

ARDROSSAN NATIVE GRASSLAND

SITE MANAGEMENT PLAN 2021

Draft May 2021



Mick Durant & Adrian Shackley 2021.

Supported by the National Trust of South Australia through funding from the Northern and Yorke Landscapes Board



ACKNOWLEDGEMENT OF COUNTRY

The Government of South Australia acknowledges and respects Aboriginal peoples as the state's first peoples and nations, and recognises them as traditional owners and occupants of land and waters in South Australia. Further, we acknowledge that the spiritual, social, cultural and economic practices of Aboriginal peoples come from their traditional lands and waters, that they maintain their cultural and heritage beliefs, languages and laws which are of ongoing importance, and that they have made and continue to make a unique and irreplaceable contribution to the state.

We acknowledge that Aboriginal peoples have endured past injustice and dispossession of their traditional lands and waters.

Furthermore, the Authors would like to acknowledge the Narungga people as the Traditional Custodians of the Ardrossan Grassland, and pay respect to their elders past, present and emerging.

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1 Introduction

The remnant grassland area bounded by Park Terrace in the Ardrossan township has been recognised for many years as an important botanical record of the original vegetation of the Ardrossan area. There is a rich history to discover in the early descriptions of the vegetation by Otto Tepper and the early surveyors of the Ardrossan township. The fact that over 80 native plant species still occur in such a small area is remarkable and gives an indication of the incredible biological diversity that existed prior to European colonisation and change in utilisation of Australia's temperate landscapes. It is also of interest in relation to the land management practices of the traditional Narungga custodians of the area.

Grasslands in temperate Australia have been decimated in extent and condition since the arrival of European agriculture and livestock and are now among the most threatened ecosystems in the country. Grasslands may be dominated by a diverse mix of perennial native grass species and a high diversity of herbs and lilies. They are generally treeless although sparse trees and shrubs may occur. In many instances the treeless situation may be the result of long-term burning strategies of traditional custodians of an area (as discussed in many studies over recent years). As can be seen around Ardrossan, there is currently little or no climatic restriction on trees growing in previously treeless areas.

In South Australia the common grass genera include *Austrostipa* (speargrasses), *Rytidosperma* (wallaby grasses), *Themeda* (kangaroo grasses), *Enneapogon* (nine-awn grasses) and *Aristida* (three-awn grasses). On Yorke Peninsula, grasslands are naturally rare and tend to have a significant cover of irongrasses (*Lomandra* spp.) and various sedges (e.g. *Gahnia lanigera*, *G. deusta*, *Lepidosperma viscidium*, *L. congestum*), particularly from Ardrossan to the south.

The recent Northern & Yorke Coastal Management Action Plan (Durant, Ling & Hope 2020) recognised the uniqueness of the remnant grasslands around Ardrossan and recommended action to 'Develop a specific management plan involving the local community, interest groups and Council'. The Action Plan also assigned a High priority to this action due to the significant and ongoing threats to the integrity of the site.

It is hoped that this Plan will provide managers, botanists and the general community with sufficient guidance to ensure that the area known colloquially as the 'Ardrossan Grassland' will persist and perhaps improve in condition into the future. The Authors would also like to see the area become known by an appropriate Narungga name and consultation for this is underway.

This work has been instigated by the Friends of Park Terrace Grassland with sponsorship support from the National Trust of South Australia. Funded by the Northern and Yorke Landscape Board through the Grassroots Grant Program 2020.

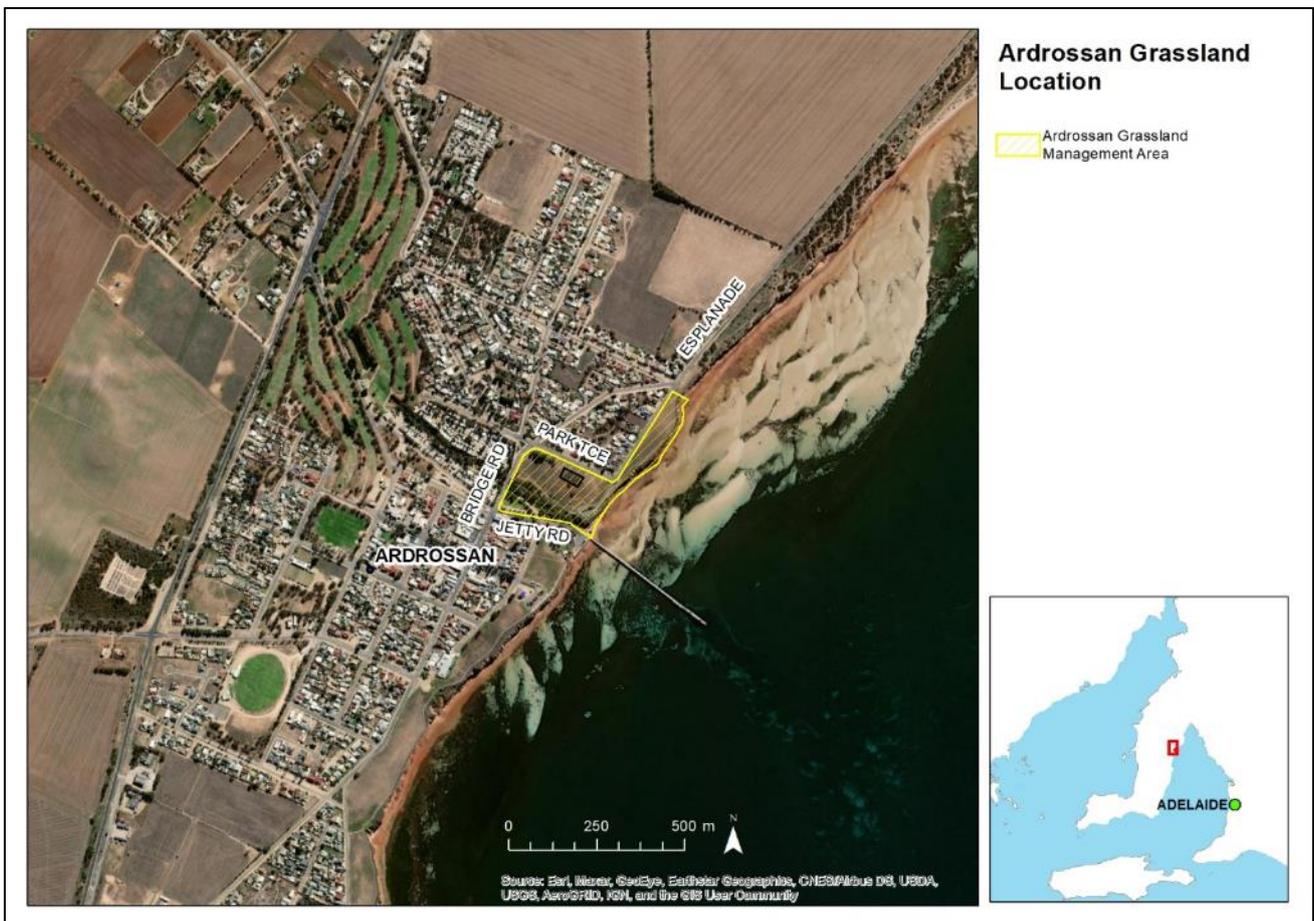
2 Site Details and Management Context

2.1 Location

The Ardrossan grassland is located toward the northern part of Ardrossan township, north of Clay Gully which is the watercourse running through the golf course and caravan park to the coast. The most significant remnant vegetation occurs in the open parkland bounded by Park Terrace, Bridge Rd, Jetty Rd and Clay Gully. There is also a narrow remnant on the eastern side of the Esplanade.

Map 1 below shows the general location of the site and a loosely defined management area which will be referred interchangeably as the Management Area, the Project Area or the Ardrossan Grassland in this Plan.

Figure 1: Ardrossan Grassland Location



2.2 Land Information

The Management Area covers approximately 6.8 hectares and is comprised of parts of five Sections in the Hundred of Cunningham (S355, S360, S308, S405 and S414) as shown in Figure 2. All of the land is Crown land with the relevant history of dedications under the various Crown Lands acts described below.

In 1918 the Ardrossan Harbor based on the original jetty was gazetted and an area now comprising section 355 Hd of Cunningham was dedicated as a reserve for Harbors Board purposes.

In February 1970 Section 405 Hd of Cunningham was dedicated as a reserve for park lands purposes along with other major park lands in the Ardrossan. The District Council of Yorke Peninsula was re-assigned care control and management of this Section.

In March 2005 sections 355 and 360 were dedicated as a Reserve for Car Park, Recreation, Public Jetty and Access Purposes under the care, control and management of the District Council of Yorke Peninsula, subject to the same terms and conditions as are contained in Memorandum of Lease 8914342. The lease deals with management of the jetty only and has minimal relevance to section 355 which contains most of the small car park near Clay Gully and the short access road from Park Terrace/Esplanade.

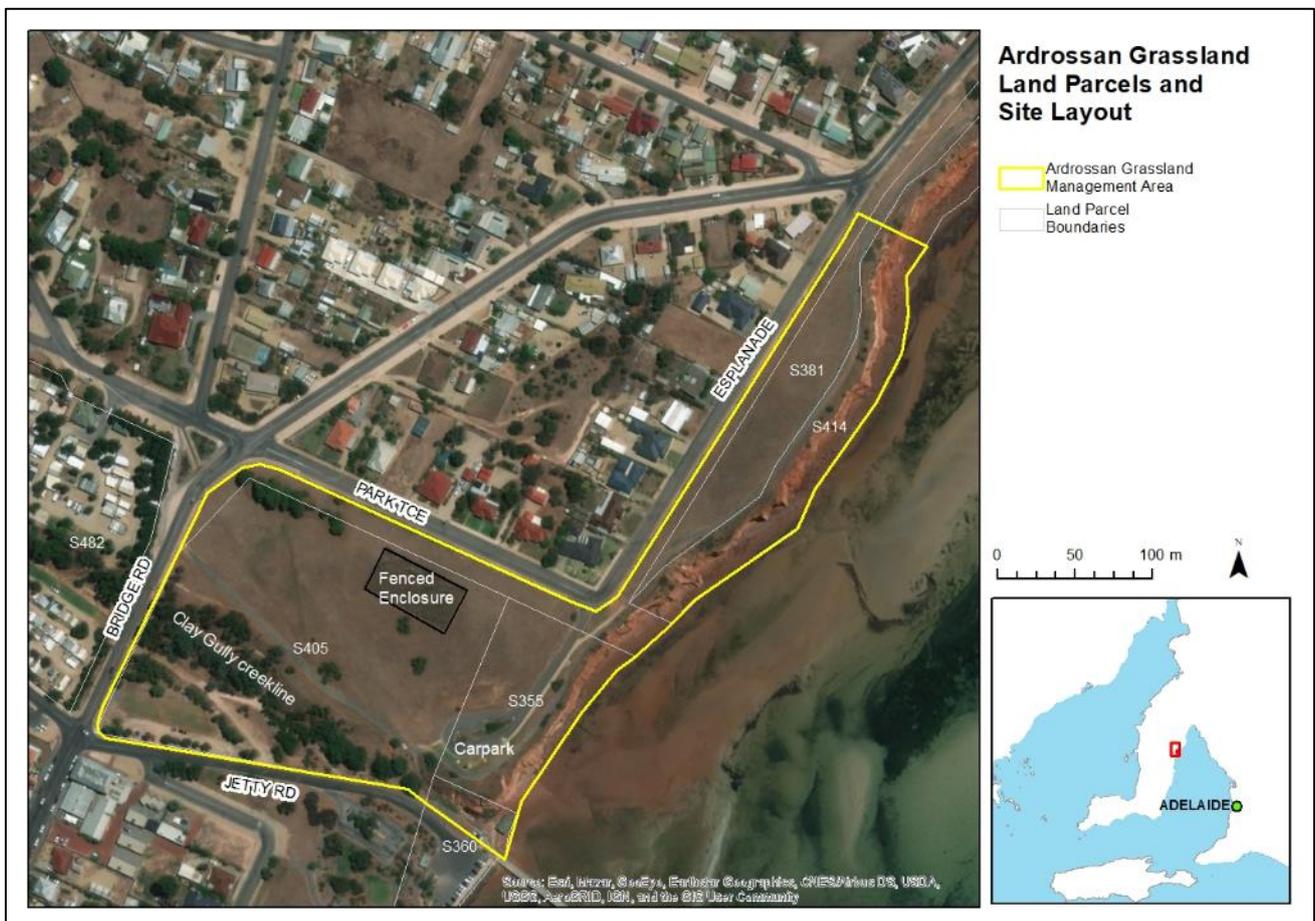
Section 381 is Crown Land which has never been subject to dedication and remains under the control of the Minister responsible for Crown Lands. Section 414 being the coastal reserve adjacent section 381 similarly is not subject to dedication and remains under the control of the Minister responsible for Crown Lands.

The site is part of the traditional lands and waters of the Narungga people and Native Title exists over the majority of the site apart from Sections 355 and 360 near the jetty. Native title rights in the area are ‘non-exclusive’ rights meaning that public access rights remain unchanged and management by Council continues. Yorke Peninsula Council undertake the majority of the management actions on the site.

2.3 Site Features and Layout

The Project Area consists of a gently sloping clifftop with a mild southerly aspect leading down to a moderately deep creekline (Clay Gully) and a small section of flat land on the corner of Bridge Road and Jetty Road. There is also a narrow strip of flat clifftop land heading north along the coast.

Figure 2: Project Area and Site Features



The main infrastructure features of the site include:

- Sealed carpark and access road in the south east corner
- Gravel pathway following the northern side of the gully from the carpark to Bridge Road
- A fenced enclosure near Park Terrace which was installed for conservation purposes
- Several large Aleppo Pine trees on the corner of Bridge Rd and Park Tce
- A storm water outlet just south of the pine trees
- Clay Gully with a culvert under Bridge Rd and various native tree and shrub plantings
- Flat section of land on the corner of Jetty Rd and Bridge Rd with a walking trail and used for car parking
- A fence running parallel with the coast with native tree and shrub plantings on top of the eroding cliff.

2.4 Stakeholders

Key stakeholders in the future protection and management of the site could include:

- Local community and residents (e.g. Ardrossan Progress Association)
- Narungga Aboriginal people and organisations (e.g. Narungga Nations Aboriginal Corporation, Narungga Aboriginal Progress Association)
- Yorke Peninsula Council
- Northern and Yorke Landscapes Board
- The Department for Environment and Water (inc. Coast Protection Branch and Native Vegetation Council)
- Environmental Non-Government Organisations
- Australian Plant Society (NYP)
- National Trust of South Australia
- Ardrossan Museum
- Local schools (Ardrossan Area School)
- Yorke Peninsula Tourism

2.5 Relevant Protections and Legislation

The principal legislative protection for the vegetation at the site is the Native Vegetation Act 1991. Under that legislation all native vegetation is protected although applications for clearance can be made. However in the case of the Ardrossan grassland the vegetation would be deemed an Intact Stratum meaning that any clearance would be Seriously at Variance with the Principals of the Act. Hence clearance for any reason (apart from a Major Project) would not be approved by the Native Vegetation Council.

Other legislation that directly provides protections includes:

- National Parks and Wildlife Act 1972 (plants and animals listed as threatened under Schedule 3)
- Landscapes South Australia Act 2019
- Coast Protection Act 1972
- Native Title Act 1993
- Aboriginal Heritage Act 2006
- Planning and Development Act 2020



Figure 3: View from the mine lookout looking out across what was once the coastal grassland plain of Ardrossan.

