

Memo



To: Melinda Brand

Cc:

From: Iain Posnett

Date: 04 February 2021

Subject: Parker Point Benthic Community and Habitat Survey – January 2021

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1. Introduction

Rio Tinto Iron Ore (RTIO) is undertaking an assessment of the environmental impacts of constructing and operating a reverse osmosis (RO) desalination plant at its Parker Point facility within its Dampier Operations in Western Australia's Pilbara Region. MScience Pty Ltd (MScience) has been commissioned to conduct field studies to support that assessment.

RTIO have been investigating two product flow rate options for the RO plant, 4 GL/a and 8 GL/a. RTIO proposes to locate the plant's associated seawater intake and brine discharge pipes near existing port infrastructure. The seawater intake and discharge outfall are proposed to be located at the site of the decommissioned Power Station pond and the Parker Point fuel jetty, respectively (Figure 1). The 4 GL/a plant has an additional option to locate the discharge outfall along the rock wall south of the fuel jetty.

A preliminary assessment of the potential marine environmental impacts of the project, using the Western Australian EPA's recommended environmental factors for Sea (WAEPA 2020), identified Benthic Communities and Habitats (BCH) as a key environmental factor which has the potential to be impacted by the project. As a result of this outcome, RTIO requested that MScience conduct a qualitative assessment of the BCH at Parker Point.

The initial assessment (Survey 1) was conducted in August 2020. An additional assessment (Survey 2) was conducted in January 2021, in response to a request by the Department of Water and Environment Regulation (DWER) for further information. This document details the outcome of both assessments.

2. Assessment Objectives

The composition of BCH within the Dampier Archipelago has been well documented by a variety of studies over the last 20 years and a habitat map detailing the distribution of BCH, using spatial data from those studies, has been produced previously (see MScience 2018 and references therein). The distribution of BCH within and adjacent to Parker Point based on the spatial data available in 2018 is shown in Figure 1. However, the Pilbara marine environment is subject to frequent perturbations (Evans et al. 2020) and much of the data in the 2018 mapping was older than 10 years, necessitating an update of its currency.

The objective of the present assessment was to determine the current status of mapped BCH around Parker Point and to infill the map of BCH distribution in relation to the proposed works and predicted passage of discharge plumes for the 8 GL/a RO plant option.

3. Methods

Survey 1 was conducted between 11 and 12 August 2020, and Survey 2 was conducted on 20 January 2021. Both surveys used a drop camera system with live surface feed to capture high definition downwards-facing video footage along pre-determined transects (Figure 1). A GPS track was recorded during drop camera deployments to allow geo-referencing of the imagery for the purposes of relating the data to the existing habitat map.

The survey design prioritised assessment of the previously mapped BCH and areas adjacent to the proposed intake pipe and discharge outfall locations. Additional transects were then surveyed to cover the areas the discharge plume was predicted to occupy close to the discharge which were outside of the Parker Point dredge design area (see Figure 1). The predicted spatial extent of the brine discharge plume, based on the 95thile of the modelled brine discharge salinity for the 8 GL/a plant, is provided in Figure 1. Transects were typically greater than 70 m long and surveyed at a speed of <1kt. A total of 49 transects was surveyed across the two assessment periods. Transects were grouped into areas as per Table 1

