Lidia Ryan

From: Gildas Colleter [redacted]
Sent: Friday, 29 March 2019 12:02 PM
To: Michael Holland
Cc: Daniel Rodger
Subject: Accepted: Initial meeting for 'Marine Foreshore Concept Plan Development' - Amity Point and Rocky Point, Russell Island.

Hi Michael,

Dan and I will be there at 2pm for the kick off meeting.

Thank you again for trusting us with this work.

Thanks and regards,

g.

image001.jpg

Gildas Colleter
CPEng, RPEQ

Technical Director | Jeremy Benn Pacific (JBP)
Suite 01, 477 Boundary Street, Spring Hill QLD 4000 Australia
T +61 (0) 730 857 469 **M** [redacted]

image002.gif image003.gif

www.jbpacific.com.au

please don't print this email unless you really need to

G.

Lidia Ryan

Subject:	Tentative Foreshore erosion inspection
Location:	Sandy Beach, Russell Island & Rocky Point
Start:	Thu 13/06/2019 10:00 AM
End:	Thu 13/06/2019 3:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Michael Holland
Required Attendees:	Wayne Matthews
Optional Attendees:	Alistair Michell

Hi Wayne,

The vehicle is booked on to the 10:30am barge over to Russell Island, returning at either 2:15, or (alternatively) 1pm, if required.

Assess current erosion hazard / maintenance options

Low-tide at 1:17pm
Vehicle booked 9am – 3pm
Ferry booking
Wayne to confirm availability

Tides

All Tide Points | High Tides | Low Tides

TUE 11 Jun	WED 12 Jun	THU 13 Jun	FRI 14 Jun	SAT 15 Jun
▲ 4:22 am 2.47m	▲ 5:25 am 2.4m	▼ 12:48 am 0.75m	▼ 1:55 am 0.7m	▼ 2:54 am 0.65m
▼ 11:27 am 0.56m	▼ 12:24 pm 0.5m	▲ 6:26 am 2.33m	▲ 7:22 am 2.26m	▲ 8:14 am 2.19m
▲ 5:23 pm 2.16m	▲ 6:27 pm 2.32m	▼ 1:17 pm 0.45m	▼ 2:06 pm 0.41m	▼ 2:50 pm 0.39m
▼ 11:34 pm 0.78m		▲ 7:24 pm 2.47m	▲ 8:15 pm 2.62m	▲ 9:02 pm 2.7m

JBP
scientists
and engineers

Redland Marine Foreshore Project - Concept Plan Development

16 September 2019

Redland City Council

JBP Project Manager

Gildas Colleter
Jeremy Benn Pacific
Suite 1, 477 Boundary Street
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Australia

Revision History

Revision Ref / Date Issued	Amendments	Issued to
0.1 / 26.06.2019	DRAFT	MH
0.2 / 26.07.2019	DRAFT	MH
1.0 / 02.09.2019	DRAFT	MH
1.1 / 16/09.2019	DRAFT	MH

Contract

This report describes work commissioned by Michael Holland, on behalf of Redland City Council, by email dated 26 March 2019. Cheryl Briars, Pamela Wong and Oliver Poynter of JBP carried out this work.

Prepared by .... Cheryl Briars BSc, MSC
Coastal Analyst

Prepared by .... Pamela Wong BEng
Civil Engineer

Reviewed by .... Gildas Colleter BEng, MIEAust, RPEQ, CPEng
Technical Director

Approved by .... Daniel Rodger BSc MEng GDipGIS GCert CoastalEng, CEng CMarEng MIEAust
RPEQ 17794

Director

Purpose

This document has been prepared as a Draft Report for Redland City Council. JBP accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

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Executive Summary

This study was undertaken by Jeremy Benn Pacific (JBP), on behalf of the Redland City Council (RCC), to carry out Concept Design Plans for two marine foreshore locations at Park Beach, Amity Point, and Rocky Point, Russell Island.

Amity Point

Following a review of options, the preferred design is a seawall extension, which includes a short length of rock armour followed by an optional Geosynthetic Sand Container (GSC) seawall. This GSC seawall would act as a "last line of defence", with new sand nourishment, rock spur stabilisation and coastal revegetation providing the primary mitigation to ongoing erosion.

Rocky Point

Following a review of options, a seawall is considered the most practical way to reduce the erosion risk at the site. This would be combined with a ramp structure to maintain pedestrian access to the foreshore and to support recreational boating, canoes and kayak users of the site.

Next steps

The development of concept design plans has considered a range of factors to allow the continued consultation with State Government agencies and the community.

- Pre-lodgement advice should be sought from State Departments, including the Moreton Marine Park Authority, the Department of Environment and Science (DES), and Department of Agriculture and Fisheries (DAF).
- Given the presence of a nationally significant wetland and a Ramsar wetland under the EPBC Act, a Significant Impact Assessment may be required for both sites.
- Given the native tidal claims over state land, recommendations are made to pursue stakeholder engagement with the Minjerribah camping ground and Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC).
- Given the potential for marine plants, which as a Matter of National Environmental Significance (MNES) under the Planning Act, and a Matter of State Environmental Significance (MSES) under the Fisheries Act, a marine plant survey should be undertaken for both sites
- Given the extent of works within tidal waters, the works will be within the marine park and the ‘tidal area of the local government’. A marine park permit will be required, and a Development Application required with Council.

JBP scientists and engineers

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Abbreviations

AHD .... Australian Height Datum. *Unless specified otherwise all datum are AHD in this report*

ARI .... Average Recurrence Interval

JBP .... Jeremy Benn Pacific

BOM .... Bureau of Meteorology

DES .... Department of Environment and Science

DSDIP .... Department of State Development, Infrastructure and Planning

D_{50} .... Median rock diameter

FOS .... Factor of Safety

GPS .... Global Positioning System

HA .... Highest Astronomical Tide

Hs .... Significant wave height

LAT .... Lowest Astronomical Tide

M_{50} .... Median rock mass

MHWS .... Mean High Water Springs

MHWN .... Mean High Water Neaps

MLWN .... Mean Low Water Neaps

MLWS .... Mean Low Water Springs

MSL .... Mean Sea Level

MSQ .... Maritime Safety Queensland

RCC .... Redland City Council

Tp .... Wave peak period, modelled as Spectral Peak Period, i.e. $T_{mm,0-1}$

USACE .... United States of America Corps Engineers

Definitions

Abbreviation	Explanation
Overtopping	Overtopping discharge occurs as a result of waves running up the face of a structure. If wave run-up levels are high, enough water will reach and pass over the crest of the structure. The overtopping rate is a mean overtopping discharge, given in L/s per metre of defence, which is an average of the quantity of water passing over the crest during a storm event. It doesn't describe how many waves will overtop and how much water will overtop for each wave. Individual wave overtopping flows may be up to 100 times larger than the average overtopping quantities.
Sea level rise	Sea level rise is defined by an increase of the mean water level due an increase in the volume of water in the world's oceans.
Significant wave height	The significant wave height (Hs) is the average wave height (trough to crest) of the one-third largest waves.
Storm surge	A storm surge is a rise in water level due to a change in atmospheric pressure and strong winds associated with weather events such as a cyclone.
Storm tide level	The storm tide level is the effect of water level of a storm surge combined with the normally occurring astronomical tide.
Surf beat	Surf beat is the long period (typically several minutes) oscillation of the water line on the beach. It can be associated with the arrival of a wave group.
Wave peak period	The wave peak period (Tp) is the wave period associated with the most energetic waves in the total wave spectrum at a specific point.
Wave set-up	After incoming waves break, the average level of the water inside the surf zone to the beach is set up higher than the sea level offshore from the breaker zone.

In this report the following Direction conventions have been used:

- Winds and waves: "coming from"
- Currents and sediment transport: "moving towards"

1 Introduction

This study was undertaken by Jeremy Benn Pacific (JBP), on behalf of the Redland City Council (RCC), to carry out Concept Design Plans for two marine foreshore locations within Moreton Bay. These are shown in Figure 1-1, and include:

- Park Beach, Amity Point, North Stradbroke Island (local indigenous name Minjerribah)
- Rocky Point, Russell Island

The development of concept design plans has considered a range of factors to allow the continued consultation with State Government agencies and the community. The designs at each location has considered:

- Planning and previous stakeholder engagement
- Site investigations and data analysis
- Studying of the local coastal processes
- Assessment of the risk of damage to infrastructure
- Prediction of local wave heights and storm tide levels
- Structural requirements for new infrastructure.

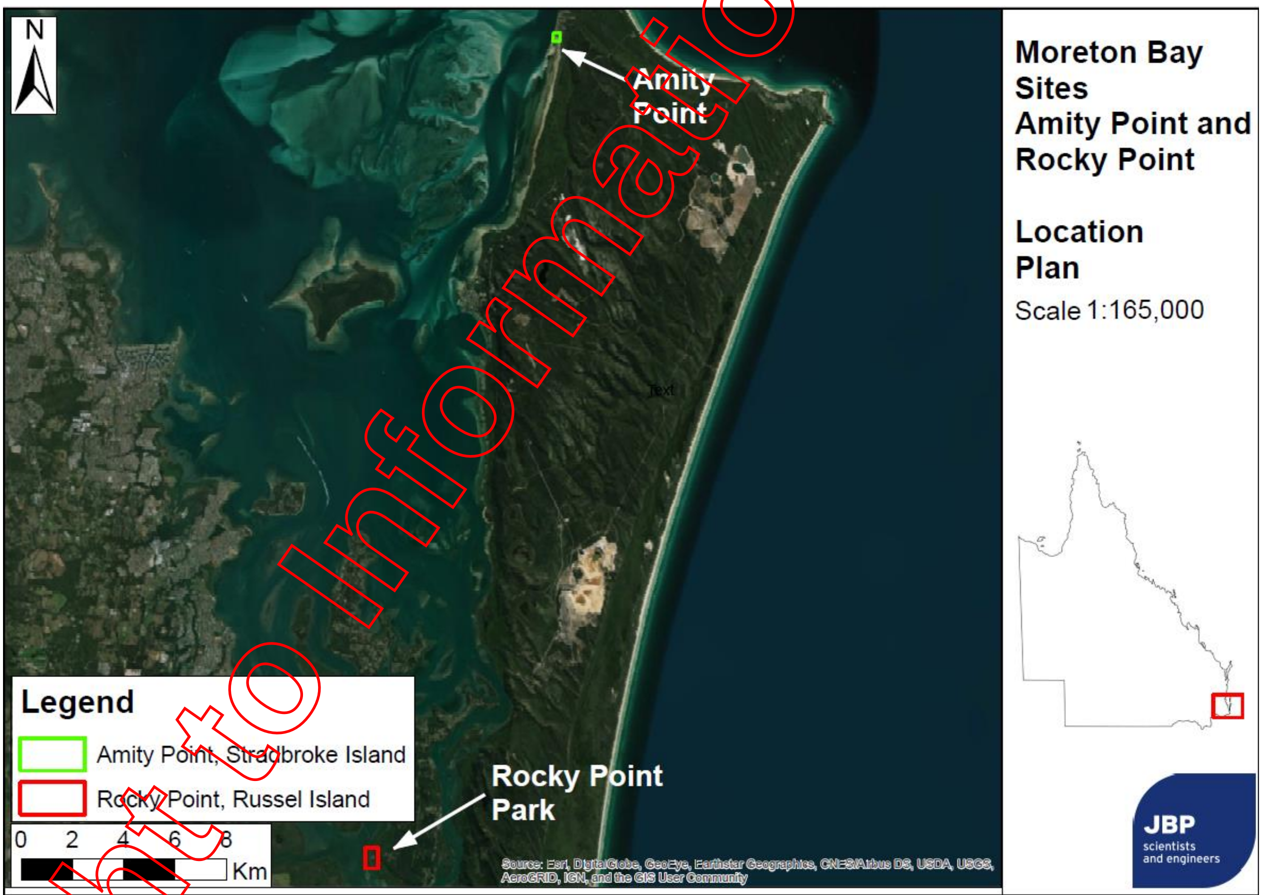


Figure 1-1: Location of Park Beach, Amity Point and Rocky Point, Russell Island.

1.1 Report Structure

In addition to this introductory chapter, this report is laid out in the following sections:

- **Chapter 2 (Background)** summarises previous coastal processes assessments at each site, existing management plans and planning requirements.
- **Chapter 3 (Park Beach - North Stradbroke Island / Minjerribah)** presents the background, review of existing assets, coastal processes assessment, concept plan and designs for Park Beach, Amity Point.
- **Chapter 4 (Rocky Point - Russell Island)** presents the background, review of existing assets, coastal processes assessment, concept plan and designs for Park Beach, Amity Point. .
- **Chapter 5 (Recommendations)** presents a summary of the appraisal and recommendations

2 Background to existing coastal management

2.1 Coastal design and coastal zone management

Before developing any coastal designs to mitigate erosion, it is important to first consider the coastal processes for the site, any existing management plans and planning requirements. There has been a range of scientific and planning studies completed throughout Moreton Bay, which are summarised below.

2.1.1 Coastal processes

The most recent coastal processes studies have been prepared as part of the Amity Point Shoreline Erosion Management Plan (Water Technology 2019) and the Draft Amity Point Shoreline Erosion Management Plan (BMT 2013). These reports undertook numerical modelling of coastal processes, although were primarily focussed on wave and hydrodynamics. Building on this work, this new study has included new wave and sediment transport modelling at Amity Point.

No comprehensive coastal processes assessments have been prepared for Russell Island. This study has included new wave and sediment modelling at the site.

2.1.2 Stakeholders

Stakeholder engagement was not a part of this project, with new concept designs intended to allow for consultation with State Government agencies and the community. However, a summary of local stakeholders is presented here for reference.

Stradbroke Island has a long history of human settlement. The Quandamooka people have lived on the island for at least 25,000 years, under the local name Minjerribah. The Federal Court of Australia made two native title consent determinations recognising the Quandamooka People's native title rights and interests over land and waters surrounding North Stradbroke Island managed by the Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC). Sir Thomas Brisbane named the Amity Point in December 1824. The Township grew from the early convict days (1824-1842) into a small settlement. The 2011 census recorded of a population of 248 people living at Amity Point. A caravan park was established adjacent to the study site, and Park Beach constitutes the southernmost point of the township.

At Russell Island, the population is approximately 2,000 inhabitants and the island was settled in 1866 following survey of Robert Dixon in 1839. The island was predominantly used thereafter for farming and oyster production.

2.2 Planning requirements

Any new works at Amity Point or Russell Island will be subject to QLD planning and approvals process. As a part of this process, the Department of State Development Manufacturing, Infrastructure and Planning (DSDMIP) has gathered pre-lodgement advice for coastal management works across the study site (24 August 2018). This advice has considered state government agencies and key stakeholders, including the Department of Agriculture and Fisheries (DAF) and the Department of Environment and Science (DES) and the associated Moreton Bay Marine Park (MBMP) operating within DES Queensland Parks and Wildlife Service and Partnership division.

2.2.1 **Park Beach, Amity Point, Minjerribah**

In Queensland, statutory Erosion Prone Areas (EPA) are declared under section 70 of the Coastal Protection and Management Act 1995 (Coastal Act). At Amity Point, a declared EPA width of 145m exists along the camping ground shoreline, and a 40m width to the south of the camping ground along Wanga Wallen Beach[1]. The approach used to calculate these EPA widths includes measured rates of recession (often limited to aerial pictures), storm-induced coastal erosion, and allowances for sea level rise. The EPA may be revised following detailed coastal processes assessment. A 40m ingress into the Wanga Wallen Beach would potentially breach the beach and lead to a relocation of the Wallum Creek estuary northward.

1 REC3A Map 3, Department of Environment and Heritage Protection, 2015

Figure 2-1 shows that Park Beach is located along the Moreton Bay Marine Park in a Conservation Zone. Further South a Marine National park zone is declared across the Wanga Wallum sand flats. The Wallum Pool indicated on this map has disappeared alongside the Wanga Wallen sandbank.

