Tingira Reserve

Biodiversity Action Plan

February 2025

DOCUMENT INFORMATION	
Client:	Green Adelaide
Issue date:	6/12/2024
Version:	1.0
Author:	Ben McCallum
Title	Partner

DOCUMENT HISTORY	
Version	**Issue Date**
1.0	6/12/2024
1.1	20/2/2025
2.0	19/03/2025

Full Business Name: Flora Sight Pty Ltd
Australian Business Number: 25 680 356 165
Registered Business Address: Bridgewater SA 5155

Contact person 1: Ben McCallum, Managing partner,
Phone: 0438 140 237
Contact 2: Melissa McCallum, Managing Partner,
Phone: 0419 820 394
Email: admin@florasight.com.au

Disclaimer

Flora Sight Pty Ltd and its employees do not warrant or make any representation regarding the use, or results of the use, of the information contained herein as regards to its correctness, accuracy, reliability, currency or otherwise. Flora Sight Pty Ltd and its employees expressly disclaim all liability or responsibility to any person using the information or advice.

All maps and photographs are produced by Flora Sight Pty Ltd unless otherwise stated.

Cover photos: Top, Amphitheatre next to O'Sullivans Beach Road. Photo, B. J. McCallum. Bottom left, *Euphrasia collina* ssp. *osbornii.* (Osborn's Eyebright) and Bottom right, *Antipoda atralba* (Black and White Sedge-skipper) Photo, M. Endacott, Hallett Cove CP.

Acknowledgements

The following people were of great assistance in compiling this report:

City of Onkaparinga Staff (in no particular order), including Ben Moulton, Jock Conlon, Tait Kowalick, Nikola Manos, Leanne Lawrence and Lee Withers. Supply of different maps, general site background information and history.

Matthew Endacott, Metro Coastal Conservation Officer, Green Adelaide, hosted by City of Holdfast Bay supported by. Especially supplying the front cover photo of the Endangered *Euphrasia collina* ssp*. osbornii* (Osborn's Eyebright) and identifying several butterfly species.

Warrick Barnes from Green Adelaide for support, patience and supplying information such as relevant reports on vegetation mapping Port Stanvac.

Phil Barron for initial work, identifying some of the key threats and main management zone photopoints.

Special acknowledgement and recognition to the local Bush for Life volunteers for their tireless contributions to the reserve and noticeable impact controlling weeds around highly sensitive areas.

We would also like to acknowledge the traditional custodians and respect for the area as a sensitive area, and place.

Contents

1. INTRODUCTION

1.1 Purpose

The purpose of the Biodiversity Action Plan (BAP) for Tingira Reserve is to outline management strategies that prioritise conservation efforts, focusing on preserving and enhancing the site's ecological integrity and biodiversity. This plan has been prepared for Green Adelaide and City of Onkaparinga [1],and includes a comprehensive review of current ecological values, utilising the Bushland Assessment Methodology[2] to assess ecosystem health and establish a baseline for future surveys.

1.2 Background

Tingira Reserve is a scenic coastal area located at O'Sullivans Beach, South Australia, offering stunning views of Gulf St Vincent. It is situated next to a recently upgraded and popular boat ramp and beach. There are unique and spectacular surface-expressions of geological features and soil deposits similar to Hallett Cove and the site has a high floristic species diversity, with 90 indigenous flora species present within the site.

For over 30 years, the City of Onkaparinga, along with a dedicated Bush For Life volunteer group have invested significant time and resources into the vegetation management and restoration of Tingira Reserve. Since 2001, management strategies have been developed and directed through a multitude of vegetation management and annual biodiversity action plans (produced by the City of Onkaparinga and independent consultants).

Recommendation to increase the extent of the reserve in 2001, resulted in the purchase of 5,250 square metres of residential land in 2006. The land parcels were purchased with financial support from Planning SA (Coast Parks initiative) and the generosity of the landowner, Mrs Rakowski. Other funding contributions were received from Mobil and Transitions Optical.

Community responses to O'Sullivan Beach Action Plan in 2005, supported the protection of the native vegetation in Tingira Reserve[3]. In 2008, a perimeter fence was installed to protect the highest priority areas. Other major reserve improvements included shack removal and site remediation, improvements to the coastal walking trail and the upgrade of the boat ramp, beach access and parking. The site is now managed for conservation and restoration outcomes, resulting in considerable ecological gain, most notably the increasing natural regeneration and vegetation cover. See Figure 1.

The Reserve is currently co-managed by the City of Onkaparinga and Green Adelaide, for conservation and recreation / green space. Vegetation is being managed and conserved in accordance with the City of Onkaparinga '*Native Vegetation Strategy - A community plan 2028 initiative*' and aligns with the Metropolitan Adelaide and Northern Coastal Action Plan objectives. [4]

[1] Report prepared for Green Adelaide, Coast and Seas, Department for Water and Environment & the City of Onkaparinga 2025.
[2] Native Vegetation Council (2024). Bushland Assessment Manual. Government of South Australia, Department for Environment and Water, Adelaide.
[3] Moulton, B City of Onkaparinga (2008) Protecting Significant Vegetation at Tingira Reserve. Weekly News
[4] Caton, Brian *et al* (2009) Metropolitan Adelaide and Northern Coastal Action Plan. Department for Environment and Heritage

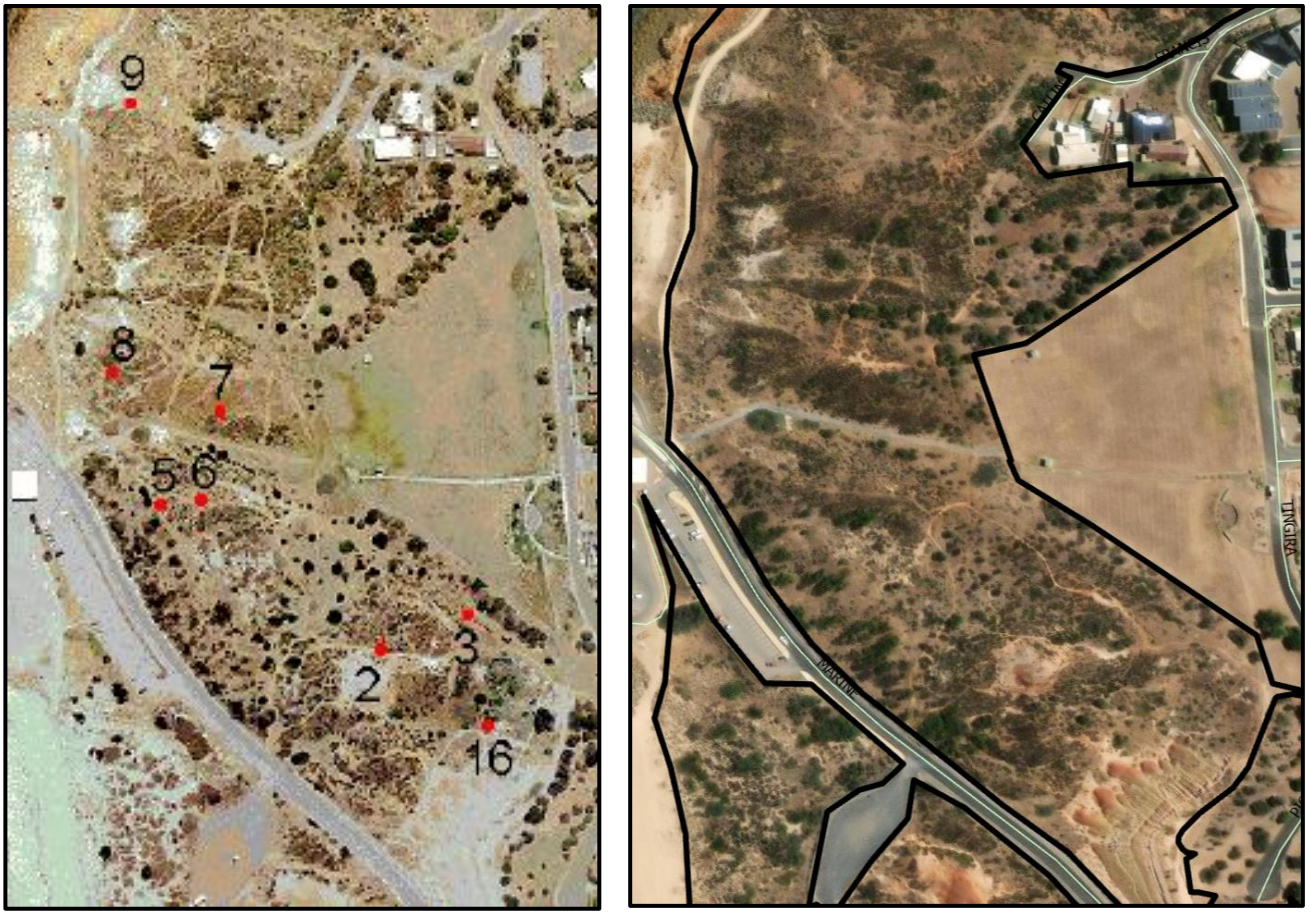


Figure 1. Left - Imagery from 2001 report. Dark green patches, were likely to be Olives. Right - Imagery from 2024, Noticeable regeneration with the low shrublands and overall vegetation cover.

1.3 Reserve Management Objective

The reserves management objectives will closely align the Metropolitan Adelaide and Northern Coastal Action Plan and adopt core values of the 'Coastal Adaptation Action Plan - 2024–30'[5] facilitate long-term natural regeneration of native vegetation and habitat for threatened species.

This Biodiversity Action Plan Objectives for the next 5 years is as follows:

- Continue follow-up woody weed management, reduce annual/ grassy weed cover by 50% and complete early intervention of new weeds.
- To promote the importance of ecological connectivity between Tingira and other sensitive and significant areas such as the Port Stanvac and Hallett Cove precincts. This approach will guide the establishment and consolidation of linkages and the natural regeneration of ecologically sensitive species.

[5] City of Onkaparinga (2024) *Coastal Adaptation Action Plan | 2024–30.*
https://www.onkaparingacity.com/Services/Environment-and-sustainability/Climate-change/Coastal-adaptation

- To act as a conservation refuge for the reintroduction and restoration of threatened flora
- To guide appropriate reserve usage and prevent inappropriate uses through new and updated interpretative signage.
- Revegetate with appropriate, less common species and increase threatened species as outlined in **5.3.1**
- Guide and facilitate ongoing site conservation.

1.4 Plan Development

How this plan has been developed:

1. Reviewing existing management plans and strategies such as: The Metropolitan Adelaide and Northern Coastal Action Plan (MANCAP) and 'Native Vegetation Strategy - A community plan 2028 initiative' and previously collected baseline Bushland Condition Monitoring data.
2. Stakeholder consultation and liaison.
3. Site survey using the Bushland Assessment Methodology (NVC, 2024) for cover, condition, plants and communities of conservation significance including mapping.

2. STUDY AREA

Tingira coastal reserve at O'Sullivans Beach, is located approximately 29km south of Adelaide city centre within the City of Onkaparinga jurisdiction and the Green Adelaide footprint in the Hundred of Noarlunga. And comprises 6 land parcels shown in **Table 1**.

Table 1. Land parcels and Certificate of Title

Parcel(s)	Title details
D75381 Q56	CT/6106/266
D75381 Q55	CT/6106/266
D72733 A50	CT/5983/354
F152598 A22	CR/5967/932
F152597 A21	CR/5967/931
F152596 A20	CR/5967/930
D71866 A2	CT/6012/543
D9931 A137	CT/5572/36

The total area to be assessed for this plan is 9.4 ha. See the reserves boundary in **Figure 2.** It is connected to the Port Stanvac area which also contains good remnant coastal heathlands. There is a proposed coastal park which contains a trail network being planned by the City of Onkaparinga and Planning SA.[6] which will be associated with proposed Port Stanvac housing development of 3,600 houses.[7]

[6] City of Onkaparinga (2019) *Coast Park Plan 2019*. https://www.onkaparingacity.com/Council/Projects/Coast-Park-Plan-2019

[7] Department for Housing and Urban Development (2024) P*ort Stanvac unlocked for new housing development.* Government of South Australia https://www.dhud.sa.gov.au/news/stories/port-stanvac-unlocked-for-new-housing-development

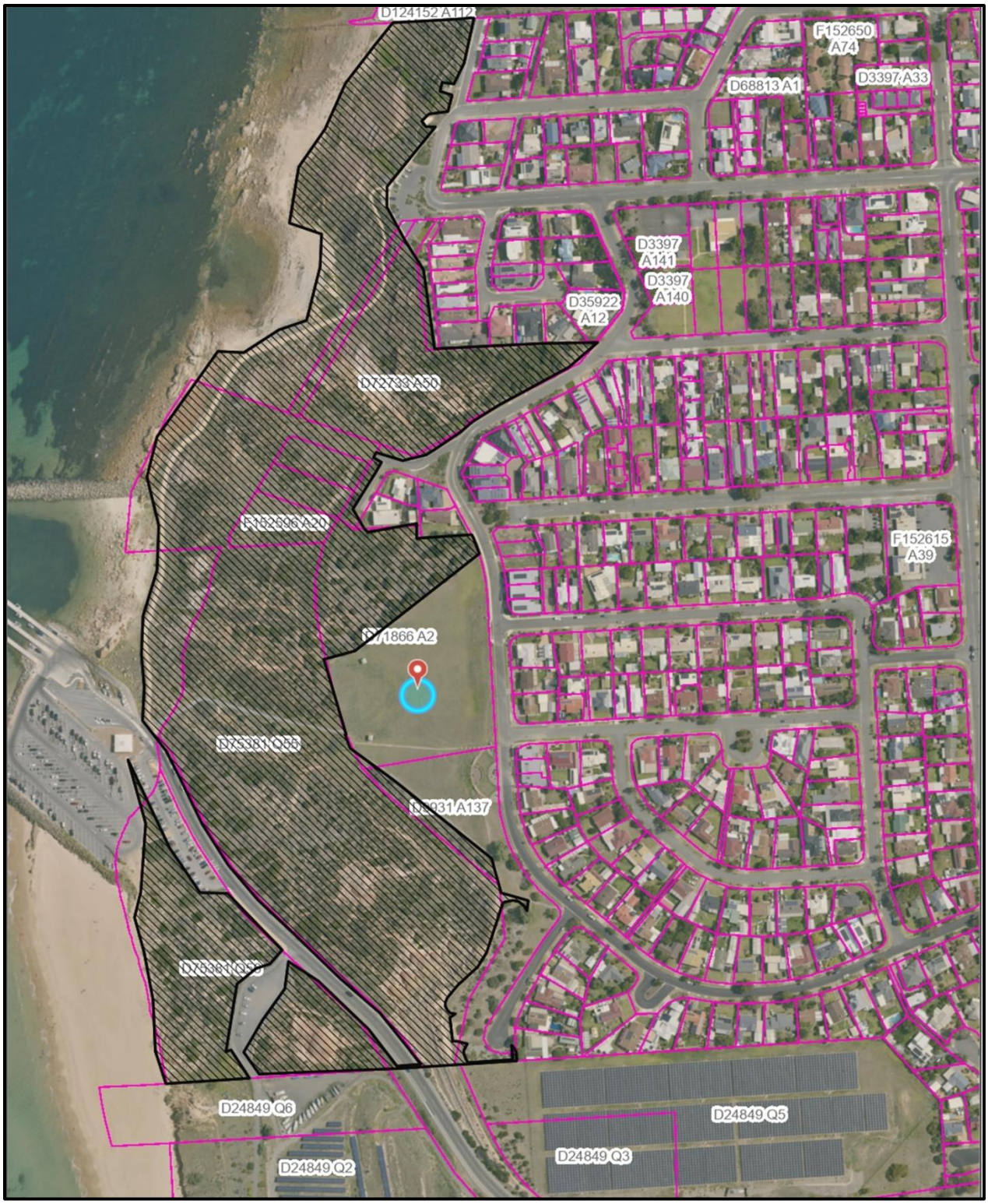


Figure 2. General Tingira reserve boundary and parcel boundaries.[8] Note: Parcels F152598 A22, F152597 A21 are next F152597 A20

[8] Department for Environment and Water (2025) NatureMaps
http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps

2. 2 Surrounding and Historical Land Use

2.2.1 Pre-European

It is documented that the Kaurna people have inhabited the area for at least 40,000 years for camping along the banks and outlet of Christies Creek, fishing and hunting during the summer months. One of the last known burial sites was also located within the Christie Creek precinct sites.[9] Given the close proximity of sites and camps to Tingira Reserve, and the high diversity of forage plants, it is likely the area was frequented.

Referencing the pre-European vegetation mapping and notes by Kraehenbuehl (1996), for the adjoining 'Port Stanvac Scrub' and Marino Conservation Park, a dense compact covering of Low Closed Heathland was the dominant vegetation community. This vegetation consisted of species such as of *Pomaderris paniculosa* ssp. *paniculosa* (Coastal Pomaderris), *Beyeria lechenaultii* (Pale Turpentine), *Acrotriche patula* (Prickly Ground-berry), *Alyxia buxifolia* (Sea Box), *Gahnia lanigera* (Black Grass Saw-sedge) and *Lepidosperma congestum* (Clustered Sword Sedge). With other cohorts in patches throughout *Grevillea lavandulacea* ssp*. lavandulacea* (Spider-flower)*, Dampiera rosmarinifolia* (Rosemary Dampiera), *Goodenia amplexans* (Clasping Goodenia), *Calytrix tetragona* (Common Fringe-myrtle)*, Dodonaea hexandra* (Horned Hop-bush)*, Eutaxia microphylla* (Common Eutaxia)*, Olearia ramulosa* (Twiggy Daisy-bush), *Gonocarpus mezianus* (Broad-leaf Raspwort)*,* and microclimates supporting a diverse mix of herbaceous species, including orchids. [10]

Coastal dunes would have most likely been dominated by *Olearia axillaris* (Coast Daisy-bush) *Spinifex hirsutus* (Coast Spinifex), *Ficinia nodosa* (Knobby Club-rush) and native groundcover, including *Carpobrotus rossii* (Pig-face).

The hydrology of the area would have been significantly different, with a greater influx of freshwater, likely influencing wetland species such as *Gahnia filum* (Chaffy Saw-sedge) and *Typha domingensis* (Bulrush), which may have had a more extensive coverage.

2.2.2 Post European

European settlement is recorded from 1838, primarily for farming. In 1926, the O'Sullivan Beach area was subdivided and named after Ignatius O'Sullivan who had arrived in the area in 1840 from Ireland. Development of public housing occurred in the 1960s to 70's.

In 1983 the O'Sullivans Beach boat ramp was constructed, likely increasing site visitation, leading to the creation of unofficial access points and trails. This unmanaged access placed pressure on the fragile coastal environment resulting in significant erosion and native vegetation degradation. In recent years, an old 'shack' located just west of Catlin Court, once within the footprint of Tingira Reserve, was removed in 2006/07. This prompted significant site rehabilitation, including the removal of debris and the elimination of major woody weed threats.

In an effort to improve the reserves ecological condition and restore important remaining remnants, the City of Onkaparinga in collaboration with Adelaide Mount Lofty Ranges NRM Board has produced multiple vegetation

[9] Tindale, NB 1987. Wanderings of Tjibruki: A Tale of the Kaurna People of Adelaide. Records of the South Australian Museum V20: 5-13.

