



**Jim's Plain & Robbins Island**  
Renewable Energy Parks

## Robbins Island Renewable Energy Park

### Appendix S

# Preliminary Geoconservation Assessment

*UPC Robbins Island Pty Ltd*



**PRELIMINARY GEOCONSERVATION ASSESSMENT OF PROPOSED  
ROBBINS ISLAND RENEWABLE ENERGY PARK, TASMANIA**

A Report Prepared for GHD Australia by Macquarie University

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## Contact Information

Contact Information	
Contact Name	A/Prof Ian D. Goodwin
Address	Department of Environmental Sciences   Room 414 12 Wallys Walk, Macquarie University, NSW 2109, Australia
Email	Ian.Goodwin@mq.edu.au
Phone	+61 2 9850 8354

PRELIMINARY GEOCONSERVATION ASSESSMENT OF PROPOSED  
ROBBINS ISLAND RENEWABLE ENERGY PARK, TASMANIA

1. INTRODUCTION

UPC Robbins Island Pty Ltd has submitted a permit application under the Land Use Planning and Approvals Act 1993 to undertake a wind energy project on Robbins Island, off the north-west coast of Tasmania, known as the Robbins Island Renewable Energy Park. The Marine Climate Risk Group at Macquarie University was engaged to undertake a preliminary assessment of the geoconservation potential from the range of geodiversity on Robbins Island. This preliminary assessment is based on the ongoing 'Bass Strait Paleo-Sea-Level Project' undertaken by Chief Investigators A/Prof Ian Goodwin (Macquarie University) and Dr Mick O Leary (Curtin University) as part of their Australia-wide research project on 'Last Interglacial Ice sheet collapse, sea-level rise and Australian coastal response' funded by the Australian Research Council.

This preliminary assessment of geoconservation impacts is based on a survey of the geodiversity of geomorphology, soils and landforms, and the inherent archive of geohistorical indicators of past sea level change, wave direction change and sediment supply, and coastal evolution for north-west Tasmania. The terminology and approaches used in this assessment follow those summary guidelines published by: (i) Houshold and Sharples (2008) and the extensive references contained within; and, (ii) the Tasmanian Indicative Sensitivity Scale for Geoconservation Values, and Tasmanian Geoconservation Database (<https://dpipwe.tas.gov.au/conservation/geoconservation/tasmanian-geoconservation-database>).

Geodiversity is assessed on the basis of its significant research and educational values of geoheritage, in addition to its significance as part of the natural heritage of the north-west Tasmanian and Bass Strait region.

2. ROBBINS ISLAND GEOHERITAGE AND EXISTING GEOSITES

Robbins Island contains a rich archive of geoheritage, particularly its extensive Quaternary sand ridge plain, and the Robbins Passage and Walker Channel tidal deposits. The Robbins Island sedimentary environment is part of a continuum of sites from Circular Head, across the western Bass Strait Islands, including Hunter

Island and Three Hummocks Island. Robbins Island contains the richest Quaternary sedimentary archive in western Bass Strait, together with King Island.

Previous evaluations of geodiversity have resulted in 4 locations on Robbins Island listed as Geoconservation Sites on the Tasmanian Natural Values Atlas. These are: (i) Remarkable Banks Pleistocene Beach Ridge Complex Geosite 2457; (ii) Robbins Passage Tidal Channel System Geosite 2464; Back Banks –Walker Island Geosite 2445, and, (iv) Guyton Point Aquagene Lavas Geosite 2155. (Dixon, 1996). The Geosite nominations and listings were based on aerial surveillance photography and field surveys conducted during the 1980's (van de Geer, 1981).