The camping ground "Minjerribah Camping Pty Ltd" is owned by QYAC and manages the camping ground and is a key stakeholder for the management of Park Beach.

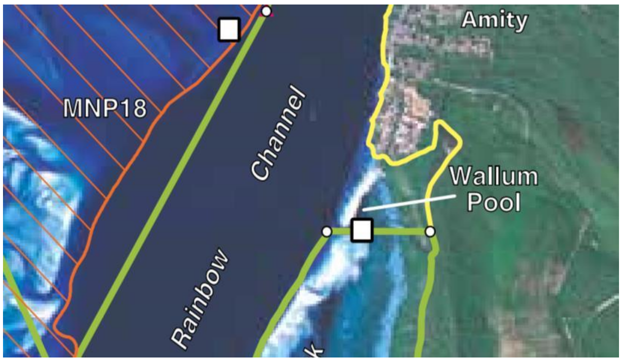


Figure 2-1 Moreton Bay Marine Park - Zone Plan for Southern Amity Point

2.2.2 Rocky Point, Russell Island

The site is located along Rocky Point Park, a rocky/alluvium foreshore with a thick mangrove colony to the south of the site. There is no clean sandy beach at the site, and the tidal flat is dominated by silt, sand, small peddles and cobbles. However, a declared EPA width is 40m over the site.

The North Stradbroke Island high voltage overhead power line (steel lattice tower) is located in the Park, some 20m from the retreating shoreline. This structure is within the Erosion Prone Area.

Aerial pictures show that the erosion has been progressing slowly at the site, at a rate around 0.1m per year over the last decade which are consecutive to local slip failures created by toe erosion

Rocky Point is located along the to the Moreton Bay Marine Park, in the Habitat protection zone as shown on Figure 2-2.

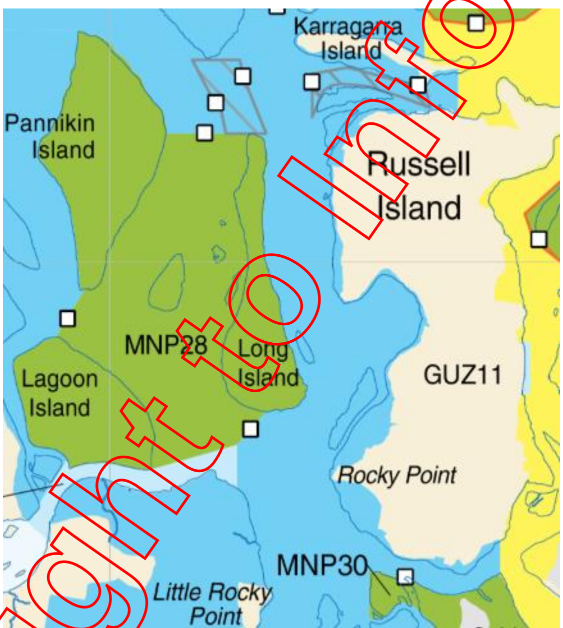


Figure 2-2 Moreton Bay Marine Park - Zone Plan for Rocky Point, Russell Island

3 Park Beach - North Stradbroke Island / Minjerribah

3.1 Introduction

This project has prepared a concept plan to mitigate erosion at Park Beach, located south of the Amity Point Camping Ground as shown on Figure 3-1. This chapter describes:

- Detailed site investigation undertaken for this project
- Modelling of sediment transport to understand erosion
- Concept plan development
- Concept designs.

3.2 Site investigation

A literature review, site walkover by JBP staff on 17 May 2019, and new physical data collection between 20-21 June 2019 has been used to consider the local coastal processes and various coastal management options to manage ongoing erosion.

3.2.1 Location and local features

Amity Point is located on the north of Stradbroke Island. It is located within Moreton Bay and is protected from offshore waves by Stradbroke Island and Moreton Island. The passage between these two islands is 3.5km wide and consists of dynamic and transient shallow sand banks, which has formed under the complex flow regime of tidal currents, waves and sediment supply.

Within the study site, a seawall runs along the coastline and terminates at the southern end of the camping ground at the sandy shore known as Park Beach. Erosion is observed at the end of this seawall, which is negatively affecting the sites amenity.

Wallum Creek discharges approximately 400m south from Park Beach. The Wallum Creek estuary is a mangrove environment, with the Wanga Wallen sandbank forming a 300m wide tidal flat along the Wanga Wallen beach alignment. A shallow tidal pool known as the Wallum Pool, used to form between the Wanga Wallen sand banks and the Wanga Wallen Beach.

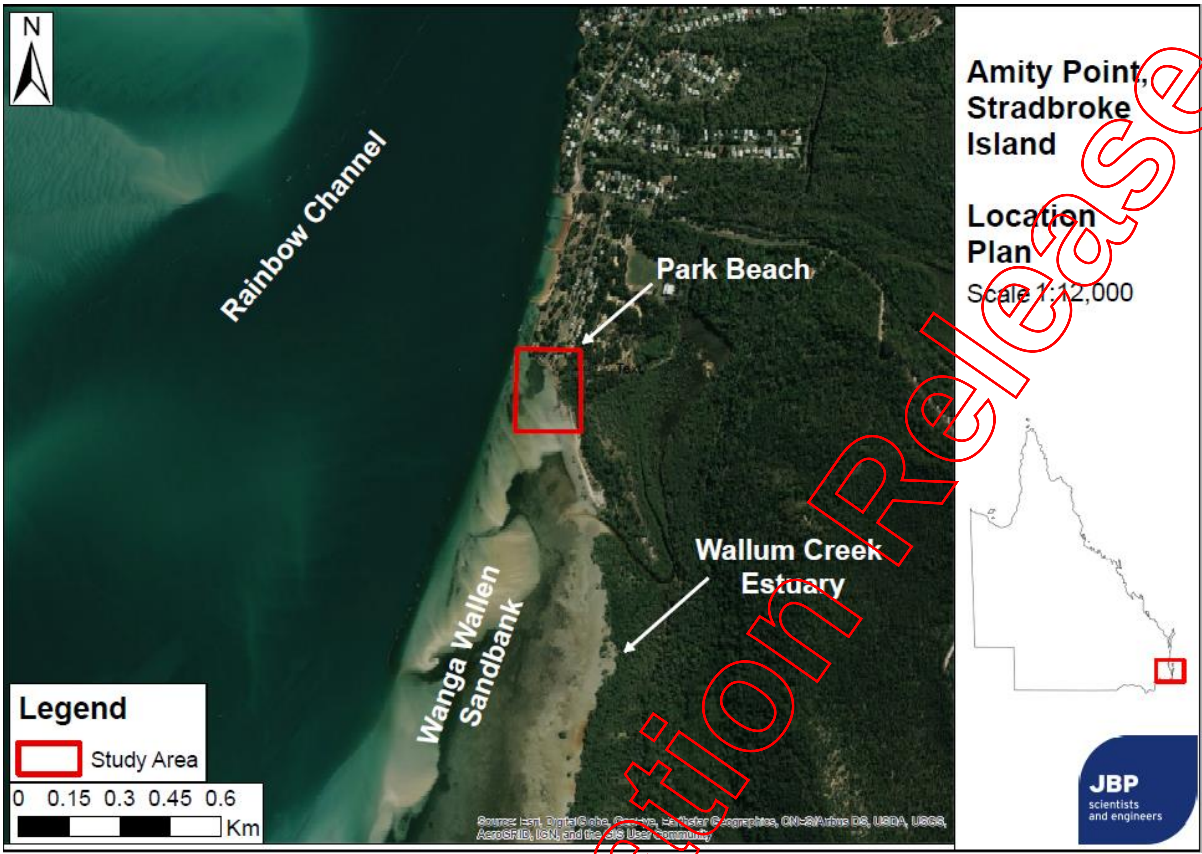


Figure 3-1 Study area - Amity Point, North Stradbroke Island

A bitumen sealed access road extends through the caravan park to the site, which terminates with a vehicle turning bay. The bitumen pavement is eroded along Park beach and the bitumen aggregates and sub-base are depositing on Park Beach.

Around the bitumen seal, there is a dip in the pavement with an elevation drop from 1.7m AHD to 1.30m AHD, which then drops further to 1.15mAHD along the crest of the sea wall. This is visually displayed in Figure 3-2. Additional evidence of scour along the crest were noted and displayed in Appendix A.4.

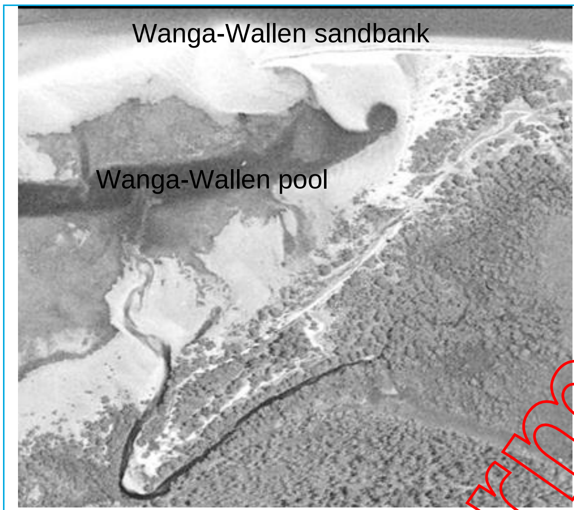
Figure 3-2 Crest of seawall condition

3.2.2 Review of Aerial pictures

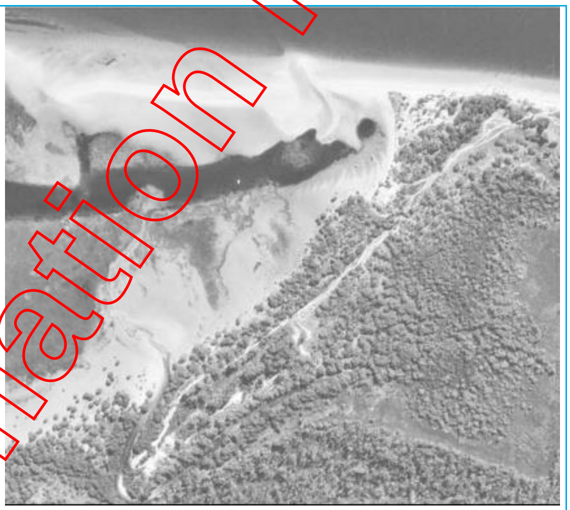
Historic aerial images were reviewed to understand long-term trends. Between 1 May 1958 to 27 October 2017 a total of 51 aerial pictures have been georeferenced and rectified at the study site. These have been compiled into an animation which highlights the dynamic morphological environment of Amity Point. Figure 3-3 highlights some of the pictures and key morphological observations related to the stability of Park Beach.

The migration of the Wanga Wallen begins after the construction of a southern groyne along the Amity Point coastline. This groyne was constructed to stabilise erosion along the western side of the caravan park area. The dominant sand longshore transport appears to move southward on the beach and the onshore deposition of the Wanga Wallen sandbar has resulted in mangrove die-back but also in the creation of a wide healthy beach.

Based on aerial photography, the volume of sand in the Wanga Wallen bar is estimated to be around 20,000m^3, while the volume of beach loss at Park Beach is around 2,000m^3 over the period 2009 to 2019 (i.e. 200m^3 per year).

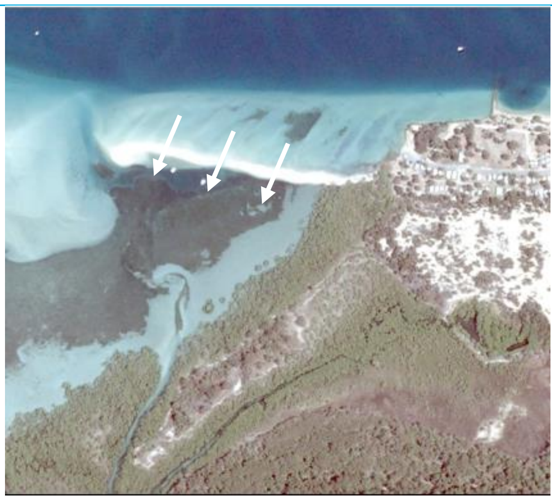


1 May 1958 - The Wanga Wallen sandbank delineates the Wallum Pool. The sandbank is located on the edge of the Rainbow Channel



1 May 1970 - A breach in the Wanga Wallen sandbank. Breaching occurs regularly (78', 83', 88', 04) until 2009. The southern end of the sandbank has moved slowly onshore.

7 May 1974 - The Wanga Wallen sandbank forms a long linear bar. Over 1974 to 2009 the sandbank continues to move onshore overtime at a rate of 2m per year. The southern Groyne



17 October 2004 - the last aerial picture available to us of the Wanga Wallen sandbank as a linear bank, parallel to shore. The sandbank is significantly offset from the

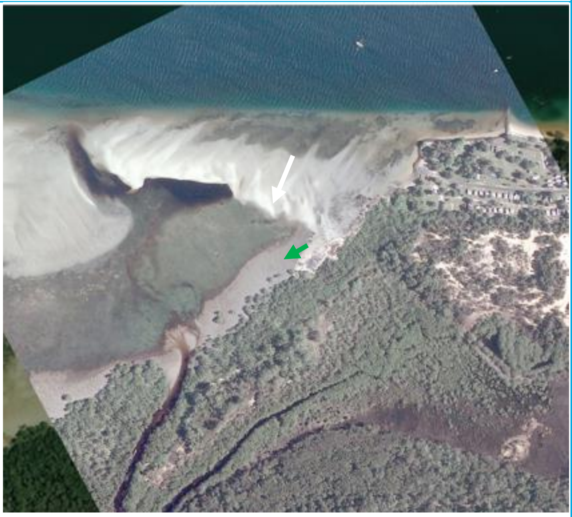
is built around 1975.	Rainbow Channel edge which is controlled by the groyne.
	
16 July 2009 - the bar has split in several perpendicular to shore tidal bars. These small bars continue to move towards the shore (white arrow) and the estuary (green arrow). Sand accumulation at park beach is moving towards the Wallum Creek estuary.	**27 October 2017** - the sandbar is fully welded into the shoreline and mangrove have died along the shore, buried by the sand. The erosion at the Park Beach is pronounced. A seagrass colony has established in front of the seawall. Mangrove died back along the shoreline.

Figure 3-3 Selected aerial pictures

3.2.3 Survey

During the physical site visit of 20-21 June 2019, a detailed survey of the seawall was undertaken. This included survey of the crest, toe, land 5m behind the structure, any areas of observed erosion, and general surface levels around Beach Park. The survey extent is indicated on Figure 3-4.

The crest of the seawall ranged between 1.79m AHD to 1.32m AHD. The average slope of the sea wall was 1 (vertical) : 2 (horizontal).

