3.3 Heritage

Indigenous and non-Indigenous heritage sites have been used in the process of assessing conservation priority within the Limestone Coast and Coorong region. Aboriginal heritage sites have been buffered and so only generalised location is shown for these.

3.3.1 Non-Indigenous Heritage

There are a number of non-Indigenous heritage registers currently in use in Australia: World Heritage, National Heritage, Commonwealth Heritage, Register of the National Estate (RNE), State Heritage and Local Heritage. These are discussed in more detail in Appendix 13. There are no places recorded in the World or National heritage registers within the SE coastal boundary.

All non-Indigenous heritage sites with legislated heritage protection in South Australia are recorded in the South Australian Heritage Register Database (SAHRDB). This includes places of State significance as well as other categories of heritage places in South Australia including World, National, Commonwealth and local and contributory places. Other places of heritage significance, which were identified in regional heritage surveys commissioned by the Heritage Branch of DENR, are also included in this database.

Cultural heritage places that are protected by legislation (World, National, Commonwealth, State, Local and Shipwrecks) are generally deemed to have significance according to specific criteria and so have values that should be protected and conserved.

The majority of coastal townships in the South East were established because of their connection with the sea, providing a service centre and link between the farming (or mining) activities nearby and the ships which provided transport to other parts of the state, Australia or the world.

There are 154 non-Indigenous built heritage sites recorded within the South East coastal region. This includes 1 Commonwealth Heritage Place, 42 State Heritage Places, 57 Local Heritage Places and 54 Identified Places. Many of these are buildings within or outside of townships that are unlikely to be the subject of coast or land care action within the region. However, many of these sites have a maritime connection and still add conservation value to their localities and are relevant to the management decisions within the area. Appendix 13 provides a full list of the built heritage sites within the study area.

Over 800 shipwrecks are recorded along South Australia's coast and inland waters reflecting the State's significant maritime history. However, the position of many of these wrecks is unknown or estimated. The remains of these vessels are important historical, educational, recreational and tourism assets. Therefore, shipwrecks that lie within the project area have been included within the conservation analysis. There are 151 shipwrecks off the South East coast. Of these 32 lie within the study area boundary and are all protected under State or National legislation. Only three of the shipwrecks have been found; The Nene Valley, Margit and Glenrosa Barques.

Heritage places identified as part of this study that are not covered by legislation are still deemed to have some cultural significance and conservation value. Most of these have been identified by qualified professionals in the course of heritage surveys or assessment work, but have not been formally included in statutory registers for a number of reasons, particularly the 'voluntary' nature of the establishment of Local Heritage lists by local councils.

3.3.2 Indigenous Heritage

Indigenous sites within the GIS analysis

Significant Aboriginal sites have been included within the conservation analysis: thus these are part of the relative valuation of various localities within the region; also this serves as a reminder of the need for dialogue over land management decisions in adjacent areas.

Aboriginal heritage sites that have been registered on the state heritage register have been used in the conservation analysis. These sites are buffered on the digital maps to the cell level: thus if the cell contains a registered site, the whole cell would be given a high value for this digital layer. This process had two uses for the analysis: firstly, Aboriginal sites contributed to the identification of places with a high conservation priority; secondly, the digital layer flags those areas where there is registered Aboriginal significance, for the users of this report. This is aimed to trigger a dialogue between users of the locality and the Aboriginal custodians of the site.

There are obvious shortcomings in the analysis. It is likely that all coastal lands are significant for indigenous people, but this analysis only refers to specific registered sites. Some sites are notified, to the Department of Aboriginal Affairs and Reconciliation, but not registered: these do not appear in the analysis. Other specific sites are of great significance to Aboriginal people, but are neither registered nor notified and hence not counted in the analysis.

The buffering to the cell level introduces another problem: on the ground sites are to some extent protected by buffering, but within the analysis their value is diluted by extension over a large area. In the SE region there are one or more registered sites in every cell; through buffering to the cell level the entire coastal region receives the same priority score for this layer. Thus for this data set there is no discrimination between one area and another, thereby defeating the object of the analysis. Clearly, buffering reduces the discrimination of the analysis spatially and the scoring method does not introduce any relative values for differing sites.

General Information on Indigenous Heritage within the SE Coastal Region

[ref. Luebbers RA, *Environmental Impact Assessment of Aboriginal Sites in the South East Coast Protection District*, report for the Department for the Environment, SA, Dec 1980].