[10] Kraehenbuehl, D.K. (1996). Pre-European Vegetation of Adelaide: A Survey from the Gawler River to Hallett Cove. Nature Conservation Society of South Australia, Adelaide.

implementation / management action plans (2001, 2004/5, 2012/13, 2017/18). These plans have guided management including; weed management, improvements to the coastal walking trail, boat ramp / beach access and formalised parking. Boundary fencing was installed to prevent unauthorised access and activities, such as the creation of bike jumps, within sensitive areas like the cliff tops, gullies, and regions with threatened flora (refer to Section 4.4 & 4.5). Although access has decreased, the erosion and fragmentation from prior activities remain noticeable, and vegetation is recovering slowly.

Significantly, large and intact remnant vegetation associations such as *Beyeria lechenaultii* (Pale Turpentine), *Acrotriche patula* (Prickly Ground-berry)*, Pomaderris paniculosa* (Coastal Pomaderris)*, Gahnia lanigera* (Black Grass Saw-sedge) Low Coastal Heath and some *Eucalyptus porosa* (Mallee Box) Low Woodlands persist on site. Although fragmented, the long-term management of the site's remnant vegetation is resulting in excellent restoration results. See the aerial comparisons in **Figure 1.**

3. ENVIRONMENTAL ASSETS

3.1 Climate, microclimates

The annual average rainfall of ~457mm/yr, experiencing dry summers and wet winters with an annual median temperature of 21 °C. Smaller gullies and folds in the landscape, provide micro relief from sea breezes favouring more sensitive plants such as ferns.

3.2 Landform and soils

The area has unique Geological composition and falls within Aldinga Environmental Association (4.2.12) (Laut, P., et al 1977) and the Mount Osmond Block Geological formation. It features whitish calcareous remnant sands, tillite, and limestone similar to Hallett Cove but with unique features like a small amphitheatre capped by calcrete and the sugarloaf see **Figure** 3.

The terrain includes a mix of gentler slopes to steep slopes (>45 degrees), Badlands terrain, and skeletal soils, which are highly prone to moisture evaporation, leading to elevated salt levels.

The landscape has been shaped by the erosion of soft Permian, Pliocene, and Pleistocene deposits. Erratic rocks accumulate at the base of these slopes due to erosion. Some gullies in the area show deposits of grey silty clay loam, which is often spongy under foot near southern aspects and, to tertiary sand dune in the southern corner of the reserve, along with a shallow sand deposit in Zone 2 and the fringes of the cliffs.

The varied geological formations and erosion processes have created distinct microhabitats within the area, influencing soil characteristic and supporting diverse flora. To the north there are solid limestone cliffs fracturing and below this the purple and mottled alluvial silt and clay (Badlands) is the remains of sedimentation derived from the deposition of terrestrial freshwater sediments in the Middle Eocene.

Figure 3. Top left - Cliff to the north of the reserve with >45 slope with Badlands terrain, with purple mottled alluvial soils and iron rich clay. Top right - claystone, siltstone and sandstone pebbles derived from ancient river deposition in Zone 2. Bottom left - View looking south at edge of amphitheatre and little Sugarloaf formation across the road. Bottom right - grey silty clay loam with a higher salt content and calcareous nodules.

3.3 Vegetation

The reserve hosts 214 plant species—133 indigenous and 81 introduced—with indigenous species increasing by 43 since the 2001 Vegetation Management Plan (up from 90). This can largely be attributed to sustained weed management, management of access, strategic reintroduction of threatened species and increased knowledge. Zone mapping in **Figure 4**, and broad overview of Bushland Condition Monitoring vegetation communities assigned to each Zone are outlined in **Table 1**. More extensive descriptions of vegetation complexities are outlined in the proceeding sections **3.2.1 to 3.2.5** and **4.1 Invasive Weeds**.

Table 2. Zones – Vegetation community, Area, Condition and Unit Biodiversity Score

Zone	Bushland Condition Monitoring Vegetation Community	Area	Vegetation Condition Score	Unit Biodiversity score	General location in reserve
1: Cliffs and Cliff-tops Steep slopes	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands	2.38	41.09	47.86	Clifftop and steeper slopes in northern end of the site (Note: purple and mottled alluvial silt and clay is the remains of sedimentation).
2: Cliffs and Cliff-tops Gentle slopes	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands	5.87	64.82	87.12	Dominated by gentle clifftop slopes in southern end of the site.
3: Coastal Gullies	SMLR 6.1 Shrubland, Sedgeland & Woodland Swamps & Bogs (Estimated best fit)	0.22	29.01	32.49	3 small, narrow gullies, presence of *Typha* and *Gahnia filum and Samolus repens*. One steep one on a diagonal SW direction Behind the toilet blocks.
4: Dryland Tea-tree/Mallee Box low mallee	SMLR Co Community 1.2 Coastal Very Low Woodlands with Heath Understorey	2.56	36.85	42.92	Mainly "inland", majority through the middle and south. Some near northern cliffs parallel to boat ramp road.
5: Coastal Dunes	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands	1.13	53.05	59.42	Coastal dune strip immediately south of the Boat Ramp carpark and small sand deposit next to Mallee Box opposite side of road.

The Bushland Assessment Method (BAM) uses between 5-9 different indicators (depending on whether the vegetation is naturally treeless or not), and the results of the assessment are in **Appendix 4.**

In summary most of the Zones had Medium-High ("Good") condition, with the Zone 2 Cliffs and Cliff-tops: Gentle slopes scoring very high for overall vegetation condition and unit biodiversity score, most likely attributed to the quality and cover of vegetation, threatened flora species and reduced woody weed threats. Zone 1 received a lower score due to fewer threatened flora, lower diversity, greater weed threats/coverage, and increased fragmentation. In contrast, Zone 5, Coastal Dunes, scored relatively high, as it contains minimal significant weed threats and has a strong structural composition. Zone 3 consists of three main gullies. The northern gully was not previously assessed in this manner, but it contains several plant species that suggest it has the appropriate hydrology. For details on the vegetation, refer to Section 3.2.3, Coastal Gullies. Refer to **Table 1.** Zones – Vegetation community, Area, Condition and Unit Biodiversity Score **Figure 4.** Map of Vegetation Management Zones.

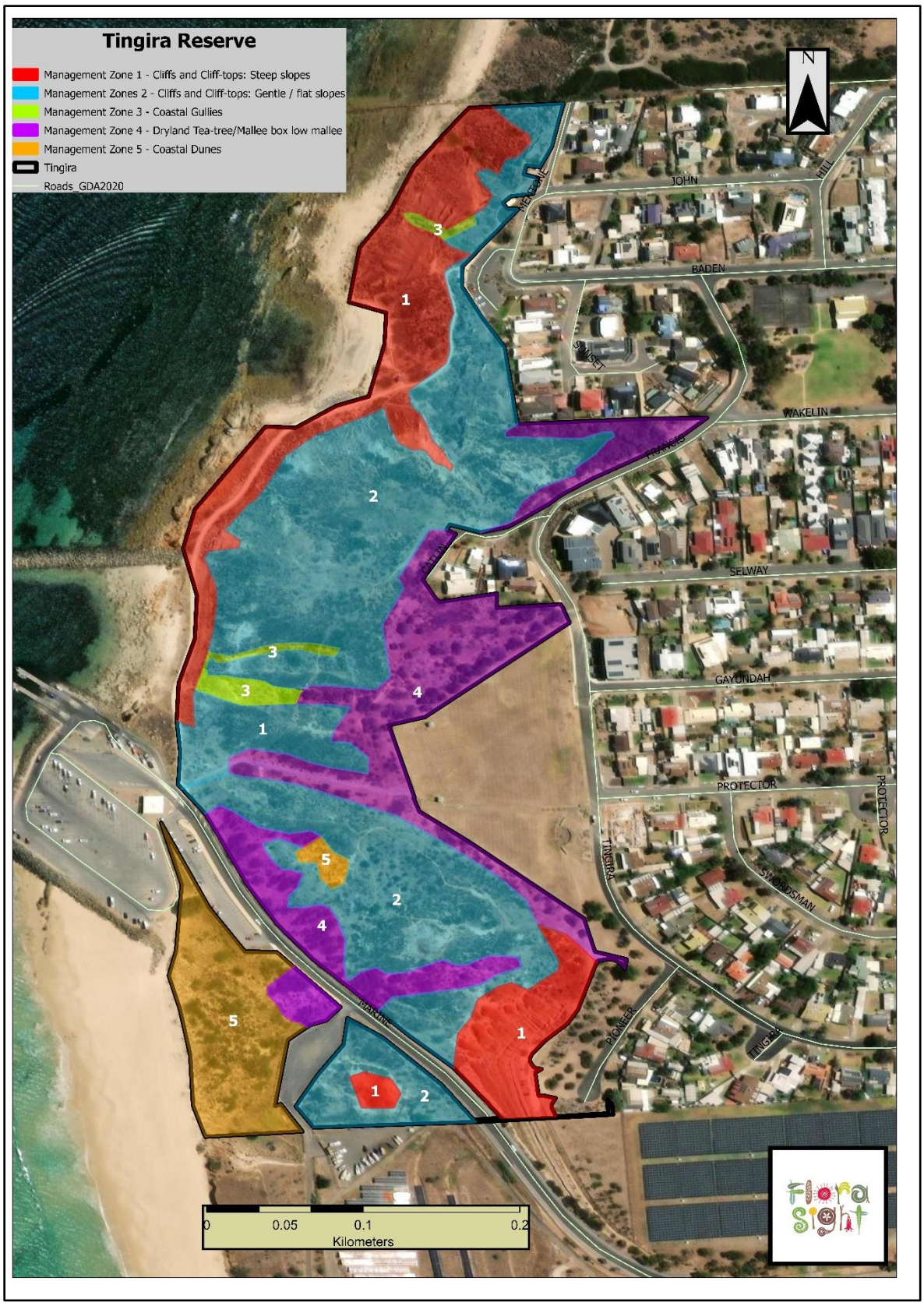


Figure 4. Map of Vegetation Management Zones

3.3.1 Zone 1: Cliffs and Cliff-tops: Steep slopes

SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

Steep cliff slopes, with shale and sodic soils, *Atriplex paludosa* (Marsh Saltbush) +/ - *Nitraria billaridieri* (Nitrebush) Low Open Shrubland, *Maireana oppositifolia* (Salt Bluebush)*, Lawrencia squamata* (Salt Lawrencia)*, Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface)*,* similarly described by (Croft & Croft 2023) see **Figure 5** (top left image) with large patches of the introduced **Cenchrus clandestinus* (Kikuyu) smothering the cliff to the north and some infestations of **Gazania sp*. on the open scalded areas and **Oxalis pes-caprae* (Soursob).

At the base of the steep cliffs and where deeper soils remain *Nitraria billaridieri* (Nitrebush), along with *Dianella brevicaulis* (Blueberry Flax-lily), *Poa poiformis* var*. poiformis* (Coast Tussock grass) and some smaller patches of *Distichlis distichophylla* (Emu grass).

Around the rim of the amphitheatre, a mix of highly erosive, powdery clays and cracking clays supports the growth of *Atriplex paludosa* (Marsh Saltbush), forming a sparse low open shrubland, *Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface) with *Beyeria lechenaultii* (Pale Turpentine Bush), *Acrotriche patula* (Shiny Ground-berry). *Austrostipa drummondii* (Cottony Spear-grass) +/ - the similar *Austrostipa nitida* (Balcarra Spear-grass), grow on the powdery soils**, Figure 5**.

**Lycium ferocissimum* (African Boxthorn) and **Asphodelus fistulosus* (Onion weed), occur predominantly around the periphery of the Amphitheatre.

Figure 5. Top left - *Atriplex paludosa* (Marsh Saltbush) Low Open Shrubland, with *Maireana oppositifolia* (Salt Bluebush), *Lawrencia squamata* (Salt Lawrencia) on scalded and eroded soils. Top right - regenerating and similar in appearance *Maireana oppositifolia* (Salt Bluebush), *Lawrencia squamata* (Salt Lawrencia) and *Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface). Bottom left - Feathery seed heads of *Austrostipa drummondii* (Cottony Speargrass) on powdery soils. Bottom right - *Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface) at the base of the amphitheatre.

3.3.2 Zone 2: Cliffs and Cliff-tops: Gentle slopes

SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

This Zone is a higher quality area with a species diversity greater 30 plants and good native: weed ratio score of 4 and supports multiple threatened species and important ecological communities. Located primarily on the gentler upper slopes, dominated by loams, some partially eroded compacted grey-brown loams with calcareous nodules and shallow sand films overlying ancient river deposits. Included in this are the fracturing limestone ledges is dominated by *Beyeria lechenaultii* (Pale Turpentine Bush), *Acrotriche patula* (Shiny Ground-berry), *Gahnia lanigera* (Black Grass Saw-sedge) +/- *Pomaderris paniculosa* ssp. *paniculosa* (Coastal Pomaderris) Low Closed shrublands to Low shrublands in more fragmented areas near tracks **Figure 6.** left image. Notably *Alyxia buxifolia* (Sea Box), becomes a co-dominant where calcareous limestone cliff ledges of calcrete occur and where it is close to the underlying limestone bedrock expresses on or close to the surface with nodules. **Figure 6**. right image.

Figure 6. Left, Coastal cliff top vegetation on gentle hills with Low shrubland with the less fragmented low closed shrubland. Note the lighter green between low shrubs is generally annual weed patches, which are bare over summer months. Photo by Phil Baron. Right, Dense low coastal heath on west facing slope with calcareous strew, *Gahnia lanigera* (Black Grass Saw-sedge) and *Alyxia buxifolia* (Sea Box).

Other associated dominants are *Grevillea lavandulacea* ssp*. lavandulacea* (Spider-flower), *Dampiera rosmarinifolia* (Rosemary Dampiera) see images in **Figure 7**, *Goodenia amplexans* (Clasping Goodenia), *Calytrix tetragona* (Common Fringe-myrtle), *Dodonaea hexandra* (Horned Hop-bush), *Eutaxia microphylla* (Common Eutaxia), *Gonocarpus mezianus* (Broad-leaf Raspwort), *Hakea rugosa* (Dwarf Hakea) and *Styphelia humifusum* (Cranberry Heath) and there are some smaller pockets in better remnant soils of *Pultenaea tenuifolia* (Slender Bush-pea). Notably, on the south facing slopes with spongy loams, there is more cover *Gonocarpus mezianus* (Broad-leaf Raspwort) and heat sensitive *Cheilanthes austrotenuifolia* (Annual Rock-fern) and *Caesia calliantha* (Blue Grass-lily) are still supported.

The introduced grasses *_Cynodon dactylon_ var. _dactylon_ (Couch), *_Lagurus ovatus_ and the herbaceous *_Oxalis pes-caprae_ (Soursob), *_Avena barbata_ (Wild Oats) collectively have a cover approximately 15% across this Zone. **Figure 6.**

In open disturbed clays there is a patchy occurrence of *_Romulea minutiflora_ (Small-flower Onion-grass), *_Vicia sativa ssp._ (Common Vetch), *_Moraea setifolia_ (Thread Iris).

This Zone has some excellent seedling and juvenile recruitment of the dominant and cohort species, see notes regarding regeneration in section **5.3.**

Figure 7. Left _Grevillea lavandulacea_ ssp. _lavandulacea_ (Spider-flower). Centre - _Dampiera rosmarinifolia (Rosemary_ Dampiera) and right _Leptorhynchos squamatus_ ssp. _squamatus_ (Scaly Buttons).

3.3.3 Zone 3: Coastal Gullies

6.1 Shrubland, Sedgeland & Woodland Swamps & Bogs

The coastal gullies are defined by deeper cut drainage areas between the gentle Cliff & Cliff-top Zones. The gullies, funnel seasonal water run-off, potentially receiving underground freshwater seepage through the porous limestone and provide a microclimate for riparian flora species. Historically, these coastal gullies were utilised as beach access points across the region, and as a result are often highly disturbed, significantly eroded and often infested with weeds.

Vegetation is _Gahnia filum_ (Thatching grass), _Typha domingensis_ (Narrow-leaf Bulrush) and _Ficinia nodosa_ (Knobby Clubrush) open sedgeland. Fringed by mixed native grasses _Poa poiformis_ var. _poiformis_ (Coast Tussock grass), _Setaria constricta_ (Knotty-butt Paspalidium) on the scalded rockier slopes with some dense infestations of *_Cenchrus clandestinus_ (Kikuyu). See Figure 17. Notably there is a good patch of _Samolus repens_ (Creeping Samolus) near wetter areas with Bulrush, and is often an indicator of slightly salty water **Figure 8**.

There is relatively good shrub cover albeit patchy _Beyeria lechenaultii_ (Pale Turpentine Bush), _Goodenia amplexans_ (Clasping Goodenia), _Pomaderris paniculosa_ ssp. _paniculosa_ (Coastal Pomaderris). Stunted forms of

Santalum acuminatum (Quandong) occur in several small patches, with *Melaleuca lanceolata* (Dryland Teatree) at the head of the gully.

Figure 8. Left - View towards *Typha domingensis* (Bulrush) patch and *Gahnia filum* (Thatching grass) Centre - *Samolus repens* (Creeping Samolus) near wetter area. Right – mid view *Gahnia filum* (Thatching Grass) and introduced *Cyperus involucratus* (Umbrella Sedge) with disturbed eroded beach acess track in the foreground.

3.3.4 Zone 4: Dryland Tea-tree/Mallee box low mallee

SMLR Co Community 1.2 Coastal Very Low Woodlands with Heath Understorey

The *Eucalyptus porosa* (mallee box) and *Melaleuca lanceolata* (Dryland Teatree) low mallee is restricted to deep soils and the fringes. Many of the large plants were planted in these areas over the last 30 years with smaller pockets of remnants, see right image in **Figure 9**. Minor occurrences of emergent very low stunted *Santalum acuminatum* (Quandong) and *Melaleuca lanceolata* (Dryland Teatree) are in remnants where *Alyxia buxifolia* (Sea Box) is present, **Figure 9**. Understorey is mix of planted *Allocasuarina muelleriana* ssp. *muelleriana* (Common Oak-bush), *Dianella revoluta* (Black-anther Flax lily), with *Beyeria lechenaultii* (Pale turpentine), *Acrotriche patula* (Shiny Ground-berry) and *Calytrix tetragona* (Common Fringe-heath) naturally regenerating from the soil seed bank. See section **5.3 Revegetation and Regeneration**

There are large areas where the ground layer is dominated by the grassy weeds; **Cynodon dactylon* ssp. *dactylon* (Couch) and **Lagurus ovatus* (Hare's Tail Grass) and the herbaceous; **Oxalis pes-caprae* (Soursob) in dense

patches with patchy **Romulea minutiflora* (Small-flower Onion-grass), **Vicia sativa ssp.* (Common Vetch), **Moraea setifolia* (Thread Iris).

