Biodiversity Action Plan:

Aldinga Beach Coastal Reserve

Report to Green Adelaide

Prepared by Catherine Miles & Oliver Koch

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The authors, Green Adelaide and the City of Onkaparinga acknowledge the Kaurna Nation and its people as the traditional owners and custodians of the land in the area now known as Aldinga Beach.

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Cover photo: Aldinga beach coastal heath (Vegetation Association C, Management Zone 6)

All maps and photographs are produced by Miles Environmental Pty Ltd unless otherwise stated

SUMMARY

Aldinga Beach Coastal Reserve is a high priority conservation area, under the care and control of the City of Onkaparinga. The site contains significant areas of coastal dune and heath habitats that have been widely cleared and modified throughout the greater Adelaide coastline. The Reserve is part of a larger conservation precinct that provides an important vegetation corridor along the coast.

The purpose of this Biodiversity Action Plan is to provide management strategies to direct conservation efforts aimed at preserving and enhancing the ecological integrity and biodiversity of the site, informed by a comprehensive and accurate assessment of bushland condition. The first management plan for the site was prepared in 2001, and considerable improvements have been made to the site through careful and strategic weed management and other works such as restricting access.

The site was broken into 7 distinct zones of similar vegetation associations and condition. Each zone has been assessed using the Bushland Assessment Method (BAM) (NVC 2020) and the results compared against benchmark communities. The survey found that the low heath shrubland vegetation on heavier soils (Vegetation Association C) are in excellent condition, have the highest biodiversity value, contain at least one state rare species and 17 regionally significant plant species. The vegetation in most other zones was also in good condition and has high biodiversity value, but some dune front areas were in moderate and poor condition.

The biodiversity management objectives for Aldinga Beach Coastal reserve are to:

- Maintain and improve site biodiversity;
- Improve ecosystem resilience[1];
- Conserve cultural heritage values of the site;
- Implement an adaptive management approach informed by regular monitoring of outcomes;
- Recreational, cultural, educational and amenity values of the site are considered in decisions;
- Reduce erosion impacts to site values.

Table 1 provides a summary of the whole of site biodiversity management targets and actions and table 2 outlines the targets and actions specific to vegetation association zones.

Table 1. Summary of whole of site biodiversity management targets and action priorities

5-year targets	Management actions
Grazing pressure impacts from rabbits reduced to a point where palatable species can naturally regenerate.	Develop and implement an integrated cross tenure rabbit control program consisting of baiting, fumigation, ripping.
High threat weeds currently in low abundance eradicated[2] from the site.	Annual patrol for and treatment of Freesia, Sparaxis, Olives, Boxthorn, Buckthorn.
Physical cultural heritage preserved and living cultural heritage facilitated and supported.	Prevent damage to cultural heritage by adhering to the *Aboriginal Heritage Act* 1988. Facilitate and support programs focussed on communicating intangible cultural heritage.

[1] The ability of an ecosystem to persist (maintain essential function, identity structure and capacity for transformation) in response to a disturbance or hazardous event or trend (IPCC 2022; Thoms et al. 2024; CoA 2024)

[2] For the purposes of this plan eradication means that the species are no longer present except as seedlings that may continue to germinate and require on-going patrol and control.

5-year targets	Management actions
Implement the *Coastal Adaptation Action Plan 2024-30* with respect to Aldinga Beach	Conduct trials on a nature-based solution to protect the Lower Esplanade through installing sand drift fencing that aims to support the establishment of a sand dune[3]. Sensitive control of weeds and supportive planting of spreading native Spinifex and other groundcovers. Block public access to high-erosion areas.
Reduce informal public access.	Investigate additional formal access points where other options to deter have not been successful. Maintain public education and physical barriers to ensure people remain on designated trails.
Ensure native species establish where exotic species are removed.	Prevent follow-up weeds establishing after weed control by not over-clearing and undertaking follow-up monitoring and control.
New weeds not introduced from gardens.	Undertake targeted engagement with adjacent residents to not plant species with weed potential such as Fountain Grass, Coastal Daisy and Gazania, and encourage use of local native species in gardens.
Coordinated management of site.	Annual meeting of volunteer coordinators, site managers and contractors to review work plan.
Regular volunteer activity focussed on environmental management occurring across the site (minimum 4 times annually).	Land manager coordinated volunteer events held across the site on a quarterly basis.

[3] Action 2.11 of CoO (2024)

Table 6: Summary of management priorities by vegetation association (in order of biodiversity value highest to lowest, see Tables 2 and 6, see Map 6 for location of zones)

<table>
<tr><th>Vegetation Association</th><th>Biodiversity value</th><th>5 year target*</th><th>High priority</th><th>Medium priority</th><th>Lower priority</th></tr>
<tr><td>C</td><td>Highest</td><td>Maintain vegetation in excellent condition, eradicate isolated high threat weeds and increase cover of native species in bare areas.</td><td>• Review existing unofficial tracks and options to reduce recreational impacts.
• Monitor for and control re-growth of weeds previously removed from the site.
<table><tr><th></th><th>Mgt Zone 4</th><th>Mgt Zone 5</th><th>Mgt zone 6</th></tr><tr><td>Eradicate isolated high threat weeds</td><td>Onion weed, Scabiosa, Succulents, Perennial Veldtgrass, Agapanthus</td><td>Onion weed, Perennial Veldtgrass, Freesia, Bridal Creeper, Iceplant, Scabiosa and Sea Lavender</td><td>Gazania, Boxthorn, Freesia Sparaxis, Olive, Lavender/ Rosemary</td></tr><tr><td>Reduce the cover of other high threat weeds</td><td>Soursobs</td><td>Annual grasses, Soursobs, Gazania</td><td>Soursobs, Annual grasses</td></tr></table></td><td>• Control other weeds, working outwards from areas of good native vegetation:
o MZ4: working from Lower Esplanade then uphill
o MZ 5: working from southeast to northwest
o MZ 6: working from south to north
• Revegetation of bare area in MZ 4, monitor for and follow-up weed control this area
• Undertake an assessment of erosion control options for the area of erosion on the inside bend of the Lower Esplanade and implement as required.</td><td>Appropriate local native plantings in closed trails to assist in rehabilitation and provide a visual indication of environmental works.</td></tr>
<tr><td>G</td><td>High</td><td>Reduce weed threat and increase the cover of native species.</td><td>• Continue to push weed front northwards and follow-up and control re-growth: Soursob, Coastal Galenia, Olive, African boxthorn, Scabiosa</td><td>• Spot weed along the boundary of native vegetation-weed areas, and around native species growing in weedy areas.
• Contain Kikuyu to existing distribution in eroded gullies.
• Brushcut annual grass weeds along clifftop in late Spring.</td><td>Revegetation with appropriate species in grassy weedy areas if regeneration does not occur.</td></tr>
</table>

Vegetation Association	Biodiversity value	5 year target*	High priority	Medium priority	Lower priority
B	High	Reduce weed threat and increase the cover of native groundlayer species.	• Reduce cover of invasive weeds (Gazania, Coastal Daisy, Iceplant, Soursob, Hottentot Fig, Perennial Veldt Grass, Freesia, Scabiosa, Sea Lavender and Sea rocket). • Remove Coast Tea-tree and monitor for and control re-growth of this and other high threat weeds. • Stabilise dunes and reduce erosion potential through planting spreading native groundcovers (e.g. Spinifex, Pigface), reducing over-weeding and investigating options to replace the barrier fence.	• Control Marram Grass where there is adequate native groundcover.	Supportive plantings to increase native biomass if natural recruitment fails to increase (after rabbit control)
D	High	Increase the cover of native groundlayer and reduce weed threat.	• Control isolated high threat weeds (Bridal Creeper, Gazania, Freesia and Perennial Veldtgrass, Sallow Wattle, Salvation Jane, Coast Tea-tree). • Reduce cover of Soursobs working from edge of native groundcover	• Control other weeds, working outwards from areas of good native vegetation. • Supportive plantings to increase native biomass if natural recruitment fails to increase (after rabbit control)	

<table>
<tr><th>Vegetation Association</th><th>Biodiversity value</th><th>5 year target*</th><th>High priority</th><th>Medium priority</th><th>Lower priority</th></tr>
<tr><td>A</td><td>High</td><td>Reduce weed threat and increase the cover of native groundlayer species.</td><td>
<table>
<tr><td></td><td>Mgt[4] Zone 1</td><td>Mgt zone 3</td></tr>
<tr><td>Control isolated high threat weeds</td><td>Iceplant, Pypgrass, Pussytail, Galenia, Sea Rocket, Perennial Veldtgrass, Euphorbia, Boxthorn, Caltrop, Sea Wheat Grass, Freesia and Scabiosa.</td><td>Dew Plant, Onion Weed, Iceplant, Scabiosa.
Monitor for re-growth of woody weeds previously controlled.</td></tr>
<tr><td>Reduce the cover of other high threat weeds</td><td>Generally working from the northern and southern ends to the middle: Gazania, Seaside Daisy, Hottentrot Fig, Sea Spinach, Marram grass; Kikuyu around walkways.</td><td>Generally working from north to south: Gazania, Coastal Daisy, Sea Spinach, Marram grass, Sea Lavender, Sea Rocket.</td></tr>
</table>
• Stabilise dunes and reduce erosion potential through planting spreading native groundcovers (e.g. Spinifex, Pigface, including at the toe of the dune) reducing over-weeding and investigating options to replace the barrier fence.</td><td>• Spot spray around plantings and along edge of weedy areas.
• Control Marram Grass where there is adequate native groundcover</td><td>• Supportive plantings to increase native biomass if natural recruitment fails to increase.</td></tr>
<tr><td>F</td><td>Moderate</td><td>Increase the cover of native vegetation and reduce weed threat.</td><td>• Control Freesias, Perennial Veldt Grass and Onionweed.</td><td>• Spot weed around native vegetation (including plantings).
• Provide grazing protection for young revegetation and any natural regeneration until Rabbit pressure is reduced.</td><td>• Supportive plantings to increase native biomass if natural regeneration fails to increase native cover</td></tr>
</table>

[4] Mgt = Management

<table>
<tr><th>Vegetation Association</th><th>Biodiversity value</th><th>5 year target*</th><th>High priority</th><th>Medium priority</th><th>Lower priority</th></tr>
<tr>
<td>E</td>
<td>Low</td>
<td>Increase native species diversity and cover, reduce weed threat, and rehabilitate and prevent further gully erosion.</td>
<td>
<table>
<tr><td></td><td>Mgt Zone 6</td><td>Mgt Zone 9 & 10</td><td>Mgt zone 11</td></tr>
<tr><td>Control isolated high threat weeds</td><td>Euphorbias</td><td>Boxthorn, Tamarix, Coastal Daisy, Evening Primrose, Western Coastal Wattle, Gazania, Onion Weed</td><td>Boxthorn, Tamarix, Three-corner Garlic, Scabiosa, Sea Bower</td></tr>
<tr><td>Reduce the cover of other high threat weeds</td><td>Perennial Veldtgrass, soursobs, Plantain</td><td>Coast Tea-tree, Iceplant, Galenia, Euphorbias, Marram Grass</td><td>Kikuyu, Coast Tea-tree, Coastal Daisy, Iceplant, Galenia, Euphorbias</td></tr>
</table>

Continue to remove Coast Tea-tree working from south to north and patrolling for and controlling re-growth.
Control kikuyu around the perimeters of gullies and shack sites, taking care to ensure groundcover is maintained and no new infestations occur.

</td>
<td>

Spot spray other weeds throughout dune area but working outwards from good native vegetation areas and around revegetation.
Continue to manage weeds around old shack site in conjunction with revegetation and erosion management works.
Control Marram Grass and Sea Rocket where there is adequate native groundcover.
Investigate and implement options to rehabilitate gullies and prevent further stormwater erosion.

</td>
<td>

Revegetation to increase the cover and diversity of native species along the foreshore, especially spreading groundcovers such as Spinifex and Pigface.

</td>
</tr>
</table>

*For the purpose of this report the following target definitions apply:

- "Reduce weed threat" means to improve the BAM weed score by 3 (e.g. from 2/15 to 5/15)
- "Increase native species cover" means to increase the combined BAM raw score of cover ratings for groundlayer plant life forms by 5; groundlayer plants being the following plant life forms: Shrubs <2m, Forbs, Mat Plants, all Grasses, all Sedges, Ferns and Grass-tree
- "Increase native species diversity" means to increase the BAM weighted native plant species diversity score by at least 5 (i.e. from 20/30 to 25/30).

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1. INTRODUCTION

1.1 PURPOSE

The purpose of the Biodiversity Action Plan (BAP) for Aldinga Beach coastal reserve is to provide management strategies to direct conservation efforts aimed at preserving and enhancing the ecological integrity and biodiversity of the site informed by a comprehensive and accurate assessment of bushland condition.

1.2 BACKGROUND

Aldinga Beach coastline is a high priority conservation area, under the care and control of the City of Onkaparinga (CoO).

The site contains important dune and cliff top habitat and the Metropolitan Adelaide and Northern Coastal Action Plan (MANCAP) states that these habitats are of high conservation value, and the only high conservation value area south of Barker Inlet (Caton et al. 2009). At the landscape scale, Aldinga Beach Coastal Reserve is part of a larger conservation precinct that provides an important vegetation corridor along the coast (Map 1, Edge Impact TM 2023). It is continuous with Gulf St Vincent to the west, Aldinga Conservation Park to the east, Silver Sands Coastal Reserve to the south and Snapper Point to the north.

It contains a diversity of flora, habitat types and vegetation communities broadly grouped into:

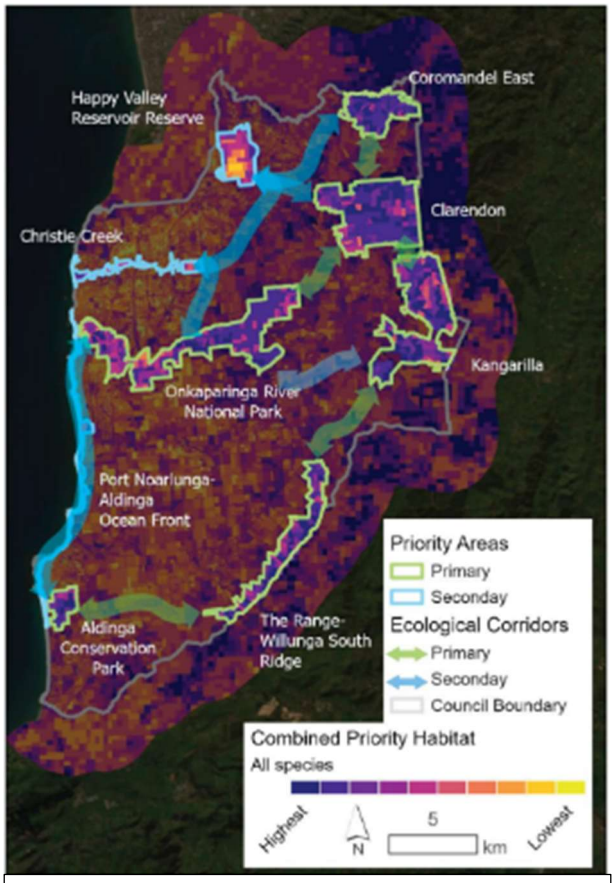
- Coastal heath on slopes and low cliffs
- Coastal shrubland on dunes and
- Tall shrubland and low woodland.

Green Adelaide (and its predecessor organisations) have supported CoO to manage the site, and Trees for Life/ Bush for Life volunteers also manage and restore two areas within the reserve.

The 2022 City if Onkaparinga community Survey identified the management of the environment and coast as the second highest priority for council to focus on over the next few years.

As custodians of public lands, the council recognizes the vital connection between restoring and managing ecosystems, including our urban environment, and the goal of conserving biodiversity and enhancing well-being. The council manages more than 2,100 hectares of open space, half of which contains significant habitats.

Given the amount of past ecological restoration effort invested, Green Adelaide and the City of Onkaparinga identified a need to develop a BAP that identifies and prioritises long term actions necessary to continue improving the site's ecological values. The integration of Bushland Assessments, utilising the methodology provided by the Native Vegetation Council, will provide critical baseline condition data and facilitate the tracking of habitat recovery progress.



Map 1 CoO priority and secondary ecological corridors for connecting priority habitat areas (Edge Impact TM 2023, supplied by CoO)

Links to regional strategies

Aldinga Beach Coastal Reserve is situated within the Green Adelaide (GA) Landscape Management Region. The Green Adelaide Regional Landscape Plan identifies Coastal Management as a key priority, with a goal to conserve and restore coastal and marine habitats and biodiversity. Key outcomes include coordinated conservation and restoration of natural coast and marine environments and improved biodiversity outcomes, including habitats and species of key conservation concern.

The CoO identifies the following goals as a focus for the Community Vision 2034: in the key result area of "Value natural world":

- Enhance the quality and quantity of tree canopy and vegetation across all land types to reduce
- urban heat islands and increase liveability
- Protect and maintain coastal features including beaches, reefs, cliffs and ecosystems
- Increase collaboration on new and traditional approaches to protect and regenerate natural spaces and biodiversity.

The CoO priorities include:

- Maintaining patches that have survived and are still in good condition.
- Improving the health of damaged habitats.
- Re-creating habitats by planting and helping bushland to spread naturally.
- Educating our communities to inspire a connection with the natural environment.

