

Technical Memorandum

From:	Not Relevant	To:	DTMR: Trevor Carter	
Date:	21 August 2017	CC:		
Subject:	Pre-dredging Wave Penetra	ation Assessments		

1 Introduction

The following technical memorandum describes wave penetration assessments undertaken by BMT WBM for the Department of Transport and Main Roads (DTMR), as an extension to the previous breakwater options study (R.B22333.001.03). The assessments are based on wave penetration modelling using the SWASH (Simulating WAves till SHore) modelling platform developed by Delft University.

The scope of works for this assessment was to develop a SWASH model configuration based on a September 2014 bathymetry, i.e. prior to DTMR undertaking a dredging project to widen and straighten the approach channel. The "Pre-dredging" bathymetry was provided as an ascii points file and was inspected onto the SWASH model grid. The baseline model configuration used in the earlier options assessment had previously been developed from hydrographic survey undertaken in September 2016, and in the context of the current assessment is specified as the "Post-dredging" case. The Pre-dredging and Post-Dredging bathymetry are both shown in Figure 1-1.

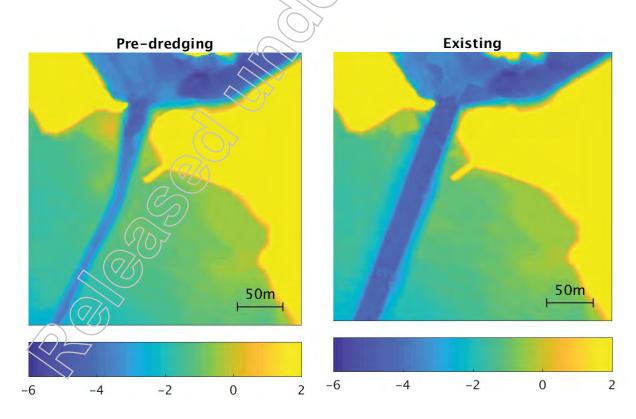


Figure 1-1 Pre-dredging (left) and Post-dredging (existing) channel alignments (bathymetry – m AHD)

Three wave event conditions were simulated using SWASH, based on scenarios described in the previous breakwater options assessment:

- 1-year ARI wind speed, 155-degree wind direction,
- 1-year ARI wind speed, 180-degree wind direction, and
- 50-year ARI wind speed, 155-degree wind direction.

It should be noted that the wave event conditions simulated do not correspond to any particular historic event, but were derived in the context of the options assessment study to investigate the potential for breakwater extension options to improve wave conditions within the boat harbour. The 1 in 1 year wind speed scenarios were derived in order to assess the wave climate under strong wind conditions from the prevailing South to South East directions. The 1 in 50 year scenario was derived in order to assess the wave climate under extreme conditions corresponding to a close-proximity Tropical Cyclone generating onshore winds from the South-South-East.

2 Results

Table 2-1 summarises the results of the pre-dredge scenario simulations. Criteria for 'good' wave climate in small craft harbours is reproduced in Table 2-2 below. Figure 2-1 to Figure 2-2 show the regions of the harbour a 'good' wave climate, pre- and post-dredging. Spatial plots of the modelled significant wave height predictions are shown in Figure 2-4 to Figure 2-5. These figures show the pre-dredging case, the existing post-dredging case and the impact to the pre-dredge case for each weather condition.

Table 2-1 Summary of pre-dredging and post-dredging (existing) model results

Design Condition &	Breakwater Configuration				
Location	Pre-dredging	Post-dredging			
1-year ARI	Hs Ha	rbour (m)			
Pontoon (Site 1)	70.0	0.11			
Pile (Site 2)	0,11	0.17			
1-year ARI	Percentage increase in hark	oour wave height post-dredging			
Pontoon (Site 1)	_	57%			
Pile (Site 2)	(O) -	55%			
50-year ARI	Hs Ha	rbour (m)			
Pontoon (Site 1)	0.38	0.38			
Pile (Site 2)	0.48	0.46			
50-year ARI	Percentage increase of hark	oour wave height post-dredging			
Pontoon (Site 1)	_	0%			
Pile (Site 2)	_	-4%			
1-year ARI South Wind	Hs Ha	rbour (m)			
Pontoon (Site 1)	0.08	0.14			
Pile (Site 2)	0.13	0.21			
1-year ARI South Wind	Percentage increase of hark	oour wave height post-dredging			
Pontoon (Site 1)	_	75%			
Pile (Site 2)	-	62%			

Table 2-2 AS3962 Guidelines for Design of Marinas (Table 4.2)

CRITERIA FOR A 'GOOD' WAVE CLIMATE IN SMALL CRAFT HARBOURS

Direction and peak period	Significant wave height (H ₁)					
of design harbour wave	Wave event exceeded once in 50 years	Wave event exceeded once a year				
Head seas less than 2 s	Conditions not likely to occur during this event	Less than 0.3 m wave height				
Head seas greater than 2 s	Less than 0.6 m wave height	Less than 0.3 m wave height				
Oblique seas greater than 2s	Less than 0.4 m	Less than 0.3 m wave height				
Beam seas less than 2 s	Conditions not likely to occur during this event	Less than 0.3 m wave-beight				
Beams seas greater than 2 s	Less than 0.25 m wave height	Less than 0.15 m wave height				

NOTE: For criteria for an 'excellent' wave climate multiply wave height by 0.75, and for a 'moderate' wave climate multiply wave height by 1.25. For vessels of less than 20 m in length, the most severe wave climate should satisfy moderate conditions. For vessels larger than 20 m in length, the wave climate may be more severe.

Source: Adapted from MERCER, A.G., ISAACSON, M. and MULCAHY, M.W. Design wave climate in small craft harbours. 18th Conference on Coastal Engineering, Capetown, 1982.



Figure 2-1 Good' wave climate (AS3962 Table 4.2), pre-dredging and existing case (post-dredging), 1 year ARI SSE wind conditions.

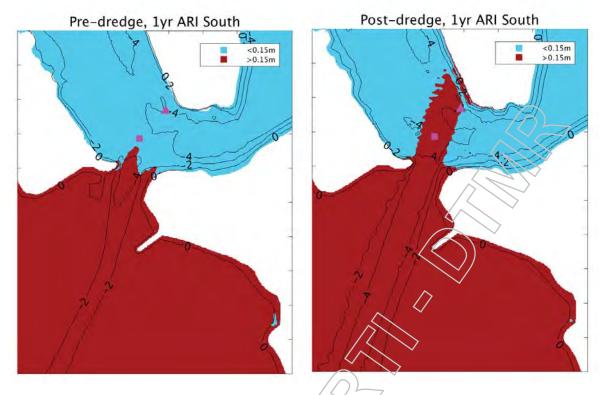


Figure 2-2 'Good' wave climate (AS3962 Table 4.2), pre-dredging and existing case (post-dredging), 1 year ARI Southerly wind conditions.

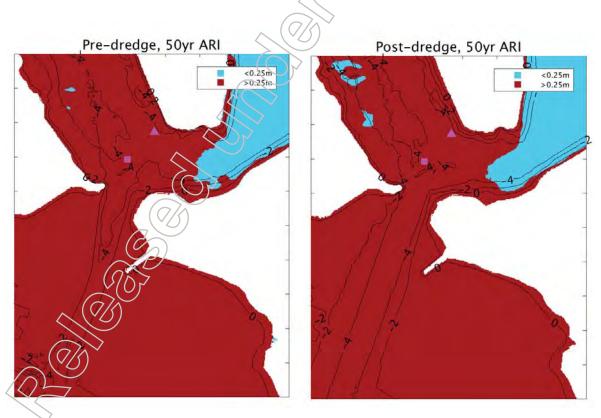


Figure 2-3 'Good' wave climate (AS3962 Table 4.2), pre-dredging and existing case (post-dredging), 50 year ARI conditions.

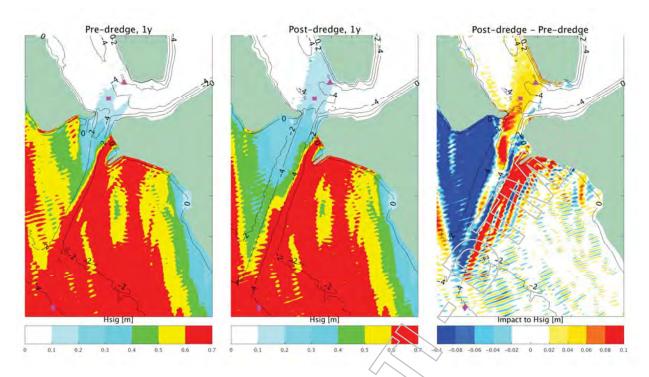


Figure 2-4 Impact to significant wave height, 1-year ARI SSE wind

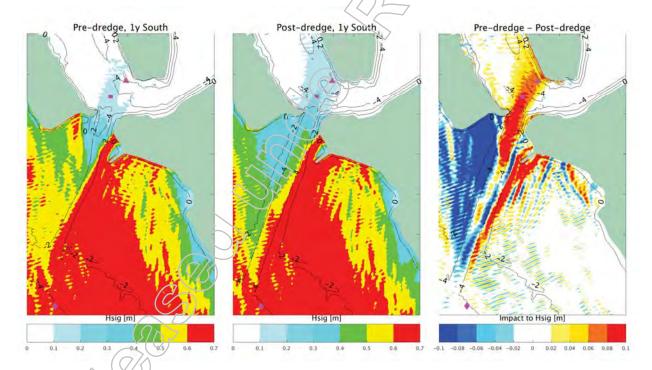


Figure 2-5 Impact to significant wave height, 1-year ARI Southerly wind

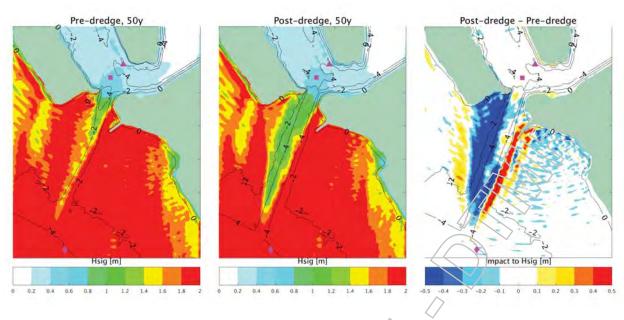


Figure 2-6 Impact to significant wave height, 50-year ARI SSE wind

Department of Transport and Main Roads **Decision Brief DBN12214**

To: Director-General

SUBJECT:

Bowen Boat Harbour - Wave Action

DATE: 26 September 2017 URGENT - next Bowen Collinsville Enterprise Inc. meeting on 9 October 2017

Director-General's Comments:

Approved / Not Appro

Director-General

Date

Summary

- The Department of Transport and Main Roads (TMR) has received complaints from tenants within the Bowen State Boat Harbour concerning a perceived increase in wave action due to recent dredging works undertaken by TMR and further exacerbated by ex-Tropical Cyclone Debbie.
- Investigative works are currently underway to evaluate options to mitigate the wave energy. The intention is to seek funding for a capital project.
- TMR representatives have been invited to the Bowen Collinsville Enterprise Inc. (BCE) meeting on 9 October 2017, to discuss the wave action issue, as well as implementation of the Concept Plan at the Bowen Boat Harbour

Recommendations

That you note the content of the brief and approve TMR representatives Ms Stephanie Threlfall, Manager (Property Management), Mr Philip Burns, Manager (Development Projects) and Mr Trevor Carter, Principal Engineer (Coastal) to attend the next BCE meeting 9 October 2017.

Financial Implications

A funding application will be made to commence a project to extend the two breakwaters. Indicative costs, based on a preliminary design, are around \$3 to \$4 million.

Action Officer:

Bradley Chandler

Executive Director (Strategic Property Management) Tel: 3066 3752

Date: 22 September 2017

Endorsed by:

Joshua Hannan General Manager

Transport Strategy and Planning Tel: 30661400

Date: 25 September 2017

Endorsed by:

Sally Noonan Deputy Director-General

Tel: 3066 7464 Date: bypassed

Page 1 of 4

Background

- Not Relevant
- Wave energy entering Bowen Boat Harbour has been an issue since construction and, in certain conditions, causes disturbance to moorings and infrastructure in the harbour.
- In 2013, TMR completed concept planning, which brought harbour tenants together
 with Whitsunday Regional Council (WRC) representatives and TMR, to develop a
 vision for the harbour and identify opportunities for development. TMR is now
 progressing investigations to inform development opportunities for marina and
 marine service infrastructure.
- Following the recent 2015–16 dredging campaign to widen and deepen the entrance channel, TMR received complaints from harbour tenants about perceived increased wave action in the harbour. Coastal engineer advice, at the time, was that wave energy already entered the harbour owing to inadequacy of original design and that the recent changes to the entrance channel would have a marginal effect of increased wave energy inside the harbour. However, the 2017 ex-Tropical Cyclone Debbie highlighted the importance of improving the level of protection by extending both breakwaters.

Key Issues

Wave Energy Reduction

- TMR commissioned a wind and wave study in late-2016, to assess breakwater extension options to mitigate wave energy entering the harbour. The study is complete and breakwater extension design options have progressed.
- Preliminary modelling identified the incorporation of a 113 metres extension to the
 eastern breakwater, in addition to a smaller extension to the western breakwater,
 would provide a substantial reduction in wave energy in the harbour in both regular
 and extreme weather.
- A survey of the seabed and existing eastern breakwater has been commissioned and
 is expected to be completed in the near future to progress the design investigations
 and define the scope of breakwater works.
- The design stage of the potential breakwater extension is likely to take up to six months.
- The necessary environmental approvals that follow design would normally take several months – with timing at the discretion of several agencies.
- Procurement and contracting processes could then follow, subject to funding availability.
- The intention is to seek funding for a capital project in the Queensland Transport and Roads Investment Program (QTRIP) October review with earliest works in the 2018-19 financial year.





Not Relevant

BCE has invited TMR representatives to attend the next BCE meeting on 9 October 2017, to discuss the wave action issue and in particular, the progress on plans for breakwater extension. They also wish to discuss projected implementation of the Bower Boat Harbour Concept Plan.

Not Relevant

If approval is granted to attend the meeting, TMR representatives Ms Threlfall, Mr Burns and Mr Carter will only discuss matters and field questions pertaining to the Not Relevant wave action issue and implementation of the concept plan.

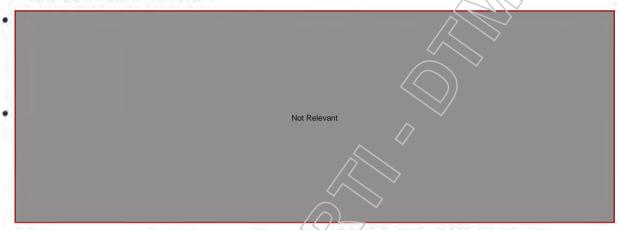
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Financial Implications

 A funding application will be made as part of the QTRIP October review to seek funding for extension of the two breakwaters. Indicative costs based on preliminary designs are around \$3 to \$4 million.

Consultation with Stakeholders

 Internally, TMR's Program, Delivery and Operations (Boating Infrastructure Unit) and Property Management (Strategic Property Management) are working together to identify, design, fund and deliver an appropriate solution to minimise the impact of wave action in the harbour.



 BCE has requested TMR representatives attend their 9 October 2017 meeting to provide an update on proposed and potential harbour works and planning.

Not Relevant

Employment

N/A.

Election Commitments

N/A.



Your ref Enquiries 215/01502

Trevor Carter

Department of Transport and Main Roads Infrastructure Management and Delivery Division

GPO Box 1549 Brisbane Queensland 4001

Telephone +61 7 30664021 Facsimile +61 7 30662065 Website www.tmr.qld.gov.eu

Email trevor.b.carter@tmr.qld.gov.au

25 September 2018

SMEC Australia Pty Ltd PO Box 2211 Fortitude Valley QLD 4006

Attention

Not Relevant

Dear Sir,

Acceptance of Offer for PMD83/17 Extension of Breakwaters at Bowen Harbour

Thank you for your offer in response to the above Invitation to Offer. Your offer has been successful for the abovementioned services for \$59,771.80 (incl. GST). Acceptance of this offer constitutes a contract between SMEC Australia Pty Ltd ("Contractor") and the Department of Transport and Main Roads ("Customer"). A purchase order for these services will be sent in due course.

The following documents will constitute the entire contract between the Customer and the Contractor. Any verbal agreements or other negotiations are specifically excluded unless reflected in the documentation forming the contract.

- Short Form Conditions of Contract for the provision of goods and services version 004 dated 1 July 2012.
- Our Invitation to Offer dated 16 August 2018.
- Your offer dated 10 September 2018.
- Your email response of 24 September 2018
- This letter of acceptance.

In the event of any inconsistency between the documents forming the contract, the inconsistency is to be resolved in accordance with clause 2 - Formation of Contract of the Short Form Conditions of Contract for the provision of goods and services version 004 dated 1 July 2012.

All contractors providing services to TMR are required to follow the current Code of Conduct for the Queensland Public Service. A copy of the code of conduct can be found on the Queensland Public Service Commission website http://www.psc.qld.gov.au/.

Contract Management Issues:

For this contract, your initial point of contact at the Department of Transport and Main Roads is Trevor Carter on (07) 3066 4021.

Invoices are to be sent to: trevor.b.carter@tmr.qld.gov.au

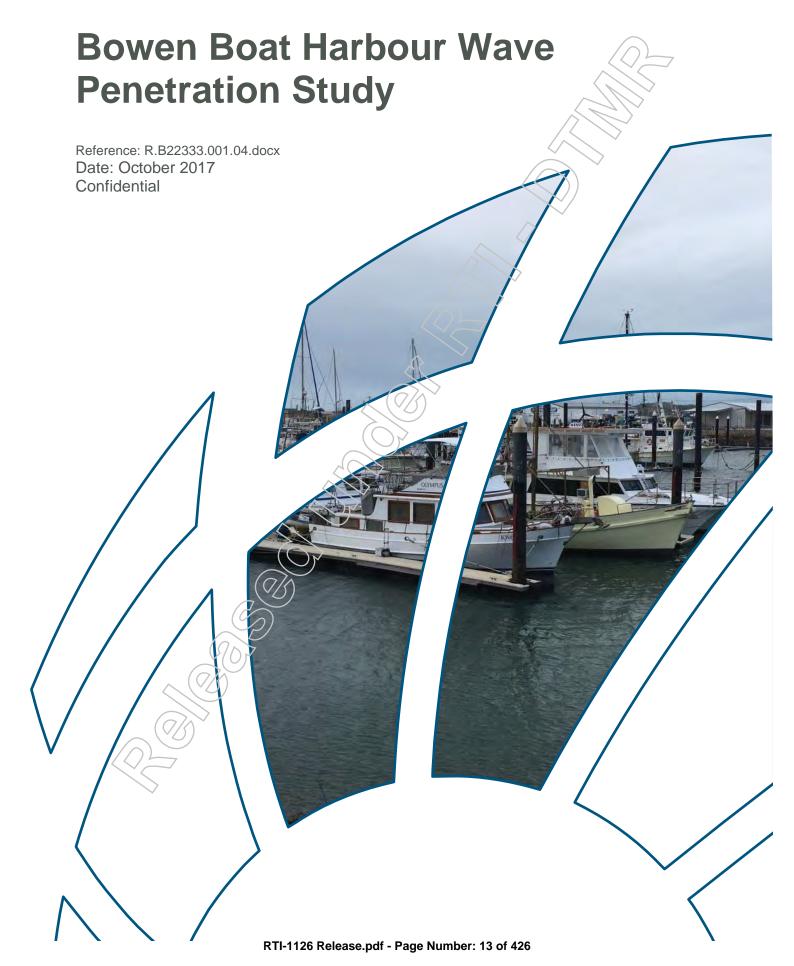
Yours sincerely,

Not Relevant

Senarath Weerakoon

A/Manager (Infrastructure Delivery)





Document Control Sheet

Document: R.B22333.001.04.docx BMT WBM Pty Ltd **Bowen Boat Harbour Wave Penetration** Title: Level 8, 200 Creek Street Study Brisbane Qld 4000 Australia **Project Manager:** PO Box 203, Spring Hill 4004 Not Relevant Author: Tel: +61 7 3831 6744 Fax: +61 7 3832 3627 Client: Department Transport Main Roads (QLD) ABN 54 010 830 421 **Client Contact:** Trevor Carter www.bmtwbm.com.au **Client Reference:** 2030504875 This report investigates options to extend the Bowen Boat Harbour breakwater Synopsis: to reduce wave penetration and enhance mooring conditions.

