

**BETTER HERITAGE INFORMATION
SUMMARY OF STATE HERITAGE PLACE
Red Cliff Point Geological Site**



Red Cliff Point Geological Site SHP 14817, 2025.

Source: Google Earth 2025.

ENTRY IN THE REGISTER

Description or notes with respect to a place entered in the South Australian Heritage Register in accordance with either the *South Australian Heritage Act 1978* or the *Heritage Places Act 1993*.

The South Australian Heritage Council may correct errors or inaccuracies in the Entry in the Register in accordance with s21 of the *Heritage Places Act 1993*.

NAME: Red Cliff Point, Winninowie Conservation Park **PLACE NO.:** 14817
(original)
Red Cliff Point Geological Site (proposed)

ADDRESS: 998 Chinaman Creek Road, Miranda & Winninowie SA 5700
Upper Spencer Gulf Marine Park & Winninowie Conservation Park
Hundred of Winninowie & Davenport
CR 5751/469 H331200 S206, CR 5751/469 H331200 S210, CR 5751/469
D31611 A50, CR 5751/469 D22473 A307, CT 0000/0000 H331200 PUBLIC
ROAD

CONFIRMED IN THE SOUTH AUSTRALIAN HERITAGE REGISTER:

9 October 1997

DESIGNATED AS A PLACE OF GEOLOGICAL SIGNIFICANCE:

10 April 1997

S16 CRITERIA SATISFIED UNDER HERITAGE PLACES ACT 1993

(b) it has rare, uncommon or endangered qualities that are of cultural significance

(c) it may yield information that will contribute to an understanding of the State's history, including its natural history

COMMENTARY ON THE LISTING

Additional information provided as a part of the content of the South Australian Heritage Register in accordance with s14(6) of the *Heritage Places Act 1993* 'hold information in association with the Register'.

KNOWN AS: Red Cliff Point, Winninowie Conservation Park [including adjacent seabed, sand and seagrass banks] [Designated as a place of geological significance]

ADDRESS Nukunu Country

STATEMENT OF HERITAGE SIGNIFICANCE

This is the finest example of several coastal and marine systems, involving interaction of biological and geological processes in an arid-temperate climate. Distinctive seagrass banks of *Posidonia australis* that fringe the coastline have been the major contributor to carbonate deposition during the Late Holocene. The large tidal range makes this area unique in southern Australia. Highly significant for sea level studies and interaction of biological and geological processes.

Validated 22 February 2000

STATEMENT OF HERITAGE SIGNIFICANCE (Proposed)

The coastal section of Red Cliff Point Geological Site demonstrates a succession of uncommon arid-temperate depositional environments and changing sea levels throughout the past 7-1.6 thousand years. The location provides a sheltered environment allowing for sediments to be almost entirely tidally dominated so that sea levels, kept in place mostly through clumped sands and seagrass in bioherms, are exceptionally well preserved and can be traced over thousands of years. As a result, Red Cliff Point Geological Site contains some of the best and rarest examples of Holocene, non-tropical bioherms in the world. Red Cliff Point Geological Site is a single, high-quality locality that affords an excellent opportunity to research preserved depositional environments and sea levels which continue to develop in the modern day.

STATEMENT OF DESIGNATION (Proposed)

Designated Place of Geological Significance

Red Cliff Point Geological Site preserves sedimentary layers of Holocene-aged seagrasses that demonstrate previous sea levels over the last 7-1.6 thousand years. The sheltered, arid-temperate environment preserved within the sediment at Red Cliff Point Geological Site provides insight into previous depositional environments across supratidal, intertidal and subtidal zones. These varied tidal ranges have allowed for the continued study of biological and geological processes as they develop. There are no comparable coastal localities that display a similar range in South Australia making it highly significant for reconstructing the coastal evolution of the State.

Elements of Significance:

Elements of heritage significance include:

- Buried seagrass banks and bioherms,
- Subtidal, intertidal and supratidal areas including sand flats and dunes,
- Associated geological units containing the above.

Elements not considered to contribute to significance of place include:

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- Human-made objects, trails and roads, vegetation, fencing and signage.

CRITERIA (under section 16 of the Heritage Places Act 1993)

(b) it has rare, uncommon or endangered qualities that are of cultural significance

It has rare, uncommon or endangered qualities that are of cultural significance and is the finest example of several coastal and marine systems involving interaction of biological and geological processes in an arid/temperate climate. (Criteria statement considered at provisional entry, not reconsidered at confirmation. If proposed criteria statement is approved by the SAHC this will be deleted from this document.)