The Metropolitan Adelaide and Northern Coastal Action Plan (MANCAP) recommends the following for this High Conservation value reserve:

- Weed control and re-planting of local species.
- Education regarding garden plants becoming weeds and benefits of locally indigenous gardens.
- Aboriginal heritage sites recorded in this cell: need for appropriate and sustainable management.

Green Adelaide on ground actions are guided by the MANCAP.

1.3 HOW THE PLAN WAS DEVELOPED

The plan was developed by undertaking the following steps:

1. Review the existing management plans,
2. Collate background data from publicly available databases (Naturemaps, Atlas of Living Australia, iNaturalist) and data supplied by the CoO, Green Adelaide and Trees For Life (TFL),
3. Site survey using the Bushland Assessment Methodology (NVC 2017) and mapping and
4. Discussion with staff and contractors involved in managing the site.

2. SITE OVERVIEW

2.1 LOCATION

Aldinga Beach is located ~45 km SSW of Adelaide CBD, South Australia (Map 2). It lies in immediate proximity to Aldinga Conservation Park to the South-east (Map 3).

The site is approximately 15 ha in area and comprises the low cliffs and dunes adjoining the Aldinga Beach, but not the beach itself. The site is part of one coastal parcel (Table 1) and part of the road reserve for the Esplanade and Lower Esplanade.

Table 1. Land Parcel details for Aldinga Beach site

Parcel(s)	Title Details	Area (ha)
D45095 A53	CR/5352/513	75.63*

*part parcel only

2.2 ENVIRONMENTAL SETTING

Aldinga Beach is part of the eastern coastline of Gulf St. Vincent, serving as a natural boundary for Encounter Marine Park. It is backed by Aldinga Conservation Park to the east, a coastal woodland with high ecological importance for the Adelaide region. The area is part of a larger continuous coastal reserve network with Silver Sands to the south and Snapper Point to the north, both of which have similar BAPs.

Mean annual rainfall is 500mm. The soils and landforms comprise sand dunes and calcareous sand and clay slopes and low cliffs.

The area is of significant environmental and aesthetic value.

2.3 SURROUNDING AND HISTORICAL LAND USE

Kaurna Peoples are the traditional owners and custodians of the land on which the Aldinga Beach site is located and have Native Title over the site (NNTT 2023). The coastal area of Sellicks Beach and Silver Sands, as well as the Washpool and Blue Lagoons, were originally a Kaurna campsite and stone quarry workshop. The area has great cultural importance and includes a spring associated with the Kaurna creation Ancestor Tjirburki at the Washpool (Draper and Malland 2019).

The Aldinga area was surveyed in 1839 for allotments to be sold or leased for farming, with cereal cropping the major land use to follow and the area mostly cleared of native vegetation. The main township was built inland at Aldinga in the 1850s. The name Aldinga is based on the Kaurna word 'ngaltingga' for 'open space' which referred to the Aldinga plain (NMA 2024).

The swampy and sandy nature of the area now within Aldinga Scrub CP was unsuitable for farming and this area was left largely uncleared, providing an important biodiversity refuge for the region. An application to subdivide a portion of the scrub was refused by the Willunga Council in 1968 and over the following thirteen years 277 hectares were acquired and the Aldinga Scrub Conservation Park (north of Norman road) was gazetted in 1985[5]. The Washpool Lagoon, one of Adelaide's last remaining coastal freshwater and estuarine lagoon systems, was listed in the Directory of Important Wetlands in Australia. In 2022, the Aldinga Washpool was added to Aldinga Scrub CP and proclaimed as the Aldinga CP now totalling 340 ha.

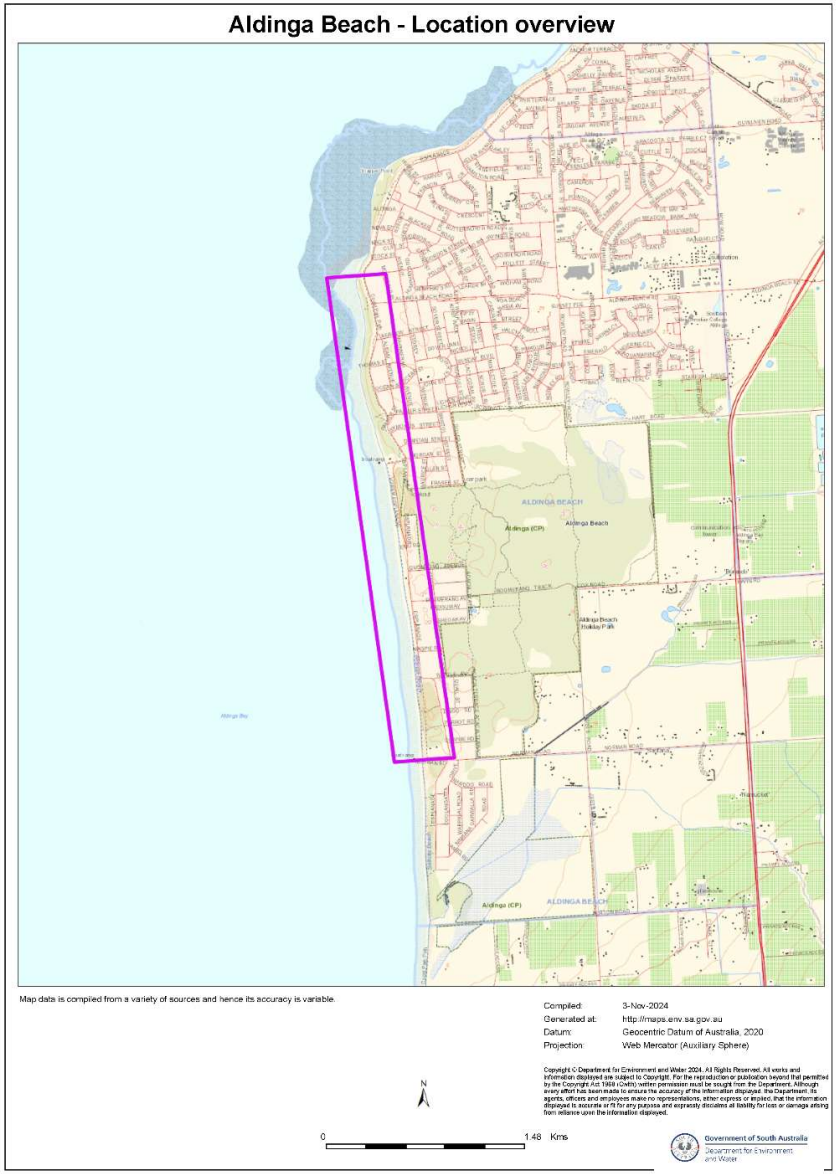
[5] https://www.friendsofaldingascrub.com.au/history

It is unlikely that the Aldinga Beach coast line was actively cleared (beyond the areas cleared for the Esplanade), except for small areas for shack sites, but there has been significant historical damage from vehicle, bike and pedestrian use, as well as dumping of fill.

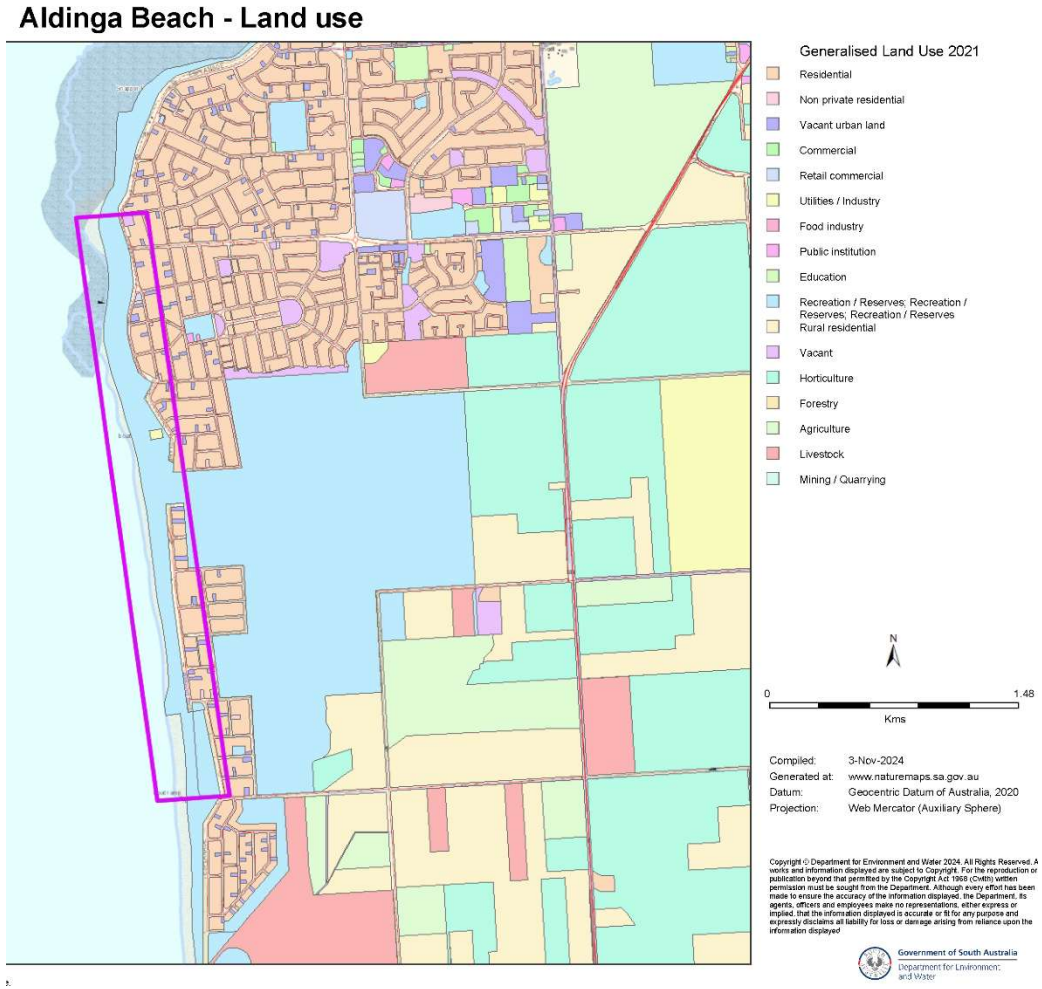
In recent years land has been subdivided along the coast and the population shifted to the coast. The Aldinga area is now a significant centre of current and future residential developments. This trend is occurring nationally:

> *"In 2001, 85% of Australia's population lived within 50 kilometres (km) of the coast, but by 2019, that proportion had risen to 87% (ABS 2020b). This equates to over 22 million Australians now calling the coast home. While coastal population growth has previously been concentrated in urban centres, it is now spreading to coastal townships and villages (Infrastructure Australia 2020). Regional coastal development as a result of migration out of the cities caused by the COVID-19 pandemic may increase this trend (see the Urban chapter).*
>
> *Pressures associated with population include the direct footprint of land use on coastal habitat, consequences of urban infrastructure (e.g. artificial light pollution) and the impact of human activities (e.g. tourism, recreation, recreational fishing and littering) on the coastal environment."* https://soe.dcceew.gov.au/coasts/pressures/population

Map 2 Regional overview (source DEW)



Map 3 (left) Location overview (source: DEW)



Map 4. Land use surrounding Aldinga Beach (Source: DEW)

2.4 RECENT SITE MANAGEMENT

The Aldinga Beach Coastal Reserve is crown land under the care and control of the City of Onkaparinga. The site is divided north and south by the beach access, carpark and café areas, and a portion is separated to the east by the Lower Esplanade (see Map 5).

A native vegetation management plan was prepared for a portion of the reserve (probably Management zone 6) in 2001 (EAC 2001). EAC noted that the site contained a high species diversity that is significant for the Adelaide coastal strip. Unauthorised bike and walking tracks and a 'blow-out' north of the carpark where a stobie pole had been installed (which was also being used as a bike jump) were noted as being concerns. The report described the steeper slopes as being highly degraded and dominated by exotic grasses. Priority weeds were: Western Coastal Wattle, Boneseed, Perennial Veldtgrass, Gazanias, Coast Tea-tree, Boxthorn, Olives, Soursobs, Kikuyu, Aleppo pines and Buckthorn/Blowfly Bush. Spanish Broom and Cotton Bush were also noted as being present (EAC 2001). Dumping of garden refuse and horse manure, as well as rabbit damage, (although no warrens were observed) were also noted as problems.

The CoO, with funding support from the Adelaide Mt Lofty Ranges Natural Resources Management Board (AMLR NRMB) (now Green Adelaide), and also previously the Urban Biodiversity Program have been undertaking weed control throughout the site. Woody weed control works were the primary focus through this section of coast, the majority of which was completed prior to and in 2016/17 which then left only seedling follow-up in 2017/18. Other priority weed control has included: Gazania, Bridal Creeper, Perennial Veldt Grass, Kikuyu, Buffalo Grass, Freeway Daisy, Sonchus Thistle, *Carpobrotus Edulis*, Freesia, Iceplant and succulents. Revegetation has been undertaken where there are areas of erosion or to replace weeds, with seedlings grown at the Council nursery.

The CoO has been working to restrict access within the reserve and has created designated walking trails, steps and boardwalks to connect the Esplanade to the beach, with fencing and signage to discourage the public from going into the dunes and cliff areas and revegetating sites. Fencing has been installed along most of the most of eastern edge of the reserve. Whilst the fencing and path consolidation has been largely successful in removing pedestrian foot traffic in sensitive areas, there are however several unauthorised trails that still appear to be regularly used.

Two Bush for Life sites have been established and are weeded by Bush Action Team volunteers (see Map 5). Green Adelaide provides funding support for the Trees for Life, Bush for Life program in the region.

Three Bushland Condition Monitoring (BCM) sites have also been established (see section 2.4.1 below).

Map produced by Catherine Miles (Miles Environmental)
Numbers indicate City of Onkaparinga management zones

Map 5. Site overview showing CoO management zones and monitoring sites

2.4.1 Changes in vegetation condition

Assessments and monitoring of vegetation condition at the site have focussed on the areas close to the carpark and boat ramp area and it is not possible to quantify changes elsewhere. Council and Green Adelaide staff observations are that the native species diversity at the site scale has always been good, the cover of native vegetation has improved, and the abundance and coverage of high threat weeds has been reduced through on-going and coordinated weed management. Degraded areas have been improved with natural regeneration and revegetation with local native species. In particular significant weed control and revegetation has been undertaken east and immediately north of the car park, as well as installing barrier fencing to prevent access (Figure 2.1).

Figure 2.1 Area immediately east of the boat ramp carpark adjacent to the Esplanade following installation of fencing and ready for revegetation in 1999

A range of high threat weeds that were noted as being present on the site in the EAC (2001) management plan were not observed in this survey for the same area, including Aleppo Pines, Coast Tea-tree, Boneseed, and Blowfly Bush. It also appears that the cover of Gazanias and Perennial Veldtgrass has decreased and only a single Boxthorn was observed.

There are three Bushland Condition Monitoring (BCM) sites within the Aldinga Beach coastal reserve (see Map 5). Key changes in the sites and photo-points are presented below. Note that while (BCM) and Bushland Assessment Method (BAM; NVC 2020; used for this plan) use similar range of indicators and methods, they are done over different size areas, with BCM covering 0.09 ha and BAM covering 1 ha. The monitoring generally shows the diversity and cover of native species and life forms has been maintained and improved while the abundance and diversity of high threat weeds has reduced. However, there are notable declines in the level of natural regeneration, likely attributed to high rabbit numbers.

BCM site ALD-ABCR-A-1

Location: E267607 N6092021
Monitored: 12/1/2009 and 3/4/2013
Photo 2009

2009 key points (Telfer 2009)

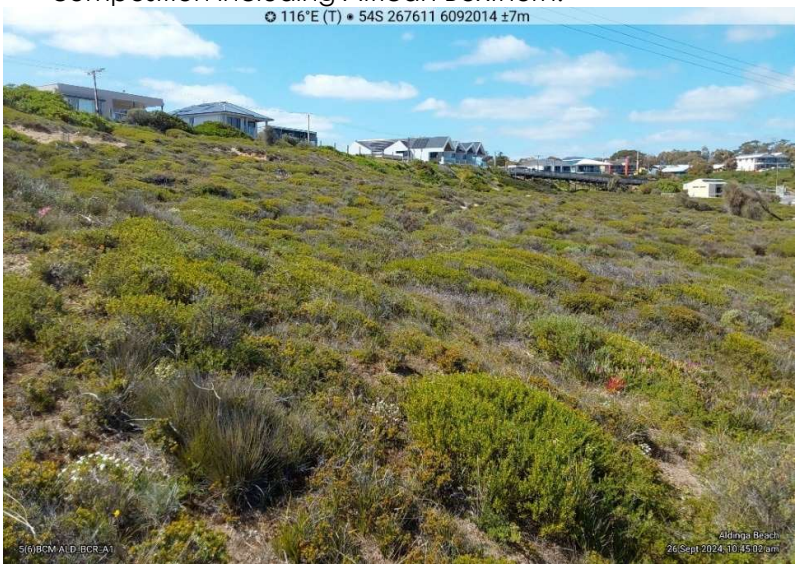
- Vegetation association: *Beyeria lechenaultii, Alyxia buxifolia, Olearia axillaris*, Low shrubland with emergent *Allocasuarina verticillata* over *Gahnia lanigera, Acrotriche patula, Pomaderris paniculosa, Calytrix tetragona* (SMLRCo7.2 - Coastal Shrublands & Tall Shrublands).
- Excellent native species diversity (37 species), ground cover level and regeneration.
- Good diversity of plant life forms.
- Weed abundance and threat moderate, mostly herbs and annual grasses; weed with moderate to high threat rating was African Boxthorn.