Figure 9. Left - *Melaleuca lanceolata* (Dryland Tea-tree) in the background along fire break and Francis Street. Right - *Eucalyptus porosa* (Mallee Box) fruit. Bottom Left – *Santalum apiculatum* (Quandong) foreground, mid ground and *Melaleuca lanceolata* (Dryland Tea-tree) across the reserve. Right - *Eucalyptus porosa* (Mallee Box) in the background with **Oxalis pes-caprae* (Soursob), **Cynodon dactylon* var. *dactylon* (Couch Grass) infestation and native *Enteropogan acicularis* (Curly Windmill Grass) foreground.

3.3.5 Zone 5: Coastal dunes

SMLR Co 7.2 Coastal Shrublands & Tall Shrublands

Two distinct areas occur along the coast, with minor species composition differences. The southern Coastal complex is on calcareous sand dunes dominated by *Olearia axillaris* (coast daisy-bush) shrubland +/- *Acacia longifolia* var. *sophorae* (Coastal Wattle), *Acacia cupularis* (Umbrella Wattle), *Myoporum insulare* (Common Boobialla).

The understorey is dominated by *Spinifex hirsutus* (Coast spinifex)*, Carpobrotus rossii* (native pigface), *Ficinia nodosa* (Knobby Club-rush), *Senecio pinnatifolius* var. *maritimus* (Variable Groundsel) *Nitraria billardierei* (Nitre-bush) occurring on sand mounds near the middle carpark next to the 'sugarloaf' See Figure 10.

The scrambling *Tetragonia implexicoma* (bower spinach) is restricted to growing on larger shrubs, the sedge *Dianella brevicaulis* (Short-stem Flax-lily) and grasses *Poa poiformis* (Coast Tussock-grass), *Austrostipa flavescens* (Coast Spear-grass) are patchy between larger shrubs. Medium shrubs *Rhagodia candolleana* spp. *candolleana* (Sea-berry saltbush), *Pimelea serpyllifolia* ssp. *serpyllifolia* (Thyme Riceflower) are patchy throughout.

A high percentage of the vegetation has been established through ongoing revegetation effort and reducing site disturbance through access control.

Of note there is a shallow sand deposit within Zone 4 on the other side of the boat harbour road, see map in **Figure 4.**

Figure 10. Left – *Olearia axillaris* (Coast Daisy-bush), with *Ficinia nodosa* (Knobby Club-rush) and *Senecio pinnatifolius ssp. maritimus* (Variable Groundsel). Right – *Nitraria billardierei* (Nitrebush) next to the car park.

3.4 Ecologically significant Flora Species & Communities

The site contains a number of native plant species of conservation significance including 1 Nationally threatened species, 6 state and 28 regionally rated species. The presence of these species is largely due to remnant intactness, long-term sensitive management and recently reintroduced threatened species. **Table 2** lists these species and their current conservation ratings.

Of particular note is the Nationally and State Endangered *Euphrasia collina* ssp*. osbornii* (Osborn's Eyebright) has now been translocated into the reserve as result of seed collection and propagation from a remnant population in Port Stanvac, by Green Adelaide and SA Seed Conservation Centre. **Figure 11**. This compliments the remnant population at Port Stanvac, which is now at approximately 600 plants.[11]

Figure 11. Left - Planted form of Endangered *Euphrasia collina ssp. osbornii* (Osborn's Eyebright) in front of *Gahnia lanigera*. Right - Tree guards around the newly translocated plants.

Another significant species recently translocated is the State Vulnerable *Ptilotus angustifolius* (Narrow-leaf Fox tail), reintroduced in 2023/24, via planted seedlings, in a collaboration with the SA Seed Conservation Centre, Green Adelaide and City of Onkaparinga, [12] **Figure 12**. Soil characteristics based on the Marino Conservation Park population locations, were carefully matched to ensure survivorship.[13]

[11] Endacott, M (2024) Metro Coastal Conservation Officer, City of Holdfast Bay & supported by Green Adelaide *Pers comm.* With Flora Sight, 4th August.
[12] Baron Environmental (2024) Tingira Reserve Biodiversity Action Plan (DRAFT). March
[13] Endacott, M (2024) Metro Coastal Conservation Officer, City of Holdfast Bay & supported by Green Adelaide *Pers comm.* With Flora Sight, 4th August.

Figure 12. Left – pink and white flags marking planted *Ptilotus angustifolius* (Narrow-leaf Fox tail). Photo P. Baron. Right – flag marking planting

The regionally Endangered, *Scaevola linearis ssp. confertifolia*, (Bundled Fanflower). This species appears to be particularly sensitive to fragmentation and maybe reliant on particular environmental factors for recruitment. See section **5.3.1 Revegetation notes.**

Figure 13. Left – Purple to whitish flowers typically more mauve flowers on Kangaroo Island forms[14]. Right - Mature plants occurring on the margin of a recovering erosion track are relatively inconspicuous.

[14]Plants of South Australia (2024) Scaevola linearis ssp. confertifolia https://syzygium.xyz/saplants/Goodeniaceae/Scaevola/Scaevola_linearis_ssp._confertifolia.html#&gid=1&pid=2

Table 3. List of Conservation Significant species

Species	Common Name	EPBC Act Status[15]	NPW Act Status[16]	FLB1 MLR Subregional Status[17]	Comments; Zone location, record information
Acacia cupularis	Cup Wattle			RA	Zone 2 & 5
Adriana quadripartita	Coast Bitter-bush			RA	Zone 1, 4 & 5
Alyxia buxifolia	Sea Box			RA	The majority in Zone 1&2, patchy in 3,4
Austrostipa acrociliata	Graceful Spear-grass			RA	Zone 4
Austrostipa multispiculis	Many-flowered Spear-grass		R	RA	Zone 2
Austrostipa puberula	Fine-hairy Spear-grass			RA	Zone 2, 4
Austrostipa tenuifolia	Narrow-leaf Spear-grass		R	RA	Record is from search near north boundary just inside Port Stanvac. This species like areas with exposed limestone or close to surface.
Brachyscome lineariloba	Hard-head Daisy			RA	Clays in Zone 2
Comesperma volubile	Love Creeper			RA	Patchy throughout Zone 2
Dodonaea hexandra	Horned Hop-bush			VU	In good dense remnants Zone 2
Euphrasia collina ssp. osbornii	Osborn's Eyebright	EN	E	EN	Planted Zone 2, Frances Street.
Gahnia filum	Thatching Grass			VU	Bottom of gullies, Zone 1, 2 & 3
Gahnia lanigera	Black Grass Saw-sedge			RA	Good remnants in Zone 2, some in Zone 1
Lawrencia squamata	Thorny Lawrencia			VU	Zone 1
Lepidosperma congestum	Clustered Sword-sedge			RA	Zone 2
Lomandra effusa	Scented Mat-rush			RA	Zone 2, 4
Melaleuca lanceolata	Dryland Tea-tree			RA	Zone 2, 4
Myoporum parvifolium	Creeping Boobialla		R	VU	Zone 1 & 2
Nitraria billardierei	Nitre-bush			RA	Zone 1, 2, 4, 5
Ptilotus angustifolius	Fox-tail		E	VU	Zone 2
Rhagodia spinescens	Spiny Saltbush			EN	Zone 2, 4
Roepera confluens	Forked Twinleaf			VU	Zone 2, 4
Santalum acuminatum	Quandong			RA	Zone 2 & 4
Scaevola crassifolia	Cushion Fanflower			VU	Zone 5
Scaevola linearis ssp. confertifolia	Bundled Fanflower			EN	Zone 2
Sclerolaena diacantha	Grey Bindyi			RA	Zone 1, 2
Senecio pinnatifolius var. maritimus	Elegant Yellow-top			RA	Zone 2, 4, 5

[15] Under the *Environment Protection and Biodiversity Conservation Act*
[16] Under the *National Parks and Wildlife Act 1972*
[17] As per Gillam, S. and Urban, R. (2014) Regional Species Conservation Assessment Project, Phase 1 Report – Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia. (Subregional status)

3.4.1 Other species of ecological significance / interest

The occurrence of two *Gahnia spp.* (Saw-sedges) species is quite unique, *Gahnia filum* (Thatching grass) is a regionally Vulnerable species and is almost forming an open sedgeland in Zone 1 on the front western facing slopes and becomes a patchy overstorey dominant in Zone 3.

Gahnia lanigera (Black Grass Saw-sedge) is a relatively common species, particularly in limestone areas with shallow sands and yellow-brown loams. While some well-preserved patches exist within the reserve, the species remains fragmented along this section of the coastline, making these populations especially significant. It does not readily colonize new areas beyond its established clusters. The threatened butterfly *Antipodia atralba* (Diamond Sand Skipper Butterfly) depends entirely on this species as its sole larval host plant, making its survival directly tied to the presence of *Gahnia lanigera* (Black Grass Saw-sedge).[18] This highlights the importance of protecting and expanding existing patches, encouraging further growth and spread, and re-establishing plants through revegetation efforts as soon as stock becomes available.

The exact trigger for germination of this species in the wild is not completely understood; however, it is believed to require fire, whose impact and regime are currently absent from the system. These species are also indicative of underground hydrology, both have seed shaped like keels designed to travel short distances. Spread of *Gahnia filum* (Thatching Grass) might be attributed to elevated soil moisture and retention, which may have increase as a result an increase in native vegetation cover.

Two species listed, but not recorded during recent years or this survey;

Micrantheum demissum (Dwarf Micrantheum) is an endemic to South Australia, smaller understorey shrub more typically associated with other Epacridaceae species on sandy loams. This is an interesting record from 1997 (noted in NatureMaps as not personally observed), because it would be an isolated population, with just one other historic record from Dorset Vale (Mount Bold) nearly 30km away and the rest occurring around the greater Mount Compass area, Deep Creek and Kangaroo Island.[19] It is most likely a dubious record, however it is a species which could be planted, if there is a suitable soil on site.

Craspedia paludicola, (Swamp Buttons) is a State Vulnerable species and has an historic record in the MANCAP (MA10) 2009. The current distribution is for the South-East, 300km away, so for the purpose of this report it has been omitted.

3.5 Native Vertebrate Fauna

Interestingly, the NatureMaps search for Tingira Reserve did not reveal any records of mammals, reptiles, or amphibians, nor did the 2009–2015 MANCAP MA10 Port Stanvac report. However, a recent area search using iNaturalist has provided a more comprehensive list of observed and inferred species see **Appendix 3**.

3.5.1 Birds

Despite the higher diversity of flora and patches of good shrub density the reserve hosts only a small suite of species, with 13 species recorded.

[18] Stolarski, A (Ento Search) (2024) *Antipodia atralba* (Diamond Sand Skipper Butterfly) *A Consolidation of Population and Distribution Reports.*

[19] Atlas of Living Australia (2024) Micrantheum demissum https://bie.ala.org.au/species/https://id.biodiversity.org.au/node/apni/2916702

The Singing Honeyeaters are by the far the most common species within the reserve, along with the Nankeen Kestrel, **Figure 14** and Australian Magpie. The smaller pockets of smaller trees and shrubs provided added cover for other species smaller species.

Figure 14. *Falco cenchroides* (Nankeen Kestrel) perched on small rocky ledge in the coastal cliff tops northern section.

3.5.2 Reptiles and Amphibians

Suitable habitat features such as; cracking clays, rock cropping including limestone bedrock crags, dense vegetation cover including sedges and even some sheet iron from the old shack that would suit variety of species. However, current known records for the area in the Biological Database of South Australia (BDBSA) are low.

There is one recent record of an Eastern Bluetongue *Tiliqua scincoides* from iNaturalist (T. Kowalick, May 2024) and a sighting of a *Tiliqua rugosa* (Shingleback), however no image was captured.

Although not observed or recorded, species occurring nearby and mentioned in the 2001 report from 'Vegetation Management Plan for Tingira Reserve suggest that with additional surveys and improvement in vegetation condition, species such as *Ctenotus robustus* (Robust Ctenotus), *Hemiergis decresiensis* (Southern Three-toed Earless Skink), *Underwoodisaurus milii* (Thick-tailed Barking Gecko) *Christinus mamoratus* (Southern Marbled Gecko), *Pseudonaja textilis* (Eastern Brown Snake) and the common *Pogona barbata* (Eastern Bearded Dragon) could likely be found in the reserve[20] [21]. In addition, *Lerista dorsalis* (Southern Four-toed Slider), *Menetia greyii* (Dwarf Skink) and the *Lymnodynastes tasmaniensis* (Spotted Marsh Frog) were recently recorded in Port Stanvac during Cliff-top survey.[22]

[20] Reptiles recorded at Hallett Cove- https://www.inaturalist.org/observations?place_id=92579&iconic_taxa=Reptilia
[21] EAC – Ecological Evaluation (2001) VEGETATION MANAGEMENT PLAN FOR TINGIRA RESERVE, Including Tingira Drive and Francis St Remnants & Surrounds
[22] Niejalke, D. & Armstrong, D (2023) *A non-invasive vertebrate survey of selected coastal cliff-top heathlands along the southern Adelaide metro coastline*. Prepared for Green Adelaide by Yacca Environmental Pty. Ltd.

3.5.3 Mammals

Several species have been noted in MANCAP, Echidna was noted in the MA 10 for Port Stanvac, with an undisclosed date and a one record of Grey-headed Flying-fox from the MA9 Christies Creek. It could be expected, that with improvements to connectivity that Echidnas may become more frequent.

3.5.4 Invertebrates

Invertebrates, due to their size, cryptic nature and in the case of some gnats, moths and butterflies brief appearance in a mature form, are often not captured during one off surveys. Tingira Reserve appears to support a relatively high diversity of species, with a number of recent records on iNaturalist NatureHoodz Tingira Coastal Reserve page. A greater emphasis has been placed on these species in this report due to the presence of flora species that require pollination and potential role they could play in regards to reintroduction of orchid species. **Refer to section 5.3.1**

Butterflies & Moths

Butterflies and moths have been overlooked in the past, but they are often good indicators of good intact functioning ecosystems. They are rarely observed during one-off surveys, especially if undertaken within season when they aren't present or are least active. For this report, referencing the iNaturalist NatureHoodz Tingira Coastal page has been helpful in identifying six butterflies and one moth species. Four additional species; *Metallarcha thiophara* (A Metallarcha moth), *Zizinia otis labradus* (Common Grass Blue) **Figure 15 (right image)** *Taractrocera papyria* (White-banded Grass-Dart) and a record of, *Ocybadistes walkeri* (Yellow-banded Dart), has been noted as being observed in a *Beyeria lechenaultii* (Pale Turpentine) between August-November. For the full list of species refer to **Appendix 3.**

The most important records are that of the Black and White Sedge-skipper *Antipodia atralba,* locally vulnerable species of butterfly, relying on healthy stands of *Gahnia lanigera* (Black Grass Saw-sedge) **Figure 15.**[23] And *Neolucia agricola* (Fringed Heath-blue) which is attracted to *Pultenaea tenuifolia* (Narrow-leaf Bush-pea) which is naturally occurring albeit sparse. [24]

[23] Stolarski, A (Ento Search) (2024) *Antipodia atralba* (Diamond Sand Skipper Butterfly) *A Consolidation of Population and Distribution Reports*

[24] Butterfly Conservation SA (2024) Fringed Heath-blue) preferred plant species. https://butterflyconservationsa.net.au/butterfly/fringed-heath-blue/

Figure 15. Left - *Antipodia atralba* (Black and White Sedge-skipper), has four records for the reserve on iNaturalist. Photo by M. Endacott. Centre – *Neolucia agricola agricola* (Fringed Heath-blue) on a *Acrotriche patula* (Prickly Ground-berry) Right – *Zizinia otis labradus* (Common Grass Blue) observed early September. Photo: M. McCallum

Bees, Wasps & Ants

Wasps are often overlooked, but like flies, butterflies and moths, they are key pollinators. No wasps were observed during the surveys, however there are many wasp species that are attracted to plant species within the reserve. It is likely that additional survey effort would result in the observation and recording of further wasp diversity. Some are very small and reintroduction of orchids through revegetation would increase the chance of their appearance.

An interesting ant species the *Myemecia mandibularis* (Toothless Bull Ant) was recorded in the coastal dunes and is a new record for the area on iNaturalist, **Figure 16.**

Figure 16. *Myemecia mandibularis* (Toothless Bull Ant). C. Margetts

Jewel Beetles

In recent years, our understanding of Jewel Beetles and their interrelationship with host plants and as key pollinators has increased. There are no known records on NatureMaps or iNaturalist of Jewel beetles from the reserve likely due to their often-cryptic movement and camouflage within their preferred vegetation (see Figure 17). Other jewel beetle host plants occurring in the reserve include; *Hakea rugosa* (Dwarf Hakea), *Lepidosperma congestum* (Clustered Sword-sedge), *Melaleuca lanceolata* (Dryland Tea-tree), *Pultenaea tenuifolia* (Narrow-leaf

Bush-pea), *Kunzea pomifera* (Muntries), *Calytrix tetragona* (Common Fringe-myrtle).[25] So based on having suitable host flora species, it likely that there might be at least one species of jewel beetle and will need further investigation.

Figure 17. Meleobasis cf. splendida Green on *Beyeria lechenaultii* (Pale Turpentine). Photo Peter J. Lang

[25] Lang, P. J. (2024) Buprestidae of South Australian (Jewel beetles) host plant information https://syzygium.xyz/buprestidae/taxonomy_host.php

4. ENVIRONMENTAL THREATS (MANAGEMENT ISSUES)

Like many coastal environments, Tingira reserve is susceptible to multiple threats. Dating back to 2012, a number of threats have been identified, mapped and addressed.

Current threats to the reserve are as follows:

- Re-emergent weeds
- Weed incursions – weeds originating from neighbouring properties and illegal garden waste dumping.
- Vegetation disturbance – due to trampling and BMX bike riding.
- Erosion resulting from disturbance threatening areas of sensitive vegetation.
- Pest animals – foxes predating on native reptile and bird species as well as introduced rabbits and hares.
- Climatic changes – decreased rainfall, erratic weather events, increased surface evaporation.

4.1 Invasive Weeds

Implementation of on-ground weed threat abatement over the last 30 years has significantly reduced the major weed threats. A woody weed map from 2013, see **Appendix 7** noted significant numbers of **Acacia cyclops* (Western Coast Wattle), **Olea europaea ssp. europaea* (Olive), **Lycium ferocissimum* (African Boxthorn) and two large patches of **Leptospermum laevigatum* (Coastal Tea-tree) and a high concentration of **Osteospermum moniliferum* (Boneseed) along the northern boundary in Zone 1 abutting Port Stanvac. The extent of woody weed cover has been drastically reduced, with only isolated re-emergent seedlings and juveniles remaining, and almost no adult plants present.

Grassy weeds such as **Cynodon dactylon* var. *dactylon* (Couch) pose the highest threat to some of the highly sensitive slopes in Zone 2. Patches previously managed, have spread further in recent years resulting in a decline in vegetation condition. Although[26] **Cenchrus clandestinus* (Kikuyu), **Gazania spp*. (Gazania), **Oxalis pes-caprae* (Soursob), and **Freesia cultivar* remain threats, they have been pushed out of the core of the good intact remnants such as that in Zone 2. See **Appendix 2** for full weed species list.

No **Cenchrus setaceus* (Fountain grass) was found within the reserve but it is high priority weed species to monitor for. A drive by survey in May to July 2024 revealed that it is planted in residential gardens nearby.