(b) it has rare, uncommon or endangered qualities that are of cultural significance (Proposed replacement statement)

Situated in the Winninowie Conservation Park, Red Cliff Point Geological Site demonstrates several uncommon coastal and marine systems from the Late Holocene within a single locality. The sheltered, tidal-dominated environment within the Northern Spencer Gulf enabled the formation of a large range of tidal environments over the past 7-1.6 thousand years. Sand banks, shelly ridges and Holocene sediments, in part consolidated by fossil seagrass, preserve and record a succession of tidal facies that demonstrate the interaction of biological and geological processes in an arid-temperate climate.

While several similar coastal landscapes exist within South Australia such as large areas near Gulf St. Vincent, Robe and the Coorong, Red Cliff Point Geological Site contains some of the best and rarest examples of Holocene, non-tropical bioherms in the world. The preserved sediments record sea level regression in three tidal zones (subtidal, intertidal and supratidal) and confirm the process of progradation.

(c) it may yield information that will contribute to an understanding of the State's history, including its natural history

This geology may yield information that will contribute to an understanding of the State's natural history by providing information on sea level studies and interaction of biological and geological processes. (Criteria statement considered at provisional entry, not reconsidered at confirmation. If proposed criteria statement is approved by the SAHC this will be deleted from this document.)

(c) it may yield information that will contribute to an understanding of the State's history, including its natural history (Proposed replacement statement)

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Red Cliff Point Geological Site is considered to be highly likely to yield information that contributes to the understanding of the evolution of the state's coastal and marine stratigraphy during the Late Holocene. Described by the Geological Society of South Australia as 'probably the best Holocene example of non-tropical, biohermal structures in the world,' the preserved stratigraphy of the Holocene bioherm has already proved instrumental in tracking stratigraphy and Holocene sea level changes and provided evidence for the cause of these changes.

It has been noted, specifically for ancient sea level studies, that collection of data should occur in one place, as data and results can vary considerably from place to place. Red Cliff Point Geological Site has been identified as an excellent site for studying these processes, its high intactness enabling a more vigorous and precise study to occur. It also allows for the study of the interaction of biological and geological processes in a single locality. The singular, high quality locality enables precise collection of sea level data making it highly likely that this place will continue to provide evidence that contributes to the understanding of the State's natural history.

SITE PLAN

Red Cliff Point Geological Site

PLACE NO.: 14817

998 Chinaman Creek Road, Miranda SA 5700



Red Cliff Point Geological Site, 998 Chinaman Creek Road, Miranda SA 5700, Hundred of Winninowie and Hundred of Davenport
CR 5751/469 H331200 S206, CR 5751/469 H331200 S210, CR 5751/469 D31611 A50, CR 5751/469 D22473 A307, CT 0000/0000 H331200 PUBLIC ROAD. *

N ↑

LEGEND

 Parcel boundaries (Indicates extent of Listing)

 Outline of Elements of Significance for State Heritage Place

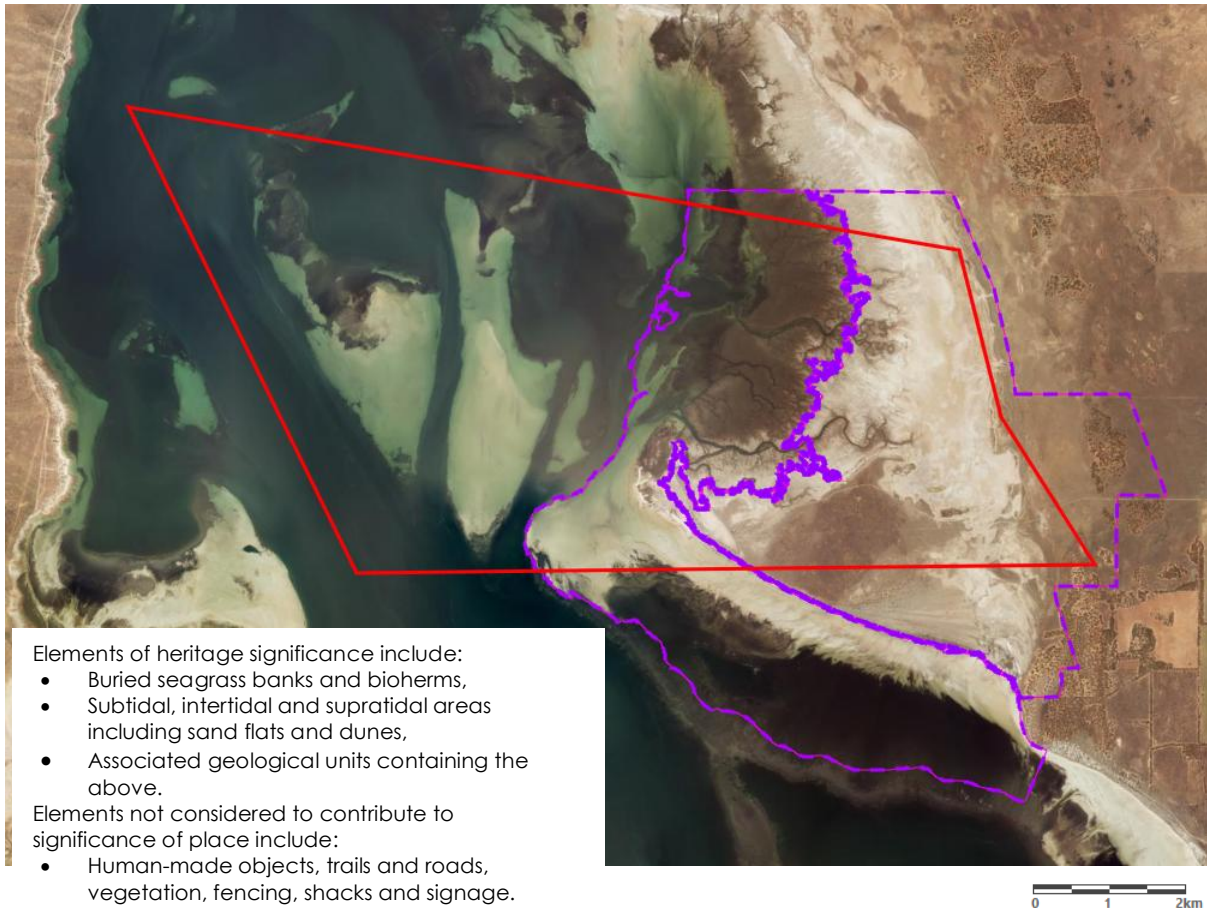
Ocean has no Cadastre; the seabed is owned by the Minister for Infrastructure and Transport under the *Harbors and Navigation Act 1993