- Remarkable Banks Pleistocene Beach Ridge Complex Geosite 2457 is defined as: 'Extensive inland area (>14 sq km) of beach ridges and linear wetlands, Robbins Island'; and its significance is stated as 'the most extensive and best preserved example of a Pleistocene beach ridge complex in Tasmania the Remarkable Banks have significant value as a relatively undisturbed representative reference site'.
- Robbins Passage Tidal Channel System Geosite 2464 is defined as: 'Littoral landforms of the entire area between Robbins Island and mainland Tasmania, also to Walker Passage'; and its significance is stated as: 'The littoral system of Robbins Passage is considered to have outstanding reference value due to its size and complexity'.
- Back Banks - Walker Island Dunes Geosite 2445 is defined as: 'a 10+ km long dune complex behind Ransonnet Bay beaches, Robbins and Walker Islands' and its significance is ' a notable example of type'.
- Guyton Point Aquagene Lavas Geosite 2155 is defined as: 'Coastal exposures of basaltic rocks west (in particular) and south of Guyton Point', and 'Basaltic pillow lavas and laminated vitric volcanoclastic sediments occur around Guyton Point, with "megapillows" further west and massive lavas to the south. Two submarine centres of eruption, northeast and southeast of Robbins Island, are indicated'; and its significance is stated as: 'Notable example of type'.

### 3. EXISTING RESEARCH AND ONGOING STUDIES

Since 2015, the Marine Climate Risk Group at Macquarie University has lead a research program on modern coastal processes and the geological evolution (Tertiary and Quaternary) of Robbins Island. To facilitate this research an aerial LiDAR survey of the island and nearshore was contracted to Airborne Research Australia. The

resulting 0.5 m LiDAR DEM has served as a base map for the research (shown in Figure 1, after Goodwin et al., 2018 in prep). Field surveys have been conducted on the island since 2015 and have resulted in the geomorphic mapping of Robbins Island, Walker Island and the Robbins Passage. In addition, a total of 30 sand samples have been dated using Optically Stimulated Luminescence dating, together with another 10 samples awaiting analysis, to provide a geochronology for the Quaternary coastal evolution. Holocene (<10,000 years Before Present B.P.) and Last Interglacial age (130,000 to 116,000 years B.P.) shell deposits have been collected for age dating. Ground Penetration Radar surveys have been completed over 2 km of lines along the mid to outer zone of the Remarkable Banks. Three excavations have also been made on the Remarkable Banks to map the internal stratigraphy. Surface sand samples have been collected across the island and Robbins Passage for grain size analysis. The Walker Island - Back Banks Dunes and extending to Second Bluff have been mapped and a number of relict foredunes have been dated with OSL and radiocarbon methods. These dates indicate an evolution spanning the mid-late Holocene. A traverse of White Rock Ridge has also been made to investigate high-level paleo shorelines evident in the LiDAR DEM. During 2019/2020 more detailed geomorphic mapping, and sub-surface investigations using GPR and coring will be made across the Remarkable Banks and along the west coast from Cape Buache on Walker island to Bird Point to Kangaroo Island. The first research paper is currently in preparation for publication (Goodwin et al., in prep) that presents the geomorphological and sedimentological mapping and an interpretation of the Quaternary evolution of Robbins Island and region; including, paleohydrography and coastal evolution, sea-level and wave climate history, and sand supply.