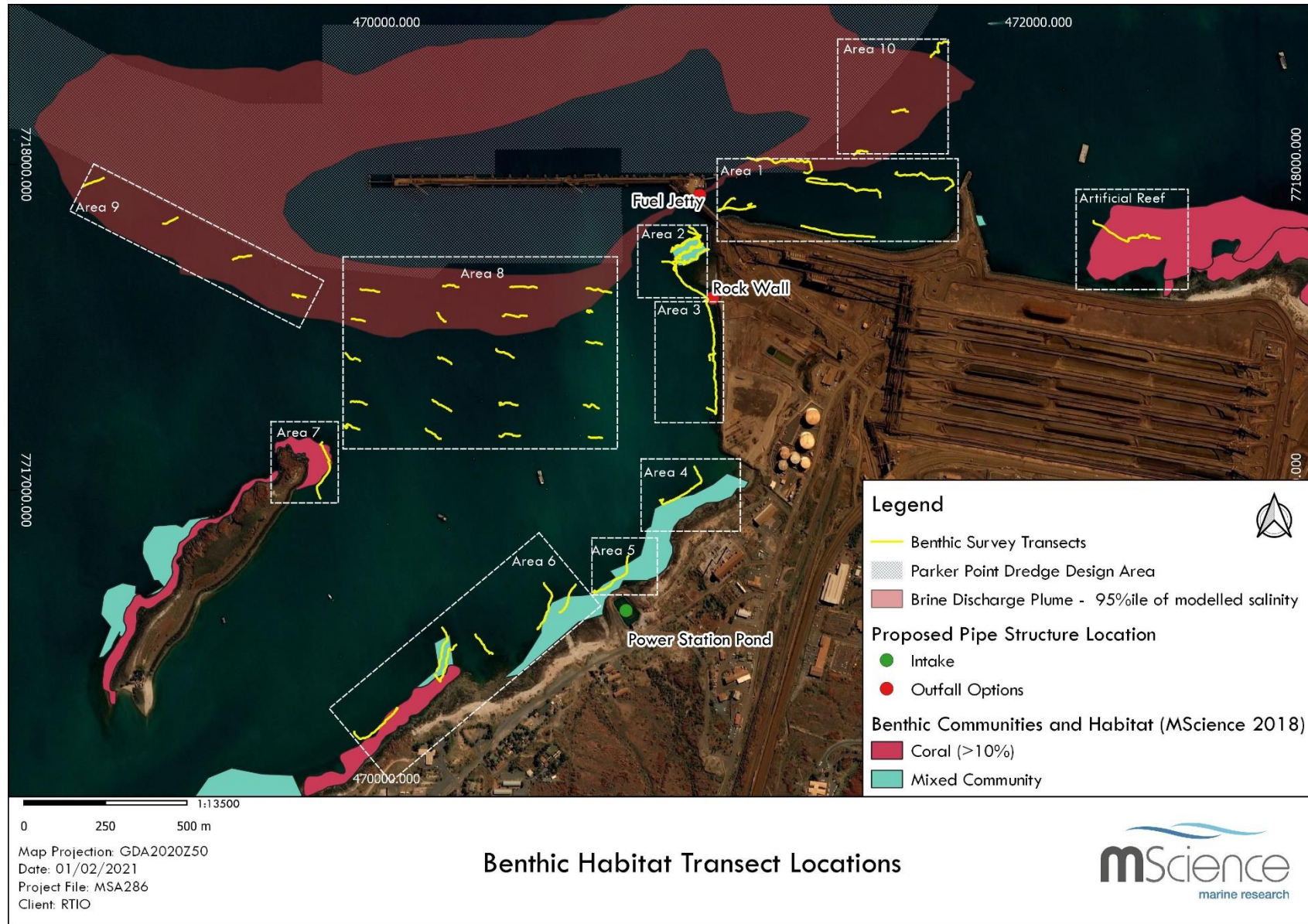


Figure 1. Benthic survey locations, shown on habitat map from MScience (2018)

Table 1 Survey areas shown in Figure 1

Area #	Location Description	Survey #
1	Northeast of the Parker Point fuel berth	1
2	Shiploader / fuel jetty to rock wall (south of Parker Point)	1 & 2
3	Rock wall (south of Parker Point)	1
4	Rock wall (south of Parker Point) to power station pond	1
5	Power station pond	1
6	South of the power station pond	1
7	Tidepole Island	1
8	Parker Point Southern Swing Basin	2
9	West of the Shiploader	2
10	Offshore from fuel berth	2

Qualitative analysis was completed on the video footage to provide a general description of the communities and habitats observed along each transect. The transects were classified based on the habitat types described in Table 2. Where possible, the most common coral taxa were identified and the average percentage of live coral cover along a transect was estimated. Assessments were conducted by qualified marine scientists with greater than 10 years' experience in mapping habitats of the Dampier Port.

