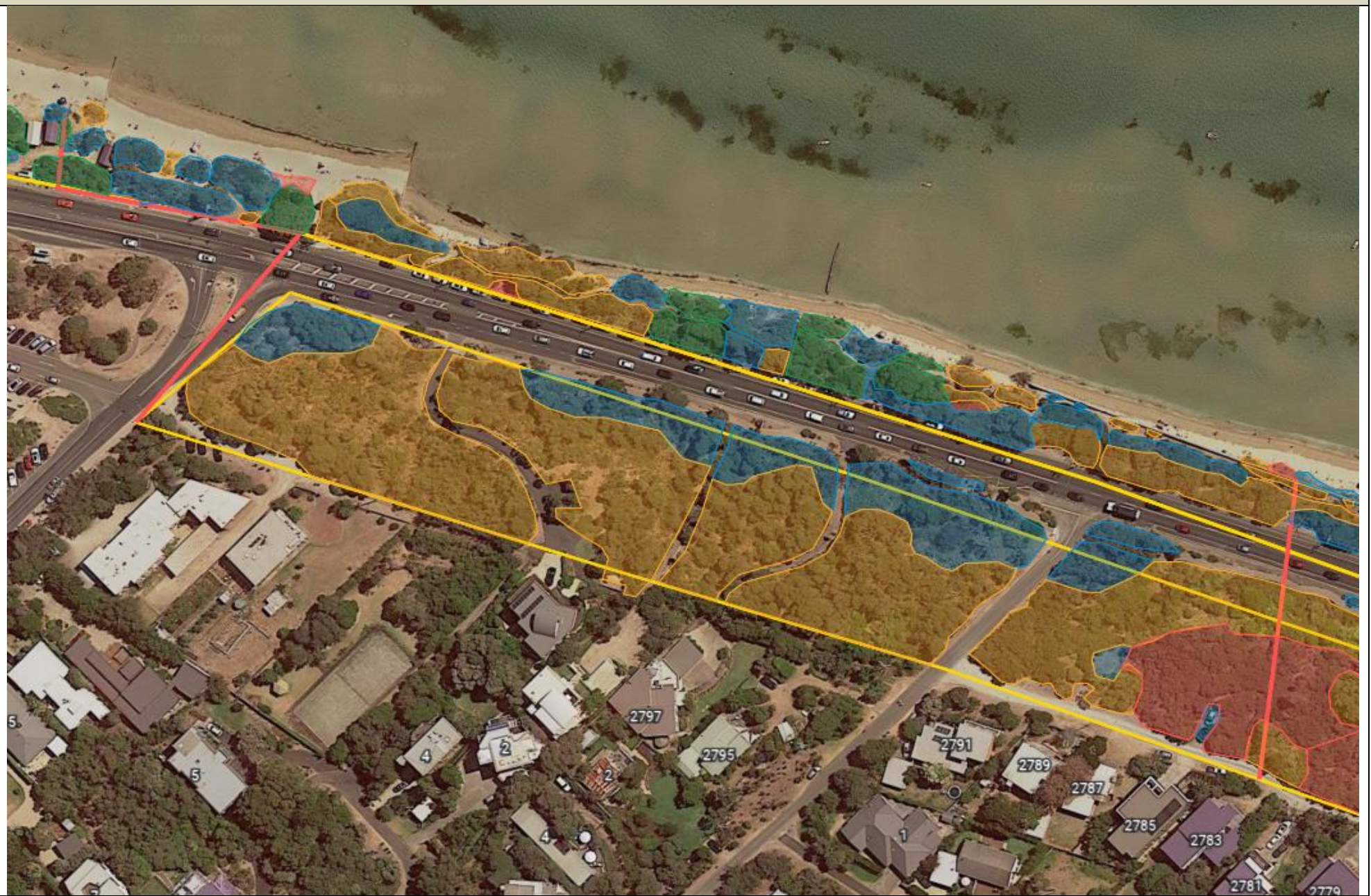
2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1I- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1J- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1K- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (<i>Sundew Ecological Services</i>)

MAP 1L- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1M- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



Legend

	Retention: High quality, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover
Map Date	20/03/2022	Created by	Katherine Smedley (Sundew Ecological Services)

MAP 1N- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

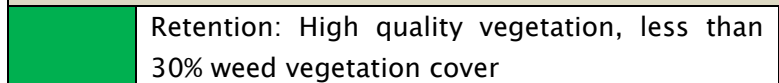
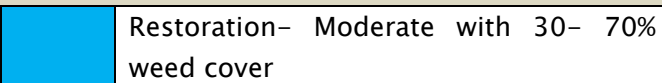
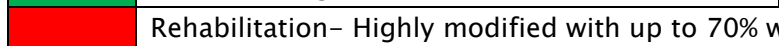
2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



2021 Vegetation Cover Mapping Data (Sundew Ecological Services)

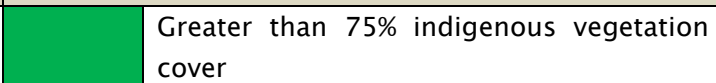
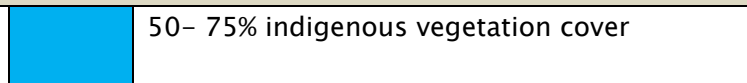
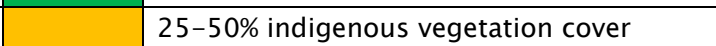
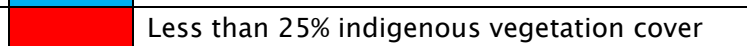


Legend

	Retention: High quality vegetation, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

Map Date
20/03/2022

Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover

Created by Katherine Smedley (Sundew Ecological Services)

MAP 10- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Retention: High quality vegetation, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover

Map Date 20/03/2022

Created by Katherine Smedley (Sundew Ecological Services)

MAP 1P- INDIGENOUS VEGETATION COVER MAPPING (WHITECLIFFS TO CAMERON'S BIGHT FORESHORE)

2009 Vegetation Cover Mapping Data (SEEDs Bushland Restoration)



2021 Vegetation Cover Mapping Data (Sundew Ecological Services)



Legend

	Retention: High quality vegetation, less than 30% weed vegetation cover		Restoration- Moderate with 30- 70% weed cover
	Rehabilitation- Highly modified with up to 70% weed cover		

Legend

	Greater than 75% indigenous vegetation cover		50- 75% indigenous vegetation cover
	25-50% indigenous vegetation cover		Less than 25% indigenous vegetation cover

Map Date 20/03/2022

Created by Katherine Smedley (Sundew Ecological Services)