HERITAGE ASSESSMENT REPORT

NAME: Stranded Shingle Ridges **PLACE NO.:** 26443

Address: Upper Spencer Gulf

DESCRIPTION

A series of elevated shingle ridges consisting of packed sub-rounded pebbles and cobbles deposited by high sea levels in the mid-Holocene period (~5000 years ago), and then uplifted by 4m to be 5-8m above the adjacent landscape. The ridge is located parallel to and slightly inward from the modern coastline of western Upper Spencer Gulf between Whyalla and Port Augusta, South Australia.

Of the ridges, the one at Fitzgerald Bay is the largest, most distinctive and most intact, and is recommended for inclusion in the South Australian Heritage Register as a State Heritage Place (see proposed extent of listing below).

Additional ridges of interest are between Douglas Point and Crag Point near One Shack Bay, and further north between Blanche Harbor and Commissariat Point. The One Shack Bay ridges comprise three distinguishable but much shorter and less prominent stranded shingle ridges, each ~200m long, which are located separately, adjacent and parallel to the shoreline along a distance of one kilometre just south of One Shack Bay.

The northern location of stranded shingle ridges extends for ~10kms from Blanche Harbour to Commissariat Point, approaching Port Augusta. The occasional stranded shingle deposits here are of lower profile and relatively obscure. They have been built in with many dozens of seaside shacks and access tracks which cross them to boat ramps and adjacent moorings within a virtual urban environment.

EXTENT OF LISTING

The Stranded Shingle Ridge at Fitzgerald Bay is the ridge system running southwards from the Fitzgerald Bay shack community for a distance of ~1.3kms, just inland from the modern shoreline.

Extent of listing should specifically exclude these components:

Extent of listing excludes human constructed interventions into original stranded shingle ridges such as existing tracks, caravan sites, structures etc.

ASSESSMENT OF HERITAGE SIGNIFICANCE

Statement of Heritage Significance

The Fitzgerald Bay Stranded Shingle Ridge is an elevated shingle ridge deposited by 3m high sea levels during the mid-Holocene period (~5000 years ago) and then regionally uplifted by around 4m. The ridge consists of packed, sub-rounded pebbles and cobbles that now lie 5-8m above the adjacent landscape. It is located parallel to and slightly inward from the modern coastline of western Upper Spencer Gulf between Whyalla and Port Augusta, South Australia.

The Stranded Shingle Ridges were formed through the erosion of the adjacent plateau country when sea levels were up to three metres higher than today, removing material from the cliffs and extensively from the alluvial aprons at their base. The way in which the removed stones were deposited in ridges indicates an ancient sea-level variation associated with the Quaternary Ice-Ages and regional uplift processes in the Upper Spencer Gulf from the late Pleistocene and mid-Holocene period. They are in largely undisturbed condition and of extreme rarity, with only two other comparable examples known in the world. The Stranded Shingle Ridge near Fitzgerald Bay has particularly high integrity.

Assessment against Criteria (Under Section 16 of the *Heritage Places Act 1993*):

(a) it demonstrates important aspects of the evolution or pattern of the state's history.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

> *The place should be closely associated with events, developments or cultural phases which have played a significant part in South Australian history. Ideally it should demonstrate those associations in its fabric.*
>
> *Places will not normally be considered under this criterion if they are of a class of things that are commonplace, or frequently replicated across the State, places associated with events of interest only to a small number of people, places associated with developments of little significance, or places only reputed to have been the scene of an event which has left no trace or which lacks substantial evidence.*

The Fitzgerald Bay Stranded Shingle Ridge does demonstrate important aspects of the natural evolution of the State's history. However, the usual application of this criterion focuses on the cultural history of the state as it relates to the period since European settlement, with natural history being considered under criterion (c). In this context, the Shingle Ridge is not considered to have close associations with events, developments or cultural phases in South Australia's history. In this context, the Shingle Ridge is not considered to have close associations with events, developments or cultural phases in South Australia's history. This place does not meet this criterion.

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

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

> *The place should demonstrate a way of life, social custom, industrial process or land use which is no longer practised, is in danger of being lost, or is of exceptional interest. This encompasses both places which were always rare, and places which have become scarce through subsequent loss or destruction.*
>
> *Places will not normally be considered under this criterion if their rarity is merely local, or if they appear rare only because research has not been done elsewhere, or if their distinguishing characteristics have been degraded or compromised, or if they are at present common and simply believed to be in danger of becoming rare in future.*

Stranded Shingle Ridges are rare in South Australia, but do not contribute qualities that relate social customs, industrial processes or land uses which is no longer practised, is in danger of being lost, or is of exceptional interest as their formation is a natural process that precedes human occupation of the State.

This place does not meet this criterion.

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

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

> *The place should provide, or demonstrate a likelihood of providing, information that will contribute significantly to our knowledge of the past. The information should be inherent in the fabric of the place. The place may be a standing structure, an archaeological deposit or a geological site.*
>
> *Places will not normally be considered under this criterion simply because they are believed to contain archaeological or palaeontological deposits. There must be good reasons to suppose the site is of value for research, and that useful information will emerge. A place that will yield the same information as many other places, or information that could be obtained as readily from documentary sources, may not be eligible.*

The Fitzgerald Bay Stranded Shingle Ridge contributes to our understanding of the geological history of South Australia by providing knowledge of coastal and marine development processes resulting from the Quaternary Ice Ages and ancient climatic events.

The Fitzgerald Bay Stranded Shingle Ridge is unusual in that it –

- consists entirely of sub-rounded pebbles and cobbles
- is slightly inland at an elevated level in relation to the modern shoreline
- is devoid of sand
- contains an abundance of the fossil mollusc, *Anadara trapezia,* enabling a method for estimating the age of the feature
- provides evidence of a 3m higher Holocene sea level in the upper Spencer Gulf
- provides evidence of the 4m Holocene regional uplift across the upper Spencer Gulf area ('hydro-isostatic upwarping')
- is the best representative of the Spencer Gulf shingle ridges, a feature unknown elsewhere on the Australian continent
- is the longest and most prominent of the three ridges on Spencer Gulf, as well as being least disturbed by human activity
- has a highly unusual double-ridge at its northern end which is yet to be explained by geologists

The combination of material and associated evidence explaining the formation of the stranded Shingle Ridges is not repeated in South Australia. Different elevated beaches and terraces are common around the world but this particular elevated assembly of high-energy-deposited shingles is rare. Two other stranded accumulations of similar material, elevation and dimensions have been recorded along the southern Red Sea coast in Egypt (late Pleistocene) and at Munlochy in north-eastern Scotland (Holocene), but stranded Shingle ridges are unreported elsewhere on the Australian continent.

This place meets this criterion.

(d) it is an outstanding representative of a particular class of places of cultural significance.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

> *The place should be capable of providing understanding of the category of places which it represents. It should be typical of a wider range of such*

places, and in a good state of integrity, that is, still faithfully presenting its historical message.

Places will not be considered simply because they are members of a class, they must be both notable examples and well-preserved. Places will be excluded if their characteristics do not clearly typify the class, or if they were very like many other places, or if their representative qualities had been degraded or lost. However, places will not be excluded from the Register merely because other similar places are included.

As the only example of its type in South Australia, the Stranded Shingle Ridges of the Upper Spencer Gulf are an important representative of their type, with the Ridge at Fitzgerald Bay being an outstanding representative. However, as stranded shingle ridges have not been identified as a class of place of outstanding cultural significance in the context of South Australia, this place is not considered to meet this criterion.

This place does not meet this criterion.