Table 3 has a list of some of the weeds, that are listed as; Weeds of National significance (WONS), Declared, weed threat level of 4-9[27] and require immediate attention.

[26] Moulton, B (2024) *Pers comm* on Couch management and recent spread.
[27] Green Adelaide (2024) Metropolitan Adelaide and Northern Coastal Action Plan 2023 – Threatening processes: Environmental Weeds.

Table 3. List of Declared invasive woody, grassy and herbaceous weeds. Note, table only has weeds with a threat level 4-9.

SPECIES	COMMON NAME	WONS	Declared	Weed Threat level[28]	Threat comment
Acacia cyclops	Western Coastal Wattle			9	Low but may be being because of similarity in appearance to *Acacia cupularis/ Acacia longifolia* var. *sophorae*, but can be distinguished by the new growth, leaf venation and bright red aril in the seed
Agave americana	Century Plant			6	Re-emergent in Zone 1 & 2
Aizoon pubescens	Coastal Galenia			5	Mainly occurring in Zone 1, with minor patches throughout.
Ammophila arenaria	Marram Grass			4	Minor occurrence of this species emerging in Zone 1 and 5 on the coastal fringes
Arctotheca calendula	Cape Weed			5	Zone 1, 2, 3, 4
Cenchrus clandestinus	Kikuyu			5	Zone 1, large patches
Chrysanthemoides monilifera ssp. *monilifera*	Boneseed	Y	Y	7	Most of the plants mapped from the 2013 weed mapping project have been controlled, however during the time of the survey several larger plants have been noted within the reserve.
Coprosma repens	Mirror bush		Y	6	Zone 1 & 4
Cynara cardunculus ssp. *flavescens*	Artichoke Thistle			5	Zone 1, northern end there are multiple plants, including on the Port Stanvac side of the fence
Cynodon dactylon ssp. *dactylon*	Couch Grass				Some patches were being managed and extent reduced. Edges of some good remnants in Zone 2 and 4
Euphorbia paralias	Sea Spurge			7	Small numbers re-emerging Zone 5 & 1
Euphorbia terracina	False Caper		Y	7	Small numbers re-emerging Zone 5 & 1
Gazania sp.	Gazania			9	Continual threat spread from gardens, steep slopes in Zone 1
Leptospermum laevigatum	Coast Tea-tree		Y	7	Some returning around the boundaries of Zone 4 and new outbreaks should be closely monitored.

[28] Green Adelaide (2024) Metropolitan Adelaide and Northern Coastal Action Plan 2023 – Threatening processes: Environmental Weeds

SPECIES	COMMON NAME	WONS	Declared	Weed Threat level[28]	Threat comment
Lycium ferocissimum	African Boxthorn	Y	Y	7	Seedlings re-emerging, some large plants within other plants
Olea europaea ssp. europaea	Olive			5	Low numbers due to ongoing control but small numbers remain. Seedlings re-emerging, Port Stanvac plants
Oxalis pes-caprae	Soursob			7	Pest on margins of the good intact areas in Zone 2, persisting in shade amongst *Cheilanthes*
Polygala myrtifolia	Myrtle-leaf Milkwort		Y	8	One or two plants re-emerging
Tribulus terrestris	Caltrop		Y	6	Limited to certain tracks – difficult to manage due to growing prevalence in the region.

Figure 18. Left - Persistent ****Cynodon* **dactyolon var. ***dactylon*** **(Couch) spread in Zone 2 & 4. Right – ****Gazania sp.* **(Gazania) spreading down slope of garden plants on the steep slopes of Zone 1.**

Figure 19. Left - ****Agave americana* **(Century Plant) re-emergent in Zone 1 & 2. Right - ****Crassula tetragona* **ssp. ***robusta*** **(miniature pine tree).**

Two new emerging weeds have been recorded for the first time **Lavendula stoechas* ssp. *stoechas* (Topped Lavender) and Asteraceae sp. (**Euryops pectinatus*)*,* both are common garden plants.

Figure 20. Left - **Lavendula stoechas* ssp. *stoechas* (Topped Lavender). Right – an individual plant of Asteraceae sp. (**Euryops pectinatus*)

4.2 Pest Animals

The primary pest threat to the site is the presence of *Lepus europaeus* (European Brown Hare) and *Oryctolagus cuniculus* (European Rabbit) and the damage they cause through vegetation grazing and soil disturbance. Hares have recently been controlled. Foxes pose a threat to reptiles, smaller birds such as the *Acanthiza chrysorrhoa* (Yellow-rumped Thornbill) and small native invertebrates. The threat of cats on the reserve is not known. Refer to 7.2 Action prioritisation tables

Table 4. List of introduced animals present or considered to be present.

Species	Common Name	Comments
Columba livia	Feral Pigeon	Low risk, but monitor for resource and habitat competition. Improved waste disposal will assist with this. Roosting in low Melaleuca Zone 4
Passer domesticus	House Sparrow	Noted in Zone 3, 4, 5 may outcompete for habitat and food resources
Sturnus vulgaris	Common Starling	Noted in Zone 3, 4, 5 may outcompete for habitat and food resources
Canis familiaris	Dog	Trampling vegetation in southern section of the coastal dunes due to gaps in the fences Zone 5 and the top of Zone 1 near amphitheatre.
Felis catus	Feral Cat	With the increase of cover and recovery of vegetation, will most certainly result in a potential increase in bird diversity. It will most certainly favour both movement of feral and domesticated cats and aid them being more inconspicuous.
Lepus europaeus	European Brown Hare	Low, possibly due to probable high levels of foxes and cats but monitor and act (fumigate) for rebounds following feral predator control above.
Vulpes	Fox (Red Fox)	A few active dens were located and recorded by Council staff, have since been fumigated in March 2024. Expected to be an ongoing issue due to local resource and habitat availability: other local habitat (reinvasion), residential sources of food, along with marine recreation (fish & bait waste/dumping). Improved general local waste disposal will assist with this. Continue to manage via monitoring and den fumigation and consider escalating signage and bins near the beach and boat ramp. Mentioned at inspection 30/8 that calicivirus has been released in the past and had a positive impact on keeping animal numbers down.
Apis mellifera	European Honey Bee	Competition with native bees and other fauna for floral resources. Risk to further cross pollination of native *Aizoaceae* family. Also, threaten of competition with smaller hollows suitable for smaller bats and microbats.
Cochlicella acuta	Pointed Snail	May have an impact on reintroduction of young threatened flora or seedling recruitment.
Xerocincta neglecta	Dune Snail	Minor concern in Zone 1, 2 & 5.
Vespula germanica	European Wasps	May become an issue with some of the other native invertebrates, especially for rarer *Antipodia atralba* (Black and White Sedge-skipper), which are in low numbers already

4.3 Rubbish dumping & debris removal

Dog scats and bags thrown over perimeter fence, litter from car parks, occasional trailer rubbish dumping requires ongoing maintenance and monitoring.

4.4 Erosion

O'Sullivan Beach has been assessed as having medium to high-risk erosion 'Coastal Adaptation Action Plan | 2024–30'.[29] One of the biggest threats to any coastal environment is erosion, often a result of unauthorised and unmanaged walking and vehicle tracks. Erosion scars from these activities persist, evident in patches of bare soil, which are particularly visible in aerial photography. Some disturbances are very recent see section **4.5 Recreational Activities.**

Although the majority of the existing erosion would be considered minor some relatively significant erosion scars exist on the steep slopes of Zone 1 and in the Zone 3 Gullies. There is also a major erosion gully adjacent to Marine Drive See **5.2 Management Zones.**

Encouragingly, some trails have noticeably decreased in width and stabilisation is occurring. Some of the erosion management has helped to trap and retain more soil allowing vegetation to recolonise and the roots of vegetation are beginning to stabilise some areas. In time further natural regeneration in these areas will stabilise the gullies, provided they are not trampled.

4.5 Recreational Activities

Access management strategies are required to manage inappropriate recreational activities.

- Illegal bike tracks - constructed on the steeper gullies and on connecting historic walking trails, causing minor to major erosion, loss of ecologically threatened flora, damage to pre-existing erosion control and damage to fencing.
- Minor trampling of sensitive vegetation and erosion by pedestrians using historic interior and exterior trails around mini amphitheatre and through some gullies.

4.6 Climate Change

As identified in the 'Metropolitan Adelaide and Northern Coastal Action Plan in 2009', [30] Sea Level rise and Storm magnitude, along with increasing temperatures will impact sea-level rise and higher tides could begin to erode the base of the cliffs.

Run-off regime change - Increasing aridity will be reflected in reduced run off: some seasonal streams will flow for fewer months; others will not flow which no doubt will directly impact the small gullies with moisture dependent species.[31]

[29] City of Onkaparinga (2021), *Coastal Adaptation Action Plan | 2024–30.* Prepared by BRM Advisory and Integrated Coasts
[30] Caton B., Fotheringham D., Krahnert E., Pearson J., Royal M. and Sandercock R. 2009. Metropolitan Adelaide and Northern Coastal Action Plan. Prepared for the Adelaide and Mount Lofty Ranges NRM Board and Department for Environment and Heritage
[31] Murray-Darling Basin Authority (2019) Climate change and the Murray–Darling Basin Plan. Murray-Darling Basin Authority Discussion Paper.

4.7 Fire management- Controlled and uncontrolled fire risk.

Local fire regimes have been radically altered since European settlement and the encroachment of urban development. There are no fires recorded within this area during the last 90 years in NatureMaps.[32] However, it has been noted that fire regimes the frequency of ignitions is expected to increase in coastal areas and will negatively affect mammal abundance and richness.[33] Small biodiversity asset protection 'Prescribed ecological burns' could be trialled in areas of weeds between remnants and / or in areas containing *Gahnia lanigera* (Black Grass Saw-sedge). It is known that the *Antipodia atralba* (Diamond Sedge Skipper) is very responsive to post fire plant growth and will recolonise burnt areas. Introducing a fire would also benefit obligate seeders, and regenerating flora species such as *Grevillea lavandulacea* ssp. *lavandulacea* (Spider-flower) and *Hakea rugosa* (Dwarf Hakea).

[32] NatureMaps (2024) – Last Fire spatial layer - http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps

[33] Department of Agriculture, Water and the Environment (2022), Fire regimes that cause declines in biodiversity as a key threatening process, Department of Agriculture, Water and the Environment, Canberra, April. CC BY 4.0. https://www.dcceew.gov.au/sites/default/files/documents/ktp-fire-regimes-that-cause-declines-in-biodiversity-advice.pdf

5. BIODIVERSITY MANAGEMENT STRATEGIES

5.1 Biodiversity Management objectives

The next phase of management for Tingira Reserve needs to consider:

- Protection of good quality intact remnants and areas where natural recruitment is occurring.
- Continued follow up from previous 5-year annual weed management plans and strategic coordination of management with state government and land manager, on north boundary within the Port Stanvac footprint.
- Flora and fauna habitat values.
- Increase support with the Bush for life volunteers.
- Recreational and amenity values.
- Sensitive, strategic revegetation and alternative vegetation management techniques i.e. small patch burns.
- Erosion stabilisation and rehabilitation of unauthorized trails.

5.2 Management Zones

There are 5 main management zones based on Vegetation, soil composition, topography and geology. Zone description including specific management issues are outlined in brief below.

5.2.1 Management Zone 1- Cliffs and Cliff-tops (North)

Atriplex paludosa (Marsh Saltbush) + *Nitraria billaridieri* (Nitrebush) Low Open Shrubland, *Maireana oppositifolia* (Salt Bluebush)*, Lawrencia squamata* (Salt Lawrencia)*, Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface) and large patches of introduced **Cenchrus clandestinus* (Kikuyu)*, **Oxalis pes-caprae* (Soursob) and **Gazania spp.* (Gazania).

Figure 21. Steeper highly erosive slopes of sodic soils, halophytic plants *Atriplex paludosa* (Marsh Saltbush), *Maireana oppositifolia* (Salt Bluebush), *Lawrencia squamata* (Salt Lawrencia).

Key management issues in this Management Zone

- Priority weeds – **Gazania spp*. (Gazania), **Lycium ferocissimum* (African Boxthorn), **Chrysanthemoides monilifera* (Boneseed), **Cenchrus clandestinus* (Kikuyu).
- New emerging weeds - *Asteraceae sp. (*Euryops pectinatus*) and **Lavendula stoechas* ssp. stoechas (Topped Lavender)
- Erosion – includes, lack of cover, post weed management.

Priority activities in this Management Zone

- Follow-up weed control – Woody Weeds, Crassula, Gazania and Kikuyu.
- Early intervention - **Lavendula stoechas* ssp. *stoechas* (Topped Lavender) and *Asteraceae* sp. (**Euryops pectinatus*).

- Erosion control using natives (Note natural regeneration structure, explore jute matting options or native grass thatching; other naturally occurring annuals perennials direct seeding.

Figure 22. Left – ****Lycium ferocissimum* **(African Boxthorn), Centre – ****Gazania linearis* **(Gazania) in local garden, above the amphitheatre Zone 1. Right – ****Gazania* **sp. (Gazania) on steep erosional slope.

5.2.2 Management Zone 2- Cliffs and Cliff-tops (South)

Beyeria lechenaultii (Pale Turpentine Bush), *Acrotriche patula* (Shiny Ground-berry), *Gahnia lanigera* (Black Grass Saw-sedge) +/- *Pomaderris paniculosa* ssp. *paniculosa* (Coastal Pomaderris) +/- *Alyxia buxifolia* (Sea Box) Low Closed shrublands to Low shrublands.

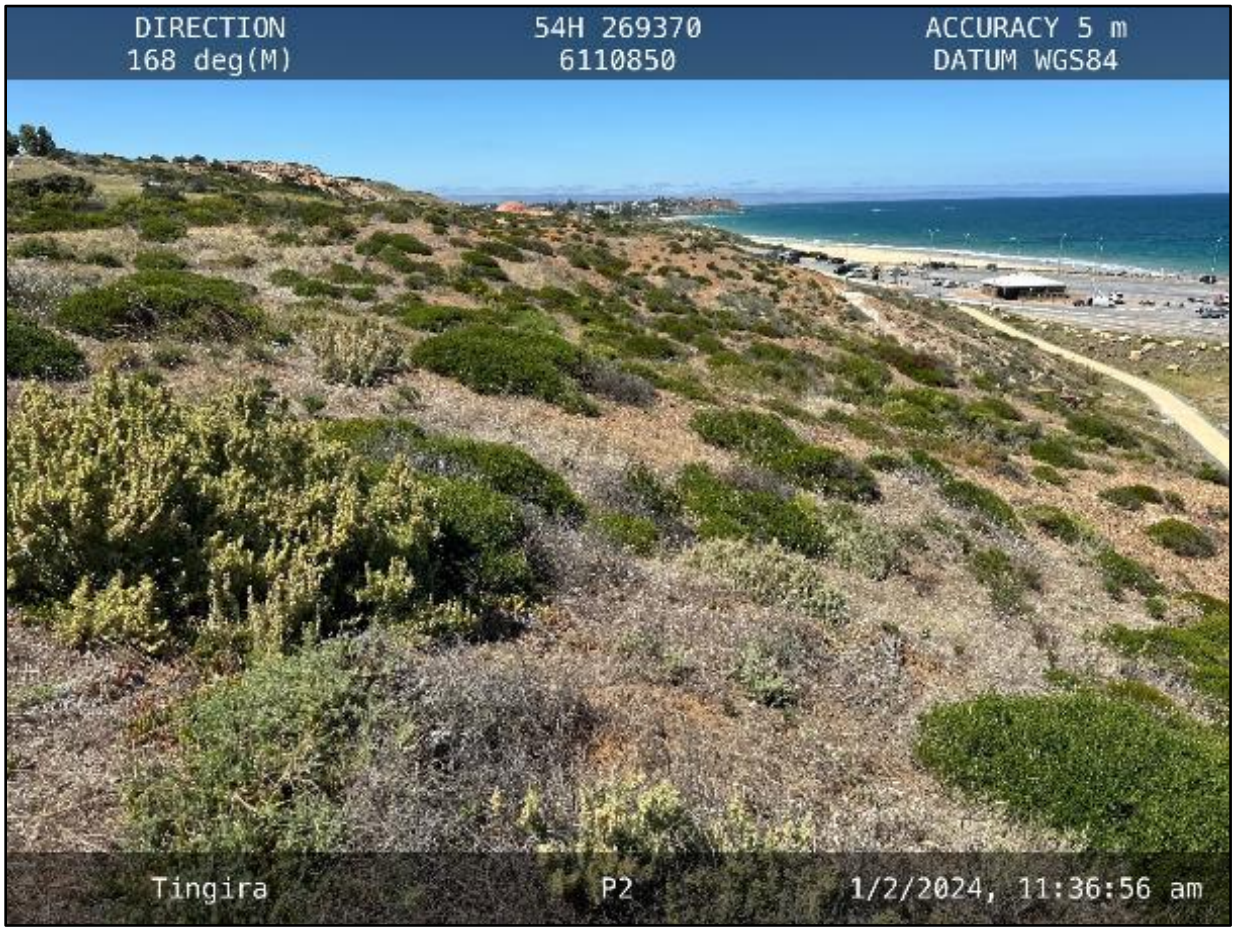


Figure 23. Zone 2 assessment photo, Low coastal heath.

Key management issues in this Management Zone

- High quality remnant vegetation, including species of conservation significance.
- Priority weeds - High threat from – **Olea europaea* (Olives), **Cynodon dactylon* (Couch Grass), **Acacia cyclops* (Western Coastal Wattle), **Oxalis pes-caprae* (Soursob) and **Agave americana* (Century Plant).
- Erosion – Major, compromising remnants and road.
- Erosion – minor trails.
- Revegetation.

- Lack of fire regime.
- Lack of interpretative signage.

Priority activities in this Management Zone

- Maintenance of high biodiversity values, including threatened flora species – sensitive weed control.
- Follow-up weed control - sweep of woody weeds, push weeds and decrease weed lines back from remnants.
- Major erosion control – A 'Hold the line' approach may need to be investigated; to install a natural or engineered solution.
- Minor erosion control – Jute matting and stick thatching
- Careful selection and minimise plantings, hand broadcast native grass, herbaceous species and shrubs. Include follow-up plantings of *Euphrasia collina* ssp. *osbornii* (Osborne's Eyebright) and reintroduce *Logania linifolia* (Flax-leaf Logania) in new locations in spongy loams or highly intact areas.
- Investigate options for micro patch burns – targeting *Gahnia lanigera* (Black Grass Saw-sedge).

Example images

Figure 24. Left – managed **Olea europaea* (Olive). Right – Major erosion

Figure 25. Left – *_Agave americana_* (Century Plant) emergent. Right – *_Acacia cyclops_* (Western Coastal Wattle)

5.2.3 Management Zone 3- Coastal Gullies

Gahnia filum (Thatching grass), *Typha domingensis* (Narrow-leaf Bulrush) and *Ficinia nodosa* (Knobby Clubrush) open sedgeland. Fringed by mixed native grasses *Poa poiformis* var. *poiformis* (Coast Tussock grass), *Setaria constricta* (Knotty-butt Paspalidium) on the scalded rockier slopes with some dense infestations of **Cenchrus clandestinus* (Kikuyu) and the perennial herb *Samolus repens* (Creeping Samolus) underneath.