Photo 2013

2013 key points (New 2013)

- *Beyeria lechenaultii, +/- Allocasuarina verticillata* Low open shrubland over dense low vegetetion cover including *Gahnia lanigera, Lepidosperma sp.* with medium density *Acrotriche patula* and *Pomaderris paniculosa* (may now be 7.4 Coastal Cliff Low Shrublands, Hummock Grassland and Low Open Woodland)
- Native species diversity still excellent (34 species observed) and groundcover and regeneration;
- Plant life forms diversity increased to excellent.
- Weed abundance and threat declined to poor, similar composition including African Boxthorn.

Photo 2024 (this survey)



2024 key points

- Vegetation association as for 2013, site located in Vegetation association C, Management zone 6.
- Excellent native species (50 species including annuals; note larger survey area) and plant life forms diversity.
- Regeneration levels declined to moderate.
- Very low cover of weeds but threat level poor; no Boxthorns observed, one olive found, annual grasses still common but low abundance; Sparaxis at <1% and Sour Sobs 1-5% but would not have been present during past surveys due to timing.

BCM site ALD-ABCR-B-4

Location:	E267637	N6091940
Monitored:	20/08/2012	

Photo 2012

2012 key points (McCallum 2012a)

- Vegetation association: *Beyeria lechenaultii, Olearia axillaris, Acrotriche patula,* Low shrubland over *Lepidosperma viscidum, Gahnia lanigera* (SMLRCo7.2 - Coastal Shrublands & Tall Shrublands).
- Excellent native species diversity (43 species), diversity of plant life forms and regeneration.
- Good ground cover.
- Weed abundance and threat poor, mostly perennial herbs (including Soursobs, Gazania, Flatweed and Ribwort) and annual grasses; weed with moderate to high threat rating was Soursob; Broadleaf Cottonbush was also observed.

Photo 2024 (this survey)

2024 key points

- Vegetation association as for 2013 with the exception of *Olearia axillaris* not being dominant.

- Site located in Vegetation association C, Management zone 6, note as for A-1 this is classified as 7.4 Coastal Cliff Low Shrublands, Hummock Grassland and Low Open Woodland in this survey.
- Excellent native species (50 species including annuals; note larger survey area) and plant life forms diversity.
- Regeneration levels declined to moderate.
- Very low cover of weeds but threat level poor; no Broadleaf Cottonbush or Gazania observed.
- Track appears to have covered over slightly and shrubs established on slope adjacent to the Esplanade.

BCM site ALD-ABCR-B-5

Location:	E2676761	N6091789
Monitored:	20/08/2012	

Photo 2012

2012 key points (McCallum 2012b)

- Vegetation association: *Myoporum insulare,* very open shrubland with emergent *Eucalyptus porosa* over *Acacia paradoxa, Santalum accuminatum, A. pycnantha* (SMLRCo7.2 - Coastal Shrublands & Tall Shrublands)
- Excellent native species diversity (37 species), plant life forms diversity and regeneration
- Good groundcover level
- Weed abundance and threat very poor; weeds with moderate to high threat rating were African Boxthorn, Blowfly Bush, Soursob, Freesia, Bridal Creeper, Perennial Veldt Grass, Gazania and Kikuyu.

Photo 2024 (this survey)

2024 key points

- Vegetation association *Myoporum insulare* with Eucalyptus porosa low open woodland/tall open shrubland over *Rhagodia candolleana* and *Tetragonia implexicoma*, site located in Vegetation association D, Management zone 5
- Slight decline in native species diversity (30 species; note larger but slightly different survey area)
- Excellent plant life forms diversity
- No regeneration of woody species
- Very low cover of weeds but threat level poor; no African Boxthorn, Blowfly Bush; Freesia, Bridal Creeper, Perennial Veldt Grass, Gazania and Kikuyu still present but <1% cover; Soursobs 5-25% throughout.
- Comparison of the photo-points shows a very clear reduction in Perennial Veldtgrass and increase in native Muntries and Pigface groundcover.

3. ENVIRONMENTAL ASSETS

3.1 VEGETATION

The site is divided into vegetation association zones for the purpose of the site assessment and Biodiversity Action Plan. It should be noted that most of the vegetation associations do not align with the current management plan zoning. A summary of vegetation communities observed on site is provided in Table 2 and their distribution shown on Map 6. The zones are described in more detail in Section 5.2 and Appendix 2.

None of the vegetation communities are considered threatened at a State or National level, however the site is considered important as part of a section of coastline with the highest conservation value south of port Adelaide, and the Pale Turpentine Bush and Prickly Groundberry low heath found in Association C are considered endemic floristic community (Caton et al. 2009).

Rating	Vegetation Condition Score
Excellent	66-80
Good	51-65
Moderate	36-50
Poor	21-35
Very Poor	0-20

The Unit Biodiversity Score (UBS) and Total Biodiversity Score for each management zone (resulting from the site assessments) are provided in Table 2. Vegetation zone C (cover photo) is in excellent condition and has the highest biodiversity value (88). As noted below, Zone C also has a high number of regionally significant flora (although this doesn't contribute to the VCS or UBS). Zones B, D and G are also in good condition and are considered to have high biodiversity value (unit biodiversity score > 60). In general, the coastal dune sites are in poorer condition than the low coastal cliff zones.

Table 2. Vegetation associations, zones they occur in and vegetation description and sores (see Map 6)

Assn *	Mgt* Zone	Vegetation description	Area (ha)	VCS* /80	UBS *	TBS*
A	1 (all) 3 (all)	Coast Daisy-bush (*Olearia axillaris*) +/- Common Boobialla (*Myoporum insulare*) open shrubland over Pale Turpentine Bush (*Beyeria lechenaultii*) over Rolling Spinifex (*Spinifex hirsutus*), Karkalla (*Carpobrotus rossii*) and exotic herbs	2.17	47	60	131
B	2 (all)	Sea Box (*Alyxia buxifolia*), +/- Common Boobialla (*Myoporum insulare*), +/- Pale Turpentine Bush (*Beyeria lechenaultii*) heathy shrubland	1.66	57	**72**	120
C	4 (all) 5 (part) 6 (part)	Sea Box (*Alyxia buxifolia*) +/- Coast Beard-heath (*Leucopogon parvifolium*) and Cushion Fanflower (*Scaevola crassifolia*) low shrubland over sedges (*Lepidosperma* spp.) and Native Pigface (*Carpobrotus rossii)* grading to Pale Turpentine Bush (*Beyeria lechenaultii*) and Prickly Groundberry (*Acrotriche patula)* very low shrubland over Black Grass Saw-sedge (*Gahnia lanigera*)	4.38	70	**89**	391
D	5 (part)	Common Boobialla (*Myoporum insulare*) +/- Mallee Box (Eucalyptus porosa), with emergent Drooping Sheoaks (*Allocasuarina verticillata*) over Sea-berry Saltbush (*Rhagodia candolleana ssp. candolleana*) and Bower Spinach (*Tetragonia implexicoma*)	0.53	52	**64**	34
E	6 (part) 9-11 (part)	Coast Saltbush (*Atriplex cinerea*) +/- Common Boobialla (*Myoporum insulare*) open shrubland over Spinifex (*Spinifex hirsutus)* and weeds	3.67	29	**38**	140
F	8 (all)	Cushion Fanflower (*Scaevola crassifolia*) +/- Coast Daisy-bush (*Olearia axillaris*) open shrubland over Wallaby Grass (*Rytidosperma* sp.) and exotic grasses & herbs	0.51	39	49	25
G	7 (all) 9-11 (part)	Nitre-bush (*Nitraria billardierei*) shrubland over Pale Turpentine Bush (*Beyeria lechenaultii*), Bower Spinach (*Tetragonia implexicoma*) over native/exotic grasses and herbs	2.93	58	**75**	219
		Total Biodiversity Scores				1059

*Assn = Association, Mgt = Management, VCS = Vegetation Condition Score, UBS = Unit Biodiversity Score based on Bushland assessment; TBS = Total Biodiversity Score (UBS x ha)

Map produced by Catherine Miles (Miles Environmental)

Map 6. Distribution of vegetation associations, management zones (indicated by numbers) and location of photo-points

Significant flora observed on site are provided in Table 3 (a full list of flora by zone is provided in Appendix 1). No species of national significance have been recorded, however one state rare species (Creeping Boobialla) was observed in all except one zone. A total of 21 regionally significant species were recorded as part of the surveys and the regionally endangered Stiff White Spider Orchid has been recorded by Trees for Life at their Bush for Life site. Vegetation zone C had 17 regionally significant species, the highest number, while the next highest number (9) were recorded in Zones F and G.

Table 3. Summary table of flora of conservation significance

Scientific name	Common name	Regional	SA	Obs*	Number Zones
Acacia cupularis	Cup Wattle	RA		✓	7
Alyxia buxifolia	Sea Box	RA		✓	6
Caladenia rigida	Stiff White Spider-orchid	EN		O	-
Comesperma volubile	Love Creeper	RA		✓	1
Gahnia lanigera	Black Grass Saw-sedge	RA		✓	2
Goodenia willisiana	Silver Goodenia	RA		✓	1
Kunzea pomifera	Muntries	RA		✓	4
Lomandra collina	Sand Mat-rush	RA		✓	2
Lomandra effusa	Scented Mat-rush	RA		✓	3
Melaleuca lanceolata	Dryland Tea-tree	RA		✓	1
Minuria leptophylla	Minnie Daisy	RA		✓	1
Myoporum parvifolium	Creeping Boobialla	VU	R	✓	6
Nitraria billardierei	Nitre-bush	RA		✓	4
Pelargonium australe	Austral Stork's-bill	VU		✓	1
Pomaderris paniculosa ssp. paralia	Coast Pomaderris	RA		✓	4
Pultenaea tenuifolia	Narrow-leaf Bush-pea	RA		✓	2
Roepera confluens	Forked Twinleaf	VU		✓	2
Roepera glauca	Pale Twinleaf	RA		✓	1
Santalum acuminatum	Quandong	RA		✓	1
Scaevola crassifolia	Cushion Fanflower	VU		✓	4

*✓ = observed this survey, O = observed by BFL, a Caladenia sp. was observed during this project but could not be identified to species level.
R = rare, V = vulnerable, E = endangered

*FLB = Fleurieu Lofty Block regional rating, SA = listed under National Parks and Wildlife Act (SA)

Ratings are: R = rare, V = Vulnerable

Love Creeper

Silver Goodenia

Minnie Daisy and Sea Box seedlings

Narrow-leaf Bush-pea

Figure 3.1 Some of the regionally significant flora found at Aldinga Beach

3.2 NATIVE FAUNA

Native fauna surveys were not undertaken as part of the surveys for the BAP, although observed native fauna were recorded. Most notably, nationally Vulnerable Hooded Plovers, which regularly nest at Aldinga Beach, were seen nesting on the beach adjacent to the dunes. Hooded Plovers nest on sand and pebble banks above the high tide mark and young chicks need to access the shoreline to feed. High numbers of vehicles being able to access most of Aldinga Beach makes this a challenging site for raising Hooded Plover chicks, and Aldinga Beach has very poor breeding success compared with other beaches in the area. The CoO has implemented measures to prevent cars being parked directly in front of breeding sites (Furbank et al. 2023) and Fox control in this area is a priority. The Our Plover

Coast project has been controlling grassy weeds such as Sea Wheat Grass and replanting with native Rolling Spinifex. Early results show that Hooded Plovers have preferentially nested where this has occurred (W. Barnes, DEW, pers. com. 15/01/25).

EAC (2001) recorded state rare Rock Parrots within the site, and there is an iNaturalist record of state Vulnerable Yellow-tailed Black Cockatoos further north along the coast (Snapper Point), with many also observed in nearby Aldinga Scrub as part of another project survey by the authors. EAC (2001) considered the site is likely to provide habitat for Painted Dragons, however there are no nearby records in the Atlas of Living Australia (ALA).

Numerous birds associated with the coast have been recorded (but are not considered likely to use the site as habitat), including Eastern Osprey (state Vulnerable), one of which was observed flying above the dunes.

Sleepy Lizards and Singing Honeyeaters were frequently observed during the survey in all habitats, while several Mistletoe birds were seen in vegetation association D.

Native fauna records from the site are presented in Appendix 2. Threatened fauna species that have been observed at Aldinga Beach coastal reserve or recorded within a 2 km radius in Atlas of Living Australia and the site may provide habitat for are listed in Table 4.

Table 4. Summary table of fauna of conservation significance recorded from the site and within 2km of the site that the site may provide habitat for

Group	Scientific name	Common name	EPBC	SA	Obs*
AVES	*Thinornis cucullatus cucullatus*	Hooded Plover	VU	V	O
AVES	*Neophema petrophila*	Rock Parrot		R	P
AVES	*Hieraaetus morphnoides*	Little Eagle		V	X
AVES	*Melanodryas cucullata cucullata*	Hooded Robin (YP, MN, AP, MLR, MM, SE)	EN	R	X
AVES	*Falcunculus frontatus frontatus*	Eastern Shriketit		R	X
AVES	*Neophema elegans elegans*	Elegant Parrot		R	X
AVES	*Zanda funerea whiteae*	Yellow-tailed Black Cockatoo		V	X

*O = observed on site this survey, P = past record from within the site (EAC 2001), X = no observation from within the site (recorded nearby ALA)

Figure 3.2. Some of the most commonly encountered native fauna: Singing Honeyeater (left) and a pair of Sleepy Lizards (right)

Invertebrates

The Diamond Sedge Skipper Butterfly (*Antipodia atralba*) has no formal conservation rating but is considered locally vulnerable. It occurs in coastal areas from Marino CP to Newland Head CP, in heath habitats that support stands of Black Saw-sedge (*Gahnia lanigera*) on which the larvae feed. Areas of such habitat occur at Aldinga Beach (in Vegetation Association C and to a lesser extent in G) but none of the Butterflies have been observed; the closest population is 8.5 kms away at Moana South (Ento Search 2024a).

A translocation of Diamond Sedge Skipper Butterflies (eggs, larvae and adults) to a stand of Black Saw-sedge at Aldinga Beach was undertaken in 2024 to aid conservation of the species. Unfortunately the population failed to establish and it was considered that the site is too exposed, therefore no further translocations should be undertaken (Ento search 2024b).

3.2 LANDFORMS

A pebble bank runs from the southern extent of the site (extending into the adjacent Silver sands section) between the foredune and the beach (Figure 3.1). The pebble bank is important for providing protection to the dunes to slow erosion; climate change modelling suggests the pebble bank will provide longer term protection from anticipated climate change impacts (i.e. sea level rise, storm surges and high water events) (Western et. al. 2021). Maintaining the integrity of the pebble bank is important for protecting the dunes as well as habitat for Hooded Plovers and other fauna.

Figure 3.2 The pebblebank runs along the base of the foredunes for most of the site and is an important geological feature

4. THREATS

4.1 INVASIVE WEEDS

Weeds are classified as high threat if they meet one or more of the following criteria:

- Declared under the *Landscapes South Australia Act 2019*; and/or
- Red Alert weed rating of 3 or more using updated MANCAP (2023) ratings; and/or
- non-indigenous woody and herbaceous species noted to be proliferating in the site.

Table 4 provides a list of high threat weeds that have been recorded on the site. Soursobs are the most widespread weed, recorded in all zones, followed by Gazania, Capeweed, Sea Spurge, Common Iceplant and Kikuyu. Further information on the location where weeds have been recorded is provided in Section 5. A full list of introduced plant species by zone is provided in Appendix 2.

Table 5. High threat weeds recorded in the Aldinga Beach site

Scientific name	Common name	LSA	WoNs	SMLR-C threat	Number of Zones
Acacia cyclops	Western Coastal Wattle			5	2
Agave americana	Century Plant			4	1
Aizoon pubescens	Coastal Galenia			3	3
*Ammophila arenaria**	Marram Grass			3	2
Arctotheca calendula	Cape Weed			3	6
Asparagus asparagoides f. asparagoides	Bridal Creeper	Yes	Yes	5	2
Carpobrotus edulis ssp. edulis	Hottentot Fig			4	2
Cenchrus clandestinus	Kikuyu			3	5
Chrysanthemoides monilifera ssp. monilifera	Boneseed	Yes	Yes	4	1
Cynara cardunculus ssp. flavescens	Artichoke Thistle			3	1
Dimorphotheca fruticosa	Trailing African Daisy			3	2
Ehrharta calycina	Perennial Veldt Grass			4	5
Ehrharta villosa var. maxima	Pyp Grass			5	1
Euphorbia paralias	Sea Spurge			4	6
Euphorbia terracina	False Caper	Yes		4	1
Freesia cultivar	Freesia			4	4
Gazania linearis	Gazania	Yes		5	5
Leptospermum laevigatum	Coast Tea-tree	Yes		4	4
Limonium companyonis	Sea-lavender			3	4
Lycium ferocissimum	African Boxthorn	Yes	Yes	4	4
Mesembryanthemum crystallinum	Common Iceplant			3	5
Oenothera stricta ssp. stricta	Common Evening Primrose			4	1
Olea europaea ssp. europaea	Olive			3	3
Oxalis pes-caprae	Soursob			4	7
Rhamnus alaternus	Blowfly Bush	Yes		4	1
Scabiosa atropurpurea	Pincushion			4	5
*Thinopyrum junceiforme**	Sea Wheat-grass			5	2

*Not reliably identified or differentiated due to timing of survey

Garden escapees

Several of the weed species observed are "garden escapees" such as Gazania, Agave and various succulents (e.g. Cotyledon and Aloe). Gazania is now very widespread and most new plants are more likely to be sourced from within the site rather than adjacent properties, however in the longer term, as the population is reduced, plants in near-by gardens will become a source of re-infestation.