3 Historical Context

3.1 Aboriginal History

The Yorke Peninsula region is the Traditional Land of the Narungga Aboriginal people and custodianship continues today. While there many accounts of encounters with Aboriginal people around the Peninsula including Ardrossan at the time of European colonisation, there is relatively little detail on Narungga land management practices and how they influenced ecology of the Peninsula.

Certainly, the coastal plain at Ardrossan was actively managed for thousands of years before Europeans arrived and it is highly likely that this management, and in particular the application of fire, influenced the open nature of the vegetation.

3.2 History of Ardrossan Township and Parklands

The Hundred of Cunningham was established in 1873 and included setting out the township of Ardrossan. Park lands were designated around the town centre bounded by North, South, East and West Terraces. The Plan dated 1876 is reproduced in Figure 4 and shows the first layout of land parcels.

Some early newspaper reports relating to the Ardrossan township.

The Rev. Robert Kelly wrote an article in 1922 recalling experiences on Yorke Peninsula in the first part of the 1870s. Sat 14 Jan 1922 The Pioneer (Yorketown)_from Trove

Page 4 OLD PENINSULA DAYS. BIG ESTATES CUT UP.

“The Bowmans reigned at Parara, and the copper mine of that name was managed by Capt. Tregoweth, a burly Cornishman..... All there was of Ardrossan was a few score of white pegs among the tussocks, but less than four years it became a solid-looking little town with excellent prospects.” *The significance of the reference to “tussocks” follows later.*

Another early report on the town in the Adelaide Observer Sat 15 Aug 1874 (Pg 10) covered a ship visit with a government Minister as follows.

MINISTERIAL INSPECTION OF PORT WAKEFIELD AND ARDROSSAN. The steam being up, we were not long in making a start, and having got clear of the shallows steered a direct course for Ardrossan on the opposite coast. This is the name of a township recently surveyed and sold, at a spot about two miles north of Messrs. Bowman & Parnell's Parara Station, and within the same distance of the Parara Mine. The locality has been chosen on account of its being the most suitable place for a jetty to accommodate the numerous settlers on the rich lands of Yorke Valley. At daylight on Saturday morning we found by the peculiar bank of red clay cliffs which were in view that Captain Ferguson had been very close to the mark in his calculations, and after a few minutes' steaming we anchored within half a mile of the shore, and put off in the dingy for a small steep beach, which afforded a favourable landing-place.

Clambering up the cliffs, lines of white survey pegs indicated what is to be the town of Ardrossan. It is most pleasantly and advantageously situated, as beside being the outlet for Yorke Valley there is good wheat land along the coast on either hand, and if the mine should realize the expectations entertained of it, we shall ere long see a considerable population at Ardrossan. The site is an admirable one for a jetty, as the requirements of calm water and good anchorage are abundantly satisfied. A pool of fresh water at the bottom of the clay gully being covered with ice is sufficient to show the self-denying zeal of the explorers, who on their return were glad of a cup of hot coffee, which thanks to the steward they had not long to wait for.

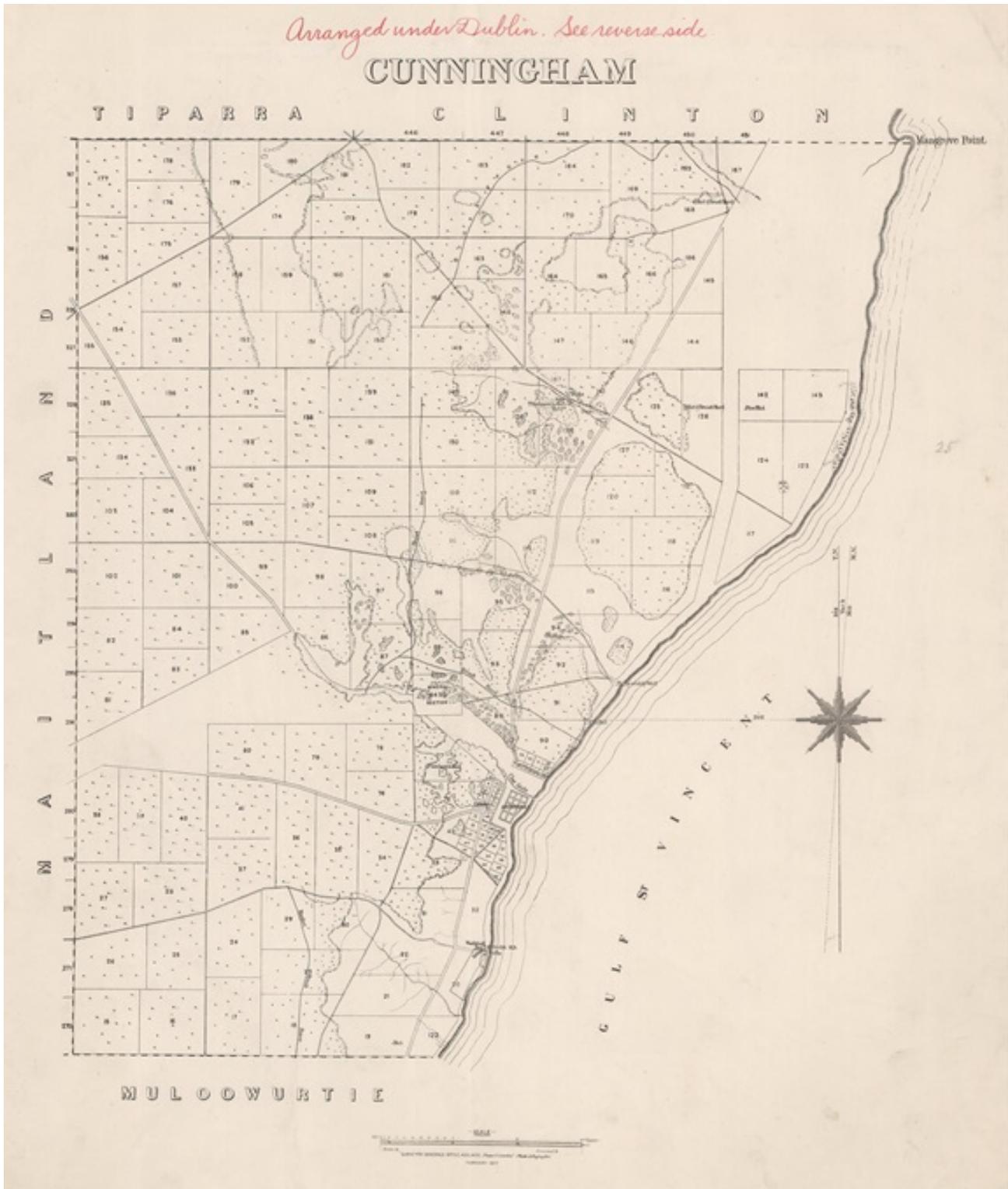


Figure 4: Original Map of the Hundred of Cunningham, 1876

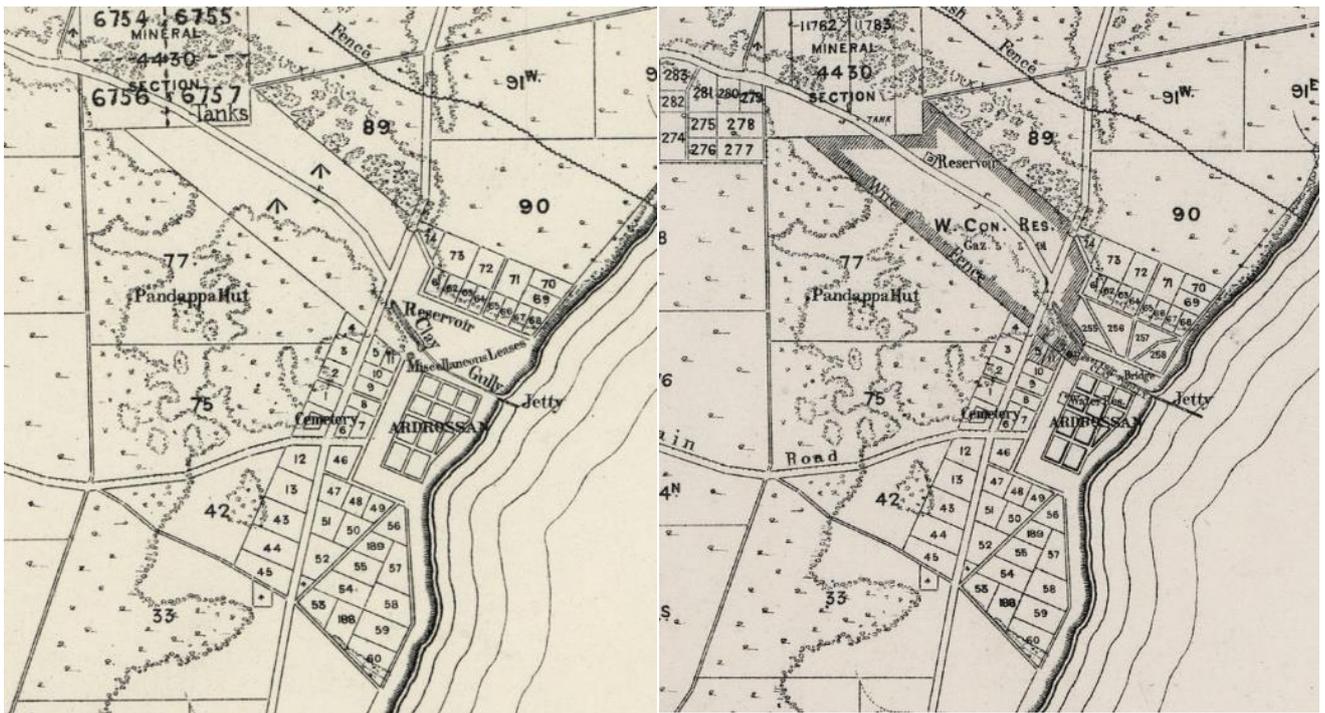


Figure 5: Left: Ardrossan town plan 1883 post jetty construction showing the reservoir constructed in Clay Gully and the areas of taller mallee etc vegetation and open plain. Right: Town plan 1895 showing 4 new suburban blocks on Park Terrace and also showing Water Reserve area

Subsequently in 1886 four additional suburban blocks were created between what is now Park Terrace and High St. Later these large blocks were divided for the housing blocks now present (see Figure 5 above). This decision upset Ardrossan residents as the Adelaide Observer reported on Sat 11 Dec 1886 Page 16:

ARDROSSAN. December 8.

A large and influential meeting was held in the Ardrossan Institute on Tuesday night with regard to the sale of working men's blocks in the vicinity of the township. The meeting regretted the action of the Commissioner of Crown Lands, and resolutions were passed urging upon Mr. W. H. Beaglehole, M.P., to lay the matter before him with a view to withdrawing the three allotments, Nos. 256, 257, and 258, from sale, being the only park lands on the north of the town ship.

The request was not agreed to and the lots remained. There was also a large area of crown land set aside in the catchment of what was called Clay Gully – the creekline to the north of North Terrace.

Local government in Ardrossan

Local government in Ardrossan did not commence until 1888 when it became part of the original District Council of Yorke Peninsula which included Maitland. Until then the Commissioner of Crown Lands managed the park lands. The SA colonial government was responsible for funding early works such as the jetty in 1877, the road and culvert across Clay Gully (early 1880, cost 270 pounds – see Figure 6) and water tanks and reservoirs for town water (a small reservoir of 52,000 capacity gallons was built on Clay Gully in the current golf course land around 1877).



Figure 6: Ardrossan - approach over a bridge [built c 1880] in 1907. - State Library of SA - B 11048

At some time after the original small reservoir was built, a larger one was constructed. In March 1891 a substantial area of Crown Land extending out from the north-west edge of the town park lands [being the main local catchment area for Clay Gully] was officially declared a water conservation reserve as part of attempts to provide a town water supply.

In October 1893 the Ardrossan park lands were dedicated as a reserve for park lands. The District Council of Yorke Peninsula was assigned care control and management.

By 1911 after many years of problems with the town water supply, which included carting of water from various tanks and the wells at Tiddy Widdy, a connection was constructed to Clinton which provided water from the Beetaloo Reservoir to the town. Subsequently the Water Reserve in the Clay Gully catchment was removed and blocks of land sold off along the Arthurton Road (shown in 7 below).

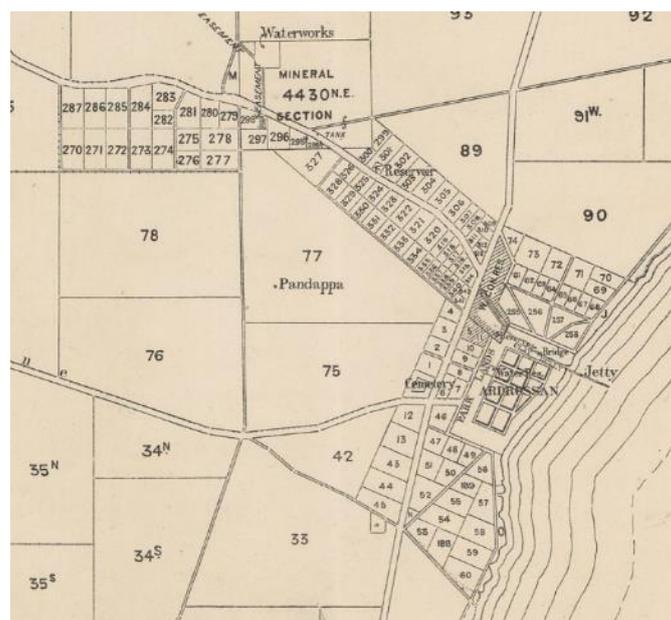


Figure 7: Plan of Ardrossan town 1914

3.3 Historical Accounts of the Vegetation Around Ardrossan

The Hundred of Cunningham maps and associated Survey Diagram Books dating from as early as 1872 contain good information on the vegetation present at the time.

The Hundred Map shows a delineation line and markings which distinguish between the Mallee Scrub which was common in the locality, and the open plains toward the coast.

Figure 8 shows the Hundred map with colours added to highlight the vegetation types described. The white areas show the vegetation described as of Mallee Scrub and the yellow areas show the open plains country (usually described as black-grass [i.e. *Gahnia lanigera*]) based on surveys conducted up to 1876.

Also on the map land near Price changes from grass plain to a saltbush and samphire plain with some native pines (*Callitris gracilis*) and mallee on higher ground near the town (area coloured reddish brown and with likely transition from grass to saltbush).