This report was carried out for the Coast Protection Board (CPB) in 1980, as a preparatory document for the SE CP District plan, which the Coast Protection Act required the CPB to produce. The substance of Luebber's report is based on his PhD (1975), with supplementary fieldwork. Luebbers mentions the CPB 100m coastal 'zone', but reports on a much wider area, in order to describe and explain Aboriginal migrations through coastal places: in fact he describes the area of this conservation assessment report. This coastal area supported *"one of the largest populations believed to have existed in prehistoric Southeastern Australia"*(Luebbers, 1980, p.2) in spite of the simple hunter-gatherer technology used to acquire food.

There were 3 main tribal groups: Tanganekald owned the Younghusband Peninsula; Meintank owned between Lake Hawdon and Lacepede Bay; Boandik owned between Robe and southern Victoria.

Locations of Sites

On the dunes of the Younghusband Peninsula, the Robe Range and the Canunda Range, Luebbers reports remains commonly found at 3 types of site:

1) Between the foredune and large transgressive dunes – usually middens of shells and other kitchen wastes; *Plebidonax* is common before 2,000BP;
2) Viewpoints of the lake/ Coorong/ estuarine shore on the inner edge of the dune – these are both middens, tool making sites and burial sites; and
3) At headlands – these are often older sites in red earth e.g. Cape Martin 8,700BP, Cape Dombey, as well as younger sites; they contain both shell and tool making materials.

In addition, where shallow caves/ overhang in calcarenite exist, these have been used. The lower floodplain and river mouth of Maria Creek show many sites. Between Cape Banks and the Victorian Border almost all headlands have sites, often older than 6,000 years; for example Cape Northumberland has a notable site on red earth. Sites are also found on many dunes and freshwater upwellings.

Environmental Impacts on Sites

Wind erosion of midden sites in the foredune area is estimated to have severely degraded 95% of the sites: over time all will be destroyed. Frequently relatively modern sites are equally degraded as old sites; which may possibly indicate that dune instability is a relatively modern phenomenon. On the Coorong ORV damage to midden sites is apparent: one vehicle passage across a midden site destroys the protective shell cover, which is then degraded by the wind. Luebbers concludes there is an urgent need to control ORV access to the foredune area.

Burial sites found on the estuarine side of the dunes show extensive exposure by earlier grazing; frequent removal of skulls has been common, as well as breaking of bones: there is a need to control public access to areas where cemeteries are common. (Luebbers, 1980, p.26).

Beach ridge systems of Guichen and Rivoli both form a time series of aggradation of foredune ridges, progressively occupied by Aboriginal camping parties; significant remains are also found along Robe cliffs, within Frenchmans Bay estate, and near Lake Fellmongery. No official survey of sites in and around the town has been carried out.

The swamp edge Aboriginal subsistence sites between the Woakwine Range and the Rivoli beach ridge system are threatened by dune instability.

The calcarenite/ dune coast from Robe to Beachport and through Canunda NP shows impact on headlands, where vehicles and pedestrians have accelerated erosion of soils and middens. The middens, which are frequent at these sites have been dated to the last 2,000 years. There are sites both in the Holocene dunes and in older sites "An older horizon, dated 8-9000 stratigraphically underlies the mid-Holocene dunes in a red soil". Shell middens and rock shelter deposits also found on the inner edge of the dunes.

19th C grazing is thought to have de-stabilised many dunes (e.g. 10-Mile drift); modern recreational driving tracks have placed great pressure on all clifftop sites, leading to modern deflation of sites which had previously survived 1,000+ years under natural conditions. Field observation points to rapid modern destruction of many sites.

The field work by Luebbers, undertaken 30 years ago, shows that the headlands, dunes, lake edges, freshwater springs, lakes and nearshore waters held a rich variety of resources, which were skilfully collected by the traditional owners. Hence this coastal region supported a large population, and these people left many remains: burial sites, stone working sites and middens. In the late 1970's Luebbers reports that modern use was impacting these sites. Although many sites, for example in dunes are inherently unstable, the remains had survived in excess of 1,000 years;

but they were quickly succumbing to the tyres of the 4 wheel drives. Thirty years on from Luebbers survey it is likely that many sites have been lost, since the conservation work proposed in that study has not been carried out. After the previous generation appears to have lost an opportunity, perhaps this is the time for a new survey of what is left, in order that proper decisions can be made on what should be conserved.

Aboriginal midden, Canunda National Park. Photograph Jason Quinn.

3.4 Geology and Geomorphology

The South East coastal region encompasses many types of coastal landform: estuaries, calcareous and mineral sand beaches, dunes, cliffs and steep headlands. This variety is a result of the dynamic interaction of the processes of wave action, wind, solution and runoff with biological processes and underlying rocks and sediments.