Green Adelaide works with Councils to raise community awareness about garden escapees, promoting Gazania free gardens distributing coastal garden booklets and providing native plant giveaways. This type of awareness raising, especially targeting Esplanade and Lower Esplanade residents, should be undertaken here.

Non-local native species

Western Coastal Wattle (*Acacia cyclops*), Sallow Wattle (*Acacia longifolia* ssp. *longifolia*) and Coast Tea-tree (*Leptospermum laevigatum*) are found in Aldinga Beach. The introduced wattles can be difficult to distinguish from native wattles, however the CoO have successfully removed most of the Western Coast Wattle and only a few small plants were found in zones E and G. Sallow Wattle is similar to the local subspecies Coastal Wattle (*A. longifolia* ssp. *sophorae*) and was only found in Vegetation Association D, adjacent to Aldinga CP, where more of it occur (Miles & Koch in prep.). If staff or contractors are not confident to distinguish the two subspecies it is suggested to have the non-locals flagged or marked in conjunction with those in Aldinga Scrub. On-going control is required as they produce seed that remains viable for many years.

Coast Tea-tree is more readily identified and has historically been abundant in the dune parts of the site north of the car park (i.e. vegetation zone E). The CoO have been controlling this species, generally working from south to north, with mature plants mainly confined to the most northern areas, however some seedlings were observed, indicating regular patrol and control will be required until the seed bank is exhausted.

There are a small number of non-local Eucalypts that appear to have been planted relatively recently (i.e. 3-5 years ago) near to paths and shelters. It is recommended that these be removed.

Over Weeding

Care needs to be taken to avoid "over-weeding" (i.e. controlling weeds over too large an area for native species to naturally regenerate), leading to bare ground which is at risk of erosion and/or re-colonisation by new weeds. Some examples of this were seen during the survey at different locations in the site, however the southern end of the site (i.e. management zone 1, Figure 4.1) is particularly susceptible given the narrow width between the base of the dune and edge of the road.

Figure 4.1 Example of over-weeding in management zone 1

This issue may partly arise due to some weeds needing to be controlled in late Winter/early Spring when there is little time for native species to germinate and establish before the soil dries out too much, leaving the site bare until next Winter. Where this is the case, weed control needs to be coordinated with active

revegetation and follow-up watering or mulching, however both may be challenging on steeper and/or difficult to access sites.

4.3 PEST ANIMALS

Diggings, warrens and buck heaps of Rabbits (*Oryctolagus cuniculus)* were observed during the survey, particularly in areas where Native Juniper (*Myoporum insulare*) are present, with warrens under many of these bushes. Rabbits are a priority to control due to their grazing of native vegetation (including planted, regenerating and more palatable native species such as grasses), impacting both native biodiversity values and contributing to soil erosion through removal of soil cover and creating preferential flow paths contributing to water erosion. The lack of natural regeneration observed in most zones is considered most likely due to rabbits.

Rabbit control is a priority and pest management utilising integrated site sensitive methods (i.e. taking into consideration cultural heritage and erosion risks) need to be employed on an on-going basis across land ownership boundaries. CoO have recently received a Green Adelaide grant to implement a baiting program for Aldinga Beach and Silver Sands that will be delivered from February and March 2025 in conjunction with release of a biological control.

The presence of Foxes (*Vulpes vulpes*) and Cats (*Felis catus*) is likely, although they were not seen during the survey. Foxes are a known threat to Hooded Plovers when breeding and therefore a priority for management; there is less evidence of cat predation however a cat predation was suspected las season (Flaherty, T. DEW pers. com. 23/01/25). CoO control foxes where they are threatening vulnerable or endangered species such as Hooded Plovers by monitoring during the plover breeding season and fumigating dens close to nesting sites. Fox management is coordinated by DEW (Green Adelaide and NPWSA) in conjunction with management of Aldinga CP.

4.4 EROSION

Aldinga Beach site has extreme inherent potential for wind and water erosion (Figures 4.2 – 4.3), with highly erodible sodic clay soils underlying some areas. This risk of erosion is exacerbated by multiple factors including:

- Stormwater outlets into the dunes and slopes as well as direct road run-off (Western et al. 2020) (e.g. Figure 4.4)
- High tides and storm surges eroding the base of the dunes and low cliffs (Western 2020) (e.g. Figure 4.5)
- The presence of exotic coastal grasses (e.g. Pypgrass) and other weeds, which have reduced the presence of native sand stabiliser plants, such as Rolling Spinifex (*Spinifex hirsutus*),
- A high rabbit population further heightens the risk by reducing the ability for native plants to regenerate and recruit through significant grazing pressure,
- A popular recreational asset, Aldinga Beach is subject to extensive foot traffic, that further threatens the structural integrity of the dunes,
- Vehicle access is permitted to some parts of the beach and can result in damage to the foot of the pebble bank and dunes.

Erosion of the narrower southern section of the dunes (i.e. management zones 1 to 3) poses a threat to the structural integrity of The Lower Esplanade (Western et al. 2020).

Along the northern part of the site there are steep "drop-offs" where old shack sites existed, evidence that the dunes once extended further out. Control of weeds originating from planting in these areas is being undertaken in conjunction with revegetation, however erosion management should be seen as the highest priority and weed control should be focussed on reducing the weed threat to surrounding areas rather than conversion the vegetation at these locations to native vegetation (i.e. remove fruits before seed set, or only control very high threat species).

Map 7 identifies the location of the major erosion sites observed during the surveys, however it is not comprehensive and the spatial scale of the affected areas is only approximate. As noted in section 5, a thorough assessment of erosion should be undertaken for this site, include more accurate mapping and classification of the affected areas, assets at risk (including infrastructure and biodiversity) and causes of erosion. Management measures need to be identified that are appropriate for the cultural, social and ecological values of the site.

CoO engaged consultants to undertake a coastal adaptation study (Western et. al. 2020) to bring together all previously undertaken studies about the coast, provide a baseline understanding of how the coast currently operates, and assess the coastal risks and vulnerabilities from sea-level rise, evaluating the risk of coastal inundation and erosion. The study found areas with soft sediment backshores in low lying areas, such as Aldinga, are likely to experience significant recession. Comparison of aerial photographs showed the coastline at Aldinga Beach carpark to be 9 to 11 m further inland in 2018 than it was in 1949. The study also noted the vulnerability of the Lower Esplanade to erosion during large storm events, although the pebble bank should continue to provide some protection to the southern shoreline until around 2050 (Western et. al. 2020).

CoO subsequently developed a Coastal Adaptation Plan (CoO 2024). The plan includes goals and actions for information and evidence, resilience, community knowledge and action and resources and capability. For Aldinga Beach (Lower Esplanade) "Hold the line" was selected as the adaptation option and the following action "Conduct trials on a nature-based solution to protect the Lower Esplanade through installing sand drift fencing that aims to support the establishment of a sand dune" to be undertaken in 2025-26.

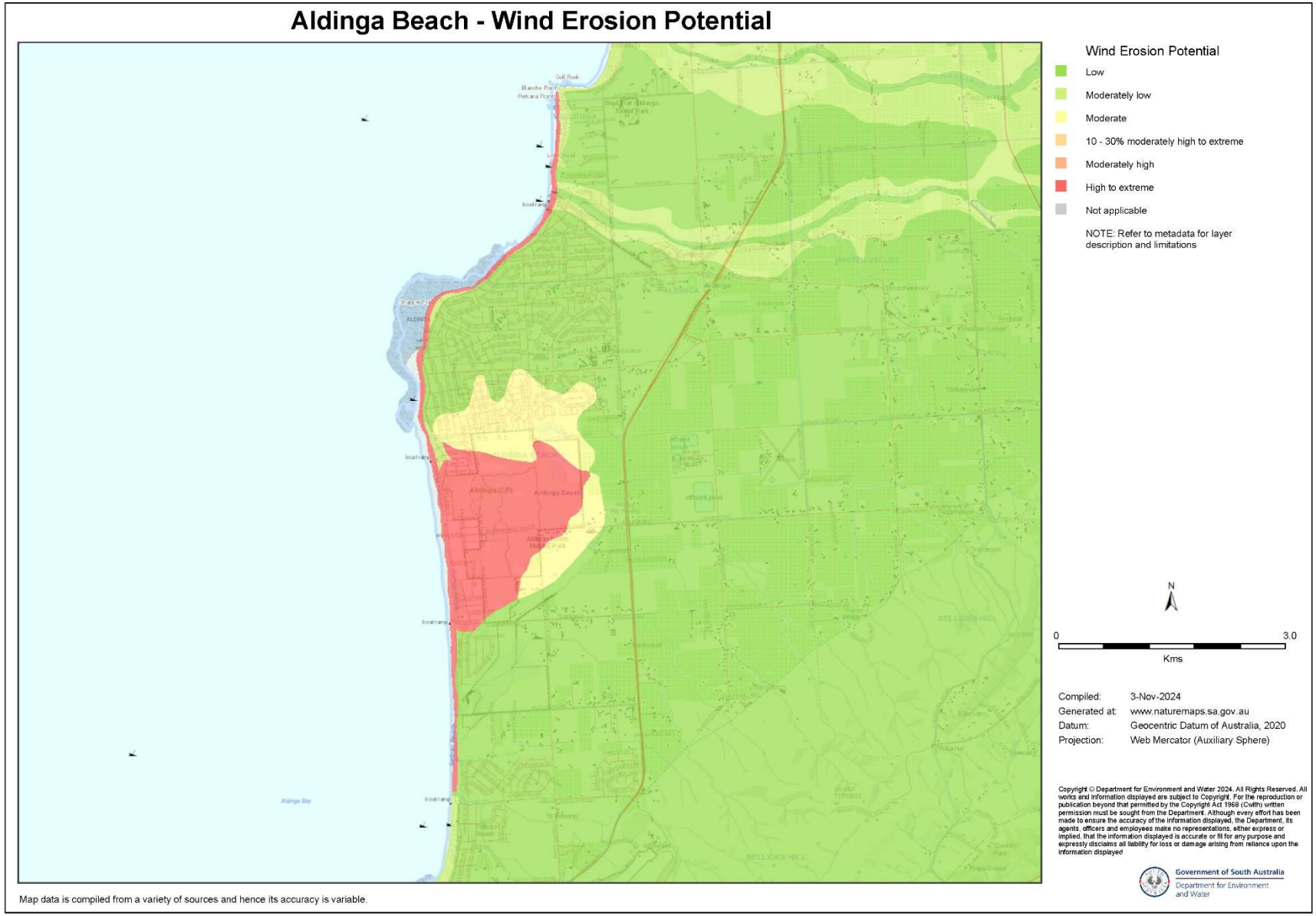


Figure 1.2: Wind erosion potential across Aldinga Beach (Source: DEW)

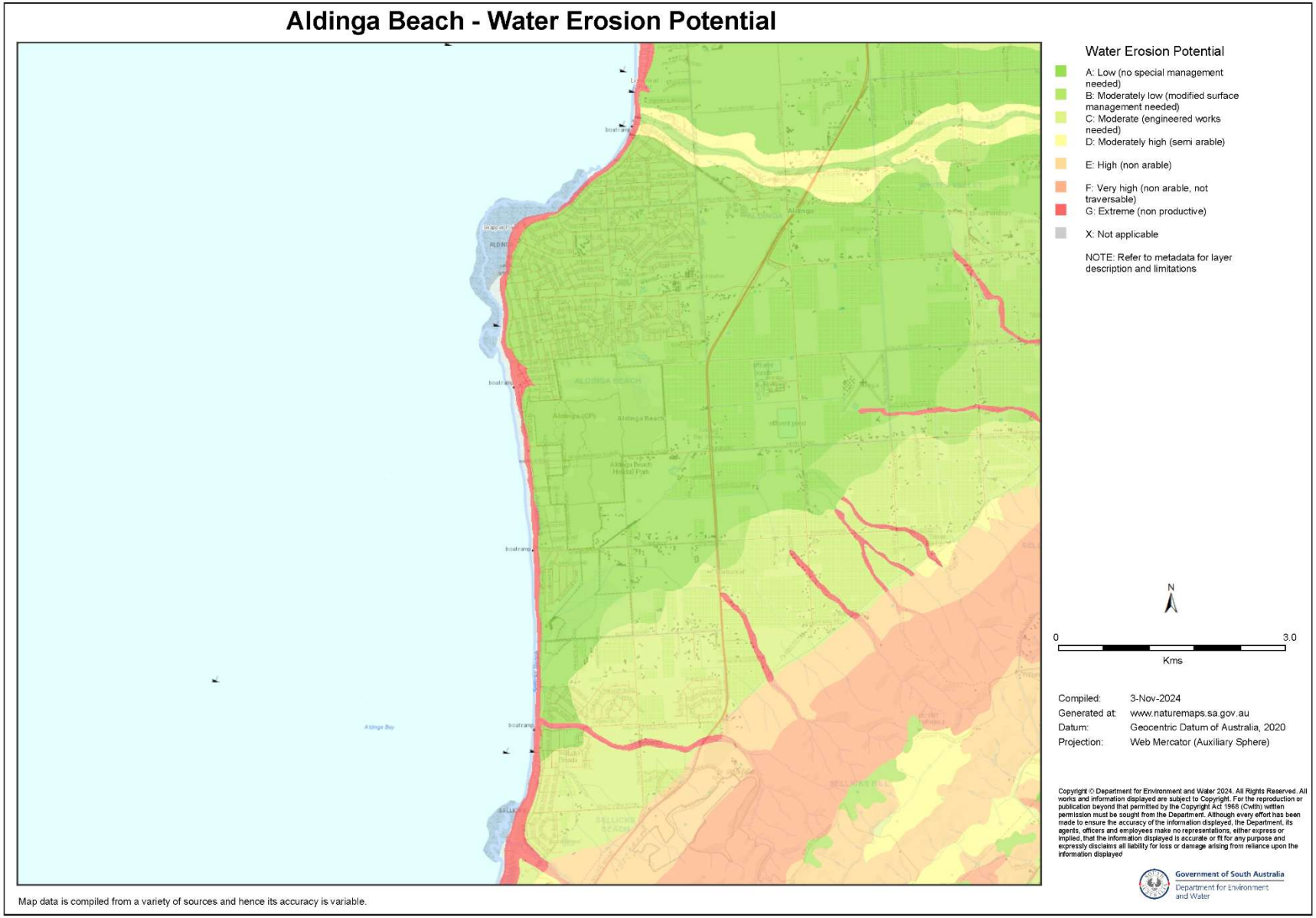


Figure 4.3: Water erosion potential across Aldinga Beach (Source: DEW)

Figure 4.4 (above left) Example of erosion of the base of the dunes at the southern end of management zone 2, note the narrow width and steep slope between the beach and the railing marking the edge of the Lower Esplanade

Figure 4.5 (above right) Stormwater outlet with erosion beneath

Figure 4.6 (above left) Large area of bare and eroded soil opposite the boat-ramp and carpark (management zone 5)

Figure 4.7 (above right) Various erosion control techniques have been trialled at this location, with coir logs (pictured) being successful at trapping sediments and facilitating recovery of the toe of the slope.

4.5 OTHER THREATS AND MANAGEMENT ISSUES

Climate Change

As a low-lying coastal reserve, the Reserve is vulnerable to projected changes in climate (as per Green & Pannel 2020, Western et al. 2020) including:

- Sea-level rise and storm magnitudes increasing, causing more pressure along the western edge of the zone; and
- Increasing temperatures and aridity impacting the survival of native vegetation and making it more difficult to establish native species, potentially leading to loss of species that are most sensitive to these changes.

With the road and urban zone along the eastern boundary of the site, the dune system cannot migrate inland if the beach front moves eastwards. The actions set out in this plan will help to maintain and improve the resilience of the dune environment to climate change, but as discussed above, engineering solutions may be required at some locations.

As noted previously, the pebble bank along the foredunes is considered important for providing protection to the dunes against anticipated climate change threats (Western et al. 2021).

Cultural Heritage

The Reserve is classified as a Culturally Significant Area containing Kaurna cultural heritage (CoO 2024) that is vulnerable to damage from a range of activities. On-ground activities, particularly those involving ground disturbance, are carefully planned to prevent damage to sites and when required, cultural monitors engaged.

Preventing public access to these areas to minimise collection of artefacts and accidental damage is also important.