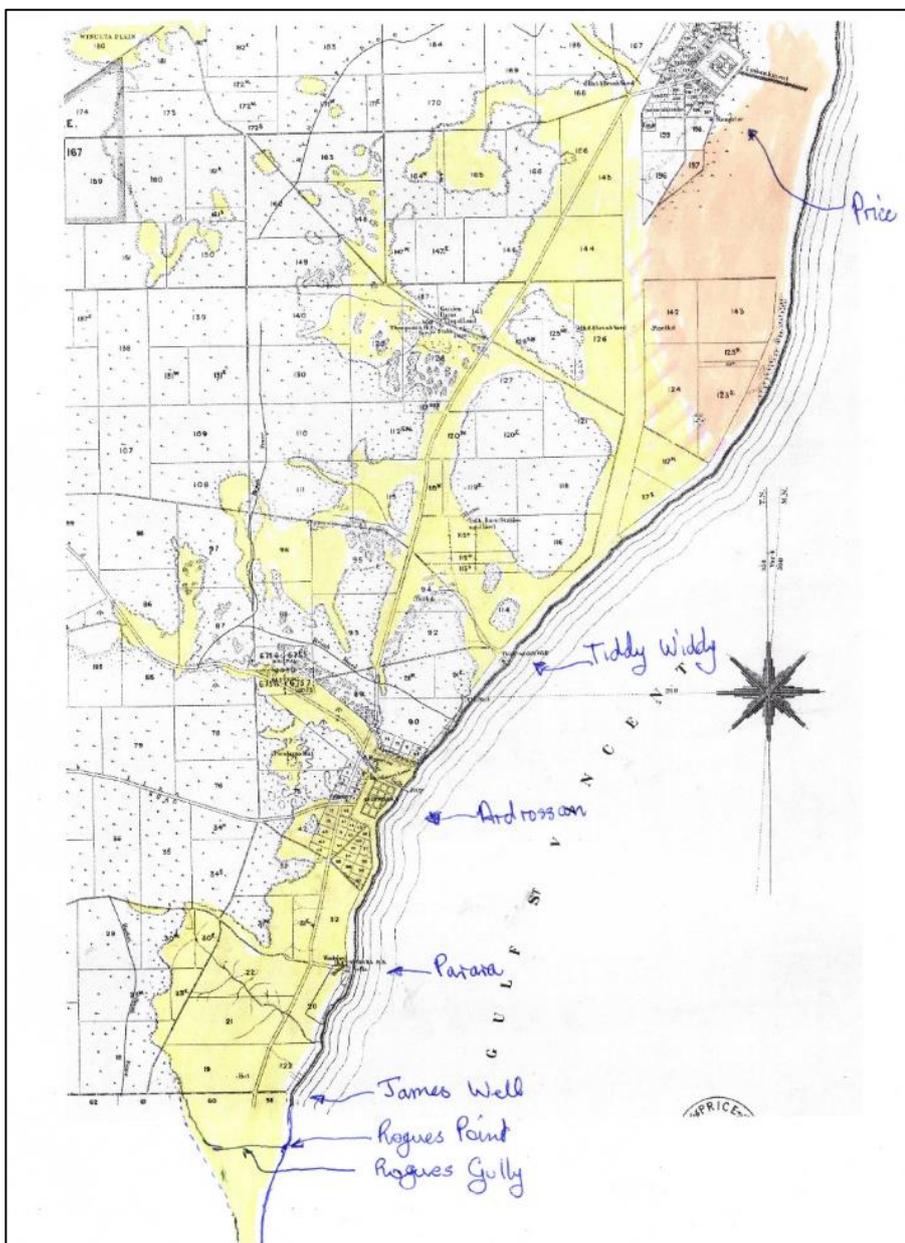


Figure 8: Hundred of Cunningham Map with vegetation types highlighted (courtesy of A.Shackley)

3.4 History of Plant Records: Otto Tepper Collections

Ardrossan has a special place in the botanical history of Yorke Peninsula, principally associated with Johann [Otto] Tepper. Tepper taught at the new Ardrossan school in 1878-81 and recorded in a Royal Society of South Australia article in 1880 more than 500 native plant species in the wider region, almost all from Ardrossan or close by. Tepper also wrote articles related to the coast, fossils, insects and reptiles around Ardrossan – some are recorded in the Bibliography.

Tepper noted in his article that “Being limited in time and means of locomotion, the area examined is necessarily small, mainly comprised within a radius of three or four miles. [of Ardrossan]”. Tepper clearly walked out to get most of his specimens from Ardrossan and presumably took a horse and cart on the isolated more extensive trips he made to Maitland and the Kilkerran coast and Muloowurtie and the coast south of Ardrossan to Black Point.

Related to the particular area around Ardrossan of which the site covered in this management plan relates, Tepper described it as “coastal-plain” as follows. [italics comments added]:

“The coast-plain and other open patches are thickly studded with large tufts of grass-like Cyperaceae and Xerotideae. The most common is *Cladium lanigerum*, [now *Gahnia lanigera*] with cylindrical, needle-like, pungent leaves, associated with four species of Xerotes [*Lomandra* spp. irongrasses] and one of *Lepidosperma* (undetermined) [*Lepidosperma congestum* or *viscidum*], the latter distinguished from the preceding by its flat, leaf-like flower-stalk. The most common of the Xerotids is *X. effusa* [*Lomandra effusa*]. All these are almost useless as food for domestic animals, and lend to the landscape a weird, forbidding aspect.

Among their tufts other grasses find a precarious domicile, of which *Stipa scabra*, *S. crinita*, *Danthonia penicillata*, *Poa caespitosa*, and *Agropyrum scabrum* are the most conspicuous, together with the introduced *Festuca bromoides*, *Koeleria phleoides*, and *Hordeum murinum*. *Anthistiria ciliata*, the “kangaroo grass,” is in the whole very scarce. “Wherever a fire sweeps away the scrub, *Stipa semibarbata* and *S. aristiglumis* appear in profusion, often growing a stalk three to five feet high, producing a singular effect at certain seasons by their large waving seed-plumes.

During the season of spring these grasslands are enlivened by the thousands of yellow and white flowers of many Composites, Goodenovaea, and Orchids, the blue of *Wahlenbergia gracilis*, the blue or pink of *Dampiera rosmarinifolia*, and many others; few only, among which is- *Stackhousia linarifolia* [*Stackhousia monogyne*], being at all remarkable for any pleasant scent.

Of shrubs, dotting the open country near Ardrossan, &c, the most remarkable are the low, dense *Styphelia patula* [*Acrotriche patula*], with dark green, glabrous, myrtle-like leaves and red edible berries; *Hakea rugosa* and the unavoidable *Bursaria spinosa*, with its large white clusters of snow-white flowers, but very spiny branches.

Grevillea Huegeli and a variety of *Eremophila Brownii* [*Eremophila glabra*], both with fine red flowers, occasionally find their way from the hills to the plain, increasing the variety agreeably in company with the much smaller *Pimeleas*, dressed in a profusion of white or yellow.” [page 29].

This coast-plain described briefly by Tepper is the “open Black Grass plain” described by the land surveyors. As well as “Black Grass” which describes the *Gahnia* species, the surveyors also mention Silvergrass and Whitegrass as well as porcupine grass in a few spots (not near Ardrossan). Silvergrass and Whitegrass are not

commonly used names for native grass species but likely refer to speargrasses and wallaby grasses. Silver grass is also a name applied to introduced *Vulpia* species and this could be the reference – it is mentioned by Tepper in 1880 as present (*Festuca bromoides*) but it is very unlikely this weed had a significant presence in the areas where it is mentioned which had very little impact of grazing or farming at the time. The term “porcupine grass” usually refers to *Triodia* species, also referred to as spinnifex. Tepper in his 1880 article refers to “*Festuca irritans*” as present in inland places including Kilkerran but does also have a specimen in Melbourne Herbarium described as *Triodia scariosa* from Ardrossan.

For the purpose of the management plan we have produced and interpreted data from Tepper. That is no easy task as the names of the majority of the plant species in the 1880 article have changed; many changes related to families, genus and species of the plants have occurred.

For example, Tepper recorded 4 species of spear grasses related to the Ardrossan area and 1 more inland. At the time these were the only ones recorded for the whole of Yorke Peninsula. And there were only 10 recorded for the state. These numbers have now increased a lot as more detailed study has meant new species have been described. Our current lists for the Park Terrace area show 12 spear grass species and there are close to 40 are recorded for the state. With Bluebells (*Wahlenbergia* spp.) Tepper recorded 1 species (with 2 varieties). Now our lists show 4 species. Other separate species or varieties described by Tepper have now been included into a single species.

Tepper recorded general localities for his species – coastal, inland hills and inland plains and in some cases specific inland localities. With Ardrossan we are interested in Tepper’s “coastal” area. Tepper listed about 220 species as either coastal or general (which included coastal). The Park Terrace area would have been part of what Tepper called the “coast plain”. Tepper said “The width of the Ardrossan coast-plain is about a mile.” In addition to the higher areas such as at Park Terrace, Tepper’s coastal plant list included plants from the sandy beachfront and the coastal cliffs. We have excluded these plants where appropriate from relevance for the Park Terrace area but clearly many of them are relevant for assessing vegetation on the coastal cliffs on the eastern side of the site.

Appendix 1 provides a list of species Tepper recorded that are relevant to his “coast-plain” area and our site as species that would be expected or likely to be in a native grassland. The benefit of Tepper’s records are that many species which have not been recorded at the Park Terrace site or indeed elsewhere in or near Ardrossan by other botanists have potential to be reintroduced to the area based on Tepper.

We have developed a list of about 100 species in addition to the c 80 recorded as remnant on site which would be suitable for planting for an Ardrossan grassland area. See Appendix 1. There are approximately a further 100 species which might be considered for planting for an Ardrossan grassland area but lower priority. Or for planting in a botanical garden setting in Ardrossan away from the project area. Again almost all of these species are based on the Tepper article and on Herbarium records of Tepper. An extraordinary legacy.

Tepper went on to work for the SA Museum for about 30 years as a collector of plants, insects and other invertebrates and wrote extensively on these and other topics in South Australian publications and in some small booklets (see Bibliography for some). His connection with Ardrossan is a wonderful opportunity to promote the flora and fauna of the area through interpretative signs on this site and elsewhere on the Walk the Yorke path, exhibitions in the Ardrossan Museum, Ardrossan Area School or other places.



Figure 10: Digital copy of a Tepper "type" specimen in Melbourne Herbarium – *Goodenia pusilliflora* collected from "Yorke Peninsula"

4 Site Description and Conservation Values

4.1. Uniqueness and conservation context

The historical descriptions and accounts by Otto Tepper are not widely known, however the Ardrossan Grassland area has been known to contemporary botanists and environmental managers for many years as an important remnant of the original vegetation around Ardrossan, and probably the most significant ‘true’ native grassland area on Yorke Peninsula.

Recent Botanical Recognition

A Biological Survey report in 1994 said the site was “of significance at a state level, due to its uniqueness and because it contains four species of conservation significance at a state and regional level” (p57). The report went on to say “The plants of conservation significance combined with the colourful display of Compositae (daisy) species in spring, make this area not only botanically attractive but also important in terms of conservation. This area, if managed for the purpose of conservation, could provide a possible tourist attraction for the Council whilst preserving a unique vegetation association” (p60). A small area in the open parkland was later fenced for protection.

Context within the Broader Grasslands of the Ardrossan Area

Of the estimated 4,000 hectares of grassy plains vegetation in and around Ardrossan existing prior to European colonisation, possibly 100 hectares (2.5%) could be said to remain as remnant areas. However, with minor exceptions and apart from the Park Terrace site, all retain only moderate numbers of native species. The Park Terrace/Esplanade Project Area contains around 4 hectares (0.1% of the original grassland) and is the only good quality remnant. Therefore it is of exceptionally high conservation significance and botanical interest.

A site inspection of the original grassy areas around Ardrossan was conducted in April 2021 with the assistance of a number of landowners south of the current dolomite mine. The visit confirmed that the areas shown as open land in the Hundred maps contained only very limited trees and shrubs – a few in creeklines close to the coast and a few elsewhere in creeklines. Apart from areas containing stony and steep topography, most of the areas which appear uncultivated in recent aerial photographs, also appear uncultivated on the ground. But while the uncultivated areas had a moderate range of native species, there was a low cover of native grasses and other grassland species. The likely reasons for this are the accumulated impacts of grazing, including rabbits, and weed invasion across the whole area and likely additional impacts from use of fertilisers and spreading of pasture species in some areas. An assessment in spring after good rain would no doubt produce a greater number of species and many additional weeds.

The road reserves through this grassland area have also lost most of their original grassland character through a combination of weeds, rabbits, no doubt some stock grazing during droughts and Depression, cultivation and widespread planting of trees and shrubs (and subsequent further spread of these species where seed has been spread by birds or other means).

A few stony rises in paddocks on the west side of the grassland area retain a moderate diversity of grassland species. The only publicly accessible or viewable areas apart from the Park Terrace/Esplanade site which provide some indication of original appearance are sections of Bosh Road west of Stevies Road, a tiny section of road reserve where Rogues Gully crosses Yorke Highway (SE verge) and private land near the corner of Arthurton Road and Kenny Road (north of the planted road verge revegetation). There are also small areas in the coastal crown land reserves near the main port and further south. In total these areas are smaller than the project site and all contain much less than half the species diversity of the project site.

There are some other small remnant areas of significance in Ardrossan township. A small section of Clay Gully opposite the Golf Course clubhouse had 20 native species present on an April 2021 visit. The cliff-face edge

of the main town park lands and part and parts of the coastal park lands contain a similar number of grassy ecosystem species overall.

Why has the Grassland Persisted?

The fact that the remnant vegetation is a grassland and resembles an open urban park may have helped it slip under the radar. Undoubtedly the regular mowing of the site by the Council, while not intended for biodiversity enhancement, has helped maintain the perennial grass basis to the vegetation and the perennial herbs. The regular mowing has also prevented the proliferation of native shrubs. The fenced enclosure contains a higher cover of shrubs which appears to be why the site was selected.

Additional Values of the Site

In addition to the intrinsic natural and botanical values, the project site has potential to provide a native seed resource due to the high concentration of daisies, grasses and goodenias in particular. Seed collected from the site has a monetary value and could be used for grassland restoration and enhancement projects in Ardrossan and elsewhere in the region.

4.3 Native Plant Species of the Ardrossan Grassland.

Plant surveys to date have recorded at least 80 naturally occurring plant species, including 3 which are significant within the State and at least 17 which have conservation significance in the local area. The small daisy known as Lanky Buttons (*Leptorhynchos elongatus*) is considered Endangered within the State and the Ardrossan Grassland remnant is one of the few Yorke Peninsula sites where it occurs (Klein Point being the only other recorded site).

The following list has been compiled by Adrian Shackley of the Friends of Park Terrace community group.

Table 1: Native Plant Species Recorded at the Park Terrace Grassland (source: Biological Survey No. 63, recent observations of Sonia Croft, Mick Durant and Adrian Shackley).

State Conservation Ratings: E = Endangered, V = Vulnerable, R = Rare. NY Regional and sub-regional ratings: EN = Endangered, VU = Vulnerable, RA = Rare, NT = Near Threatened, LC = Least Concern, DD = data deficient, ne = not evaluated.