SITE PLAN - DETAIL

Red Cliff Point Geological Site

PLACE NO.: 14817

998 Chinaman Creek Road, Miranda



Red Cliff Point Geological Site, 998 Chinaman Creek Road, Miranda SA 5700, Hundred of Winninowie and Hundred of Davenport
CR 5751/469 H331200 S206, CR 5751/469 H331200 S210, CR 5751/469 D31611 A50, CR 5751/469 D22473 A307, CT 0000/0000 H331200 PUBLIC ROAD. *

N ↑

LEGEND

Parcel boundaries (Indicates extent of Listing)

Outline of Elements of Significance for State Heritage Place

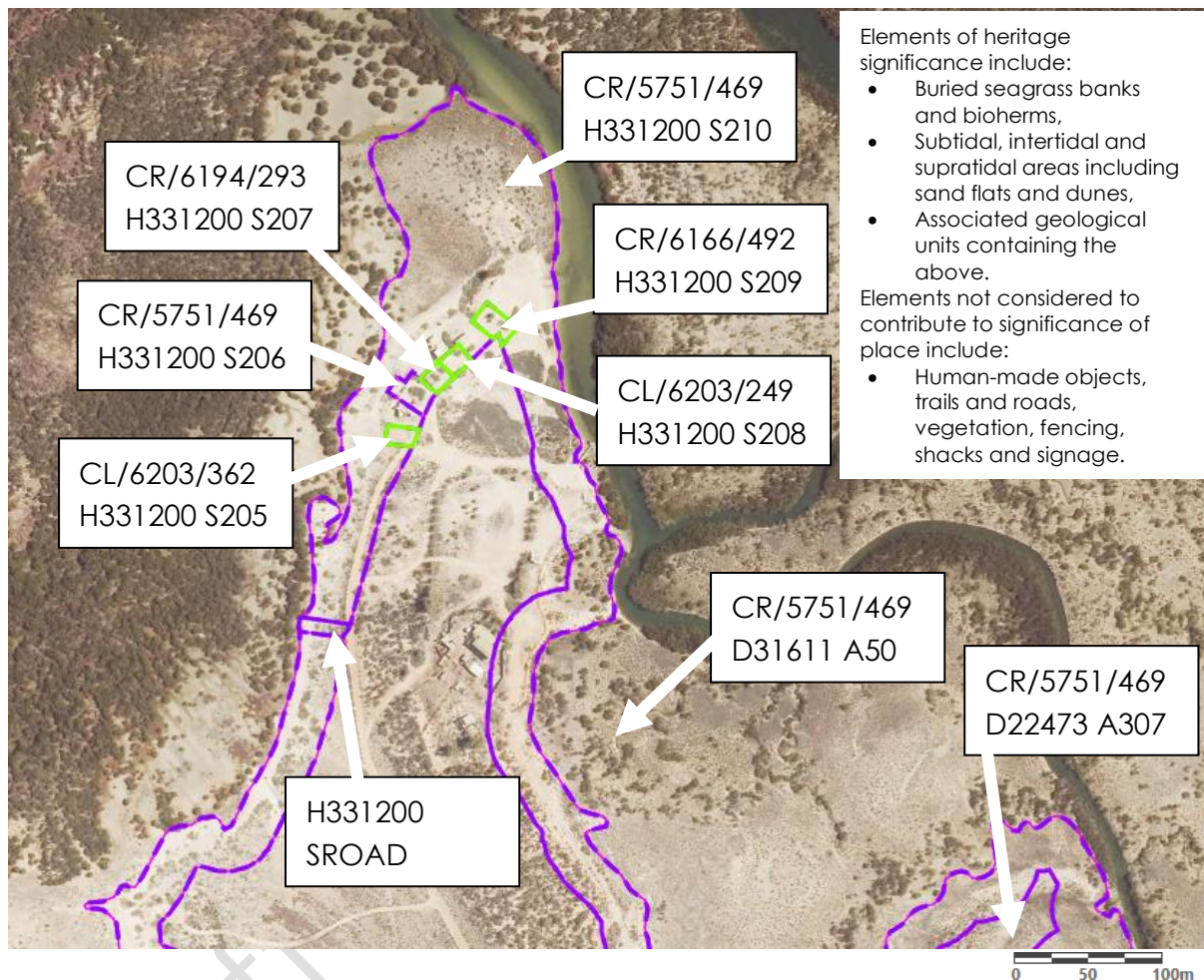
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SITE PLAN - DETAIL