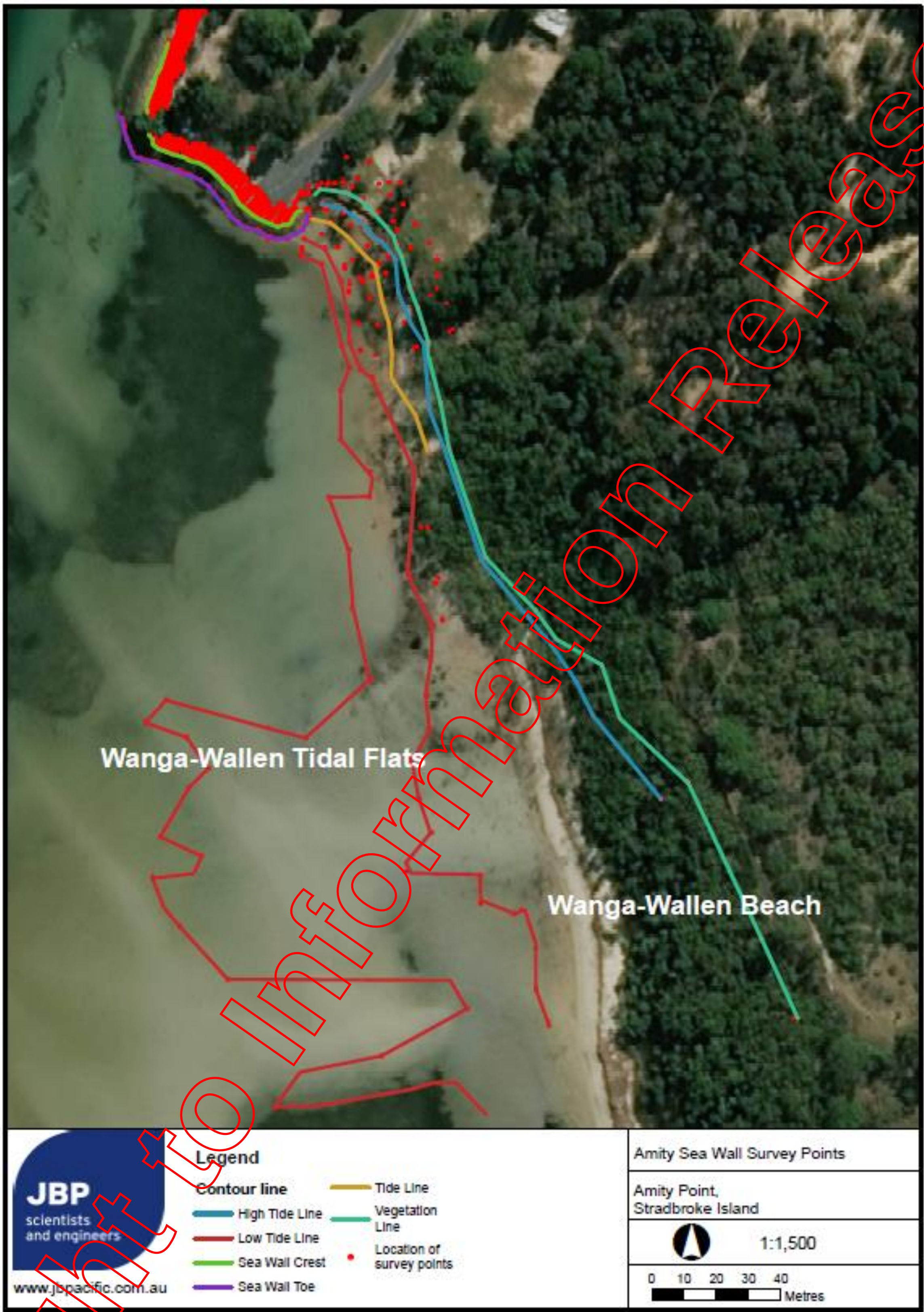


Figure 3-4 Survey point locations

3.2.4 Bathymetry

The western coastline of Stradbroke Island is fronted by intertidal sand flats and a deep tidal channel called the Rainbow Channel. The meandering channel and the result of transient sandbar dynamics, resulting in an intermittent supply of sand from offshore sources, which is dominated by tidal currents.

The Port of Brisbane Carried out two bathymetric surveys of Amity Point along the Rainbow Channel in 2015 and 2017. These surveys have been used to consider the local sediment transport. A cross-section of the shoreline from Park Beach and along the seawall is shown on Figure 3-5.

Review of the surveys within the Amity Point Shoreline Erosion Management Plan (Water Technology, 2019) indicated that the Rainbow Channel has been moving towards Stradbroke Island, eroding its eastern bank at a rate of approximately 1.2m per year between 2015-2017. However, over the same period the depth along the tidal flats at Wanga Wallen beach are practically unchanged.

Large sand ripples, typically 2m high with a wavelength of 100m, can be observed in each survey along the base of the channel at depth typically around -10m. These sand ripples are observed to change positions, moving under tidal current influence. The sandbar direction suggests that the currents and sand transport move northerly in the Rainbow Channel, which is opposite to the direction of sand transported by longshore sediment transport (Section 3.2.2). The morphology of the scour hole at the head of the southern groyne is compatible with the dominant tidal flow going northward.

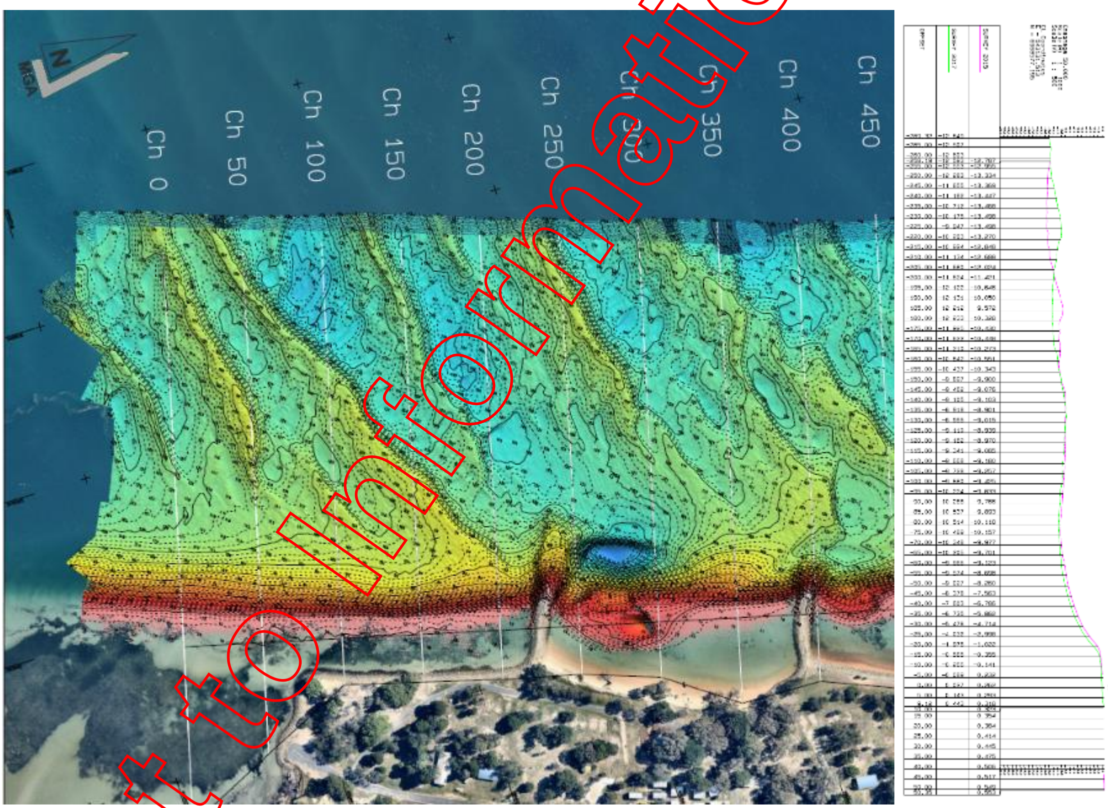


Figure 3-5 Amity Campground Park Beach Bathymetry and Profile for 2015 and 2017 (Port of Brisbane)

3.2.5 Tidal Planes

Tidal planes are provided based on the location at Amity Point in the Queensland Tide Tables and are summarised in the table below:

Table 3-1 Tide conditions at Amity Point

Tidal plane	Present day (m, LAT)	Present day (m, AHD)
HAT	2.24	1.22
MHWS	1.78	0.76
MHWN	1.46	0.44
MSL	1.09	0.07
AHD	1.02	0.00
MLWN	0.62	-0.40
MLWS	0.30	-0.72
LAT	0.00	-1.02

3.2.6 Extreme sea levels

Design water levels have been extracted from the Redland Shire Detailed Storm Tide Analysis (Cardno, 2011) which was compiled following the regional wave climate estimated within Redland Shire and Logan City Council Storm Tide Hazard Study (Cardno Lawson Treloar, 2009). The storm tide levels include for 50 year of sea level rise along with a 10% increase in wind speeds to account for greenhouse effects for the 2069 storm tide conditions. Table 3-2 presents the extreme storm tide levels at the site.

Table 3-2 Extreme sea levels at Amity Point

Return period (1 in x years)	Present day, m AHD no wave setup	Present day, m AHD with wave setup	2109, m AHD no wave setup	2109, m AHD with wave setup
50	1.77*/1.81	1.87*/1.98	1.89+0.8=2.69	2.07+0.8=2.87
100	1.79*/1.85	1.89*/2.03	1.95+0.8=2.75	2.13+0.8=2.93
200	1.81*/1.90	1.91*/2.08	2.01+0.8=2.81	2.19+0.8=2.99
500	1.83*/1.96	1.93*/2.14	2.08+0.8=2.88	2.26+0.8=3.06
1,000	1.85*/2.19	1.96*/2.01	2.14+0.8=2.94	2.32+0.8=3.12
* indicates non-cyclonic conditions.				

These storm tide levels have been reviewed in relation to the existing seawall height. Storm tide planning levels, including a freeboard of 300mm and sea level rise allowance of 300mm for 2059 and 800mm for 2109, are:

- Extreme sea level for 2059 planning horizon: 2.73m AHD
- Extreme sea level for 2109 planning horizon: 3.23m AHD

These storm tide levels readily exceed the level of the perimeter wall (approx. 1.8m AHD) and flooding of the camping ground is likely associated with most significant storm and of these storms. As such any proposed revetment toe stabilisation will not reduce the existing level of risk associated with coastal flooding.

3.2.7 Currents

Currents have been modelled for the Draft Amity Point Shoreline Erosion Management Plan (BMT, 2013). The modelled spring tide current, which is considered to be the dominant process for sediment transport, is depicted on Figure 3-6.

Along the shoreline the peak currents are northward (ebb tide) currents, which dominate the southward (flood tide) currents. Dur to the local bathymetry and shoreline orientation, the currents at Park Beach and along the southern reach of the seawall are very weak in both conditions. As a consequence the local hydrodynamics affecting the Park Beach is believed to be dominated by occasional storm waves.

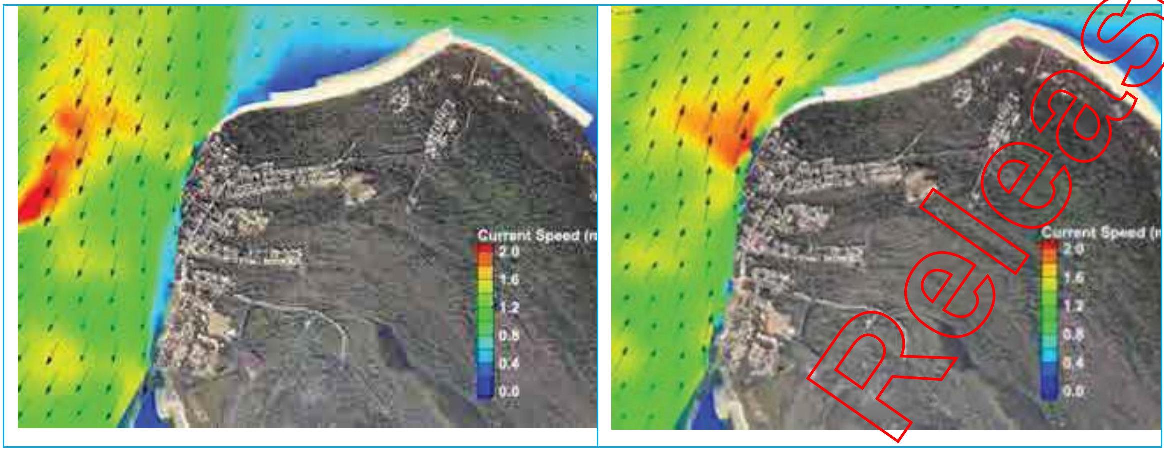


Figure 3-6 Modelled Spring Tide Current Speed Contour Peak Flood (Left) and Peak Ebb (Right)

New field data was collected to verify the modelled trends. To understand the nature of the currents in the vicinity of Park Beach, three drifters (A, B, C) were deployed simultaneously and repetitively (25 deployments) over a tide cycle. Figure 3-7 shows the stack of tracks obtained during the period of measurement, indicative of tidal flow patterns around Amity Point.

Surface offshore currents, running north along the Rainbow channel bank have a typical speed of 0.4/m/s to 0.5m/s. Tidal currents on the Wanga Wallen sandflat is reduced to below 0.1m/s. The latter is considered to be below the typical threshold of motion, and will be insufficient to generate substantial sediment transport. This supports the principle that storm waves are the dominant driver of sediment transport at Park Beach.

Figure 3-7 Tracks from deployment of drifters

3.2.8 Wave climate assessment

A wave climate assessment was undertaken to consider the nearshore wave conditions, direction and associated longshore sediment transport.

The Park Beach wave climate is influenced by wind-sea across Moreton Bay, residual swell from the rainbow channel entrance, and occasional storm waves. The waves are limited by the water depth as the toe of the beach is located on the Wanga Wallen tidal flat.

Hourly wave significant height and peak period, including tidal interactions and breaking processess, have been modelled for the period 1957 to 2019. The distribution of nearshore significant wave height and period near the toe of Park Beach is shown on Figure 3-8. The trends within the distribution indicate that the median wave height is approximately 0.15m, with occasional storm waves reaching 1.5m. These relatively small waves are due to the combined effect of nearshore tidal water level variations, the Moreton and Rainbow Channel offshore banks, and the relatively protected Moreton Bay.

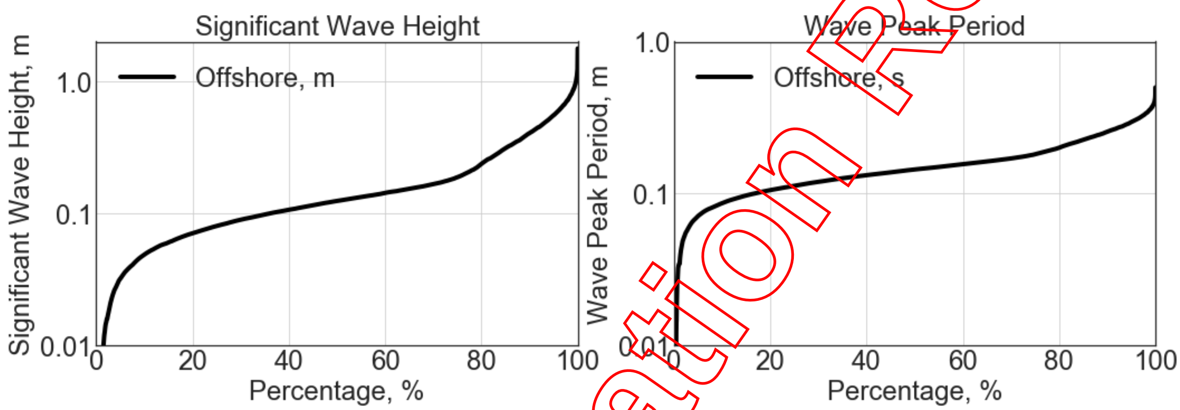


Figure 3-8 Wave parameters distribution at southern Amity Point

A further wave hindcast calculation wave carried out including a 10% increase in wind speed to provide an estimate of design waves at a 2100 planning horizon. The distribution is presented on Figure 3-9 and summarised in Table 3-3. The findings are compatible with the 2013 Lawson and Treloar Storm Tide Study.