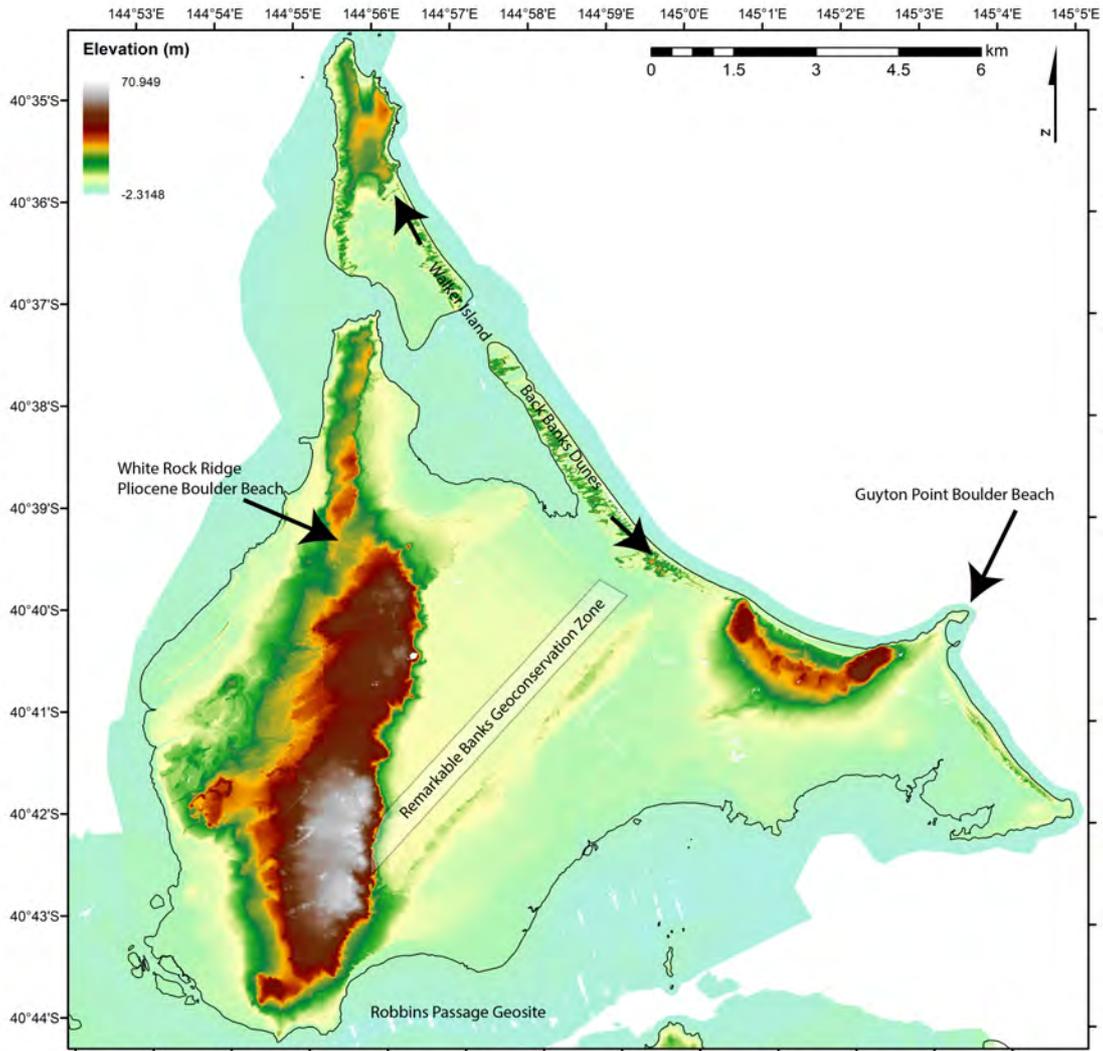


Figure 1 LiDAR Digital Elevation Model showing principal Geosites and Geoconservation zones (after Goodwin et al, 2018 in prep).

#### 4. REASSESSMENT OF GEODIVERSITY

The ongoing MQ research program has produced a detailed understanding of the evolution of Remarkable Banks and its national and international significance as a unique Geosite containing an archive of evolution during the last 2 glacial cycles (since 220,000 years B.P.) and Quaternary sea-levels and wave climate. Anthropogenic modification of the Remarkable Banks natural attributes is minimal despite fire management, conversion to pasture over the outer half and overall network of earthworks to construct a channelized drainage scheme. The integrity of the Geosite attributes has been maintained. The form, tidal processes and intertidal/subtidal ecosystems along the Robbins Passage Geosite have been

preserved in their natural state. Channel bank erosion and shoreline erosion is evident along the Montague to Welcome Inlet coast.