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LEGEND

Parcel boundaries (Indicates extent of Listing)

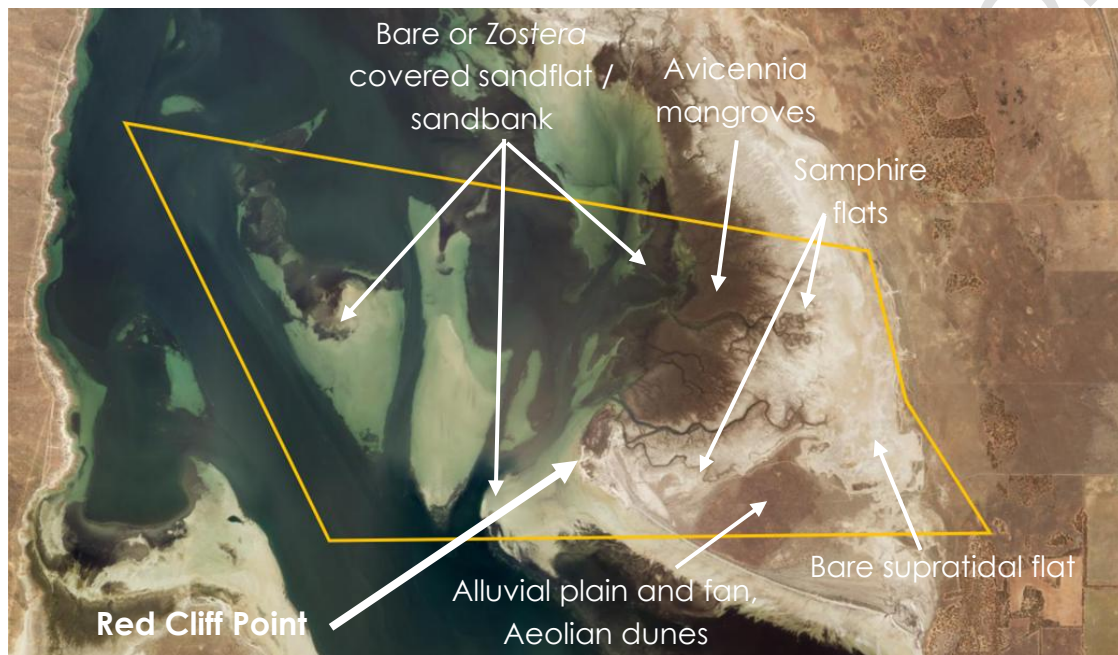
Not included within listing

***Ocean has no Cadastre; the seabed is owned by the Minister for Infrastructure and Transport under the Harbors and Navigation Act 1993**

PHYSICAL DESCRIPTION

Red Cliff Point, sometimes spelt 'Redcliff Point,' is located within the Winninowie Conservation Park just south of Port Augusta. Covering an 52km² area, the place includes marine sandbanks, mangroves, flats and dunes.

Modern supratidal (flooded only during spring tides or storms), intertidal (where the tide rises between low and high tides) and subtidal (submerged unless there is a particularly low tide) zones exist within the State Heritage Place¹ and ancient examples of these tidal zones are also preserved.