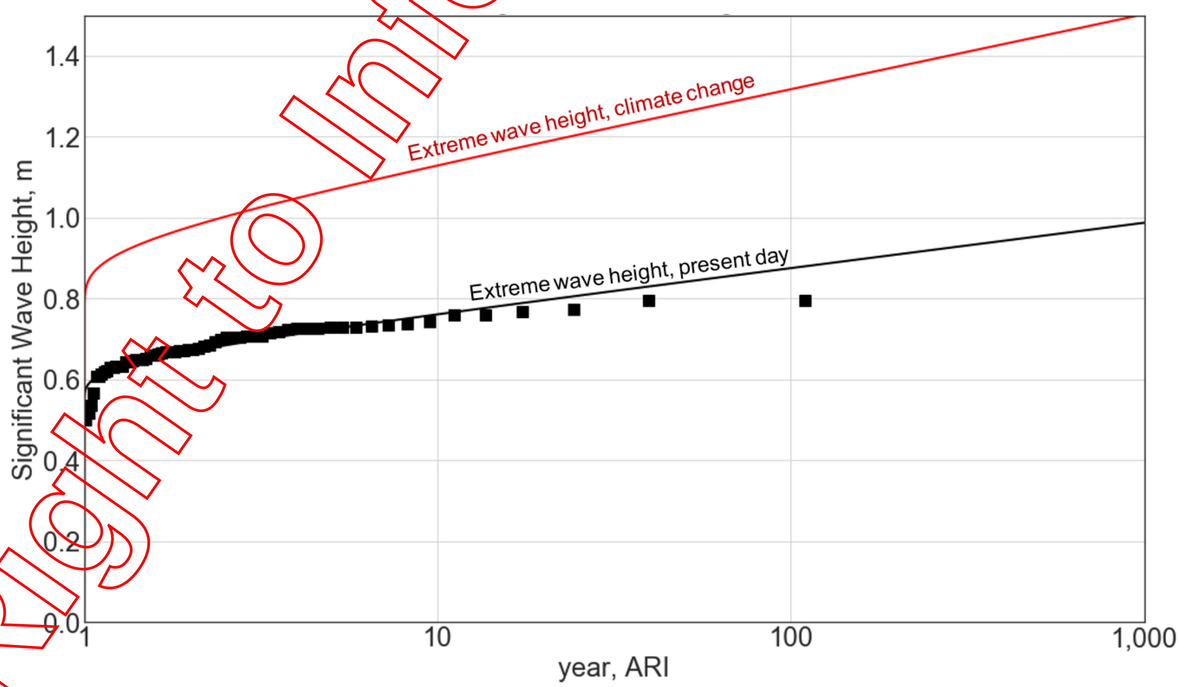


Figure 3-9 Significant wave height exceedance at Southern Amity Point

Table 3-3 Extreme wave parameters at Amity Point, present day and future planning horizons

	Present Day		2100	
Annual exceedance probability (1 in X)	1% (1 in 100)	0.1% (1 in 1,000)	1% 1 in 100	0.1% (1 in 1,000)
Wave significant height, m	0.88	1.00	1.38	1.52

3.2.9 Morphological observations

Sandy seabed formations such as ripples, sandbanks and dunes are formed by the interaction of water flow with the sand grains. On the seabed, the ripple size and forms are depending on waves action, tidal currents, grain-size, topology, etc. Site observations highlighted a wide variety of seabed formation patterns of ripples across the area of Park Beach, which is unusual given its small area (approx. 1ha). A description of these is presented in Figure 3-10, which includes multi-directions (criss-cross) patterns, long and short ripples, holes and sandbars. In addition to these features, a large and shallow sand bar was observed north of the creek, a layer of shell fragments deposited within the higher intertidal area, near Mean High Water, and seagrass observed within the Wanga Wallen tidal flat. This indicates that the bed shear stress is generally insufficient to maintain a highly mobile seabed and most the transport occurs either in the deeper area (via tidal action) or along the beach (via wave action).

The review of these multiple bedforms suggests the area is at the confluence of two dynamic coastal cells at Park Beach and Wanga Wallen Beach.

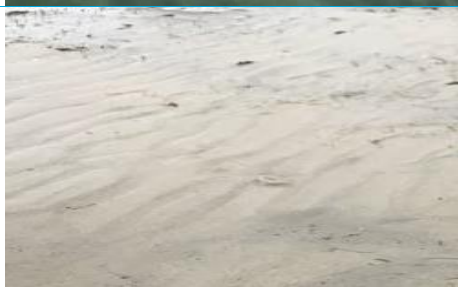
At the seawall bend (from N/S alignment to E/W alignment) a criss-cross pattern of sand ripples was observed. These unusual patterns are likely formed under the action of swell waves and reflected waves off the seawall.	
Along Park Beach the ripple height are relatively small, smooth and elongated, this indicates "fresh sand" has deposited in the area from the upper beach erosion. A small underwater sandbar, approximately 5m^3, merges into the seawall toe. This bar originates from storm erosion, and it partially covers the toe of the seawall. This suggests the beach does not hold an equilibrium beach profile and that sand leaks at the base of the Park Beach onto the tidal flat. This also suggests that the sand has been moving westward/northward at the toe of the seawall in this sheltered area.	
In most area on the Wanga Wallen tidal flat, the crest of ripples are sinuous, with one gentle side and another steep side which typically range between 20mm and 50mm height. The length of one ripple is typically less than 1m.	
Sand holes were also evident on the side of the Wallum Creek estuary. These localised holes have eddy-like sand deposition patterns, which are semi-circular. (Refer to Figure 3-10 [d])	

Figure 3-10 Sandforms present adjacent to Park Beach

3.2.10 Sediment transport modelling

As shown within the review of tidal currents (Section 3.2.7), current-driven sediment transport dominates the deeper coastal channel. Instead, erosion processes at Park Beach are believed to be episodic and occur predominantly during storms, where elevated water level and waves contribute to longshore sediment transport. As shown in 3.2.9, the review of seabed morphology further complicates this sediment transport regime, which suggests that the area is at the confluence of two dynamic coastal cells.

To analyse the intertidal sandbar and beach evolution in these coastal cells further, a Longshore Sediment Transport (LST) model was assembled from 1957 to 2019. This has spanned the southern seawall, Park Beach and along the Wanga Wallen Beach. The LST model estimated hourly sediment movement over this period, allowing for the rise and fall of the tide and the nearshore wave refraction, wave shoaling and wave breaking processes in the nearshore zone. The resulting potential LST volumes are presented in the respective Figure 3-11 (a), (b) and (c).

The general movement on the sandflats, intertidal bars and upper beach is southward. This is opposite to the dominant flow direction in the Rainbow Channel, which runs northward under the dominant ebb tide current. Seasonal variations are observed in the LST direction; northward transport dominates during the summer period and southward the rest of the year. Averaged annual potential LST rates are relatively low, approximately 500m^3 per year along the southern seawall and Park Beach, and 550m^3 along the Wanga Wallen Beach.

These findings suggest that Park Beach potential LST deficit is approximately 50m^3 per year. Without sand being transported south from Amity Point, the natural response of the shoreline is to move landward. Even during a storm event, the sand transported along the seawall is insufficient to restore the erosion experienced at Park Beach. The model results suggest the Park Beach coastal cell could have lost approximately 4,000m^3 of sand over the ten-year period between 2009-2019. Given these rates consider the potential sediment supply, which assumes a readily available sediment supply, they are conservative. A review of aerial pictures indicates the actual volume loss for Park Beach is around 2,000m^3 over the same period.

Given these trends, without active management Park Beach will continue to erode landwards into the camping ground, until a morphodynamic equilibrium is found. Further erosion of Park Beach will also lead to a narrowing of the Wanga Wallen beach, dur to the decreased 'downdrift' sand supply. Park Beach erosion will therefore increase the risk of a breach of the Wallum Creek estuary north of its current position, in closer vicinity of Park Beach because the dune height typically lower or near extreme storm tide levels and are not protected by seawalls, unlike the camping ground.

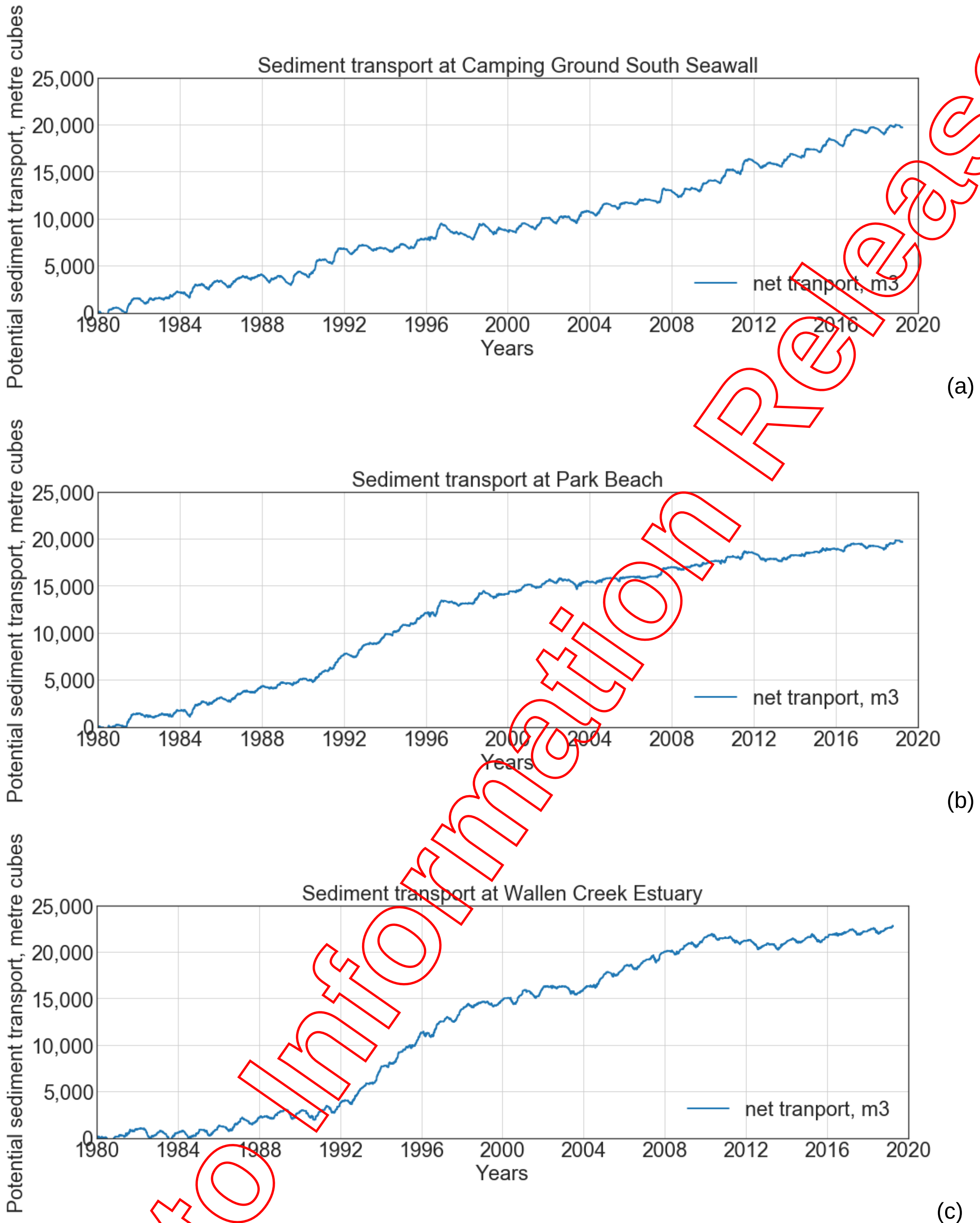


Figure 3-11 Longshore sediment transport in the intertidal area (positive going South)

3.3 Concept plan for erosion mitigation

3.3.1 Key objectives

A concept plan has been prepared to address the erosion observed at Park Beach. The key objectives of the plan are to:

- Consider public safety and occupational health, safety and environmental risks.
- Be deliverable under current legislation and arrangements pertaining to coastal management.
- Work with Nature, whilst being respectful of the site cultural values.
- Be designed to meet 2100 climate conditions, which will include raised sea level and increased wave action.
- Focus on mitigating coastal erosion, with storm tide mitigation being a secondary benefit[2].

In addition to these objectives, a coordinated approach should also be given to addressing actions from the Shoreline Erosion Management Plan and Coastal Hazard Adaptation Strategy, which are both underway for the study site. Additional work will be required to coordinate all actions.

3.3.2 Coastal management option overview

Three coastal management options have been considered for the site and are described below.

- **Option A - Seawall** - A seawall extension would reduce the erosion issue along the southern edge of the camping ground. This is likely to be the fastest and effective method to manage erosion in the near future. However, a seawall will not mitigate erosion along the Wanga Wallen Beach and is likely to require further extension around the camping ground. There is a risk for the seawall to trigger an early breakthrough of the Wallum Creek near the camping ground. Figure 3-12 shows a possible layout for this option.

Figure 3-12 Option A - Park Beach Seawall

2 Flood-proofing the camping ground would require substantial additional civil engineering works which are beyond the scope of this project.

- **Option B - Beach Nourishment** for the site would manage the sediment transport deficit as well as maintaining beach amenity and access along the foreshore. The main drawback is on-going maintenance and space available on the site to rebuild the beach without impacting the neighbouring lands around the camping ground.

  Nourishment could be achieved through several approaches.

  - One option includes rainbowing form a small suction trailer hopper dredge. An economical volume would be to use around 20,000m3 of sand taken from the Rainbow Channel to reform the Wanga Wallen sandbank and to restore the Wallum Pool. This would stabilise Park Beach and the Wanga Wallen Beach for around 40 years. These works would assist in anchoring the Wallum Creek estuary into its current position for the next two generations. However, a high risk exists to some mangroves being impacted along the Wanga Wallen beach. This is not necessarily a net loss since a much larger mangrove dieback is likely if the Wallum Creek estuary breaks north of its current position due to a narrowing out of the Wanga Wallen Beach. However, this option is considered risky from a timeframe and approval perspective under current legislative and management practices.
  - Instead, a smaller beach nourishment of around 2,000m^3 is proposed. This would require an on-going investment but will remain economically viable for the short term (10 years) to medium term (40 years or more). Figure 3-13 shows a possible General Arrangement for Option B.

Figure 3-13 Option B: Park Beach Nourishment

- **Option C - Groyne** - A groyne could be constructed at the downdrift side of Park Beach to interrupt the southward sediment transport, provide shelter from waves and thereby reduce erosion at Park Beach. However, this option will lead to further sand loss of Wanga Wallen Beach, as the groyne will exacerbate the downdrift longshore sediment transport deficit. The issue of land tenure is also significant since a Groyne would have to be built in the Marine Park to be functional. Figure 3-14 shows a possible General Arrangement for Option C.

Figure 3-14 Option C: Park Beach Groyne

Following this option review, a seawall is the most effective method to halt erosion whilst the nourishment is considered a more balanced management option. It is therefore proposed to combine these various options together into a successful coastal management scheme suited to the site.

3.3.3 Proposed coastal management scheme

3.3.3.1 Seawall extension

The alignment of the seawall and termination could be drawn from the camping ground cadastral boundaries. However, to minimise the impact on the Park the alignment has been set so that the toe of the wall would be located within the Camping Ground boundary.

The seawall has been designed as an erosion protection structure rather than a coastal flooding mitigation structure. The seawall design recognises present day and future flood risk, but only to the extent of providing safety for a camping ground development. It is understood that the camping operates an Emergency Plan during extreme weather.

Further work will be required to manage emergency planning during the detailed design of the project. At this concept stage the design has adopted the approach that it would not adversely impact the safety of member of public as well as private properties.

Section 1 - Rock seawall

The crest of the existing seawall should be repaired to meet the State minimum design standard and to reduce on-going maintenance. The crest detail shall include drainage outlets to allow for the camping ground to continue to drain storm water seaward. These formal drainage outlets will be vulnerable to overtopping and therefore need to be reinforced.

A continuation of the armour rock seawall eastward would be suited to the site, considering that the existing seawall around the camping ground are rock armour. However, unlike most of the camping ground the amenity of Park Beach include access to the Wanga Wallen tidal flat and beaches and at least some form of access structure will be required. This would include provision for access under the requirement of the Disability Service Act 2006 which recognise Queensland beaches as a "public place". As a terminal point an armour rock seawall extension is proposed.