Unauthorised Site Access

CoO have implemented a range of measures to close historic tracks through the reserve (including revegetation, fencing and the construction of raised steps and ramps), and it is likely that overall pedestrian impacts have been reduced. However some tracks are still being used by pedestrians and bike riders, contributing to erosion, damage to native vegetation and impacts on wildlife (e.g. a baby Sleepy Lizard was found dead with bike tracks indicating a bike was the cause of death). With the poor soils compacted and harsh coastal environment, these areas take a long time to naturally regenerate. In some cases branches have been laid across tracks, which can facilitate recovery, but these are being moved aside by track users. Revegetation is generally required to assist impacted areas to recover, but the species selection needs to be based on the vegetation associations at the location to assist these areas to recover to their 'natural' association rather than introducing species that wouldn't naturally occur (see below).

Community education and maintaining signage and fencing will need to be on-going, and some patrolling of the areas by CoO staff during holiday seasons may assist. Two areas are priority for additional works:

- At the **southern end of Management Zone 6** there is one trail that runs north-south along the powerline route, and another that runs east west (see BCM photo in section 2.4.1). There are several orchids growing on the edge of the trails and this is some of the highest value vegetation in the site. Given that considerable effort has gone into preventing use of this trail in the past, options to formalise the north south track should be considered, including potentially installing an additional raised ramp connecting the Esplanade to the carpark. The short term impacts of construction will need to be weighed up with longer term benefits.

- At the **northern end of Management Zone 6 and into Management Zone 8** there is a significant amount of tracking down to the beach access, including what look like bike paths. This is preventing recovery of native vegetation. There is no fencing along the Esplanade footpath in this area and therefore an initial step should be fencing.

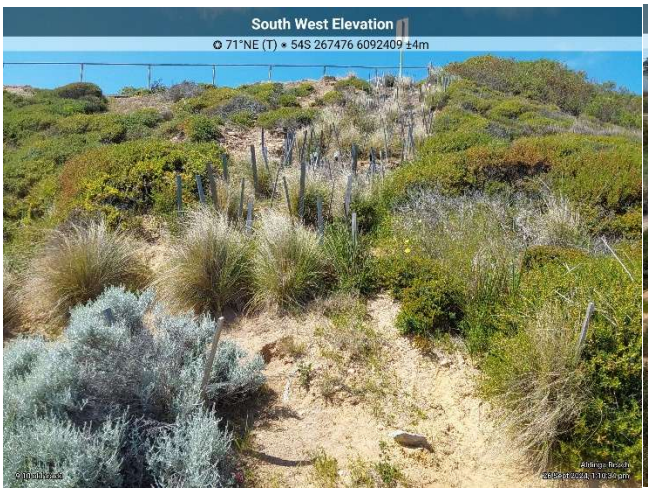


Figure 4.8 Example of successfully closed track (note species are local to the area but not this vegetation association)

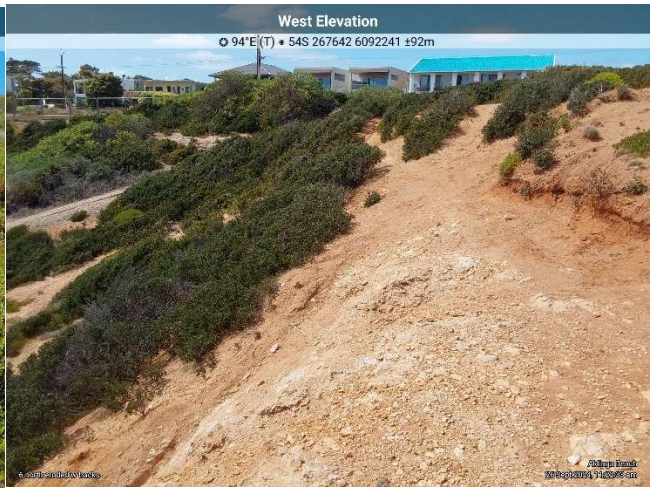


Figure 4.9 Damage from pedestrians and bikes at the northern end of Management Zone 6/boundary with Zone 8.

Revegetation with generic mixes

Revegetation has been undertaken at various locations throughout the reserve over many years, generally to establish vegetation on disturbed areas. While the planted species are all local to the Aldinga area, there are a number of instances where the species planted do not occur elsewhere in the same vegetation association. For example, there is wide use of Clasping Goodenia (*Goodenia amplexans*), and several plantings of Drooping Sheoak (*Allocasuarina verticillata*), neither of which are found growing naturally in the reserve, as well as planting of Sea-berry Saltbush (*Rhagodia candolleana*) in heathy habitats where it was not found naturally.

In general, there is probably a relatively low level of impact to the site biodiversity in comparison to other threats from such plantings, however, given the high level of diversity already present in most zones, it is recommended to match revegetation species to the relevant communities in future plantings. The exception may be on very challenging (e.g. eroded) sites where establishing cover is a priority and few species will grow.

Local Volunteer Management

Volunteer groups are an important asset in weed control and coastal protection. Successful groups, such as the Friends of Aldinga Scrub and Friends of Tennyson Dunes, are a great example of long-term commitment to habitat restoration. While Bush for Life volunteers undertake management of the two Bush for Life sites, the volunteers are from the general Bush Action Teams and not regular visitors to the area. More local ownership of the site may also lead to reduced use of unauthorised tracks and trails. It is recommended that Green Adelaide and/or CoO and TFL engage with the local community to attempt to establish a local coastcare group, expand the work of existing groups or at least hold land manager led community events. It is however noted that there are a number of volunteer environmental groups in the area, (e.g. Friends of Aldinga Scrub, Hooded Plover volunteers) and it would be important to not impact the volunteer resources of these groups.

Map 7. Location of major erosion sites and unauthorised access routes

5. MANAGEMENT PLAN

5.1 MANAGEMENT OBJECTIVES

The biodiversity management objectives for Aldinga Beach coastal reserve are to:

- Maintain and improve site biodiversity;
- Improve ecosystem resilience[6];
- Conserve cultural heritage values of the site;
- Implement an adaptive management approach informed by regular monitoring of outcomes;
- Recreational, cultural, educational and amenity values of the site are considered in decisions;
- Reduce erosion impacts to site values.

To achieve the objectives outlined above, management requirements and locations are prioritised based on a combination of biodiversity asset value and threat (Table 6):

- Asset value
    - higher value assets are the highest priority to manage, these areas contain the greatest biodiversity values and have the most to lose if they decline in condition;
    - lower value assets are lower priority to manage, they contain lower biodiversity values and have less to lose;
    - asset value is assigned on the basis of the management zones and their Unit Biodiversity Score.
- Threat level
    - highest threats are those with the potential to affect a large area and/or significantly reduce the condition of high value assets;
    - lowest threats are those that have the least potential to cause further impacts to the biodiversity value;
    - in the case of weeds, threat levels are assigned as per Table 5, whilst other threats are assigned as per the two previous points.

In practice, this generally translates to the highest priority weed control actions being to

1. Maintain high biodiversity sites (this may only require low level of input),
2. Control high threat weeds (which may mean working in low value biodiversity areas where the weeds have potential to easily spread to better condition areas), and
3. Work from areas of good condition vegetation / low weed level towards poorer condition vegetation and high weed level.

Table 6. Biodiversity value rating and zone management priorities to provide guidance on management priorities across a reserve

Unit Biodiversity Score	Zone Biodiversity Rating	Action priority for zone		
		High priority	Medium priority	Low priority
>60	High	Highest priority action for whole site	High priority action for whole site	Moderate priority action for whole site
40 -59	Moderate	High priority action for whole site	Moderate priority action for whole site	Low priority action for whole site
< 40	Low	Moderate priority action for whole site	Low priority action for whole site	Lowest priority action for whole site

[6] The ability of an ecosystem to persist (maintain essential function, identity structure and capacity for transformation) in response to a disturbance or hazardous event or trend (IPCC 2022; Thoms et al. 2024; CoA 2024)

5.2 MANAGEMENT ACTIONS AND TARGETS

Target Definitions

In this plan the following target definitions apply:

- "Eradication" of a weed means that the species are no longer present except as seedlings that may continue to germinate and require on-going patrol and control.
- "Reduce weed threat" means to improve the BAM weed score by 3 (e.g. from 2/15 to 5/15)
- "Increase native species cover" means to increase the combined BAM raw score of cover ratings for groundlayer plant life forms by 5; groundlayer plants being the following plant life forms: Shrubs <2m, Forbs, Mat Plants, all Grasses, all Sedges, Ferns and Grass-tree
- "Increase native species diversity" means to increase the BAM weighted native plant species diversity score by at least 5 (i.e. from 20/30 to 25/30).

Vegetation Associations vs Management Zones

The site is divided into vegetation association zones for the purpose of the site assessment as the survey methodology requires an assessment area to be one vegetation association. The CoO have divided the site into 11 zones for management, some of which align with the vegetation zones, however several management zones have more than one distinct vegetation association (Map 6). To assist in identifying where works should be undertaken, management actions are specified for management zones where appropriate.

Whole of Site

The following targets and actions apply to the whole site:

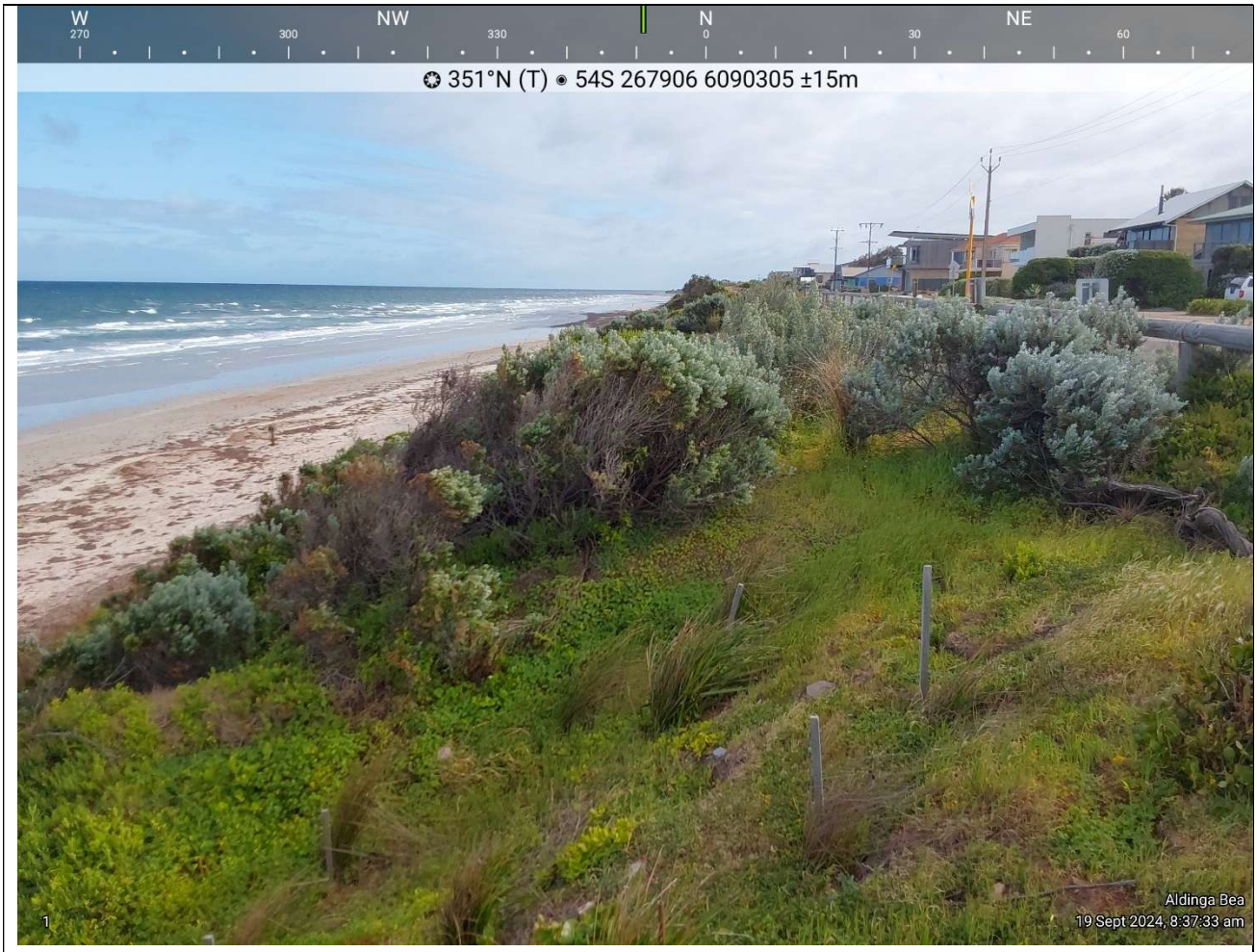
5-year targets	Management actions
Grazing pressure impacts from rabbits reduced to a point where palatable species can naturally regenerate.	Develop and implement an integrated cross tenure rabbit control program consisting of baiting, fumigation, ripping.
High threat weeds currently in low abundance eradicated from the site.	Annual patrol for and treatment of Freesia, Sparaxis, Olives, Boxthorn, Buckthorn.
Physical cultural heritage preserved and living cultural heritage facilitated and supported.	Prevent damage to cultural heritage by adhering to the *Aboriginal Heritage Act* 1988. Facilitate and support programs focussed on communicating intangible cultural heritage.
Implement the *Coastal Adaptation Action Plan 2024-30* with respect to Aldinga Beach	Conduct trials on a nature-based solution to protect the Lower Esplanade through installing sand drift fencing that aims to support the establishment of a sand dune[7]. Sensitive control of weeds and supportive planting of spreading native Spinifex and other groundcovers. Block public access to high-erosion areas.
Reduce informal public access.	Investigate additional formal access points where other options to deter have not been successful. Maintain public education and physical barriers to ensure people remain on designated trails.

[7] Action 2.11 of CoO (2024)

5-year targets	Management actions
Ensure native species establish where exotic species are removed.	Prevent follow-up weeds establishing after weed control by not over-clearing and undertaking follow-up monitoring and control.
New weeds not introduced from gardens.	Undertake targeted engagement with adjacent residents to not plant species with weed potential such as Fountain Grass, Coastal Daisy and Gazania, and encourage use of local native species in gardens.
Coordinated management of site.	Annual meeting of volunteer coordinators, site managers and contractors to review work plan.
Regular volunteer activity focussed on environmental management occurring across the site (minimum 4 times annually).	Land manager coordinated volunteer events held across the site on a quarterly basis.
Grazing pressure impacts from rabbits reduced to a point where palatable species can naturally regenerate.	Develop and implement an integrated cross tenure rabbit control program consisting of baiting, fumigation, ripping.

Vegetation Association A – Coast Daisy-bush open shrubland in moderate condition

Management Zones: 1 (all) and 3 (all)



Vegetation Type A, looking north from the southern end of Management Zone 1

Dominant overstorey	*Olearia axillaris*	Coast Daisy-bush
	Scaevola crassifolia	Cushion Fanflower
	Beyeria lechenaultii	Pale Turpentine Bush
Dominant understorey	*Carpobrotus rossii*	Karkalla
	Spinifex hirsutus	Rolling Spinifex
Management issues	• Overall good native species and plant life forms diversity but high threat weeds and low native compared to exotic biomass. There is very little natural regeneration but revegetation has been undertaken in some areas to re-establish native cover. • Sections of disturbed, bare ground, partly due to damage from foot traffic, water erosion but some areas also left bare following weed control. • The landform is partly sand dune and partly harder clayey and limestone soils with rubble and possibly past disturbance from the road construction. The pebblebank extends along the edge of this zone and the beach; it is thinner at the southern end but improves going north. • Very narrow width in some areas between base of dune and edge of road, with potential erosion from seaward side to result in road	

<table>
<tr><td></td><td>damage; over-weeding along road verge is causing insufficient soil cover that contributes to erosion; this zone (and zone B) is a priority for erosion management. In some areas the barrier fence along the Lower Esplanade is being undermined and collapsing; replacing the fence with a cyclone mesh (such as is used further north) may be more effective at deterring public access while being lighter weight.
• Some areas have been "over-weeded" which may exacerbate erosion.
• Caltrop was not observed during the survey but has been treated along the roadside.</td></tr>
<tr><td>5-year target</td><td>Reduce weed threat and increase the cover of native groundlayer species.</td></tr>
<tr><td>Management action priorities</td><td>High priority:
• Control isolated high threat weeds and reduce the cover of other high threat weeds:
<table>
<tr><td></td><td>Mgt[8] Zone 1</td><td>Mgt zone 3</td></tr>
<tr><td>Eradicate isolated and low cover</td><td>Iceplant, Pypgrass, Pussytail, Galenia, Sea Rocket, Perennial Veldtgrass, Euphorbia, Boxthorn, Caltrop, Sea Wheat Grass, Freesia and Scabiosa.</td><td>Dew Plant, Onion Weed, Iceplant, Scabiosa. Monitor for re-growth of woody weeds previously controlled.</td></tr>
<tr><td>Contain and reduce cover</td><td>Generally working from the northern and southern ends to the middle: Gazania, Seaside Daisy, Hottentrot Fig, Sea Spinach, Marram grass; Kikuyu around walkways.</td><td>Generally working from north to south: Gazania, Coastal Daisy, Sea Spinach, Marram grass, Sea Lavender, Sea Rocket.</td></tr>
</table>
• Stabilise dunes and reduce erosion potential through planting spreading native groundcovers (e.g. Spinifex, Pigface) reducing over-weeding and investigating options to replace the barrier fence.
Medium:
• Spot spray around plantings and along edge of weedy areas.
• Revegetate bare areas (including toe of dune) with spreading native groundcovers (e.g. Spinifex, Pigface).
• Control Marram Grass where there is adequate native groundcover
Low:
• Supportive plantings to increase native biomass if natural recruitment fails to increase.</td></tr>
</table>