Table 2 Habitat classification description

BCH Classification	Substrate Type	Biota Present
Bare	Silts to medium grained sand	No macro epibenthos. Bioturbation in sediment suggests presence of infauna
	Hard substrate (artificial)	No macro epibenthos.
Sparse Mixed Benthos	Hard substrate (artificial)	Algae and sparse sponges with occasional small corals (<30 cm). Live coral cover between 0 and 3 %
Mixed Community	Hard substrate (natural and artificial), sometimes overlaid by a veneer of medium to coarse grained sand.	Turf algae and macroalgae, occasional corals and sponges. Live coral cover between 3 and 10 %
Coral	Hard substrate and well-developed coral reef	Turf algae and macroalgae, large coral colonies and sponges. Live coral cover greater than 10%.

4. Results


Table 3 provides a classification and description of the BCH found within each of the areas listed in Table 1. The estimated range of coral cover across all transects within an area is also provided as a measure of habitat quality.

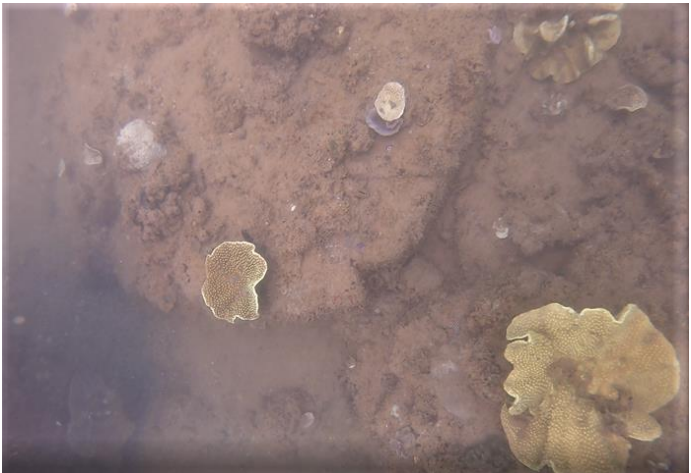

Physical habitats identified included bioturbated silt, fine to coarse grained sand, natural hard substrate and artificial hard substrate (rockwalls). The natural hard substrate supported corals, sponges, turf algae, and macroalgae. Live coral cover on the hard substrate was generally less than 10% but reached approximately 25% at Tidepole Island (Area 7) and 70% at the fringing reef south of the Power Station pond (Area 6). The artificial hard substrate was sparsely inhabited, with coral cover generally less than 3%.



The BCH composition and distribution within the study area were consistent with previous studies and align with the habitat map produced by MScience (2018), as shown in Figure 2.



Transects surveyed within the predicted spatial extent of the brine discharge plume (Areas 8, 9 and 10) consisted of disturbed, bioturbated, uncolonised and unconsolidated silt and fine sand. Most of the predicted spatial extent of the brine discharge plume falls within areas which have previously been dredged or areas regularly subjected to propeller wash from ship and tug movements.

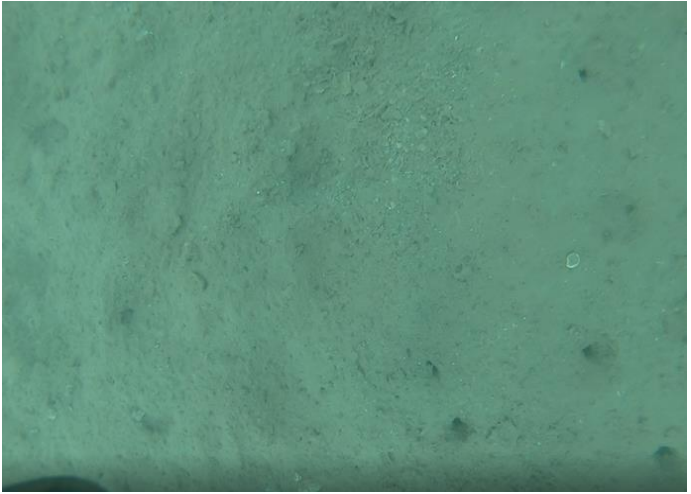
Table 3 General locations and BCH description