Section 2 - Geotextile seawall

A Geotextile Sand Container (GSC) seawall, commonly described as a "sandbag seawall", would assist in preserving a safer access across the length of the seawall. GSC would be suitable for the site wave climate and tidal range. The main drawback of such structure is the need for future intervention as the GSC polymer membrane has a limited design life, typically 20 years, while installation costs are similar to rock seawall in most situations. Constructing a "last line of defence" GSC wall along the property boundary creates a line in the sand for future coastal management actions beyond 2030.

3.3.3.2 Beach nourishment

Based on the sand transport mechanisms observed and modelled in Section 3.2.10, a nourishment volume of sand of at least 2,000m³ at Park Beach could provide a 10-years buffer to counter sediment loss. The beach nourishment would consist of forming an artificial dune to nourish the Wanga Wallen Beach.

This nourishment would combine suitable native coastal vegetation compatible with Wallum Country, managed pathway across the dune and sand fences. The nourishment may last up to 40 years as sea level rise and increase erosion pressure along the Wanga Wallen beach will narrow the width of Park Beach.

Nourishing the beach preserves existing public access conditions along the southern edge of the camping ground and reduces the need for an artificial access structure.

This nourishment will mitigate the risk of a breakthrough of the Wallum Creek near the Park Beach. The nourishment would assist in stabilizing the creek entrance, thereby protecting its ecosystem. It is likely that a large scale mangrove die-back could occur in the Marine Park if the Wallum Creek entrance was to relocate north.

3.3.3.3 Terminal structure

A terminal structure, such as a low-lying spur is a potential option at the site. While a large groyne would increase erosion along Wanga Wallen Beach, a smaller structure will allow sediment bypassing, would dampen tidal currents and could have a beneficial effect on the lower beach profile stability.

It is therefore proposed to incorporate an optional low-lying spur to the seawall. This low-lying spur will be submerged during storms and will not interrupt storm waves responsible for LST towards the south, so that the Wanga Wallen Beach is continuously nourished.

During nominal weather conditions, particularly during south easterlies wind conditions, the spur will maintain the position of the toe of the beach nourishment. This would be particularly notable during the summer months when northern LST dominates, which coincide with the camping ground peak season. The spur would also control the undertow currents along the seawall toe which tend to deflect sand westward. The spur will act as a rock oyster bed in the inter-tidal zone which will have some environmental value. This spur is also reminiscent of indigenous rock fish traps present around the island. This small spur is a measured response locally which may be subject to further evaluation if it is found to be detrimental to Wanga Wallen Beach stability it can be disconnected from shore.

Figure 3-15 shows a possible General Arrangement for the recommended coastal management scheme for Park Beach.

Figure 3-15 Proposed Park Beach coastal management plan

3.4 Concept design

The rock revetment repair, extension and rock spur structures have been designed to the following criteria:

- Rock armour to be stable during a future 1% AEP (2109) storm event.
- Overtopping reduced to safe levels during a present day 1% AEP storm event.
- A crest level designed to a future 1% AEP (2109) storm event.

3.4.1 Rock armour

To calculate overall rock armour stability the Van der Meer (VDM)[3] shallow water condition method was adopted. The formula is used to predict the stability of a uniform rock armour slope. The method includes storm duration, wave period, structure permeability, and damage level.

Table 3-4 shows the parameters that have been used at both sites to determine the median required rock mass (M50) to achieve stability during the design events. Table 3-5 shows the calculated armour size. A rock armour with median mass of 440kg has been selected for the structure.

3 CIRIA (2007), The Rock Manual: The use of Rock in Hydraulic Engineering - A guide to good practice – p.567-575

Table 3-4 Rock armour sizing input parameters

Input	Value/description
Notional permeability (P)	The proposed structures will be formed of a double interlocking layer placed on a geotextile filter. This arrangement represents a notional permeability of 0.1.
Slope angle (cotα)	1 in 2-slope has been selected at Amity Point to replicate the existing wall.
Damage number (Sd)	2 represents less than 5% damage to the structure following a design storm event.
Storm duration	1 hour to replicate change in tide levels and therefore wave climate
Rock density	Density set at 2.65t/m^3 providing a practicable minimum that will be achievable from various sources.

Table 3-5 Amity Point rock armour sizing

Event	Median armour mass, M50 (t)	Median nominal diameter, Dn50 (m)
1% AEP (Present Day)	0.12	0.35
1% AEP (2109)	0.44	0.55
Factor of safety		0.55 / 0.35 = 1.57

3.4.2 Crest level - Wave Overtopping

The wave overtopping performance of the proposed seawall was analysed using the Neural Network tool, within EurOtop II[4] manual. The profiles of the structures have been schematised to minimise overtopping to below 5 l/s/m. This threshold has been selected based on the manual for a value representing safe overtopping limits for cars close behind a sea wall. Table 3-6 summarised the overtopping rate for a range of seawall crest seawall. A crest elevation of 2.80m AHD has been selected for the structure. The future crest level at horizon 2109 may need to be raise at up to 4.20m AHD to achieve similar overtopping performance.

Table 3-6 Amity Point overtopping rates

Crest level (m AHD)	Event	Overtopping Rate (l/s/m)
2.60	1% AEP (Present Day)	7.19
2.80	1% AEP (Present Day)	2.04
4.00	1% AEP (2109)	6.36
4.20	1% AEP (2109)	2.58

3.4.3 Geotextile Sand Container (GSC)

Physical testing and damage survey following tropical cyclones have demonstrated that suitable GSCs can resist significant wave heights up to 2.0m. The unit size, orientation and toe protection will be a requirement for the detailed design phase.

3.4.4 Beach nourishment

A nourishment of 2,500m^3 is proposed, estimated to account for approximately 10 years of sand supply for Park Beach, including an allowance for placement loss. The level of the nourishment should meet the level of the seawall crest, at 2.8m AHD and the newly created artificial dune will need to be protection from wind-blown with fences and revegetated with native species to provide a seek bank for the Wanga Wallen beach vegetation. The slope of the nourishment shall be no steeper than 1:5 and a coastal access path would link the intertidal beach and the camping ground.

4 EurOtop II (2016), Manual on wave overtopping of sea defences and related structures, second edition

4 Rocky Point - Russell Island

4.1 Introduction

A new coastal processes investigation has been undertaken at Rocky Point, Russell Island, to support the concept plan to control erosion along the Rocky Point Park. The site is shown on Figure 4-1. This chapter describes:

- Site investigation undertaken for this project
- Modelling of sediment transport to understand erosion
- Concept plan development
- Concept designs.

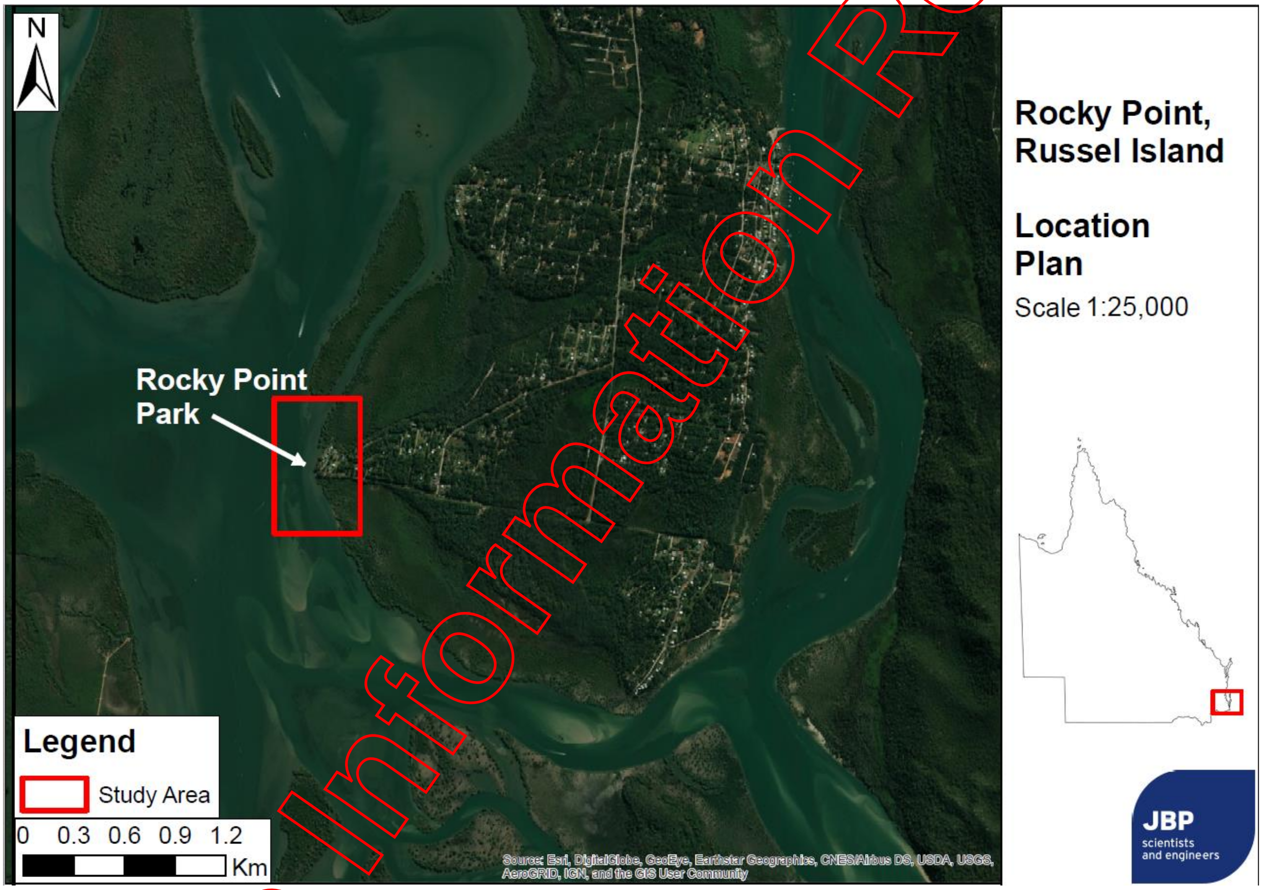


Figure 4-1 Rocky Point Study Site

4.2 Site investigation

4.2.1 Study site

The site is located along Rocky Point Park, a rocky/alluvium foreshore with a thick mangrove colony to the south of the site. Figure 4-2 shows representative photographs of the site.

The North Stradbroke Island high voltage overhead power line (steel lattice tower) is located in the Park, some 20m from the retreating shoreline. This structure is within the Erosion Prone Area.

Aerial pictures show that the erosion has been progressing slowly at the site, at a rate around 0.1m per year over the last decade which are consecutive to local slip failures created by toe erosion.

Figure 4-2 Rocky Point Foreshore (left) and Mangrove (right)

4.2.2 Tides

Tidal planes are provided based on the location at Russell Island in the Queensland Tide Tables.

Table 4-1 Tide conditions at Amity Point

Tidal plane	Present day (m, LAT)	Present day (m, AHD)
HAT	2.89	1.50
MHWS	2.30	0.91
MHWN	1.89	0.50
AHD	1.39	0.00
MSL	1.22	-0.17
MLWN	0.81	-0.58
MLWS	0.39	-1.00
LAT	0.0	-1.39

4.2.3 Extreme water levels

Design water levels have been extracted from the Redland Shire Detailed Storm Tide Analysis (Cardno, 2011) which was compiled following the regional wave climate estimated within Redland Shire and Logan City Council Storm Tide Hazard Study (Cardno Lawson Treloar, 2009).

The study storm tide levels include for 50 year of sea level rise along with a 10% increase in wind speeds to account for greenhouse effects for the 2069 storm tide conditions. Table 4-2outlines the distribution of extreme storm tide levels at the site.

Storm tide planning levels, including a freeboard of 300mm and sea level rise allowance of 300mm for 2059 and 800mm for 2109, are:

- Extreme sea level for 2059 planning horizon: 2.80m AHD
- Extreme sea level for 2109 planning horizon: 3.30m AHD

Table 4-2 Extreme sea levels at Rocky Point

Return period (1 in x years)	Present day, m AHD no wave setup	Present day, m AHD with wave setup	2109, m AHD no wave setup	2109, m AHD with wave setup
50	1.88*/1.77	1.96*/1.91	1.94+0.8=2.74	2.08+0.8=2.88
100	1.94*/1.87	2.02*/2.01	2.06+0.8=2.86	2.20+0.8=3.00
200	2.00*/1.97	2.09*/2.11	2.19+0.8=2.99	2.33+0.8=3.13
500	2.07*/2.09	2.16*/2.23	2.35+0.8=3.15	2.49+0.8=3.29
1,000	2.13*/2.19	2.22*/2.33	2.48+0.8=3.28	2.62+0.8=3.42
* indicates non-cyclonic conditions.				

4.2.4 Waves

The shoreline along the western shore of Russell Island experiences wind-sea across the Canaipa Passage. Hourly wave significant height and peak period have been modelled for the period 1957 to 2019 and the distribution of wave parameters are indicated on Figure 4-3. The wave model includes the effect of tidal water level variations at Russell Island.

The median wave height is around 0.05m with occasional storm waves reaching 0.7m.

The annual maximum significant wave height has been distributed to outline extreme wave frequencies. A further wave hindcast calculation wave carried out including a 10% increase in wind speed to provide an estimate of design waves at horizon 2100. The distribution of annual maxima is presented on Figure 4-4. Table 4-3 summarises the design conditions based on AS1170 wind speed which are more conservative but well suited to the site since the Fetch is limited across the Canaipa Channel.