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	23/5/2017	IAT 🕢	*	JGC	
1	31/5/2017	IAT O	>	JGC	
2	2/6/2017	IAT		JGC	
3	28/6/2017	IAT()		JGC	
4	4/10/2017	TA	Not Relevant	JGC	Not Relevant

DISTRIBUTION

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Executive Summary

In response to reports of excessive wave action inside the Bowen Boat Harbour a harbour wave penetration assessment has been undertaken to determine the impact on wave action inside the harbour of various options to extend the eastern entrance breakwater.

Numerical assessment of six (6) breakwater extension options has shown that sufficient extension of the eastern breakwater has the potential to substantially improve wave climate conditions at moorings currently exposed to prevailing waves penetrating through the entrance.

Eastern breakwater extensions of 15 m, 30 m, 113 m and 185 m were assessed as well as a western breakwater addition to the 113m and 185m eastern breakwater options. The two longest extension options were able to provide 'good' small boat harbour wave climate conditions under 1-year ARI conditions at the currently exposed mooring locations. The western breakwater addition did not reduce wave energy in the harbour for the 1-year ARI conditions but was beneficial in reducing longer period wave energy associated with severe (tropical cyclone) conditions.



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1 Introduction

Users of the Bowen Boat Harbour have reported excessive wave action inside the harbour during southerly to south-easterly weather, exacerbated by recent dredging to deepen and widen the entrance channel. In response the Department of Transport and Main Roads (TMR) is investigating the impact of extending the eastern entrance breakwater of the Bowen Boat Harbour.

BMT WBM Pty Ltd has been commissioned to undertake a harbour wave penetration assessment of various proposed breakwater extensions. The goal is to determine the impact of various extension options of the eastern entrance breakwater on wave action inside the harbour in order to provide information which (along with other considerations) can be used to inform a decision on the preferred configuration.

This report details the works undertaken to develop numerical modelling tools to inform the potential reduction in wave action within the harbour. High spatial resolution, phase-resolved wave modelling has been performed to investigate the wave-structure interactions and the degree of sheltering offered by the structure.



2 Data Collection

A field instrument deployment program was undertaken at Bowen for the period between 11th November 2016 and 24th January 2017. Metocean data was collected in order to provide in situ data used for numerical model calibration.

Measurement of wave height, period, and direction were taken using the following instruments:

- A seabed mounted 1000kHz Nortek Acoustic Wave and Current Profiler located outside the harbour entrance.
- Three Seabird SBE 26plus seagauge wave and tide recorders, one located outside the harbour entrance and two located within the harbour.

An offshore instrument array was deployed to the east of the harbour's approach channel to measure incident wave conditions reaching the harbour entrance. The seabed mounted Acoustic Wave and Current Profiler (AWAC) is configured to measure currents and directional waves at 10-minute intervals. A Seabird SBE-26plus tide and wave recorder was deployed with the AWAC to provide accurate water level and non-directional wave measurements.

An additional two seabed mounted Seabird instruments were deployed within the harbour in wave energy hotspots in order to provide measurements of the spatial variation in wave energy patterns within the harbour.

The locations of the bed mounted instruments are shown in Figure 2-1. A timeseries of wind conditions during the wave monitoring period from the Bowen Airport BOM site is shown in Figure 2-2.

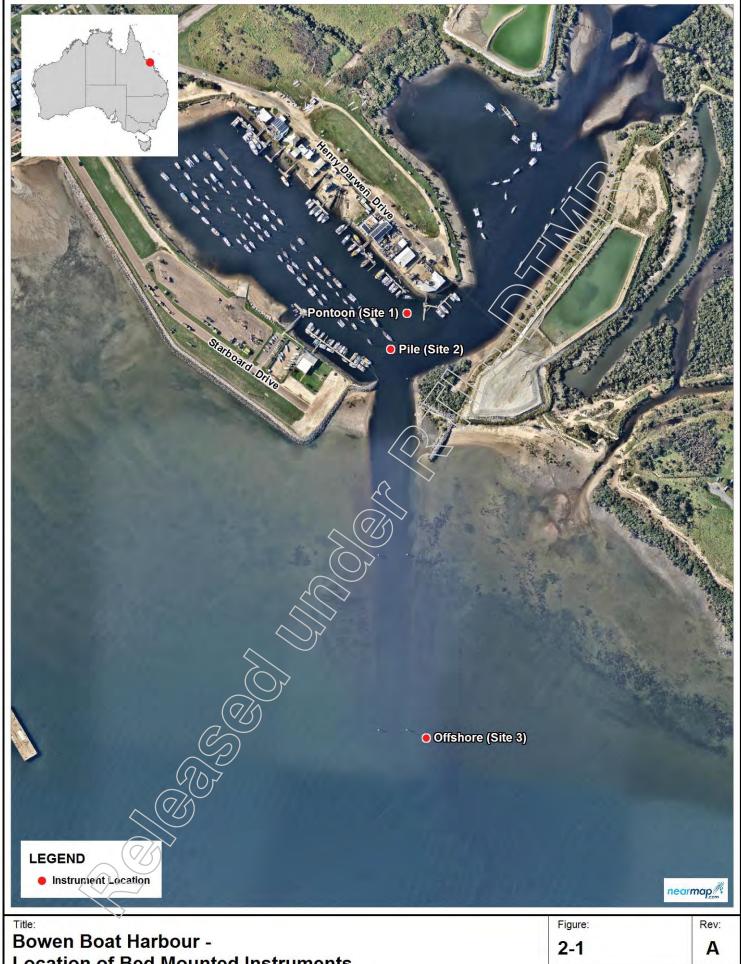
Timeseries of measured significant wave height at the three monitoring locations is shown in Figure 2-3. The significant wave heights at the offshore monitoring site typically remained below 0.4 m during the measurement campaign. A wave event corresponding to a period of sustained wind speeds of around 20 knots from the southeast occurred around the 8th January, during which significant wave heights reached around 0.5 m at the offshore site.

A scatter plot of wave height and direction from the AWAC directional wave measurements is shown in Figure 2-4. This shows that the most frequently occurring wave direction is from the SE, which is also the direction from which the largest waves occur, as would be expected from consideration of the fetch exposure and bathymetric contour orientation at this location.

 A scatter plot of significant wave height and peak period from the offshore Seabird instrument is shown in Figure 2-5 and shows that larger observed wave heights coincide with peak periods in the 2 to 4 second band.

Figure 2-6 shows a zoomed in timeseries of the significant wave height at the three monitoring locations during the event from 7 to 9 January. Significant wave heights at the pile mooring reach 0.12 m, while at the pontoon they are slightly lower at 0.10 m. A distinct tidal signal is seen in the inner-harbour wave height timeseries, with peak wave conditions occurring for a short period around high tide.





Location of Bed Mounted Instruments

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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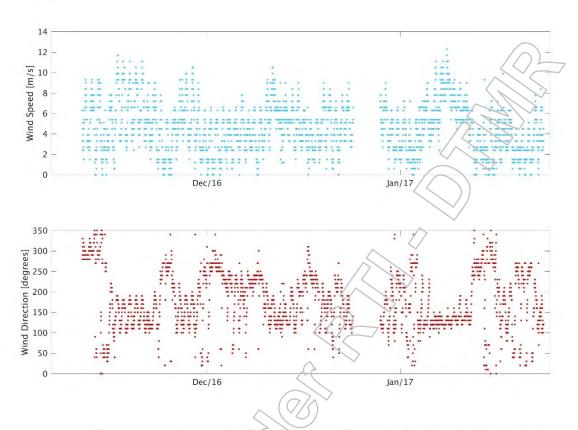


Figure 2-2 Observed Wind at Bowen Airport During Monitoring Period



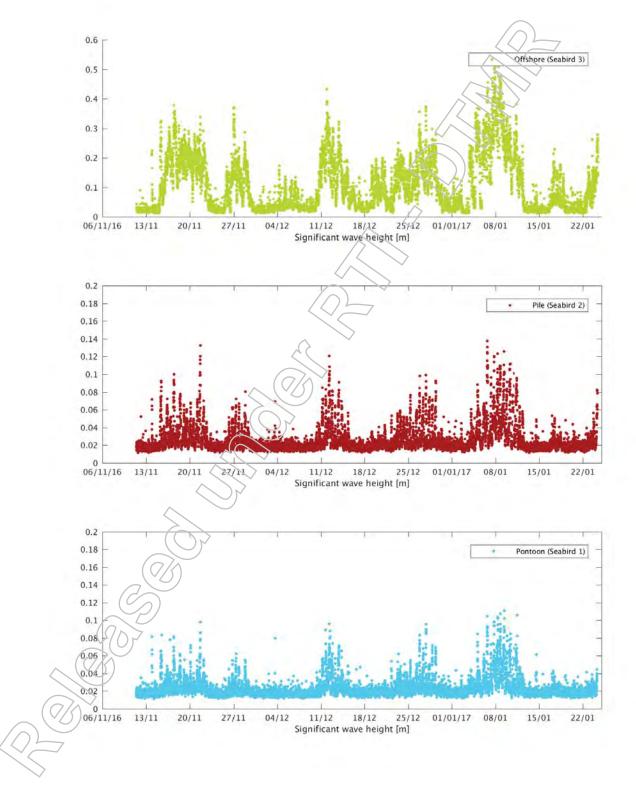


Figure 2-3 Observed Significant Wave Height at Monitoring Locations



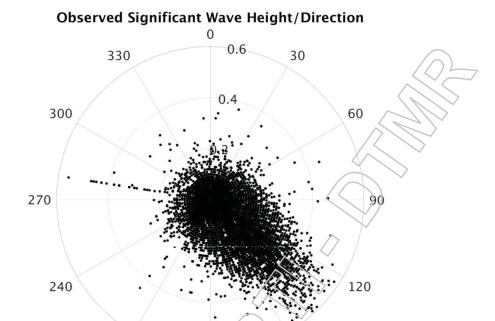
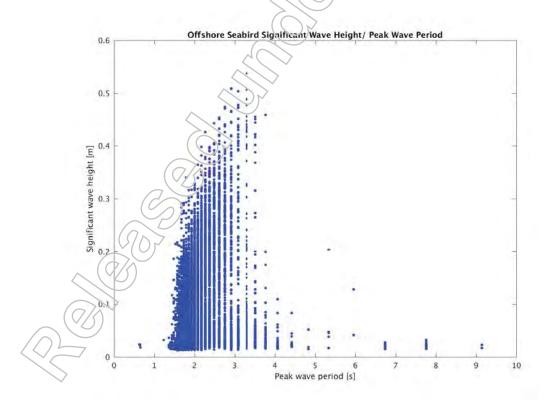


Figure 2-4 AWAC Significant Wave Height Scatter Plot

180

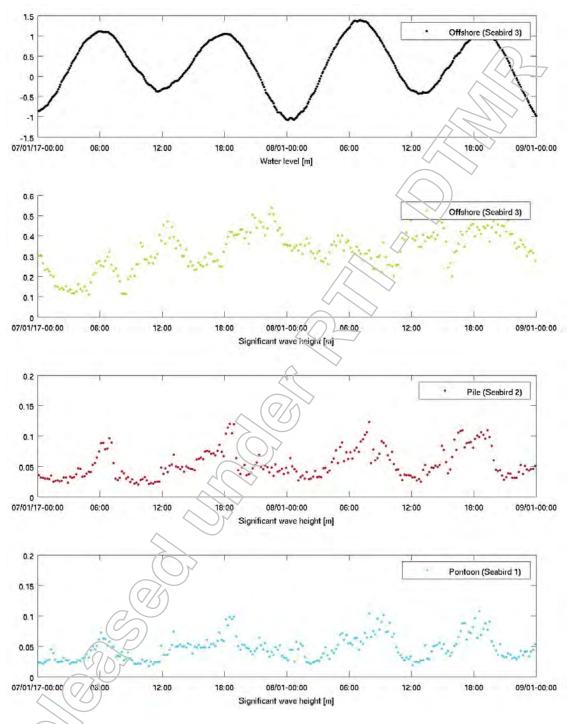
150



210

Figure 2-5 Observed Significant Wave Height/Peak Wave Period





igure 2-6 Significant Wave Height and Water Level Timeseries, 7 to 9 January 2017



3 Numerical Wave Model Description

3.1 Digital Elevation Model

Bathymetry for the numerical models has been derived from the following sources in descending priority:

- Hydrographic survey data of Bowen harbour (provided by DTMR);
- Australian Electronic Navigational Charts (AusENC) data; and
- James Cook University Project 3DGBR (Beaman, 2010).

3.2 **Boundary Condition Datasets**

In order to provide suitable boundary conditions during a hindcast period, several datasets were acquired from global models.

Gridded wind data were sourced from the National Oceanic and Atmospheric Administration (NOAA) Climate Forecast System version 2 (CFSv2) global model. These data were extracted for the entire domain at hourly intervals.

3.3 Wave Models

A wave modelling system has been established in order to investigate the penetration of the waves into Bowen Boat Harbour. This combines two models; (1) the industry standard Simulating WAves Nearshore (SWAN) wave model, which has been used to simulate the broad-scale wave conditions, and (2) the sister model Simulating WAves till SHore (SWASH) which simulates the detailed propagation of waves penetrating the Bowen Boat Harbour.

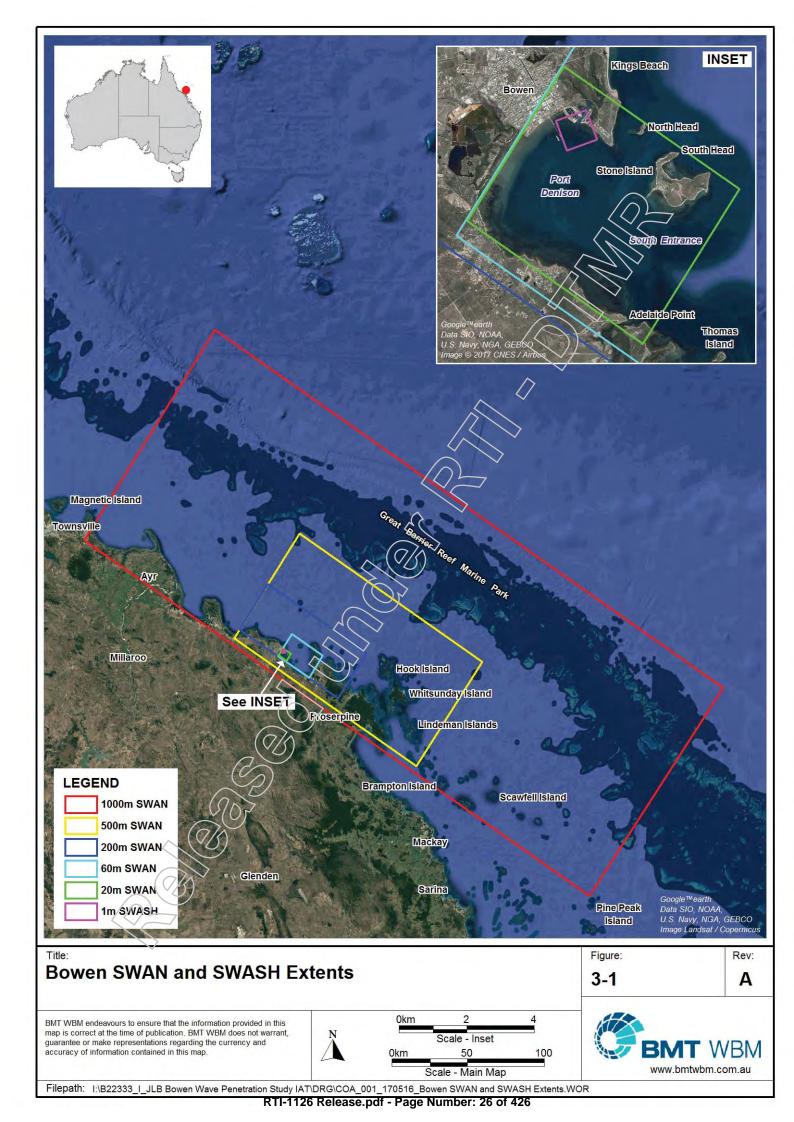
3.3.1 SWAN Model

SWAN (Delft University of Technology, 2006) is a third-generation spectral wave model, which is capable of simulating the generation of waves by wind, dissipation by white-capping, depth-induced wave breaking, bottom friction and wave-wave interactions in both deep and shallow water. SWAN simulates wave/swell propagation in two-dimensions, including shoaling and refraction due to spatial variations in bathymetry and currents. This is a global industry standard modelling package that has been applied with reliable results to many investigations worldwide.

A regional SWAN model that covered the Great Barrier Reef lagoon in the vicinity of Bowen was forced with design wind conditions. Four nests of increasing resolution were then used to resolve the waves closer to the area of interest. Finally, the spectral output of these nested SWAN models was used to force the SWASH model, which has then been used to simulate these spectra over ten minutes.

The resolutions (spacing of grid elements) and extents of the various SWAN domains are shown in Figure 3-1.





3.3.2 SWASH Modelling

SWASH (Delft University of Technology, 2010) is an advanced numerical wave-flow model capable of resolving the transformation of waves from offshore through dispersive regions and into the beach front. SWASH employs the non-hydrostatic non-linear shallow water equations (NH NLSWE) to model the agitation of the water's surface with time-varying resolution. Unlike SWAN, SWASH can accurately resolve fine-scale effects wave dynamics with spatial scales down to sub-metre and sub-second temporal scales. A snapshot of model water level predictions from a SWASH model simulation is shown in Figure 3-2.