3.4.1 Geology and landforms

The landforms within the coastal boundary of this report and Lower South East to Naracoorte are part of a large coastal plain of low relief, which declines gently north and east from Mount Gambier. With the exception of the Recent volcanic features, elevations on this plain, extending from Naracoorte to the sea, are less than 80m; but the pattern and origin of the low ridges is unique in its scale. Slow tectonic uplift and Pleistocene sea level oscillations have left a series of low 'ranges' sub-parallel with the modern coastline. These ranges represent former depositional shorelines, the beaches and dunes of Pleistocene interglacial high sea levels, now indurated to form low lines of hills and ridges. The ranges record 21 depositional phases, represented by 13 geomorphologically distinct ranges, (Schwebel, 1983, p.15). Within the project area two ranges can be distinguished, the Robe Range and the Woakwine Range, although only the toes of the latter fall within the coastal boundary. The Interdunal corridors had no direct drainage exit to the sea and formerly remained as swamps in the winter, feeding the groundwater tables and draining only slowly to the Coorong through Salt Creek. With the establishment of the SE Drainage Scheme during the 20th Century, the inter-dunal corridors were released for grazing and cultivation and huge areas of wetland habitat lost or radically altered. At the same time numerous drainage outlets cut through the coastal region to the sea: these were significant modifications to the coastal geomorphology of the region.

On the map below the Pleistocene ranges are shown in grey as the "Aeolian calcareous sand with calcrete of the Bridgewater Formation", with several ranges consolidated by the mapping. The Robe Range is found outcropping in low hills, cliffs and reefs between Robe and Canunda NP. Woakwine and Robe Ranges continue along the shallow continental shelf to the NW of Cape Jaffa and Kingston and play a role in protecting the low energy shore of Lacepede Bay.