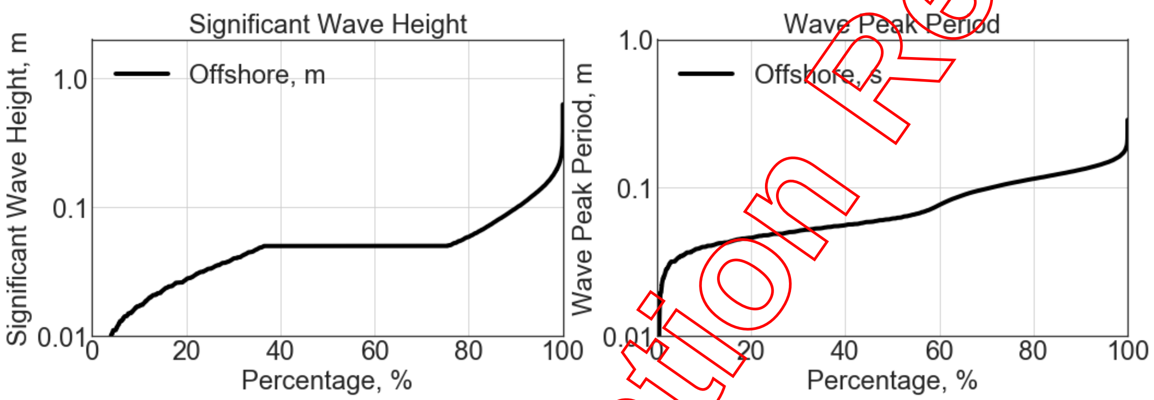


Figure 4-3 Distribution of nearshore wave conditions at Rocky Point

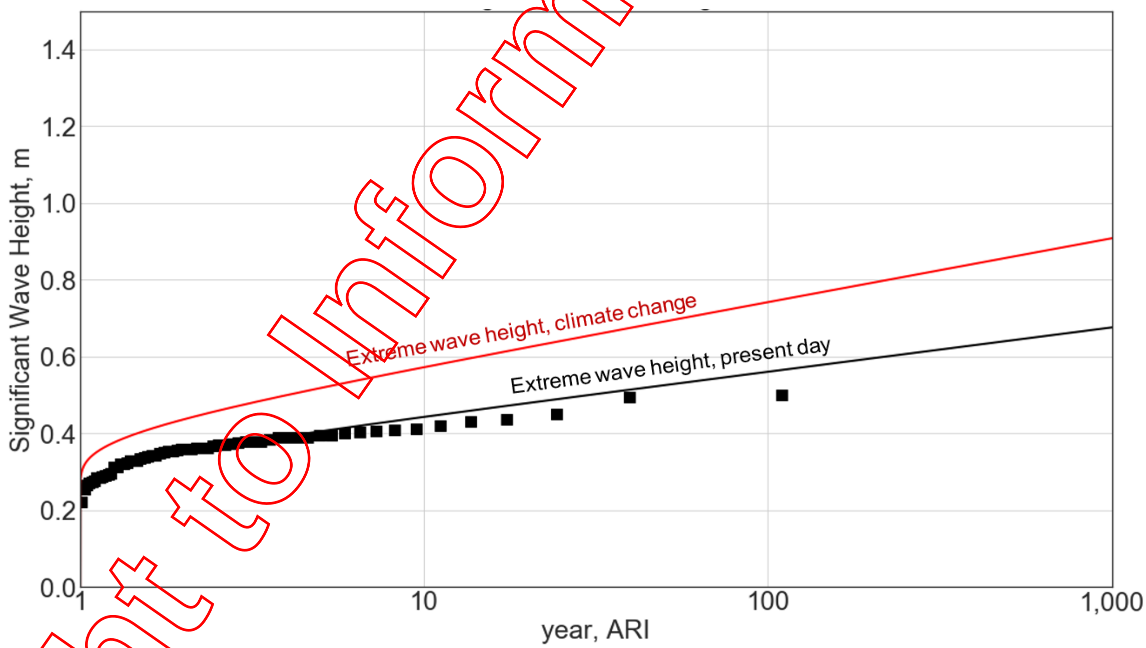


Figure 4-4 Significant wave height exceedance at Rocky Point

Table 4-3 Extreme wave parameters at Rocky Point, present day and future planning horizons

	Present Day		2100	
Annual exceedance probability (1 in X)	1% (1 in 100)	0.1% (1 in 1,000)	1% 1 in 100	0.1% (1 in 1,000)
Wave significant height, m	1.36	1.72	1.51	1.90

4.2.5 Longshore transport and local erosion issue

To analyse the erosion and scarping at Rocky Point a LST model was assembled from 1957 to 2019. The model estimates hourly sediment movement over this period, allowing for the rise and fall of the tide and the nearshore wave refraction, wave shoaling and wave breaking processes in the nearshore zone. The resulting potential LST volumes are presented in Figure 4-5.

Generally, the longshore transport is moving northward and is very small, in the order of 200m³ per year. Seasonal variations are observed in the LST direction, with northward transport dominant during summer, with slower sediment transport in the winter months.

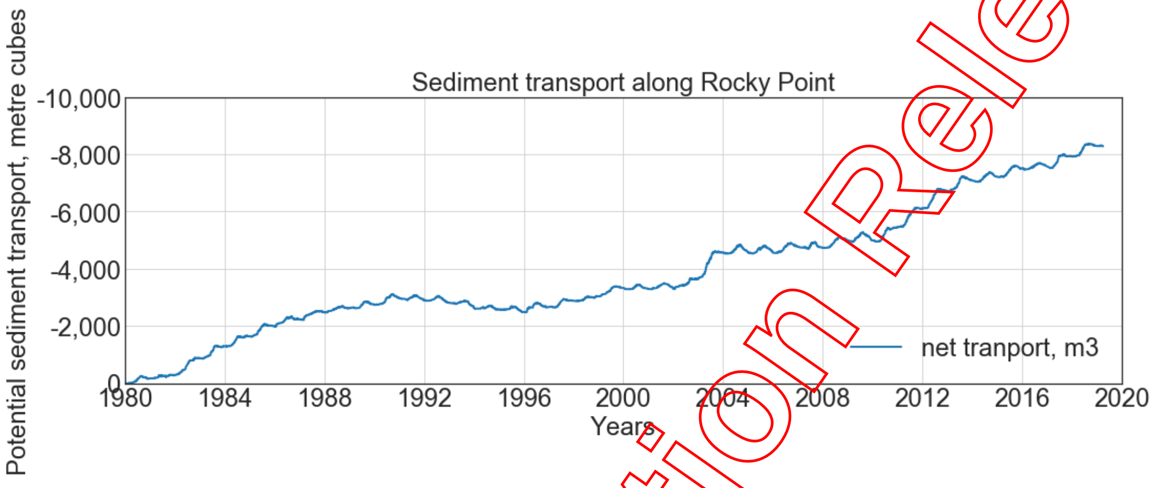


Figure 4-5 Potential sediment transport along Rocky Beach

There is no significant sandy beach along Rocky Point, therefore the sediment transport potential does not materialise into the movement of sand.

Without this sand the shoreline position retreats landward following storm erosion of the onshore banks. The intertidal area is rocky, covered with pebble and cobbled size rocks mixed with silts and sand originating from eroded alluvium deposits in the mangrove area, to the south of Rocky Point.

4.3 Concept plan for erosion mitigation

Several options have been considered based on the site investigation and modelling described in the previous subsections. A groyne is not considered likely to be effective, as there is not enough sand in the beach system to maintain a beach over time. Beach nourishment would pose a risk to neighbouring mangrove trees as eroded sand would stress the root system and could lead to die backs.

A seawall is considered the most practical way to reduce the erosion risk at the site, adjacent land and the overhead high voltage powerline tower. The seawall will essentially relocate the erosion prone area 10m away from the seawall crest, mid-distance between the seawall and the powerline.

To improve the Rocky Point Park amenities and mitigate end-effects, an access structure has been incorporated into the works. This will maintain pedestrian access to the foreshore to support recreational boat, canoes and kayak users.

4.4 Concept design

At Russel Island the seawall and access structure have been designed to following criteria:

- Seawall rock armour to be stable during a future 1% AEP (2109) storm event
- Seawall overtopping reduced to safe levels during a present day 1% AEP storm event
- A crest level be designed by a future 1% AEP (2109) storm event.
- Rock armour forming the lower section of the access ramp is stable during a future 1% AEP (2109) storm event
- Rock armour forming the upper section of the access ramp is stable during a present day 2% AEP (1 in 50-year) event

4.4.1 Rock armour

To calculate overall rock armour stability the Van der Meer shallow water condition method was adopted. The formula is used to predict the stability of a uniform rock armour slope. The method includes storm duration, wave period, structure permeability, and damage level, using the parameters shown in Table 4-4. Using the design wave climate and water levels discussed in Section 0, rock armour with median mass of 400kg has been selected for the structure.

Table 4-4 Rock armour sizing input parameters

Input	Value/description
Notional permeability (P)	The proposed structures will be formed of a double interlocking layer placed on a geotextile filter. This arrangement represents a notional permeability of 0.1.
Slope angle (cotα)	1 in 1.5 slope has been selected at Russell Island for stability whilst reducing the volume of rock 1 in 10 at Russel Island access ramp of accessibility
Damage number (Sd)	2 represents less than 5% damage to the structure following a design storm event.
Storm duration	1 hour to replicate change in tide levels and therefore wave climate
Rock density	Density set at 2.65t/m3 providing a practicable minimum that will be achievable from various sources.

Table 4-5 Russel Island rock armour sizing

Event	Median armour mass, M50 (t)	Median nominal diameter, Dn50 (m)
Rock armour wall		
1%AEP (Present Day)	0.30	0.48
1%AEP (2109)	0.40	0.53
Access Ramp		
1%AEP (2109)	0.03	0.21
2%AEP (Present Day)	0.02	0.18

4.4.2 Crest level - Wave Overtopping

The wave overtopping performance for the Rocky Point seawall was analysed utilised the Neural Network tool, within EurOtop II manual. The profiles of the structures have been schematised to minimise overtopping to below 5 l/s/m. Table 4-6 summarises the overtopping rate for a range of seawall crest seawall. A crest elevation of 2.80m AHD has been selected for the structure. The future crest level at horizon 2109 may need to be raise at up to 3.80m AHD to achieve similar overtopping performance.

Table 4-6 Russel Island overtopping rates

Crest level (m AHD)	Event	Overtopping Rate (l/s/m)
2.60	1% AEP (Present Day)	5.85
2.80	1% AEP (Present Day)	2.15
3.60	1% AEP (2109)	10.80
3.80	1% AEP (2109)	4.46

5 Planning review

5.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)

The EPBC Act provides a legislative framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance (MNES). These are recorded within the EPBC Act Protected Matters Search Tool (PMST).

- The work site at Amity Point is mapped as being within a nationally significant wetland, which is a MNES.
- The work site at Russell Island is mapped as being within a nationally significant wetland, and Ramsar wetlands, which are both MNES.

In cases such as this, if matters of national environmental significance are present or have the potential to be present within the area of works, a Significant Impact Assessment under the EPBC Act guidelines should be undertaken. If the impact is considered significant after the application of mitigation measures, a proposed action referral will be required.

5.2 Native Title Act 1993 (NT Act) (Commonwealth)

Native title recognises the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people. Native Title is extinguished (refused recognition) over freehold land, however it may exist over State land, including reserves and unallocated state land.

- Amity Point forms part of the registered Native Title Area. The majority of the site has had trusteeship transferred to QYAC, who are the legal owner. With the Amity Basin, RCC continue to hold trusteeship over Lot 2 on SP251715. QYAC have the campground – Lot 1 on SP199963. [redacted]
- Russell Island is not believed to be subject to a Native Title Claim. A search of the National Native Title Vision (NNTV) portal indicates that the area of works is not within an application or determination area. Given native title has not been extinguished over the project footprint, the assessing authorities will notify the proposed work in accordance with the provisions of the Native Title Act 1993. Other cultural heritage provisions will also apply.

5.3 Planning Act 2016 (State)

The State Assessment Referral Agency (SARA) is a concurrence agency for the State of Queensland's interests.

The proposed works for both sites will be triggered for assessment against state codes 7, 8 and 11, being tidal works, their potential impact on marine plants and navigation. This is a Matter of State Environmental Significance (MSES), which are addressed under the codes related to the Planning Act 2016. A survey should be undertaken to determine the level of impact the works will have on marine plants. If there is a significant residual impact to these values as a result of the works an offset will need to be arranged.

A review of mapping identified the following mapped overlays which will also be of interest to SARA:

- Coastal Protection:
  - Coastal management district
  - Erosion prone area
  - Medium storm tide inundation area
  - High storm tide inundation area.

- Fish Habitat Areas:
  - Tidal waterway.

- Maritime safety:
  - Navigable waterways – High risk maritime development zone.

5.4 Coastal Protection and Management Act 1995 (State)

The Coastal Protection and Management Act 1995 defines tidal works as, among other things, 'works designed to be exposed to tidal water because of shoreline fluctuations'. Tidal works (including prescribed tidal works) is made assessable development under the Planning Regulation 2017 (17.1.28) which requires a development approval for operational work

- The work site at Amity Point will be considered tidal works.
- The work site at Russell Island will be considered tidal works.

5.5 Fisheries Act 1994 (State)

For the purposes of the Fisheries Act 1994, any plant located below mean high water mark is considered to be a marine plant. There are also certain species which are considered to be intrinsic marine plants regardless of their location (e.g. mangroves, saltcouch, sandfire). Based on the location of the proposed works within the tidal zone, and the marine habitat survey the proposed works will damage or destroy marine plants. Any clearing of marine plants as part of the works would trigger the need for Development Approval in accordance with the Planning Regulation 2017, Schedule 10, Part 6, Division 3, Subdivision 1, Item 11 (operational work that is the removal, destruction or damage of a marine plant).

- The work site at Amity Point may include marine plants. In order to confirm the nature and extent of marine plant disturbance / destruction, a survey should be undertaken.
- The work site at Russell Island may include marine plants. In order to confirm the nature and extent of marine plant disturbance / destruction, a survey should be undertaken.

5.6 Aboriginal Cultural Heritage Act 2003 (ACH Act) (State)

The requirements of the ACH Act are applicable to physical works that have potential to interfere with places, artefacts and landscapes of Aboriginal heritage or spiritual culture. Cultural heritage sites are recorded within the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) Cultural Heritage Database and Register.

- The work site at Amity Point does not register any Aboriginal cultural heritage sites. In order to determine the category of works and associated requirements under the act the contractor should consult the Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines.
- The work site at Russell Island does not register any Aboriginal cultural heritage sites. In order to determine the category of works and associated requirements under the act the contractor should consult the Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines.

5.7 Nature Conservation Act 1992 (NC Act) (State)

The Nature Conservation Act considers endangered, vulnerable or near threatened (EVNT) plants. These are mapped within the Nature Conservation Act flora survey trigger map, and if found, a flora survey through a suitably qualified person will be required. If Council is not aware of any EVNT plants within the area to be cleared or within 100m of the clearing, the proposed clearing does not require a permit under the Act. It is noted that a copy of the relevant flora survey trigger map must be kept for a period of five years from the day clearing commences.

- The work site at Amity Point is located outside the high-risk area as per the flora survey trigger map, meaning a flora survey is not required.

- The work site at Russell Island is located outside the high-risk area as per the flora survey trigger map, meaning a flora survey is not required.

5.8 Marine Parks Act 2004 (State)

Marine works may require a marine parks permit under the Marine Parks Act 2004. A marine park is established over tidal lands and waters, aiming to protect and conserve the values of the natural marine environment while allowing for its sustainable use.

- The work site at Amity Point is beyond the mapped marine park area and a marine park permit is not required.
- The work site at Russell Island is within the mapped marine park area and a marine park permit is required.

5.9 Environmental Protection Act 1994 (State)

Dredging in tidal waters can trigger regulation under a suite of both state and commonwealth legislation separate to the development permit process. If 1000t annually of dredge material is removed from under tidal waters a dredging approval is required. If sand is sourced off site under different authorities no approval is required.

- The works at Amity Point will not use marine extracted sand, and a dredging approval is not required.
- The works at Russell Island will not include sand nourishment.

5.10 Coastal Protection and Management Act 1995 (State)

A quarry material allocation (QMAN) is needed where dredging activity results in the removal of material from land under tidal waters owned by the State and where the material is disposed of above the high-water mark. If sand from the works is required from sources that are not already approved a QMAN will be required.

- The works at Amity Point will not use marine extracted sand, and a dredging approval is not required.
- The works at Russell Island will not include sand nourishment

5.11 Coastal Protection and Management Regulation (Local Government)

As the subject works are located partly with the 'tidal area of the local government' they are prescribed tidal works and Redlands City Council will act as the assessment manager for the development application, and will assess the application against Schedule 3 of the Coastal Protection and Management Regulation 2017.

- The works at Amity Point will require a development application
- The works at Russell Island will require a development application.

Table 5-1 Planning summary

Legislation	Amity Point	Russell Island	Approval / action required
EPBC Act	Nationally significant wetland	Nationally significant wetland, and Ramsar wetland	Significant Impact Assessment under the EPBC Act guidelines should be undertaken for both sites
Native Title Act	Yes	No	Assessing authorities will notify groups.
Planning Act	Potential for marine plants - MNES	Potential for marine plants - MNES	Undertake marine plant survey for both sites
	Coastal Protection district (inc. erosion prone area and medium storm tide inundation zone)	Coastal Protection district (inc. erosion prone area and medium storm tide inundation zone)	Approval through SARA
	Fish Habitat Areas (within tidal waterway)	Fish Habitat Areas (within tidal waterway)	Approval through SARA
	Maritime safety (adjacent to navigable waterway)	Maritime safety (adjacent to navigable waterway)	Approval through SARA
Coastal Protection and Management Act	Tidal works	Tidal works	Development approval required for operational work for both sites
Fisheries Act	Potential for marine plants - MSES	Potential for marine plants - MSES	Undertake marine plant survey for both sites
Aboriginal Cultural Heritage Act	No Aboriginal cultural heritage sites recorded in database	No Aboriginal cultural heritage sites recorded in database	Consultation recommended, following Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines
Nature Conservation Act	Outside the high-risk area mapping	Outside the high-risk area mapping	
Marine Parks Act	Marine parks established over tidal lands	Marine parks established over tidal lands	Marine parks permit required of footprint extents into tidal waters
Environmental Protection Act	No dredging planned	No dredging planned	
Coastal Protection and Management Act	No dredging planned	No dredging planned	
Coastal Protection and Management Regulation	Partly within the 'tidal area of the local government'	Partly within the 'tidal area of the local government'	Development Application required from Council

6 Summary and recommendations

This study was undertaken by Jeremy Benn Pacific (JBP), on behalf of the Redland City Council (RCC), to carry out Concept Design Plans for two marine foreshore locations at Park Beach, Amity Point, and Rocky Point, Russell Island.