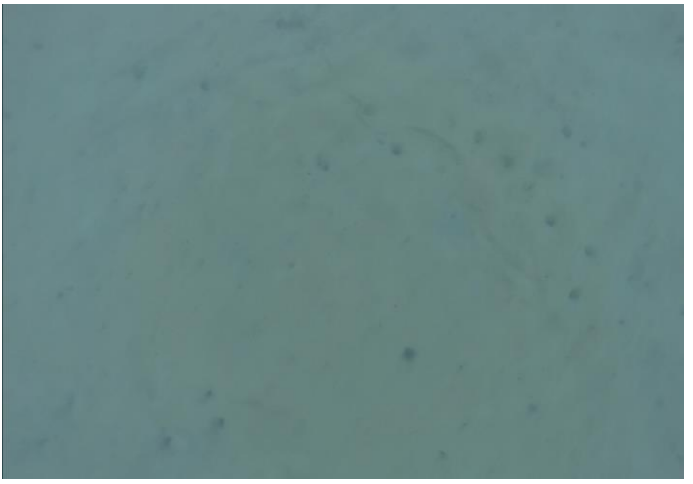
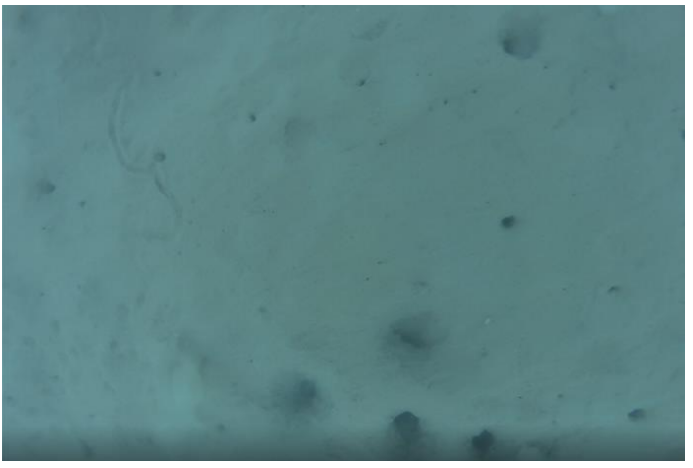
Area #	Location	Classification/Description	Representative Image
1	Northeast of the Parker Point fuel berth.	<p>Bare Sand with Sparse Mixed Benthos supported on the rockwall</p> <p>The survey area ranged between 4 to >12 m water depth.</p> <p>In 8 to >12 m, disturbed, bioturbated, uncolonised and unconsolidated silt and fine sand were observed – Bare.</p> <p>The rockwall adjacent to the shoreline was occupied by turf algae, occasional sparse coral, sponges and zoanthids. Segments of the rockwall which had fallen into deeper water (4 – 8 m) close to the fuel jetty supported turf algae and macroalgae, with occasional small corals and sponges – Sparse Mixed Benthos.</p> <p>Most common coral taxa: <i>Turbinaria mesenterina</i></p> <p>Estimated range % live coral cover: 0 – 3 %</p>	

Area #	Location	Classification/Description	Representative Image
2	Shiploader / fuel jetty to Rock Wall (south of Parker Point)	<p>Mixed Community</p> <p>A shallow rocky outcrop extending ~30m was observed at the northern end of the rockwall. The substrate consisted of seawall boulders between hardground and rubble supporting turf algae, occasional small (<30 cm) coral colonies and sparse sponges and zoanthids.</p> <p>Most common coral taxa: <i>Turbinaria spp</i></p> <p>Estimated range % live coral cover: 3 – 5 %</p>	
3	Rock wall (south of Parker Point)	<p>Bare</p> <p>Uncolonised artificial hard substrate surrounded by bare fine sediment.</p> <p>Most common coral taxa: N/A</p> <p>Estimated range % live coral cover: 0 %</p>	