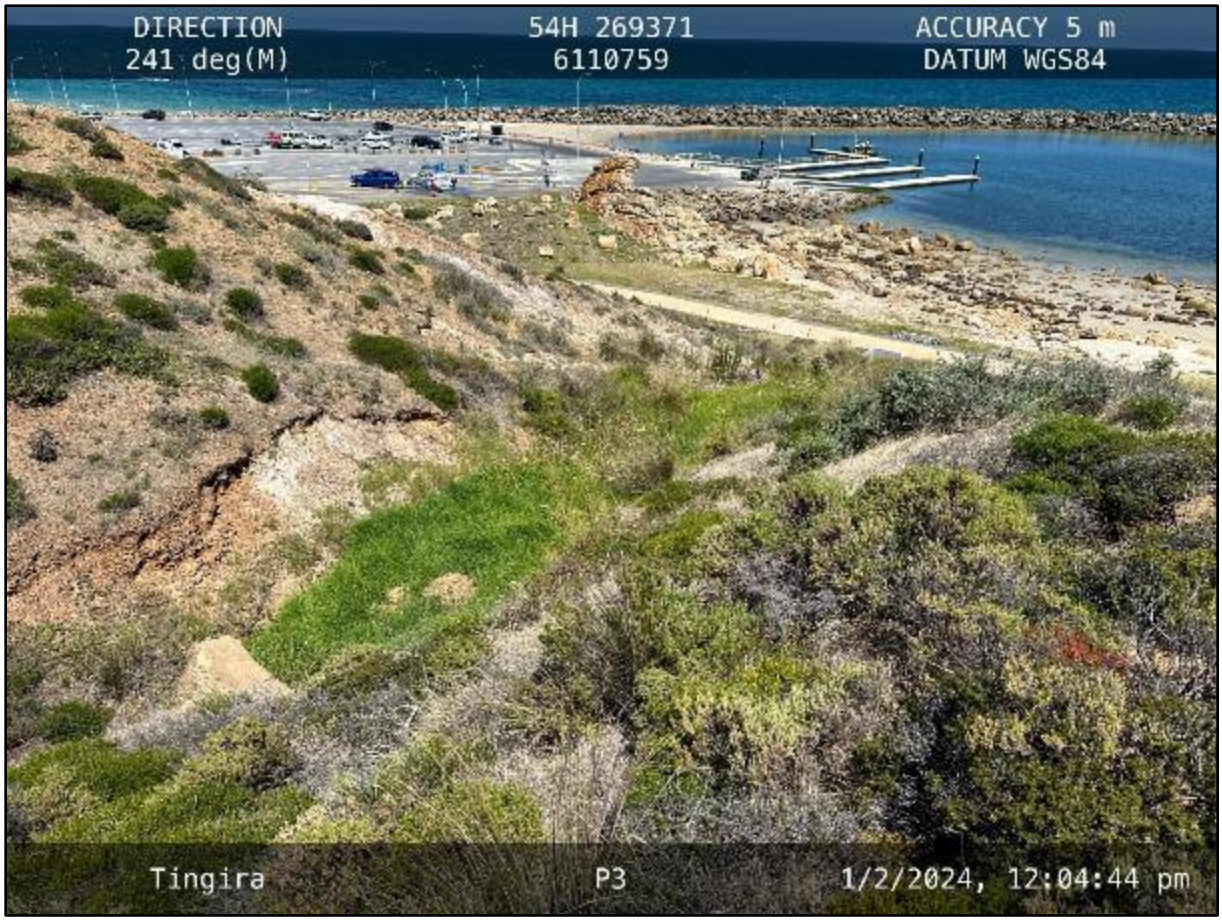


Figure 26. Zone 3, Coastal Gully

Key management issues in this Management Zone

- Weed – current **Cenchrus clandestinus* (Kikuyu) and **Cyperus involucratus* (Umbrella sedge) along with new incursions.
- Erosion management in gullies.
- Revegetation for diversity.

Priority activities in this Management Zone

- Manage weeds; Kikuyu, Umbrella Sedge and Paspalum, mass revegetate with local species and monitor for re-emergent weeds.
- Erosion control follow-up – replace twigs and branches on edges where required.
- Investigate options for threatened wetland species to be reintroduced.
- Investigate options and feasibility for environmental drainage from existing drain.

Example images

Figure 27. Left – Drain with ****Cenchrus clandestinus* **(Kikuyu). Centre – old erosion from a beach access track. Right – past erosion management undertaken.

5.2.4 Management Zone 4- Dryland Tea-tree/Mallee Box low mallee

The *Eucalyptus porosa* (mallee box) and *Melaleuca lanceolata* (Dryland Teatree) low mallee

Figure 28. Zone 4 assessment photo.

Key management issues in this Management Zone

- Priority weeds – Woody, herbaceous.
- Erosion on trails.
- Revegetation composition different to natural regeneration.
- Fire break management.
- Fencing

Priority activities in this Management Zone

- Follow-up weed management - woody weeds; Olives, Norfolk Island Hibiscus, African Boxthorn. Grassy & herbaceous –Freesia, Couch Grass, Caltrop (seasonally active – act post summer rains).
- Sensitive vegetation establishment – Broadcasting seed mixed perennial and native grass seed, use thatching of native grasses and wattles.
- Revegetation not matching natural regeneration - investigate some minor removal and mulching in places.
- Fire break management – pruning buffer.

Example images

Figure 29. Top left – ****Lycium ferocissimum* **(African Boxthorn) seedling. Top right - ****Lagunaria patersonii* **(Norfolk Island Hibiscus). Bottom left – medium sized ****Lycium ferocissimum* **(African Boxthorn) emerging from a planted Tea tree on the Zone 4 boundary. Bottom right – ****Cynodon dactylon* **var. ***dactylon*** **(Couch) and ****Oxalis pes- caprae* **(Soursob) spreading in Zone 4.**

5.2.5 Management Zone 5- Coastal Dunes

Olearia axillaris (Coast daisy-bush) shrubland +/- *Acacia longifolia* var. *sophorae* (Coastal Wattle), *Acacia cupularis* (Umbrella Wattle), *Myoporum insulare* (Common Boobialla) over *Carpobrotus rossii* (native pigface), *Ficinia nodosa* (Knobby Club-rush) and *Spinifex hirsutus* (Coast Spinifex) on foredune. With the introduced weeds **Euphorbia terracina* (False Caper), grasses **Lagurus ovatus* (Hare's Tail Grass).

Figure 30. Zone 5 – Coastal Dunes

Key management issues in this Management Zone

- Priority Weeds – re-emergent Western Coastal Wattle, Couch Grass, False Caper.
- Fencing damage – Fence damaged near beach side, dogs and humans entering dune.
- Revegetation for diversity see section **5.3**.

Priority activities in this Management Zone

- Monitor and manage re-emergent weeds.
- Fix fence damage.

Figure 31. Left - Fence requiring fixing. Right – ****Lycium ferocissimum* **(African Boxthorn) in ***Nitraria billardieri*** **(Nitrebush)**

5.3 Revegetation and Regeneration

Revegetation is an essential part of restoration, particularly where remnant vegetation is absent or displaced by weeds, clearance or other human impacts such as BMX trail building. Revegetation has occurred in many of these areas within the different management Zones, especially Zone 1, 4, and 5. Some of the revegetation doesn't closely align to notes by Kraehenbuehl for 'Port Stanvac Scrub' area and in reviewing aerial maps it is noticeable that historically lower stunted vegetation would have extended further inland with minimal larger shrub and tree structural layers, except for relief in sheltered deeper gullies.

Much of the reserve appears to have reached a tipping point with some excellent examples of regeneration due to management actions, which is apparent when comparing the satellite imagery in **Figure 1** from 2001, with **Figure 2**, 2024. Notably the lower coastal heath shrublands in Zone 2 have in increased cover, with patches being recolonised and reconnected. There is a high diversity of seedling and juvenile recruitment in bare patches on trails within Zone 1, 2, 3 and 4 of *Beyeria lechenaultii* (Pale Turpentine Bush), *Acrotriche patula* (Shiny Ground-berry), *Gahnia lanigera* (Black Grass Saw-sedge) *+/- Pomaderris paniculosa* ssp. *paniculosa* (Coastal Pomaderris), *Alyxia buxifolia* (Sea Box), *Grevillea lavandulacea* ssp*. lavandulacea* (Spider-flower), *Styphelia humifusum* (Cranberry heath). The more readily available species in cultivation *Dampiera rosmarinifolia* (Rosemary Dampiera), *Goodenia amplexans* (Clasping Goodenia), *Calytrix tetragona* (Common Fringe-myrtle) and *Pimelea serpyllifolia* ssp. *serpyllifolia* (Thyme riceflower).

Figure 32. Left – Large *Alyxia buxifolia* (Sea Box) with recruitment of suckers on the right-hand side of image. Centre – *Beyeria lechenaultii* (Pale Turpentine) seedling. Right - young *Comesperma volubile* (Love Creeper) flower is only several years old and has regenerated on an old trail.

5.3.1 Revegetation notes

Refer to **Table 5**, for suggested plantings and notes. Lack of availability of some of the rarer and harder to grow species such as *Gahnia lanigera* (Black Grass Saw-sedge)*, Beyeria lechenaultii* (Pale Turpentine Bush)*, Leucopogon parviflorus* (Coastal Beard-heath) has previously limited species composition. However, advancements in growing some of these species has improved. Future revegetation should focus on planting these species and in areas where no obvious natural seedling recruitment is occurring.

Zone 1 - natural regeneration is already occurring and is largely dictated by the salty and erosive soils. Revegetation should focus on establishing *Atriplex paludosa* (Marsh Saltbush) Low Open Shrubland, *Nitraria billardierei* (Nitrebush)*, Maireana oppositifolia* (Salt Bluebush), *Lawrencia squamata* (Thorny Lawrencia), *Disphyma crassifolium* ssp. *clavellatum* (Round-leaf Pigface). In areas where the deeper loam occurs there are seedlings of *Beyeria lechenaultii* (Pale Turpentine Bush) and *Roepera billardieri* (Coast Twinleaf).

Also, the spear grasses *Austrostipa nitida* (Balcarra Spear-grass) and *Austrostipa drummondii* (Cottony Spear-grass) could be utilised to stabilise areas of steep slopes scalded soils. *Setaria constricta* (Box Grass, Knotty-butt Paspalidium), could be another good species to throw in the mix, it naturally occurs on the front of the western slopes towards the bottom of the gullies and where more rock is exposed. Possible plans could be implemented to restore sections of the grassed reserve to previous remnant.

Zone 2 - Planning for more plantings of *Ptilotus angustifolius* (Narrow-leaf Fox-tails) and *Euphrasia collina* ssp. *osbornii* (Osborn's Eyebright) along with some hand broad casting of seed would benefit the open patches. The latter approach might be a good option and may require some gentle raking of surface soil. For revegetation. Adhere to notes in vegetation section of this report for the discreet Zones and seek advice from local specialists for guidance in plantings. Minimise larger perennial plants and perhaps reintroduce more sensitive annuals and rarer species.

In areas with small gullies, original high-quality spongy loams persist with minimal weed incursions. Consider reintroducing *Pterostylis mutica* (Midget Greenhood) and *Prasophyllum* sp. (Leek Orchid), both of which were present in Marino in the 1950s and, as noted by Kraehenbuehl, thrived in damp environments. *Diuris palustris* (Cinnamon Donkey-orchid) could also be a suitable candidate. The old Shack site might benefit from a mass planting of *Austrostipa spp.* (Spear-grasses) and *Rytidosperma spp.* (Wallaby Grasses). It appeared that there were several species already recruiting near the area.

Where there are pockets of ferns on the south facing aspects in gullies, more *Cheilanthes austrotenuifolia* (Annual Rock-fern) could be considered for plantings.

Could also consider planting *Austrostipa densiflora* (Fox-tail Spear-grass) was recently recorded in 2019 at Port Stanvac.

Zone 3 – Has some *Muehlenbeckia gunnii* (Coastal lignum) and *Tetragonia implexicoma* (Bower spinach spreading, however, it is recommended that they are planted as companion plants and do well naturally in Tennyson and Normanville Dunes next to plant *Leucopogon parviflorus* (Coastal Beard-heath), which could also be planted.

Zone 4 - *Dianella revoluta* (Black-anther Flax-lily)*, Allocasuarina muelleriana* ssp. *muelleriana* (Common Oak-bush) and *Melaleuca lanceolata* (Dryland Tea-tree) have been planted in patches. However, the naturally regenerating vegetation in this area is more indicative of the lower heath in Zone 2 and indicates there is still a good soil seed bank.

Zone 5 – Requires some infill and companion plantings, mainly introduce the sedge *Lepidosperma gladiatum* (Coast Sword-sedge) and *Leucopogon parviflorus* (Coastal Beard-heath). Retain some bare patches for possible reptile reintroduction.

Table 5. Revegetation species priorities list, specific notes and location.

Shrubs / small trees / ground covers			
Scientific name	Common name	Comments on where	Zone/s
Allocasuarina verticillata	Drooping Sheoak	Could be planted closer to the road and in reserve off Tingira drive.	4
Alyxia buxifolia	Sea Box	Plant in areas where limestone is noticeable/ known in sub surface.	1, 2
Dampiera rosmarinifolia	Rosemary Dampiera	Plant on trails in reddish crumbly clay/ loams.	2, 4, 1
Dodonaea hexandra	Horned Hop-bush	Near shacks.	2,4
Euphrasia collina ssp. osbornii	Osborn's Eyebright	Spongy grey/ brown loams, southern or middle of western slopes in protected niches near *Gahnia, Beyeria* etc.	2
Eutaxia microphylla		Fringe Heath-blue	2
Grevillea lavandulacea ssp. lavandulacea	Spider-flower	Some minor infill plantings near sugarloaf.	2,4
Leucopogon parviflorus	Coastal Beard-heath	Small clumped plantings in protected areas near *Olearia axillaris* consolidated sand mounds.	5
Logania linifolia	Flax-leaf Logania	Reintroduce into good remnants.	2, 4
Myoporum parvifolium	Creeping Boobialla	Steep cliffs, on grey clay loams in from Only plant small numbers.	1
Pomaderris paniculosa ssp. *paniculosa*	Coastal Pomaderris	Selectively reintroduce with other cohorts.	2, 3, 4
Pultenaea tenuifolia	Narrow-leaf Bush-pea	Clumped tubestock planting, near existing plants	2, 3
Roepera billardierei	Coast Twinleaf	Plant in amongst limestone boulders and on steeper slopes.	1,2
Santalum acuminatum	Common Eutaxia	Near Melaleuca Tingira drive north, small clumps	4
Scaevola linearis ssp. *confertifolia*	Bundled Fanflower	Introduce more populations in similar natural habitat and away from any erosion.	2
Samolus repens	Creeping Samolus	Growing in gullies, naturally. Can also be utilised in rock seasonal pools on limestone cliffs.	3, or trial 1
Annuals			
Scientific name	**Common name**	**Comments on where**	**Zone/s**
Chamaescilla corymbosa var. corymbosa	Blue Squill	Grows in spongy shaded soil at Hallett Cove	2, 3, 4
Cheilanthes austrotenuifolia	Annual Rock-fern	Shaded south aspects, or edge of Zone 4 near amphitheatre.	2,3
Goodenia pusiliflora	Small-flower Goodenia	Not recorded in the park. Grows in clay at Hallett Cove near Lichen crusted areas.	2
Podolepis rugata ssp. *littoralis*	Coast Copper-wire Daisy		2, 4
Leptorhynchos squamatus ssp. *squamatus*	Scaly Buttons	Plant in shallow soils in gullies, seed dispersal by hand broadcasting in open areas with other native annuals.	1, 2
Prasophyllum sp.	Leek Orchid	Plant in good pockets of remnants with higher ground cover. Plant next to or under *Acrotriche patula* and moss cover	2
Pterostylis mutica	Midget Greenhood	Plant in shaded gullies/ south slopes under Mallee Box.	2
Grasses & Sedges			
Scientific name	Common name	Comments on where	Zone/s
Amphipogon caricinus var. *caricinus*	Long Grey-beard Grass	Good quality clumping grass, relatively easy to grow, grows in clay loam or sand over clay and calcrete.	2, 3, 4
Austrostipa densiflora	Fox-tail Spear-grass		2, 3
Austrostipa nitida	Spear grasses	Refer to revegetation notes.	1, 2
Austrostipa drummondii	Cottony Spear-grass		1, 2

Austrostipa tenuifolia	Narrow-leaf Spear-grass	Plant near Sheoak in sandier loam/ in areas with some limestone.	1,4
Enteropogan acicularis	Curly Windmill Grass	Mass plant, some tubes, or hand broadcast with light raking in open areas on reddish clays/ slight depressions. Sow into areas of Thread Iris to suppress them or in areas recently cleared of couch.	1, 2, 4
Lepidosperma gladiatum	Coast Sword-sedge	Plant where erosion is occurring and where dogs enter through the coastal fence in the south western corner.	5
Gahnia lanigera	Black Grass Saw-sedge	With advancement in understanding of propagation, this species will soon be available. It would be recommended as a priority species for revegetation in and around key dominant low heath species where it is absent.	2, 1, 4
Poa poiformis	Coastal Tussock Grass	Plant on mass in clumps on small mounds or in swales, or in areas post weed control. Lower slopes of Zone 1.	5
Vines / twiners / scramblers			
Scientific name	Common name	Comments on where	Zone/s
Comesperma volubile	Love creeper	Plant next other cohorts *Acacia spinescens, Acrotriche patula, Hakea rugosa*	2, 3, 4
Glycine rubiginosa	Twining Glycine	Plant near these species *Beyeria lechenaultii,* (Pale Turpentine) O*learia ramulosa, Grevillea lavandulacea, Acacia cupularis*	1, 4
Tetragonia implexicoma	Bower spinach	Plant near larger shrubs and *Leucopogon parviflorus* as a companion plant.	5

6. MONITORING

Monitoring photopoints have been established where Bushland Assessments were conducted, identifying distinct management Zones noted in section **5.2 Management Zones**. Additional photopoints are located in areas with good regeneration, weed infestations, erosion (track recovery) and threatened species locations. These images and associated location data are provided in **Appendix 5.**

7. BIODIVERSITY ACTION PLAN

Current biodiversity management threats and issues and 5-year management targets for Tingira Reserve have been prioritised and are listed below in **Table 7**. Primarily, key weeds with high red alert threat ratings and follow up management and early intervention will be a focus for this plan.

7.1 Prioritisation and development of actions for weeds, restoration and site improvements

Actions have been separated into two tables with one focussing on weeds and is based upon factors such as risk to remnants, extent of cover and distribution, red alert ratings, invasiveness, accessibility and feasibility of containment.[34] Also, included in this table are pest fauna threats.

[34] Virtue, J. (2008). SA Weed Risk Management Guide, February 2008. Department of Water, Land and Biodiversity Conservation, Adelaide. Plant Protection Quarterly Vol.25(2) 2010

The second table utilises the 2021 State of the Environment report - Ecosystems and habitats section to determine key threatening processes such physical threats such as erosion, climatic changes, illegal trails and ecological issues such as; knowledge gaps, community education. Actions here will set out to fine tune targeted revegetation and floristic integrity, prevention of further soil erosion, support function of locally threatened ecological communities and raise the ecological profile with the broader community.