Amity Point Designs

Following a review of options, the preferred design is a seawall extension, which includes a short length of rock armour followed by a Geosynthetic Sand Container seawall. This would act as a "last line of defence", with new sand nourishment and coastal revegetation providing the primary mitigation against ongoing erosion.

The concept design selected for Park Beach is outlined on drawings C0101, C0201, C0202, C0301, C0301.

To implement the detailed design a geotechnical investigation is proposed. This will help inform if a slope stability investigation is required, particularly if the slope is kept at 1v:2h and of height lesser than 3.0m overall.

Rocky Point Designs

Following a review of options, a seawall is considered the most practical way to reduce the erosion risk at the site. This would be combined with an access structure to maintain pedestrian access to the foreshore to support recreational boat, canoes and kayak users.

The concept design selected for Rocky Point is outlined on drawings C0401 and C0402.

To implement the detailed design a geotechnical investigation is proposed, at least to provide an estimate of bed rock and settlement which will be useful to design the toe of the structure and provide confidence in long term slope stability.

Planning considerations and next steps

The development of concept design plans has considered a range of factors to allow the continued consultation with State Government agencies and the community.

- Pre-lodgement advice should be sought from State Departments, including the Moreton Marine Park Authority, the Department of Environment and Science (DES), and Department of Agriculture and Fisheries (DAF).
- Given the presence of a nationally significant wetland and a Ramsar wetland under the EPBC Act, a Significant Impact Assessment may be required for both sites.
- Given the native tidal claims over state land, recommendations are made to pursue stakeholder engagement with the Minjerribah camping ground and Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC).
- Given the potential for marine plants, which as a Matter of National Environmental Significance (MNES) under the Planning Act, and a Matter of State Environmental Significance (MSES) under the Fisheries Act, a marine plant survey should be undertaken for both sites
- Given the extent of works within tidal waters, the works will be within the marine park and the 'tidal area of the local government'. A marine park permit will be required, and a Development Application required with Council.

Appendices

A Appendix - Amity Point - Park Beach site investigation

This section details the instrumentation and methodology used to study the local coastal processes during a site investigation on 20 and 21 June 2019.

A.1 Methodology

A.1.1 Drifters

Three floating drifters were released into the ocean to monitor currents. Each drifter was positively buoyant to ensure the top of the drifter is constantly afloat. The lower part of the drifter remained submerged by three quarters of its height to minimise wind effects. The deployment of drifters was carried out between the times of 8:25am and 15:49pm.

Each drifter contained a single point precision GPS unit capable of logging latitude, longitude and time logged at 1 Hz with a position accuracy of approximately 2m. Figure A-1 shows a drifter and GPS unit prior and deployment and in the field while observing and record its movements and velocity over diurnal periods.

In order to keep the drifters in a managed boundary and stop them from floating away in Moreton Bay, a surveyor was at hand on a paddle board to keep track of the drifters. Another surveyor was observing on land for safety and to manage the deployment and re-deployed process within the observation basin.

Figure A-1 Floating drifter and GPS unit

A.1.2 Visible observations

Visual observations were recorded using a bathyscope (Figure A-2) to allow underwater viewing of the seabed morphology and sand patterns created by the tide. This instrument allows viewing as far as water clarity and light permit, eliminating water surface glare.

In shallower water, where underwater visibility was good the bathyscope confirmed the orientation of seabed ripples and allowed uninterrupted views of the seabed sand ripple fields and of sand transport processes at small scale, allowing to understand if sand mobility was present or not.

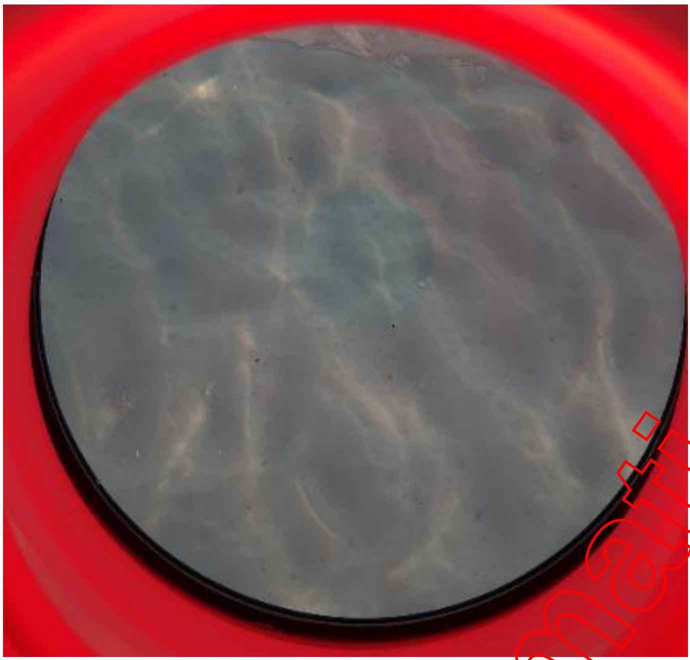


Figure A-2 Image of bathyscope

A.1.3 Settling tubes

Three settling tubes were placed on the seabed in between the areas where the drifters were deployed approximately 30m apart. The tubes were placed in the seabed, 100mm above the seabed. The settling tubes were constructed from a PVC pipe, 37mm in diameter. The settling tubes were placed at low tide on 20th June and all data was collected on the 21st June, in the afternoon, at low tide.

The tubes were placed evenly apart from each other, to monitor sediment motions from bed load and suspended load. The tubes were deployed on 20th June at low tide in the afternoon and were retrieved on 21st June at low tide in the afternoon, so where deployed for a period of 24 hours. The locations of the settling tubes are displayed in Figure A-4**Error! Reference source not found.**. This instrument was used to collect any suspended sediment.

Of the settling tubes that were retrieved, all three had little to no sediment that had been collected. All three were submerged and had water in them, filled with only a very small amount of very fine silty sediment. However, it was not significant enough to be extracted from the tube, weighted and graded, so a detailed assessment of the sample mass and grain size was not appropriate on this occasion.

Sediment found near to the tubes used is small grained with silt and in places, and there are small shell fragments along by the mangroves to the south of the bay. Location number 4 was observed as being the only area strong enough for sediment transport to occur within the bay. Observation around the beach bar that had formed as a result of a previous wave overtopping event the corner of the sea wall was also categorised as fine sand of approximately 0.225mm.

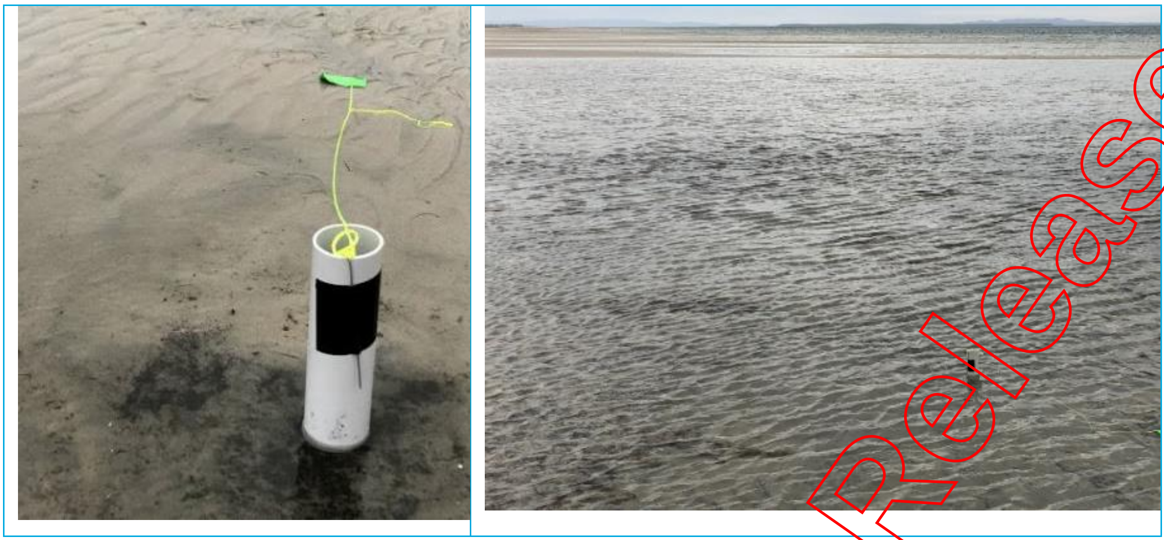


Figure A-3 Image of settling tube before and after deployment, at low tide

Figure A-4 Locations of settling tubes

A.1.4 Survey

Depth sounding was undertaken with a high-accuracy Differential GPS survey across the site using a GNSS Rover. The information gathered can be used both to establish a survey of the sea wall, surrounding topography, and also to review tidal planes. All accessible areas were surveyed within a range 5m from the sea wall crest, the toe of the structure and where scour was observed. Levels were also taken at the vegetation line, the high tide line, and at different times when the tide was going out.

Surveyed data was analysed to assess the topography of the sea wall (crest and toe) and surrounding area, including the area of erosion at top of bank around the car park of Amity Point Camping Ground, and to derive an indicative tidal plane for the survey area, assessing the topography of the high tide line, the lower tide line and the vegetation line.

Figure A-5 GPS and GNSS Receiver in use

A.2 Drifter Data

Deployment tracks summary including of duration, displacement and flow velocity measured the 21st June 2019 are presented in Table A-1.

Table A-1 Drifter deployment summary

Deployment	Total time (s)	Displacement (m)	Average speed (m/s)
A1	512	11.3	0.02
A2	261	17.7	0.07
A3	238	21.2	0.09
A4	408	36.9	0.09
A5	914	70.8	0.08
A6	1148	222.0	0.19
A7	447	65.1	0.15
A8	179	1.5	0.01
A9	942	25.2	0.03
A10	556	106.7	0.19
A11	755	10.0	0.01
B2	479	50.2	0.10
B3	1040	86.8	0.08
B4	874	185.2	0.21
B5	379	64.7	0.17
B6	415	116.0	0.28
B7	1072	95.5	0.09
C1	1990	82.8	0.04
C2	725	148.8	0.21
C3	570	174.2	0.31
C4	135	64.7	0.48
C5	240	81.5	0.34
C6	360	61.2	0.17

A.3 Ripple bed observations

The various ripple orientations that have been identified are mapped in Figure A-6.

- A: Ripples in this area are 5cm apart and approximately 2cm in height and they are approximately 5 ridges in this area of the Basin, this is a very steep ripple bed dominated by wave actions
- B: Ripples observed here at the corner of the sea wall showed ripples that are not mature an essentially indicate an oversupply of sand. The excess sand comes from the erosion of the park beach
- C: circular ripples within a sand hole formation
- D: Ripples are in a criss-cross like pattern which is dominant in both directions. A ripple of approximately 5cm in height were observed in this area. Swell waves from the Rainbow Channel and reflected waves across the seawall meet in this area.
- E: At the corner of the sea wall, there are more diverse and spread ripples out compared to the ripples observed at the edge of the sea wall; here they are approximately 10cm apart. It was observed that there is a drift in ripples towards the wall during ebbing tides (no image). A long period swell, approximately 3cm high interact with the seabed in this area.
- F: Sand bar formation approximately 15cm in height, wave-length over 10m

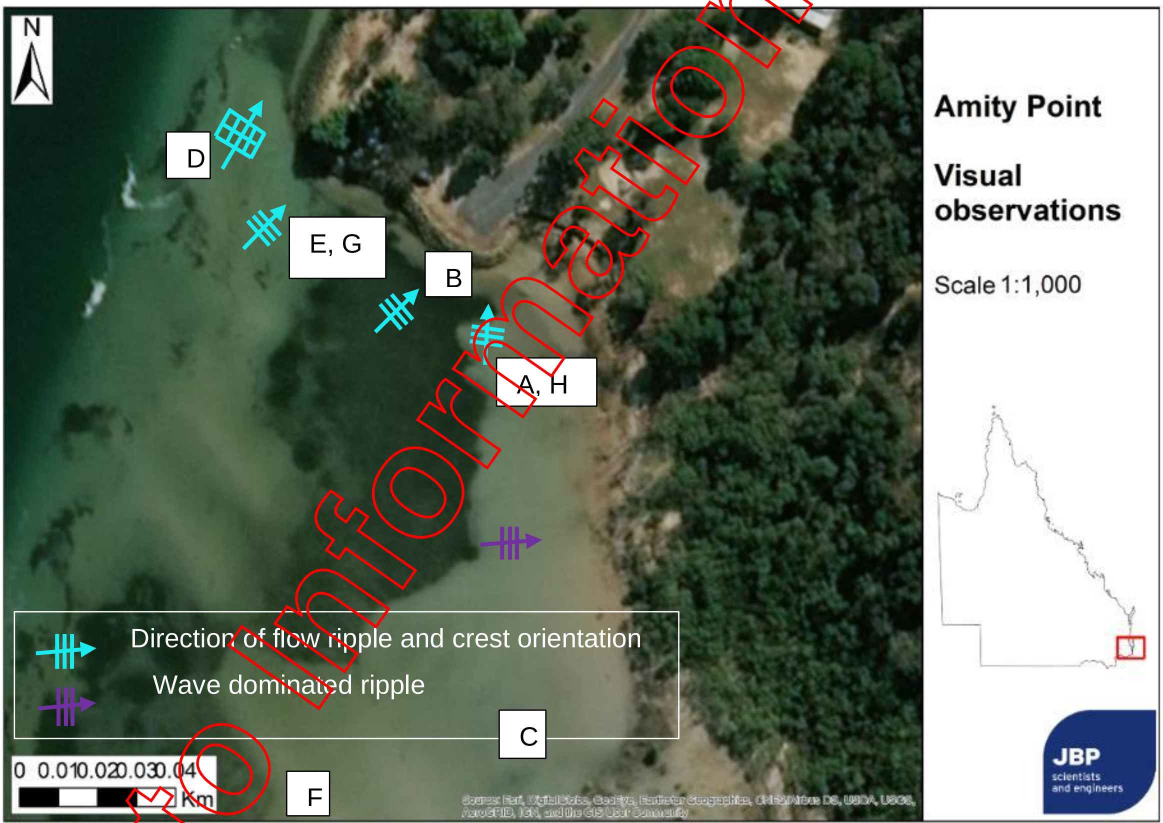


Figure A-6 Ripples orientation

(a) Sinuous ripples

(b) Sinuous ripples

(c) Ripple and tidal dip

(d) Ripples concentrated around eddies behind rock (along seawall)

(e) Criss-cross ripple formation

(f) Criss-cross ripple formation

(g) Ripples

(h) Sea grass illustrating high tide lines and shell/rock fragments from sea wall and road base erosion

Figure A-7 Photographs of seabed at low tide

A.4 Appendix - Amity Point Seawall condition assessment

(a) bitumen erosion from tide

(b) Pavement sub-base erosion

(c) sea wall crest

(d) Erosion of sub-base

(e) Bitumen seal cracking along the beach

(f) Park Beach (gravel from road base on the beach)

Figure A-8 Images of sea wall condition and evidence of scour in surrounding area

B Appendix - Concept Designs

(Attached separately)

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Planning Report: Rocky Point Revetment and Foreshore Access Ramp

Document Control Sheet

Omtrek Pty. Ltd. 43 Raff Avenue Holland Park QLD 4121 Ph [redacted] administration@omtrek.com.au www.omtrek.com.au	Project Number:	0055
	Title:	**Planning Report: Rocky Point Revetment and Boat Ramp**
	Project Manager:	Andrew Fielding
	Author:	Andrew Fielding
	Client:	JBP
	Client Contact:	Oliver Poynter
	Client Reference:	
Synopsis:	Proposal details for assessment.	