(e) it demonstrates a high degree of creative, aesthetic or technical accomplishment or is an outstanding representative of particular construction techniques or design characteristics.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

The place should show qualities of innovation or departure, beauty or formal design, or represent a new achievement of its time. Breakthroughs in technology or new developments in design would qualify, if the place clearly shows them. A high standard of design skill and originality is expected.

Places would not normally be considered under this criterion if their degree of achievement could not be demonstrated, or where their integrity was diminished so that the achievement, while documented, was no longer apparent in the place, or simply because they were the work of a designer who demonstrated innovation elsewhere.

As a natural feature that has not been augmented or constructed through human activity, the Stranded Shingle Ridge at Fitzgerald Bay is not considered to demonstrate a high degree of creative, aesthetic or technical accomplishment. Similarly, it could not be described as an outstanding representative of particular construction techniques or design characteristics.

This place does not meet this criterion.

(f) it has strong cultural or spiritual associations for the community or a group within it.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

The place should be one which the community or a significant cultural group have held in high regard for an extended period. This must be much stronger than people's normal attachment to their surroundings. The association may in some instances be in folklore rather than in reality.

Places will not be considered if their associations are commonplace by nature, or of recent origin, or recognised only by a small number of people, or not held very strongly, or held by a group not widely recognised, or cannot be demonstrated satisfactorily to others.

There is no evidence of a strong or direct association of the place with the cultural or spiritual beliefs of non-Aboriginal communities or groups.

This place does not meet this criterion.

(g) it has a special association with the life or work of a person or organisation or an event of historical importance.

In considering this criterion, I have had regard to the provided Guidelines for State Heritage Places that note:

> *The place must have a close association with a person or group which played a significant part in past events, and that association should be demonstrated in the fabric of the place. The product of a creative person, or the workplace of a person whose contribution was in industry, would be more closely associated with the person's work than would his or her home. Most people are associated with many places in their lifetime, and it must be demonstrated why one place is more significant than others.*
>
> *Places will not generally be considered under this criterion if they have only a brief, incidental or distant association, or if they are associated with persons or groups of little significance, or if they are associated with an event which has left no trace, or if a similar association could be claimed for many places, or if the association cannot be demonstrated. Generally the home or the grave of a notable person will not be entered in the Register unless it has some distinctive attribute, or there is no other physical evidence of the person's life or career in existence.*

There is no evidence of a strong or direct association of this place with a person, organisation or event of historical importance.

This place does not meet this criterion.

Statement of Geological Designation:

The Stranded Shingle Ridge at Fitzgerald Bay is of high geological significance as it contributes to our understanding of the geological history of South Australia, particularly providing knowledge of coastal and marine development processes resulting from the Quaternary Ice Ages and ancient climatic events.

The Stranded Shingle Ridge at Fitzgerald Bay is unusual in that it –

- consists entirely of sub-rounded pebbles and cobbles
- is slightly inland at an elevated level in relation to the modern shoreline
- is devoid of sand
- contains an abundance of the fossil mollusc, *Anadara trapezia,* enabling a method for estimating the age of the feature
- provides evidence of a 3m higher sea level in the upper Spencer Gulf
- provides evidence of 4m Holocene regional uplift across the upper Spencer Gulf area ('hydro-isostatic upwarping')
- is the best representative of the Spencer Gulf shingle ridges, a feature unknown elsewhere on the Australian continent
- is the longest and most prominent of the three ridges on Spencer Gulf, as well as being least disturbed by human activity
- has a highly unusual double-ridge at its northern end which is yet to be explained by geologists

The combination of material and associated evidence explaining the formation of the Stranded Shingle ridges is not repeated in South Australia. Different elevated beaches and terraces are common around the world but this particular assembly of high-energy-

deposited shingles is rare. Two other stranded accumulations of similar material, elevation and dimensions have been recorded along the southern Red Sea coast in Egypt (late Pleistocene) and at Munlochy in north-eastern Scotland (Holocene), but stranded Shingle ridges are unreported elsewhere on the Australian continent.

BRIEF HISTORY OF PLACE:

Geological history:

Evidence of past variations in sea level around the world associated with the Quaternary Ice Ages are varied according to local geological circumstances. Changes in sea levels can produce beaches, terraces and platforms etc but these can also be removed by marine erosion at different rates and degrees, causing difficulty with interpretation and accurate reconstruction of past events. Tectonic activity at the 'leading' edge of continental plates where the processes of subduction are occurring can produce many changes in land elevation but can also disrupt or destroy such evidence.

In contrast, land masses at the 'trailing' edge of continental plates can be more readily preserved as they are remote from and not subjected to subduction processes and can slowly rise. The southern coastline of Australia including that of South Australia is one of these latter regions where evidence of land elevation changes is well-preserved and can be reliably dated. For example, a series of ancient dune ridges in the South East of the State preserve 13 different shorelines between Quaternary Ice Age phases, with ages determined by magnetostratigraphy and thermoluminescence techniques. These dunes consist of marine calcareous sands, not gravels, pebbles or shingles. The renowned limestone sea cliffs of the Nullarbor Plain have been elevated in a similar way. Uplift of the upper Spencer Gulf area is an explanation for the presence of Stranded Shingle Ridges in combination with past sea level rises.

The ridges range in height from 3-5m and width from 15-30m with broad flat cobble ridgetops, running in sinuous banks for hundreds of metres. The most outstanding and prominent of these, the Fitgerald Bay Stranded Shingle Ridge, runs for ~1.3 kilometres. The abundant presence within these ridges of the fossil mollusc *Anadara trapezia* indicates that these ridges were compiled by marine processes, not terrestrial ones. The source of the pebbles and cobbles, collectively known as 'shingles', is the ancient granites, gneisses and sandstones of the adjacent plateau country immediately to the west. The seas eroded the cobble material from the cliffs and extensively from the alluvial aprons at their base.

Calculations indicate that seas capable of a higher and more energetic wave force than today were necessary for this to occur, implying that the sea level was not only higher at the time but that the sea was also wider. For a period during the mid-Holocene ~5,000 years ago, the sea level was ~3-5m higher above today's levels and at a time of dominant south-easterly wind systems. Thus the sea was capable of delivering an enhanced 'fetch' of wave distance and height to pound the western shingle shores. This is demonstrated by the three locations of the Stranded Shingle Ridges on the west side of Spencer Gulf, facing the earlier higher seas which extended to the southeast on the opposite side of the gulf across the Port Germein flats to the foot of the Flinders Ranges. The example of the large Fitzgerald Bay Shingle Ridge is of the highest integrity to demonstrate these effects.

The age of the Stranded Shingle Ridges is also interpreted from a particular marine mollusc, the sub-tropical *Anadara trapezia*, which lived amongst the shingles in abundance but later became extinct in South Australian waters by natural means when gulf waters were cooler some time in the late Pleistocene. While this mollusc is present in eastern Australia today, its eroded fossils are the only marine shell type contained within these ridges and is therefore a South Australian index fossil which constrains the dates of the Shingle Ridges formation to ~5,000 years ago.

Subsequent lowering of sea levels left the banks stranded above lower, newer shorelines. The open nature of the shingle material prevented sand and soil accumulating with the ridges and they remain unvegetated along the ridgetops and flanks, making some of them prominent to the observer. This is particularly so of the Fitzgerald Bay Stranded Shingle Ridge which is the best and most prominent example. Three small ridges at One Shack Bay and occasional lower-profile occurrences to the north from Blanche Harbour to Commissariat Point show similar features but to a lesser extent, with the northern series obscured by many beach shacks. Recent research (2014) established that regional uplift of the upper Spencer Gulf region has been occurring throughout the Holocene period (12,000-present) and the Shingle ridges formed in the mid-Holocene period, ~5,000 years ago.