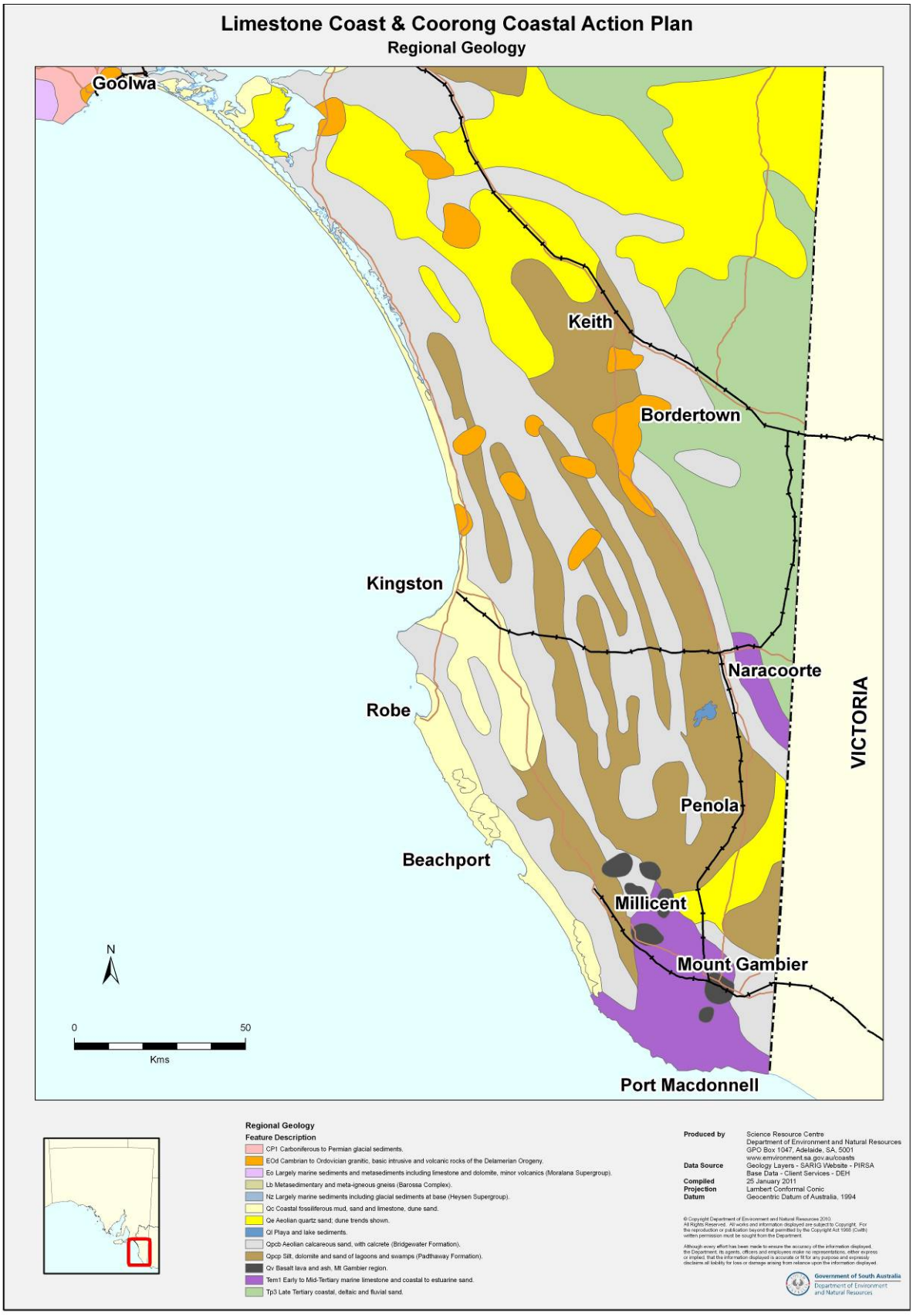

Figure 3.47. South East regional geology map.

3.4.2 Significant geological features

A significant geological feature (formally known as a geological monument) "is a site showing features of outstanding geological or physiographic significance that is considered by the community of earth scientists to be worthy of conservation" (McBriar and Giles 1984, p.2). These features are examined in the field and assessed in terms of being representative of wider features or rarity. Taken together, the significant geological features should represent the geological history of the state.

Significant geological features do not have any particular extent and may be very large areas or a very small site. They may be a site or feature with aspects of geology or geomorphology such as a fossil locality, a type section, a landform, or a distinctive structural feature The Geological Society of Australia (GSA) uses the following definition:

> *"significant geological features are those features of special scientific or educational value which form the essential basis of geological education, research and reference. These features are considered by the geological community to be worthy of protection and preservation*[1]*."*

The list of significant geological features is reviewed and revised by the Geological Heritage Sub-committee of the SA Division of the Geological Society of Australia Incorporated. Information on significant geological features is stored at Primary Industries and Resources South Australia (PIRSA) and at the South Australian Museum.

Significant geological sites provide the principal visual evidence from which the geological history of the region has been written and taught. Geology and related landform variation provides the basis of the scenic attraction of many parts of the coast. Thus the geology and geomorphology of the coast is of both scientific and economic value to the region and its natural resources management.

The sites listed in this report contribute in important ways to the documentation of the geological history of the region, as identified by the leading geologists of the state, and supported by published reports. As such they are of high conservation priority, and a score assigned to the site within the analysis represents this. The presence or absence of a significant geological site within a coastal cell can be seen in the digital maps that form part of this report.

Conservation of significant geological features

Significant geological features are irreplaceable and need to be conserved but the means of conservation varies from site to site. Some need protection by isolation; some need protection by reservation; others by fencing or access control; while more well-known sites may benefit from local interpretation. Almost all are threatened if development and earthmoving are proposed at the site and the list of these features should be included in council development plans, in order to inform such decisions.

Sites or features identified as a significant geological feature are not automatically protected under legislation through that process, although they may be protected under some other legislation, such as the *NPW Act 1972*, *EPBC Act 1999*, *Heritage Places Act 1993*, *Crown Lands Management Act 2009*, *Development Act 1993*, or the *Aboriginal Heritage Act 1988*. However, if a site is not within a reserve created under the *NPW Act 1972*, is not on the State or National heritage registers, and is not identified within the council's development plan, it may have little legal protection and may be vulnerable to damage, degradation or destruction.

[1] http://www.gsa.org.au/pdfdocuments/management/POL_heritage_7Mar06.pdf Accessed 18/3/2011.

The PIRSA website on Geological Monuments states:

> "At the outset of the process of designating geological monuments, it was thought that protection should precede any publicity as this would inevitably increase visitation which would likely lead to damage. Attitudes throughout the community have changed since that time and it is now accepted that, except for rare and vulnerable features, the location of sites needs to be publicly known if they are to be effectively protected".

Significant geological features within the study area are distributed throughout all parts of the coast.

3.4.3 Significant geological features within the South East coastal region

This list has been compiled from the DVD 'Geological Monuments in South Australia, March 2008' produced by the PIRSA Customer Services Branch. Original descriptions and maps are held by PIRSA, State Library SA and the Geological Association of Australia South Australian Branch.