Note, there will be occasions where some actions might become a higher priority to achieve and it is acceptable that this can be done in the form of adaptive management.

7.2 Action prioritisation tables

Table 6. Issue/ Threats - Approach taken to management strategies and targets, based upon risk and feasibility of containment of Weeds/ Pest Fauna & invertebrates

ISSUE/THREAT – Weeds/ Pest Fauna & invertebrates	Feasibility of Containment (based upon available resources, current Distribution and accessibility)		
	Low	**Medium**	**High**
Lower/Moderate	Monitor and implement new management strategies if significant spread occurs and/ or follow up with existing successful management		
High	Protect significant highly diverse vegetation and threatened reintroduced species	Contain weed spread, early intervention of new emerging Weeds/ Pest Fauna & invertebrates	Destruction and complete eradication of Weeds/ Pest Fauna & invertebrates where possible
Very High	Implement whole of Park management strategies to reduce level of weeds (increase native: weed understorey biomass)		

Table 7. Issue/ Threats for physical threats; erosion, fencing etc and Ecology

ISSUE/THREAT – Erosion, Rubbish, Fencing, Ecology & Education	Prioritisation and Feasibility of action (based upon available resources, accessibility)
Low/ Moderate	Implementation of proposed action within 5 years, suggested action not recommended. Not a crucial threat/ issue to resolve. General observation and suggestion of something than can be done.
High	Recommended complete partial action within 5-years. A high threat/ issue which can be resolved overtime.
Very High	Immediate action required; 1-2 years. Very High threat to the reserve, ecology or an issue of highest importance i.e. Raising the reserve profile

Table 8. Issues/ threats for weeds and other (i.e., erosion) Milestones, proposed actions priorities, the Zones.

ISSUE/THREAT – Weeds/ Pest Fauna & invertebrates	5-Yr Objective / Milestone	Proposed actions	Management Zone(s)	Priority*
Highly invasive and persistent woody weeds: *Acacia cyclops* (Western Coastal Wattle) *Acacia saligna* (Golden Wreath Wattle) *Chrysanthemoides monilifera* (Boneseed) *Lycium ferocissimum* (African Boxthorn) *Olea europaea* (Olive)	Eradicate these species from Tingira Reserve, including weeds on the opposite side of the fence in Port Stanvac to prevent constant incursions.	• Twice annual patrol, mark all specimens and seedling emergent with flagging tape or survey markers • Target areas where previous infestations have occurred • calibrate contractors with identifying seedlings (especially Acacia cyclops), • hand pull seedlings or cut and swab, frill drill and fill • Use herbicide capsules as required on steeper erosive slopes • Re map woody weeds and compare with map in **Appendix 7.** • Mulch up Western Coastal Wattle and use for planting	All Zones	Very High
Reinfestation of woody weeds from Port Stanvac side of fence	Removal of all mature woody weeds, up to a 30m buffer	• Work with state government and ExxonMobil to eradicate woody weeds along boundary fence line. Yr 1	1,2	High
Highly invasive and persistent forb herbaceous weeds: *Gazania linearis* (Gazania), *Oxalis pes-caprae* (Soursob), *Aizoon pubescens* (Coastal Galenia), *Asphodelus fistulosus* (Onion Weed), *Sixalix atropurpurea* (Sweet scabious) *Arctotheca calendula* (Cape Weed)	Eradicate these species from high priority coastal heath habitats Reduce to scattered <1% cover	• Annually patrol and spot spray / hand pull if observed. Ensure all work is bushcare sensitive (i.e. no off-target damage), particularly in Zone 2 • Use tongs of death or swab wand for *Oxalis pes-caprae* (Soursob) in sensitive areas • Coordinate management of onion weed around the top and alongside O'Sullivans Beach Road.	All Zones	Very High
	No traces of plants	• *Euphorbia spp.* - hand pull with minimal disturbance techniques, mark with a pin for later replacement of holes with tube stock	1, 5	High
	At least 100% eradication *Tribulus terrestris* (Caltrop)	• *Tribulus terrestris* (Caltrop) - Monitor between August to April, especially post summer rain and immediate spot spray patches	1, 2,3	Very High
	At least 95% eradication *Aizoon pubescens* (Coastal Galenia)	• *Aizoon pubescens* (Coastal Galenia) - Spray, Hand pull and/ removal from site	1,4	High
	Reduced to small numbers on the periphery and none within the reserve	• *Sixalix atropurpurea* (Sweet scabious) – 3-4 times annual spot spray until numbers reduced	All	High
	No traces of plants	• *Arctotheca calendula* (Cape Weed) spot spray / hand pull ad hoc	All	High
	Reduce no or sparse cover	• *Asphodelus fistulosus* (Onion Weed) – • Optional sow native grasses	All	High
Minor threat annual lilies and grasses: *Romulea spp.* (Onion-grass) *Morea setifolia* (Thread iris) *Lagurus ovatus* (Hare's Tail Grass)	Reduce cover by 50% and increase cover of native flora in managed areas	• Annually patrol and spot spray / hand pull if observed. Ensure all work is bushcare sensitive (i.e. no off-target damage) • Mark out targeted sites where perennial shrubs are patchy • direct seed native grasses/ annuals - hand broadcasting and raking method in patches of *Lagurus ovatus* (Hare's Tail-grass), *Avena barbata/ fatua* (Oat) Continue late winter slashing (August), before	1, 2, 3, 4	Low/ moderate

Avena barbata/ fatua (Oat) *Brachypodium distachyon* (False Brome)		introduced annual grasses have set seed, and then re-evaluate early to mid-September as whether to slash again, before then leaving to allow the native grass species to set seed.		
High invasive grasses/ sedges weeds: *Cenchrus clandestinus* (Kikuyu), *Cynodon dactylon* var. *dactylon* (Couch),	Improvement of cover of native grasses, microflora in trial areas	• Target management in areas where previous management has occurred with regular follow-up and eventual sowing native grasses or mixed lower shrubs with relevance to management Zones.	1, 2, 4	Very high
High threat sedge *Cyperus involucratus* (Umbrella sedge):	All adult plants removed	• Remove all plants *Cyperus involucratus* (Umbrella sedge) and replace with native sedges	3	High
Lower threat - woody weeds *Lagunaria pyramidalis* (Norfolk Island Hibiscus)	Remove woody weeds	• Remove entire plants from the site; bagging seed heads. • Revegetate area with suitable species.	4	Low/ Moderate
Garden escapee/ emerging weeds Asteraceae sp. (*Euryops pectinatus*) and *Lavendula stoechas* ssp. stoechas (Topped Lavender), Gazania, *Crassula tetragona* ssp. *robusta* (Crassula)	Reduced garden escapee threats none in local gardens	• Education program promoting weed free gardens and plant replacement incentives and plant giveaways reference to Marion Council – 'Gazania free gardens'[35] • Remove entire plants from the site; bagging seed heads. • Revegetate area with suitable species, rake in local grass seeds. • *Crassula tetragona* ssp. *robusta* (Crassula) Trial herbicide capsules, preferably organic chemical based if feasible ''Slasher'.	1,2	Very high
High threat weed: *Aloe* sp. (Aloe) *Agave americana* (Century Plant)	Eradicate emergent plants/ root stock	• Remove all new emerging plants, follow up annually. • Trial herbicide capsules, preferably organic chemical based if feasible 'Slasher'.	1,2	High
Cynara cardunculus (Artichoke Thistle)	No adults or seedlings in 5 years	• Cut spray and remove heads of large adults, • follow-up seedling spot spray annually	1,2	High
Pest Fauna – *Felis catus* (Cat), threatening reptiles and bird populations	Impacts from Cats managed and community awareness and support developed	• Monitor – deploy Remote Camera monitoring • Trap feral cats/ foxes • Community campaign to keep cats inside near the coast investigate (Cat By-law and keeping your cat at home).[36]	All	High
Lepus europaeus (European Brown Hare) and *Oryctolagus cuniculus* (European Rabbit) threatening survivorship of threatened plants	Eradicate known populations	• Monitor – deploy Remote Camera monitoring • Community education – flier to residents • Re- release virus and/ or Diffusion fumigation of any active warrens	All	Very High

[35] Marion Council (2025) Gazania free gardens. https://www.marion.sa.gov.au/services-we-offer/environment/get-involved/gardening/gazania-free-gardens
[36] Adelaide Hills Council (2024) Cat By-Law information https://www.ahc.sa.gov.au/services/pets-and-animals/cats

Cochlicella acuta (Pointed snail)	Control around new herbaceous plantings	• Ad Hoc control around herbaceous annuals if required	All	Low/ Moderate
Vespula germanica (European Wasp)	*Vespula germanica* (European Wasp) quantified and any nest eradicated	• Engage and entomologist as part of butterfly surveys to quantify if there is any threat or active nests in key butterfly areas	All	Low/ Moderate

Table 9. Issue/ Threat table for Erosion, Rubbish, fire. And below Issues/ threats addressing Ecological understanding education, revegetation etc

ISSUE/THREAT – Erosion, Rubbish, Fencing, Fire	5-Yr Objective / Milestone	Proposed actions	Management Zone (s)	Priority*
Major erosion – soil loss, sensitive vegetation protection and threat of eventual road collapse	Prevent more major erosion occurring, and stabilise the area using natural engineering solutions, Goal stabilises area and conserve soil, and protection of sensitive vegetation	• Major natural environmental engineering management, to develop a solution to prevent erosion	1,2,4 straddles multiple areas	Very High
Minor erosion – in gullies and historic tracks	Stabilise minor erosion and aid regeneration of	• Use jute matting • Continue packing pest *Acacia cyclops* (Western Coastal Wattle) (vegetative only branches) and other pruned branches along erosion gullies • Use of native grasses/ Bulrush see broad casting and tubestock to fill scalded ground.	1,2,3	Low/ Moderate
Climatic change impact on sensitive flora species	Establish sensitive plants in micro niches and establish salt tolerant species in line	• Follow revegetation guide and notes	All zones	Low/ Moderate
Disturbed area 'Old shack site'	Suppress weed cover, increase cover indigenous flora cover, connecting good quality remnants	• Revegetate using high diversity species and native grasses – within the next 3 years	2	Low/ Moderate
Illegal bike trail building	No new tracks built	• Use of temporary barriers - larger fences / barriers may need to be installed in the more sensitive areas, particularly where there is remaining spongy loam soils, threatened species and plantings. • Instal Remote monitoring cameras • Investigate option of installing pump track construction in nearby reserve on one side through public consultation.	2, 3, 4	High
Pedestrians walking	No access and trails become grown over with plants and prevents further erosion	• Consider installing more fencing barriers • Develop and install restoration and interpretive signage at key access points informing visitors of the ecological importance	All	Low/ Moderate
Fire Break management	Keep suitably pruned	• General buffer pruning, twice yearly • Target weed removal under plants.	1, 4	Very High
Fencing repairs required	Fencing in good condition with lockable accesses gates to enable site management activities.	• Fix broken sections of fence posts, tension wires first year of this plan. • Install additional fencing near tracks off Caitlin Ct. access gates installed for contractors in easy to access locations.	1, 2, 5,4	Very High

ISSUE/THREAT – lack of ecological understanding, knowledge gaps, inadequate revegetation	5-Yr Objective / Milestone	Proposed actions	Management Zone (s)	Priority*
Very limited understanding of orchids and lack of presence	Locate iNaturalist record and establish at least one new orchid species	• Surveys with several orchid specialist to locate iNaturalist record • Translocation plan for one orchid species found in similar habitat locally. See all notes in section **5.3.1 and Table 5.**	2,3	High
Highly restricted threatened flora populations	Increase state/ national and regional threatened flora species numbers and populations including extent of occurrence within the reserve	• Plant more *Scaevola linearis* ssp. *confertifolia* (Bundled Fanflower) mentioned in revegetation notes. See all notes in section **5.3.1 and Table 5.**	2,3	Low/ Moderate
Revegetation not matching natural regeneration	Focus on specialist species in revegetation (Refer to section **5.3.1** revegetation notes	• Guard new seedlings of species naturally regenerating. • Removal and mulching of selective species, using excess branches for erosion control. • Plant more butterfly friendly species in selective areas.	1,4, parts of 2 & 3	High
Lack of survivorship – recent loss of numbers of translocated flora	Assess successes, annually. Strengthen survivorship. Increase current threatened species numbers and locations. broaden revegetation species palette	• Follow-up survivorships assessments for *Ptilotus angustifolius* (Narrow-leaf Fox tails) and *Euphrasia collina ssp. osbornii* (Osborn's Eyebright) • Infill plants where required, consider plantings in favourable conditions and plant in good seasons.	2, 4, 3	High
Lack of reserve profile	Improve interpretative signage and have reserve formerly recognised as an ecologically important location	• Install ecological interest signage for significant flora, butterflies and consider link to the Tingira Reserve naturalist page • Consider art installations or artist in residence throughout the year to capture the site	All	Very High
Limited spread of important host plants for butterflies and limited understanding	Increase cover of key flora species through revegetation and seed trials.	• Seed trials and revegetation of *Pultenaea tenuifolia* (Narrow-leaf Bush-pea) and *Gahnia lanigera* (Black Grass Saw-sedge) patches • Infill plantings in gaps between populations	2, 3, 4	High
Lack of native fauna and reptile knowledge for the reserve	Better knowledge of reptiles and whether it will be feasible to reintroduced any	• Conduct several surveys within Tingira reserve • Promote surveys through iNaturalist (with caution)	All	High
Lack of consistent tracking of rarer butterfly populations	More in depth knowledge of localised butterfly populations	• Conduct annual/ biennial Butterfly surveys	All	High
Lack of knowledge of Jewel Beetle pollination	Increase knowledge, records and role as pollinators in the reserve	• Annual entomological group surveys for Jewel Beetles • Talk to universities regarding student study topic		Low/ Moderate
Lack of natural fire regimes, preventing natural regeneration	Better understanding of role of fire and how these species respond in coastal heath environment.	• Refer to findings from Marino Rocks burns • Trial small patch burn for Gahnia and another patch and include follow-up weed management and then compare information with Marino results in 5 years.	2,3 and 4	Low/ Moderate

8. REFERENCES

Butterfly Conservation South Australia Inc. (2024) https://butterflyconservationsa.net.au/

Bourman, R.P., Murray-Wallace, C.V. & Harvey, N. (2016) Coastal Landscapes of South Australia. eBook

Caton, B et al (2009) Metropolitan Adelaide and Northern Coastal Action Plan. Department for Environment and Heritage.

Convention on Biological Diversity (2024) https://www.cbd.int/gbf

Conservation, Adelaide. Plant Protection Quarterly Vol.25(2) 2010

Cresswell, I. Janke T. & Johnston, E. (2021) State of the Environment Report. Department of Climate Change, Energy, the Environment and Water (DCCEEW)
https://soe.dcceew.gov.au/biodiversity/environment/ecosystems-and-habitats#soil-ecosystems-and-biodiversity

Croft, S & T, Croft (2023) Port Stanvac: Remnant Vegetation Mapping. Prepared for Green Adelaide, Department for Environment and Heritage.

EAC – Ecological Evaluation (2001). Vegetation Management Plan for Tingira Reserve. City of Onkaparinga internal report.

efloraSA – Census Electronic Flora of South Australia online resource. http://www.flora.sa.gov.au/

FloraSight (2024) Survey and Mapping of Fountain Grass in Metropolitan Adelaide. Green Adelaide internal report.

Flora of South Australia website - https://syzygium.xyz/saplants/Genus.html

Government of South Australia. (2019). Landscape South Australia Act 2019.
https://www.legislation.sa.gov.au/lz?path=%2FC%2FA%2FLandscape%20South%20Australia%20Act%202019

iNaturalist NATUREhoodz Tingira Coastal Reserve, SA, AU Open Space
https://www.inaturalist.org/places/naturehoodz-tingira-coastal-reserve

Kraehenbuehl, D.K. (1996). Pre-European Vegetation of Adelaide: A Survey from the Gawler River to Hallett Cove. Nature Conservation Society of South Australia, Adelaide.

P. Laut, P.C. Heyligers, G. Keig, E. Löffler, C. Margules, R.M. Scott, M.E. Sullivan, M. Lazarides (1977) Environments of South Australia. Handbook. CSIRO Division of Land Use Research, Canberra.

Lock, C. (2021). *Coastal gardens: A planting guide.* Green Adelaide, Department for Environment and Water, 81 - 95 Waymouth Street Adelaide SA 5000.
https://cdn.environment.sa.gov.au/greenadelaide/images/coastal-gardens-planting-guide.pdf

Native Vegetation Council (2024). Bushland Assessment Manual. Government of South Australia, Department for Environment and Water, Adelaide.

Virtue, J. (2008). SA Weed Risk Management Guide, February 2008. Department of Water, Land and Biodiversity Conservation, Adelaide. Plant Protection Quarterly Vol.25(2) 2010.

Appendix 1: Native Plant species list

Includes all plant records from Phil Baron, NatureMaps, iNaturalist and our site inspection.

Species	Common Name	EPBC Act Status[37]	NPW Act Status[38]	FLB1 Mount Lofty Ranges Subregional[39] Status
Acacia cupularis	Cup Wattle			RA
Acacia cyclops	Western Coastal Wattle			
Acacia longifolia ssp. sophorae	Coastal Wattle			
Acacia pycnantha	Golden Wattle			
Acacia spinescens	Spiny Wattle			
Acrotriche patula	Prickly Ground-berry			NT
Actinobole uliginosum	Flannel Cudweed			
Adriana quadripartita	Coast Bitter-bush			RA
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush			
Alyxia buxifolia	Sea Box			RA
Amphipogon caricinus var. *caricinus*	Long Grey-beard Grass			NT
Arthropodium strictum	Common Chocolate-lily			
Atriplex cinerea	Grey Saltbush			
Atriplex paludosa ssp.	Marsh Saltbush			
Atriplex semibaccata	Berry Saltbush			
Atriplex vesicaria	bladder saltbush			
Austrostipa acrociliata	Graceful Spear-grass			RA
Austrostipa drummondii	Cottony Spear-grass			NT
Austrostipa elegantissima	Feather Spear-grass			
Austrostipa flavescens	Coast Spear-grass			
Austrostipa mollis	Supple Spear-grass			
Austrostipa multispiculis	Many-flowered Spear-grass		R	RA
Austrostipa nitida	Balcarra Grass			RA
Austrostipa puberula	Fine-hairy Spear-grass			RA
Austrostipa scabra ssp. falcata	Curved-awn Spear-grass			
Austrostipa scabra ssp. scabra	Rough Spear-grass			NT
Austrostipa sp.	Spear-grass			
Austrostipa tenuifolia	Narrow-leaf Spear-grass		R	RA
Beyeria lechenaultii	Pale Turpentine Bush			NT
Billardiera cymosa ssp. cymosa	Sweet Apple-berry			
Brachyscome lineariloba	Hard-head Daisy			RA
Brachyscome perpusilla	Tiny Daisy			
Bulbine bulbosa	Bulbine-lily			
Caesia calliantha	Blue Grass-lily			

[37] Under the *Environment Protection and Biodiversity Conservation Act*
[38] Under the *National Parks and Wildlife Act 1972*
[39] As per Gillam, S. and Urban, R. (2014) Regional Species Conservation Assessment Project, Phase 1 Report - Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.