Our field work has also identified 2 new Geosites on Robbins Island:

- an extensive basalt boulder beach flight sequence at Guyton Point that spans the Last Interglacial (130,000 to 116,000 years B.P.) and the mid to late Holocene periods (since 6,000 years B.P.). The location of this Geosite partially overlaps with the existing Guyton Point Aquagene Lavas Geosite 2155. The Guyton Point boulder beach is rare continuous flight of boulder beaches along the Southern Australian coast, formed during a sea-level regression; and,
- a high-level quartz pebble and boulder beach formed on a wider paleo-tombolo feature at the northern edge of White Rock Ridge. The beach spans the 24-28 m elevation range and by stratigraphic correlation with equivalent features on Flinders Island we attribute a Pliocene age for this feature. The 4wd track from White Rock Ridge north towards Walker Island is located along the boulder beach berm. Minimal disturbance to the natural attributes has occurred. This beach and embayment is potentially a significant site to reconstruct the highest Pliocene sea-levels. MQ research team is currently attempting to provide a geochronology for the formation.

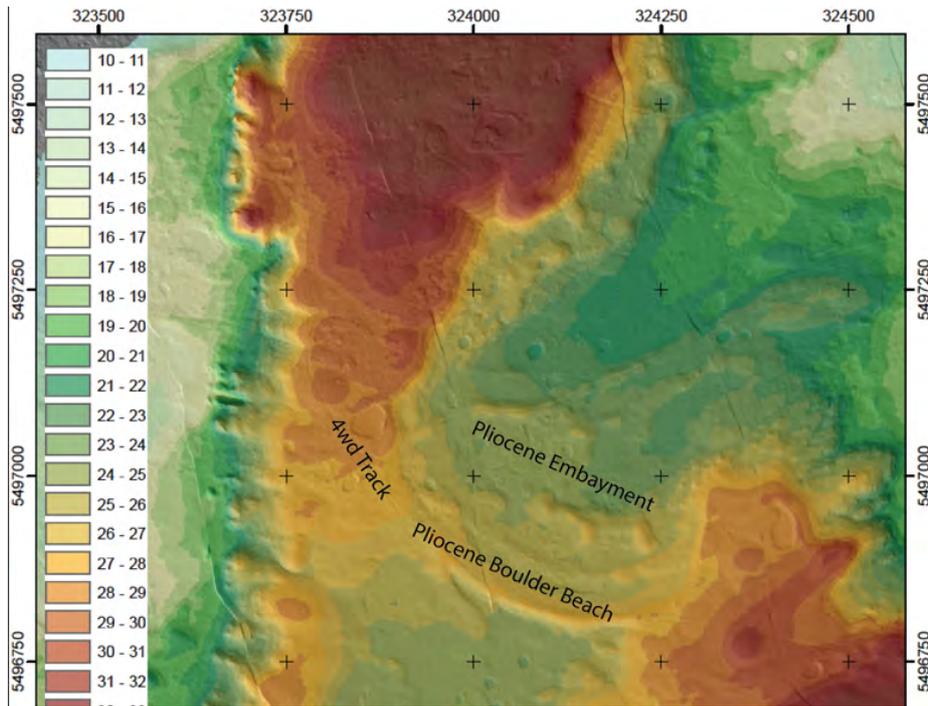


Figure 2 LiDAR Digital Elevation Model showing White Rock Ridge, Pliocene boulder beach and embayment (after Goodwin et al, 2018 in prep).

## 5. GEOCONSERVATION RECOMMENDATIONS

With respect to the development of the Robbins Island Renewable Energy Park, we make the following mitigation or offset measures to be included in the DPEMP.

- *Remarkable Banks Pleistocene Beach Ridge Complex Geosite 2457*

At the conclusion of the current coastal geology research project conducted by MQ, we will be able to provide a high resolution geomorphic map based on the LiDAR Digital Elevation Model (DEM) of the entire 14.9 km<sup>2</sup> Remarkable Banks site. In addition, subsurface sedimentology and Quaternary coastal evolution interpretation constrained by up to 50 OSL dates will be available.