Coastal environments within Red Cliff Point Geological Site. 2024.

The northern shores of Red Cliff Point display living mangroves and samphire flats. Extensive *Posidonia australis* and *Posidonia sinuosa*² seagrass banks/meadows grow up to 10m deep into the water of the sheltered embayments to the north. These merge with intertidal and supratidal flats and banks. Some are covered with vegetation however others are bare including supratidal pans and flats and alluvial fans. *Zostera* seagrasses are found on the intertidal flats, mangrove woodlands (*Avicennia marina*) and samphire marshes.³

To the southeast are flats and dunes. This area is composed of barely vegetated sandflats and sand ridges that extend inland as a result of wind and wave action.⁴ Depressions allow for small saline lakes to allow evaporites to be deposited and for freshwater algae (charophytes) to grow in the ephemeral lakes.⁵

The inland Pleistocene red cliffs⁶ to the south that give Red Cliff Point its name are not a part of the State Heritage Place.

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Red Cliff Point Geological Site, contains excellent examples of arid-zone carbonate deposition (formation and accumulation of carbonate sediments) and demonstrates several chemical and depositional processes including diagenesis (burying and alteration of sediment) and precipitation processes.⁷

Beneath modern sediments on the north shores of the gulf, *Posidonia australis* seagrasses have assisted in consolidation of sediment into rock and are responsible for much of the carbonate deposition in the Late Holocene (Within the last 11.7 ka).⁸ Further beneath this layer are Pleistocene limestones. The sediments preserve evidence of previous sea levels and environments.

Several shacks are present within the State Heritage Place. At least one of these shacks have at least partially been demolished between 2015 and 2018. One is used by the Department for Primary Industries and Resources SA for seismography, another is owned by the South Australian Government.⁹ Some of these shacks are located within registered land titles of the current State Heritage Listing but are excluded from the listing.

Elements of Significance:

Elements of heritage significance include:

- Buried seagrass banks and bioherms,
- Subtidal, intertidal and supratidal areas including sand flats and dunes,
- Associated geological units containing the above.

Elements not considered to contribute to significance of place include:

- Human-made objects, trails and roads, vegetation, fencing, shacks and signage.

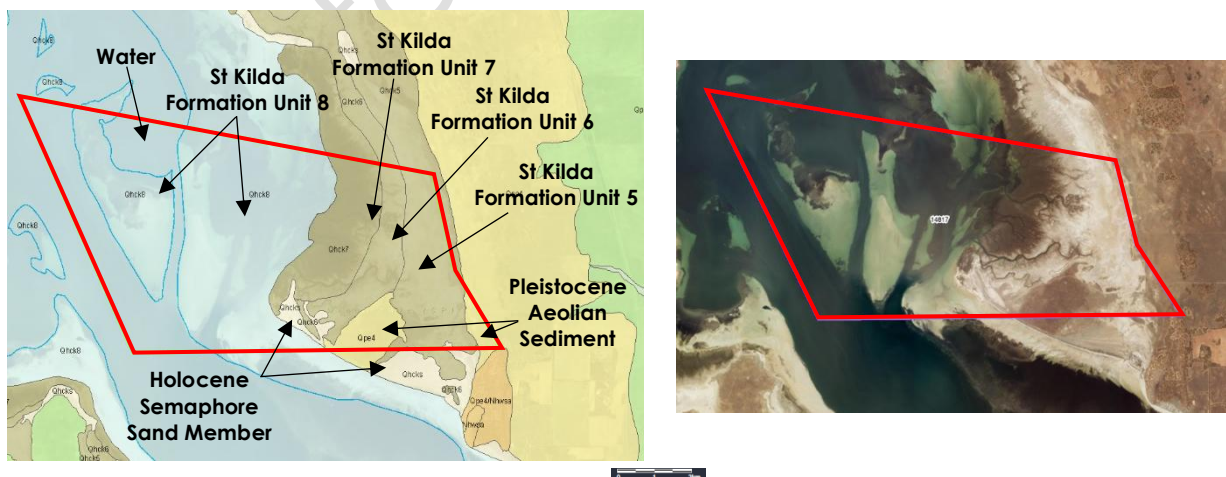
HISTORY OF THE PLACE

Geological Setting

Red Cliff Point Geological Site depicts a number of well-preserved coastal and marine systems dating from the Late Holocene, in particular the last 7-1.6 ka (thousand years).¹⁰ The area includes 4-6m thick and 6km wide buried grassbanks, largely as a result of trapping of sediment by *Posidonia australis* seagrasses and general accumulation of sediment. The succession of rock layers (strata) demonstrates three tidal zones and ten depositional environments.¹¹