Area #	Location	Classification/Description	Representative Image
4	Rock wall (south of Parker Point) to power station pond	<p>Sparse Mixed Benthos</p> <p>A single transect was surveyed in the area. The habitat transitioned from fine to medium burrowed sand to patches of hard substrate, supporting turf algae, macroalgae and occasional corals and sparse sponges.</p> <p>Most common coral taxa: <i>Turbinaria mesenterina</i></p> <p>Estimated range % live coral cover: 0 – 5 %</p>	
5	Power station pond	<p>Mixed Community</p> <p>Patches of hard rubble substrate, supporting turf algae, macroalgae, and sparse corals, surrounded by medium grained sand.</p> <p>Most common coral taxa: <i>Turbinaria spp</i> and <i>fungiids</i></p> <p>Estimated range % live coral cover: 3 – 10 %</p>	

Area #	Location	Classification/Description	Representative Image
6	South of the power station pond	<p>Mixed Community (Coral habitat adjacent to Peninsula Palms)</p> <p>Patches of hard substrate and cobble habitat surrounded by medium grained sand. The hard substrate support turf algae, macroalgae, corals and sponges. Sections of the transect surveyed adjacent to the Peninsula Palms accommodation had coral cover estimated at 100%.</p> <p>Most common coral taxa: <i>Turbinaria spp</i></p> <p>Estimated range % live coral cover: 5 – 70 %</p>	
7	Tidepole Island	<p>Coral</p> <p>Natural hard substrate and reef supporting turf algae, macroalgae, coral colonies and sponges.</p> <p>Most common coral taxa: <i>Pavona</i>, <i>Porites</i> and <i>Goniastrea</i></p> <p>Estimated range % live coral cover: 25 – 50 %</p>	

Area #	Location	Classification/Description	Representative Image
8	Parker Point Southern Swing Basin	<p>Bare</p> <p>The survey area ranged between 7 to ~ 12 m water depth. Most of the transects consisted of disturbed, bioturbated, unconsolidated, silt and fine sand. One of the 20 transects surveyed in the area, closest to Tidepole Island, exhibited a transitional rubble substrate which hosted very sparse patches of gorgonians, sponges and turfing algae at < 2% cover. These organisms were in poor condition and covered in sediments.</p> <p>Most common coral taxa: N/A</p> <p>Estimated range % live coral cover: 0 %</p>	

Area #	Location	Classification/Description	Representative Image
9	West of Shiploader	<p>Bare</p> <p>Disturbed, bioturbated, uncolonised and unconsolidated silt and fine sand.</p> <p>Most common coral taxa: N/A</p> <p>Estimated range % live coral cover: 0 %</p>	
10	Offshore from fuel berth	<p>Bare</p> <p>Disturbed, bioturbated, uncolonised and unconsolidated silt and fine sand.</p> <p>Most common coral taxa: N/A</p> <p>Estimated range % live coral cover: 0 %</p>	