[8] Mgt = Management

Vegetation Association B – Sea Box and Pale Turpentine Bush heathy shrubland in moderate condition

Management Zone: 2 (all)

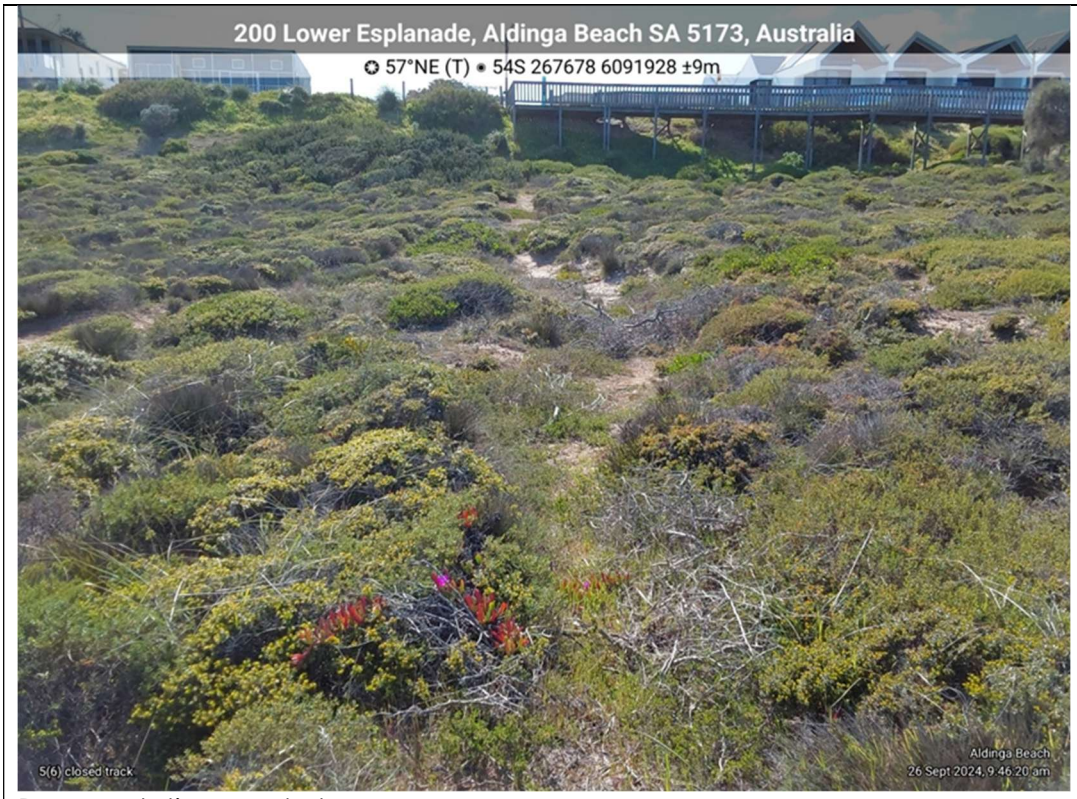
Note pebblebank in foreground and narrow width to road edge (wooden rails)

Dominant overstorey	*Alyxia buxifolia*	Sea Box
	Myoporum insulare	Common Boobialla
	Beyeria lechenaultii	Pale Turpentine Bush
	Olearia axillaris	Coast Daisy-bush
Dominant understorey	*Acrotriche patula*	Prickly Ground-berry
	Tetragonia implexicoma	Bower Spinach
Management issues	• High levels of erosion, with stormwater outlets, road run-off and high storm surges likely contributors. The zone is very narrow in parts and a priority for erosion management. • The soil varies but is mostly sand with areas of harder clay and limestone rubble. The pebblebank extends along the base of edge of the zone with the beach. • The vegetation has a higher native species diversity and cover and more "heathy" type species than Vegetation Association A giving an overall high vegetation condition rating. • There are a range of high threat weeds throughout but the ratio of native to exotic biomass is more native than Association A.	

	• Marram Grass is common along the base of the dunes but is retained due to the need to retain some groundcover, however in time native species should be promoted. • Little evidence of natural regeneration & recruitment. • As for Zone A, there is a very narrow width in some areas between base of dune and edge of road, with potential erosion from seaward side to result in road damage; over-weeding along road verge is causing insufficient soil cover that contributes to erosion; this zone (and zone B) is a priority for erosion management. In some areas the barrier fence along the Lower Esplanade is being undermined and collapsing; replacing the fence with a cyclone mesh (such as is used further north) may be more effective at deterring public access while being lighter weight.
5-year target	Reduce weed threat and increase the cover of native groundlayer species.
Management action priorities	**High priority:** • Reduce cover of invasive weeds (Gazania, Coastal Daisy, Iceplant, Soursob, Hottentot Fig, Perennial Veldt Grass, Freesia, Scabiosa, Sea Lavender and Sea rocket), removing isolated plants then working from the edge of patches inwards. • Remove Coast Tea-tree and monitor for and control re-growth of this and other high threat weeds. • Stabilise dunes and reduce erosion potential through planting spreading native groundcovers (e.g. Spinifex, Pigface) reducing over-weeding and investigating options to replace the barrier fence. **Medium:** • Control Marram Grass where there is adequate native groundcover. **Low:** • Supportive plantings to increase native biomass if natural recruitment fails to increase (after rabbit control)

Vegetation Association C – Sea Box, Coast Beard Heath, Cushion Fanflower and Pale Turpentine Bush coastal heath in excellent condition

Management zones: 4 (all), 5 (part), 6 (part)



Representative quadrat area

Dominant overstorey	Alyxia buxifolia	Sea Box
	Beyeria lechenaultii	Pale turpentine Bush
	Scaevola crassifolia	Cushion Fanflower
	Leucopogon parviflorus	Coast Beard-heath
Dominant understorey	*Acrotriche patula*	Prickly Ground-berry
	Kunzea pomifera	Muntries
	Carpobrotus rossii	Karkalla
	Gahnia lanigera	

Management issues

- This association is in excellent condition with high native species and life forms diversity and high proportion of native vs exotic biomass; species diversity includes Orchids.
- Bush for Life sites 44 and 45 cover parts of the association; Bush for Life volunteers assist to maintain these areas and have detailed plans for their areas.
- Weed pressure from high threat but low abundance weeds, these are a priority for follow up to ensure gains from past work are realised.
- Unauthorised access: Council have attempted to close trails but people are still using them, if future efforts to limit access are unsuccessful consideration should be given to establishing some additional boardwalks to direct foot-traffic, taking into consideration the sensitivity of the site and the benefits and impacts of both options.
- Large area of erosion on Lower Esplanade bend with past treatment, coir logs appear most successful (see figures 4.6 and 4.7) but erosion is still active.

<table>
<tr><td></td><td>

Northern end declines in condition with lots of tracks; Freesias have also started to establish in this area and Mustard weed should also be removed during Winter/spring (M. Endacott, DEW, pers. com. 17/01/25).
The road reserve that extends into Aldinga Scrub (Management Zone 4) had Coast Tea trees removed and is very bare, Targeted revegetation with appropriate and fast-growing species could assist to reduce erosion. Patches of Back Grass Sedge in Management Zone 6 have been identified as suitable habitat for Diamond Sedge Skipper Butterfly and a translocation was attempted in 2024, monitoring indicates it was not successful and no further translocations have been recommended (Stolarski 2024).

</td></tr>
<tr><td>5-year target</td><td>Maintain vegetation in excellent condition, eradicate isolated high threat weeds and increase cover of native species in bare areas.</td></tr>
<tr><td>Management action priorities</td><td>
High priority:

Review existing unofficial tracks: recommend new boardwalk to provide direct route from Esplanade to carpark above unauthorised trail and additional barriers and signage to close trails to north.
Monitor for and control re-growth of weeds previously removed from the site.
Control isolated high threat weeds and reduce the cover of other high threat weeds:

<table>
<tr><td></td><td>Mgt Zone 4</td><td>Mgt Zone 5</td><td>Mgt zone 6</td></tr>
<tr><td>Eradicate isolated and low cover</td><td>Onion weed, Scabiosa, Succulents, Perennial Veldtgrass, Agapanthus</td><td>Onion weed, Perennial Veldtgrass, Freesia, Bridal Creeper, Iceplant, Scabiosa and Sea Lavender</td><td>Gazania, Boxthorn, Freesia Sparaxis, Olive, Lavender/Rosemary</td></tr>
<tr><td>Contain and reduce cover</td><td>Soursobs</td><td>Annual grasses, Soursobs Gazania</td><td>Soursobs, Annual grasses</td></tr>
</table>
Medium:

Control other weeds (including Mustard Weed and Freesias), working outwards from areas of good native vegetation:

MZ4: working from Lower Esplanade then uphill
MZ 5: working from southeast to northwest
MZ 6: working from south to north

Revegetation of bare area in MZ4, monitor for and follow-up weed control this area.
Undertake specific assessment of erosion control options for the area of erosion on the SE bend of the Lower Esplanade and implement as required.

Low:

Appropriate local native plantings in closed trails to assist in rehabilitation and provide a visual indication of environmental works.

</td></tr>
</table>

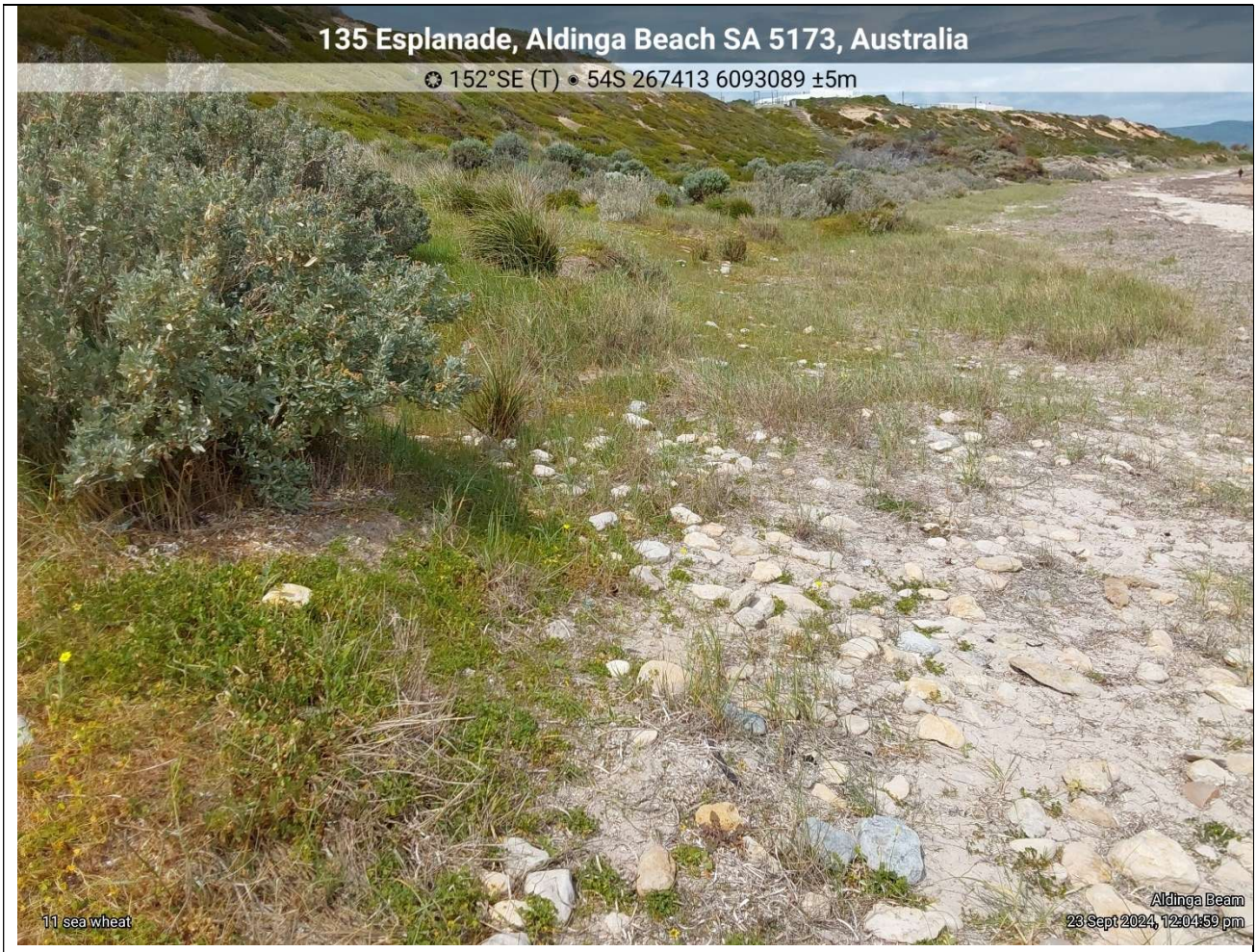
Vegetation association D – Common Boobialla tall shrubland with Drooping Sheoaks and Mallee Box in good condition

Management Zone: 5 (part)

Dominant overstorey	*Myoporum insulare*	Common Boobialla
	Eucalyptus porosa	Mallee Box
	Allocasuarina verticillata (emergent)	Drooping Sheoak
Dominant understorey	*Rhagodia candolleana*	Seaberry Saltbush
	Tetragonia implexicoma	Bower Spinach
	Kunzea pomifera	Muntries
	**Oxalis pes-caprae*	Soursobs
Management issues	• Good level of weed control achieved to date (see section 2.4.1) with most high threat weeds only occurring at <1%, however Soursobs remain high. • High native species and life forms diversity. • The association is part of Bush for Life site 45, volunteers work to a detailed plan for this area • No regeneration observed likely due to rabbit grazing with numerous burrows observed under Boobiallas; rabbit control is recommended above as a "Whole of Site" action	
5-year target	Increase the cover of native groundlayer and reduce weed threat.	
Management action priorities	**High priority:** • Control isolated high threat weeds (Bridal Creeper, Gazania, Freesia and Perennial Veldtgrass, Sallow Wattle, Salvation Jane, Coast Tea-tree). • Reduce cover of Soursobs working from edge of native groundcover **Medium:** • Control other weeds, working outwards from areas of good native vegetation. • Supportive plantings to increase native biomass if natural recruitment fails to increase (after rabbit control)	

Vegetation Association E – Coast Saltbush and Common Boobialla open shrubland in poor condition

Part Management zones 6 and 9 to 11



Dominant overstorey	*Myoporum insulare*	Common Boobialla
	Atriplex cinerea	Coast Saltbush
	Olearia axillaris	Coast Daisy-bush
Dominant understorey	*Spinifex hirsutus*	Rolling Spinifex
	Carpobrotus rossii	Karkalla
	**Cenchrus clandestinus*	Kikuyu
	Tetragonia implexicoma	Bower Spinach
Management issues	• This zone comprises the foredune in Management Zones 6 to 11. • Includes sites where shacks have been removed in Mgt Zone 10, covered in exotic kikuyu and succulents (e.g. Agave, Aloe spp.) and other common invasive coastal garden plants such as Tamarix trees that are spreading around the perimeter. These areas are generally now incorporated as picnic areas and Council has been removing exotic species, however this is being done with care and replacement with native species to retain groundcover in eroded areas. • There are several deeply eroded gullies extending into vegetation zone G where stormwater discharges, the additional moisture promotes the growth of exotic grasses such as Kikuyu. • Sea Wheat Grass occurs along beachfront.	

<table>
<tr><td></td><td>Note: if classed as Coastal tussock Grassland would score higher (moderate condition) however the association incorporates species from the coastal shrublands</td></tr>
<tr><td>5-year target</td><td>Increase native species diversity and cover, reduce weed threat, and rehabilitate and prevent further gully erosion.</td></tr>
<tr><td>Management action priorities</td><td>
High priority:

Control isolated high threat weeds and reduce the cover of other high threat weeds:

<table>
<tr><td></td><td>Mgt Zone 6</td><td>Mgt Zone 9 & 10</td><td>Mgt zone 11</td></tr>
<tr><td>Eradicate isolated and low cover</td><td>Euphorbias</td><td>Boxthorn, Tamarix, Coastal Daisy, Evening Primrose, Western Coastal Wattle, Gazania, Onion Weed</td><td>Boxthorn, Tamarix, Three-corner Garlic, Scabiosa, Sea Bower</td></tr>
<tr><td>Contain and reduce cover</td><td>Perennial Veldtgrass, soursobs, Plantain</td><td>Kikuyu, Coast Tea-tree, Iceplant, Galenia, Euphorbias,</td><td>Kikuyu, Coast Tea-tree, Coastal Daisy, Iceplant, Galenia, Euphorbias</td></tr>
</table>

Continue to remove Coast Tea-tree, a few each year, working from south to north and patrolling for and removing any new seedlings or re-growth.
Control kikuyu around the perimeters of gullies and shack sites, taking care to ensure groundcover is maintained and no new infestations occur.