The combination of material and associated evidence explaining the formation of the stranded Shingle Ridges is not repeated in South Australia. Different elevated beaches and terraces are common around the world but this particular assembly of elevated high-energy-deposted shingles in a distinct elevated ridge is rare. Two other stranded accumulations of similar material, elevation and dimensions have been recorded along the southern Red Sea coast in Egypt (late Pleistocene) and at Munlochy in north-eastern Scotland (Holocene), but stranded Shingle ridges are unreported elsewhere on the Australian continent.

Post-settlement Human History:

The Fitzgerald Bay Shingle Ridge is the only such ridge in this region sufficiently conspicuous from the sea to be observable. Thus it was identified during the British Admiralty charting of the upper Spencer Gulf area in 1863 and indicated on the chart as ***'Stony Terrace'*** (see map image). At that time, Fitzgerald Bay was originally named Backy Bay.

For a century or so, the culture of establishing seaside shacks has been a feature of South Australia. Increased population and mobility following World War 2 and the industrial development of the Whyalla and Port Augusta regions have contributed to an increase in shack construction along the western Upper Spencer Gulf coast. Tracks, buildings, moorings, small jetties, 4WD and trailbike activities have increased as a result and impacted upon some of the ridges.

Academic geologists observed and interpreted the stranded Shingle Ridges in several papers from 1963-1984. However, their interchangeable terminology describing 'Shingle Ridges' and 'Shingle Beaches' (and even 'Shingle Beach Ridges') has led to confusion between two distinct geomorphic features. Stranded shingle beaches are reasonably common around the world's shorelines but elevated stranded shingle *ridges* are not.

In 2013 the Cultana-Jenkins Shackowners Association submitted an ambit nomination for 'Stranded Shingle Beach Ridges' which included reference to modern shingle beaches to be considered for State Heritage. Basing information on the existing research, the Shackowners Association and related organisations combined efforts to provide interpretation and access signage at several relevant locations, also advising the public that ‘penalties for damage apply under the Geological Monument Act and the Aboriginal Heritage Act’. (There has never been a "Geological Monument Act' in South Australia). The submission links the Shingle Ridges to a more regional indigenous ‘Dreaming Trail’ extending from the Whyalla region to central Australia but no reference is made to specific local indigenous traditions or legends.

Geological timeline:

Years BP	Event
~26,000–18,000	Last Glacial Maximum and lowest sea levels (-125m)
~18,000	Ice age ends and world starts warming again
~18,000–5,000	Subsequent rising of sea levels
~5,000	Sea within Spencer gulf: • rose to 3m higher than today • expanded up to 10km wider in the east and west • eroded boulders and rocks from the edge of the adjacent western plateaus • dragged eroded rocks below the shoreline, forming shingle ridges under the sea
~5,000–2,000	Shingle Ridges exposed and stranded by slight lowering of sea level (3m)
5,000–present	Shingle Ridges exposed and stranded by hydro-isostatic uplift of upper Spencer Gulf region (5m)

Historical timeline

Dates	Event
1802	Upper Spencer Gulf shoreline mapped by Matthew Flinders
1803	More local features named by Freycinet during Baudin's French coastal exploration
1836	Settlement of South Australia
1863	British Admiralty observes and records Fitzgerald Bay Shingle Ridge as ***'Stony Terrace***', inscribed on the nautical navigation chart of Spencer Gulf
1901	Whyalla founded as 'Hummock Hill'
1945–current	Increase in number of Beach shacks being constructed
1982	Construction of Port Bonython oil and gas refinery at nearby Point Lowly (Stony Point)

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- Hails J.R. and Gostin V.A. 1978: Stranded Shingle Beach Ridges, upper Spencer Gulf, South Australia: evidence for high wave energy dissipation during the late Pleistocene. Trans. R. Soc. S. Aust. **102**(6), 169-173.

- Hails, J.R., Belperio, A.P. and Gostin, V.A., 1984. Quaternary sea levels, northern Spencer Gulf, Australia. *Marine Geology*, 61:373-389.

- Murray-Wallace, C. V. 2002. Pleistocene coastal stratigraphy, sea-level highstands and neotectonism of the southern Australian passive continental margin—a review. J*. Quaternary Sci.*, Vol. 17 pp. 469–489.

NAME: Stranded Shingle Ridges **PLACE NO.:** 26443

SITE RECORD:

FORMER NAME:	Stranded Shingle Ridges, Fitzgerald Bay, Upper Spencer Gulf, South Australia. Fitzgerald Bay named Backy Bay by Flinders in 1802. Also named Baie Corneille by Freycinet in 1803.	
DESCRIPTION OF PLACE:	Sinuous elevated gravel-and-pebble bank parallel and just inland of the coastline, extending ~1.3km in length southwards from the Fitzgerald Bay shack community.	
DATE OF COMPLETION:	Estimated at ~5,000 years ago during the mid-Holocene epoch	
LOCAL HERITAGE STATUS:	**Description:**	Not listed
	Date:	
REGISTER STATUS:	**Description:**	Nominated for the South Australian Heritage Register
	Date:	06 May 2015
CURRENT USE:	**Description:**	Reserve
	Dates:	Developed from WWII
PREVIOUS USE(S):	**Description:**	None
	Dates:	None
ARCHITECT:	**Name:**	None
	Dates:	None
BUILDER:	**Name:**	None
	Dates:	None
SUBJECT INDEXING:	**Group:**	Insert Group Type
	Category:	Insert Category Type
LOCAL GOVERNMENT AREA:	**Description:**	Whyalla Council
LOCATION:	**Description**	Upper Spencer Gulf, particularly in the area of Fitzgerald Bay.
LAND DESCRIPTION:	D55504 A124, D53874 A17, D53874 A112, D53874 A90, D53874 A11	