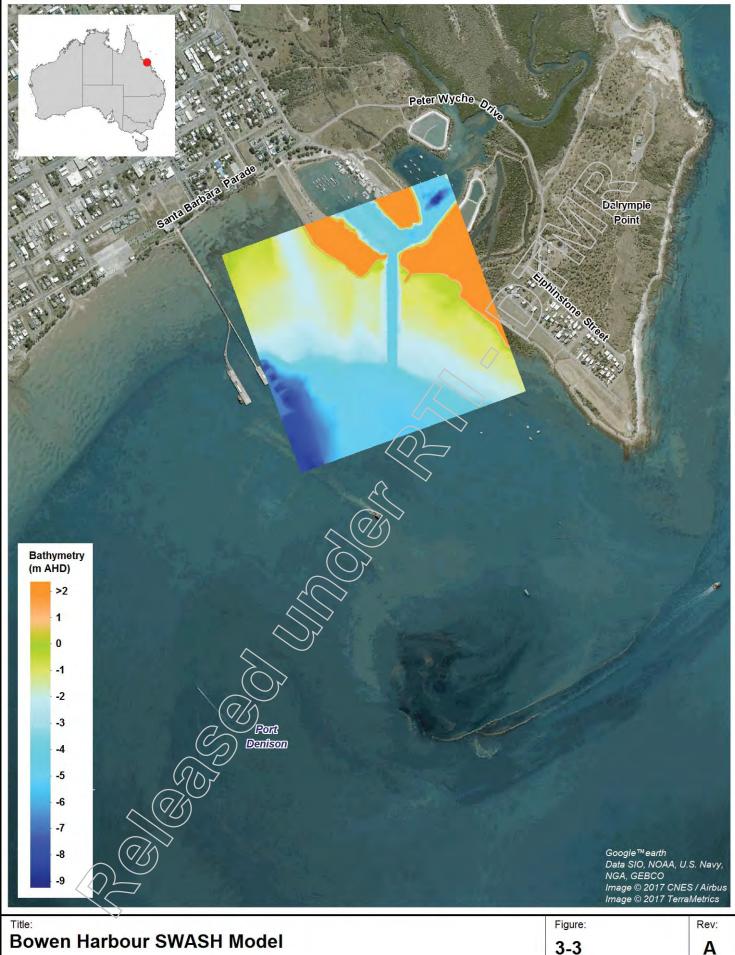


Figure 3-2 SWASH model example water level snapshot

SWASH has been adopted for this study to resolve the propagation of wave energy into Bowen Harbour, both for the base case condition and also for the breakwater extension options under investigation.

The open (southern) boundary of the SWASH model has been forced with spectral output from the finest SWAN grid. Figure 3-1 shows the extent of the SWASH model nested within the SWAN grid and Figure 3-3 shows the Bowen Boat Harbour SWASH model bathymetry. SWASH boundary conditions were applied based on a SWAN 2D spectral output, from which a stochastic irregular wave field was generated. Predicted wave heights were monitored at the end of the channel and a bias-correction was applied to the SWASH wave height predictions so that they matched the SWAN model significant wave height at this location.





Bowen Harbour SWASH Model

3-3

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3.4 Model Validation

The SWAN wave model comparison to the offshore measurements is shown in Figure 3-4 and demonstrates that the model performed well at predicting the peak wave conditions during the deployment period.

The wave condition occurring at high tide on 8 January was selected for comparing the SWASH model's prediction of wave height to the measurements at the two inner-harbour monitoring locations shown in Figure 2-1. Figure 3-5 shows the comparison between modelled and observed significant wave heights.

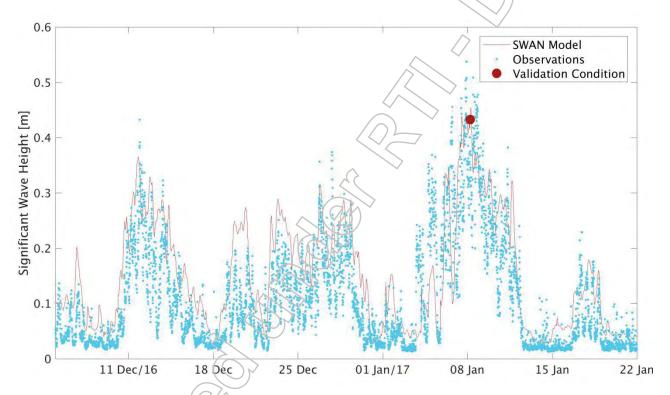


Figure 3-4 Offshore observed and SWAN model significant wave heights



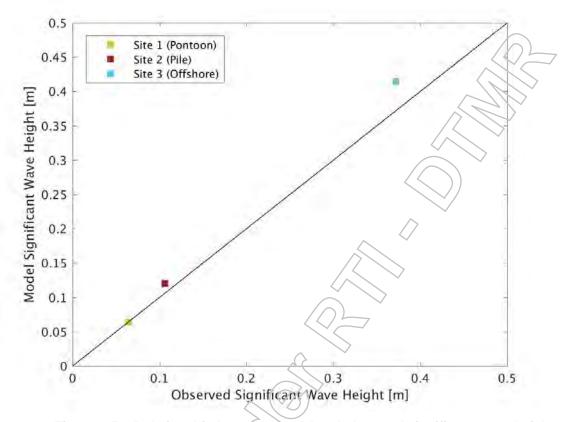


Figure 3-5 Relationship between model and observed significant wave heights





4 Impact Assessment

4.1 Scenarios

The proposed mitigation to the wave penetration is to extend the breakwater on the eastern bank of the harbour. Six different alignments and lengths of this breakwater have been put forward:

- Option 1 a 15 m long breakwater extension aligned perpendicular to the channel;
- Option2 a 30 m long breakwater extension at the same alignment,
- Option 3 a 185 m long breakwater extension;
- Option 4 a 113 m long breakwater extension;
- Option 5 a 113 m long breakwater extension with a new 105 m breakwater on the western side of the channel; and
- Option 6 a 185 m long breakwater extension with a new 105 m breakwater on the western side of the channel.

The alignments of the six scenarios are shown in Figure 4-1 and 4-2 with the bathymetry grid of the SWASH model. Breakwater extension length is measured as the extension of the breakwater crest.

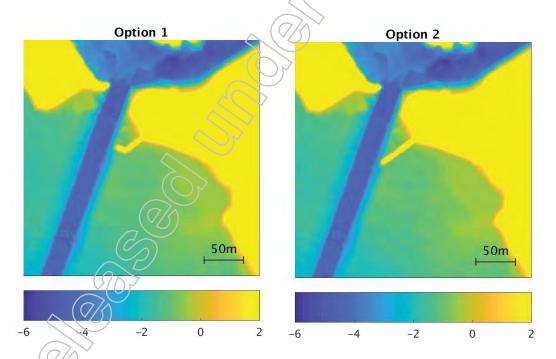
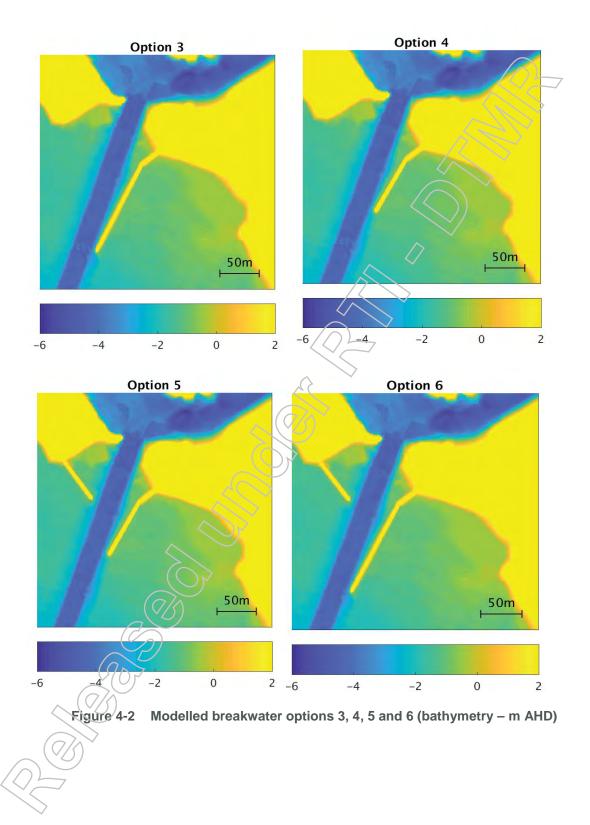


Figure 4-1 Modelled breakwater options 1 and 2 (bathymetry – m AHD)





4.2 Wave Penetration Investigation

An assessment of the wave penetration into Bowen Boat Harbour has been carried out using the SWAN / SWASH modelling system. In order to assess the breakwater's response in both typical and extreme conditions, 1-year Average Recurrence Interval (ARI) and 50-year ARI design conditions were chosen as the scenarios to simulate. Gust wind speeds as per AS1170.1 have been adjusted to 10 minute-average wind speeds (V₆₀₀ winds), with the 1-year ARI wind speed calculated at 15.5 m/s and the 50-year ARI at 37 m/s.

The design wind speeds were modelled for a range of incident directions from southeast through to northeast in order to assess the sensitivity of wave penetration to direction. The modelled scenarios were based on a SSE wind direction (155 degrees). The adopted design wind speeds and directions are shown in relation to a long term dataset for offshore waters near Bowen in Figure 4-3. This figure supports the adopted design conditions as being generally consistent with prevailing winds, however further refinement of these criteria prior to detailed design would be warranted.

The wave height monitoring described in Section 2 demonstrated that wave height measurements in the harbour are strongly correlated with water level and therefore selection of design water level is an important consideration for the options assessment scenarios. Work is currently underway on the Bowen storm tide study, which is being undertaken by BMT WBM. Preliminary advice from this study suggests a 50-year ARI storm tide level of 2.1 mAHD and a 1-year ARI level of 1.7 mAHD, (slightly less than HAT, 1.95 mAHD). These water levels have been adopted for the options assessment 1-year and 50-year ARI scenarios.

The adopted design winds and water levels were applied to the nested SWAN models which were run in a stationary mode in order to simulate a fully developed sea state for those wind conditions. Spectral wave outputs from the SWAN models were then applied to the SWASH model eastern boundary. The SWASH model was run for a 15-minute simulation to allow the waves to fully develop throughout the domain, and a significant wave height was then calculated by statistically sampling the final 5 minutes of the simulation.

The design scenario conditions used in the options assessment are summarised in Table 4-1 below. The reported wave conditions correspond to the offshore (Site 3) monitoring location shown in Figure 2-1.

Table 4-1 Design Scenario Condition Summary

Scewario	Design Win	d	Water	Offshore Wave Conditions			
(%)	Spd (m/s)	Dir (°)	Level (m AHD)	Hs (m)	Tp (s)	Dir (°)	
1-year ARI	15.5	155	1.7	0.7	3.9	156	
50-year ARI	37	155	2.1	2.0	4.9	163	



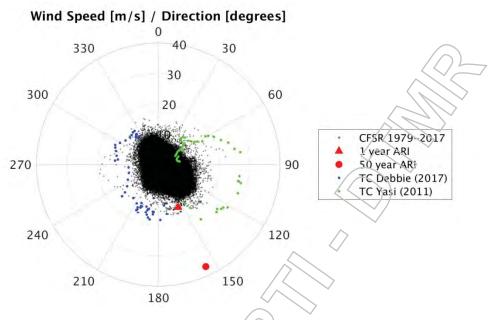


Figure 4-3 Polar Scatter Plot of Design Wind Speeds (AS1170.2) and Long Term Dataset (CFSRv2). Wind conditions during TC Debbie and Yasi are shown for reference.

Criteria for 'good' wave climate in small craft harbours (as reproduced in Table 4-2 below) were used to assess the protection benefits of the structure options.

Table 4-2 AS3962 Guidelines for Design of Marinas (Table 4.2)

CRITERIA FOR A 'GOOD' WAVE CLIMATE IN SMALL CRAFT HARBOURS

Direction and peak period	Significant wave height (H ₁)					
of design harbour wave	Wave event exceeded once in 50 years	Wave event exceeded once a year				
Head seas less than 2 s	Conditions not likely to occur during this event	Less than 0.3 m wave height				
Head seas greater than 2 s	Less than 0.6 m wave height	Less than 0.3 m wave height				
Oblique seas greater than 2s	Less than 0.4 m	Less than 0.3 m wave height				
Beam seas less than 2 s	Conditions not likely to occur during this event	Less than 0.3 m wave height				
Beams seas greater than 2 s	Less than 0.25 m wave height	Less than 0.15 m wave height				

NOTE: For criteria for an excellent' wave climate multiply wave height by 0.75, and for a 'moderate' wave climate multiply wave height by 1.25. For vessels of less than 20 m in length, the most severe wave climate should satisfy moderate conditions. For vessels larger than 20 m in length, the wave climate may be more severe.

Source: Adapted from MERCER, A.G., ISAACSON, M. and MULCAHY, M.W. Design wave climate in small craft harbours. /18th/Conference on Coastal Engineering, Capetown, 1982.

Figure 4-4 shows the base case regions in the harbour with a 'good' wave climate for both a 1-year and 50-year event. For the 1-year ARI design condition the predicted zone where Hs>0.15 m extends into the pile moorings. For the 50-year ARI design condition the predicted zone where Hs>0.25 m extends well into the harbour, which is a consequence of the longer period waves generated under these severe wind conditions. Regions with a good wave climate for each modelled breakwater option are shown in Figure 4-5 and 4-6 for 1 year ARI conditions (Hs less than 0.15 m) and Figure 4-7 and 4-8 for 50 year ARI conditions (Hs less than 0.25 m). The ratio of offshore to



harbour wave heights is shown in Figure 4-9 for each breakwater option. Wave penetration was largely correlated with the length of the breakwater. The shorter breakwater options resulted in reduced sheltering, with more waves penetrating around the end of the breakwater and into the harbour. In addition to the results presentesectid in this section of the report, Table 4-3 provides a summary of wave heights inside the harbour, and ratios of offshore to harbour wave heights for each option and design condition.

It can be seen from these results that Options 1 and 2 are predicted to only provide a marginal (~5%) improvement in wave height within the harbour for the 1-year ARI conditions. For these same conditions, Option 3 (185 m extension) and Option 6 (185m extension with a new 105m western breakwater) are predicted to provide a 66-72% reduction in wave height. Option 4 (113 m extension) and Option 5 (113m extension with a new 105m western breakwater) are predicted to provide a 25-38% reduction. The addition of the western breakwater (Option 5 and 6) does not provide a benefit for the 1-year ARI conditions. Options 3, 4, 5 and 6 are all predicted to provide 'good' wave climate at the pile mooring location for the 1-year ARI condition.

For the 50-year ARI condition, Option 5 and Option 6 are sufficient to provide 'good' wave climate at the mooring locations directly exposed to the incoming waves. For these conditions, the western breakwater does provide additional benefit in reducing the penetration of longer period waves into the harbour. Option 2, 3 and 4 are all predicted to provide some improvement to wave energy penetrating further west into the harbour.

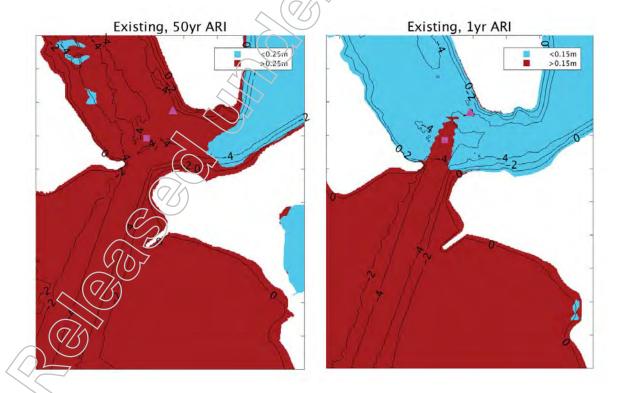
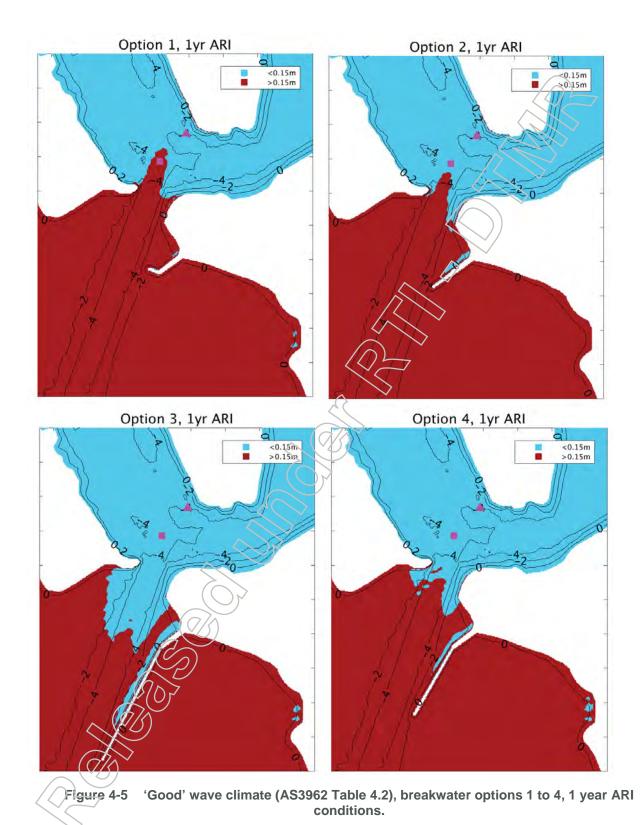


Figure 4-4 'Good' wave climate (AS3962 Table 4.2), existing case, 1 and 50 year ARI conditions.







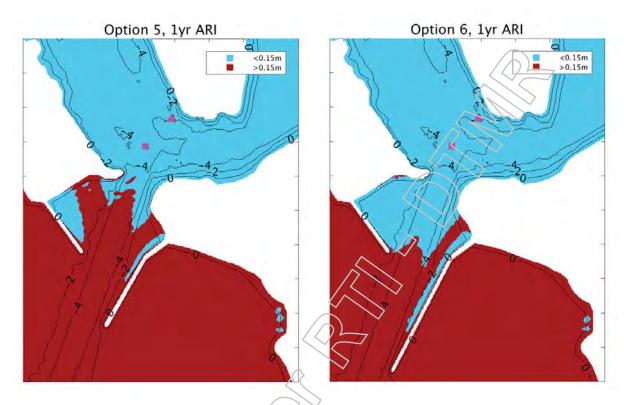


Figure 4-6 'Good' wave climate (AS3962 7 able 4.2), breakwater options 5 and 6, 1 year ARI conditions.



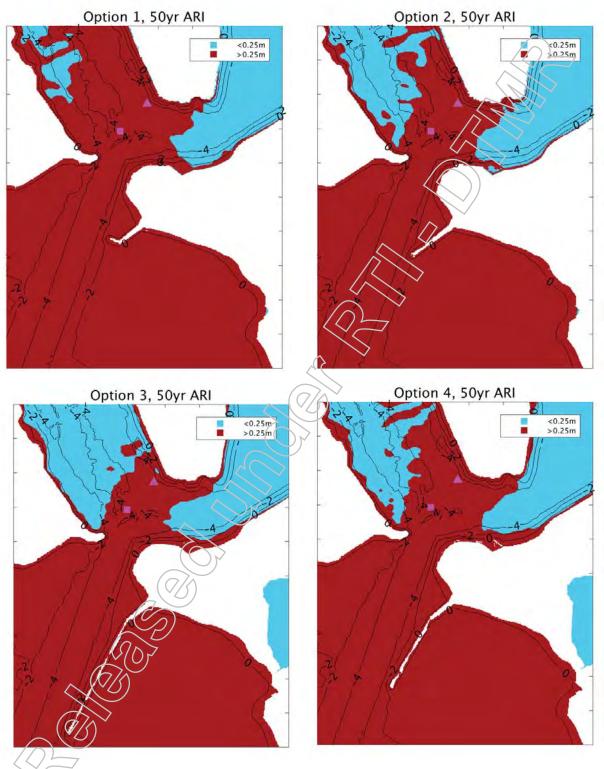


Figure 4-7 'Good' wave climate (AS3962 Table 4.2), breakwater options 1 to 4, 50 year ARI conditions.