Medium:

Spot spray other weeds throughout dune area but working outwards from native vegetation areas and around revegetation.
Continue to manage weeds around old shack site in conjunction with revegetation and erosion management works.
Control Sea Wheat Grass where there is adequate native groundcover.
Investigate and implement options to rehabilitate gullies and prevent further stormwater erosion.

Low

Revegetation to increase the cover and diversity of native species along the foreshore, especially spreading groundcovers such as Spinifex and Pigface.

</td></tr>
</table>

Vegetation Association F – Cushion Fanflower and Coast Daisy-bush open shrubland in moderate condition

Management Zone 8

Dominant overstorey	*Scaevola crassifolia*	Cushion Fanflower
	Olearia axillaris	Coast Daisy-bush
Dominant understorey	*Rytidosperma sp.*	Wallaby Grass
	**Oxalis pes-caprae*	Soursobs

Management issues

- This is a small area which appears to have had high level of disturbance historically (possibly a historic building site), it now contains a mix of remnant, regenerating and revegetated native vegetation with a weedy ground layer of Soursobs, other annual herbs and grasses with Perennial Veldtgrass and Onionweed; the area appears to be heavily impacted by Rabbits.
- The association has a high diversity of native species and plant life forms but low native biomass compared to exotics.
- Very little evidence of natural regeneration & recruitment.
- Several unofficial trails from the Esplanade and northern end of zone 6 run through this area, resulting in bare ground and suppression of native vegetation.
- Freesia's have been found by CoO staff under Sea Box near road.

5-year target

Increase the cover of native vegetation and reduce weed threat.

Management action priorities

High priority:

- Control Freesias, Perennial Veldt Grass and Onionweed.

Medium:

- Spot weed around native vegetation (including plantings).
- Provide grazing protection for young revegetation and any natural regeneration until Rabbit pressure is reduced.

Low:

- Supportive plantings to increase native biomass if natural regeneration fails to increase native cover (using species appropriate to the heath and dune vegetation associations).

Vegetation Association G – Nitre-bush shrubland in moderate condition

Management Zone 7 (all) and part 9 to 11

Dominant overstorey	*Nitraria billardierei*	Nitre-bush
Dominant understorey	*Tetragonia implexicoma*	Bower Spinach
	Beyeria lechenaultii	Pale Turpentine Bush

Management issues	• A fence has been established between the edge of the zone and the road reserve and areas that were probably formally reserve revegetated • Areas of revegetation along the road edge, presumably these areas were formally path • Very high weed pressure, with the number and cover of high threat weeds increasing northwards (the area from the northern walkway to Gordon Street has a high density of weeds). • The association has a very high native species diversity and good structural diversity and natural regeneration. • Some evidence of natural regeneration & recruitment, • Feral Turtle Doves are nesting in hollows in low cliff areas.
5-year target	Reduce weed threat and increase the cover of native species.
Management action priorities	**High priority:** • Continue to push weed front northwards and follow-up and control re-growth: Soursob, Coastal Galenia, Olive, African boxthorn, Scabiosa **Medium:** • Spot weed along the boundary of native vegetation-weed areas, and around native species growing in weedy areas. • Contain Kikuyu to existing distribution in eroded gullies. • Brushcut annual grass weeds along clifftop in late Spring. **Low:** • Revegetation with appropriate species in grassy weedy areas if regeneration does not occur.

5.3 COVERAGE OF HIGH THREAT WEEDS AND PRIORITY CONTROL AREAS

The location of isolated occurrences of high threat weeds and major direction for control works from areas of better to poorer vegetation is shown in Map 8. The density of four of the main widespread high threat weeds by zone is shown in Maps 9a to 9d.

Map 8: Location of isolated high threat weeds, sensitive species areas and direction of control works (white arrows) and Unit Biodiversity Score (UBS) of vegetation associations.

Map produced by Catherine Miles (Miles Environmental)
Numbers indicate City of Onkaparinga management zones

Map 9a: Distribution and cover rating of widespread high threat weeds by vegetation association, a Gazania (*Gazania* sp.)

Cover ratings: Not many, cover <1% = **1** Covering 1 - 5% = **2** Covering 6 – 25 % = **3** Covering 26 – 50% = **4**

Map produced by Catherine Miles (Miles Environmental)
Numbers indicate City of Onkaparinga management zones

Map 9b: Distribution and cover rating of widespread high threat weeds by vegetation association, a Coast Daisy (*Dimorphotheca fruticosa*).

Cover ratings: Not many, cover <1% = **1** Covering 1 - 5% = **2** Covering 6 – 25 % = **3** Covering 26 – 50% = **4**

Map produced by Catherine Miles (Miles Environmental)
Numbers indicate City of Onkaparinga management zones

Map 9c: Distribution and cover rating of widespread high threat weeds by vegetation association, Perennial Veldtgrass (*Ehrharta calycina*).

Cover ratings: Not many, cover <1% = **1** Covering 1 - 5% = **2** Covering 6 – 25 % = **3** Covering 26 – 50% = **4**

Map produced by Catherine Miles (Miles Environmental)
Numbers indicate City of Onkaparinga management zones

Map 9d: Distribution and cover rating of widespread high threat weeds by vegetation association, Soursob (*Oxalis pes-caprae*).

Cover ratings: Not many, cover <1% = **1** Covering 1 - 5% = **2** Covering 6 – 25 % = **3** Covering 26 – 50% = **4**

5.4 MONITORING AND REVIEW

It is recommended that the management zones should be monitored on a 5-year basis using the method in this plan, as well as annually searching for and controlling high threat weeds. The monitoring results should be used to review the plan and update the actions if required.

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APPENDIX 1: LIST OF FLORA

NATIVE FLORA

Table A1.1 lists all native species recorded during this survey and the zone they were recorded in. A total of 93 native species were observed during this survey, with an additional 15 recorded from the Bush for Life sites.

Table A1.1 Native flora species observed this survey

		Rating*			Vegetation zone							No.
Scientific Name	Common Name	FLB	SA	BFL**	A	B	C	D	E	F	G	obs.
Acacia cupularis	Cup Wattle	RA			1	1	1	1	1	1	1	7
Acacia longifolia ssp. sophorae	Coastal Wattle				1	1	1	1	1	1		
Acacia paradoxa	Kangaroo Thorn							1				
Acacia pycnantha	Golden Wattle							1				
Acrotriche patula	Prickly Ground-berry				1	1	1			1	1	
Actites megalocarpus	Coast Sow-thistle	RA		1								
Allocasuarina verticillata	Drooping Sheoak				1	1	1	1		1		
Alyxia buxifolia	Sea Box	RA			1	1	1	1		1	1	6
Amyema miquelii	Box Mistletoe							1				
Atriplex cinerea	Coast Saltbush				1	1	1		1	1		
Austrostipa drummondii	Cottony Spear-grass										1	
Austrostipa elegantissima	Feather Spear-grass						1			1	1	
Austrostipa flavescens	Coast Spear-grass					1					1	
Austrostipa sp.	Spear-grass				1		3		1	2	1	
Banksia marginata	Silver Banksia						1					
Beyeria lechenaultii	Pale Turpentine Bush				1	1	1		1		1	
Billardiera cymosa ssp. cymosa	Sweet Apple-berry						1					
Caesia calliantha	Blue Grass-lily			1								
Caladenia cardiochila	Heart-lip Spider-orchid	EN		1								0
Caladenia sp.	Spider-orchid						1					
Calytrix tetragona	Common Fringe-myrtle					1	1	1				
Carpobrotus rossii	Native Pigface				1	1	1	1	1			
Cassytha pubescens	Downy Dodder-laurel					1	1	1				
Cheilanthes austrotenuifolia	Annual Rock-fern						1	1				
Chloris truncata	Windmill Grass			1								
Comesperma volubile	Love Creeper	RA					1					1
Correa sp.	Correa (possibly non-local species)							1				
Corybas diemenicus	Veined Helmet-orchid			1								
Craspedia variabilis	Billy-buttons			1								
Crassula colligata ssp. colligata								1				
Crassula decumbens var. decumbens	Spreading Crassula					1		1		1		
Crassula sp.	Crassula/Stonecrop						1				1	
Cynodon dactylon var. pulchellus	Native Couch										1	
Cyrtostylis robusta	Robust Gnat-orchid						1					
Dianella brevicaulis	Short-stem Flax-lily					1	1	1	1	1	1	

Scientific Name	Common Name	Rating*		BFL**	Vegetation zone							No. obs.
		FLB	SA		A	B	C	D	E	F	G	
Dianella revoluta var. revoluta	Black-anther Flax-lily										1	
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface				1	1					1	
Distichlis distichophylla	Emu-grass				1	1	1			1		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush									1		
Drosera whittakeri	Scented Sundew			1								
Enchylaena tomentosa var. tomentosa	Ruby Saltbush				1	1	1			1	1	
Eucalyptus leucoxylon ssp.	South Australian Blue Gum							1				
Eucalyptus porosa	Mallee Box							1				
Eutaxia microphylla	Common Eutaxia						1			1		
Ficinia nodosa	Knobby Club-rush					1	1			1	1	
Gahnia lanigera	Black Grass Saw-sedge	RA					1				1	2
Geranium sp.	Geranium						1					
Glycine rubiginosa	Twining Glycine			1								
Goodenia amplexans	Clasping Goodenia					1	1			1		
Goodenia arguta	Toothed Velleia						1					
Goodenia pinnatifida	Cut-leaf Goodenia						1				1	
Goodenia willisiana	Silver Goodenia	RA					1					1
Grevillea lavandulacea ssp. lavandulacea	Spider-flower					1	1					
Hakea rugosa	Dwarf Hakea					1	1	1				
Helichrysum leucopsideum	Satin Everlasting						1	1				
Hibbertia devitata	Smooth Guinea-flower						1					
Kunzea pomifera	Muntries	RA			1		1	1	1			4
Lepidosperma sp. (concavum/ congestum)	Sword-sedge					1					1	
Lepidosperma congestum							1	1				
Leucophyta brownii	Coast Cushion Bush				1	1	1				1	
Leucopogon parviflorus	Coast Beard-heath				1	1	1	1				
Lomandra collina	Sand Mat-rush	RA					1			1		2
Lomandra effusa	Scented Mat-rush	RA					1			1	1	3
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush					1	1				1	
Lomandra sp.	Mat-rush										1	
Machaerina juncea	Bare Twig-rush				1	1	1	1				
Melaleuca lanceolata	Dryland Tea-tree	RA									1	1
Microseris lanceolata	Yam Daisy			1								
Minuria leptophylla	Minnie Daisy	RA					1					1
Muehlenbeckia gunnii	Coastal Climbing Lignum				1	1	1	1	1		1	
Myoporum insulare	Common Boobialla				1	1	1	1	1	1		
Myoporum parvifolium	Creeping Boobialla	VU	R		1	1	1		1	1	1	6
Nitraria billardierei	Nitre-bush	RA				1	1			1	1	4
Olearia axillaris	Coast Daisy-bush					1	1	1	1	1		
Olearia ramulosa	Twiggy Daisy-bush					1	1				1	
Olearia sp.	Daisy-bush									1		
Opercularia turpis	Twiggy Stinkweed						1					

Scientific Name	Common Name	Rating*		BFL**	Vegetation zone							No. obs.
		FLB	SA		A	B	C	D	E	F	G	
Oxalis perennans	Native Sorrel						1			1		
Pauridia glabella var. glabella	Tiny Star			1								
Pelargonium australe	Austral Stork's-bill	VU		1	1							1
Pimelea flava ssp. dichotoma	Diosma Riceflower						1			1	1	
Pimelea glauca	Smooth Riceflower					1	1					
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower										1	
Plantago hispida	Hairy Plantain			1								
Poa poiformis var. poiformis	Coast Tussock-grass				1	1	1		1			
*Pololepis rugata ssp. littoralis****	Coast Copper-wire Daisy	EN										
Pomaderris paniculosa ssp. paralia	Coast Pomaderris	RA				1	1			1	1	4
Pultenaea sp.	Bush-pea						1					
Pultenaea tenuifolia	Narrow-leaf Bush-pea	RA					1			1		2
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush				1	1	1	1	1	1	1	
Roepera confluens	Forked Twinleaf	VU					1				1	2
Roepera glauca	Pale Twinleaf	RA					1					1
Rytidosperma caespitosum	Common Wallaby-grass										1	
Rytidosperma sp.	Wallaby-grass				1	3	1			1		
Santalum acuminatum	Quandong	RA						1				1
Scaevola crassifolia	Cushion Fanflower	VU				1	1		1	1		4
Schoenoplectus pungens	Spiky Club-rush						1					
Senecio pinnatifolius var. maritimus	Coast Groundsel				1	1	1	1				
Senecio spanomerus					1	1	1					
Sonchus sp.	Sow-thistle				1						1	
Spinifex hirsutus	Rolling Spinifex					1	1		1			
Tetragonia implexicoma	Bower Spinach					1	1	1	1		1	
Tetraria capillaris	Hair Sedge	RA				1	1					2
Thomasia petalocalyx	Paper-flower			1								
Threlkeldia diffusa	Coast Bonefruit					1	1	1	1		1	
Thysanotus patersonii	Twining Fringe-lily			1								
Trachymene pilosa	Dwarf Trachymene			1								
	Number				26	45	71	31	18	31	36	108

*Ratings: FLB = regional conservating for Fleurieu Lofty Block, SA = NPW Act state conservation rating
**BFL = additional species observed by Bush for Life volunteers
***Planted (M. Endacott DEW pers. com. 17/01/25)

EXOTIC FLORA

Table A1.2 lists all exotic species recorded during this survey and the zone they were recorded in, whether they are declared under the Landscape SA (2019), Weeds of National Significance (WoNS) and their threat rating for the Southern Mt Lofty Ranges Coast (MANCAP 2023).

Table A1.2 Exotic flora species observed this survey

Scientific Name	Common Name	Classification			Vegetation zone							No. obs.
		WoNS	LSA	SMLR -C	A	B	C	D	E	F	G	
Acacia cyclops	Western Coastal Wattle			5					1		1	2
Acacia longifolia ssp. longifolia	Sallow Wattle			2				1				
Agapanthus praecox ssp. orientalis				1			1					
Agave americana	Century Plant			4					1			1
Aizoon pubescens	Coastal Galenia			3	1				1		1	3
Allium triquetrum	Three-cornered Garlic			1					1			
Aloe sp.	Aloe			1					1			
Ammophila arenaria	Marram Grass			3	1	1			1			3
Anagallis sp.						1		1		1		
Arctotheca calendula	Cape Weed			3		1	1	1	1	1	1	6
Asparagus asparagoides f. asparagoides	Bridal Creeper	Yes	Yes	5			1	1				2
Asphodelus fistulosus	Onion Weed			2	1		1		1			
Brassica sp.									1		1	
Briza maxima	Large Quaking-grass			1	1	1	1	1		1		
Bromus catharticus	Prairie Grass			1					1			
Bromus rubens	Red Brome			1			1			1		
Bromus sp.	Brome						1				1	
Cakile maritima ssp. maritima	Two-horned Sea Rocket			1		1			1			
Carpobrotus edulis ssp. edulis	Hottentot Fig			4	1	1						2
Cenchrus clandestinus	Kikuyu			3	1	1		1	1		1	5
Centranthus ruber ssp. ruber	Red Valerian								1			
Chrysanthemoides monilifera ssp. monilifera	Boneseed	Yes	Yes	4							1	1
Cotyledon orbiculata var.	Cotyledon			2			1	1	1			
Cynara cardunculus ssp. flavescens	Artichoke Thistle			3							1	1
Cynodon dactylon var. dactylon	Couch			2					1	1		
Dactylis glomerata	Cocksfoot			2			1				1	
Dimorphotheca fruticosa	Coastal Daisy /Trailing African Daisy			3	1	1			1		1	4
Diosma floribunda	#N/A									1		
Drosanthemum candens	Rodondo Creeper				1				1			
Echium plantagineum	Salvation Jane			2				1				