NAME: Stranded Shingle Ridges **PLACE NO.:** 26443

0 5 10 kms

LOCATION PLAN STRANDED SHINGLE RIDGES, Upper Spencer Gulf **N ↑**

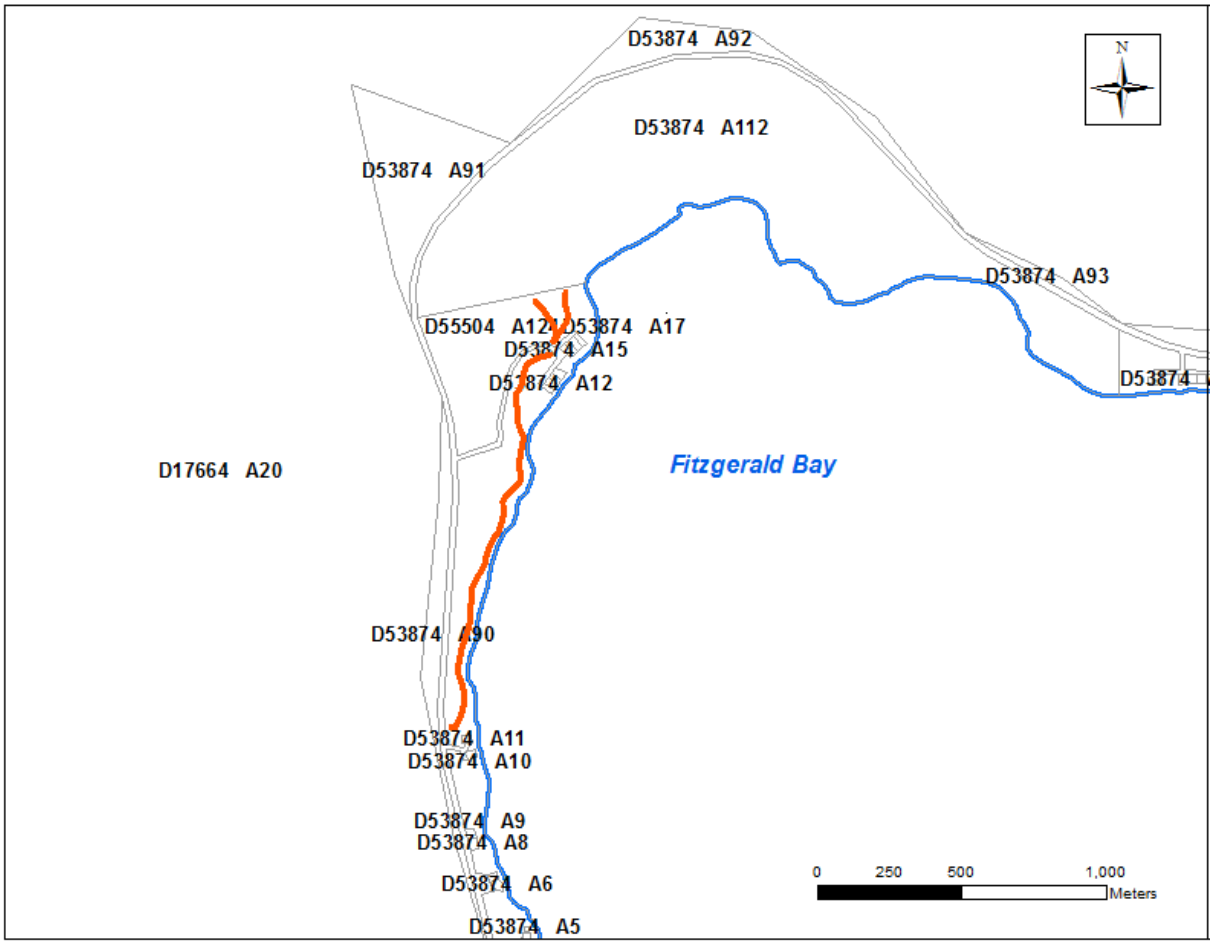
LEGEND

Proposed boundary of place

Other shingle ridges not included in proposed place

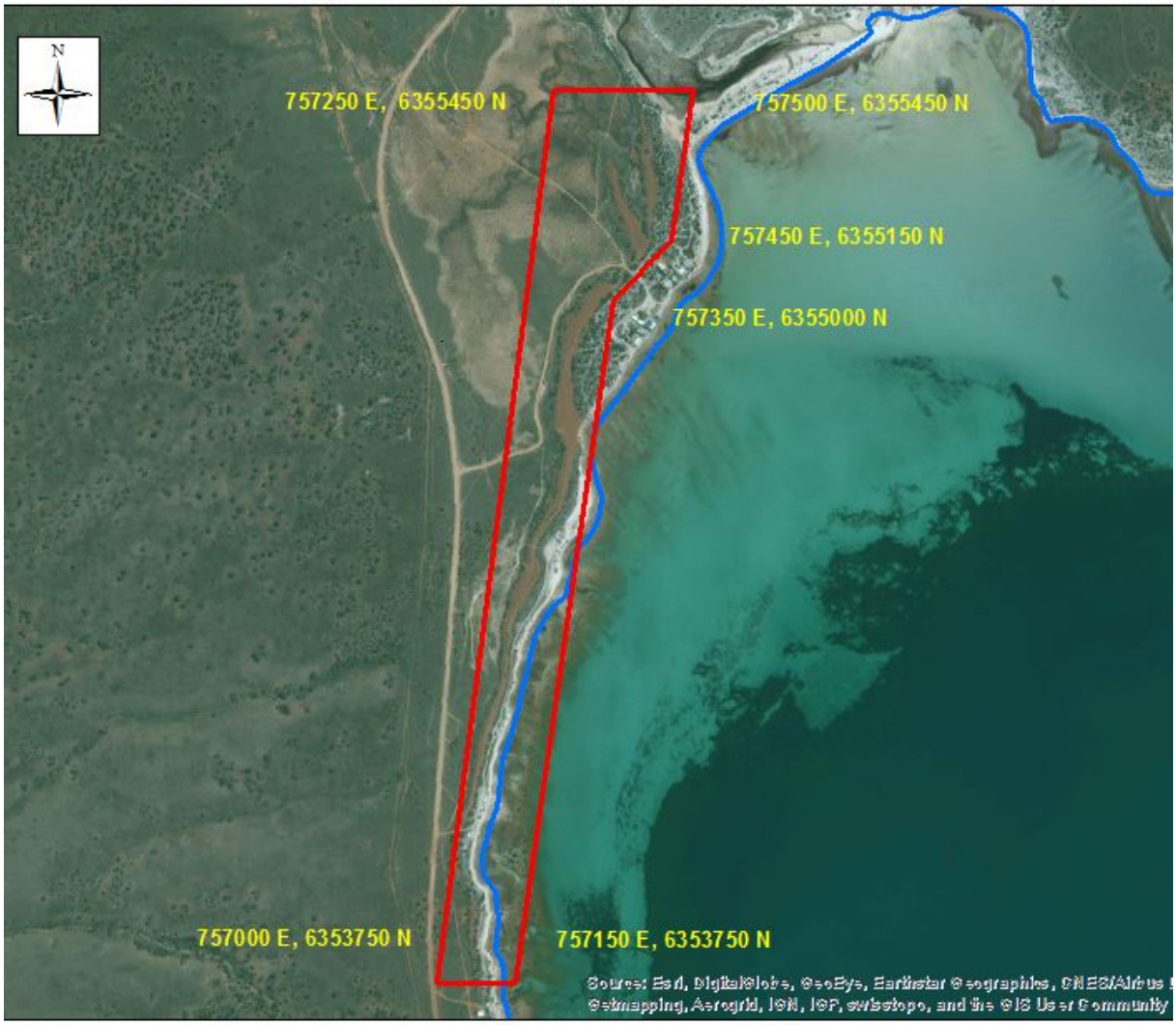
See detail plans for exact location of stranded Shingle Ridges.