There is potential that the conservation of the natural attributes and the related geoscientific archive will be degraded by development, since the values are sensitive to damage by higher intensity shallow linear impacts, depending upon their precise position. The Remarkable Banks contains sand ridge and wetland features whose values would be degraded by vehicular tracks, minor road construction, or excavation of ditches or trenches.

Hence we recommend the preservation of a 100 m wide corridor across the full width of the Remarkable Banks. We have outlined an envelope of ~200 m wide where a suitable Remarkable Banks Geoconservation Zone could be located, in Figure 3, that is bounded by the following coordinates: 40°42' 13.39"S, 144°55' 21.17" E, 40°40' 07.0"S, 144°58' 20.51" E, , 40°40' 15.67"S, 144°58' 25.21" E, 40°42' 35.65"S, 144°55' 06.95" E.

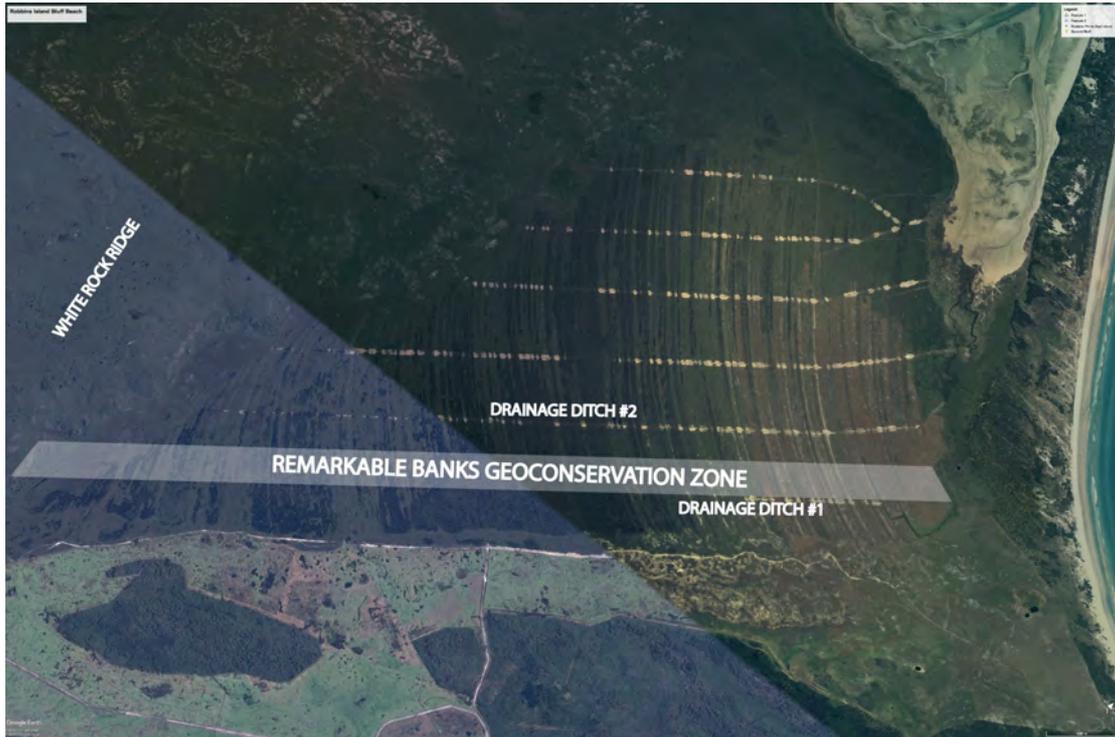


Figure 3 Proposed Remarkable Banks Geoconservation zone (Image: Google Earth).

- Guyton Point Boulder Beaches and Aquagene Lavas Geosite 2155

The highest geoscientific values are located on the north-eastern and northwestern sides of Guyton Point (Figure 4). We recommend that these beaches are excluded from excavation and major removal of geo-material, or construction.