Species	Common Name	EPBC Act Status[37]	NPW Act Status[38]	FLB1 Mount Lofty Ranges Subregional[39] Status
Caladenia sp.	Spider-orchid			
Calandrinia eremaea	Dryland Purslane			NT
Calytrix tetragona	Common Fringe-myrtle			
Carpobrotus rossii	Karkalla			
Cassytha pubescens	Downy Dodder-laurel			
Cheilanthes austrotenuifolia	Annual Rock-fern			
Chloris truncata	Windmill Grass			
Comesperma volubile	Love Creeper			RA
Convolvulus sp.	Bindweed			
Crassula sp.	Crassula/Stonecrop			
Cyperus sp.	Flat-sedge			
Dampiera rosmarinifolia	Rosemary Dampiera			NT
Daucus glochidiatus	Native Carrot			
Dianella brevicaulis	Short-stem Flax-lily			NT
Dianella revoluta var. *revoluta*	Black-anther Flax-lily			
Disphyma crassifolium ssp. *clavellatum*	Round-leaf Pigface			
Distichlis distichophylla	Emu-grass			
Dodonaea hexandra	Horned Hop-bush			VU
Drosera whittakeri	Scented Sundew			
Einadia nutans ssp. nutans	Climbing Saltbush			
Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush			
Enteropogon acicularis	Curly Windmill Grass			
Eucalyptus porosa	Mallee Box			NT
Euphrasia collina ssp. *osbornii*	Osborn's Eyebright	EN	E	EN
Eutaxia microphylla	Common Eutaxia			
Ficinia nodosa	Knobby Club-rush			
Gahnia filum	Thatching Grass			VU
Gahnia lanigera	Black Grass Saw-sedge			RA
Geranium sp.	Geranium			
Glycine rubiginosa	Twining Glycine			
Gonocarpus mezianus	Broad-leaf Raspwort			
Goodenia amplexans	Clasping Goodenia			NT
Goodenia pinnatifida	Cut-leaf Goodenia			NT
Grevillea lavandulacea	Lavender Grevillea			
Hakea rugosa	Dwarf Hakea			NT
Halgania cyanea	Rough Blue-flower			
Hydrocotyle callicarpa	Tiny Pennywort			
Kennedia prostrata	Running Postman			
Lawrencia squamata	Thorny Lawrencia			VU
Lepidosperma congestum	Clustered Sword-sedge			RA
Lepidosperma sp.	Sword-sedge/Rapier-sedge			
Leptorhynchos squamatus ssp. *squamatus*	Scaly Buttons			
Leucophyta brownii	Cushion Bush			
Lomandra densiflora	Soft Tussock Mat-rush			
Lomandra effusa	Scented Mat-rush			RA

Species	Common Name	EPBC Act Status[37]	NPW Act Status[38]	FLB1 Mount Lofty Ranges Subregional[39] Status
Lomandra micrantha ssp. *micrantha*	Small-flower Mat-rush			
Lomandra multiflora ssp. *dura*	Iron-grass			
Lotus australis	Austral Trefoil			NT
Maireana brevifolia	Short-leaf Bluebush			
Maireana enchylaenoides	Wingless Fissure-plant			
Maireana oppositifolia	Salt Bluebush			
Melaleuca lanceolata	Dryland Tea-tree			RA
Micrantheum demissum	Dwarf Micrantheum			
Muehlenbeckia gunnii	Coastal Climbing Lignum			
Myoporum insulare	Common Boobialla			NT
Myoporum parvifolium	Creeping Boobialla		R	VU
Nitraria billardierei	Nitre-bush			RA
Olearia axillaris	Coast Daisy-bush			NT
Olearia ramulosa	Twiggy Daisy-bush			
Oxalis perennans	Native Oxalis			
Oxalis perennans/exilis	Native Oxalis			
Pauridia glabella var. *glabella*	Tiny Star			
Pimelea serpyllifolia ssp. *serpyllifolia*	Thyme Riceflower			NT
Poa labillardieri var. *labillardieri*	Common Tussock-grass			
Poa poiformis var. *poiformis*	Blue Tussock-grass			
Pogonolepis muelleriana	Stiff Cup-flower			NT
Pomaderris paniculosa ssp. *paniculosa*	Mallee Pomaderris			
Portulaca oleracea	Pigweed			
Pterostylis excelsa	Tall Rustyhood			
Ptilotus angustifolius	Narrow-leaf Fox tails		EN	EN
Pultenaea tenuifolia	Narrow-leaf Bush-pea			
Rhagodia candolleana ssp. *candolleana*	Sea-berry Saltbush			
Rhagodia parabolica	Fragrant Saltbush			
Rhagodia spinescens	Spiny Saltbush			EN
Roepera aurantiaca ssp.	Twinleaf			
Roepera billardierei	Coast Twinleaf			DD
Roepera confluens	Forked Twinleaf			VU
Rytidosperma caespitosum	Common Wallaby-grass			
Rytidosperma sp.	Wallaby-grass			
Samolus repens	Creeping Brookweed			NT
Santalum acuminatum	Quandong			RA
Scaevola crassifolia	Cushion Fanflower			VU
Scaevola linearis ssp. confertifolia	Bundled Fanflower			EN
Schoenus apogon	Common Bog-rush			
Schoenus breviculmis	Matted Bog-rush			
Sclerolaena diacantha	Grey Bindyi			RA
Senecio glossanthus	Slender Groundsel			NT
Senecio pinnatifolius var. *maritimus*	Elegant Yellow-top			RA
Setaria constricta	Knotty-butt Paspalidium			NT
Spinifex hirsutus	Rolling Spinifex			

Species	Common Name	EPBC Act Status[37]	NPW Act Status[38]	FLB1 Mount Lofty Ranges Subregional[39] Status
Tetragonia implexicoma	Bower Spinach			
Themeda triandra	Kangaroo Grass			
Threlkeldia diffusa	Coast Bonefruit			NT
Thysanotus patersonii	Twining Fringe-lily			
Triglochin calcitrapum (NC)	Spurred Arrowgrass			
Typha domingensis	Narrow-leaf Bulrush			
Westringia rigida	Stiff westringia			
Westringia sp.	Native Rosemary			
Wurmbea dioica ssp. *dioica*	Early Nancy			
TOTAL NUMBER	**133**			

Regional Conservation status, Mount Lofty Ranges IBRA (Interim Biogeographical Regionalisation for Australia) subregion (Gillam & Urban (2014). Regional Species Conservation Assessment Project, Phase 1 Report - Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. DEWNR: SA)

RE = Regionally Extinct	CR = Critically Endangered	EN = Endangered
VU = Vulnerable	RA = Rare	NT = Near Threatened
LC = Least Concern	DD = Data Deficient	NE = Not Evaluated

Appendix 2: Weed Plant species list

Includes all plant records from Phil Baron, NatureMaps, iNaturalist and our site inspection.

Species	Common Name	Weed of National Significance[40]	Declared[41]	Weed Threat Level	
Acacia cyclops	Western Coastal Wattle			9	
Acacia saligna	Golden Wreath Wattle			7	
Agave americana	Century Plant			6	
Agave sp.	Aloe			-	Different species, not identified
Aizoon pubescens	Coastal Galenia			5	
Ammophila arenaria	Marram Grass			4	
Apium graveolens	Celery			1	
Arctotheca calendula	Cape Weed			5	
Asphodelus fistulosus	Onion Weed			3	
Atriplex nummularia ssp.	Old-man Saltbush			-	Planted out of natural distribution, not a threat.
Avena barbata	Bearded Oat			1	
Avena barbata/fatua	Oat			1	
Brachypodium distachyon	False Brome			1	
Briza maxima	Blowfly Grass			1	
Bromus diandrus	Rigid Brome			1	
Cakile maritima ssp. maritima	European Searocket			1	
Carpobrotus edulis ssp. *edulis*	Hottentot Fig			7	
Cenchrus clandestinus	Kikuyu			5	
Chrysanthemoides monilifera ssp. *monilifera*	Boneseed	Y	Y	7	North boundary Zone 1
Clematis vitalba	Old man's beard			1	
Coprosma repens	Mirror bush		Y	6	
Crassula tetragona ssp. *robusta*	Crassula			3	
Cynara cardunculus ssp. *flavescens*	Artichoke Thistle			5	
Cynodon dactylon var. *dactylon*	Bermuda Grass			2	
Cyperus involucratus	Umbrella sedge			-	Not rated
Dimorphotheca fruticosa	Trailing African Daisy			4	
Echium plantagineum	Salvation Jane		Y	2	
Ehrharta longiflora	Annual Veldt Grass			2	
Eragrostis cilianensis	Stink Grass			1	
Erigeron bonariensis	Tall Fleabane			1	
Euphorbia paralias	Sea Spurge			7	
Euphorbia terracina	False Caper		Y	1	
Freesia leichtlinii	Freesia			6	
Galium murale	Small Bedstraw			1	

[40] https://weeds.org.au/weeds-profiles/
[41] Declared Weeds **Landscape Act Weed Status** https://pir.sa.gov.au/biosecurity/weeds/declared-weeds-

Species	Common Name	Weed of National Significance[40]	Declared[41]	Weed Threat Level	
Gazania linearis	Gazania		Y	9	
Gazania sp.	Gazania			-	
Gomphocarpus cancellatus	Broad-leaf Cotton-bush			1	
Heliotropium europaeum	European heliotrope			1	
Hordeum leporinum	Common Fox-tail			1	
Hordeum sp.	Grass			1	
Lactuca serriola f.	Prickly Lettuce			3	
Lagunaria patersonii	Itchy Powder Tree/ Norfolk Island Hibiscus			3	
Lagurus ovatus	Hare's Tail Grass			2	
Lavandula stoechas ssp. *stoechas*	Topped Lavender			-	
Leptospermum laevigatum	Coast Tea-tree		Y	7	
Limonium companyonis	Sea-lavender			5	
Limonium sp.	Sea-lavender			-	
Lolium sp.	Ryegrass			-	
Lycium ferocissimum	African Boxthorn	Y	Y	7	
Lysimachia arvensis	Pimpernel			1	
Malva parviflora	Small-flower Marshmallow			1	
Medicago polymorpha	Burr-medic			1	
Melaleuca nesophila	Melaleuca			1	
Melilotus indicus	King Island Melilot			1	
Mesembryanthemum crystallinum	Common Iceplant			5	
Moraea setifolia	Thread Iris			3	
Oenothera biennis	Evening-Primrose			7	
Olea europaea ssp. *europaea*	Olive			5	
Oxalis pes-caprae	Soursob			7	
Paspalum dilatatum	Paspalum			1	
Paspalum sp.	Paspalum			1	
Pinus halepensis	Aleppo Pine		Y	1	
Piptatherum miliaceum	Many-flowered Millet			2	
Plantago coronopus ssp. *commutata*	Bucks-horn Plantain			5	
Plantago lanceolata var. *lanceolata*	Ribwort			5	
Polygala myrtifolia	Myrtle-leaf Milkwort		Y	8	
Raphanus raphanistrum	Jointed Charlock			1	
Rapistrum rugosum ssp. *rugosum*	Short-fruited Wild Turnip			3	
Reichardia tingitana	False Sow Thistle			1	
Romulea minutiflora	Small-flower Onion-grass			1	
Romulea rosea var. *australis*	Common Onion-grass			1	
Silene gallica	French Catchfly			1	
Sixalix atropurpurea	Pincushion			7	
Solanum nigrum	Black Nightshade			4	
Sonchus sp.	Sow-thistle			-	
Spergularia media	Coast Sand-spurrey			1	

Species	Common Name	Weed of National Significance[40]	Declared[41]	Weed Threat Level	
Tribulus terrestris	Caltrop		Y	6	
Trifolium campestre	Clover			1	
Vicia sativa ssp. nigra	Common Vetch			1	
Vicia sp.	Vetch			1	
Zaluzianskya divaricata	Spreading Night-phlox			1	
TOTAL	**81**				

Appendix 3: Native Fauna species list

Note: Includes all fauna records from Phil Baron, NatureMaps, iNaturalist and our site inspection.

Table 10. Avifauna list

Species	Common Name	Class	Introduced *	EPBC Act Status[45]	NPW Act Status[47]	O = Observed/ I = inferred	Notes
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	AVES					2024
Chroicocephalus novaehollandiae	Silver Gull	AVES				O	
Corvus mellori	Little Raven	AVES				O	2024
Egretta sacra	Pacific Reef Heron	AVES				O	
Falco cenchroides	Nankeen Kestrel	AVES				O	2024
Gavicalis virescens	Singing Honeyeater	AVES				O	2024
Gymnorhina tibicen	Australian Magpie	AVES				O	2024
Haematopus fuliginosus	Sooty Oystercatcher	AVES				O	
Microcarbo melanoleucos	Little Pied Cormorant	AVES				O	
Passer domesticus	House Sparrow	AVES				O	2024
Rhipidura leucophrys	Willie-wagtail	AVES				O	2024

Table 11. Invertebrate species list

Species	Common Name	Class	Introduced *	EPBC Act Status[50]	NPW Act Status[51,52]	O = Observed/ I = inferred	Notes
Acrida conica	Giant Green Slantface	INSECTA				O	
Argiope protensa	Tailed Forest Spider	INSECTA				O	
Agrotis munda	Brown Cutworm	INSECTA				O	
Anisynta cynone	Mottled Grass skipper	INSECTA				I	Similar to the Chequered Grass Skipper Prefers Open Woodland.
Antipodia atralba	Diamond Sand-skipper	INSECTA				O	In dense *Gahnia lanigera* patches.
Apis mellifera	European Honey Bee	INSECTA	*			O	2023, iNaturalist
Bathypogon sp.	Robber Fly	INSECTA				O	2024, iNaturalist
Candalides heathi	Rayed Blue	INSECTA				O	2021 M. Endacott, in *Dampiera rosmarinifolia.*
Catantopini sp.	A Spur-throated Grasshopper	INSECTA					2024, iNaturalist
Ephutomorpha albosignata	Velvet Ants	INSECTA				O	2023, iNaturalist
Family *Erythraeidae*	Mites	INSECTA					2023, iNaturalist
Heliothis punctifera	Lesser Budworm Moth	INSECTA				O	2024, iNaturalist
Idiosoma sp.	Australian Armoured Trapdoor Spiders	INSECTA				O	2023, iNaturalist
Junonia villida	Meadow Argus	INSECTA				O	Likes Native and weedy Plantago.
Lampides boeticus	Long-tailed Pea-blue	INSECTA				O	2021 M. Endacott
Lycosidae sp.	Wolf Spiders	INSECTA					2023, iNaturalist
Metallarcha diplochrysa	Metallarcha	INSECTA				O	2024, Flora Sight. iNaturalist
Myrmecia mandibularis	Toothless Bull Ant	INSECTA				O	2024, Flora Sight. Several in Zone 5 coastal dunes.
Neolucia agricola	Fringed Heath-blue	INSECTA				O	2021. M. Endacott, no photograph.
Ocybadistes walkeri	Yellow-banded Dart	INSECTA				O	2021. M. Endacott, no photograph.
Orthodera ministralis	Australian Garden Mantis	INSECTA				O	
Family *Oestroidea*	Bot Flies/ Blow Flies	INSECTA					
Taractrocera papyria	White-banded Grass-Dart	INSECTA				O	2024. In *Acrotriche patula* near good grassy area.

Species	Common Name	Class	Introduced *	EPBC Act Status[48][49]	NPW Act Status[31][51][52]	O = Observed/ I = inferred	Notes
Theba pisana	White Italian Snail	INSECTA				O	
Theclinesthes serpentata	Saltbush Blue	INSECTA				O	
Uraba lugens	Gum Leaf Skeletonizer	INSECTA				O	
Xerocincta neglecta	Dune Snail	INSECTA	*			O	
Zizinia otis labradus	Common Grass Blue	INSECTA				O	2024, Flora Sight. In good grassy area on introduced vetch.

Table 12. Mammal list

Species	Common Name	Class	Introduced *	EPBC Act Status[53][54][55]	NPW Act Status[31][56]	O = Observed/ I = inferred	Notes
Felis catus	Domestic Cat (Feral Cat)	MAMMAL	*			O	
Lepus europaeus	European Brown Hare	MAMMAL	*			O	
Oryctolagus cuniculus	Rabbit (European Rabbit)	MAMMAL	*			O	2021, controlled
Tachyglossus aculeatus	Short-beaked Echidna	MAMMAL				I	
Vulpes	Fox (Red Fox)	MAMMAL	*			O	2024, management undertaken.

Table 13. Reptile list

Species	Common Name	Class	Introduced *	EPBC Act Status[58][59]	NPW Act Status[31][60]	O = Observed/ I = inferred	Notes
Christinus mamoratus	Southern Marbled Gecko	REPTILE				I	Common and wide spread. Live in structures
Ctenotus robustus	Robust Ctenotus	REPTILE				I	In areas of enough cover of sedges. Current name.
Hemiergis decresiensis	Southern Three-toed Earless Skink	REPTILE				I	Very common.
Lerista dorsalis	Southern Four-toed Slider	REPTILE				I	
Lymnodynastes tasmaniensis	Spotted Marsh Frog	REPTILE				I	Might turn up in gully in wet years, suitable reeds
Menetia greyii	Dwarf Skink	REPTILE				I	Common small and often over looked.
Pogona barbata	Eastern Bearded Dragon	REPTILE				I	
Pseudonaja textilis	Eastern Brown Snake	REPTILE				I	
Tiliqua rugosa	Shingleback	REPTILE				O	2024, Flora Sight
Tiliqua scincoides	Eastern Bluetongue	REPTILE				O	2024, Flora Sight
Underwoodisaurus milii	Thick-tailed Barking Gecko	REPTILE				I	Enough suitable spider and ant holes.