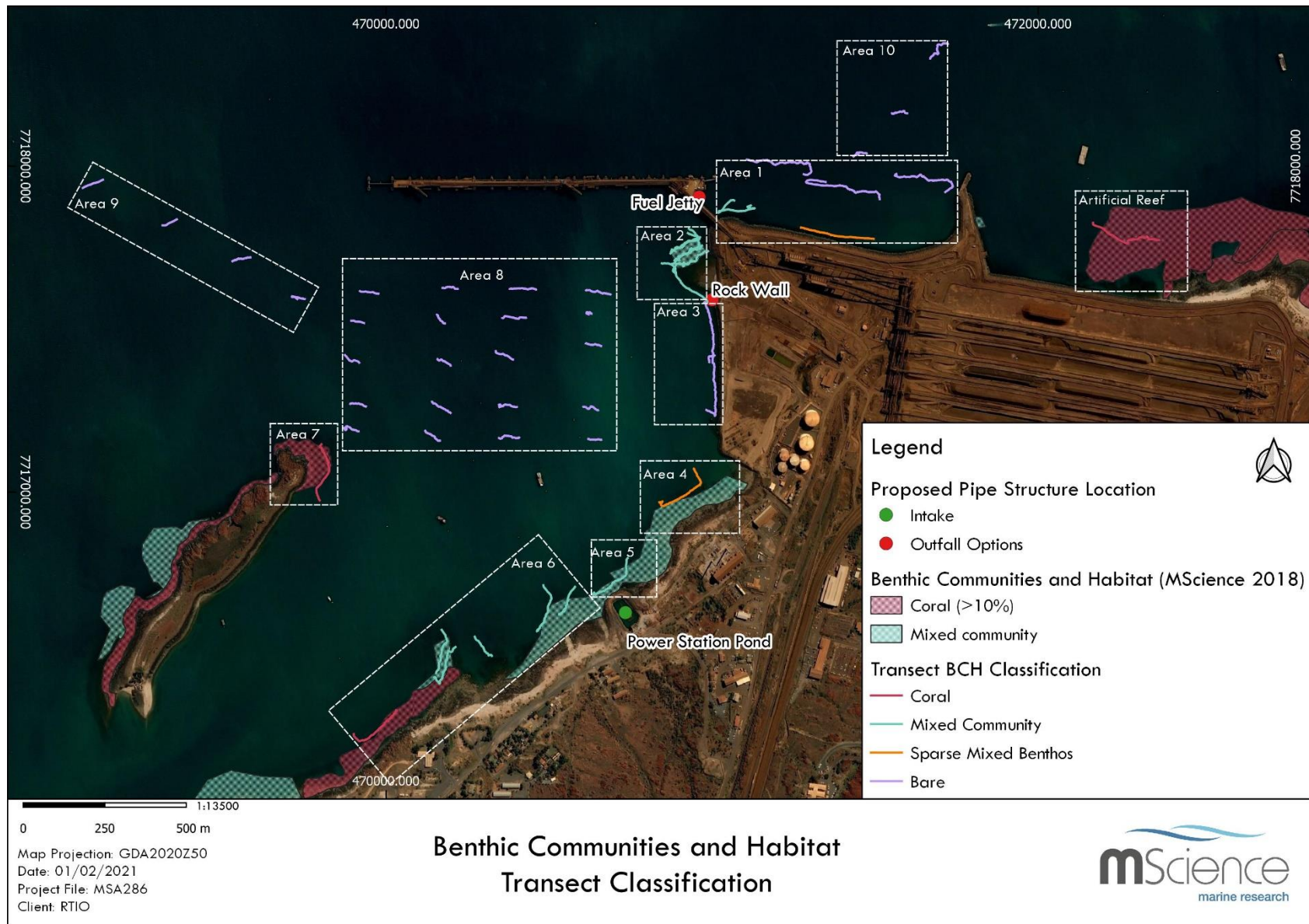


Figure 2. BCH classification of the transects

5. Summary

The composition and distribution of benthic communities and habitat within the study area were consistent with the habitat map produced for the area in 2018 (MScience 2018). Additional areas mapped showed habitats depauperate or at early stages of community development, typical of much of the inner Dampier Harbour and surrounds. These would be of little conservation significance.

The most significant habitat mapped was the reef along the front of what was the old Training Centre to the south-east of the intake pond. That area shows locally exceptional coral cover at 50-70%. The continued presence of coral cover above 25% at Tidepole Island is encouraging given that previous long-term monitoring conducted by RTIO had suggested that area was declining in coral cover (MScience 2010).

6. References

- Evans R, Wilson S, Fisher R, et al (2020) Early recovery dynamics of turbid coral reefs after recurring bleaching events. *J Environ Manage* 228:110666.
- MScience (2010) Dampier Port Upgrade Dredging program 2006: Long Term Coral Habitat Monitoring & Management: August 2010. Report: MSA149R1, Unpublished Report by MScience Pty Ltd to Pilbara Iron Ore Pty Ltd, Perth, WA
- MScience (2018) Marine Habitat Mapping. Dampier and Cape Lambert 2017. Report for Rio Tinto Iron Ore, Perth WA
- WAEPA (2020) Western Australia Environmental Protection Authority Factor Guidelines and Technical Guidance: Sea. <http://www.epa.wa.gov.au/policies-guidance/sea>. Accessed 29 Jan 2020