The Coorong (Magnesite and Dolomite Lake)

GSA file	1; Locality 1; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which magnesite and dolomite minerals are being precipitated. Of educational and research value and of international significance as an example of carbonate sedimentation.
Preservation State	Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Dolomite Pellets Lake)

GSA file	1; Locality2; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which dolomite mineral pellets are being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

Figure 3.48. The Coorong (Dolomite Pellets Lake) Significant Geological Feature. Photograph Coast Protection Board 2008.

The Coorong (Ordered Dolomite Lake)

GSA file	1, Locality 3; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which dolomite mineral is being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Dolomite Lake 4)

GSA file	1, Locality 4; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which dolomite mineral is being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow

	groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Dolomite Lake 5)

GSA file	1, Locality 5; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which dolomite mineral is being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Hydromagnesite and Aragonite Lake)

GSA file	1; Locality 6; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which hydro-magnesite and aragonite minerals are being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	ORV activity around and likely over the lake. Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Magnesite Calcite Lake)

GSA file	1; Locality 8; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which magnesite and calcite minerals are being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	ORV activity around and likely over the lake. Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

The Coorong (Ordered Dolomite Lake)

GSA file	1, Locality 9; Part 1
Cell	SE 15
Significance	One of a series of small Holocene lakes extending for over 20 kilometres to the east of the Coorong in which ordered dolomite mineral is being precipitated. Of educational and research value and international significance as an example of carbonate sedimentation.
Preservation State	ORV activity around and likely over the lake. Continued fall in regional groundwater pressure, and projected sea level rise threaten this site.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Coorong NP.
Comments	Whilst protected in the Coorong NP, the lakes are vulnerable to off-road vehicle impacts which should be addressed. The precipitates are formed through shallow groundwater interaction, which is dependent upon the preservation of native vegetation.

Sinkholes in the Lower South East – Piccaninnie Ponds

GSA file	5; Locality 7; Part 1
Cell	SE 1
Significance	Water-filled, spring-fed sinkhole from karst development in the fossiliferous Tertiary Gambier Limestone.
Preservation State	Protected within reserve. Access limited and impacts controlled.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Piccaninnie Ponds CP.
Comments	The sinkhole and surrounding wetland are supplied with fresh water from regional groundwater upwelling. The quality of this water is currently monitored by the Dept of Water, but is threatened by sea level rise and rising saline groundwater pressure.

Figure 3.49. Piccaninnie Ponds Sinkhole Significant Geological Feature. Photograph Coast Protection Board 2008.

Sinkholes in the Lower South East – Ewens Ponds

GSA file	5; Locality 8; Part 1
Cell	
Significance	Water-filled, spring-fed sinkhole from karst development in the fossiliferous Tertiary Gambier Limestone.
Preservation State	Protected within reserve but zoned Primary Industry. Adjacent primary industry land threatens water quality of ponds and 8 Mile Creek. High visitation also threatens water quality and fauna habitat.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - Ewens Pond CP
Comments	The spring feeds Eight Mile Creek, east of Port MacDonnell. This site is immediately north of the coastal boundary; the discharge of the springs is large, leading to a significant discharge of fresh water through the coastal boundary

Glenelg River and the Lower South East Coast – Coastal Exposures

GSA file	6; Locality -; Part 1
Cell	SE 1-13 (Shoreline and cliffs from Glenelg River to Kingston SE)
Significance	Former back shore beach dunes of fossiliferous Pleistocene Bridgewater Formation in the coastal zone and as offshore stacks showing cross bedding and other aeolian features.
Preservation State	Preserved extensively as calcarenite cliffs, headlands and shore platforms. These are eroding relatively rapidly, revealing new features in the rocks and destroying others.
Protection	National Estate: X; State Heritage: X; Protection in Park: ✓ - portions protected in Piccaninnie Ponds CP, Douglas Pt CP, Nene Valley CP, Canunda NP, Beachport CP, Little Dip CP, Guichen Bay CP, Bernouilli CR, Butcher Gap CP,
Comments	The coastal dune material has a high calcium carbonate content, being comprised mostly of reworked shell debris, deposited on shore to form aeolian ridges that lie perpendicular to the prevailing winds of the time. Weathering of these dune ranges has shaped the modern coast, with Lacepede, Guichen and Rivoli Bays forming where the dune range has almost completely eroded , with only sea stacks, reefs and islands remaining. Elsewhere the calcarenite forms prominent headlands such as Cape Jaffa and Cape Northumberland.