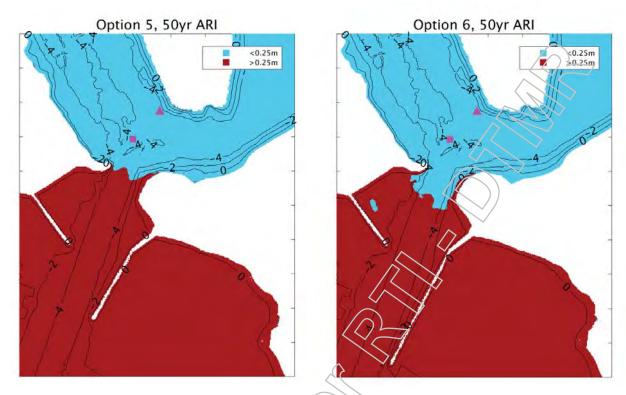


Figure 4-8 'Good' wave climate (AS3962 Table 4.2), breakwater options 5 and 6, 50 year ARI conditions



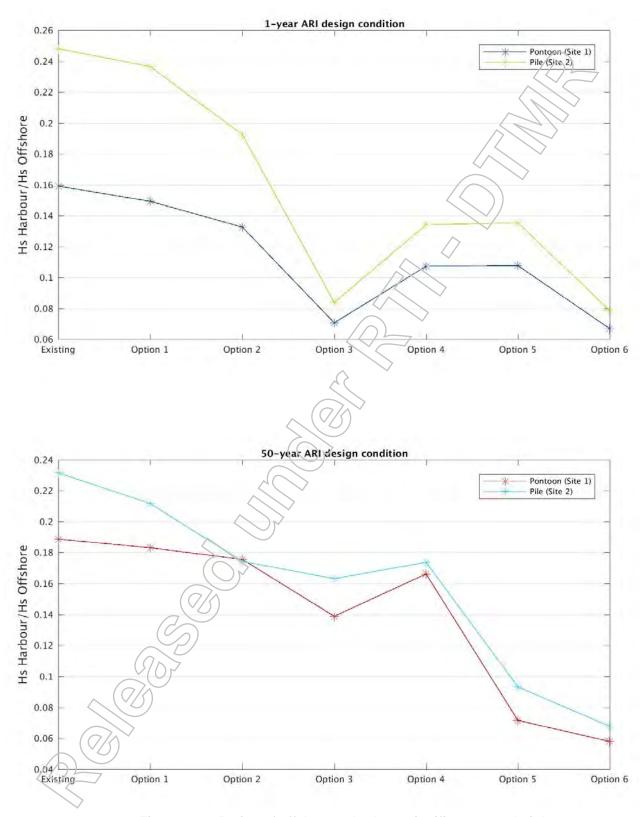


Figure 4-9 Ratios of offshore to harbour significant wave heights



Design		Breakwater Configuration						
Condition & Location	Base	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	
1-year ARI		Hs Harbour (m)						
Pontoon (Site 1)	0.11	0.11	0.09	0.05	0.08	0.08	0.05	
Pile (Site 2)	0.18	0.17	0.14	0.06	0.1	0.1	0.06	
1-year ARI	Harbour wave height percentage of base case							
Pontoon (Site 1)	-	94%	83%	45%	68%	68%	43%	
Pile (Site 2)	-	96%	78%	35%	55%	55%	31%	
50-year ARI	Hs Harbour (m)							
Pontoon (Site 1)	0.38	0.37	0.36	0.28	Ø.34	0.15	0.12	
Pile (Site 2)	0.46	0.42	0.35	0,33	0.36	0.19	0.14	
50-year ARI	Harbour wave height percentage of base case							
Pontoon (Site 1)	_	97%	94%	75%	89%	39%	31%	
Pile (Site 2)	_	91%	75% 🗸	70%	77%	42%	30%	

Table 4-3 Summary of Options Assessment Results

In addition to the results presented in this section of the report, spatial plots of the modelled significant wave height predictions are shown in Appendix A, Figure A-1 to Figure A-12. These figures show the base case, the developed case and the impact to the base case for each scenario. The wave impact plots shown in Appendix A indicate that there would be some additional wave reflection from the eastern side of the extended breakwater options.

A sensitivity assessment of the model predictions was undertaken in order to test the robustness of the options assessment conclusions to alternative assumptions. The results of an offshore wave condition generated by southerly wind conditions are provided in Appendix B for Options 3 and 4 (relative to the base case). Figure 4-3 indicates that the due south wave condition is likely to occur less frequently than the SSE condition. The results in Appendix B show that while the offshore wave height is similar to the SSE condition, due to the incoming wave angle the base case wave height penetrating into the harbour is up to 27% higher. The southerly wind sensitivity test for Option 3 indicates a 50–60% reduction in harbour wave heights and for Option 4 a 28–38% reduction. These results indicate a similar degree of additional sheltering provided by the breakwater extensions compared with the SSE condition.



5 Conclusions and Recommendations

The numerical assessment of six (6) breakwater extension options for Bowen Harbour has shown that sufficient extension of the eastern breakwater has the potential to substantially improve wave climate conditions at moorings currently exposed to prevailing waves penetrating through the entrance.

A summary of the options assessment findings is:

- Option 1 (15 m extension) is not likely to provide a substantial improvement in wave climate at exposed mooring locations;
- Option 2 (30 m extension) should reduce the wave energy entering the harbour, however it may not be sufficient to provide 'good' conditions at the most exposed mooring locations;
- Option 3 (185 m extension) provides a substantial reduction in wave energy in the harbour and should result in 'good' conditions at the most exposed moorings except under the most severe environmental conditions (associated with Tropical Cyclones);
- Option 4 (113 m extension) also provides a substantial reduction in wave energy and should result
 in 'good' conditions at the most exposed moorings except under the most severe environmental
 conditions (associated with Tropical Cyclones).
- Option 5 (113 m extension with a new 105m western breakwater) provides a substantial reduction in wave energy and should result in 'good' conditions at the most exposed moorings.
- Option 6 (185 m extension with a new 195 m western breakwater) provides a substantial reduction in wave energy and should result in 'good' conditions at the most exposed moorings.



Appendix A Wave Impact Predictions

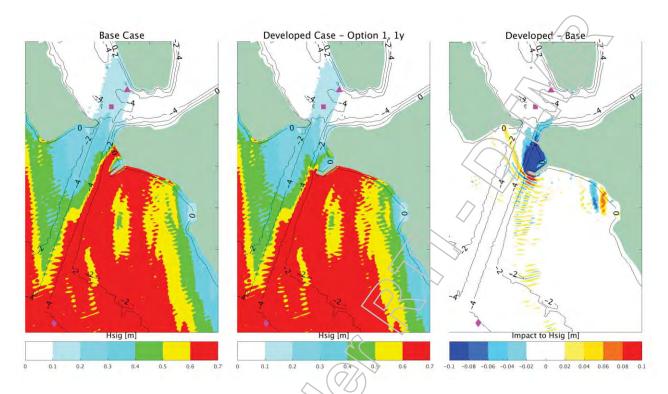


Figure A-1 Impact to significant wave height, 1-year ARI Option 1

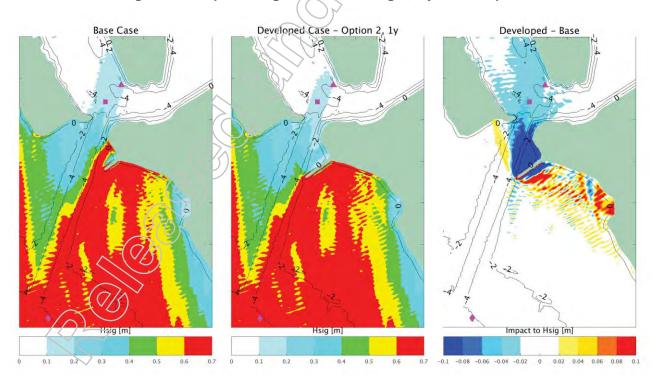


Figure A-2 Impact to significant wave height, 1-year ARI Option 2



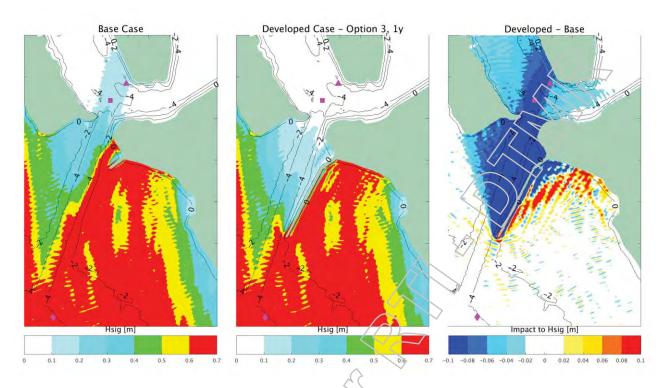


Figure A-3 Impact to significant wave height, 1-year ARI Option 3

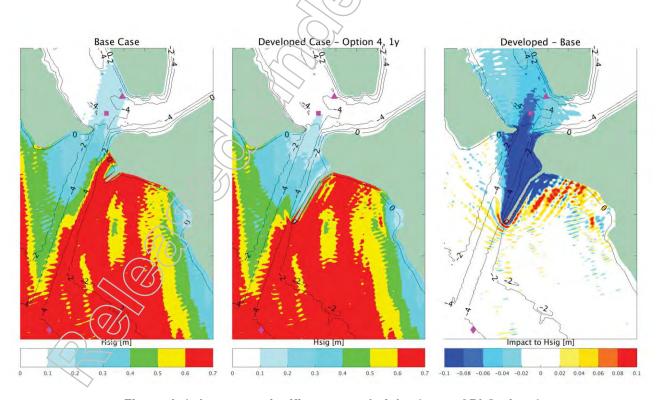


Figure A-4 Impact to significant wave height, 1-year ARI Option 4



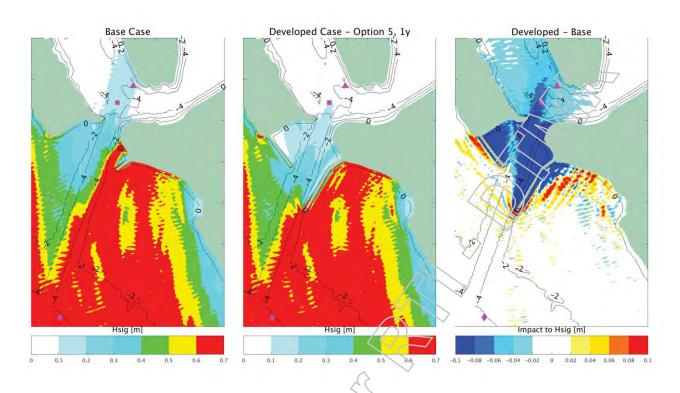


Figure A-5 Impact to significant wave height, 1-year ARI Option 5

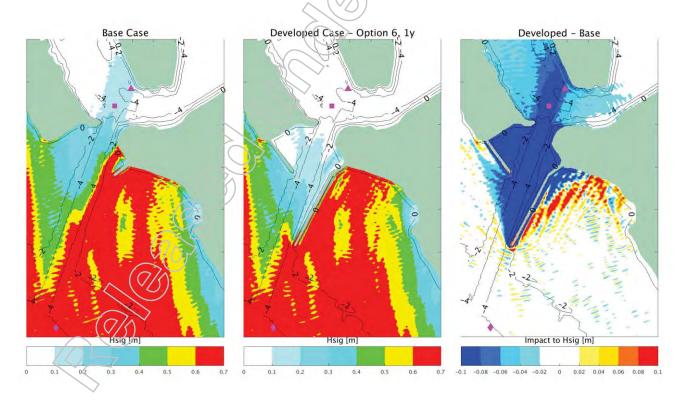


Figure A-6 Impact to significant wave height, 1-year ARI Option 6



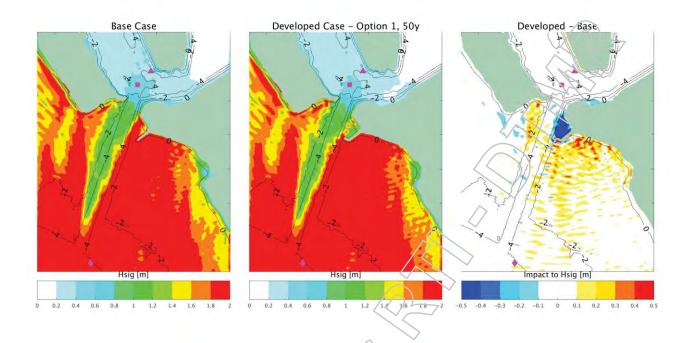


Figure A-7 Impact to significant wave neight, 50-year ARI Option 1

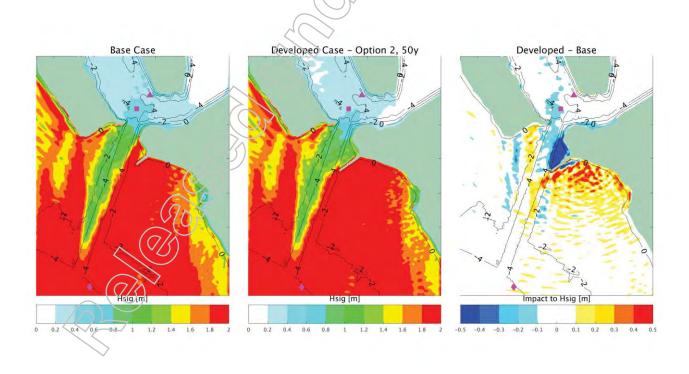


Figure A-8 Impact to significant wave height, 50-year ARI Option 2



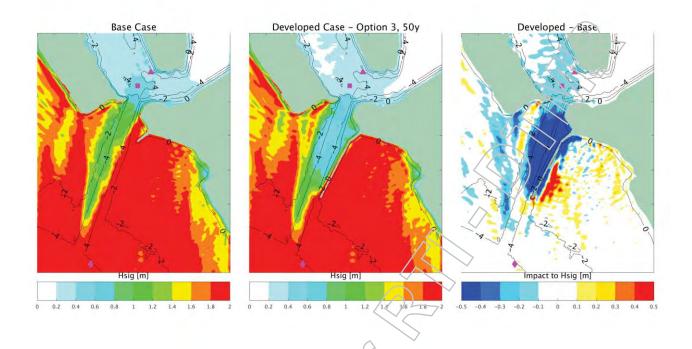


Figure A-9 Impact to significant wave height, 50-year ARI Option 3

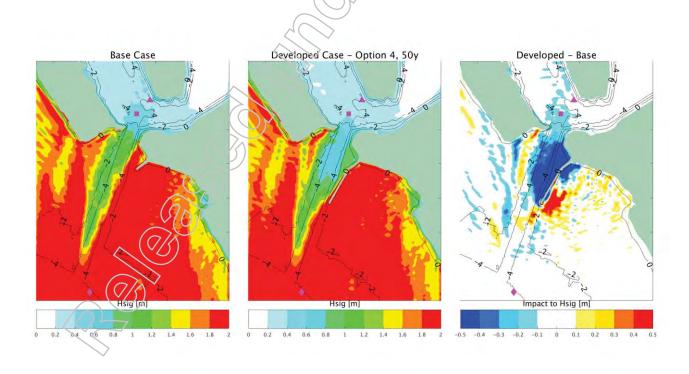


Figure A-10 Impact to significant wave height, 50-year ARI Option 4



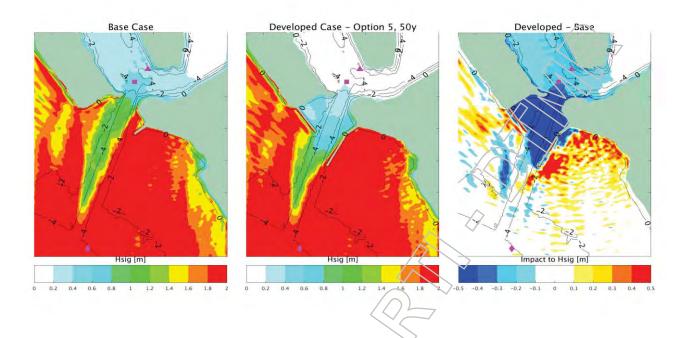


Figure A-11 Impact to significant wave height, 50-year ARI Option 5

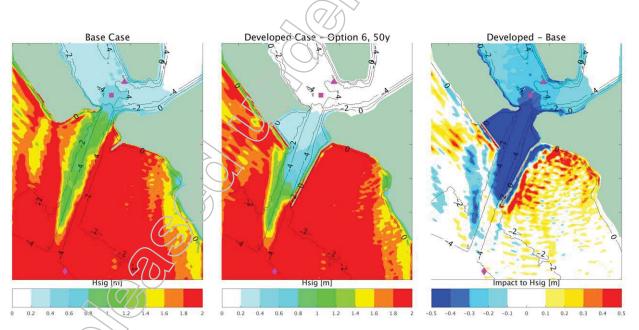


Figure A-12 Impact to significant wave height, 50-year ARI Option 6



Appendix B Sensitivity Testing

Table B-1 Sensitivity Test (Southerly Wind) Design Condition Summary

Scenario	Design Wind		Water	Offshore Wave Conditions		
	Spd (m/s)	Dir (°)	Level (m AHD)	Hs (m)	Tp/(s) Dir (°)	
1-year ARI (South)	15.5	180	1.7	0.7	3.0 169	

Table B-2 Summary of Sensitivity Test Results

Design Condition	Breakwater Configuration						
& Location	Base	Option 1	Option 2	Option 3	Option 4		
1-year ARI (South)	Hs Harbour (m)					
Pontoon (Site 1)	0.14	_	(<u>)</u> -	0.07	0.10		
Pile (Site 2)	0.21	_ <	\\\	0.09	0.13		
1-year ARI (South)	Harbour wave	e height percer	ntage of base c	ase			
Pontoon (Site 1)	-	- <	-	50%	72%		
Pile (Site 2)	_	. (0/6)	· –	40%	62%		



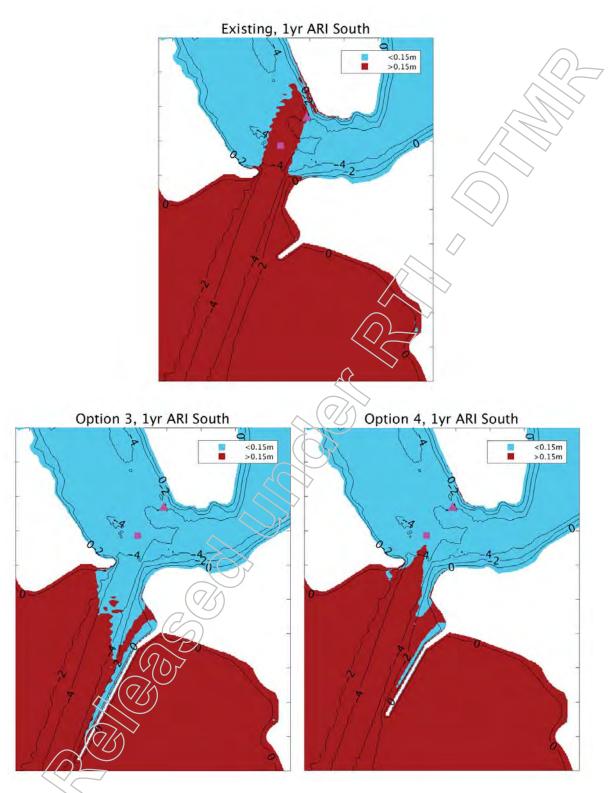


Figure B-î 'Good' wave climate (AS3962 Table 4.2), existing case, 1 year ARI Southerly wind, Base case, Option 3 and Option 4.