Scientific Name	Common Name	Classification			Vegetation zone							No. obs.
		WoNS	LSA	SMLR -C	A	B	C	D	E	F	G	
Ehrharta calycina	Perennial Veldt Grass			4	1	1	1	1		1		5
Ehrharta longiflora	Annual Veldt Grass			2		1						
Ehrharta villosa var. maxima	Pyp Grass			5	1							1
Erodium botrys	Long Heron's-bill			1					1			
Eucalyptus platypus ssp. platypus	Round-leaved Moort										1	
Euphorbia paralias	Sea Spurge			4	1	1	1	1	1	1		6
Euphorbia terracina	False Caper	Yes		4					1			1
Frankenia pulverulenta	Mediterranean Sea-heath			1	1							
Freesia cultivar	Freesia			4	1	1	1	1				4
Fumaria sp.	Fumitory			1	1							
Gazania linearis	Gazania	Yes		5	1	1	1	1			1	5
Hordeum leporinum	Wall Barley-grass			1			1					
Hordeum sp.				1	1			1		1	1	
Hypochaeris glabra	Smooth Cat's Ear			2		1				1		
Hypochaeris sp.	Cat's Ear			2	1		1					
Lagunaria patersonii	Pyramid Tree			2					1			
Lagurus ovatus	Hare's Tail Grass			2	1	1	1	1	1	1	1	
Lavandula sp.	Lavender			1			1					
Leontodon rhagadioloides	Cretan Weed			2		1	1					
Leptospermum laevigatum	Coast Tea-tree	Yes		4		1		1	1		1	4
Limonium companyonis	Sea-lavender			3	1	1	1				1	4
Lolium sp.	Ryegrass			1	1							
Lycium ferocissimum	African Boxthorn	Yes	Yes	4	1		1		1		1	4
Medicago polymorpha	Burr-medic			1	1	1						
Medicago sp.	Medic			1			1		1		1	
Melilotus sp.	Melilot			1	1							
Mesembryanthemum crystallinum	Common Iceplant			3	1	1	1		1		1	5
Oenothera stricta ssp. stricta	Common Evening Primrose			4					1			1
Olea europaea ssp. europaea	Olive			3			1		1		1	3
Oxalis pes-caprae	Soursob			4	1	1	1	1	1	1	1	7
Pentameris airoides ssp. airoides	False Hair-grass			1	1							
Pinus sp.	Pine			1							1	
Piptatherum miliaceum	Rice Millet			2							1	
Plantago lanceolata var.	Ribwort			2	1		1	1	1		1	
Poa bulbosa	Bulbous Meadow-grass			1		1						
Polycarpon tetraphyllum	Four-leaf Allseed					1						
Reichardia tingitana	False Sowthistle			1	1	1	1	1	1	1		
Rhamnus alaternus	Blowfly Bush	Yes		4			1					1
Romulea sp.	Onion-grass			1							1	

Scientific Name	Common Name	Classification			Vegetation zone							No. obs.
		WoNS	LSA	SMLR -C	A	B	C	D	E	F	G	
Salvia verbenaca var. verbenaca	Wild Sage			1			1				1	
Scabiosa atropurpurea	Pincushion			4	1	1	1		1		1	5
Sisymbrium sp.	Wild Mustard			1			1					
Sonchus oleraceus	Common Sow-thistle			1		1						
Sparaxis bulbifera	Sparaxis						1					
Stenotaphrum secundatum	Buffalo Grass			2		1						
Tamarix aphylla	Athel Pine		Weeds of National Significance	1					1			
Taraxacum khatoonae	Dandelion			1					1			
Tetragonia decumbens	Sea Spinach				1				1			
*Thinopyrum junceiforme**	Sea Wheat-grass*			5	1	1			1			3
Trifolium sp.	Clover			1	1							
Tropaeolum majus	Nasturtium			1					1			
Vicia sp.	Vetch			1	1				1			
Vulpia sp.	Fescue			1				1				

*Declared under Landscape SA (2019); threat rating for the Southern Mt Lofty Ranges coast (1 = lowest threat to 5 = highest threat)

APPENDIX 2: LIST OF FAUNA RECORDED ON SITE

Table 7. List of fauna recorded from the site from Atlas of Living Australia records[9], the previous assessment (EAC 2001), this survey and National and conservation rated species with potential to occur

Group	Scientific name	Common name	EPBC	SA	Obs*
Amphibia	*Crinia signifera*	Common Froglet			A
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog			A
Aves	*Anthochaera (Anellobia) chrysoptera*	Little Wattlebird			A
Aves	*Apus (Apus) pacificus*	Fork-tailed Swift			A
Aves	*Calidris (Ereunetes) ruficollis*	Red-necked Stint			A
Aves	*Chroicocephalus novaehollandiae*	Silver Gull			A
Aves	*Corvus mellori*	Little Raven			A
AVES	*Dicaeum hirundinaceum*	Mistletoebird			O
Aves	*Egretta novaehollandiae*	White-faced Heron			A
Aves	*Eolophus roseicapilla albiceps*	Eastern Galah			A
Aves	*Falco (Tinnunculus) cenchroides*	Nankeen Kestrel			A
AVES	*Falcunculus frontatus frontatus*	Eastern Shriketit		R	X
AVES	*Gavicalis virescens*	Singing Honeyeater			O, A, P
AVES	*Grallina cyanoleuca*	Magpie-lark			O, A
AVES	*Gymnorhina tibicen*	Australian Magpie			O, A
AVES	*Hieraaetus morphnoides*	Little Eagle		V	X
Aves	*Hirundo neoxena*	Welcome Swallow			A, O, P
Aves	*Larus pacificus*	Pacific Gull			A, O, P
Aves	*Larus pacificus georgii*	West Coast Pacific Gull			A
AVES	*Melanodryas cucullata cucullata*	Hooded Robin (YP, MN, AP, MLR, MM, SE)	EN	R	X
AVES	*Melanodryas cucullata cucullata*	Hooded Robin (YP, MN, AP, MLR, MM, SE)	EN	R	X
Aves	*Microcarbo melanoleucos*	Little Pied Cormorant			A
AVES	*Neophema elegans elegans*	Elegant Parrot		R	X
AVES	*Neophema petrophila*	Rock Parrot		R	P
Aves	*Ocyphaps lophotes*	Crested Pigeon			A
AVES	*Pandion haliaetus cristatus*	Eastern Osprey		E	O
Aves	*Podargus strigoides*	Tawny Frogmouth			A
Aves	*Recurvirostra novaehollandiae*	Red-necked Avocet			A
AVES	*Rhipidura leucophry*	Willie Wagtail			O
Aves	*Thalasseus bergii*	Crested Tern			A
AVES	*Thinornis cucullatus cucullatus*	Hooded Plover	VU	V	O
Aves	*Vanellus miles ssp. novaehollandiae*	Masked Lapwing			A

[9] Only species identified to species level included, note that list includes citizen science records

AVES	*Zanda funerea whiteae*	Yellow-tailed Black Cockatoo		V	X
Insecta	*Bathyllus albicinctus*	Froghopper			A
Insecta	*Choerocoris variegatus*	Shield Bug			A
Insecta	*Castiarina flavopicta*	Jewel beetle			A
Insecta	*Iridomyrmex purpureus*	Meat Ant			A
Insecta	*Rhytidoponera metallica*	Metallic Pony Ants			A
Insecta	*Teleogryllus commodus*	Black Field Cricket			A
Insecta	*Temognatha lessoni*	Jewel Bug			ME
Insecta	*Trichilogaster acaciaelongifoliae*	Wattle Apple-gall Wasp			A
Insecta	*Vandiemenella viatica*	Grasshopper			A
Mammalia	*Chalinolobus gouldii*	Gould's Wattled Bat			A
Mammalia	*Ozimops planiceps*	South-eastern Free-tailed Bat			A
Reptilia	*Christinus marmoratus*	Marbled Gecko			A
Reptilia	*Hemiergis peronii*	Lowlands Earless Skink			A
Reptilia	*Menetia greyii*	Grey's Menetia			A
Reptilia	*Tiliqua rugosa*	Shingle-back			A
Reptilia	*Tiliqua scincoides*	Eastern Blue-tongue			A

*O = observed on site this survey, P = past record from within the site (EAC 2001), A = Atlas of Living Australia database search within the site, X = no observation from within the site but recorded within 2 kms of the site and may utilise habitats present, ME = M Endacott (DEW pers. com. 17/01/25).

APPENDIX 3: BUSHLAND ASSESSMENT RESULTS

Notes regarding BAM data entry scoresheets

The cleared perimeter is based on internal edge with the cemetery and the external eastern, northern and part southern boundaries.

Fauna – only fauna of State and National conservation significance that have either been recorded on-site or within 2 km radius recorded in Naturemaps and the site is considered potential habitat for are entered into the BAM data sheets.

Flora – only species observed during the surveys for this assessment are entered into the data sheets or species of conservation significance previously observed specifically in an area recently (<5 years) that may not have been observed at the time of the survey.

LANDSCAPE CONTEXT FOR BLOCK

The following information (except area and perimeter) is populated from Naturemaps:

Size of Block (ha)	5.22
Cleared perimeter (m)	963
Landscape region	Hills & Fleurieu
BCM region	Southern Mt Lofty Ranges
IBRA Association	Fleurieu
IBRA Subregion	Fleurieu

Landscape context attribute	**Raw**	**Score**
% veg cover 5km radius	11%	0.04
Cleared perimeter: area ratio	18.45	0
% native veg remaining: IBRA Ass IBRA subregion	19 12	0.08
% native veg. protected IBRA Assoc.	43	0
Riparian zone present: **Swamp/wetland present:**	Yes Yes	0.03
Landscape Context Score (max 1.25)		**1.15**

BUSHLAND ASSESSMENT DATA FOR THE MANAGEMENT ZONES

Assessment quadrat

The NVC method (2020) specifies that an assessment quadrat should be 1 ha and if a zone is less than 0.5 ha the assessment method for small sites should be used. For this project the small sites method was not used where zones were less than 0.5 ha, however very small zones were generally not identified unless a small zone was particularly distinct. The 1 ha quadrat size was not rigorously measured, however if a zone was identified as being significantly larger than 1 ha, species recorded after more than 1 ha were noted as "outside quadrat."

Species Diversity

Number of native species does not include herbaceous annuals and is only species observed during the surveys.

Threatened Fauna Scores

Unless specified for a management zone, all management zones are considered to provide potential habitat for the threatened fauna species identified in Table 3. Threatened fauna scores are therefore the same for all sites.

Scores and categories

All scores and categories follow the method specified in the Bushland Assessment Method (NVC 2020). Cover categories are as follows:

Not many, cover <1% = 1	Covering 1 - 5% = 2	Covering 6 – 25 % = 3
Covering 26 – 50% = 4	Covering 51 – 75% = 5	Covering > 75% = 6

Excel datasheets have been provided to Green Adelaide.

Management Zone A

CoM management zone ID: All Z1 and Z3

BCM Community	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

	(A1)		(A3*)	
Attribute	**Raw**	**Weighted**	**Raw**	**Weighted**
Native plant species diversity	24	26/30	22	24/30
Native plant life forms	20	20/20	18	20/20
Regeneration	2	4.5/12	0	0/12
Weed score	1/15		0/15	
Native:exotic Understorey Biomass	3/5		4/5	
Fallen timber/debris	n/a		n/a	
Hollow-bearing trees	n/a		n/a	
Mature trees	n/a		n/a	
Tree canopy cover	n/a		n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating (A1)	Cover rating (A3*)
Gazania linearis	4	1
Lycium ferocissimum	1	0
Oxalis pes-caprae	2	3
Ammophila arenaria	2	3
Carpobrotus edulis ssp. edulis	2	0

Native Plant Life forms

Native Plant Life Forms	Cover rating (A1)	Cover rating (A3*)
Trees > 15m	-	-
Trees 5 - 15 m	-	-
Trees < 5m	-	1
Shrubs > 2m	1	1
Shrubs 0.5 - 2m	3	4
Shrubs < 0.5	3	3
Forbs	1	-
Mat Plants	3	3
Grasses > 0.2m	2	1
Grasses < 0.2m	1	2
Sedges > 1m	-	-
Sedges < 1m	1	2
Vines, scramblers	2	1
Mistletoe	-	-
Ferns	-	-
Grass-tree	-	-

As recorded for management zone 3

Management Zone B

CoM management zone ID: Z2

BCM Community	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

Attribute	Raw	Weighted
Native plant species diversity	29	28/30
Native plant life forms	18	20/20
Regeneration	3	6/12
Weed score	2/15	
Native:exotic Understorey Biomass	4/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating
Oxalis pes-caprae	2
Pennisetum clandestinum	2
Ammophila arenaria	2
Carpobrotus edulis ssp. edulis	2
Gazania sp.	2

Native Plant Life forms

Native Plant Life Forms	Cover rating
Trees > 15m	-
Trees 5 - 15 m	-
Trees < 5m	1
Shrubs > 2m	2
Shrubs 0.5 - 2m	4
Shrubs < 0.5	4
Forbs	-
Mat Plants	2
Grasses > 0.2m	1
Grasses < 0.2m	1
Sedges > 1m	1
Sedges < 1m	1
Vines, scramblers	1
Mistletoe	-
Ferns	-
Grass-tree	-

Management Zone C

CoM management zone ID: 4 (all), 5 (part), 6 (part)

BCM Community	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands		
Landform and soil	Sand over limestone, sodic clays		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

	(C4)	
Attribute	**Raw**	**Weighted**
Native plant species diversity	34	30/30
Native plant life forms	19	20/20
Regeneration	6	12/12
Weed score	4/15	
Native:exotic Understorey Biomass	5/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Native Plant Life forms

Native Plant Life Forms	Cover rating (C4)
Trees > 15m	0
Trees 5 - 15 m	0
Trees < 5m	1
Shrubs > 2m	0
Shrubs 0.5 - 2m	2
Shrubs < 0.5	5
Forbs	2
Mat Plants	1
Grasses > 0.2m	1
Grasses < 0.2m	1
Sedges > 1m	0
Sedges < 1m	4
Vines, scramblers	1
Mistletoe	0
Ferns	1
Grass-tree	0

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating (C4)
Oxalis pes-caprae	2
Olea europaea ssp.	1
Salvia verbenaca var.	1
Lagurus ovatus	2
Sparaxis bulbifera	1

Management Zone D

CoM management zone ID: part 5

BCM Community	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

Attribute	Raw	Weighted
Native plant species diversity	30	28/30
Native plant life forms	21	20/20
Regeneration	0	10.5/12
Weed score	4/15	
Native:exotic Understorey Biomass	4/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating
Oxalis pes-caprae	3
Asparagus asparagoides	1
Ehrharta calycina	1
Freesia cultivar	1
Euphorbia paralias	1

Native Plant Life forms

Native Plant Life Forms	Cover rating
Trees > 15m	-
Trees 5 - 15 m	3
Trees < 5m	1
Shrubs > 2m	4
Shrubs 0.5 - 2m	3
Shrubs < 0.5	2
Forbs	1
Mat Plants	3
Grasses > 0.2m	-
Grasses < 0.2m	-
Sedges > 1m	-
Sedges < 1m	1
Vines, scramblers	-
Mistletoe	3
Ferns	1
Grass-tree	-

Management Zone E -

CoM part management zones: 9-11

BCM Community	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

Attribute	Raw	Weighted
Native plant species diversity	16	20/30
Native plant life forms	12	14/20
Regeneration	1	3/12
Weed score	3/15	
Native:exotic Understorey Biomass	2/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating
Pennisetum clandestinum	3
Lycium ferocissimum	1
Leptospermum laevigatum	2
Ammophila arenaria	2
Olea europaea ssp.	1

Native Plant Life forms

Native Plant Life Forms	Cover rating
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee <5m	
Shrubs > 2m	1
Shrubs 0.5 - 2m	3
Shrubs < 0.5	2
Forbs	
Mat Plants	2
Grasses > 0.2m	1
Grasses < 0.2m	1
Sedges > 1m	
Sedges < 1m	1
Hummock grasses	
Vines, scramblers	1
Mistletoe	
Ferns	1
Grass-tree	

Management Zone F

CoM management zone ID: 8

BCM Community	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

Attribute	Raw	Weighted
Native plant species diversity	30	28/30
Native plant life forms	17	18/20
Regeneration	1	3/12
Weed score	2/15	
Native:exotic Understorey Biomass	3/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating
Oxalis pes-caprae	4
Hordeum sp.	3
Asphodelus fistulosus	2
Arctotheca calendula	2
Ehrharta calycina	2

Native Plant Life forms

Native Plant Life Forms	Cover rating
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	1
Mallee > 5m	
Mallee <5m	
Shrubs > 2m	2
Shrubs 0.5 - 2m	3
Shrubs < 0.5	2
Forbs	1
Mat Plants	3
Grasses > 0.2m	1
Grasses < 0.2m	2
Sedges > 1m	
Sedges < 1m	1
Hummock grasses	
Vines, scramblers	1
Mistletoe	
Ferns	
Grass-tree	

Management Zone G

CoM management zone ID: part 9-11

BCM Community	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands		
Landform and soil	Sand over limestone		
Substantial rock outcrop	~~Yes~~/No	**Substantial moss and/or lichen**	~~Yes~~/No
Long dead trees?	~~Yes~~/No		

Bushland Assessment Attributes

Attribute	Raw	Weighted
Native plant species diversity	34	30/30
Native plant life forms	15	18/20
Regeneration	4	9/12
Weed score	3/15	
Native:exotic Understorey Biomass	4/5	
Fallen timber/debris	n/a	
Hollow-bearing trees	n/a	
Mature trees	n/a	
Tree canopy cover	n/a	

Top 5 weed species (cover x abundance) cover ratings

Weed species	Cover rating
Medicago spp.	2
Oxalis pes-caprae	2
Gazania sp.	1
Pennisetum clandestinum	2
Lycium ferocissimum	1

Native Plant Life forms

Native Plant Life Forms	Cover rating
Trees > 15m	-
Trees 5 - 15 m	-
Trees < 5m	-
Shrubs > 2m	1
Shrubs 0.5 - 2m	4
Shrubs < 0.5	4
Forbs	1
Mat Plants	-
Grasses > 0.2m	1
Grasses < 0.2m	1
Sedges > 1m	-
Sedges < 1m	1
Vines, scramblers	2
Mistletoe	-
Ferns	-
Grass-tree	-