Situated within the Northern Spencer Gulf, the Red Cliff Point Geological Site locality has been subject to several changes to sea level in the past 3 Ma, largely due to glacial and interglacial periods.¹² During the Last Interglacial period during the Pleistocene approximately 125 ka, sea levels were at least 2m higher than today.¹³ This caused the deposition of the geological formation directly underlying the aforementioned Holocene-aged sediments.¹⁴ Known as the Mambray Formation, it is poorly sorted and shelly.¹⁵ The Mambray Formation is equivalent to the Late Pleistocene-aged Glanville Formation in other areas of the State and likely contains marine fossils such as foraminifera, bivalves and gastropods.¹⁶

As the glaciers returned, at approximately 100 ka, sea levels fell by around 8m and continued to fall until the Last Glacial Maximum at approximately 21 ka when the global sea level reached 125m below the present.¹⁷ At this point, it's believed that desert dunes were common in the entirely exposed gulf. Around 17 ka, sea levels rose again, nearing the current (2026) level which was reached around 7 ka.¹⁸



Geological and aerial view of Red Cliff Point Geological Site. Geological Formations from SARIG on Left and Imagery map from ENVMaps on the right. 2024.

Above the Mambray Formation, much of the overlying geology of the place is within units of the Saint Kilda Formation including units 5, 6, 7, 8 and the associated

Semaphore Sand Member. These sediments were deposited during the Holocene, within the last 11.7 ka. The Holocene Saint Kilda Formation units are made up of the following sediments:

- Unit 5 – Supratidal sand and mud flats with some clays
- Unit 6 – Carbonate muds with samphire and algal marsh
- Unit 7 – Organic muds with mangrove woodland
- Unit 8 – Shelly to muddy sand in intertidal flats that are bare or colonised by *Zostera*. In the western upper Spencer Gulf, these sediments are veneered by cobbles and gravel.

The Semaphore Sand Member and unnamed Pleistocene aeolian sediments are simply made up of unconsolidated sand typical of modern beaches.

Tidal Zone	Depositional Environment	
Supratidal	Sabkha	Coastal dune ridges
Intertidal	Beach	Samphire Flat
	Sand flat	Mangrove
	Tidal Channel	Zostera flat
Subtidal	Posidonia seagrass banks	
	Freshwater Channel	

Depositional environments near Red Cliff from VA Gostin *et al.* (1984)

Source: derived from Gostin *et al.* 1984

The evolution of the coast in this area has been controlled by the growth of seagrass banks,¹⁹ mangroves and cyanobacterial mats.²⁰ As a result, Holocene sediment has been trapped and consolidated²¹ in the temperate climate.²² Carbonate organisms and decaying fibres from plant materials were joined together to create what are referred to as 'organically bound carbonate beds'.²³ This occurred rapidly and contributed to the development of offshore banks and platforms which are well developed at Red Cliff Point Geological Site.²⁴ Similar coastal provinces exist as large areas near Gulf St. Vincent, Robe and the Coorong. Sedimentary accumulation and progradation (extension of the shoreline) at Red Cliff Point Geological Site over 6000-7000 years created 4-6m thick Holocene sediments that underly the current (2026) intertidal and supratidal zones.²⁵

As *Posidonia australis* occurs only between the spring low water level and a depth of 6m, buried seagrass presence can be used to determine sea levels in geological time. Preserved facies have been used to determine previous sea levels.²⁶ The age and elevation of the top of the seagrasses is a minimum sea level indicator while the intertidal examples show the maximum sea level at any one time.²⁷

These offshore organo-sedimentary structures created due to the binding of sediments and seagrass remains are believed to likely be the best example of Holocene, non-tropical bioherms in the world.²⁸ The sediments denote clear evidence of sea level regression (a fall in sea level) that are recorded in three tidal zones; subtidal, intertidal and supratidal facies which have grown farther out into the sea in a process called 'progradation'.²⁹ For example, landward sediments are elevated approximately 2.5m above the current (2026) sea level, demonstrating previous higher sea levels that has been dated to range between 6-1.7 ka.

Human History

Winninowie Conservation Park is a part of Nukunu Country. Prior to colonisation, the Nukunu People lived in a harmonious and respectful relationship with the environment, only hunting or collecting the animals and plants they needed to sustain life and culture. The surrounding areas may have provided the Nukunu People with access to freshwater water. Campsites, cooking fires, implements³⁰ and animal remains have been attributed as remains of occupation by Aboriginal People, including some of which continued after European colonisation.