Appendix 4: Bushland Assessment scoresheets

Vegetation Condition Scores

SITE:	A1 - Northern Cliffs & Clifftops
BCM COMMUNITY	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands
VEGETATION ASSOCIATION DESCRIPTION	*Nitraria billardierei & Maireana oppositifolia coastal shruband*
SIZE OF SITE (Ha)	2.76

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	19
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	22.0
Number of regenerating native species	8
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	12

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Lagurus ovatus	3	2	6
Gazania sp.	1	3	3
Oxalis pes-caprae	2	4	8
Pennisetum clandestinum		3	0
Euphorbia terracina	1	3	3
	Cover x Threat		20
Weed Score (max 15) from benchmark community			4

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	2
Shrubs 0.5 - 2m	3
Shrubs < 0.5	3
Forbs	1
Mat Plants	2
Grasses > 0.2m	2
Grasses < 0.2m	2
Sedges > 1m	1
Sedges < 1m	1
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	17

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **18.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

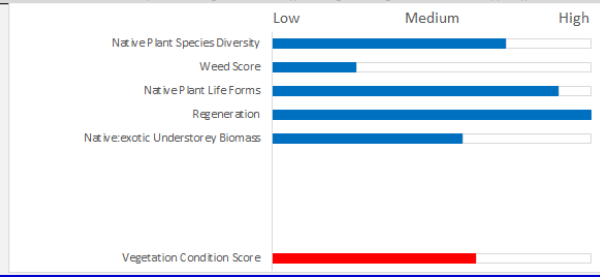
Native:exotic Understorey biomass Score (max 5)	3

Is the community naturally treeless?	☑
Tree attributes not scored for treeless	~~5~~
communities or communities with only	~~0~~
emergent trees	~~2~~
	~~1~~

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms
Fallen timber/debris + Hollow-bearing trees
- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	67.08
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	19.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	51.15



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	**Yes/No**
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) **Vulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**0**
Threatened Fauna Score	0

CONSERVATION SIGNIFICANCE SCORE **1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	1.09
VEGETATION CONDITION SCORE	51.15
CONSERVATION SIGNIFICANCE SCORE	1.00

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	55.75
Total Biodiversity Score (Biodiversity Score x hectares)	153.88

Photo Point and Vegetation Survey Location

SEB Area | Other

Direction of the Photo	
GPS Reference	
Datum	
Zone (52, 53 or 54)	
Easting (6 digits)	
Northing (7 digits)	
Description	

Figure 33. Zone 1 scoresheet

Vegetation Condition Scores

SITE:	A2 - Southern Cliffs & Clifftops
BCM COMMUNITY	SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands
VEGETATION ASSOCIATION DESCRIPTION	*Beyeria lechenaultia, Acrotriche patula low shrubland*
SIZE OF SITE (Ha)	4.93

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	50
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	30.0
Number of regenerating native species	8
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	12

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Lagurus ovatus	2	2	4
Lycium ferocissimum	1	3	3
Oxalis pes-caprae	3	4	12
Olea europaea ssp.	1	4	4
Gazania linearis	1	3	3
	Cover x Threat		26
Weed Score (max 15) from benchmark community			3

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	1
Mallee > 5m	
Mallee < 5m	1
Shrubs > 2m	2
Shrubs 0.5 - 2m	2
Shrubs < 0.5	4
Forbs	2
Mat Plants	2
Grasses > 0.2m	3
Grasses < 0.2m	3
Sedges > 1m	2
Sedges < 1m	2
Hummock grasses	1
Vines, scramblers	1
Mistletoe	
Ferns	1
Grass-tree	
Total	27
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	20.0

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	4	*Is the community naturally treeless?*	☐
		Tree attributes not scored for treeless communities or communities with only emergent trees	4 / 0 / 6

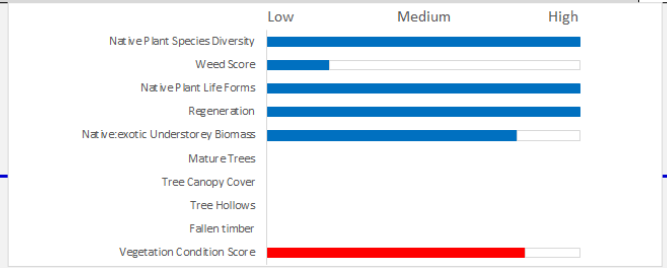
Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms + Fallen timber/debris + Hollow-bearing trees

- If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24

- If the community is naturally treeless this score is multiplied by 1.29

	79.98
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	14.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	65.98



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	**Yes/No**
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) **Vulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	1
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	1
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	21
Threatened Flora Score	0.2

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	0
Threatened Fauna Score	0
CONSERVATION SIGNIFICANCE SCORE	1.2

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	1.09
VEGETATION CONDITION SCORE	65.98
CONSERVATION SIGNIFICANCE SCORE	1.20

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	86.31
Total Biodiversity Score (Biodiversity Score x hectares)	425.49

Photo Point and Vegetation Survey Location

Direction of the Photo	
GPS Reference	
Datum	
Zone (52, 53 or 54)	
Easting (6 digits)	
Northing (7 digits)	
Description	

What is the purpose of Assessment? Clearance | SEB Area | Other

Figure 34. Zone 2 scoresheet

Vegetation Condition Scores

SITE:	A3 - Coastal Gullies
BCM COMMUNITY	SMLR 6.1 Shrubland, Sedgeland & Woodland Swamps & Bogs (note only 'naturally treeless if not a Woodland Swamp)
VEGETATION ASSOCIATION DESCRIPTION	*Gahnia filum / Typha open sedgland*
SIZE OF SITE (Ha)	0.28

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	20
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**20.0**
Number of regenerating native species	8
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**12**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Lagurus ovatus	2	2	4
Lycium ferocissimum	1	3	3
Oxalis pes-caprae	2	4	8
Pennisetum clandestinum	3	3	9
Paspalum dilatatum	2	3	6
	Cover x Threat		30
Weed Score (max 15) from benchmark community			**4**

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	2
Shrubs < 0.5	2
Forbs	
Mat Plants	2
Grasses > 0.2m	3
Grasses < 0.2m	2
Sedges > 1m	3
Sedges < 1m	1
Hummock grasses	1
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	17

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **16.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	3

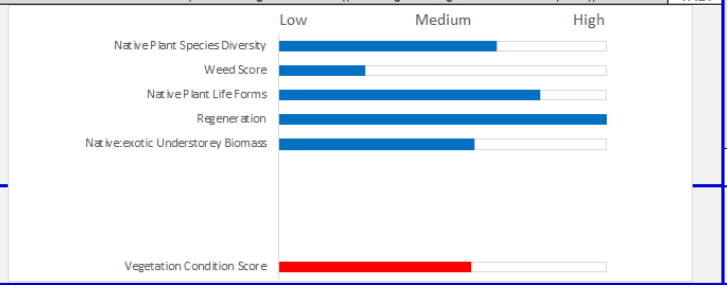
Is the community naturally treeless?	☑
Tree attributes not scored for treeless	~~5~~
communities or communities with only	~~0~~
emergent trees	~~2~~
	~~1~~

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms
Fallen timber/debris + Hollow-bearing trees
- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29* 61.92

Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2) 19.00

VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80)) **47.21**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	**Yes/No**
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) **Vulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐

Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score** 1

Number of Threatened Flora Species recorded for the site (within the site)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**0**
Threatened Fauna Score	0

CONSERVATION SIGNIFICANCE SCORE **1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	1.09
VEGETATION CONDITION SCORE	47.21
CONSERVATION SIGNIFICANCE SCORE	1.00

Vegetation Condition x Landscape Context x Conservation Significance =

UNIT BIODIVERSITY SCORE	51.46
Total Biodiversity Score (Biodiversity Score x hectares)	14.41

Photo Point and Vegetation Survey Location

Direction of the Photo

GPS Reference	
Datum	
Zone (52, 53 or 54)	
Easting (6 digits)	
Northing (7 digits)	
Description	

What is the purpose of Assessment? Clearance | SEB Area | Other

Figure 35. Zone 3 scoresheet

Vegetation Condition Scores

SITE:	A4 - Dryland Tea-tree/Mallee box low mallee
BCM COMMUNITY	SMLR Co Community 1.2 Coastal Very Low Woodlands with Heath Understorey
VEGETATION ASSOCIATION DESCRIPTION	*Melaleuca lanceolata & Eucalyptus porosa low woodland*
SIZE OF SITE (Ha)	3.16

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	50
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	28.0
Number of regenerating native species	8
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	10.5

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Lagurus ovatus	2	2	4
Lycium ferocissimum	1	3	3
Oxalis pes-caprae	3	4	12
Olea europaea ssp.	1	4	4
Gazania linearis	1	3	3
	Cover x Threat		26
Weed Score (max 15) from benchmark community			4

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	1
Shrubs > 2m	2
Shrubs 0.5 - 2m	3
Shrubs < 0.5	2
Forbs	2
Mat Plants	2
Grasses > 0.2m	3
Grasses < 0.2m	2
Sedges > 1m	
Sedges < 1m	2
Hummock grasses	
Vines, scramblers	2
Mistletoe	
Ferns	1
Grass-tree	
Total	22

Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2* **16.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	4

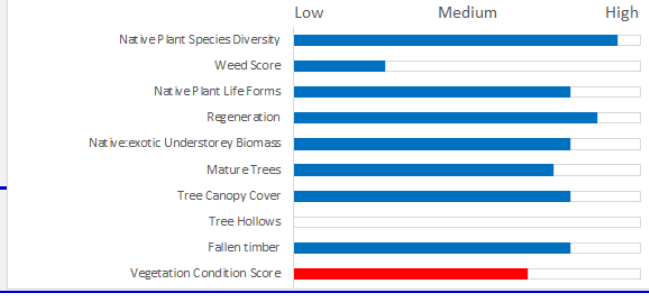
Is the community naturally treeless?	☐
Fallen Timber/Debris (max 5)	4
Hollow-bearing trees Score (max 5)	0
Mature Tree Score (max 8)	6
Tree Canopy Cover Score (max 5)	4

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	64.50
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - Biomass score - Tree Canopy Cover Score)exp2/2)	13.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**54.02**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	**Yes/No**
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) **Vulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	1
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	1
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	21
Threatened Flora Score	0.2

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	0
Threatened Fauna Score	0

CONSERVATION SIGNIFICANCE SCORE **1.2**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	1.09
VEGETATION CONDITION SCORE	54.02
CONSERVATION SIGNIFICANCE SCORE	1.20

Vegetation Condition x Landscape Context x Conservation Significance =

UNIT BIODIVERSITY SCORE	70.66
Total Biodiversity Score (Biodiversity Score x hectares)	223.27

Photo Point and Vegetation Survey Location

Direction of the Photo

GPS Reference

Datum	
Zone (52, 53 or 54)	
Easting (6 digits)	
Northing (7 digits)	

Description

What is the purpose of Assessment? Clearance | SEB Area | Other

Figure 36. Zone 4 scoresheet

Vegetation Condition Scores

SITE:	A5 - Southern Dune
BCM COMMUNITY	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands
VEGETATION ASSOCIATION DESCRIPTION	*Olearia axilaris & Myoporum insulare coastal shruband*
SIZE OF SITE (Ha)	NVC

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	20
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	24.0
Number of regenerating native species	10
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	12

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Lagurus ovatus	3	2	6
Cynodon dactylon var.	3	2	6
Oxalis pes-caprae	3	4	12
Avena spp.	2	2	4
Euphorbia terracina	1	3	3
	Cover x Threat		31
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	2
Shrubs 0.5 - 2m	3
Shrubs < 0.5	3
Forbs	
Mat Plants	2
Grasses > 0.2m	2
Grasses < 0.2m	2
Sedges > 1m	1
Sedges < 1m	1
Hummock grasses	
Vines, scramblers	2
Mistletoe	
Ferns	
Grass-tree	
Total	18
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**20.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	3

Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	~~5~~ ~~0~~ ~~2~~ ~~1~~

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms
Fallen timber/debris + Hollow-bearing trees

- If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24
- If the community is naturally treeless this score is multiplied by 1.29

	72.24
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	20.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**54.18**

Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	**Yes/No**
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	**Number**
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**0**
Threatened Fauna Score	0

CONSERVATION SIGNIFICANCE SCORE	**1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.09**
VEGETATION CONDITION SCORE	**54.18**
CONSERVATION SIGNIFICANCE SCORE	**1.00**

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	59.06
Total Biodiversity Score (Biodiversity Score x hectares)	#VALUE!

Photo Point and Vegetation Survey Location

Direction of the Photo

GPS Reference

Datum	
Zone (52, 53 or 54)	
Easting (6 digits)	
Northing (7 digits)	

Description

What is the purpose of Assessment? Clearance | SEB Area | Other

Figure 37. Zone 5 scoresheet

Appendix 5: Additional photopoints for consideration

Zone 1

Zone 2


54H 269435 6110926 ± 5 m GDA2020
120 deg(T), 24 m, 2024-10-19 16:59:46+10:30
Best Gahnia lanigera

Zone 3


54H 269366 6110809 ± 4 m GDA2020
76 deg(T), 25 m, 2024-08-30 11:47:28+09:30
Scaevola linearis

Zone 4


54H 269344 6110637 ± 4 m GDA2020
12 deg(T), 16 m, 2024-08-30 12:29:56+09:30
Acacia cyclops

Zone 5


54H 269371 6110548 ± 4 m GDA2020
193 deg(T), 24 m, 2024-09-09 12:43:52+09:30
5-coastal dune


54H 269357 6110416 ± 7 m GDA2020
67 deg(T), 4 m, 2024-09-09 13:15:27+09:30
5-coastal erosional gully

Appendix 6: Weed identification

Figure 38. **Acacia cyclops* (Western Coastal Wattle), below noticeable venations on leaf, Leaf tip pointy, flowers bright yellow and full like a pom, narrower than *Acacia longifolia* ssp. *sophorae* and has a bright red aril on the seed.

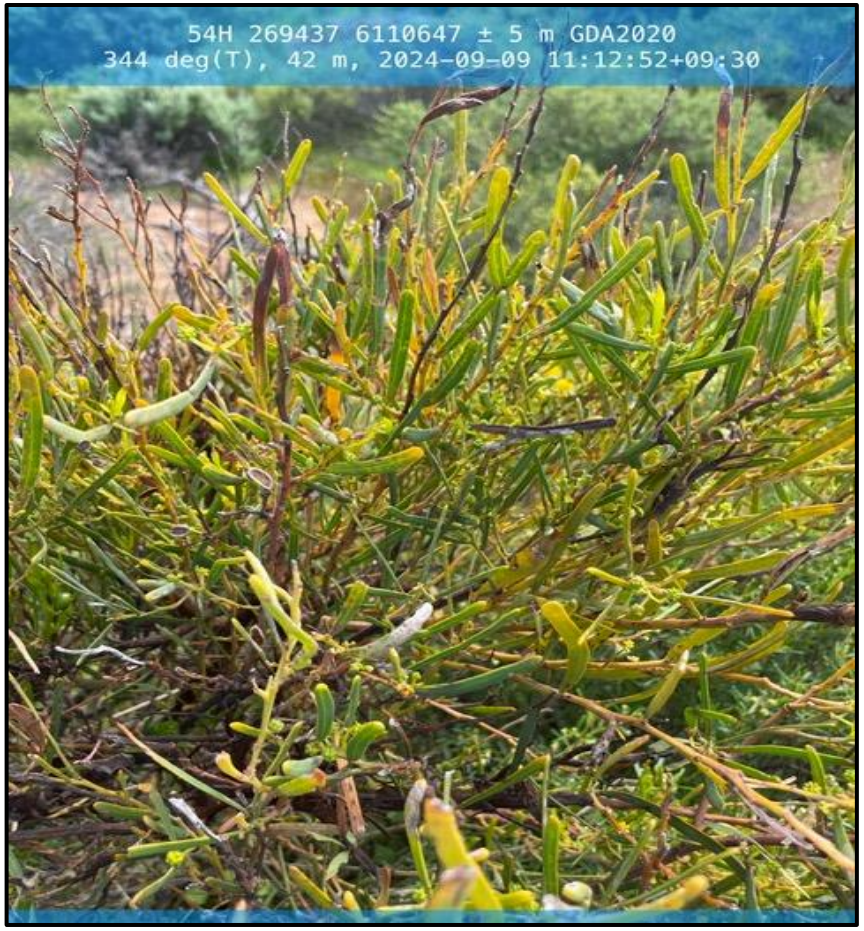


Figure 39. The similar indigenous *Acacia cupularis* (Cup Wattle), has fleshier leaves, no venation, leaf tip off centre mucronate, Deep golden yellow flowers appearing in sections.

Appendix 7: Historic weed mapping

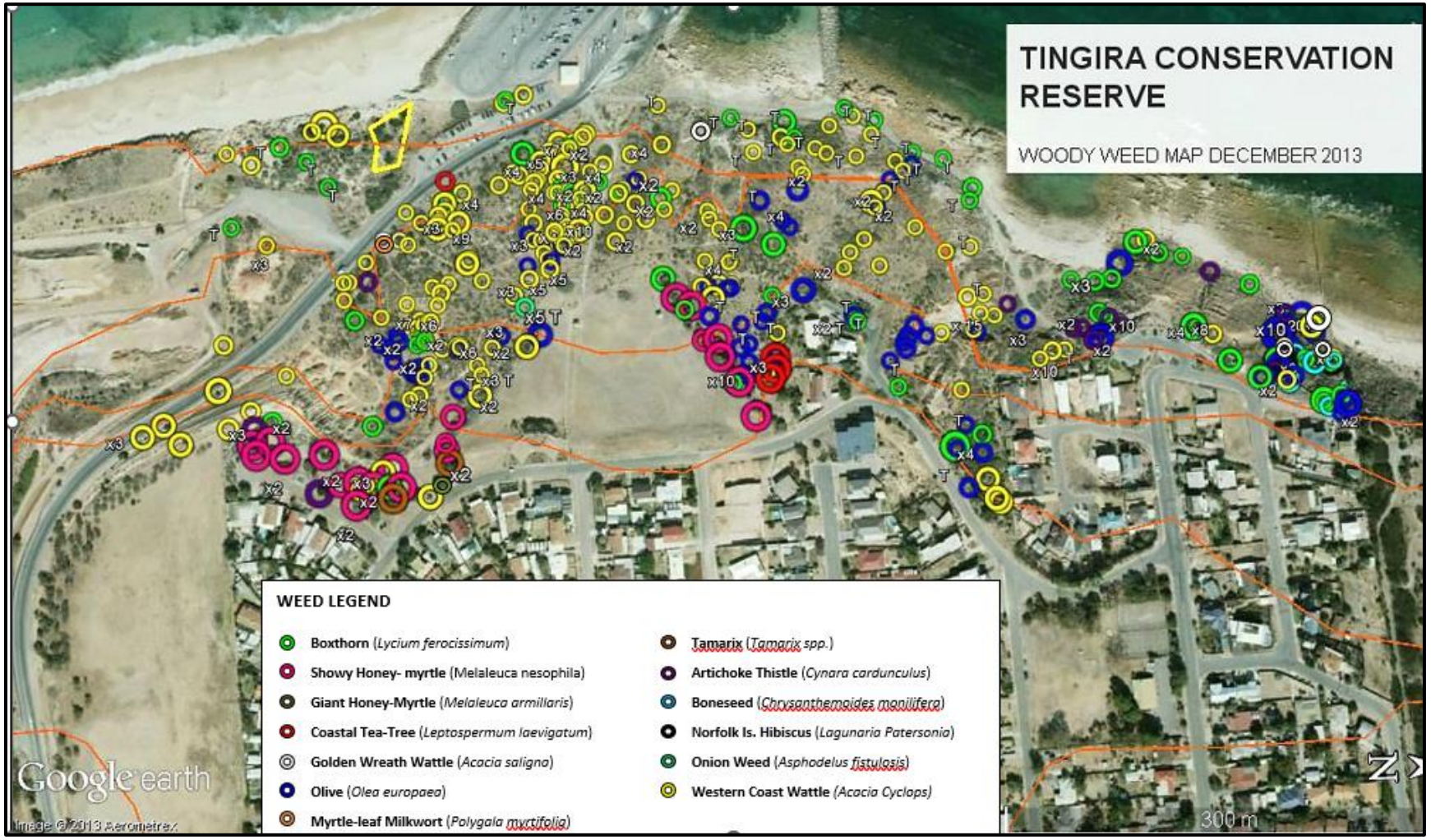


Figure 40. Weed mapping conducted for City of Onkaparinga