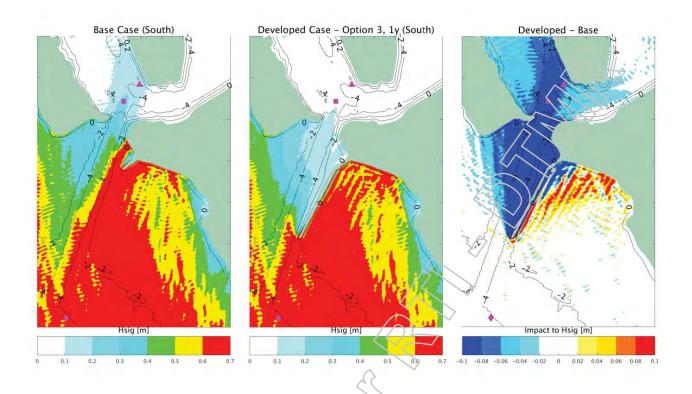


Figure B-2 Impact to significant wave height, 1-year ARI Southerly wind Option 3

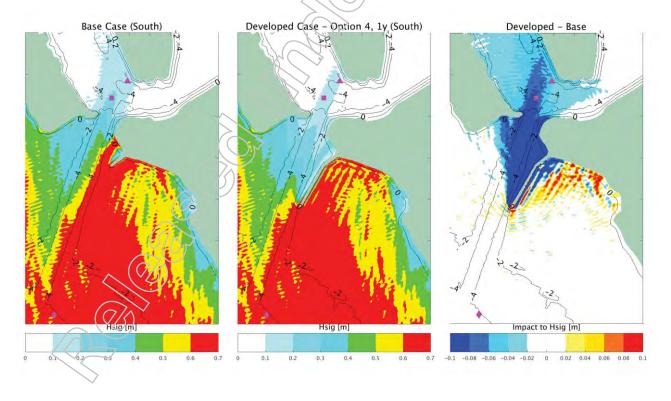


Figure B-3 Impact to significant wave height, 1-year ARI Southerly wind Option 4





BMT WBM Bangalow 6/20 Byron Street, Bangalow 2479

Tel +61 2 6687 0466 Fax +61 2 66870422

bmtwbm@bmtwbm.com.au Email www.bmtwbm.com.au

BMT WBM Brisbane Level 8, 200 Creek Street, Brisbane 4000

PO Box 203, Spring Hill QLD 4004

Fax +61 7 3832 3627 Tel +61 7 3831 6744

Email bmtwbm@bmtwbm.com.au Web www.bmtwbm.com.au

BMT WBM Denver 8200 S. Akron Street, #B120

Centennial, Denver Colorado 80112 USA Fax +1 303 792 9742 Tel +1 303 792 9814

denver@bmtwbm.com Email Web www.bmtwbm.com

BMT WBM London International House, 1st Floor

St Katharine's Way, London E1W 1AY Email london@bmtwbm.co.uk Web www.bmtwbm.com

BMT WBM Mackay PO Box 4447, Mackay QLD 4740

Tel +61 7 4953 5144 Fax +61 7 4953 5132

Email mackay@bmtwbm.com.au Web www.bmtwbm.com.au

BMT WBM Melbourne Level 5, 99 King Street, Melbourne 3000

PO Box 604, Collins Street West-VIC 8007
Tel +61 3 8620 6100 Fax 461/3 8620 6105
Email melbourne@bmwbm.com.au

Web www.bmtwbm.com.au

BMT WBM Newcastle 126 Belford Street, Broadmeadow 2292

PO Box 266, Broadmeadow NSW 2292 Tel +61 2 4940 8882 Fax +61 2 4940 8887

Email newcastle@bmtwbrn.com.au Web www.bmtwbm.com.au

BMT WBM Perth Level 4, 20 Parkland Road, Osborne, WA 6017

PO Box 1027, Innaloo WA 6918

Tel +61 8 9328 2029 Fax +61 8 9486 7588

Email perth@bmtwbm.com.au Web www.bmtwbm.com.au

Suite G2, 13-15 Smail Street, Ultimo, Sydney 2007 Tel +61 2 8960 7755 Fax +61 2 8960 7745 Email sydney@bmtwbm.com.au BMT WBM Sydney

Web www.bmtwbm.com.au

BMT WBM Vancouver

Suite 401, 611 Alexander Street

Vancouver British Columbia V6A 1E1 Canada Tel +1 604 683 5777 Fax +1 604 608 3232

Email vancouver@bmtwbm.com Web www.bmtwbm.com

 From:
 Peter G Wood

 To:
 Belinda Z Stewart

 Cc:
 Charles-Dean A Sorbello

 Subject:
 FW: Bowen Boat Harbour

 Date:
 Monday, 25 May 2020 5:42:37 PM

Attachments: <u>image001.png</u>

For the RTI.

Kind regards,

Peter Wood

Manager (Infrastructure Delivery) | Boating Infrastructure Unit |

Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Old 4000

GPO Box 1549 | Brisbane City Qld 4000

P: (07) 30663620 | F: (07) 30662065

M: Not Relevant

E: peter.g.wood@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Trevor B Carter < Trevor. B. Carter @tmr.qld.gov.au>

Sent: Tuesday, 11 September 2018 10:41 AM

To: Philip A Burns < Philip.A.Burns@tmr.qld.gov.au>

Cc: Peter G Wood <peter.g.wood@tmr.qld.gov.au> Roger Priest <roger.priest@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour

Phil

The BMT report (study of 2017) is a more thorough investigation and I think its conclusions are valid. However rather than start a battle between the consultants, I'd rather adopt the Baird recommendation which is more conservative than the BMT proposal but not that different in terms of cost and is supported by all the stakeholders.

The only major difference is in the western breakwater which Baird has recommended be extended to match the eastern breakwater. While figure 6 of the Baird report shows the western breakwater as a dogleg, they state on page 11 that it could be built along a straight alignment without affecting the level of wave protection. This would make it almost identical to the variation suggested by BMT shown as figure 4.1 in their Bowen Breakwater Feasibility Study of 2018. We would adopt a straight alignment for the western breakwater.

In terms of retrofitting costs for a future channel realignment, the Baird proposal would require a larger section of the western breakwater to be removed. However the additional cost of removal would be minimal compared with the cost of all the work needed for a realigned channel. It also is worth noting that the mayor is happy with the Baird proposal.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery **Program Delivery and Operations** | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4001 P: (07) 30664021 | F: (07) 30668305

M: NR

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Philip A Burns

Sent: Monday, 10 September 2018 4:56 PM

To: Trevor B Carter < <u>Trevor.B.Carter@tmr.qld.gov.au</u>>

Cc: Peter G Wood peter.g.wood@tmr.qld.gov.au; Roger Priest <reepriest@tmr.qld.gov.au</pre>

Subject: RE: Bowen Boat Harbour

Hi Trevor,

I've had a read through the report, and highlighted a couple of points for consideration. In summary, my reading of the report is that Baird do not consider Options A and B would provide a 'good' wave climate. Given we were proposing to progress with Option A as the solution, if the review doesn't consider this would produce a good wave climate - that is concerning.

I note Baird have raised the issue that the revised Option A has a higher retro-fit cost (i.e if there is a need to realign the channel at a later date). From that perspective I would be interested to see what their revised western breakwater alignment is (I assume just a single straight line).

I'll give you a call tomorrow to discuss

Regards

Philip Burns Manager

Development Projects

Strategic Property Management | Department of Transport and Main Roads

Floor 17 | 61 Mary Street Brisbane Qld 4000 GPO Box 1412 | Brisbane Qld 4001

P: (07) 30663753

M: Not Relevant

E: philip.a.burns@tmr.qld.gov.au

W: www.tmr.qld.gov.au



From: Trevor B Carter

Sent: Friday, 7 September 2018 3:28 PM

To: Philip A Burns < Philip.A.Burns@tmr.qld.gov.au>

Subject: FW: Bowen Boat Harbour								
Phil								
I've taken a look at the Baird report. The recommended layout for the breakwaters is similar to what we were planning to do. In view of all harbour users and the mayor indicating their satisfaction with the Baird recommendation, I suggest we proceed with this option. I'm happy to advise Not Relevant accordingly unless you want to do this.								
The tenders for the breakwater design close on Monday 10 Sep. The proposed modification to the layout won't make any difference to the tendered prices.								
Regards,								
Frevor Carter Principal Engineer (Coastal) Program Management and Delivery Program Delivery and Operations Department of Transport and Main Roads								
Works: Mon, Tues, Thur & Fri Floor 17 Brisbane City - 313 Adelaide Street 313 Adelaide Street Brisbane City Qld 4000 GPO Box 1549 Brisbane City Qld 4001 D: (07) 30664021 F: (07) 30668305 M: Not Relevant E: trevor.b.carter@tmr.qld.gov.au N: www.tmr.qld.gov.au								
From NR NR								
Sent: Thursday, 6 September 2018 2:51 PM								
To: Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au>								
Not Relevant								
								
Not Relevant								
Hi Trevor Please find report from Baird attached as well as a letter from stakeholders of the Bowen Boat marbour. Please let me know if you require any further information. Regards Not Relevant BCE Chairman								
Not Relevant								
10.								
Cc: Peter G Wood < <u>peter.g.wood@tmr.qld.gov.au</u> >; Roger Priest < <u>roger.priest@tmr.qld.gov.au</u> >;								
Emma M Schumacher < <u>Emma.M.Schumacher@tmr.qld.gov.au</u> >; Philip A Burns < <u>Philip.A.Burns@tmr.qld.gov.au</u> >; Not Relevant								
Not Relevant								

Cc: Peter G Wood peter.g.wood@tmr.qld.gov.au; Roger Priest roger.priest@tmr.qld.gov.au

Subject: RE: Bowen Boat Harbour Thanks for your email advising that the tenants do not think option A will provide sufficient protection during cyclones. Option A has been modelled by our coastal engineering consultants and shown to provide a "good" wave climate (as defined in AS3962 Guidelines for Design of Marinas) for both day to day conditions and for cyclonic conditions. Unless your peer review can show that our consultants are wrong in their assessment, it is unlikely that we would agree to construct anything other than option A. I've attached for your information an extract of the report undertaken last year which assessed a number of breakwater options. Of the 6 options assessed in the report, option 5 is the one which most closely resembles the proposed option A. You will see in figure 4.8 of the report that option 5 results in waves less than 0.25m in the harbour (criteria for "good" wave climate under cyclonic conditions). Furthermore it is worth noting that both the eastern and western breakwaters proposed in option A are slightly longer than those tested as option 5 and therefore option A can be expected to provide slightly better protection than option 5. Regards, **Trevor Carter** Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | Brisbane City Qld 4000 GPO Box 1549 | Brisbane City Qld 4001

P: (07) 30664021 | F: (07) 30668305

M: Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

Not Relevant From:

Sent: Monday, 20 August 2018 4:39 PM

To: Trevor B Carter < <u>Trevor.B.Carter@tmr.qld.gov.au</u>>

Cc: Peter G Wood peter.g.wood@tmr.qld.gov.au>;; Roger Priest roger.priest@tmr.qld.gov.au>;

Emma M Schumacher < Emma.M.Schumacher@tmr.qld.gov.au >; Philip A Burns

<Philip.A.Burns@trnr.gld.gov.au>;

Not Relevant

Subject: RE. Bowen Boat Harbour

Thanks Trevor

The tenants believe Option A will not protect the harbour in a cyclone due to no barrier from the SE where most of the wind comes from if a cyclone crosses the cost north of us. Yes, we discussed the fact there is an option to extend the wall, however the general consistence was it is better to get it right the first time.

We will have the peer review completed in 2 weeks and will meet and discuss once this

information is available. Cheers NR BCE Chairman	
From: Trevor B Carter < Trevor.B.Carter(etmr ald gov aus
Sent: Monday, 20 August 2018 4:20 PM	
To NR	
	<pre>qld.gov.au>; Roger Priest <roger.priest@tmr.qld.gov.au>;</roger.priest@tmr.qld.gov.au></pre>
• -	nacher@tmr.qld.gov.au>; Philip A Burns
<pre><philip.a.burns@tmr.qld.gov.au></philip.a.burns@tmr.qld.gov.au></pre>	lacrier (w trin. qiu.gov.au >, Friiiip A buriis
Subject: RE: Bowen Boat Harbour	
Subject. N.E. Bowell Boat Harbour	
NR	
I'm not sure what problems the tenants	s have with option A NR had mentioned that he
·	ter was not long enough. However I pointed out to
	kwater to be extended further offshore if the currently
proposed length proved to be inadequa	
proposed religin proved to se induced	
Regards,	
- 5	
Trevor Carter	
Principal Engineer (Coastal) Program Mana	
Program Delivery and Operations Departs	ment of Transport and Main Roads
Works: Mon, Tues, Thur & Fri	
	et 313 Adelaide Street Brisbane City Qld 4000
GPO Box 1549 Brisbane City Qld 4001	
P: (07) 30664021 F: (07) 30668305	
M: Not Relevant E: trevor.b.carter@tmr.qld.gov.au	
W: www.tmr.qld.gov.au	
From:	Relevant
Sent: Thursday, 16 August 2018 8:08 PM	M
To: Trevor B Carter < Trevor B. Carter@t	
Cc: '	Not Relevant
Not Relevant	Philip A Burns
<philip.a.burns@tmr.qld.gov.au>;</philip.a.burns@tmr.qld.gov.au>	Not Relevant
Prinip.A.burristerm .oru.gov.du>,	Not Relevant
	Not Relevant
Cubicati Cova Doct Howbour	
Subject: Bowen Boat Harbour	
Hi Trevor	
	ve he was going to discuss this with you.
I have attached a letter from Bowen Col	·
Please let me know if you require any fu	urther information.
Cheers _{NR}	

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Baird Australia Pty Ltd as Trustee for the Baird Australia Unit Trust
ACN 161 683 889 | ABN 92 798 128 010

Office | Suite 8, Level 22, 227 Elizabeth Street, Sydney, NSW 2000, Australia
Phone | +61 2 8278 7266 Email | sydney@baird.com

Not Relevant

Chairperson | Bowen Collinsville Enterprise PO Box 113 Wilson Street BOWEN QLD 4805

via email to

Not Relevant

Status: Final 12 September 2018

Dear

NR

Reference # 13053.101.L1.Rev1

RE: BOWEN BOAT HARBOUR – REVIEW OF BOAT HARBOUR ENTRANCE PROTECTION OPTIONS - DRAFT

Baird Australia Pty Limited (Baird) has been engaged by the Bowen Collinsville Enterprise (BCA) to provide a coastal engineering review of potential options to improve wave protection at the entrance to Bowen Boat Harbour. The following correspondence presents the outcomes of our review of the wave conditions at Bowen Boat Harbour and our coastal engineering assessment of the wave protection options that have been considered by the Department of Transport and Main Roads (TMR). The following review does not address all factors that need to be considered in the assessment of the harbour upgrade options. Rather, the scope of this review has focused on.

- Assessment of the current wave climate at Bowen Boat Harbour in accordance with AS3962:2001;
- Assessment additional wave protection provided by the various upgrade options considered by TMR;
- Recommendations related to the level of wave protection that is required to achieve a 'good' wave climate in the harbour in accordance with AS3962:2001.

Summary and Recommendations for the Bowen Collinsville Enterprise

The review completed by Baird has identified the following:

- A desktop assessment of the wave climate for the current harbour configuration has identified that
 there are likely many mooring locations that do not achieve a wave climate that is classified as 'good'
 in accordance with As3962:2001. AS3962:2001 wave climate guidelines are exceeded for the 1 and
 50 year ARI oriteria.
- The review has not been able to determine the level of impact on the at-berth wave climate from the 2015 channel deepening.
- Of the breakwater options reviewed in this assessment (see Attachment 1), Option C affords the
 largest wave protection and this option provides a wave climate at the most exposed mooring locations
 that is in accordance with the 1-year ARI criteria in AS3962:2001.
- Options A and B are unlikely to afford adequate protection for 50-year cyclone conditions and the 50-year wave climate at exposed mooring locations will significantly exceed AS3962:2001.

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- Options C and D have longer project execution time and costs primarily associated with dredging of an estimated 50,000 m³ of material to re-align the channel, and the additional costs and schedule duration presented in BMT (2017) compared to Options A and D are realistic.
- Baird has analysed an extended Option A (see Figure 6) with the western breakwater extended to form a 30 m wide entrance in a similar position to as the eastern breakwater in Option A (see Attachment 1). With this modification, a 'good' wave climate in accordance with AS3962:2001 for the 1-year ARI wave condition and nearly achieve the 50-year ARI wave condition criteria. Based on BMT (2017), the estimate cost of the extended Option A is \$3.0 million. The project schedule for an extended Option A would not be significantly longer than the original Option A.
- It is recommended that TMR review the Option A concept design and compare the wave climate from current Option A, and an extended Option A with both breakwaters terminating at the same relative position on the channel.
- Baird has not seen any consideration of options to reconfigure the actual harbour entrance or additional wave protection inside the entrance. It is recommended that such options should be considered in the assessment, at least at a high level, as they may have long-term benefits.

Background on the Site

Bowen boat harbour was first proposed by the Bowen Town Council in the late 1940s (TMR, 2013), and construction commenced in the 1960s when the Queensland Government began construction of a number of state boat harbours across Queensland (MSQ ,2017). The boat harbour was completed by 1966, with the exact date of completion unknown (TMR, 2013).

Prior to the recent channel upgrade the navigation depth of the approach channel was approximately 1.5 m CD, but the channel did not have a uniform or maintained navigation depth (pers. com. NR 22 Aug 2018. Approval for capital and maintenance dredging works to widen and deepen the Bowen boat harbour and harbour entrance channel was granted by the Department of State Development, Infrastructure and Planning on the 12th of February 2015. This approval included a dredge area with batter slopes either side of the channel, dredging to a depth of 2.8m CD with 1:4 batter slopes. The Queensland Government subsequently tendered the works on the 10th of September 2015, with project components including maintenance dredging of five shoaled areas within the boat harbour and capital dredging to straighten, widen and deepen the entrance channel. The expected dredge volume associated with these works was estimated at 48,000 m³ (Queensland Government 2015). The tender was awarded on the 7th of December, with the works being carried out subsequently.

Severe Tropical Cyclone Debbie was first identified as a tropical low on the 22nd of March 2017. Debbie intensified from a tropical low to a tropical cyclone on the 25th of March, followed by intensification from a category 2 to a category 4 cyclone on the 27th of March (BOM 2017). Debbie made landfall at Arilie Beach, 50km southeast of Bowen at 12.40pm on the 28th of March (Figure 1), causing a peak wind speed at Bowen of 125km/hr and a peak 3 second wind gust of 148 km/hr at 1.35pm on the 28th of March (BOM 2017). The lowest atmospheric pressure experienced at Bowen was 969.1 hPa at 1.59pm on 28th of March (BOM 2017).

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12 September 2018

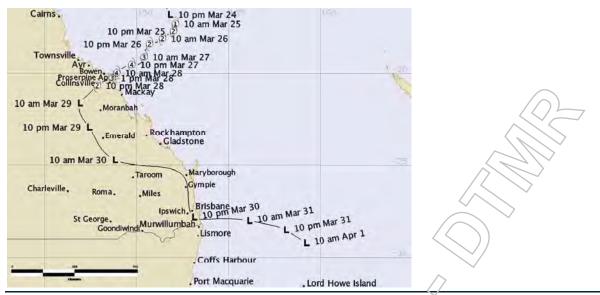


Figure 1: Tropical Cyclone Debbie track and intensity from time of classification to dissipation (BOM 2017)

High winds and storm surge associated with Severe Tropical Cyclone Debbie caused damage to the town, foreshore area and boat harbour (Figure 2). Surge recorded in Bowen (0.52m max surge) occurred during a receding tide (TMR 2016), leading to a maximum storm (ide (0.16m below HAT) below the possible worst case scenario (BOM 2017), but the cyclone track was such that strong winds were directed along the considerable fetch of the Edgecumbe and McCanes Bay towards the entrance to the Bowen boat harbour, contributing to high wave height waves and surge related to wind setup.