Chert, chalcedony, agate, quartz and quartzite have been recorded in the Winninowie Conservation Park. It is believed that quartzes found within Winninowie Conservation Park are used for 'healing or ceremonial rituals' and are not endemic to the area, suggesting that most were likely brought from elsewhere or traded by Aboriginal People.³¹

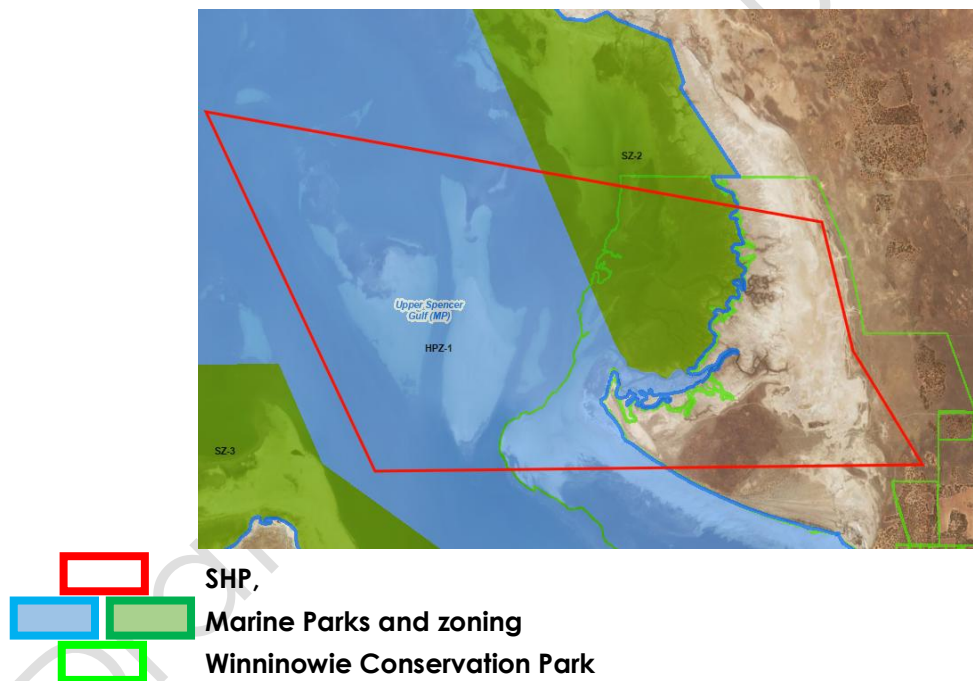
The area now known as Red Cliff Point was likely sighted by Matthew Flinders on his sailing expedition up the Spencer Gulf in 1802.³² The area was named descriptively for its red cliffs.³³ European settlement in the area from the 1840s onwards devastated the Nukunu people and culture. Land clearing for agricultural and pastoral purposes, the introduction of invasive species such as Salvation Jane, and the relocation of many Nukunu people to places like Point Pearce and Point McLeay had severe consequences for Nukunu traditions, customs, language and survival, and by the late 1800s, the population of Nukunu People had diminished drastically. Today, many Nukunu live in Adelaide but maintain a close connection to country.

During the early years of the colony, the Spencer Gulf area was a port for farming and pastoral exports. A drought in 1862-63 resulted in a shift in exports, notably of 'sandalwood' in the form of quandongs and false sandalwood by Chinese merchants

in the region.³⁴ Between 1911 and the commencement of World War I in 1914, a German company mined *Posidonia australis* from the Northern Spencer Gulf.³⁵ While in the 1920's, the sand dunes of the Winninowie Conservation Park were likely mined for shell-grit by Broken Hill Associated Smelters (B.H.A.S).³⁶

More recently, the surrounds of Red Cliff Point have been used in commercial fishing, primarily for King prawns, blue swimmer crab and several scalefish.³⁷ Fishing for prawns was prohibited near Red Cliff Point in 2023.³⁸ During the 1970s, the South Australian Government attempted to develop a petrochemical plant at Red Cliff Point. This proposal was met with public and scientific backlash with several reports being published against the construction of the plant.

In 1980, a large portion of Red Cliff Point was recognised as a Geological Monument, in the Geological Society of Australia's South Australian Division' publication 'Geological Monuments in South Australia'. Shortly after, further media and research reports drew attention to the area and in 1982-83 plans for the petrochemical project were abandoned. In 1990, the Winninowie Conservation Park was proclaimed.