NAME: Stranded Shingle Ridges **PLACE NO.:** 26443



PLAN SHOWING LOCATION OF PARCELS: FITZGERALD BAY (HIGH SIGNIFICANCE: ORANGE)

Upper Spencer Gulf Shingle Beach State Heritage Nomination
Fitzgerald Bay Shingle Ridge - proposed linear boundary

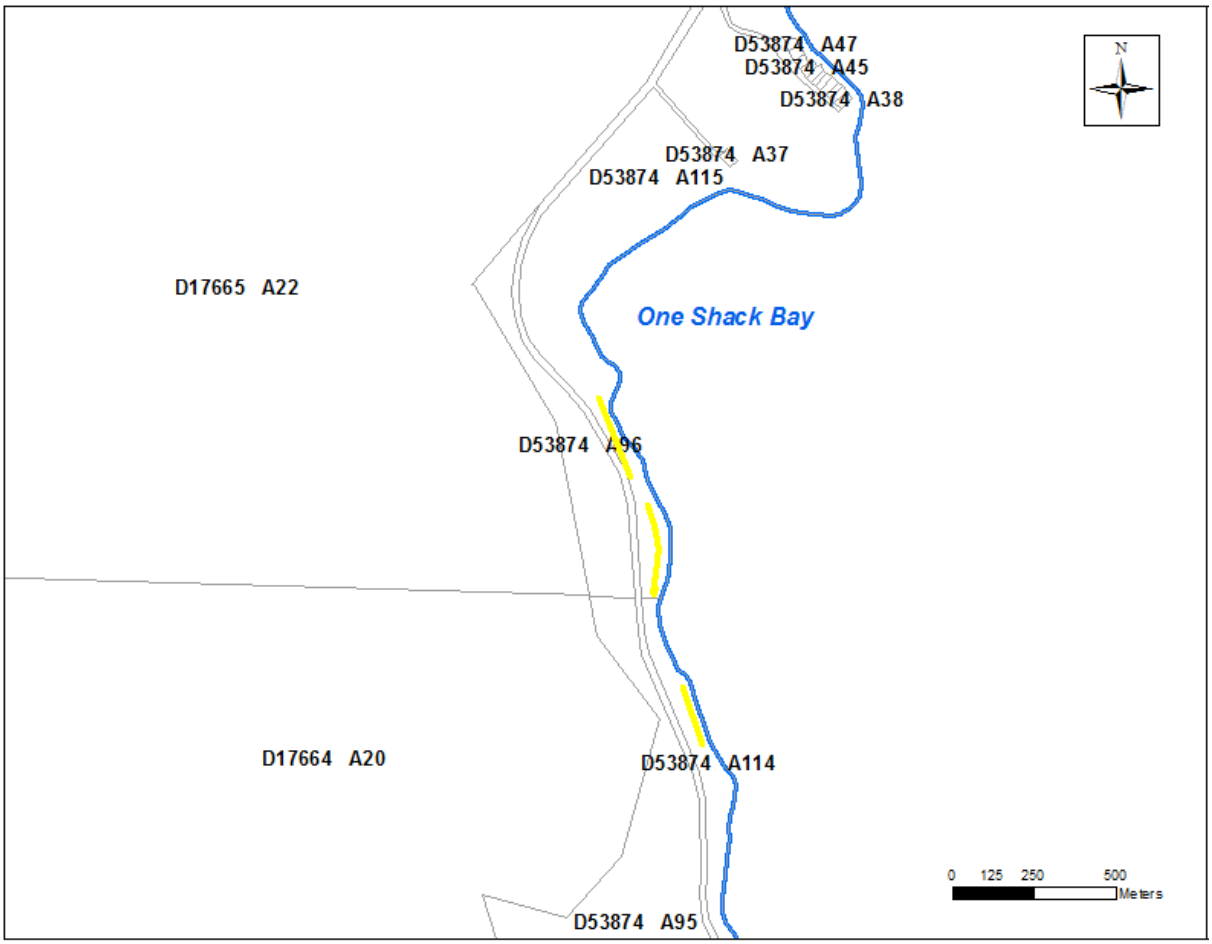


Map Projection: Lambert Conformal Conic Geocentric Datum of Australia
Map Datum: GDA94
Date: December 2014

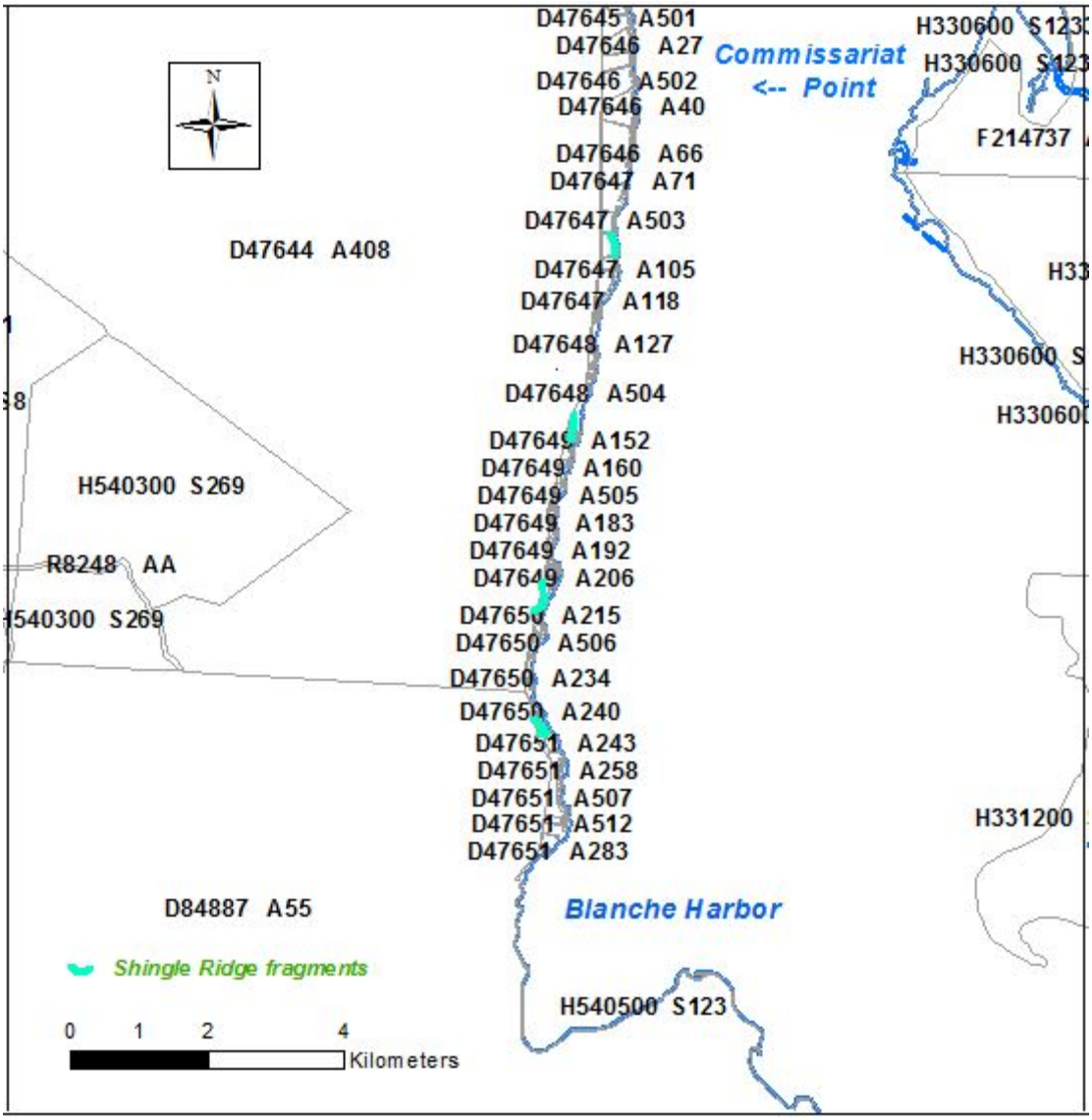
Science, Monitoring and Knowledge
Assessment and Advice Team