SPECIES	COMMONNAME	FAMILYNAME	AUS	SA	NY region	EYB 2 StV subreg
<i>Acacia hakeoides</i>	Hakea Wattle	LEGUMINOSAE			LC	LC
<i>Acacia spinescens</i>	Spiny Wattle	LEGUMINOSAE			LC	LC
<i>Acrotriche patula</i>	Prickly Ground-berry	EPACRIDACEAE			RA	NT
<i>Alyxia buxifolia</i>	Sea Box	APOCYNACEAE			LC	LC
<i>Arthropodium fimbriatum</i>	Nodding Vanilla-lily	LILIACEAE			NT	LC
<i>Arthropodium strictum</i>	Nodding Vanilla-lily	LILIACEAE			NT	LC
<i>Asteridea athrixoides f. athrixoides</i>	Wirewort	COMPOSITAE			DD	DD
<i>Austrostipa acrociliata</i>	Graceful Spear-grass	GRAMINEAE			NT	LC
<i>Austrostipa drummondii</i>	Cottony Spear-grass	GRAMINEAE			LC	LC
<i>Austrostipa elegantissima</i>	Feather Spear-grass	GRAMINEAE			LC	LC
<i>Austrostipa eremophila</i>	Rusty Spear-grass	GRAMINEAE			LC	LC
<i>Austrostipa flavescens</i>	Coast Spear-grass	GRAMINEAE			LC	LC
<i>Austrostipa nodosa</i>	Tall Spear-grass	GRAMINEAE			LC	LC

<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass	GRAMINEAE			LC	LC
<i>Beyeria lechenaultii</i>	Pale Turpentine Bush	EUPHORBIACEAE			NT	LC
<i>Bulbine bulbosa</i>	Bulbine-lily	LILIACEAE			RA	EN
<i>Bursaria spinosa ssp. spinosa</i>	Sweet Bursaria	PITTIOSPORACEAE			LC	LC
<i>Calocephalus citreus</i>	Lemon Beauty-heads	COMPOSITAE			NT	DD
<i>Cassinia arcuata maybe planted</i>	Drooping Cassinia	COMPOSITAE			NT	NT
<i>Chrysocephalum apiculatum</i>	Common Everlasting	COMPOSITAE			LC	LC
<i>Convolvulus angustissimus ssp. angustissimus</i>	Australian Convolvulus	CONVOLVULACEAE			NE	NE
<i>Convolvulus angustissimus ssp. peninsularum</i>	Grassland Convolvulus	CONVOLVULACEAE			NE	NE
<i>Convolvulus remotus</i>	Grassy Bindweed	CONVOLVULACEAE			LC	LC
<i>Craspedia variabilis</i>	Billy-buttons	COMPOSITAE			RA	?
<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera	GOODENIACEAE			RA	NT
<i>Dianella brevicaulis</i>	Short-stem Flax-lily	LILIACEAE			LC	LC
<i>Dianella revoluta var. revoluta</i>	Black-anther Flax-lily	LILIACEAE			LC	LC
<i>Dodonaea baueri</i>	Crinkled Hop-bush	SAPINDACEAE			LC	LC
<i>Elachanthus pusillus</i>	Elachanth	COMPOSITAE			LC	DD
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush	CHENOPODIACEAE			LC	LC
<i>Enneapogon nigricans</i>	Black-head Grass	GRAMINEAE			LC	LC
<i>Enteropogon acicularis</i>	Umbrella Grass	GRAMINEAE			LC	LC
<i>Eremophila deserti</i>	Turkey-bush	MYOPORACEAE			LC	LC
<i>Eremophila glabra ssp. glabra</i>	Tar Bush	MYOPORACEAE			LC	LC
<i>Eremophila longifolia</i>	Weeping Emubush	MYOPORACEAE			LC	LC
<i>Eucalyptus porosa</i>	Mallee Box	MYRTACEAE			LC	LC
<i>Eutaxia microphylla</i>	Common Eutaxia	LEGUMINOSAE			LC	LC
<i>Gahnia deusta</i>	Limestone Saw-sedge	CYPERACEAE			LC	LC
<i>Gahnia lanigera</i>	Black Grass Saw-sedge	CYPERACEAE			NT	LC
<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia	GOODENIACEAE			NT	LC
<i>Goodenia willisiana</i>	Silver Goodenia	GOODENIACEAE			NT	LC
<i>Isoetopsis graminifolia</i>	Grass Cushion	COMPOSITAE			LC	LC
<i>Lepidosperma congestum</i>	Sword-sedge	CYPERACEAE			LC	LC
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge	CYPERACEAE			LC	LC
<i>Leptorhynchus elongatus</i>	Lanky Buttons	COMPOSITAE		E	VU	VU
<i>Lomandra collina</i>	Sand Mat-rush	LILIACEAE			LC	LC
<i>Lomandra effusa</i>	Scented Mat-rush	LILIACEAE			LC	LC
<i>Lomandra multiflora ssp. dura</i>	Hard Mat-rush	LILIACEAE			LC	LC
<i>Maireana brevifolia</i>	Short-leaf Bluebush	CHENOPODIACEAE			LC	LC
<i>Maireana enchylaenoides</i>	Wingless Fissure-plant	CHENOPODIACEAE			LC	LC
<i>Maireana rohrlachii</i>	Rohrlach's Bluebush	CHENOPODIACEAE		R	VU	VU
<i>Malva preissiana</i>	Australian Hollyhock	MALVACEAE			RA	VU
<i>Minuria leptophylla</i>	Top-fruit Bluebush	CHENOPODIACEAE			LC	LC
<i>Myoporum viscosum/petiolaris (possibly planted)</i>						
<i>Neurachne alopecuroidea</i>	Fox-tail Mulga-grass	GRAMINEAE			NT	RA
<i>Nitraria billardierei</i>	Minnie Daisy	COMPOSITAE			LC	LC
<i>Pimelea glauca</i>	Nitre-bush	ZYGOPHYLLACEAE			LC	LC

<i>Pimelea micrantha</i>	Smooth Riceflower	THYMELAEACEAE			NT	NT
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>	Silky Riceflower	THYMELAEACEAE			NT	RA
<i>Pittosporum angustifolium</i>	Native Apricot	PITTOSPORACEAE			LC	LC
<i>Plantago varia</i>	Variable Plantain	THYMELAEACEAE			LC	LC
<i>Podolepis jaceoides</i>	Showy Copper-wire Daisy	COMPOSITAE		R	NT	CR
<i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>	Mallee Pomaderris	RHAMNACEAE			VU	VU
<i>Ptilotus spathulatus</i>	Pussy-tails	AMARANTHACEAE			LC	LC
<i>Rhagodia crassifolia</i> (possibly planted)						
<i>Roepora glauca</i>	Pale Twinleaf	ZYGOPHYLLACEAE			LC	LC
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass	GRAMINEAE			LC	LC
<i>Scerolaena diacantha</i>	Grey Bindyi	CHENOPODIACEAE			LC	LC
<i>Senna artemisioides</i> ssp. <i>petiolaris</i>	Punty Bush	LEGUMINOSAE			LC	LC
<i>Sida corrugata</i> var. <i>angustifolia</i>	Grassland Sida	MALVACEAE			NT	LC
<i>Sida corrugata</i> var. <i>corrugata</i>	Grassland Sida	MALVACEAE			LC	NT
<i>Stackhousia monogyna</i>	Creamy Candles	STACKHOUSIACEAE			NT	LC
<i>Teucrium sessiliflorum</i>	Mallee Germander	LABIATAE			NT	LC
<i>Themeda triandra</i>	Kangaroo Grass	GRAMINEAE			LC	LC
<i>Velleia arguta</i>	Toothed Velleia	GOODENIACEAE			LC	LC
<i>Vittadinia blackii</i>	Narrow-leaf New Holland Daisy	COMPOSITAE			RA	RA
<i>Vittadinia cervicularis</i> var. <i>cervicularis</i>	Waisted New Holland Daisy	COMPOSITAE			LC	LC
<i>Vittadinia cuneata</i> var. <i>cuneata</i>	Fuzzy New Holland Daisy	COMPOSITAE			LC	LC
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	COMPOSITAE			LC	LC
<i>Vittadinia megacephala</i>	Giant New Holland Daisy	COMPOSITAE			LC	LC
<i>Wahlenbergia communis</i>	Tufted Bluebell	CAMPANULACEAE			LC	LC
<i>Wurmbea dioica</i> ssp. <i>brevifolia</i>	Early Nancy	LILIACEAE			ne	ne

Previous tree planting efforts

Historical accounts and aerial photography confirm that the trees and most of the taller shrubs within the reserve and including the creekline (Clay Gully) have been planted by people. In fact as early as the late 1800s the local community saw value in planting trees in the township and this no doubt reflects the fact that there were few trees present when the town was founded.

Today the vast majority of the trees now visible on the coastal plain at Ardrossan have been planted.

4.3 Fauna

The small size and urban location of the project area limits the diversity of animals likely to be present, and many of the other remnants of the original Ardrossan grassland are relatively poor in condition.

However, grasslands are known to provide habitat for a range of animals in South Australia, including the Nationally Threatened Pygmy Blue-tongue Lizard (*Tiliqua adelaidensis*) which occurs nearby at Kulpara and the southern Hummock Ranges. This species may also have occurred at Ardrossan.

Reptiles

Table below shows the species of snakes and lizards recorded within 10 Kms of Ardrossan town (Atlas of Living Australia May 2021). Noticeably absent are Eastern or Western Blue-tongue Lizards which are known to be present in the district. Keeping tabs on reptile sightings would be a useful exercise for volunteers including from organisations that undertake surveys of reptiles. Additional surveys would be expected to uncover additional species.

Table 2: Reptile Species Recorded within 10km of the Project Area (source ALA 2021)

Common name	Scientific name
Death Adder	<i>Acanthophis antarcticus</i>
Dwarf Skink	<i>Menetia greyii</i>
Eastern Brown Snake	<i>Pseudonaja textilis</i>
Eastern ctenotus	<i>Ctenotus orientalis</i>
Eastern Spiny-tailed Gecko	<i>Strophurus intermedius</i>
Edwards' slider	<i>Lerista edwardsae</i>
Gould's Goanna	<i>Varanus gouldii</i>
Lowlands Earless Skink	<i>Hemiergis peronii</i>
Painted Dragon	<i>Ctenophorus pictus</i>
Peninsula Dragon	<i>Ctenophorus fionni</i>
Prong-snouted Blind Snake	<i>Anilius bituberculatus</i>
Shingle-back	<i>Tiliqua rugosa</i>
Southern Slider	<i>Lerista dorsalis</i>
Thick-tailed Gecko	<i>Underwoodisaurus milii</i>
Three-toed Earless Skink	<i>Hemiergis decresiensis</i>
Wood Gecko	<i>Diplodactylus vittatus</i>

At the October 2020 Field Day questions were asked about brown snakes related to the project area. Brown snakes are occasionally seen in Ardrossan and are attracted to gardens with water, poultry sheds and yards with mice, and sheds or other materials providing shelter. It is unlikely that the grassland project area would be attractive to brown snakes, even with some increase in grass cover resulting from changes in management.

The other venomous snake in the general locality is the Death Adder. Death adders look for areas with a lot of debris on the ground to provide cover while they wait for prey. Areas near beaches with dried seaweed or areas of woodland with bark and other debris on the ground provide good habitat. The project area would not be favourable habitat for Death Adders.

Butterflies and other insects

Butterfly and insect diversity is generally high in native grasslands and there are many larval foodplants within the Ardrossan grassland list.

Grassland insects are important fauna to understand because they provide the food resource to sustain many of the other animals in the ecosystems. Many of the butterflies and moths are also very attractive and of interest to people.

The only species of native butterflies and moths recorded at Ardrossan (Atlas of Living Australia May 2021) are shown in Table 4.

Table 3: Butterflies and Moths Recorded in the Ardrossan District (source ALA 2021)

Common name	Scientific name
<i>Candalides hyacinthinus</i>	Varied Dusky-blue
<i>Candalides heathi heathi</i>	Rayed Blue
<i>Eurema smilax</i>	Small Grass-yellow
<i>Helicoverpa punctigera</i>	Heliothis Moth
<i>Herimosa albovenata albovenata</i>	White-veined Grass-skipper
<i>Hylarcta nigrescens</i>	Ribbed Case Moth
<i>Jalmenus icilius</i>	Icilius Blue
<i>Synemon nais</i>	Orange Sun Moth
<i>Vanessa kershawi</i>	Australian Painted Lady

Undoubtedly many more species exist in the area. Roger Grund in Caton [2006] produced a list of butterflies for Yorke Peninsula which included several species using grassland habitat that were considered to be rare (see Appendix 3).

Otto Tepper in 1882 produced a paper on *The Papilionidae of South Australia*. In which he recorded that some 18 of 30 species listed had been observed near Ardrossan. Only four of these species appear to be listed in Atlas of Living Australia [name changes made a couple of extras possible with further checking].

Being the highest quality patch of native grassland for some distance means that monitoring is likely to produce some very interesting results. Butterfly Conservation South Australia have been approached to assist with this. Although the site seems very isolated, the survey work undertaken as part of work for this draft plan has recorded 65 or the c 80 species present at the project sites on other scattered sites within 10 kms of Ardrossan. For insects including butterflies and moths this means that the site is not so isolated as to prevent viable populations of most species being able to exist. Recording them is the challenge – butterflies and moths are most commonly seen in spring but year-round monitoring over several years is needed to catch up with all of them.

One of the most useful outcomes of focussing on the project area would be if a much more comprehensive list of insects could be recorded over future years.

Birds

Common grassland birds still present in the broader Ardrossan grasslands include Rufous Songlarks, Australian Pipit, Stubble Quail. Table 2 lists the terrestrial birds recorded on the Atlas of Living Australia within 10km of Ardrossan. Many of these species are woodland dependant and may be found in similar habitats to the planted Clay Gully. Few of these birds would be considered grassland specialists (apart from quails and pipets), though many of the raptors regularly hunt in open country.

Table 4: Terrestrial Bird Species Recorded within 10km of the Project Area (source ALA 2021)

Scientific Name	Common Name	Introduced
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	
<i>Acanthiza apicalis</i>	Inland Thornbill	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	
<i>Acanthiza iredalei</i>	Slender-billed Thornbill	
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	
<i>Accipiter fasciatus</i>	Brown Goshawk	
<i>Alauda arvensis</i>	Eurasian Skylark	Y
<i>Anas castanea</i>	Chestnut Teal	
<i>Anas gracilis</i>	Grey teal	
<i>Anas platyrhynchos</i>	Mallard	
<i>Anas superciliosa</i>	Grey duck	
<i>Anthochaera carunculata</i>	Red wattlebird	
<i>Anthus novaeseelandiae</i>	Australian Pipit	
<i>Aquila audax</i>	Wedge-tailed Eagle	
<i>Artamus cyanopterus</i>	Dusky Woodswallow	
<i>Artamus superciliosus</i>	White-browed woodswallow	
<i>Aythya australis</i>	Hardhead	
<i>Biziura lobata</i>	Musk Duck	
<i>Cacatua sanguinea</i>	Little Corella	
<i>Cacomantis pallidus</i>	Pallid Cuckoo	
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	
<i>Chalcites basalis</i>	Horsfield's Bronze-cuckoo	
<i>Chalcites lucidus</i>	Shining Bronze-cuckoo	
<i>Chenonetta jubata</i>	Maned Duck	
<i>Cheramoeca leucosterna</i>	White-backed Swallow	
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	
<i>Cincloramphus cruralis</i>	Brown Songlark	
<i>Circus assimilis</i>	Spotted Harrier	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	
<i>Columba livia</i>	Rock Dove	Y
<i>Coracina novaehollandiae</i>	Black-faced cuckoo-shrike	
<i>Corvus coronoides</i>	Australian Raven	
<i>Corvus mellori</i>	Little Raven	
<i>Coturnix pectoralis</i>	Stubble Quail	
<i>Coturnix ypsilophora</i>	Swamp Quail	
<i>Cracticus torquatus</i>	Grey Butcherbird	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	
<i>Dromaius novaehollandiae</i>	Emu	
<i>Egretta novaehollandiae</i>	White-faced Heron	
<i>Elanus axillaris</i>	Black-shouldered Kite	
<i>Eolophus roseicapilla</i>	Galah	
<i>Epthianura albifrons</i>	White-fronted Chat	
<i>Epthianura tricolor</i>	Crimson Chat	
<i>Falco berigora</i>	Brown Falcon	