Figure 2: High winds and storm surge experienced along the Bowen foreshore during Severe Tropical cyclone Debbie (Lyndon Mechielsen/The Australian 2017)

TMR Concept Options

The department of Transport and Main Roads (TMR) commissioned BMT-WBM to complete a study of options to provide improved wave protection for Bowen Boat Harbour. Four concept options were considered and assessed for level of protection, future expandability, environmental constraints, cost and schedule. The BCE has provided Baird with the executive summary and a modelling results section from the BMT report (BMT, 2017). The four options developed from the BMT study are presented in Figure 3. Attachment 1 is a copy of the concept option layout provided by TMR.

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Figure 3: Concept options developed from BMT study - Options A, B, C and D (clockwise from top left). Not to scale

Wave Climate Guidelines - AS3962:2001

The wave climate assessment presented in this report is based on the requirements specified in Table 4-2 of AS3962-2001 to achieve a 'good' wave climate for a small craft harbour. Wave conditions are specified for different relative wave directions (to vessel). The current layout of Bowen Harbour result in most of the mooring locations closest to the entrance being exposed to 'beam-on' or 'quartering' wave conditions. The wave exceedance thresholds in AS3962-2001 for beam-on seas (> 2s wave period) to achieve a 'good' wave climate are:

- Wave event exceeded once in 50-years (50-year ARI): < 0.25m
- Wave event exceeded once per year (1-year ARI): < 0.15m

Scope of Work

12 September 2018

Baird has completed the following Scope of Work for this review:

- Assessed operational and extreme wave climate at the site including review of TC Debbie impacts.
 Operational and extreme wave climate as defined by AS3962:2001 has been estimated from
 numerical wave modelling of local seas from prevailing SE direction. Wind conditions that generate
 operational waves have been calculated from an analysis of a 25-year BoM measured data set from
 Bowen Airport. Cyclonic wind conditions that generate extreme waves have been estimated from
 measured winds and Baird's 10,000-year synthetic event data base of cyclone winds.
- Apply numerical modelling and analytical methods to estimate wave transformation to the exposed moorings of the Bowen Boat Harbour for the four wave protection options.
- Assess current layout and the four breakwater options for wave climate achieved inside the Boat Harbour in accordance with AS3962:2001.

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- Review cost, schedule and environmental constraints for the four options.
- Provide advice and recommendations to the BCE on the suitable option(s) to achieve an acceptable wave climate in the Boat Harbour.

Review Outcomes

Wind Climate at Bowen

The wind climate at Bowen has been analysed to define 1-and-50-year ARI wind conditions that will generate the governing wave conditions at the entrance to the harbour. The site is not exposed to the open swells or waves generated over moderate fetches inside the Great Barrier Reef Lagoon. Bowen Boat Harbour is most exposed to waves from the southeast to south sector, corresponding to the prevailing SE trade winds which occur in the region.

Two wind data sets have been analysed to define wind conditions for the wave climate assessment. The data sets are:

- 31-year measured wind data set from the BoM station at Bowen Airport (site ID 33327). Data was sampled at a number of time intervals, with the coarsest temporal resolution sampled at 9am and 3pm every day (2 measurements per day), and the finest temporal resolution sampled every 3 hours excluding midnight (7 measurements per day).
- 10,000-year synthetic cyclone wind data set as presented in Burston et al (2015). This extensive
 modelled data has been validated to long-term wind data sets around the cyclone prone coastline of
 Australia, including Cairns and Townsville.

For this assessment, the wind data from the East to South sector has been analysed using the statistical methods summarised in Attachment 2. Table 1 presents a summary of the wind conditions that have been applied in the wave climate assessment. Compared to BMT (2017), the 1-year ARI wind condition is nearly identical, and the 50-year ARI wind speed adopted in this assessment of 29 m/s is less severe than 37 m/s adopted in BMT (2017). BMT (2017) has adopted the 50-year ARI sustained wind speed from adjustment of the design wind gust conditions presented in 1170.1:2011. That approach can be prudent for design of small facilities although for wave hindcasting this approach is generally considered conservative.

Table 1: Summary of wind conditions calculated to determine wave climate in accordance with AS3962-2001.

Wind Condition	W _{spd} (m/s, 10 min ave)	W _{dir} (°TN)	Water Level (AHD)	Data Reference
1-day per year	15	157.5 (SSE)	1.05	Calculated from directional probability of exceedance analysis of 31-yr measured data set. Water level is Mean High Water Springs – see AUS268)
50-yr ARI (SE quadrant)	22.5	157.5 (SSE)	2.6	Burston et al (2015) and 31-year measured data set. Water level is 50-year storm tide level from Connell Wagner (2004).
50-yr ARI (all directions)	29.0	157.5 (SSE)	2.6	Burston et al (2015). Water level is 50-year storm tide level from Connell Wagner (2004).

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Wave Modelling

The 3rd generation spectral wave model, SWAN (Booij et al, 1999) has been applied to model wind generated waves at the location of the entrance structures at Bowen harbour. The SWAN model setup has been applied with default parameter settings for local sea wave conditions. Model bathymetry was developed from the Great Barrier Reef 100m bathymetry model (Beaman, 2010) and additional survey data points presented in the latest version of the navigation chart AUS 268.

The model consists of an overall model domain with 200 m grid resolution covering the whole area that can generate waves from a SE fetch. The model includes two nested grids, with the finest grid having a grid resolution of 10 m approaching Bowen Harbour. Figure 4 presents the overall model extent and Figure 5 presents the model grid near the entrance to Bowen Harbour with the study output locations. Wave climate has been estimated at 4 locations in the harbour representing the closest mooring locations to the harbour entrance (see red points, Figure 5).

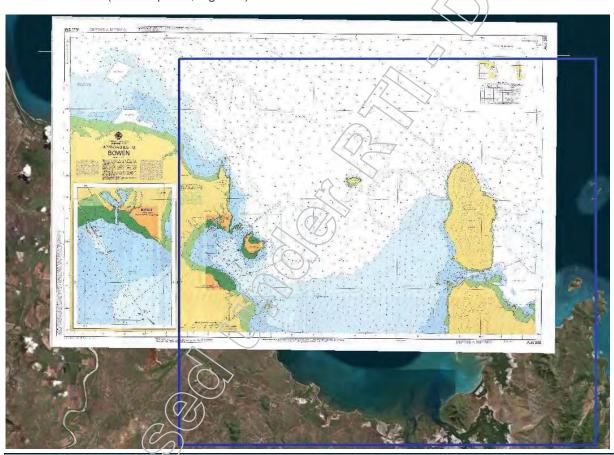


Figure 4: SWAN Model Extent for Bowen

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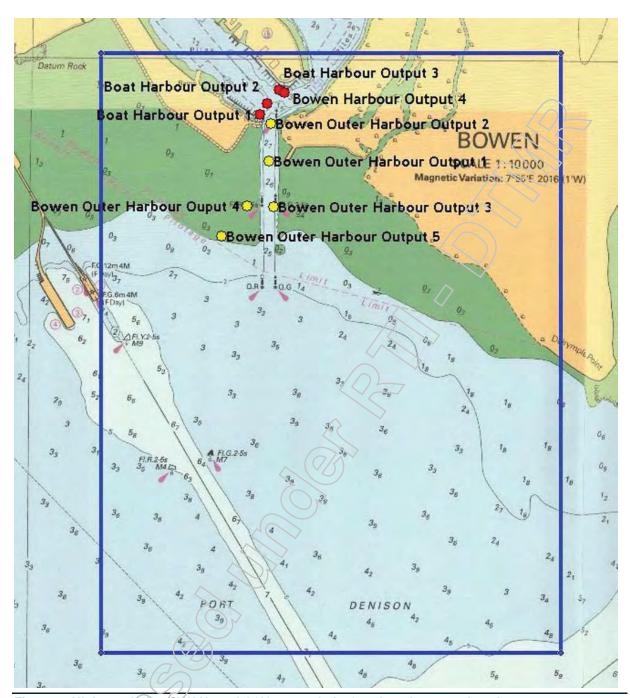


Figure 5: High resolution SWAN model (10 m resolution) and study output locations

Wave Penetration into Bowen Harbour

The SWAN model provides an accurate model to estimate the wind generated waves up to the point where wave propagation becomes dominated by diffraction around structures and through the entrance to the harbour. In this review, the analytical wave diffraction solutions for random seas as presented in Goda (2000) have been adopted to estimate the resulting wave conditions at four selected mooring locations indicated on Figure 5.

It is noted that BMT used a phase resolving wave model, SWASH, to model the wave conditions inside the entrance. SWASH has been demonstrated as an appropriate model for wave diffraction dominated wave

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penetration into harbours (van Vledder and Zijlema, 2014). However, Baird has not reviewed any validation or assessment of suitability for Bowen harbour.

Wave Climate Results

Existing Harbour Configuration

Table 2 summarises the modelled wave conditions at the entrance to Bowen Harbour.

Table 2: Summary of Modelled Wave Climate - Entrance Locations

Wave Condition	Harbour	Location 1		Location 2	>
wave Condition	Layout	H _s (m)	T _p (s)	H _s (m)	T _p (s)
1-day per year	2018 (-2.5 m CD)	0.72	2.9	0.55	2.6
50-yr SE wind	2018 (-2.5 m CD)	1.30	2.9	1.05	3.4
50-yr (omni directional wind)	2018 (-2.5 m CD)	1.55	4.1	1.20	3.4

Table 3 summarises the estimated wave climate at selected mooring locations in Bowen Harbour, calculated from an analytical solution of wave diffraction.

Table 3: Summary of wave climate estimated by wave transfer calculation – Harbour Locations

Wave Condition	Harbour	Location 1	Location 2	Location 3	Location 4
wave Condition	Layout	Hs (m)	H _s (m	H _s (m)	H _s (m)
1-day per year	2018 (-2.5 m CD)	0.19	0.26	0.21	0.22
50-yr SE wind	2018 (-2.5 m CD)	0.34	0.47	0.38	0.39
50-yr (omni directional wind)	2018 (-2.5 m CD)	0.39	0.54	0.43	0.45

The results presented in Table 3 indicate that at four of the most exposed mooring locations in Bowen Harbour, the wave climate exceeds the thresholds for beam seas as defined in AS3961-2001. Whilst the results from this assessment are not directly comparable to the modelled results in BMT (2017), of the four locations assessed in this study, only Location 2 was identified in BMT (2017) to exceed the 1-year ARI threshold, whereas all four locations in this assessment exceed the 1-year threshold. For the 50-year ARI threshold, the exceedance of the AS3962 thresholds at the four locations assessed in this review is significant and the results are consistent with BMT (2017).

Sensitivity modelling was undertaken to see the effect of water level and channel configuration on the wave height at the entrance to the Bowen Harbour. The exact depth of the channel pre-2015 was not confirmed but it was indicated that the depth of the channel was approximately -1.5 m CD. For this scenario, modelled wave heights for the 1-year ARI condition at the entrance for high water level conditions are similar to the results in Table 2.

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These results indicate that the 2015 channel upgrade works appears not to have increased the maximum annual wave conditions at the entrance, but the time of exposure for wave conditions near the annual maximum may have increased as the deepening of the channel may increase wave heights for lower water level conditions. However, without data to define the pre-2015 channel depth, it not possible to assess those changes in duration of wave exposure.

TMR Harbour Upgrade Options

Attachment 3 presents results from the wave climate assessment of the four options presented in Attachment 1. Table 4 provides a summary of the wave climate assessment at the 4 location inside the boat harbour estimated from this investigation. All options provide some level of improvement, but only Options C and D provide a significant reduction in wave heights at the four calculation locations. It should be noted that the application of analytical diffraction methods in the assessment of Options C and D is likely conservative, and the level of wave protection provided from Options C and D is expected to be higher than estimated in this initial review. Based on the four TMR options assessed, Option C, and possibly Option D, are the options that will provide a wave climate at current mooring locations that are in accordance with a 'good' wave climate definition in accordance with AS3962.

Table 4: Summary of wave climate estimated by wave transfer calculation – Boat Harbour Locations

Harbour Layout	Wave Condition	Locations Achieving AS3962 Criteria	Locations Not Achieving AS3962 Criteria
2018	1-day per year		1, 2, 3, 4
2018	50-yr (omni directional wind)		1, 2, 3, 4
Option A	1-day per year		1, 2, 3, 4
Option A	50-yr (omni directional wind)		1, 2, 3, 4
Option B	1-day per year		1, 2, 3, 4
Option B	50-yr (omni directional wind)		1, 2, 3, 4
Option C	1-day per year	1, 2, 3, 4	
Option C	50-yr (omni directional wind)	1, 3, 4	2
Option D*	i-day per year	1	2, 3, 4
Option D*	50-yr (omni directional wind)		1, 2, 3, 4

^{*} Results for Option D are likely overly conservative, and this option is expected to provide greater wave protection than estimated in this assessment.

As presented in the summary of this report, Baird has identified that a modified and extended Option A may provide enough wave protection to reduce the wave climate to achieve a 'good' 1-year ARI wave climate in accordance with AS3962:2001.

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Extended Option A Concept

Following consultation with BCE, Baird investigated the concept of extending and/or modifying the breakwater arrangement presented in the BMT Option A, to achieve waves of at least <0.15m during a 1-year ARI event at all locations within the Bowen Boat Harbour (red locations in Figure 5). This option is presented in Figure 6. The revised Option A has a total of an additional 45 m of breakwater length and both breakwaters terminate at the same position on the channel. The wave climate assessment results are presented in Attachment 3 and the extended breakwater option would improve the wave protection for the 50-year ARI cyclone wave condition and is estimated to achieve the wave climate requirements of AS3962:2001. The assessment of wave climate is presented in Table 5.

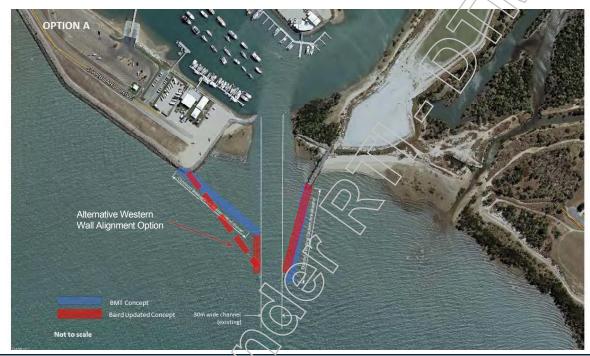


Figure 6: Extension of BMT Option A concept

Table 5: Summary of wave climate estimated by wave transfer calculation – Boat Harbour Locations, Option A extended

Harbour Layout	Wave Condition	Locations Achieving AS3962 Criteria	Locations Not Achieving AS3962 Criteria
2018	1-day per year	-	1, 2, 3, 4
2018	50-yr (omni directional wind)		1, 2, 3, 4
Option A	1-day per year		1, 2, 3, 4
Option A	50-yr (omni directional wind)		1, 2, 3, 4
Option A Extended	1-day per year	1, 2, 3, 4	
Option A Extended	50-yr (omni directional wind)	1, 3, 4	2

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The increased overall breakwater length associated with the new Option A Extension is presented in Table 6.

Table 6: Length of breakwaters for BMT Option A and Baird Option A Extension

	Western Breakwater Length (m)	Eastern Breakwater Length (m)	Total Breakwater Length (m)
BMT Option A	140m	140m	280m
Option A Extension	200m	125m	325m

If the cost estimates of BMT (2017) are adopted, a comparison of the Option A and the extended Option A are:

- Option A: \$2.5 million
- Option A Extended: \$3.0 million

It is noted that the revised Option A has increased costs if future channel expansion is considered, although the revised design could be modified to have a single alignment for the western breakwater without impacting on the wave protection provided by the concept.

Comments on Executive Summary of Breakwater Feasibility Study (BMT, 2017)

A review of the Executive Summary for the *Breakwater Feasibility Study* has been completed based on the results of this assessment. The following comments are provided on the Executive Summary:

- BMT (2017) assesses the four breakwater Options according to 9 feasibility criteria. The scope of the
 assessment criteria is suitable; however, some of the criteria are qualitative and Baird has not seen
 any of the stakeholder input into the criteria assessment scores or rank.
- The assessment that Options A and B have lower cost and shorter project schedules is sound and both these options would have less regulatory complexity and risk as dredging would not be required.
- It is unclear if BMT or TMR have considered options involving additional wave protection structures near the main harbour entrance or reconfiguration of the current entrance to reduce wave penetration to mooring locations. Whilst the costs of entrance reconfiguration options may be high, the effectiveness in reducing at berth wave conditions and long-term maintenance may offset initial capital costs. Reconfiguration of the entrance would require consideration of the long-term layout and use of the harbour.
- Based on the wave climate assessment presented in this report, it is recommended that TMR consider an extended Option A with the two breakwaters terminating at the same position on opposite sides of the channel.
- Baird has not completed an assessment of the cost estimates presented in BMT (2017); however, the
 relative cost difference between Options A/B compared to Options C/D appears reasonable due to the
 addition of dredging and obtaining environmental approvals for Options C and D.

Baird does not provide any specific comments with regards to the wave penetration modelling in BMT (2017) as we have not reviewed the entire report. The two general comments that we would make are:

- The methods adopted by BMT to derive the wind conditions for assessing the wave climate in accordance with AS3962:2001 are sound and in our opinion confirm with adopted professional practice in Queensland and Australia.
- The application of the SWASH model can be appropriate for the wave penetration modelling as it has been demonstrated for wave diffraction dominated wave penetration into harbours (van Vledder and Zijlema, 2014). However, Baird has not reviewed the details of the Bowen model configuration and would recommend that the numerical model results of wave penetration be compared to wave

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penetration estimated from appropriate analytical or empirical methods. It is noted that models like SWASH can account for the full range of processes that impact wave penetration to the mooring locations including refraction, diffraction, bed friction and reflection/dissipation from structures. However, numerical models have model coefficients and parameterisation options that can unrealistically alter wave dissipation and propagation that may make the wave penetration results nonconservative.

Concluding Remarks

Thank you for your request to assist the BCE on this matter. Should you accept this correspondence, or you require any further information, please contact Not Relevant @baird.com) on +61 (0) 2 8278 7266.

Best regards, 2018.09.1 2 09:52:36 +10'00' Not Relevant Principal Baird Australia E: NR @baird.com M: Not Relevant CC: Not Relevant Baird)

References

AS3962:2001. Guidelines for the design of marina. Standards Australia. Second edition 2001. Reissued incorporating Amendment No. 1 (March 2010).

BMT (2017). Bowen Boat Harbour Wave Penetration Study. Prepared for Department of Transport and Main Roads. Ref: B22333.g.iat.Bowen Wave Study\R.B22333.001.04.docx.