Figure 4 Proposed Guyton Point Geoconservation zone (Image: Google Earth).

- White Rock Ridge Pliocene Boulder Beach and embayment

The geoscientific values are significant and extend north-east from the paleo-berm downslop to include the paleo-embayment (Figure 5). We recommend that these beaches and embayment are excluded from excavation and major removal of geo-material, or construction. We also suggest a re-routing of the track if it is to be used by vehicle other than 4wd. We have outlined a suitable Geoconservation Zone, that is bounded by the following coordinate string: 40°39' 27"S, 144°54' 54" E, 40°39' 35.6"S, 144°55' 02" E, 40°39' 39.5"S, 144°55' 10" E, 40°39' 38.5"S, 144°55' 17" E, 40°39' 34.5"S, 144°55' 17.5" E, 40°39' 26.9"S, 144°54' 57.7" E.

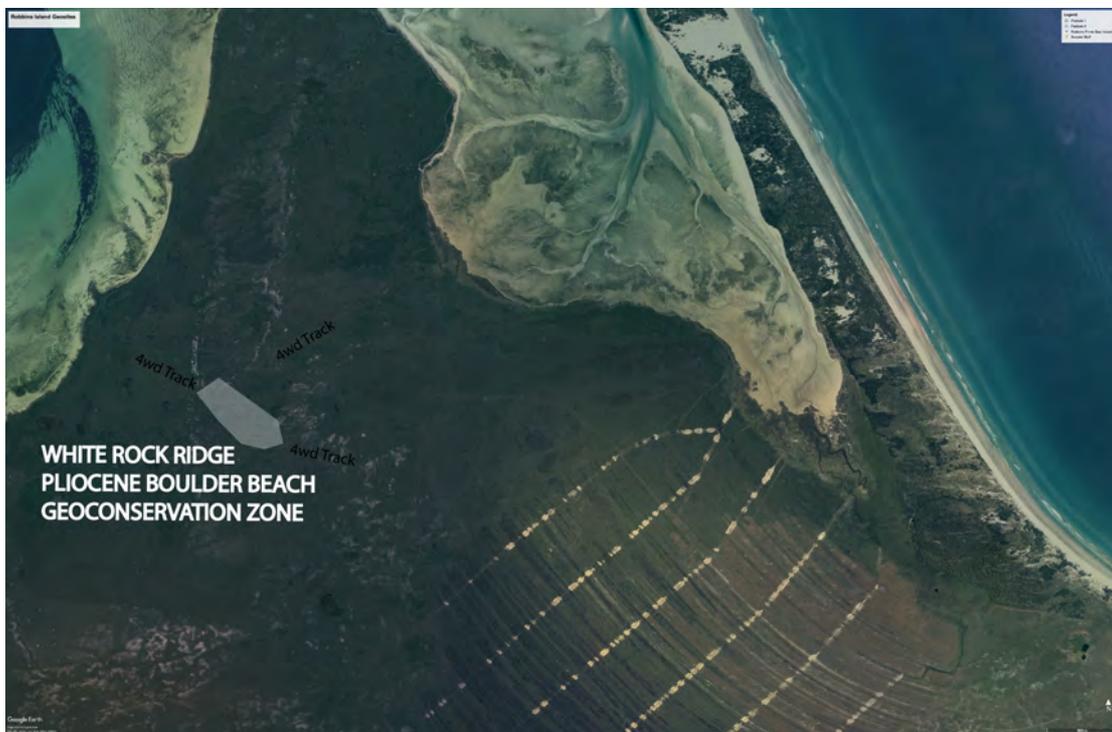


Figure 5 Proposed White Rock Ridge Pliocene boulder beach and embayment Geoconservation zone (Image: Google Earth).