0 0.25 0.5 1
Kilometers

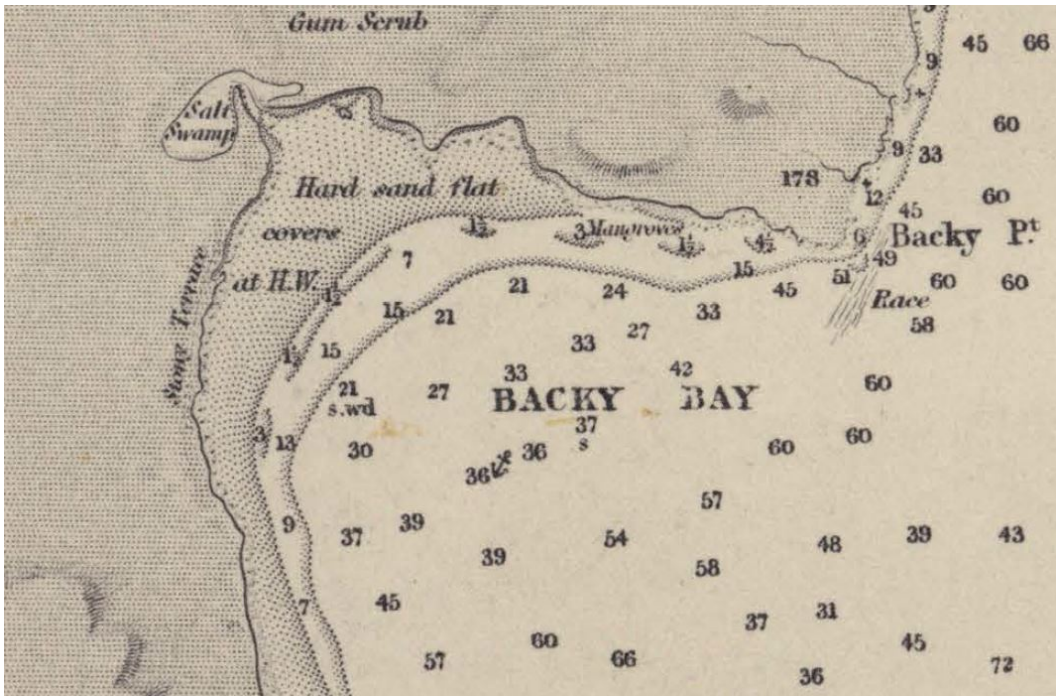
NAME: Stranded Shingle Ridges **PLACE NO.:** 26443



DETAIL PLAN: ONE SHACK BAY FORMATION (NOT INCLUDED IN PROPOSED LISTING)



DETAIL PLAN: RIDGE FRAGMENTS BETWEEN BLANCHE HARBOUR TO COMMISSARIAT POINT FORMATION (NOT INCLUDED IN PROPOSED LISTING)



The Fitzgerald Bay Shingle Ridge was the only such ridge in this region sufficiently conspicuous from the sea to be observable. Thus it was thus identified during the 1863 Admiralty charting of the area as 'Stony Terrace' (see map image) when Fitzgerald Bay was named Backy Bay.

Fitzgerald Bay and Stranded Shingle Ridge, Upper Spencer Gulf, looking north. The ridge is the dark brown sinuous line in the middle of the image, running parallel to and just left of the coastline and finishing near the Fitzgerald Bay shack community. It is ~1.3 kms long. Almost all tracks go around the feature, not across it, ensuring that it is the best-preserved of all similar ridges along the gulf coastline. The map on page 12 above shows its relationship to land parcel boundaries.

Fitzgerald Bay, upper Spencer Gulf, looking northeast to the southern Flinders Ranges. The beach area above is shown close up in the image below which looks southward.

Sand, pebbles and a broad cobble beach stabilised by mangroves have shacks built just above the beach line at Fitzgerald Bay. These pebble beaches are not to be confused with the stranded Shingle Ridge itself which is out of the photo behind the shacks to the right and reaches the height of the shack roofs.

Compound view of the Fitzgerald Bay Stranded Shingle Ridge looking east. It is the long orange ridge from left to right and is set a little back from the true shoreline but obscures it due to the ridge's 5m height. In the foreground, the car is on the bitumen road on the flats while the tops of several caravans at some of the campsites appear above the ridgetop as they are located on the coastal slopes of the stranded ridge itself.

Compound image along the top of the Fitzgerald Bay Stranded Shingle Ridge near its northern end, looking north towards the hills from which the original rock was eroded by a higher level mid-Holocene sea. The ridgetop is 8m above the surrounding landscape and appears like a broad natural highway. Some vegetation colonises the sideslopes but cannot grow along the ridgetop as no sand or soil is trapped within the shingles.

Close-up image of the shingles in the Fitzgerald Bay Stranded Shingle Ridge. Their shape is described by geologists as 'subrounded'. This is likely to have resulted from two processes – stream erosion at the base of the cliff source followed later by wave action abrasion from the rising sea during the ridge-building process.

Although no shells are evident in the photo above, the stranded Shingle Ridges contain an abundance of the fossil mollusc *Anadara trapezia,* also known as the Sydney Cockle (below) which has been used to date the ages of the ridge-building to the mid-Holocene, ~5,000 years ago.