<i>Falco cenchroides</i>	Nankeen Kestrel	
<i>Falco longipennis</i>	Australian Hobby	
<i>Falco peregrinus</i>	Peregrine Falcon	
<i>Falco subniger</i>	Black Falcon	
<i>Fulica atra</i>	Eurasian Coot	
<i>Gavialis vireescens</i>	Singing Honeyeater	
<i>Geopelia striata</i>	Peaceful Dove	
<i>Glossopsitta concinna</i>	Musk Lorikeet	
<i>Grallina cyanoleuca</i>	Magpie-lark	
<i>Gymnorhina tibicen</i>	Australian Magpie	
<i>Haliastur sphenurus</i>	Whistling Kite	
<i>Hieraaetus morphnoides</i>	Little Eagle	
<i>Hirundo neoxena</i>	Welcome Swallow	
<i>Lalage sueurii</i>	White-winged Triller	
<i>Leipoa ocellata</i>	Malleefowl	
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	
<i>Malurus cyaneus</i>	Superb Fairy-wren	
<i>Malurus lamberti</i>	Variiegated Fairy-wren	
<i>Manorina flavigula</i>	Yellow-throated Miner	
<i>Manorina melanocephala</i>	Noisy Miner	
<i>Megalurus gramineus</i>	Little Grassbird	
<i>Melanodryas cucullata</i>	Hooded Robin	
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	
<i>Melopsittacus undulatus</i>	Budgerigar	
<i>Merops ornatus</i>	Rainbow Bee-eater	
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	
<i>Microeca fascians</i>	Jacky Winter	
<i>Milvus migrans</i>	Black Kite	
<i>Mirafra javanica</i>	Horsfield's Bushlark	
<i>Myiagra inquieta</i>	Restless Flycatcher	
<i>Neophema elegans</i>	Elegant Parrot	
<i>Ninox novaeseelandiae</i>	Southern Boobook	
<i>Northiella haematogaster</i>	Bluebonnet	
<i>Ocyphaps lophotes</i>	Crested Pigeon	
<i>Oreoica gutturalis</i>	Crested Bellbird	
<i>Pachycephala inornata</i>	Gilbert's Whistler	
<i>Pachycephala rufiventris</i>	Rufous Whistler	
<i>Pardalotus punctatus</i>	Spotted Pardalote	
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Parvipsitta porphyrocephala</i>	Purple-crowned Lorikeet	
<i>Passer domesticus</i>	House sparrow	Y
<i>Petrochelidon ariel</i>	Fairy Martin	
<i>Petrochelidon nigricans</i>	Tree Martin	
<i>Petroica goodenovii</i>	Red-capped Robin	
<i>Phalacrocorax carbo</i>	Great Cormorant	
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	

<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	
<i>Phalacrocorax varius</i>	Pied Cormorant	
<i>Phaps chalcoptera</i>	Common Bronzewing	
<i>Phaps elegans</i>	Brush Bronzewing	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater	
<i>Plegadis falcinellus</i>	Glossy Ibis	
<i>Podargus strigoides</i>	Tawny Frogmouth	
<i>Podiceps cristatus</i>	Crested Grebe	
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	
<i>Pomatostomus superciliosus</i>	White-browed Babbler	
<i>Porzana fluminea</i>	Australian Spotted Crake	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	
<i>Psephotus varius</i>	Mulga Parrot	
<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	
<i>Rhipidura albiscapa</i>	Grey Fantail	
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Sericornis frontalis</i>	White-browed Scrubwren	
<i>Smicrornis brevirostris</i>	Weebill	
<i>Stiltia isabella</i>	Australian Pratincole	
<i>Streptopelia chinensis</i>	Spotted Turtle-dove	Y
<i>Sturnus vulgaris</i>	Starling	Y
<i>Tachybaptus novaehollandiae</i>	Australasian Little Grebe	
<i>Threskiornis moluccus</i>	Australian White Ibis	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	
<i>Tribonyx ventralis</i>	Black-tailed Native-hen	
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	
<i>Turdus merula</i>	Blackbird	Y
<i>Tyto javanica</i>	Eastern Barn Owl	
<i>Vanellus miles</i>	Masked Lapwing	
<i>Vanellus tricolor</i>	Banded Lapwing	
<i>Zosterops lateralis</i>	Silvereeye	

5 Threats and Mitigations

5.1 Weeds

Increasing weed invasion is one of the main threats to the vegetation in the grassland. The project area contains Declared Weeds (under the Landscapes SA Act 2019) and Weeds of National Significance (WoNS) which have legislated control requirements, as well as serious environmental weeds and garden escapes..

Weeds such as Gazania and Galenia spread easily and take up space that would otherwise be free for grass tussocks or herbs. Similarly, introduced bulbs in the lily and iris families overtake the niche occupied by native lilies, orchids and the like, eventually reducing native species diversity. Gazania is a Declared Weed in South Australia.

Couch Grass is another difficult weed to manage weed on the site and it is particularly present in the storm water drainage channel in the west of the main grassland. Herbicide control will be necessary to prevent this grass from spreading.

Aleppo Pines are a Declared Weed in South Australia. There are a number of mature Aleppo Pines near the corner of Bridge Rd and Park Tce, and there are dozens of seedlings originating from these trees which currently hidden by the regular slashing. Removal of all seedlings and gradual removal of the older trees is recommended.

Wards Weed (*Carrictera annua*) has become a prolific weed within the fenced enclosure which makes control quite labour intensive. If labour resources are available the Wards Weed could be carefully hand-pulled or treated with a weed wiper and herbicide, creating a weed front which is revisited each year. Knapsack herbicide control (foliar spraying) is not recommended for this infestation due to the high density and diversity of native plants.

Clay Gully is heavily infested with weeds including dense infestations of Bridal Creeper and African Boxthorn (both Declared and WoNS species), Kikuyu and Western Coast Wattle. Removal of these weeds is necessary in order to eliminate a local seed source for these species. There are also Pepper Trees in the creek which, while not seriously invasive, tend to shade out native creekline species.



Photo: Gazania plants amongst native grass tussocks

Table 5: Weed Species in the Park Terrace Grassland (source: BDSA Survey 63, Sonia Croft 2020 and Adrian Shackley, compiled by A.Shackley)

FAMILY NAME	SPECIES	COMMON NAME	Dec.*	WoNS**
LEGUMINOSAE	<i>Acacia cyclops</i>	Western Coastal Wattle		
CRASSULACEAE	<i>Aeonium arboretum</i> ***	Tree aeonium		
ALLIACEAE	<i>Allium sp</i> ***	Onion sp		
COMPOSITAE	<i>Arctotheca calendula</i>	Cape Weed		
LILIACEAE	<i>Asparagus asparagoides</i>	Bridal Creeper	Y	Y
LILIACEAE	<i>Asphodelus fistulosus</i>	Onion Weed		
COMPOSITAE	<i>Asteriscus spinosus</i>	Golden Pallensis		
GRAMINEAE	<i>Avena barbata</i>	Bearded Oat		
CRUCIFERAE	<i>Brassica sp.</i>	Wild Turnip		
GRAMINEAE	<i>Bromus rubens</i>	Red Brome		
GRAMINEAE	<i>Bromus sp</i>	Brome		
CRUCIFERAE	<i>Carrichtera annua</i>	Ward's Weed		
GRAMINEAE	<i>Cenchrus clandestinus</i>	Kikuyu		
GRAMINEAE	<i>Cynodon dactylon var. dactylon</i>	Couch Grass		
CYPERACEAE	<i>Cyperus isocladius</i> ****	Dwarf Papyrus		
EUPHORBIACEAE	<i>Euphorbia terracina</i>	False Caper		
UMBELLIFERAE	<i>Foeniculum vulgare</i>	Fennel		
IRIDACEAE	<i>Freesia cultivar</i>	Freesia		
IRIDACEAE	<i>Freesia laxa</i>	Freesia		
AIOZOACEAE	<i>Galenia pubescens</i>	Galenia		
COMPOSITAE	<i>Gazania linearis</i>	Gazania	Y	
IRIDACEAE	<i>Iris albicans</i> ***	Iris		
IRIDACEAE	<i>Iris germanica</i>	Flag Iris		
IRIDACEAE	<i>Iris sp</i>	Flag Iris		
COMPOSITAE	<i>Leontodon rhagadioloides</i>	Cretan Weed		
CRUCIFERAE	<i>Lepidium africanum</i>	Common Peppercross		
LINACEAE	<i>Linum strictum ssp. strictum</i>	Upright Yellow Flax		
GRAMINEAE	<i>Lolium rigidum</i>	Wimmera Ryegrass		
SOLANACEAE	<i>Lycium ferocissimum</i>	African Boxthorn	Y	Y
LEGUMINOSAE	<i>Medicago minima</i>	Little Medic		
LEGUMINOSAE	<i>Medicago sp.</i>	Medic		
IRIDACEAE	<i>Moraea setifolia</i>	Thread Iris		
OXALIDACEAE	<i>Oxalis pes-caprae</i>	Soursob		
PINACEAE	<i>Pinus halepensis</i>	Aleppo Pine	Y	
COMPOSITAE	<i>Reichardia tingitana</i>	False Sowthistle		
LABIATAE	<i>Salvia verbenaca var. verbenaca</i>	Wild Sage		
DIPSACACEAE	<i>Scabiosa atropurpurea</i>	Pincushion		
COMPOSITAE	<i>Sonchus oleraceus</i>	Common Sow-thistle		
LEGUMINOSAE	<i>Trifolium sp.</i>	Clover		
GRAMINEAE	<i>Vulpia sp.</i>	Ratstail Fescue		

*Declared Species (Landscape SA Act 2019), ** Weed of National Significance, **Observation of David Symon. **** Observation of Robert Bates

Strategies for weed control in the Project Area include:

- Control Gazania, Galenia, bulbs and other broadleaf weeds where they occur within the grassland area
- Control and remove succulents and garden escape weeds from under the Mallee Box trees
- Control woody weeds (Western Coast Wattle, African Boxthorn), and Bridal Creeper from within the creek and cliffs and and surrounds
- Manage annual grassy weeds as part of the mowing and slashing regime
- Monitor for alert weeds such as Buffel Grass and WoNS weeds such as Boneseed (particularly in the creek)
- Removal all seedlings of Aleppo Pine in the north-west corner of the site and over time address the seed source by removing the mature trees

5.2 Grassland Management Regime (Mowing / Slashing and Herbicide Spraying)

The mowing and slashing regime is both an important tool in maintaining and enhancing the site, and a potential degrading influence if not implemented carefully. The management regime in recent years has been to mow the vegetation regularly and close to the ground with the aim of meeting community expectations around visual amenity.

In spring of 2020 as part of preparation for this plan the Council agreed to hold off from mowing during the main spring months. A slashing occurred at the end of spring after native grasses and herbs had an opportunity to set seed. This is the recommended strategy which reduces the competitive advantage of weeds which grow and flower earlier than most native species. The change was notified to local residents and the response has been positive.

Slashing machinery can also cause damage to the soil crust due to tight turning circles and travelling speeds, particularly in lighter soils. This type of disturbance breaks the soil crust and can result in increased weed invasion. This type of damage can be minimised by working with Council staff to discuss and amend travelling speeds and patterns.

The current practice of using herbicide to control weeds of the road verge has resulted in a strip of weedy vegetation around the grassland which poses a heightened risk of weeds colonising the native vegetation. If herbicide control could be limited to within 2m from the edge of the road surface, or eliminated completely, the vegetation in this verge area could be maintained by mowing and overtime the native grass cover could return. Some discussion has occurred with Tidy Town volunteers who have 2 mowers capable of undertaking this limited mowing around edges. There is potential for a change of operation to benefit the site with regular mowing of the road edge reducing weeds and improving amenity.

Strategies to improve the grassland management regime include:

- Timing: look to slash in late winter when annual weed grasses are close to flowering and then again in early summer when native grasses and herbs have flowered and set seed
- Train Council staff in identifying optimum times for slashing and the potential for soil damage when driving and turning quickly
- Continue to engage the local community about expectations for the area
- Raise the height of the mower to approximately 100 – 150mm to prevent tussock damage and loss
- Eliminate roadside herbicide use or restrict to 2m width and use mowing / slashing as the alternative control method

5.3 Pedestrian Traffic

Whilst the number of people traversing the vegetation is low, currently there is no fencing or other indication for the general public that there is anything significant in the reserve (outside of the fenced enclosure). At the same time having people walking in the area to look at the vegetation and butterflies is to be encouraged and will have minimal affect the conservation integrity of the area. Signs can say – please take the time to have a look over the site to appreciate its values.

Strategies to minimise damage by pedestrian users include:

- Install signs on the boundary of the vegetation (i.e. Esplanade, Park Tce, Bridge Rd) to indicate the significant vegetation and minimise pedestrian entry on the vegetation while maximising use of the formed paths and road verges
- Investigate strategic locations for minimal access management infrastructure (e.g. formalised paths, bollards, fencing)
- Encourage formalisation of a local Friends group (i.e. Friends of Park Terrace/Esplanade)

5.4 Stormwater Outlet

The stormwater outlet near the large pine trees is having a negative effect on the site by encouraging weeds that are replacing the native in the area of the drain and on the southern side of the drain where water spreads. Discussions have occurred with the responsible Council staff regarding the possible removal of the stormwater outfall in the reserve. It appears that it would be relatively simple to join the pipework into the existing subterranean drainage network across Tiddy Widdy Road. This would have benefits in re-using the stormwater for the golf course or other Council gardens, and it may be cheaper in the long run to remove the source of the problem rather than continually managing the weeds that proliferate due to the run-off.

According to the Council “It would be possible to redirect the stormwater from this line to other infrastructure, but this would come at a cost, therefore it would require the support of the local community to request Council to consider this as a project in future budget deliberations.” And “In recent years Council and the Ardrossan Progress Association have worked together to install infrastructure in various locations in Ardrossan to harvest stormwater, which is now used on the bowling greens, golf course and oval”.

Strategies to mitigate the negative impacts of stormwater on the site include:

- Encourage community members to request the diversion of the stormwater into existing subterranean drainage network
- Undertake intensive weed control along the shallow drainage line created by the outlet.

5.5 Cliff erosion and climate change

The red cliffs at Ardrossan are composed of soft sediments which are highly vulnerable to water erosion and storm surge damage. The impacts of increased storm surges as a result of sea-level rise were already evident in the 1880s when Otto Tepper was described it, and it is now quite obvious in this part of the coast.

Without intervention, it could be expected that the erosion of the base of the cliffs will undermine the road and carpark areas and eventually eat away at the grassland area. The grassy areas east of the Esplanade are especially at risk.

The issue of coastal erosion was raised by local residents at the October 2020 field day. Residents were well aware of the erosion occurring on Ardrossan's coastal cliffs, best demonstrated in recent years by Yorke Peninsula Council moving the safety fence along the cliffs back several metres.

Otto Tepper not only described the vegetation and fauna of the Ardrossan district. In the article Tepper, J.G.O. (1882). *Sketch of a geological and physical history of Hundred Cunningham and neighbouring regions* Transactions of the Royal Society of South Australia, Vol IV at page70, Tepper reports as follows:

The above sketch of the geological history would hardly be complete if no illusion were made to the present. According to nearly three years' attentive observation it seems to me that the balance of evidence is inclining in favour of a slight subsidence prevailing just now. The facts are that during this interval the sea has gradually and steadily been encroaching upon the sand dunes fringing the steep cliffs or raised beaches to a great extent from the southern boundary of Muloowurtie to the northern limit of Cunningham, a distance of some 25 to 28 miles, and has swept away vast masses of sand, in some cases 20 to 30 yards' width of formerly permanent beach, as for example near Ardrossan. This had the immediate effect of the waves at high tides washing parts of the cliffs, which for many years had been protected therefrom, thus causing falls of undermined portions to occur more frequently than before. I am certainly aware that other causes may affect coasts facing the east similarly, but the previous accumulation of the sands and other debris preclude them from offering a sufficient explanation of the observed phenomena.

An article related to Ardrossan in the late 1970s by Robert Bourman did attempt to provide some figures as shown in Figure 11. Bourman's conclusions on page 83 were:

The amount of erosion varies along the coastline, from a minimum of 3.6m at site B to 32.3m at site A, which is near the town jetty. Even conceding that there may be some errors in the original and the recent surveys, it seems clear that the cliffs at Ardrossan have retreated quite considerably in the 107 year interval"

The map we have access to is 1872 showing the town plan similarly laid out. Looking at the figures provided it does seem inherently unlikely that there would be such major differences in the amount of erosion over a length of about 750m as suggested by Bourman.