Version History:

Version	Date	Checked by:		Issued by:	
1	1/6/2021	OP	2/6/2021	AWF	3/6/2021

Rationale

The purpose of this document is to provide information to the assessment manager, concurrence agencies and technical agencies for the following revetment and proposal by Redlands City Council (RCC). The proposal involves the construction of a seawall and boat ramp on the foreshore at Rocky Point on Russell Island. The construction will address the potential impacts of erosion in the area and allow the uses of the area to be maintained, and in the case of the boat ramp, enhanced. In order to substantiate the construction of the seawall and boat ramp, this document offers a summary of the proposal history, a primary analysis of the proposed works and an evaluation of the works according to relevant legislative codes.

Table of Contents

1. Site Description and Proposed Works

The site works are located within the Redland City Council Government Area in Queensland. The works are partially within Lot 52 on S31826 and partially in Moreton Bay adjacent to Lot 52. The lot is located on Russell Island.

Figure 1: Proposed works location

1.1 Site Description

The proposed works area is located on a west-facing shoreline of Russell Island at Rocky Point Park. The site has a rocky/alluvium foreshore which has an erosion scarp up to 1.5m. The foreshore includes a narrow, low level beach that sits above a rocky shelf. It is bordered by private property to the north and a dense mangrove colony to the south. A powerline easement and associated powerline runs through the site. Russell island is within Moreton Bay, and is offered protection from ocean swell by Moreton Island and North Stradbroke Island. However, the study site remains prone to extreme coastal processes, including tidal currents flowing within Moreton Bay, storm surges and wind-generated waves. In addition to the power line the area is currently used for recreation via an informal existing boat launching area.

1.2 Description of the works

To protect the public reserve from coastal erosion, RCC propose to construct a 95m rock revetment wall, the design includes a 4m wide boat ramp constructed from precast planks.

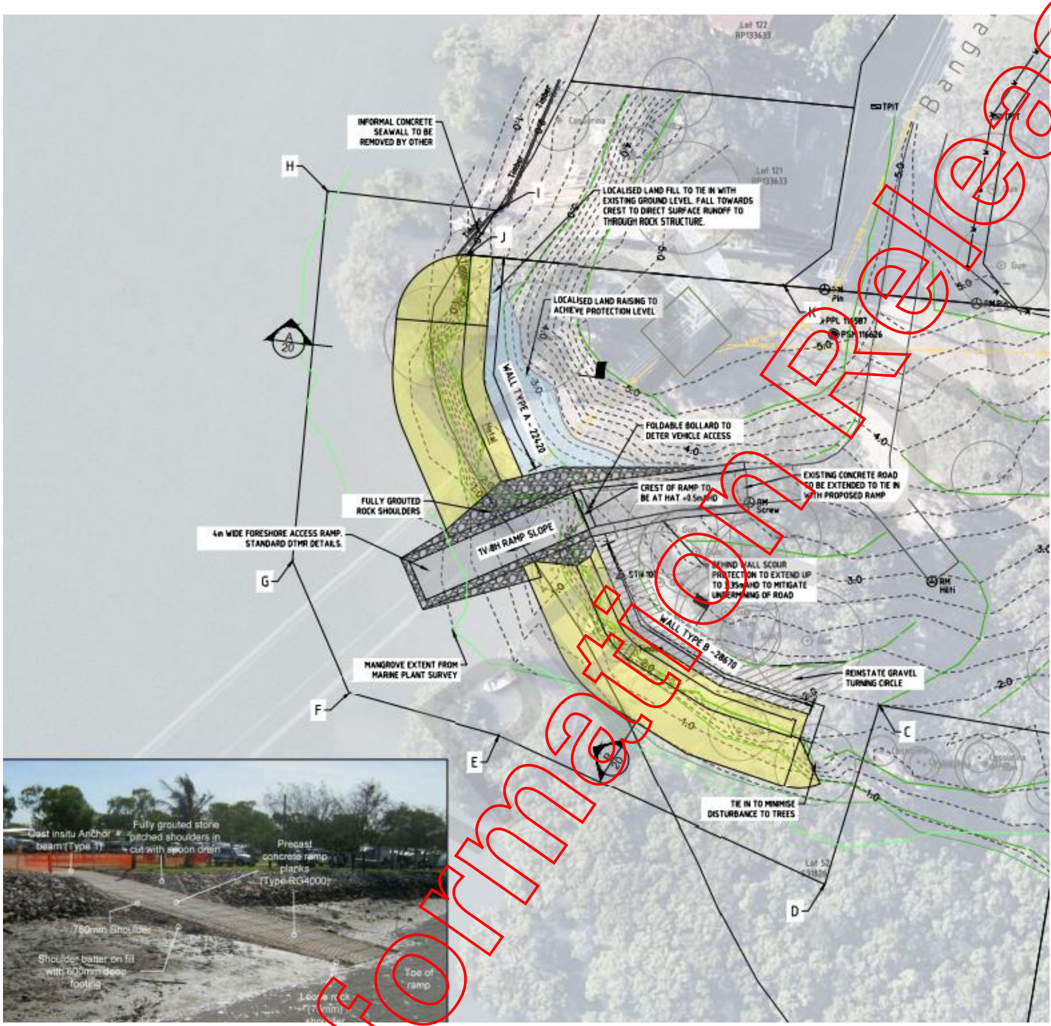

Figure 2: Extract of proposed design

For more detail, please see the attached engineer drawings, included as Appendix A.

2. History of the proposal

Once the erosion problem was identified, Redlands City Council engaged JBP to undertake several investigations of the site and design a solution that addressed the problem.

2.1 The Problem

Based on site observations, the cause of the erosion at the site is likely to be due to low energy, but persistent wave attack, mainly at times of high tide. The beach itself is unlikely to rebuild after a storm because the site is not subject to long-period swell able to generate onshore sediment transport, or a significant supply of longshore or aeolian (wind blown) sand transport. As a result, the erosion is believed to be relatively permanent. The area will continue to erode without bank protection. Over the long term, this ongoing erosion may threaten the pylon holding the overhead power line and the recreation use of the area.

2.2 Results of studies

As a result of the studies, the information has been used to minimise the impact of the design on any coastal processes. The following has been considered in the design:

- Only shore parallel structures should be considered at the site, i.e. a rock revetment. This will minimise any impact on nearshore currents and sediment transport. No groynes or jetties have been proposed. The foreshore access ramp is to be positioned adjacent to the revetment, with no associated shore-parallel structures.

- The alignment of the rock revetment is to be as landward as possible to minimise any impact on nearshore currents and sediment transport. No land reclamation is to be undertaken.

- Disturbances to marine plants, in particular mangroves, are to be avoided. The structure should be kept relatively short, spanning the eroded area only, with sufficient tie-ins to reduce any end-effects.

2.3 Marine Plant Survey

Omtrek undertook a survey of marine plants on the foreshore area of Lot 52 on s31826 over a 100 metre potential work area. The survey identified that the overall survey site has 5 major plant communities with individual plants and driftwood scattered over the site. Micro algae covered the area where it is regularly exposed to tides.

With respect to the proposed works area within the survey site, handheld GPS data and GIS analysis has determined that 780m^2 of marine plants are within the temporary impact area and 145.3m^2 are within the permanent impact area. As discussed in the attached code responses, marine plants will be significantly impacted by the proposal and will need to be offset.

3. Planning framework

This section provides an overview of potential approval triggers, exemptions and accepted development requirements works outlined in section 1.2. The proposed works footprint will be on State land and Road Parcel for the Site. The overview looks at Commonwealth, State and Local Government matters.

3.1 Approval Triggers

In order to undertake the works a number of approvals are required. The approvals framework is outlined below.

3.1.1 Commonwealth Matters

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act provides a legislative framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance (MNES). An EPBC Act Protected Matters Search Tool (PMST) for the site (and 5 km buffer) was undertaken. If MNES are present or have the potential to be present within the area of works, a Significant Impact Assessment under the EPBC

Act guidelines should be undertaken. Due to their scale the works do not constitute a significant impact on any MNES.

Native Title Act 1993 (NT Act)

Native Title is extinguished (refused recognition) over freehold land. However, it may exist over State land, including reserves and unallocated state land. A search of the National Native Title Vision (NNTV) portal indicates that the area of works is not within an application or determination area. Given native title has not been extinguished over the project footprint, the assessing authorities will notify the proposed work in accordance with the provisions of the *Native Title Act 1993*.

3.1.2 State Matters

Planning Act 2016

A review of Mapping identified the following mapped overlays which affect the works footprint.

Coastal Protection:

- Coastal management district.
- Erosion prone area.
- Medium storm tide inundation area.
- High storm tide inundation area. ·

The site is part of a coastal management district and is a high hazard area for Storm Tide. The entirety of the site exists within the 40m buffer from highest astronomical tide with probability of erosion due to storm impact and long-term trends of sediment loss. The site is also an Indicative Erosion Prone Area (including projected climate change impacts to 2100) with erosion and permanent tidal inundation due to a sea level rise of 0.8m.

Maritime safety: Navigable waterways – High risk maritime development zone.

The State Assessment Referral Agency (SARA) is a concurrence agency for the State of Queensland's interests. The works are triggered for assessment against state codes 7, 8 and 11, 22 due to the fact the works are tidal works, and are impacting on marine plants and navigation. The responses to the State codes are attached in Appendix G2.

Unexploded ordinance:

There are no UXO areas of significance.

Coastal Protection and Management Act 1995

The *Coastal Protection and Management Act 1995* defines tidal works as, among other things, 'works designed to be exposed to tidal water because of shoreline fluctuations'. By the very nature of the works, it is clear, the works are designed to be exposed to tidal water and is therefore considered tidal works. Tidal works (including prescribed tidal works) is made assessable development under the Planning Regulation 2017 (17.1.28) which requires a development approval for operational work.

Fisheries Act 1994

For the purposes of the *Fisheries Act 1994*, any plant located below mean high water mark is considered to be a marine plant. There are also certain species which are considered to be intrinsic marine plants regardless of their location (e.g. mangroves, saltcouch, samphire). Based on the location of the proposed works within the tidal zone, and the marine habitat survey the proposed works will damage or destroy marine plants. Any clearing of marine plants as part of the works would trigger the need for Development Approval in accordance with the Planning Regulation 2017, Schedule 10, Part 6, Division 3, Subdivision 1, Item 11 (operational work that is the removal, destruction or damage of a marine plant). In order to confirm the nature and extent of marine plant disturbance / destruction, please see the attached marine habitat survey (Appendix G1). The Site is not within any Aquaculture Development Areas.

Aboriginal Cultural Heritage Act 2003 (ACH Act)

The requirements of the ACH Act are applicable to physical works that have potential to interfere with places, artefacts and landscapes of Aboriginal heritage or spiritual culture. In order to determine the category of works and associated requirements under the act the contractor should consult the Aboriginal *Cultural Heritage Act 2003 Duty of Care Guidelines*. A study of the area has been undertaken by Everick Heritage Pty Ltd. Works should be undertaken as per the recommendations found in that report.

Nature Conservation Act 1992 (NC Act)

The site is located outside the high-risk Area as per the NC Act flora survey trigger map. As such, a flora survey or the engagement of a suitably qualified person is not required. If Council is not aware of any endangered, vulnerable or near threatened (EVNT) plants within the area to be cleared or within 100m of the clearing, the proposed clearing does not require a permit under the NC Act. It is noted that a copy of the relevant flora survey trigger map must be kept for a period of five years from the day clearing commences.

Marine Parks Act 2004

Separate to the development approval process the works will also require a marine parks permit under the *Marine Parks Act 2004*. Marine parks established over tidal lands and waters protect and conserve the values of the natural marine environment while allowing for its sustainable use. The Site is within the Moreton Bay Marine Park and an application will be sought in conjunction with the development permit.

Environmental Protection Act 1994

Dredging in tidal waters can trigger regulation under a suite of both state and commonwealth legislation separate to the development permit process. The project does not require dredging and no additional approvals apply in this instance.

Coastal Protection and Management Act 1995

A quarry material allocation is needed where dredging activity results in the removal of material from land under tidal waters owned by the State and where the material is disposed of above the high-water mark. The Works do not trigger these provisions.

3.1.3 Local Government

As the subject works are located partly with the 'tidal area of the local government' they are prescribed tidal works and Fraser Coast Regional Council will act as the assessment manager for the development application, and will assess the application against Schedule 3 of the Coastal Protection and Management Regulation 2017 and the response is attached in Appendix G2.

4. Conclusion

It is likely that the impacts of erosion in the area will continue if works are not undertaken. An options analysis has determined that constructing a rock revetment and formalised boat ramp is the preferred option to meet the shared stakeholder objectives for the site. This application demonstrates that the proposed works meet the provisions of the *Planning Act 2016,* the applicable state codes and is suitable for approval subject to conditions.

Redland City Council Coastal Adaptation Strategy Phase 1 – Current Hazards: Prioritisation Matrix entry for Rocky Point, Russell Island

Excerpt from RCC document reference: A3235206

#	Location	Suburb	ENVIRONMENT – Foreshore: Amount of land at direct risk of erosion (at current rate) Rating (1-5)	ENVIRONMENT – Ecological Value: Adjoining terrestrial value (BPA 3.5) & VMA regulated vegetation Rating (1-5)	ENVIRONMENT – Ecological Value: Marine Park Zoning Rating (1-5)	ENVIRONMENT – Ecological Value: Ramsar Rating (1 or 5)	ENVIRONMENT – Ecological Value: Fish Habitat Area Rating (1 or 5)	ENVIRONMENT – Ecological Value: EPBC listed endangered ecological community Rating (1-5)	ENVIRONMENT – Nature Conservation Act: Nature Conservation Act Species Present Rating (1-5)	ENVIRONMENT – Total (average)	SOCIAL – Visual Amenity: Public viewing locations seen landscapes view corridors Rating (1-5)	SOCIAL – Recreation: Loss of recreation use Rating (1-5)	SOCIAL – Cultural heritage: listed Aboriginal heritage, European heritage sites Rating (1-5)	SOCIAL – Population: The number of properties directly affected by the identified hazard Rating (1-5)	SOCIAL – Total (average)	ECONOMIC – Infrastructure value ($): Value of public infrastructure Rating (1-5)	ECONOMIC – Property value ($): Unimproved land value Rating (1-5)	ECONOMIC – Total (average)	Accumulated average score	Consequence Rating – Equal Weighting	Consequence Rating – Higher Environmental Weighting	Consequence Rating – Higher Social Weighting	Consequence Rating – Higher Economic Weighting	Prioritisation Factor – Severity of erosion Rating (1-5)	Prioritisation Factor – Priority Ranking (equal weighting consequence)	Prioritisation Factor – Priority Ranking (Environmental Weighting consequence)	Prioritisation Factor – Priority Ranking (Social Weighting Consequence)	Prioritisation Factor – Priority Ranking (Economic Weighting Consequence)	Risk Rating
62	Rocky Point Park	Russell Island	3	4	3	5	1	4	4	3.43	3	2	5	2	3	5	2	3.50	9.93	Major				3	29.79				H24