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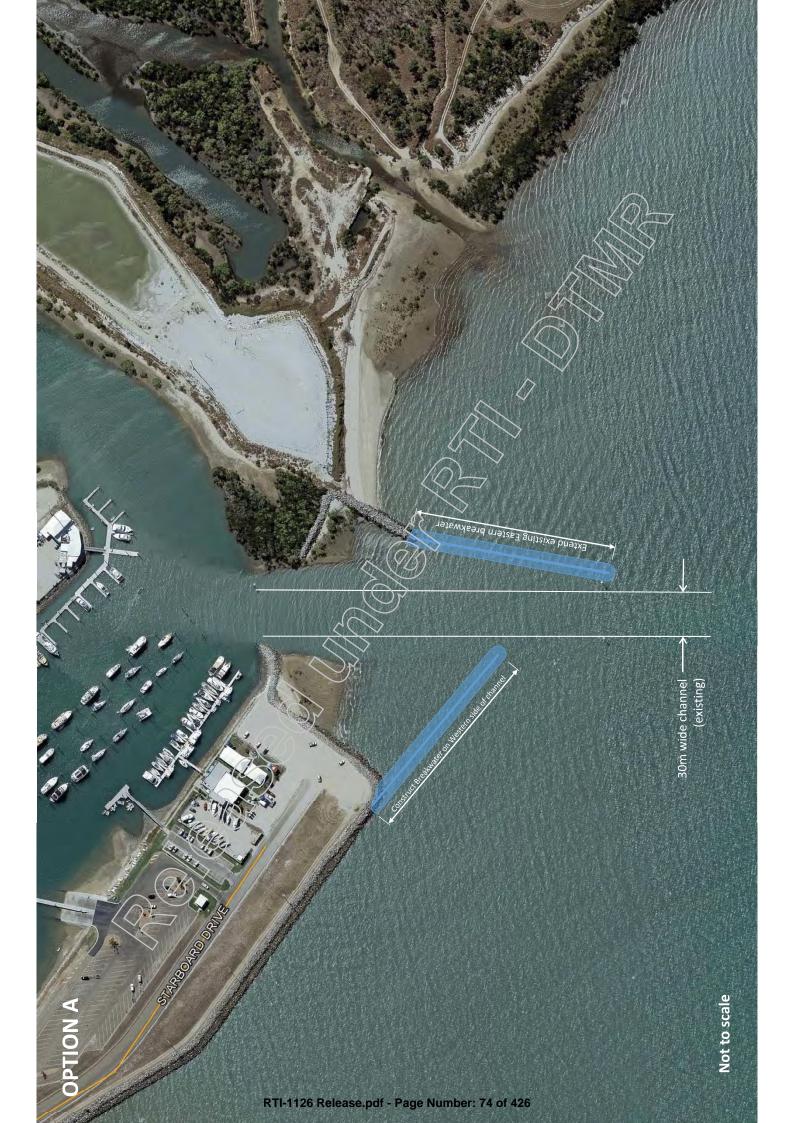
Attachment 1 Bowen Breakwater Options (Provided by TMR)

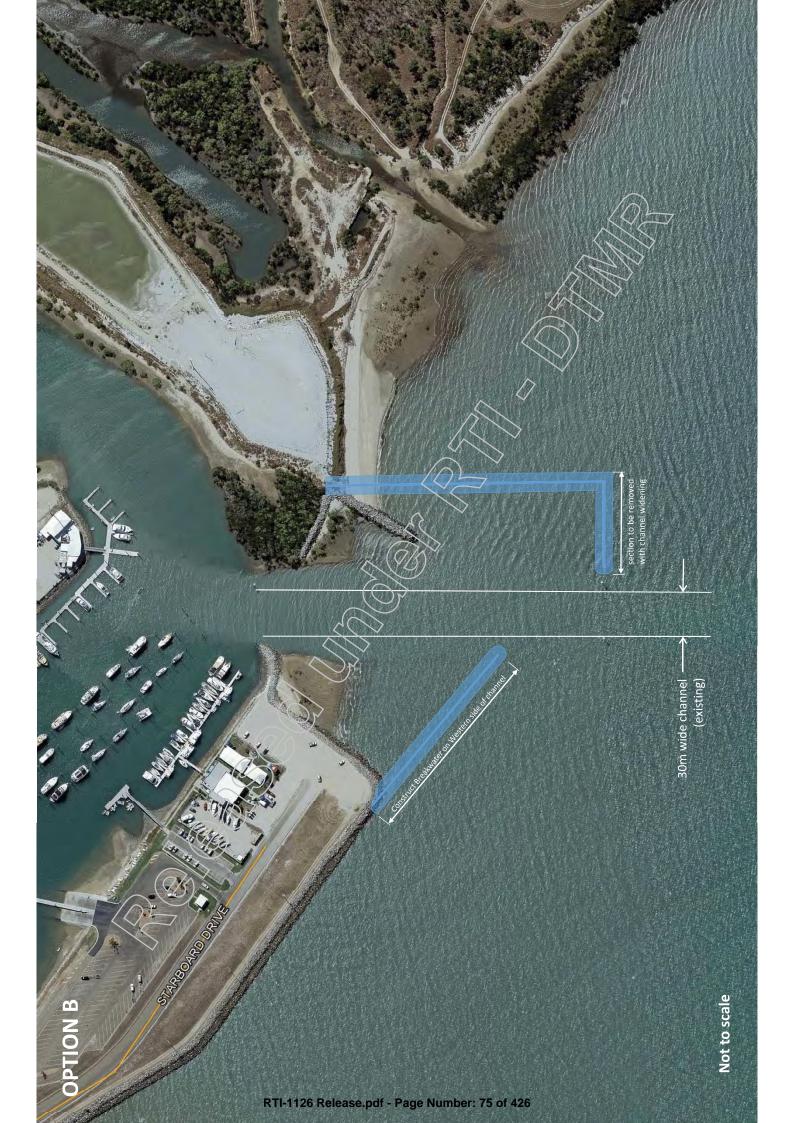


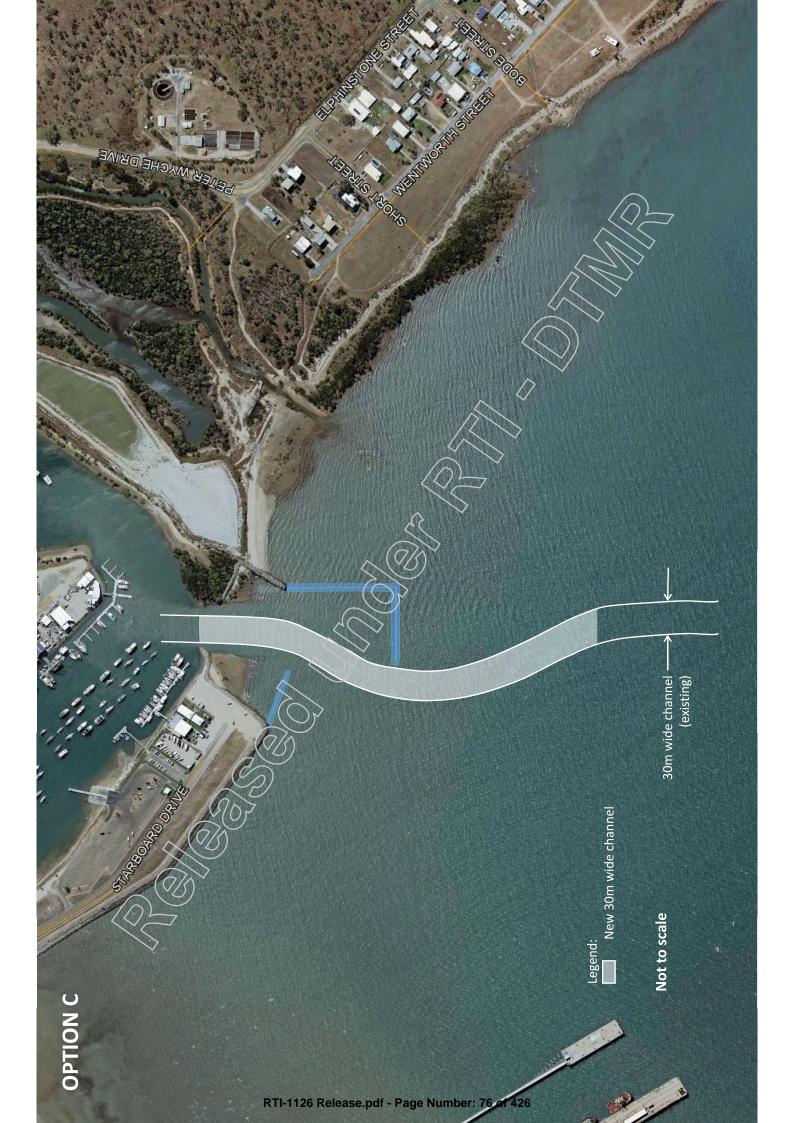
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Attachment 2 Statistical Methods

Mean and Confidence Interval Calculations

Wave height and period data has been analysed with a variety of statistical methods available in the Matlab Statistics Toolbox (v2018a). The key statistical test that has been applied is to estimate the mean wave period and associated 95% confidence interval of the wave period associated with a particular wave height, known as the Student's *t* test. Since the data sample is relatively small and the population standard deviation is unknown, the population mean and confidence interval has been estimated using the Student's *t* distribution with *v* degrees of freedom (Walpole, 2002).

Probability of Exceedance Analyses

Extreme wave heights have been estimated using probability of exceedance analysis. The extrapolation of the measured data has been undertaken using a lognormal fit to the extrema of the wave height data. The fitted lognormal distribution is then used to calculate the wave height associated with the $1/T_d$ probability with T_d is the specified return period in days.

Extreme Value Analyses

Extreme Value Analyses (EVA) have been undertaken using Baird's EVA calculation methods to estimate extreme wind and wave conditions for forcing of the local scale models. The EVA of the measured data sets considered Type-1 (Gumbel), Type-III (Weibull) and GEV (Generalised Extreme Value) distributions. Following review of the computed return period for wind speed and wave height, the Weibull distribution has been adopted for the design criteria presented in this report.

The Baird EVA distribution fitting and confidence interval calculation is described in Taylor (2006) and is based on the recommended techniques for fitting data sets by van Vledder et al (1993) and Goda (2000). For the Weibull distribution, the intercept parameter was determined by minimising the residual error. Confidence intervals were determined using a boot-strapping procedure as described by Naess and Hungnes (2002). In accordance with EVA theory as presented in Goda (2000), a Peak over Threshold (PoT) censoring approach was adopted. Typically, a PoT value between 0.6 and 0.8 of the maximum parameter value was adopted, depending on the data set and variable.

It should be noted that normal professional guidance for Extreme Value Analysis is that it is applicable to extrapolate a data sample to 2 to 3 times the duration of the input data sample (see USACE, 2002). For this study, approximately 3 to 4 months of measured data has been analysed to estimate extreme waves at 50-years ARI. This extrapolation is greater than the normal range and the end user should be aware of the uncertainty in the estimation of 50-year ARI conditions.

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Attachment 3 Wave Climate Assessment Results

Harbour Channel Layout	ARI		Hs (m, diffra	acted wave)		Wave Height required for 'Good' climate (m)
		Bowen Harbour Output 1	Bowen Harbour Output 2	Bowen Harbour Output 3	Bowen Harbour Output 4	
2018	1-day per year	0.28	0.39	0.31	0.32	0.15
2018	50-yr ARI - SE only	0.53	0.74	0.59	0.61	0.25
2018	50-yr ARI - Omni Dirn	0.60	0.84	0.67	0.70	0.25
BMT Option A	1-day per year	0.17	0.3	0.25	0.26	0.15
BMT Option A	50-yr ARI - SE only	0.40	0.56	0.45	0.46	0.25
BMT Option A	50-yr ARI - Omni Dirn	0.44	0.61	0.48	0.49	0.25
BMT Option B	1-day per year	0.22	0.31	0.25	0.25	0.15
BMT Option B	50-yr ARI - SE only	0.40	0.55	0.43	0.44	0.25
BMT Option B	50-yr ARI - Omni Dirn	0.44	0.61	0.48	0.49	0.25
BMT Option C	1-day per year	0.07	0.13	0.11	0.11	0.15
BMT Option C	50-yr ARI - SE only	0.14	0.20	0.16	0.16	0.25
BMT Option C	50-yr ARI - Omni Dirn	0.18	0.25	0.20	0.20	0.25
BMT Option D	1-day per year	0.13	0.23	0.18	0.19	0.15
BMT Option D	50-yr AR! - SE only	0.22	0.30	0.24	0.25	0.25
BMT Option D	50-yr ARI - Omni Dirn	0.25	0.36	0.28	0.29	0.25
BMT Option A - Extended	l-day per year	0.08	0.15	0.12	0.12	0.15
BMT Option A - Extended	50-yr ARI - SE only	0.18	0.25	0.20	0.21	0.25
BMT Option A - Extended	50-yr ARI - Omni Dirn	0.22	0.30	0.24	0.24	0.25

^{*} Output locations are indicated in Figure 5.

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 From:
 Peter G Wood

 To:
 Belinda Z Stewart

 Cc:
 Charles-Dean A Sorbello

Subject: FW: Bowen Breakwater Arrangement
Date: Monday, 25 May 2020 5:35:03 PM
Attachments: Amended Bowen breakwater layout.pdf

For the RTI.

Kind regards,

Peter Wood

Manager (Infrastructure Delivery) | Boating Infrastructure Unit |

Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4000 P: (07) 30663620 | F: (07) 30662065

M: 0438753003

E: peter.g.wood@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Trevor B Carter < Trevor. B. Carter @tmr.qld.gov.au>

Sent: Thursday, 20 September 2018 12:39 PM

To: Not Relevant @bmtglobal.com>

Cc: Not Relevant @bmtglobal.com>; Emma M Schumacher

<Emma.M.Schumacher@tmr.qld.gov.au>; Charles-Dean A Sorbello <Charles-</p>

Dean.A.Sorbello@tmr.qld.gov.au>; Peter G/Wood <peter.g.wood@tmr.qld.gov.au>

Subject: Bowen Breakwater Arrangement

NR

You would be aware that that the harbour users were not totally satisfied that the proposed breakwater layout would provide adequate protection. They have gone to the extent of commissioning Baird Australia to review the BMT studies undertaken. They have suggested a slight reduction in the length of the eastern breakwater and an extension of the western breakwater to match the extent of the eastern breakwater as per the attachment. The harbour users all support this amended proposal even though they have constantly argued in the past for an increase in the length of the eastern breakwater rather than the western breakwater. In order to avoid further delays, TMR has decided to adopt the Baird recommendation which will be slightly more costly to construct than the tendered arrangement but should provide at least the same level protection. It is anticipated that this amendment should not affect the tender prices for the design.

Please don't take this decision to adopt the Baird proposal as TMR being critical of your work which we have always found to be of a high standard. The decision has been based purely on a pragmatic approach aimed at having the breakwaters in place before the 2019/20 cyclone season. Give me a call to discuss.

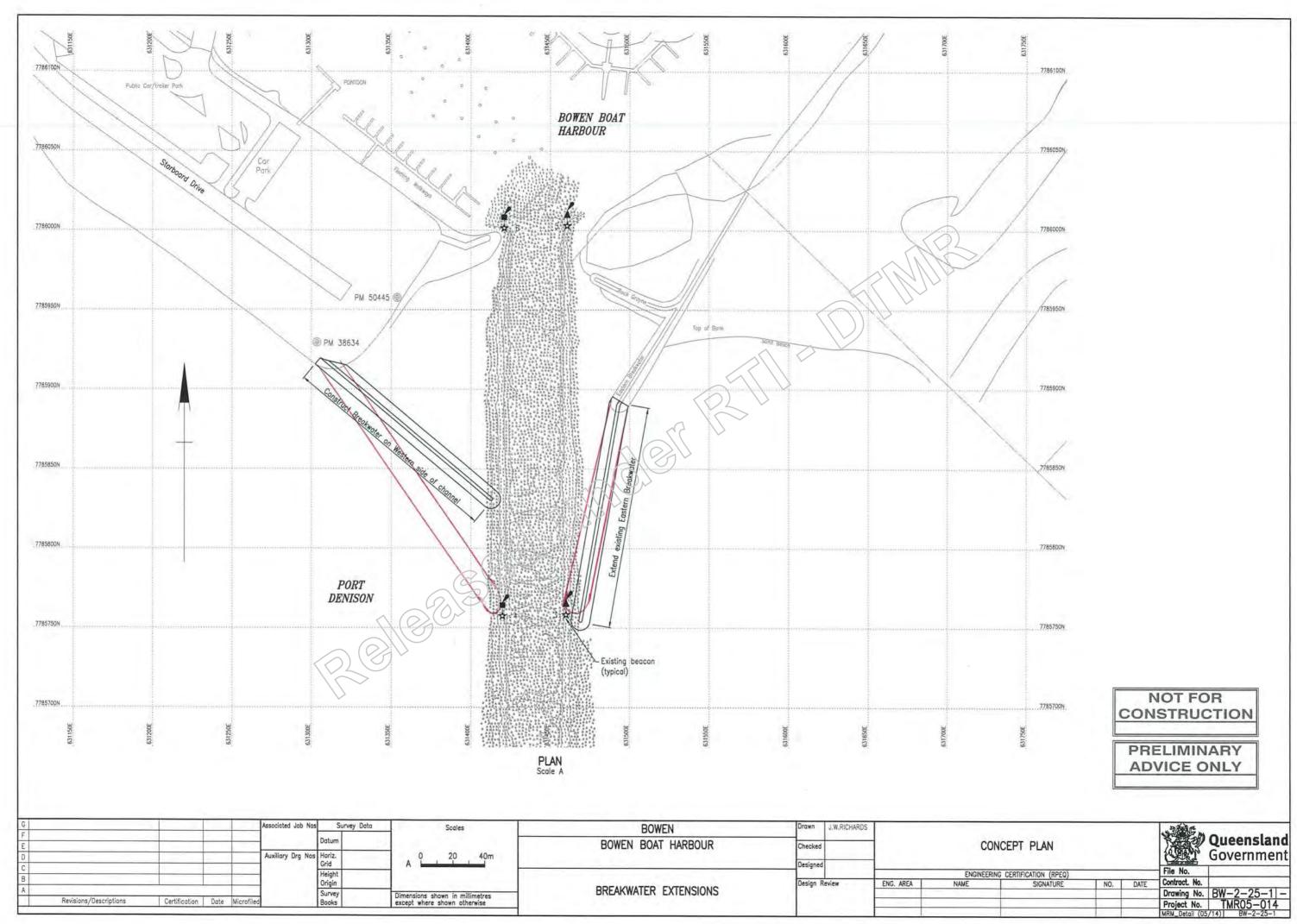
Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads





 From:
 Peter G Wood

 To:
 Belinda Z Stewart

 Cc:
 Charles-Dean A Sorbello

Subject: FW: Bowen Breakwater Design Project
Date: Monday, 25 May 2020 5:41:28 PM

Attachments: Signed letter of acceptance - Bowen breakwaters.pdf

Amended breakwater concept.pdf

For the RTI.

Kind regards,

Peter Wood

Manager (Infrastructure Delivery) | Boating Infrastructure Unit |

Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000 GPO Box 1549 | Brisbane City Qld 4000

P: (07) 30663620 | F: (07) 30662065

M Not Relevant

E: peter.g.wood@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Trevor B Carter < Trevor. B. Carter @tmr.qld.gov.au>

Sent: Tuesday, 25 September 2018 12:25 PM

To: NR @smec.com

Cc: Philip A Burns < Philip.A.Burns@tmr.qld.gov.au, Senarath Weerakoon

<Senarath.Z.Weerakoon@tmr.qld.gov.au>; Peter G Wood <peter.g.wood@tmr.qld.gov.au>

Subject: Bowen Breakwater Design Project

NR

I have just awarded the above tender to SMEC on Vendor Panel. Attached is a formal letter of acceptance.