Anadara trapezia (Deshayes, 1839)
Type: syntype
By: H.Barlow
Australian Museum

Image credit: Sue Boyd / Museum Victoria

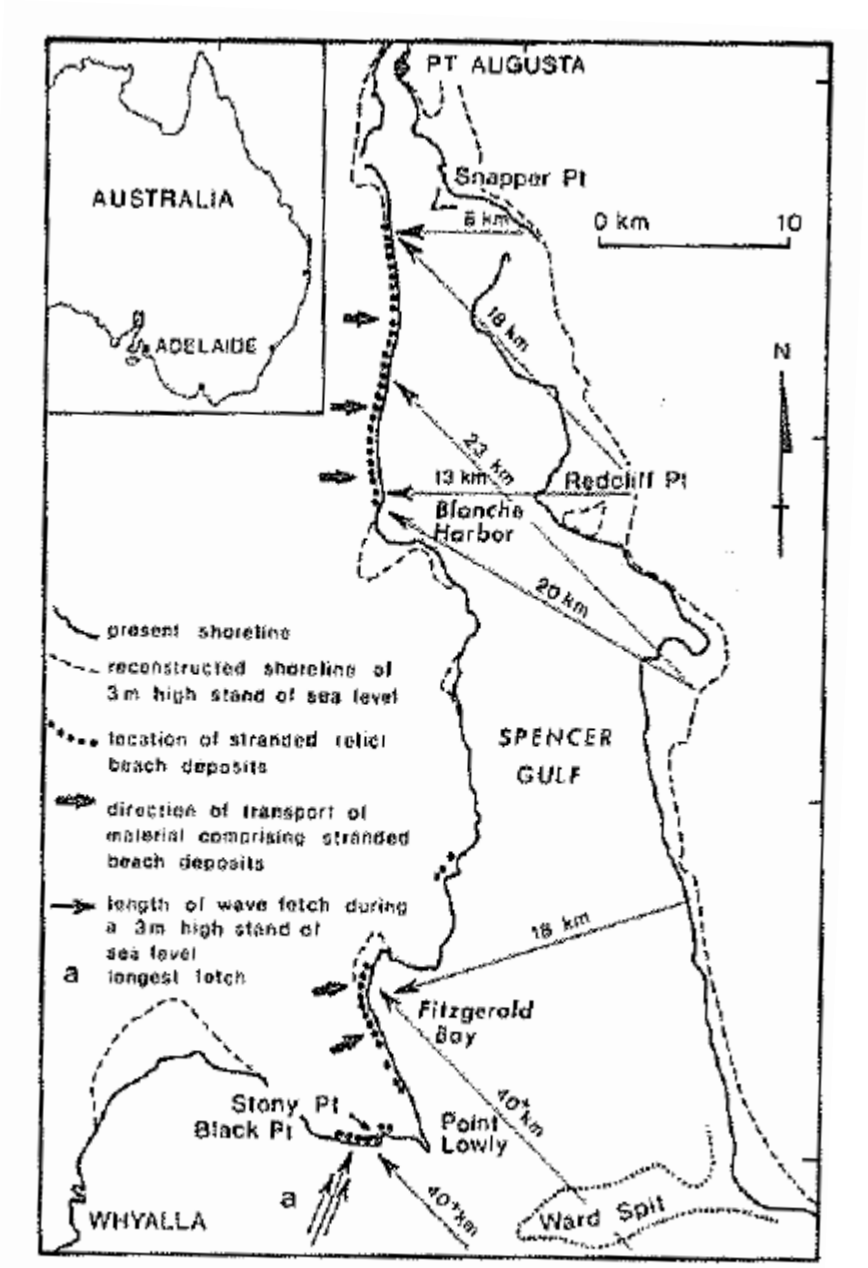
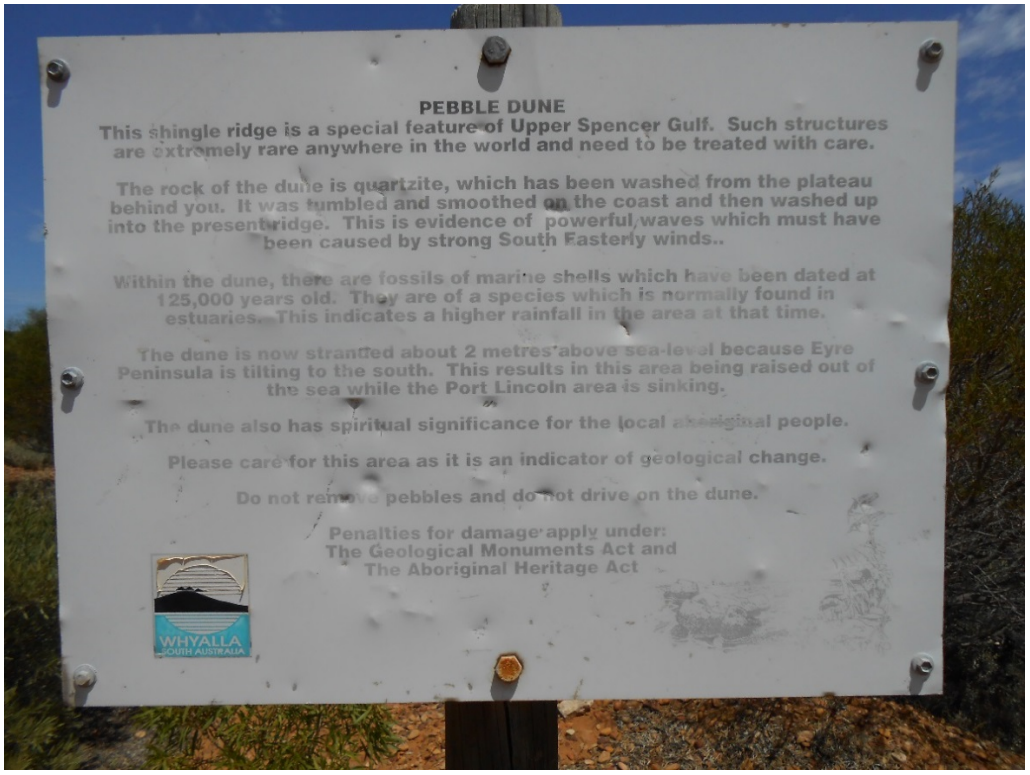


Fig. 1. Generalized map of upper Spencer Gulf to show distribution of stranded beach deposits and maximum fetches during a +3 m-high stand of Pleistocene sea level.

Map extracted from a research paper (Hails and Gostyn 1978) identifying a combination of shingle beaches and shingle rides (described collectively in the key as 'stranded relief beach deposits') in the upper Spencer Gulf. The dashed lines indicate the wider sea width when it was ~3m higher. Arrows indicate the expanded wave 'fetch', particularly from the southeast (beyond the map boundary). Stronger southeasterly winds were more prevalent during the period of ridge-building and due to its geographic location, Fitzgerald Bay was particularly exposed to these winds and heavy seas. Recent research (2014) has established that these processes and associated regional uplift occurred during the mid-Holocene period, ~5,000 years ago.

Geological interpretive signs at different locations along the Fitzgerald Bay Stranded Shingle Ridge – near a camping and caravan park (above) and next to one of the very few tracks across the ridge to nearby shacks (below). The Cultana-Jenkins Shackowners Association teamed with geological advisers to design and place these signs in areas where the few access tracks to the beach cross the ridge to maximise public awareness of the ridge and promote its preservation and protection.



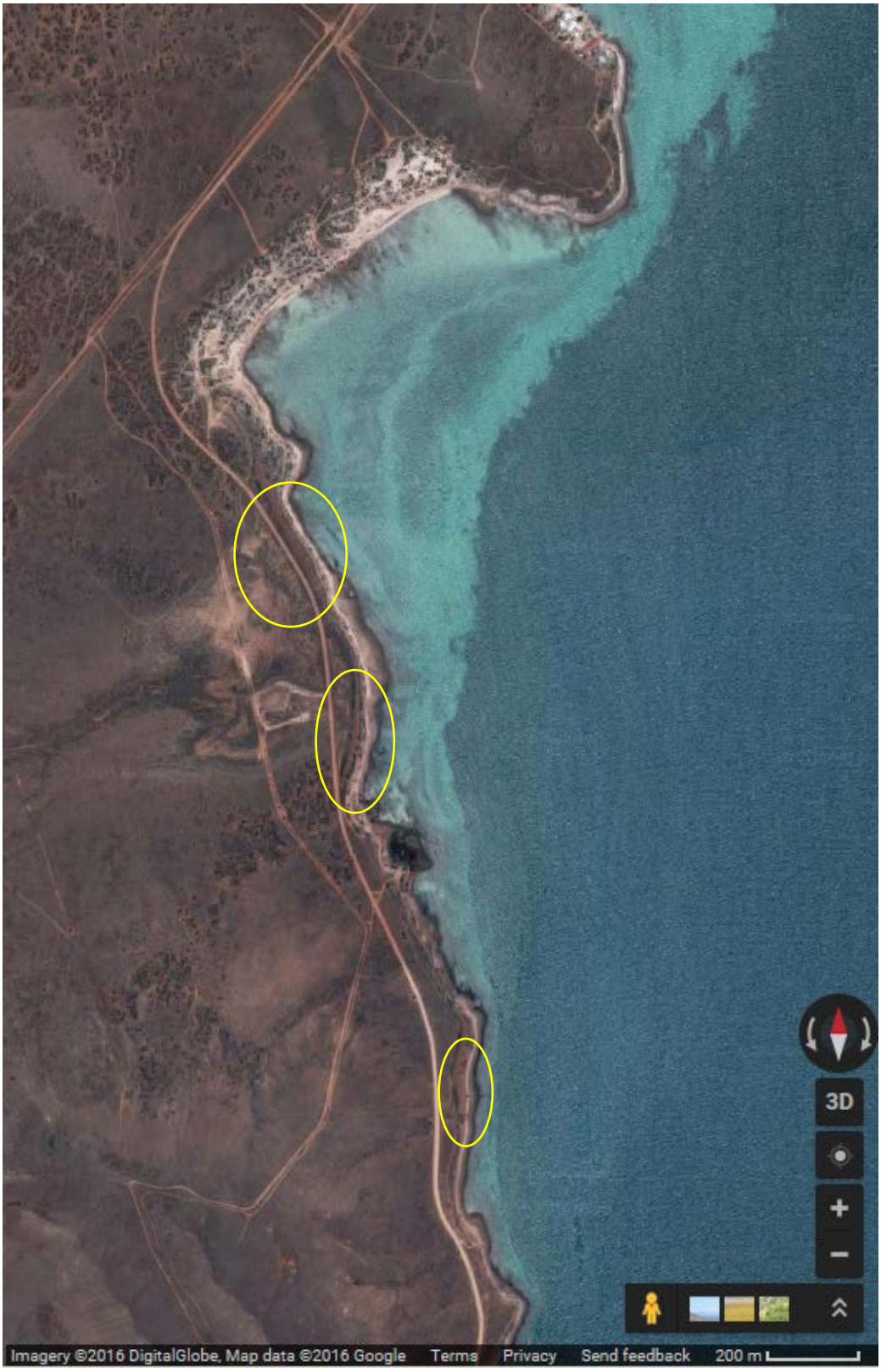
Vehicle tracks along the top of the Fitzgerald Bay Stranded Shingle Ridge leading between shacks and a campground. There are no signs or barriers on the ridgetop itself to discourage vehicles or educate their drivers. The shingles are strong and compact and can unfortunately provide an effective driving surface. On inspection, these vehicle tracks did not appear to be random or deliberately destructive; rather, just another direct route between sites of interest in what the drivers may regard as 'responsible use'.