- Robbins Passage Tidal Channel System 2464

The geoscientific values of Robbins Passage have previously been defined as significant and extend along the full-length of the passage. We recommend that the geomorphology and tidal flow be maintained as close to natural by using any construction and earthworks designs that minimise the impact to tidal flow, particularly localised tidal current increases, changes to the tidal prism and diversion of flow towards the shorelines.

- Walker Island - Back Banks Dunes Geosite 2445

The geoscientific values of the Holocene dunefield bordering the Seven Mile Beach from Walker Island – Back Banks – Second Bluff have previously been defined as significant as a notable coastal type. In the zone between the proposed landing site and Second Bluff, we have discovered that the relict foredunes overlie an older suite of basalt boulder ridges that mark the early Holocene and late Quaternary shoreline evolution as shown below in Figure 6. The proposed road from landing site to Remarkable Banks is located at the western end of this zone. We suggest that area to the east of the road be a potential Geoconservation Zone. During road construction it would be advantageous for a geoscientist to record the dune stratigraphy and obtain sample for both OSL and radiocarbon dating. The zone of interest is broadly outlined by the following coordinate string: 40°39' 52.6"S, 144°58' 56.7" E, 40°40' 27.1"S, 144°59' 59" E, along the beach.

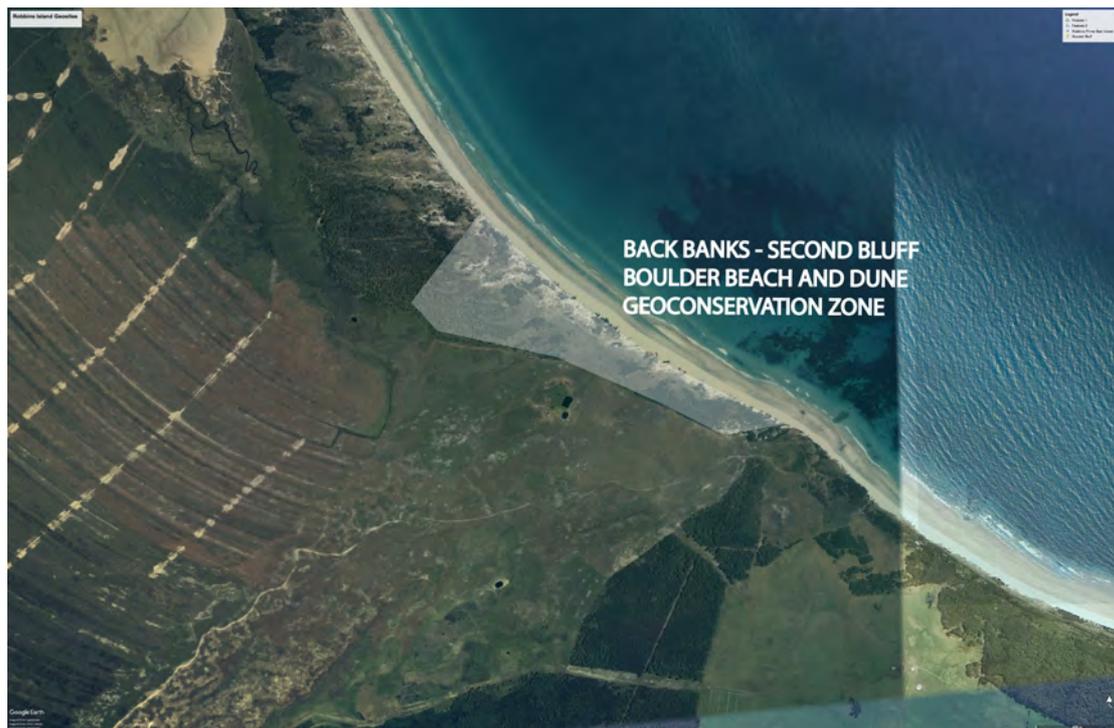


Figure 6 Proposed Geoconservation zone within the Walker Island - Back Banks Dunes Geosite (Image: Google Earth).

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