The 1872 Survey documents provide the basis for a reasonable estimate of changes to present day. This survey record from October 1872 (and the associated Diagram Book Page 1 for Hundred of Cunningham referred to elsewhere shows the relevant layout of the town.

These plans allow the distance to the coast at the points referred to by Bourman between North Terrace and South Terrace to be compared to the distance between East Terrace and West Terrace to produce a ratio for the distance from East Terrace to the top of the cliffs.

The same exercise can then be applied to a current map such as Naturemaps (<https://data.environment.sa.gov.au/NatureMaps>) to calculate a ratio as at the date of the Naturemaps data (a year or two ago).

The rough estimates obtained for this process are: A 10m (32.3); B 12m (3.6); C 13m (11.1); D 6 (5.4); E 6m (14.6); and F 6m (3.8) – the figures in brackets are from Bourman. Using the same methodology and the survey map Diagram Book 32 for the Park Terrace/High Street area above, an estimate for erosion at Park Terrace of 6m and at High Street of 12m was obtained.

Figure 11: The working map produced by Bourman

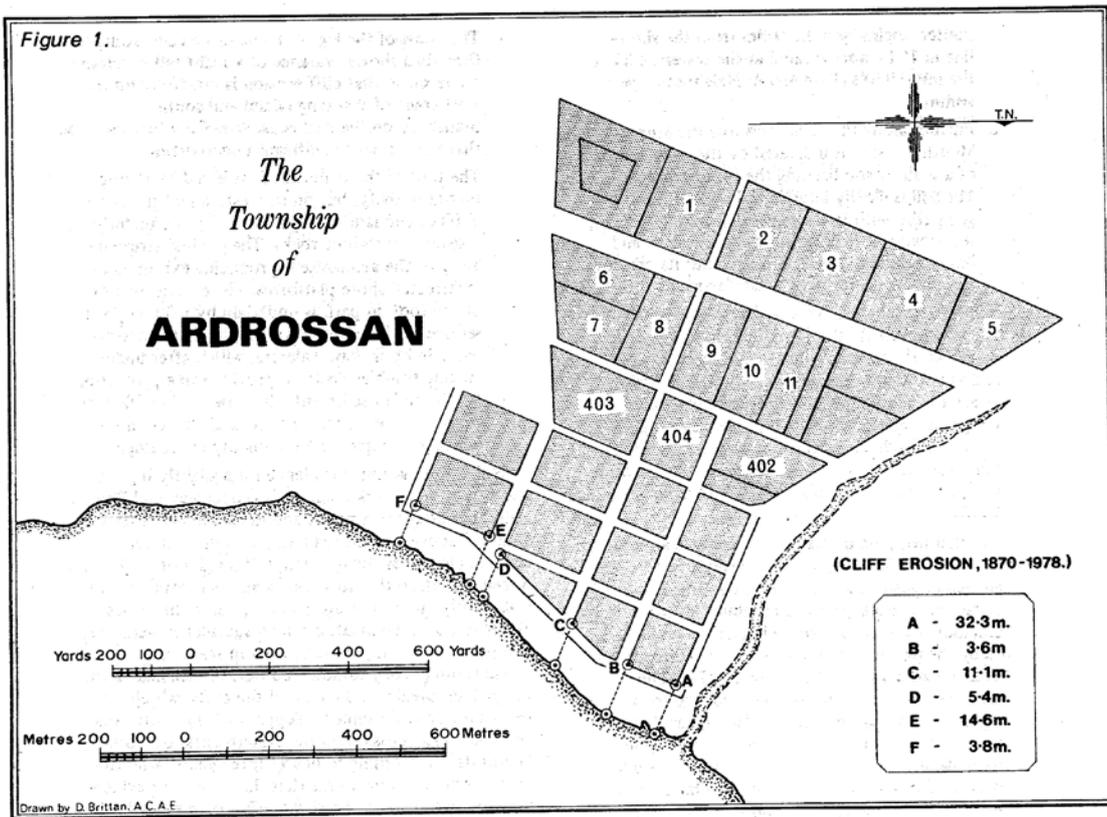
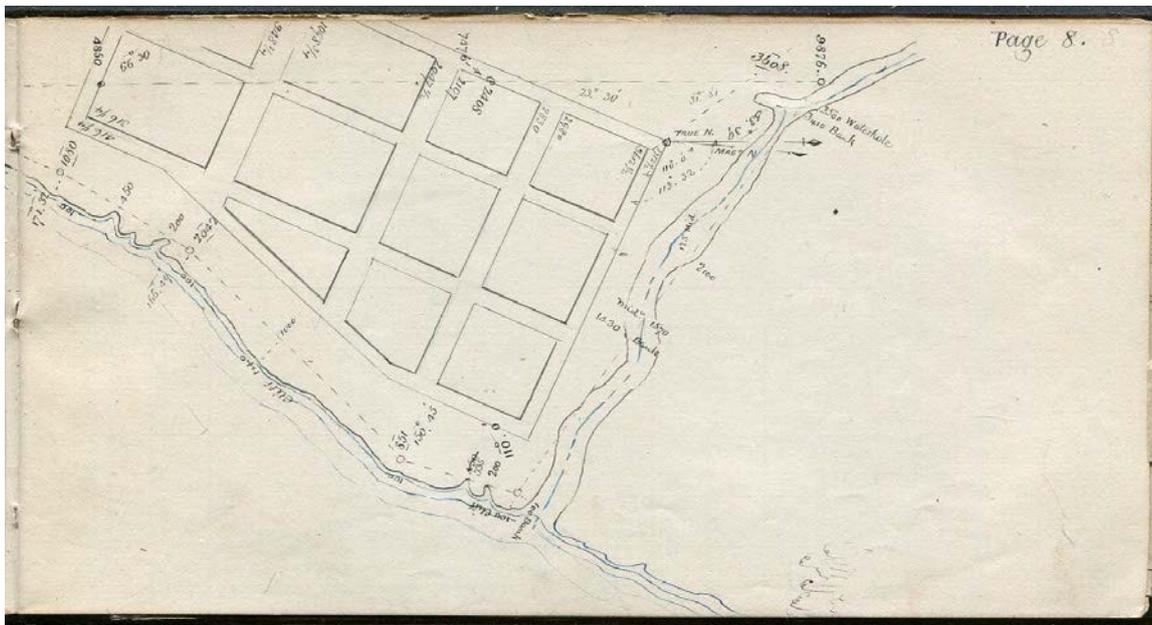


Figure 12: Page 1 of the Diagram Book for the Hd Cunningham



The calculations are based on the assumption that the roads were laid out on the ground where the surveyors intended them – almost certainly not the case, and on the accuracy of the 1872 survey plans.

Clearly without mitigation the erosion of coastal cliffs near the project site can be expected to continue and potentially even increase. Given the figures quoted above the grassland area is not expected to be affected for many years but the issue for local residents and the town generally is very significant.

There is a need to plan any infrastructure away from the cliffs. The future of the small car park and access road on the site might be an issue given it is as close as 14-15m from the cliff edge. Ensuring that heavy vehicles do not use this area would be helpful.

Strategies to delay and minimise the impacts of cliff erosion may include:

- Manage pedestrian and vehicle access to maintain a buffer from the coast
- Plant native shrubs and grasses and encourage vegetation establishment on the cliff top

5.2 Urban Development Potential

There has been recent discussion about the site as a potential area to expand development or infrastructure including a proposal for disc golf activities.

Given the restrictions on the area from an environmental perspective, promoting the site and educating the community (both local and non-local) to appreciate and value the site for its uniqueness and beauty is important for maintaining community support for the current parklands use.

Strategies to maintain support for the environmental values of the area include:

- Circulate this Plan to Council staff, Coast Protection Board and other relevant planning agencies
- Raise the profile and awareness in the community with signage, community activities, exhibitions and the like.

5.6 Community and Narungga Support and Participation

A field day open to the public was held during the development of this plan in Spring 2020. A number of local residents attended or indicated a wish to support the careful maintenance of the area. There will be significant benefits in developing active community support with volunteer weed control, replanting of weedy areas, monitoring flora and fauna on the site and the like. Further work and funding (with potential grants available from a number of sources) will be needed to make this a reality as the skills involved are not readily available. Having a trained weed control operator available to assist with community involvement would be a good step, for example. Building relationships with community organisation with expertise such as the Northern Yorke branch of Australian Plan Society or Butterfly Conservation SA will assist.

Lack of understanding and appreciation for the natural values of the site can lead to unintentional damage and hence is an important component of managing the site. Community understanding can produce wonderful results over time. The success of Ardrossan Tidy Towns over many years is a good example.

Another important component of the site is to encourage the participation of the Narungga community in the management, naming and telling of stories about the value of the site.

Strategies to improve the community perception and care of the site might include:

- Update signs to include more historical, ecological and cultural information
- Include a display on Tepper and the original Ardrossan vegetation in the Ardrossan Museum
- Encourage and facilitate volunteer activities to care for the site
- Encourage formalisation of a local community group (i.e. Friends of Park Terrace/Esplanade)
- encourage the participation of the Narungga community in the management, naming and telling of stories about the value of the site.



Photo: October 2020 field day organised by the Friends group

6 Management Aims and Goals/Targets

6.1 Aims (short & long-term vision)

Short-term Aims (1- 2yrs):

- Raise community awareness and participation in the management and care of the site
- Maintain and improve current vegetation condition by managing threats and maximising the beneficial use of slashing/mowing
- Seek Narungga participation and a Narungga name for the site.

Medium and Longer-term Aims (3-20yrs)

- Ensure the vegetation remains as a grassland reminiscent of the original vegetation of the area (as described by Tepper and others)
- Maintain the high diversity of plant species present
- Ensure no loss in the area of the grassland (seek to increase the native grass and herbaceous plant cover).
- Improve the edges of the area along roads and the stormwater drain with weed control and replanting
- Improve the appearance and environmental values of the Clay Gully area with appropriate weed control and replacement with suitable species

6.2 Management Zones

Identifying management zones within the Project Area can help communicate to managers about the location of threats and activities and help to plan future works. Figure 12 shows the Project Area divided into 7 zones based on different management requirements.

Zone 1: Grassland 1 (main diverse grassland)

This is the main area of remnant grassland which contains a high diversity of native plant species and a healthy grassland structure dominated by perennial native grass tussocks with many herbaceous native plants. As discussed previously the main management activities recommended for this zone are to alter the timing and height of the mowing/slashing events, control *Gazania*, *Galenia*, bulbs and other broadleaf weeds and minimise herbicide use on the perimeter.

Additional activities include the removal of the Aleppo Pines and seedlings in the north-west corner, and the removal of the stormwater outlet with follow-up control of weeds in the drainage line.

Disturbance and Grassland Management

Managing the grassland remnant in the long term will benefit from understanding what has changed since the first impacts of European activity. A key factor affecting the ecosystem in earlier days would have been the impact of Narungga activities which included fire, hunting, digging for root and bulb foods and moving plants/seed around.



Photo: looking east across the mown grassland area

The ecosystem functions provided by native mammals would have also influenced the ecology. Kangaroos, wallabies and their relatives along with a wide range of insects including caterpillars provided a constant grazing regime. The natural scarcity of surface water and traditional hunting kept the numbers of kangaroos, wallabies and other larger grazing animals relatively low.

Digging and scratching was a widespread activity of many animals, including mammals (e.g. bandicoots and bettongs) and birds. Making resting places, searching for food in the soil, digging burrows to hide, rest and breed would have influenced the soil and vegetation. Ants and other invertebrates living in the soil would also have been digging and mixing the soil and moving seeds around.

The result of all this activity was regular disturbance and apparently “softer” less compacted soil. The break up of the soil crust (moss, lichens and other tiny plants and decaying matter), in the absence of weeds, would have helped light hit the ground which was a key factor in the germination and growth of small plants such as some daisies and small herbs, particularly annual species.

Many of these activities no longer occur or occur to a lesser extent. Other factors have been introduced especially many weeds, but also spraying and slashing. In many ways slashing is a substitute for grazing in keeping the canopy open. Slashing is fairly effective in managing upright weeds but over time benefits prostrate weeds such as Galenia, Wireweed and Couch Grass and adaptable weeds such as soursob. Slashing is less effective as a substitute for fire so there may be potential for small scale patch burning activities such as Adelaide City Council is planning in their parklands with Kurna people. Consultation with locals would need to happen for this to occur.

The most vulnerable native species are often annual species which can be wiped out by weeds taking away sunlight and crowding out the space between the perennial species such as grasses and irongrasses. Of interest there are 3 annual daisy species still present on the site: *Asteridea athrixioides* (Wirewort); *Elachanthus pusillus* (Elachanth); and *Isoetopsis graminifolia* (Grass Cushion). There are quite a few annual species which were in Tepper’s records from 1880 and these are in the list of priority species for revegetation (Appendix 1).

The other species that disappear from grasslands are low to the ground species such as most *Drosera* species (sundews), *Calandrinia* spp. and orchids. These are most vulnerable to being shaded out by weeds or even rotted out by weeds covering them and the moisture level being high for long periods. Soursobs seem particularly good at this form of competition. Many of these species are also on the missing list with potential to be re-established (Appendix 1).

Unfortunately many of these missing species are also hard to re-establish so considerable expertise would need to be applied to finding seed or propagation material and producing plants in quantities to produce viable populations.

Zone 2: Fenced Enclosure

The fenced enclosure was created by the State Government environment agencies some years ago in recognition that the Park Terrace parkland contained a high diversity of native plant species.

Since it was fenced and excluded from the mowing regime the shrub vegetation has become more significant along with weed issues. The shrubs that have become dominant include *Pommaderris paniculosa* ssp., *Dodonaea baueri* and *Acrotriche patula*.

In response to recent dry seasons there has been quite a bit of dieback of these shrubs and some pruning may be considered as a way to improve growth.

Wards weed, *Gazania* and several bulbous weeds have become a serious issue in this Zone and will require labour-intensive control over the coming years. A couple of native *Senna* plants have appeared in recent years and these will likely have spread from seed introduced by birds from nearby gardens. The plants produce heavy seed loads and can rapidly change the nature of the area to a *Senna* shrubland. While they are native Australian plants they are not considered desirable in the grassland and should be removed as part of weed control activities.



Photo: Eastern side of the fenced enclosure showing shrubs (*Eremophila glabra* ssp. in the foreground)

Zone 3: Grassland 2 (cliff top)

This narrow strip along the cliff top contains similar grassland vegetation to the main site but with a lower diversity of plant species and a higher cover of weeds. The management regime is currently the same as the other site but due to the lower diversity this part of the grassland may require additional weed control activities and potentially revegetation in order to improve its condition.

Improving the condition can be approached through a 3-step process over a 3-5 year period:

- Step 1: Control broadleaf weeds to free up space for grass establishment (suggest a spot spray method – avoid boom sprays which will kill native herbs)
- Step 2: Manage the grassland to favour native grasses over annual weed grasses (use a similar mowing regime as the main grassland)
- Select characteristic grasses and native herbs (or unusual / threatened species) for revegetation to improve diversity.

Over time the grassland should stabilise with native tussock grasses as the dominant plants. Table xx and Appendix 1 contain a range of native herbs that could be used in revegetation.