Track access constructed across the Fitzgerald Bay Shingle Ridge to access a campground (above) and shacks (below). Both have signs of different types.

The right-hand sign below states ‘Geological Site – No vehicles – Penalties apply’.

Bitumen road, power pole, Fitzgerald Bay Stranded Shingle Ridge and caravans all within 100m of each other, southern Fitzgerald Bay

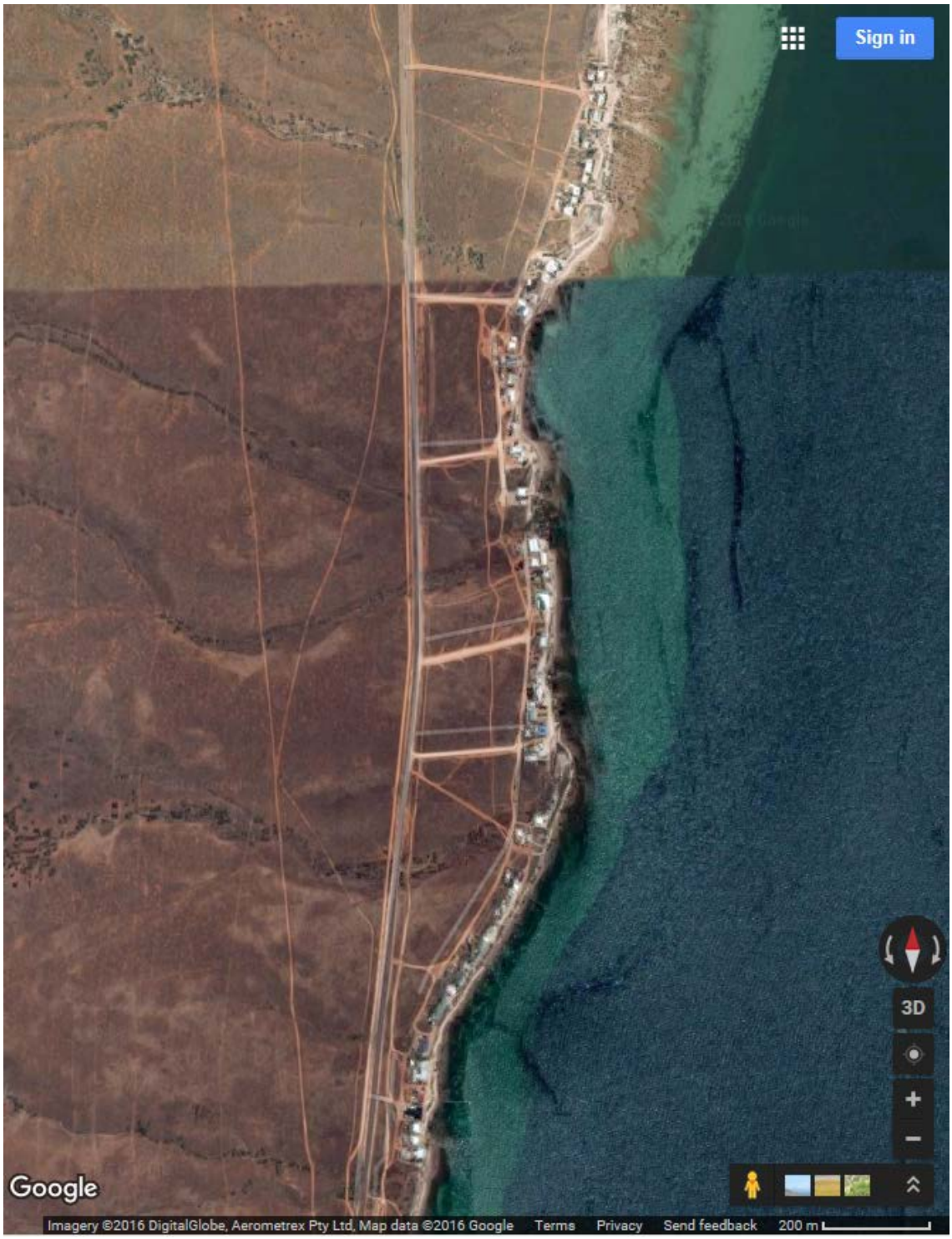
Campground vehicles and shacks adjacent to ridgetop



Three smaller separate stranded Shingle Ridges just south of One Shack Bay, between Douglas Point and Crag Point. These are similar to the large prominent ridge at Fitzgerald Bay but are further north along the coast and are of moderate significance (not included in proposed listing).

Closely-built shacks abutting the indistinct and naturally fragmented northern Shingle Ridge in the region of Commissariat Point, approaching Port Augusta. Elements of the ridge can be seen where it merges into the beach itself. Multiple tracks access the shacks from the bitumen road. Shack fronts, sheds and carparks face onto the ridge which is crossed by an access track to a small jetty. The extent of this built-up area is shown in the large image below (not included in proposed listing).

NAME: Stranded Shingle Ridges **PLACE NO.:** 26443



Continuous shack construction along the stranded Shingle Ridge foreshore between Blanche Harbor and Commissariat Point approaching Port Augusta in the far northern reaches of Spencer Gulf. A bitumen road and multiple side tracks provide easy traffic access to the congested coastline. Natural elements of the shingle ridges are indistinct and fragmented, located in obscure low-profile patches close to the shacks on the landward side. They occur occasionally for short lengths in the ~10kms between Blanche Harbour and Commissariat Point but are rated as of low significance due to the proximity and influence of the built environment which abuts them (not included in proposed listing).

Typical Shingle Ridge in northern region between Commissariat Point and Blanche Harbour - low profile, generally vegetated, small and/or obscure exposed patches. Unbuilt areas like this are limited along the northern sector. (not proposed for listing)

Partially-excavated low-profile shingle ridge and shack development between Commissariat Point and Blanche Harbour (not proposed for listing)

Shed build on low-profile shingle ridge remnant between Commissariat Point and Blanche Harbour (not proposed for listing)

Shacks and track on remnant low-profile shingle ridge between Commissariat Point and Blanche Harbour (not proposed for listing)