Source: ENVMaps, 2025

Sediments have been heavily cored through vibrocores or other coring techniques.³⁹ For example, north of Red Cliff Point, a major project of fifty-five cores was carried out prior to 1988. The research produced a detailed transect of the stratigraphy of the place.⁴⁰

In 1995, the 'Upper Spencer Gulf' was recognised in the 'Directory of Important Wetlands' compiled by the Commonwealth department, the Department of Climate Change, Energy, the Environment and Water (DCCEEW). This directory identifies

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nationally important wetlands, of which the mangrove forests surrounding 'Chinaman Creek' is 'considered to be the largest undisturbed stand of mangroves remaining in South Australia'. It is also noted that it is one of the best examples of 'sub-tropical marine and coastal ecosystems in the Southern hemisphere'.⁴¹

In 2009, the Upper Spencer Gulf Marine Park was proclaimed. The marine park encompasses all the ocean waters within the Red Cliff Point Geological Site State Heritage Place. Additionally, some northern sections of water are included in the Winninowie Sanctuary Zone of the Marine Park.⁴² The sanctuary zone includes mangroves, marshes and seagrasses of the Upper Spencer Gulf provide and provides key habitats for several aquatic species to reproduce.⁴³ Most notable is the annual migration and spawning of thousands of cuttlefish along the coastline.⁴⁴ Other fish such as prawns and whiting are also reported to use the area as breeding grounds.⁴⁵

Aboriginal Cultural Considerations

The *Heritage Places Act 1993* makes provision for the identification, recording and conservation of places and objects of non-Aboriginal heritage significance. The protection and preservation of Aboriginal heritage is provided for under the *Aboriginal Heritage Act 1988*. Contact the Aboriginal Heritage Unit for listings.

CHRONOLOGY

Year	Event
2.58 Ma	Pleistocene Epoch
- 11.7 ka	~125 ka - deposition of Mambray Formation.
11.7 ka	Holocene Epoch
-	~8 ka - Holocene seas invade Spencer Gulf. ⁴⁶
Present	~7 ka - Beginning of deposition of a majority of the seagrass bedding and sediment.
	~6.6 ka - Shallow marine sedimentation begins in Spencer gulf prior to this time. ⁴⁷
	~6 ka - Sea level is at least above 2.5m higher than present day. ⁴⁸
	~1.74-1.64 ka - Sea level returns to modern day levels, resulting in a seaward shift of the coastline. ⁴⁹
	Rapid growth of seagrasses decreases below water area of Red Cliff Point Geological Site by approximately 60% into modern day. ⁵⁰
1970s	Numerous companies have an interest in developing a petrochemical plant at Red Cliff Point.
1973	State Government buys a portion of land for the petrochemical plant. ⁵¹
1974	Study published but the South Australian Governments' Department of Environment and Conservation regarding the proposed project, titled <i>Redcliff Petrochemical Development Plan for Environmental Study</i> . ⁵²
	Australian Government passes stronger environmental protection laws such as the <i>Environment Protection (Impact of Proposals) Act 1974</i> . ⁵³
	Numerous scientific investigations regarding the area are published between 1974 and 1980. ⁵⁴
1980s	Major stratigraphic research undertaken at Red Cliff Point.
1981	Project proposals at Red Cliff Point face further media, academic and conservationist opposition.
1982-83	Petrochemical Project at Red Cliff Point is abandoned. ⁵⁵
Prior to 1988	Coring of sediment, producing a stratigraphy of the place.
1988	Red Cliff Point recognised as a Geological Monument by the South Australian Division of the Geological Society of Australia. ⁵⁶
1990	Winninowie Conservation Park proclaimed. ⁵⁷

- 1995** 31 August - Identified to Heritage Branch in the Flinders Ranges Heritage Survey, Volume 9 Geological Places.
- 1997** 10 April Provisionally Entered in the State Heritage Register and designated as a place of geological significance.
9 October Confirmed in the State Heritage Register.

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SITE DETAILS

Red Cliff Point Geological Site

PLACE NO.: 14817

998 Chinaman Creek Road, Miranda

DESCRIPTION OF PLACE:	Coastal and Marine system
HISTORIC THEME/S	1 Natural Environment 1.1. Tracing climatic and topographical change
AGE OF FORMATION:	~7-1.6 thousand years
REGISTER STATUS:	Identified to Heritage Branch 31 August 1995 Provisionally Entered 10 April 1997 Confirmed 9 October 1997 Designated 10 April 1997
CURRENT USE:	Conservation Park, seafloor and offshore sandbanks
LOCAL GOVERNMENT AREA:	Port Augusta
LOCATION:	Street No.: 998 Street Name: Chinaman Creek Road Town/Suburb: Miranda Post Code: 5700
LAND DESCRIPTION:	Title CR 5751/469 H331200 S206, CR 5751/469 H331200 S210, CR 5751/469 D31611 A50, CR 5751/469 D22473 A307, CT 0000/0000 H331200 PUBLIC ROAD Reference: Hundred: Hundred of Winninowie

REVISIONS

Date	Changes
13 February 2026	SAHC modified template to include an image at the beginning of the document.

¹ De Boer, PL, Van Gelder, A and Nio, SD (1988), 'Tide-Influenced Sedimentary Environments and Facies', *Sedimentary and Petroleum Geology*. D. Reidel Publishing Company, Dordrecht, Holland.

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