Photo: Area between the Esplanade and the coast

Zone 4: Clay Gully

The early drawings, photos and descriptions of Clay Gully show that it was originally part of the open grassland country of Ardrossan. Local residents and township groups have planted the creekline with a range of local and non-local native plants including River Red Gum (*Eucalyptus camaldulensis* ssp. *camaldulensis*), Mallee Box (*Eucalyptus porosa*) and a range of native wattles, senna and other shrubs. This area has a similar diversity of native species as the other zones with 40 species recorded, almost all on the northern bank, west of the wooden bridge across the gully.

Remnant patches of *Lomandra effusa* and *Dianella revoluta* remain and species such as Kangaroo Grass (*Themeda triandra*), Bulbine Lily (*Bulbine bulbosa*), Short-stem Flax Lily (*Dianella brevicaulis*), Nodding Vanilla-lily (*Arthropodium strictum*), and Fuzzy New Holland Daisy (*Vittadinia* spp.) have only been recorded in this zone. A couple of the shrub species present, Seabox (*Alyxia buxifolia*) and Nitrebush (*Nitraria billardierei*) appear to be remnants dating back to the formation of the town.

Over time the creek bed has become weedy with large areas covered by Kikuyu and a range of herbaceous and grassy weeds. Serious environmental weeds such as African Boxthorn and Bridal Creeper occur and require control under legislation. Other woody weeds such as Pepper Tree are also found in the creek.

The creekline could be enhanced by the removal of woody weeds, Bridal Creeper and Kikuyu, and there is potential for some revegetation of locally indigenous semi-aquatic sedges.



Photo: Eastern end of Clay Gully showing planted trees and shrubs with Bridal Creeper in the foreground

Zone 5: Coastal Cliffs

The coastal cliffs are fenced from the remainder of the Project Area. The narrow strip between the fence and the cliffs contains a range of native shrubs and weeds. While the strip is not part of the remaining grassland, it is a location where revegetation with native shrubs could be used to help stabilise the erodible cliff tops to provide some level of protection for the grassland in the future..

Zone 6: Carpark and Road

The carpark and road are infrastructure features which are maintained by the Yorke Peninsula Council. While this zone has no natural value, it does serve as a key visible location for signs and information for the public and the Walk the Yorke trail does pass through..

Zone 7: Corner Flat

This is a small area which is quite separate to the remnant grassland and has little conservation value. However, this area could be a future site for revegetation to compliment the biodiversity values of the remainder of the Project Area. It is an easily accessed public area which could in part be used for a display garden of Ardrossan native species suited to local gardens.

Figure 12: Management Zones

Ardrossan Grassland Management Zones



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Management Zones

-  Zone 1: Grassland 1
-  Zone 2: Fenced Enclosure
-  Zone 3: Grassland 2
-  Zone 4: Clay Gully
-  Zone 5: Coastal Cliff
-  Zone 6: Carpark and Road
-  Zone 7: Corner Flat



Produced by Greening Australia
Data Source: ESRI online,
Greening Australia.

6.3 Summary of Management Recommendations

Table 6: Summary of Management Recommendations for the Ardrossan Native Grassland

ACTIVITY	ZONE / LOCATION	TIMING COMMENTS	POTENTIAL CONTRIBUTORS
Weed Control			
Gazania, Galenia, introduced bulb and other broadleaf weed control by digging or herbicide spot spray.	Zone 1, Zone 2, Zone 3 and Zone 4 (north bank). Work from least dense areas toward the most dense	On-going. Start immediately. Winter or Spring while soil is moist	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Intensive Wards Weed control (hand weeding)	Zone 2 starting from least dense areas	Start immediately. Spring	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Intensive broadleaf weed control (hand-weeding or broadleaf herbicide control)	Zone 1 along the shallow stormwater channel.	Following removal of the outlet. Winter/Spring	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Remove succulents and garden escapes	Zone 1 beneath the Mallee Box trees	All year.	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
WoNS and woody weed removal (e.g. Boxthorn, Bridal Creeper, Pepper Tree)	Zone 4 in Clay Gully.	Autumn, Winter, Spring	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Aleppo Pine removal	Zone 1, north west corner	All year	YP Council, volunteers Friends of Park Tce Grassland
Mowing and Slashing Regime			
Alter timing of slashing	Zone 1 and Zone 3	Late Winter and late Spring/early Summer. Trigger for slashing should be based on the plant growth stage.	YP Council
Alter the height of the mower blade to approximately 10cm	Zone 1 and Zone 3	As soon as possible	YP Council
Train Council operations staff in native grassland management	n/a	As soon as possible	YP Council, local experts, NGOs
Stormwater Diversion			
Community to submit a formal request to remove the stormwater outlet	n/a	As soon as possible	Friends of Park Tce Grassland, Ardrossan Progress Association, local residents

Council to divert the stormwater into existing subterranean drainage network	Zone 1	As soon as possible	YP Council
Pedestrian Access Management			
Install information signs and strategically placed infrastructure and /or revegetation to help direct pedestrians to formal access points	Zone 1 and Zone 3	All year. Within 1 – 2 years	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Cliff-top Erosion			
Encourage vegetation establishment and where suitable revegetate with perennial shrubs to stabilise erodible cliff top	Zone 5	Winter. Low urgency - 1- 3 years	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Urban Development			
Circulate this Plan to Council staff, Coast Protection Board and other relevant planning agencies	n/a	Short and long-term	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Raise the profile and awareness in the community.	n/a	Short and long-term	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Community and Narungga Participation			
Install signs: Update signs to include more historical, ecological and cultural information	Zone 1, Zone 2, Zone 3, Zone 4	All year. 1-2 years.	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Plant identification signs. Modern technology with Q codes and mobile phone apps provides ready opportunities to provide information on the site generally and individual plant species.	All Zones	Medium term	Friends group, YP Council, Landscape Board
Include a display on Tepper and the original Ardrossan vegetation in the Ardrossan Museum	n/a	1-3 years. Low urgency	Ardrossan Museum Volunteers, Friends of Park Tce Grassland, Ardrossan Progress Association, Narungga
Encourage and facilitate volunteer activities / events to care for the site	n/a	All year. 1 – 2 years	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board
Encourage the participation of the Narungga community in the management, naming and telling of stories about the value of the site.	n/a	Short-term	Volunteers, Friends of Park Tce Grassland, YP Council, N&Y Landscape Board

7 Monitoring and Adaptive Management

Monitoring is a broad term which can be applied in a variety of ways. For this site an appropriate monitoring program could include:

- Repeated photopoint monitoring for general site condition (annual repeated photos)
- Regular observations to identify weed control requirements
- Survey for insects and birds to add to the biodiversity inventory of the site (opportunity to involve volunteers and community)
- Cliff recession along the coast immediately adjacent to the site
- Management effectiveness: ensure changes to the mowing management regime are having the desired impact by:
 - Repeated plot (quadrat or transect) monitoring to assess species diversity and grass tussock densities.

8 Volunteering and the Role of Community

Given the proximity of the Ardrossan Native Grassland to the township and residents of Ardrossan, the site offers an great opportunity to raise awareness, engender a caring attitude to the native plants and animals and involve people in the management through volunteering activities and educational events.

Such a program could include:

- The formation of the Friends of Ardrossan Native Grassland
- Volunteer weeding and planting events
- Schools education and planting events
- An ongoing digital presence to record the history of the area and provide community education and engagement.

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Appendix 1: Grassland-Associated Species Suitable to Re-establish in the Ardrossan Grasslands

(compiled by Adrian Shackley)

SPECIES	COMMONNAME	AUS	SA	NY	Derivation	Tepper 1880 article name, location
<i>Actinobole uliginosum</i>	Flannel Actinobole			LC	Tepper, Tate etc ALA ref	Gnaphalodes uliginosum, A. Gray. G.
<i>Amphibromus nervosus</i>	Veined Swamp Wallaby-grass			VU	Tepper, Tate etc ALA ref	Danthonia nervosa, J. Hooker. Yorke Valley, T.
<i>Amphipogon caricinus</i> <i>var. caricinus</i>	Long Grey-beard Grass			RA	Tepper, Tate etc ALA ref	Amphipogon strictus, R. Brown. Coast and T. ? Sp
<i>Anthosachne scabra</i>	Native Wheat-grass			LC	Tepper, Tate etc ALA ref	Agropyrum scabrum, Beauvois. G.
<i>Arthropodium minus</i>	Small Vanilla-lily			NT	Tepper, Tate etc ALA ref	Arthropodium minus, R. Brown. G.
<i>Astroloma humifusum</i>	Cranberry Heath			NT	Tepper, Tate etc ALA ref	Styphelia humifusa, Labillardiere. T. & P.
<i>Austrostipa nitida</i>	Balcarra Spear-grass			LC	Tepper, Tate etc ALA ref	
<i>Austrostipa scabra ssp.</i> <i>falcata</i>	Slender Spear-grass			LC	Tepper, Tate etc ALA ref	Stipa scabra, Lindley. G.
<i>Austrostipa scabra ssp.</i> <i>scabra</i>	Rough Spear-grass			LC	Tepper, Tate etc ALA ref	Stipa scabra, Lindley. G.
<i>Brachyscome ciliaris</i> <i>var. ciliaris</i>	Variable Daisy			LC	Tepper, Tate etc ALA ref	Brachycome ciliaris, Leasing. Coast, T.
<i>Brachyscome exilis</i>	Slender Daisy			LC	Tepper, Tate etc ALA ref	
<i>Bromus arenarius</i>	Sand Brome			NT	Tepper, Tate etc ALA ref	Bromus arenarius, Labillardiere. G.
<i>Bulbine semibarbata</i>	Small Leek-lily			RA	Tepper, Tate etc ALA ref	Bulbine semibarbata, Haworth. Yorke Valley, P.
<i>Caladenia latifolia</i>	Pink Caladenia			VU	Tepper, Tate etc ALA ref	Caladenia Patersoni, R. Brown. G., open ground,
<i>Caladenia sanguinea</i>	Crimson Daddy-long- legs		R	CR	Tepper, Tate etc ALA ref	
<i>Calandrinia eremaea</i>	Dryland Purslane			LC	Tepper, Tate etc ALA ref	Claytonia pusilla, F. M. Muloowurtie, C.

<i>Calandrinia granulifera</i>	Pigmy Purslane			RA	Tepper, Tate etc ALA ref	Claytonia pygmaea F. M. Muloowurtie, P.
<i>Calandrinia pygmaea</i>					Tepper, Tate etc ALA ref	Claytonia pygmaea F. M. Muloowurtie, P.
<i>Calostemma purpureum</i>	Pink Garland-lily			NT	Tepper, Tate etc ALA ref	Calostemma purpureum, R. Brown.
<i>Centipeda cunninghamii</i>	Common Sneezeweed			NE	Tepper, Tate etc ALA ref	Centipeda Cunninghami, F. M. T. and P.
<i>Centrolepis polygyna</i>	Wiry Centrolepis			NT	Tepper, Tate etc ALA ref	not in
<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern			LC	ALA other c Ard	Cheilanthes austrotenuifolia, Swartz. G.
<i>Cheilanthes distans</i>	Bristly Cloak-fern			LC	Tepper, Tate etc ALA ref	Cheilanthes distans, R. Brown.
<i>Chenopodium desertorum ssp. microphyllum</i>	Small-leaf Goosefoot			LC	Tepper, Tate etc ALA ref	Chenopodium microphyllum, F. M. P.
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting			LC	Tepper, Tate etc ALA ref	Helichrysum semipapposum, De Candolle. G.
<i>Corunastylis tepperi</i>					Tepper, Tate etc ALA ref	
<i>Cotula australis</i>	Common Cotula			NT	Tepper, Tate etc ALA ref	
<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue			RA	Tepper, Tate etc ALA ref	Cynoglossum suaveolens, R. Brown. Yorke Valley, T. and P.
<i>Cyrtostylis robusta</i>	Robust Gnat-orchid			RA	Tepper, Tate etc ALA ref	
<i>Dichelachne crinita</i>	Long-hair Plume-grass			NT	Tepper, Tate etc ALA ref	Dichelachne crinita, J. Hooker. T.
<i>Drosera glanduligera</i>	Scarlet Sundew			VU	Tepper, Tate etc ALA ref	Drosera glanduligera, Lehmann. T.
<i>Drosera macrantha ssp. planchonii</i>	Climbing Sundew			RA	Tepper, Tate etc ALA ref	Drosera Menziesii, R. Brown. Coast and T.
<i>Dysphania pumilio</i>	Small Crumbweed			LC	ALA other c Ard	
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			LC	Tepper, Tate etc ALA ref	Rhagodia nutans, R. Brown. G.

<i>Erodium crinitum</i>	Blue Heron's-bill			LC	Tepper, Tate etc ALA ref	<i>Erodium cygnorum</i> , Nees. G. maybe ?
<i>Euphorbia dallachyana</i>					Tepper, Tate etc ALA ref	<i>Euphorbia</i> <i>Drummondii</i> , Boissier. Open low ground, G.
<i>Geococcus pusillus</i>	Earth Cress			NT	Tepper, Tate etc ALA ref	<i>Geococcus pusillus</i> , Drummond and Harvey. C.
<i>Geranium retrorsum</i>	Grassland Geranium			NT	Tepper, Tate etc ALA ref	only <i>Geranium</i> <i>dissectum</i> ?? Weed
<i>Glycine rubiginosa</i>	Twining Glycine			NT	Tepper, Tate etc ALA ref	<i>Glycine clandestina</i> , Wendland. G.
<i>Goodenia varia</i>	Sticky Goodenia			RA	Tepper, Tate etc ALA ref	
<i>Halgania cyanea</i>	Rough Blue-flower			NT	Tepper, Tate etc ALA ref	<i>Halgania cyanea</i> , Lindley. Yorke Valley, P.
<i>Helichrysum luteoalbum</i>	Jersey Cudweed			LC	Tepper, Tate etc ALA ref	
<i>Hyalosperma glutinosum ssp. glutinosum</i>	Golden Sunray			LC	Tepper, Tate etc ALA ref	<i>Helipterum</i> <i>hyalospermum</i> , F. M. Coast.
<i>Hyalosperma semisterile</i>	Orange Sunray			LC	Tepper, Tate etc ALA ref	
<i>Isolepis marginata</i>	Little Club-rush			LC	Tepper, Tate etc ALA ref	<i>Scirpus cartilagineus</i> , Sprengel. G., prefers burnt ground.
<i>Kennedia prostrata</i>	Scarlet Runner			NT	Tepper, Tate etc ALA ref	<i>Kennedyia prostrata</i> , R. Brown. Coast and T.
<i>Lachnagrostis filiformis (NC)</i>	Common Blown-grass			NT	Tepper, Tate etc ALA ref	<i>Agrostis Solander</i> , F. M. G. ?? Name
<i>Lachnagrostis filiformis (NC)</i>	Common Blown-grass			NT	Tepper, Tate etc ALA ref	<i>Agrostis Solander</i> , F. M. G. ?? Name
<i>Leptorhynchus tetrachaetus</i>	Little Buttons			LC	Tepper, Tate etc ALA ref	<i>Leptorrhynchus</i> <i>pulchellus</i> , F. M. G. open ground,
<i>Leptorhynchus waitzia</i>	Button Immortelle			NT	Tepper, Tate etc ALA ref	<i>Leptorrhynchus</i> <i>Waitzia</i> , Sonder. P.
<i>Levenhookia dubia</i>	Hairy Stylewort			NT	Tepper, Tate etc ALA ref	<i>Leeuwenhoekia dubia</i> , Sonder. Coast.

<i>Lobelia gibbosa (NC)</i>	Tall Lobelia			VU	Tepper, Tate etc ALA ref	<i>Lobelia microsperma</i> , F. M. Ardrossan, G.
<i>Lotus australis</i>	Austral Trefoil			RA	Tepper, Tate etc ALA ref	<i>Lotus australis</i> , Seringe. Coast.
<i>Lotus cruentus</i>	Red-flower Lotus			LC	Tepper, Tate etc ALA ref	<i>Lotus australis</i> , var., Behriana. P hills.
<i>Malva preissiana</i>	Australian Hollyhock			RA	Tepper, Tate etc ALA ref	<i>Lavatera plebeia</i> , Sims. Coast and T.
<i>Microseris lanceolata</i>	Yam Daisy			RA	Tepper, Tate etc ALA ref	<i>Microseris Forsteri</i> , J. Hooker. Coast.
<i>Microtis arenaria</i>	Onion Orchid				Tepper, Tate etc ALA ref	<i>Microtis porrifolia</i> , R. Brown. Coast and T.
<i>Millotia muelleri</i>	Common Bow-flower			RA	Tepper, Tate etc ALA ref	<i>Toxanthus perpusillus</i> , Turcz. G. ?? Sp
<i>Minuria cunninghamii</i>	Bush Minuria			LC	Tepper, Tate etc ALA ref	<i>Minuria Cunninghami</i> , Bentham. Coast.
<i>Myoporum parvifolium</i>	Creeping Boobialla		R	RA	Tepper, Tate etc ALA ref	<i>Myoporum parvifolium</i> , R. Brown. Coast.
<i>Opercularia turpis</i>	Twiggy Stinkweed			NT	Tepper, Tate etc ALA ref	<i>Opercularia varia</i> , J. Hooker. G. ?? Sp
<i>Ophioglossum lusitanicum</i>	Austral Adder's- tongue			LC	Tepper, Tate etc ALA ref	<i>Ophioglossum vulgatum</i> , Linne. Coast.
<i>Pelargonium littorale</i>	Native Pelargonium			NT	Tepper, Tate etc ALA ref	only <i>P. australe</i>
<i>Pheladenia deformis</i>	Bluebeard Orchid			RA	Tepper, Tate etc ALA ref	<i>Caladenia deformis</i> , R. Brown. Coast and T.
<i>Pimelea curviflora var. sericea</i>	Curved Riceflower			VU	Tepper, Tate etc ALA ref	<i>Pimelea curviflora</i> , R. Brown. Coast and T.
<i>Plantago gaudichaudii</i>	Narrow-leaf Plantain			NT	Tepper, Tate etc ALA ref	
<i>Poa crassicaudex</i>	Thick-stem Tussock- grass			RA	Tepper, Tate etc ALA ref	
<i>Poa fax</i>	Scaly Poa		R	RA	Tepper, Tate etc ALA ref	<i>Poa lepida</i> , F. M. Coast.
<i>Podolepis canescens</i>	Grey Copper-wire Daisy			NT	Tepper, Tate etc ALA ref	<i>Podolepis canescens</i> , A. Cunningham. T. and P.

<i>Podolepis rugata</i> var. <i>rugata</i>	Pleated Copper-wire Daisy			RA	Tepper, Tate etc ALA ref	<i>Podolepis rugata</i> , Labillardiere. P.
<i>Podolepis tepperi</i>	Delicate Copper-wire Daisy			NT	Tepper, Tate etc ALA ref	possibly <i>Podolepis</i> <i>Lessoni</i> , Bentham. Coast.
<i>Pogonolepis muelleriana</i>	Stiff Cup-flower			LC	Tepper, Tate etc ALA ref	
<i>Prasophyllum occidentale</i>	Plains Leek-orchid			VU	Tepper, Tate etc ALA ref	only lists <i>Prasophyllum</i> <i>patens</i> , R. Brown. G.
<i>Prasophyllum odoratum</i>					Tepper, Tate etc ALA ref	only lists <i>Prasophyllum</i> <i>patens</i> , R. Brown. G.
<i>Pterostylis biseta</i> (NC)	Two-bristle Greenhood			VU	Tepper, Tate etc ALA ref	Only <i>P. longifolia</i> listed
<i>Pterostylis robusta</i>	Large Shell-orchid			RA	Tepper, Tate etc ALA ref	Only <i>P. longifolia</i> listed
<i>Pterostylis sanguinea</i>	Blood Greenhood			RA	Tepper, Tate etc ALA ref	Only <i>P. longifolia</i> listed
<i>Pyrorchis nigricans</i>	Black Fire-orchid			EN	Tepper, Tate etc ALA ref	<i>Lyperanthus nigricans</i> , R. Br. Maitland sandhills, T.
<i>Ranunculus sessiliflorus</i> var. <i>pilulifer</i>	Annual Buttercup			EN	Tepper, Tate etc ALA ref	<i>Ranunculus</i> <i>parviflorus</i> , Linne. P.
<i>Rhodanthe pygmaea</i>	Pigmy Daisy			LC	Tepper, Tate etc ALA ref	<i>Helipterum</i> <i>pygmaeum</i> , F. M. Coast.
<i>Roepera crenata</i>	Notched Twinleaf			NT	Tepper, Tate etc ALA ref	<i>Zygophyllum</i> <i>crenatum</i> , F. M. Coast and T.
<i>Rytidosperma erianthum</i>	Hill Wallaby-grass			NT	Tepper, Tate etc ALA ref	only <i>Danthonia</i> <i>penicillata</i> , F. M. G.
<i>Rytidosperma setaceum</i>	Small-flower Wallaby-grass			LC	Tepper, Tate etc ALA ref	only <i>Danthonia</i> <i>penicillata</i> , F. M. G.
<i>Sebaea ovata</i>	Yellow Sebaea			NT	Tepper, Tate etc ALA ref	<i>Sebaea ovata</i> , R. Brown. Coast.
<i>Senecio macrocarpus</i>	Large-fruit Groundsel	VU	V	CR	Tepper, Tate etc ALA ref	
<i>Senecio quadridentatus</i>	Cotton Groundsel			LC	Tepper, Tate etc ALA ref	<i>Senecio lautus</i> , Forster. Coast.
<i>Stackhousia subterranea</i>					ALA other c Ard	<i>Stackhousia linarifolia</i> , Cunningham. Coast and T.

<i>Stenanthemum leucophractum</i>	White Cryptandra			VU	Tepper, Tate etc ALA ref	
<i>Stenopetalum sphaerocarpum</i>	Round-fruit Thread-petal			RE	Tepper, Tate etc ALA ref	Stenopetalum sphaerocarpum, F. M. Coast.
<i>Swainsona fuscoviridis</i>	Dark Green Swainson-pea		R	EN	Tepper, Tate etc ALA ref	
<i>Teucrium racemosum</i>	Grey Germander			LC	Tepper, Tate etc ALA ref	Teucrium racemosum, R. Brown. P.
<i>Thelymitra antennifera</i>	Lemon Sun-orchid			EN	Tepper, Tate etc ALA ref	Thelymitra antennifera, J. Hooker. P.
<i>Threlkeldia diffusa</i>	Coast Bonefruit			NT	ALA other c Ard	
<i>Thysanotus patersonii</i>	Twining Fringe-lily			LC	ALA other c Ard	Thysanotus Patersoni, R. Brown. Coast and T.
<i>Wahlenbergia luteola</i>	Yellow-wash Bluebell			LC	ALA other c Ard	

Appendix 2: Photographic and other records related to the site.

In addition to the 1907 photo above, we have been able to obtain quite a few photos showing the site over the years.



Photo in Ardrossan Bakery – Pre 1920?



Photo in Ardrossan Bakery – Late 1920s?



NTSA Ardrossan Museum photo. Parklands above cliffs on S side of Clay Gully – late 1920s?



[General description] A few pedestrians and a horse and cart meander along the unsealed road winding uphill into the township of Ardrossan. The Royal Oak Hotel can be seen on top of the hill. Other buildings seen on the left display large advertisements for Fry's Cocoa, Lion Flour, Burford's candles and soap and Robur Tea. [On back of photograph] 'Ardrossan / Jan 1928 / Reproduced in the "Chronicle" for Jan. 28, State Library 1928.'



1937 courtesy of Coast Protection Board. SLSA B 7234. Clay Gully area low grassland. Vegetation features Clay Gully devoid of significant trees and shrubs. Cemetery and other area of remnant mallee woodland (now part of Golf Course) on west side of town. Close-up of Clay Gully below.





1945 aerial photograph. Caravan Park area has tree planting in creekline and across the whole caravan park area. Close-up also shows young plantings in the Jetty Rd/Bridge Rd/Clay Gull triangle and in the creekline just east of Bridge Rd.



1946. courtesy of Coast Protection Board Shows tree planting in Caravan Park area. Before much housing development on Park Terrace, Esplanade. No tree planting in the site parklands area.



1977 Clay Gully north bank near coast – Tussock grass vegetation above erosion line. Courtesy of Coast Protection Board



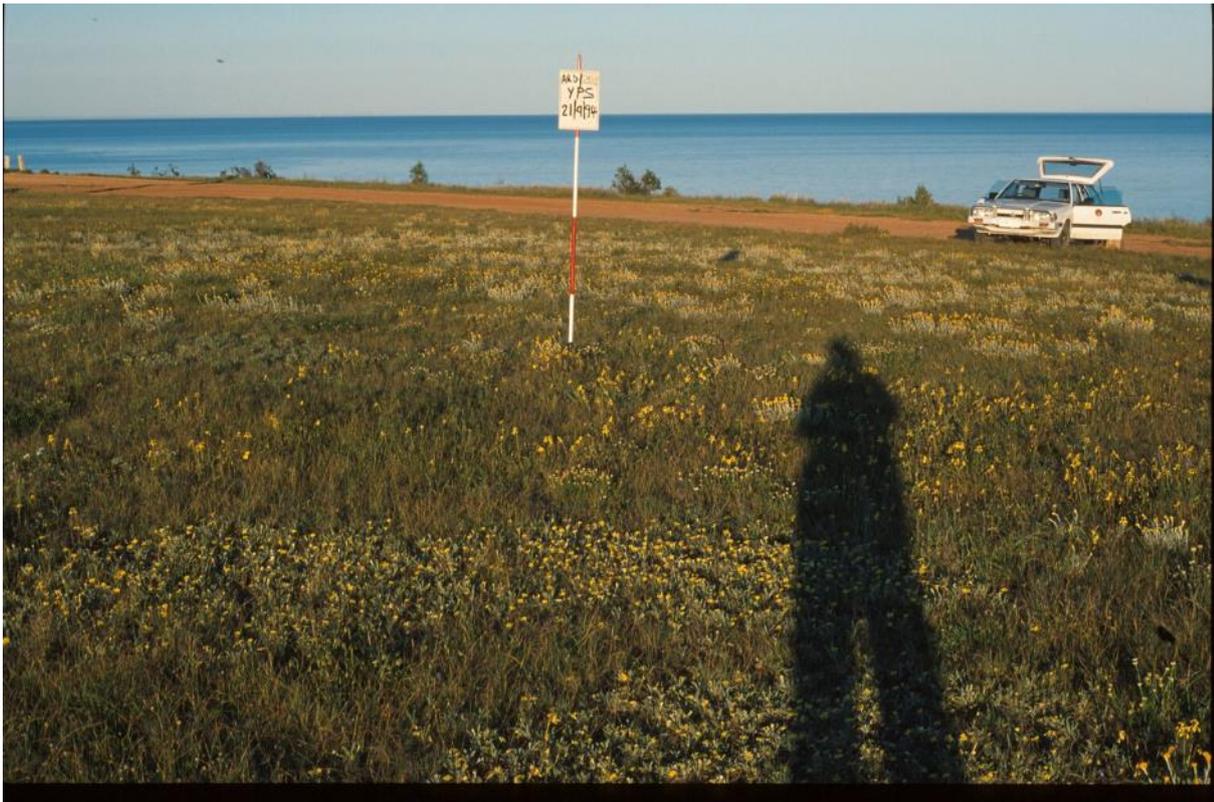
1978 same bank – walkway construction underway. Courtesy of Coast Protection Board



1978 Ardrossan coastal area adjacent cliffs – showing informal carpark prior to construction of sealed carpark. Typical open grassy system with bluish Everlasting daisies also showing up. Courtesy of Coast Protection Board



1983 view across park lands to Park Terrace. Young pine trees and small eucalypt plantings in park. Courtesy of Coast Protection Board



September 1994 Biological Survey site photopoint looking towards coast. Courtesy of Department of Environment and Water



*September 1994 Biological Survey photo of *Minuria*, *Velleia*, *Chrysocephalum* and other flowering natives. Beautiful "wildflower meadow". Courtesy of Department of Environment and Water*



September 1997 view across park. Podolepis decipiens daisy with tall flower stems in centre. Courtesy of Department of Environment and Water



August 2020 Sonia and Tim Croft site assessment photo. Low slashing reducing plant cover.



October 2020 after about 2 months with no slashing. Endangered *Leptorhynchos elongatus* single upright cream coloured flower near centre outside fenced area. *Goodenia willisiana* yellow flower.



October 2020 view of part of fenced area with low shrubs and slashed area in background.

**Appendix 3: Butterfly Species and their Food Plants Potentially Using the Vegetation in the Project Site
(Caton B et. al. 2006 Conservation Assessment of the Northern and Yorke Coast NY NRM Board)**

		Common name	Conservation rating Grund
<i>Austrodanthonia caespitosa</i>	<i>Anisynta cynone gracilis 1</i>	Cynone Grass-skipper	R
<i>Austrodanthonia spp</i>	<i>Anisynta cynone gracilis 1</i>	Cynone Grass-skipper	R
<i>Austrostipa eremophila</i>	<i>Herimosa albovenata albovenata 1</i>	White-veined Grass-skipper	V
<i>Austrostipa scabra ssp. scabra</i>	<i>Herimosa albovenata albovenata 1</i>	White-veined Grass-skipper	V
	<i>Anisynta cynone gracilis</i>	Cynone Grass-skipper	R
<i>Austrostipa scabra ssp. falcata</i>	<i>Herimosa albovenata albovenata 1</i>	White-veined Grass-skipper	V
<i>Austrostipa semibarbata</i>	<i>Herimosa albovenata albovenata 1</i>	White-veined Grass-skipper	V
<i>Eremophila deserti</i>	<i>Candalides heathi heathi 1</i>	Rayed Blue	R
<i>Eremophila longifolia</i>	<i>Candalides heathi heathi 1</i>	Rayed Blue	R
<i>Gahnia deusta</i>	<i>Antipodia atralba</i>	Black and White Sedge-skipper	R
	<i>Hesperilla chrysotricha cyclospila</i>	Chrysotricha Sedge-skipper	V
	<i>Hesperilla donnysa donnysa - form flavescens 3</i>	intermediate forms Donnysa Sedge-skipper	L
<i>Gahnia lanigera</i>	<i>Antipodia atralba</i>	Black and White Sedge-skipper	R
<i>Lepidosperma concavum</i>	<i>Motasingha trimaculata trimaculata 1</i>	Dingy four-spot Sedge-skipper	R
<i>Lomandra densiflora</i>	<i>Trapezites luteus luteus 1</i>	Rare White-spot Rush-skipper	V
<i>Lomandra filiformis ssp. coriacea</i>	<i>Trapezites luteus luteus 1</i>	Rare White-spot Rush-skipper	V
<i>Lomandra longifolia</i>	<i>Trapezites luteus luteus 1</i>	Rare White-spot Rush-skipper	V
<i>Lomandra multiflora ssp. dura</i>	<i>Trapezites luteus luteus 1</i>	Rare White-spot Rush-skipper	V
<i>Oxalis perennans</i>	<i>Lucia limbaria 1</i>	Small Copper	R
<i>Pimelea sp.</i>	<i>Candalides heathi heathi</i>	Rayed Blue	R