I confirm we wish to alter the breakwater as per the attached plan and that we will commission BMT to determine the design parameters for the 1 in 200 year event.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

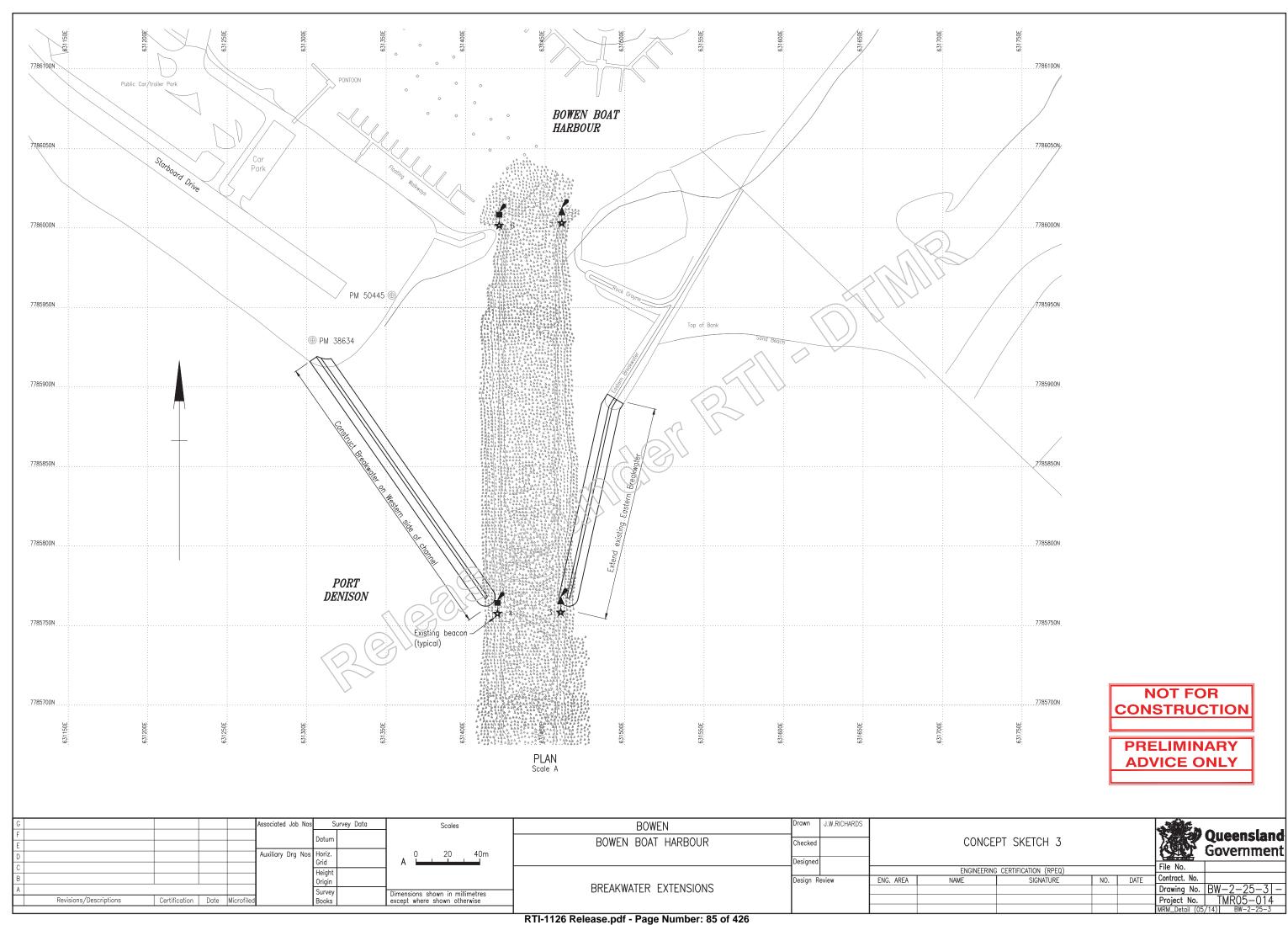
GPO Box 1549 | Brisbane City Qld 4001

P: (07) 30664021 | F: (07) 30668305

M: Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au



Sandra H Williams

Roger Priest From:

Tuesday, 16 October 2018 11:20 AM Sent:

Sandra H Williams To:

Subject: RE: APPROVAL SOUGHT - Bowen Boat Harbour breakwaters extensions #1009960

Approved.

Roger

Roger Priest

Manager (Boating Infrastructure)

Program Management and Delivery

Department of Transport and Main Roads

Floor 17 | 313 Adelaide Street | Brisbane Qld 4000

GPO Box 1549 | Brisbane Qld 4001

(07) 3066 3781 | M:

roger.priest@tmr.qld.gov.au

www.tmr.qld.gov.au



From: Sandra H Williams

Sent: Tuesday, 16 October 2018 10:38 AM To: Roger Priest <roger.priest@tmr.qld.gov.au>

Subject: APPROVAL SOUGHT - Bowen Boat Harbour breakwaters extensions #1009960

Hi Roger

Currently the total for Bowen Boat Harbour breakwaters project allocation is \$3,200,000. This will be partly funded by the State Boat Harbours surplus \$1,472,000 the remaining funds of \$1,728,000 to be funded from the Boating Maintenance Bulk # 616283, transferring these funds to the capital investment program as agreed with Michael Dale from PIP.

Thanks Sandra

Sandra Williams

Advisor (Program, Analysis & Reporting) | Program Management and Delivery Program Delivery and Operations Infrastructure Management and Delivery

Department of Transport and Main Roads

Floor 17 | 313 Adelaide St Brisbane Qld 4000

GPO Box 1549 | Brisbane Qld 4001

(07) 3066 1338

sandra.h.williams@tmr.qid.gov.au

www.tmr.qld.gov.au

From: To: Trevor B Carter Cc: Charles-Dean A Sorbello RE: [External] Bowen Breakwater Wave Parameters Subject: Date: Friday, 26 October 2018 9:24:40 AM Attachments: image004.png image005.png image006.png image002.png M.B23407.001.01.Metocean.pdf Hi Trevor Please find attached the revised (rev 01) metocean criteria report for the Bowen breakwater project. **Best Regards** Principal Engineer **Team Leader Coastal & Metocean** +61 (0) 7 3831 6744 Tel: Fax: +61 (0) 7 3832 3627 Weh: www.bmt.org LinkedIn | Twitter | Facebook | YouTube BMT Eastern Australia Pty Ltd, Level 8, 200 Creek Street, Brisbane, Queensland, 4000, (or PO Box 203, Spring Hill, QLD 4004), Australia Registered in Australia, Registered no. 010 830 421, Registered office Level 8, 200 Creek Street, Brisbane QLD 4000, Australia. BMT's Brisbane River Catchment Flood Study wins Prestigious Engineering Excellence **Awards** NR From Sent: Thursday, 25 October 2018 12:21 PM @smec.com>; Trevor B Carter < Trevor. B. Carter @tmr.qld.gov.au> Cc: Charles-Dean A Sorbello < Charles-Dean.A.Sorbello@tmr.qld.gov.au> Subject: RE: [External] Bowen Breakwater Wave Parameters Ηi Thanks for the email. I was planning to re-issue with the updated table 3.2 and some minor text corrections. Was planning to talk to Trevor first thing tomorrow (Friday) morning before doing this to make sure everything was covered off. Best Regards NR **Principal Engineer**

Team Leader Coastal & Metocean

+61 (0) 7 3831 6744

Tel:

Fax: +61 (0) 7 3832 3627 Web: <u>www.bmt.org</u>



<u>LinkedIn</u> | <u>Twitter</u> | <u>Facebook</u> | <u>YouTube</u>

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From:	Not F	Relevant	@smec.com>
Sent:	Thursday,	, 25 Octobe	er 2018 11:58 AM
To:	Not Rel	evant	@bmtglobal.com>; Trevor B Carter < <u>Trevor B.Carter@tmr.qld.gov.au</u> >
Cc: Ch	arles-Dea	ın A Sorbel	lo < <u>Charles-Dean.A.Sorbello@tmr.qld.gov.au</u> >
Subje	ct: RE: [Ex	ternal] Bov	wen Breakwater Wave Parameters
Ні м	R		
Were	you going	g to reissue	the report/technical note?
Please	let me kı	now.	
Many	thanks	ı	
Not R	elevant		
		' ¬	
Not	Relevant		
	Engineer -		
N/I	lot Relevant	T +61 7 30	a Jurong Group) 129 6980)
	ot Neievant		
From		Not Relevant	@bmtglobal.com]
Sent:	Tuesday,	23 October	2018 1:26 PM
To: Tr	evor B Ca	rter < <u>Trev</u>	or.B.Carter@tmr.qld.gov.au>
Сс	Not Relev	ant 0	smec.com>; Charles-Dean A Sorbello < <u>Charles-</u>
Dean.	A.Sorbello	@tmr.qld.	gov.au>
Subject Hi/Tre		ternal] Bov	wen Breakwater Wave Parameters

Thanks for picking this up. This has been rectified in the table below and I will also fix in a re-issue.

The slight difference is because the water level is different (higher) than the original BHWS modelling and the model grid resolution is different (more refined).

Water

ARI	Level		Hs (m)						Tp (s)
(years)	(m AHD)	B81	Α	В	С	D	E	F	
100	2.44	1.42	1.42 1.17 1.21 1.23 1.06 1.10 1.13						5.2
200	2.53	1.76	1.48	1.50	1.49	1.35	1.43	1.46	5.8

Best Regards, NR

Not Relevant

Principal Engineer

Team Leader Coastal & Metocean

Tel: +61 (0) 7 3831 6744 Fax: +61 (0) 7 3832 3627 Web: <u>www.bmt.org</u>



LinkedIn | Twitter | Facebook | YouTube

BMT Eastern Australia Pty Ltd, Level 8, 200 Creek Street, Brisbane, Queensland, 4000, (or PG Box 203, Spring Hill, QLD 4004), Australia

Registered in Australia, Registered no. 010 830 421, Registered office Level 8 200 Creek Street, Brisbane QLD 4000, Australia.



BMT's Brisbane River Catchment Flood Study wins Prestigious Engineering Excellence

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From: Trevor B Carter < Trevor.B. Carter@tmr.ald.gov.au>

Sent: Tuesday, 23 October 2018 12:51 PM

To Not Relevant @bmtglobal.com>

Cc: NR @smec.com>; Charles-Dean A Sorbello < Charles-

Dean.A.Sorbello@tmr.qld.gov.au>

Subject: RE: [External] Bowen Breakwater Wave Parameters

NR

Thanks for the report. I have one question regarding table 3.2. The report states that the wave height shown in 3.2 is the maximum of the events shown in table 3.1. For the 100 year event, the table 2 value at B81 is 1.3m but the corresponding heights in table 3.1 are all larger than this. Also the table 3.2 height for the 200 year event is marginally larger than the corresponding table 3.1 wave heights.

Can you check these tables?

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000 GPO Box 1549 | Brisbane City Qld 4001

P: (07) 30664021 | F: (07) 30668305

M: NR

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From Not Relevant @bmtglobal.com]

Sent: Tuesday, 23 October 2018 9:42 AM

To: Trevor B Carter < <u>Trevor.B.Carter@tmr.qld.gov.au</u>>

Cc Not Relevant @smec.com>; Charles-Dean A Sorbello <<u>Charles-</u>

Dean.A.Sorbello@tmr.gld.gov.au>

Subject: RE: [External] Bowen Breakwater Wave Parameters

Hi Trevor,

Please find attached the Bowen breakwater Metocean criteria draft technical note for review by TMR and SMEC.

Let me know if there are any questions arising. I'd be happy to join in a telecon or discuss directly with Tim from SMEC if this is easiest.

Best Regards,

t negards, NR

Not Relevant

Principal Engineer

Team Leader Coastal & Metocean

Tel: +61 (0) 7 3831 6744 Fax: +61 (0) 7 3832 3627 Web: <u>www.bmt.org</u>



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BMT's Brisbarie River Catchment Flood Study wins Prestigious Engineering Excellence

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From: Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au >

Sent: Tuesday, 2 October 2018 09:31 AM

To: Not Relevant @bmtglobal.com>

Cc: Not Relevant @smec.com>; Charles-Dean A Sorbello < Charles-

<u>Dean.A.Sorbello@tmr.qld.gov.au</u>>

Subject: [External] Bowen Breakwater Wave Parameters

NR

We had discussions on Friday with SMEC who are designing the breakwaters for Bowen. They would like

you to ascertain the design conditions for the 1 in 1, 1 in 2, 1 in 5, 1 in 50, 1 in 100 and 1 in 200 year events. The main reason for the higher frequency events relates to the frequency of overtopping with respect to the safety of the pathway we're installing on top of the western breakwater. SMEC have also asked if you could determine the design parameters at the 6 points indicated on the attachment. These points are nominally at the tip, $\frac{1}{2}$ of the length and $\frac{1}{2}$ of the length. Let me know if there are any increased costs for this work.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4001 P: <u>(07) 30664021 | F: (</u>07) 30668305

VI: Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

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Document	M.B23407	7.001.01.Metocean.docx	
Title	Bowen Ha	arbour Breakwater Metocean Criteria	
Client	Departme	nt of Transport and Main Roads	
Revision Number	1		
Date	26 th Octob	per 2018	
Issued by	IAT		
Checked by	MJA	Not Relevant	

BMT Eastern Australia Pty Ltd Level 8, 200 Creek Street Brisbane Qld 4000 Australia PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744 Fax: +61 7 3832 3627

ABN 54 010 830 421

www.bmtwbm.com.au

Technical Note

BOWEN HARBOUR BREAKWATER METOCEAN CRITERIA

1 Introduction

BMT have been commissioned by the Queensland Department of Transport and Main Roads (TMR) to develop wave and water level design criteria for the Bowen Breakwater Design Project. The metocean criteria, which span 1 year to 200 year Average Recurrence Intervals (ARI), will be used by TMR's appointed consultants to design eastern and western breakwater extensions as shown in Figure 1-1.

Bowen Boat Harbour is located at the mouth of Magazine Creek in Bowen, Queensland. As a State Boat Harbour, Bowen Boat Harbour is owned and managed by TMR. In this role, TMR provide maintenance of the boat harbour and associated infrastructure, including navigation channels and wave attenuation infrastructure (e.g. breakwaters). The harbour is located at the north-western extent of Edgecumbe Bay and due to its location and orientation experiences a relatively sheltered wave climate. The Edgecumbe Bay bathymetry is relatively shallow near Bowen boat harbour, and a 400 m long approach channel with a 30 m width and depth of approximately 2.5 m LAT has been dredged to provide access to the facility.

A tide gauge has been located at Bowen jetty since 1975. Tidal planes for Bowen are published by Maritime Safety Queensland (MSQ, 2017) and are reproduced in Table 1-1. The Project brief specifies that the design working life of the new breakwaters is 50 years and that design water levels and waves should account for a 0.3 m Sea Level Rise.

Fable 1-1 Contemporary Bowen tidal planes (MSQ, 2017)

Tidal Plane	Level m LAT	Level m AHD
HAT	3.73	1.95
MHWS	2.83	1.05
MHWN	2.21	0.43
AHD	1.78	0.00
MSL	1.76	-0.02
MLWN	1.31	-0.47
MLWS	0.67	-1.11
LAT	0.00	-1.78

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The town of Bowen is located in an active Tropical Cyclone (TC) region and consequently design water levels and waves will be driven by a combination of TC and non-TC extreme events. The Bowen Water Hazards Study (BWHS) was commissioned in 2017 by Whitsunday Regional Council (WRC) to inform its coastal hazard adaptation planning.

The BWHS technical study (BMT, 2018) included the statistical analysis of the historical TCs that have impacted the region and the development of a detailed numerical modelling system to predict tropical cyclone generated surge and wave conditions along the WRC coastline. The study derived surge plus tide water levels for the 5, 10, 50, 100, 200, 500, 1000, 2000, 5000 and 10000 year Average Recurrence Interval (ARI) events, considering the combined influence of both TC and non-TC events. TC event driven wave conditions were also derived for the 100, 200, 500, 1000, 2000, 5000 and 10000 year ARI events.

The BWHS reporting locations in the vicinity of Bowen Boat Harbour are shown in Figure 1-2. As part of the Bowen breakwater project, refined SWAN wave modelling has been undertaken to transfer the 100 and 200 year ARI criteria to the six (6) breakwater reporting locations shown in Figure 1-1.

Non-cyclonic extreme wave conditions have been separately assessed as part of the current study. SWAN wave modelling has been used to translate the derived wind conditions into wave parameters at the study reporting locations.

1.1 Frames of Reference

- Units are expressed using the SI (Système International d'unités) convention unless otherwise stated.
- Wave and Wind direction is expressed as FROM which the wind and waves are approaching and in nautical degrees, i.e. degrees relative to true north (°T), positive clockwise.
- Directional analyses within this report are divided into 8 equal 45° sectors centred on the cardinal points of the compass (e.g. North 337.5°T 22.5°T).

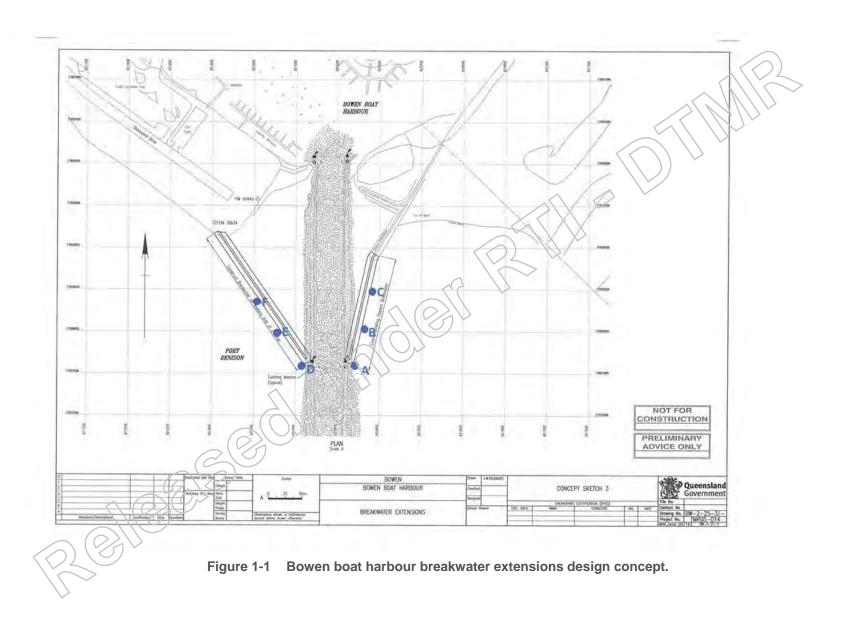




Figure 1-2 BWHS reporting locations near Bowen boat harbour.

2 Non-TC Extremes

2.1 Water Level

Non-cyclonic water level return period statistics were derived as part of the BWHS via application of a Tide and Residual Recombination Model (TRRM – refer BMT 2018). This method is based on the resampling of the tidal residual event record from suitably long and reliable tide gauge records, in this case the 30-year Bowen tidal station dataset from 1986 to 2017 (data courtesy of Tidal Unit of Maritime Safety Queensland, Department of Science, Information Technology and Innovation). To events were filtered from the water level dataset prior to undertaking the TRRM analysis.

The contemporary (2017) non-TC water level extremes from the BWHS are reproduced in Table 2-1. The 1-year and 200-year ARI water levels were not included in the BWHS reporting and have been added here.

ARI (years)	Water Level (m AHD)
1	1.87
5	1.93
10	1.97
50	2.07
100	2.10
200	2.14

Table 2-1 Non-TC water level extremes (not including SLR)

2.2 Wind

Extreme non-TC wind speeds were derived as part of this study to provide the basis for estimating non-TC wave conditions. Two wind datasets were reviewed as part of this study; Bowen Airport measurements and the National Center for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR).

Wind measurements at Bowen Airport (-20.0154°, 148.2138°) have been conducted routinely by the Commonwealth Bureau of Meteorology (BOM) since 1987. The frequency of these measurements was initially twice-daily (9am and 3pm) before being upgraded to 3-hourly during daylight periods and finally automated (to 10-minute frequency) in 2015.

The NCEP CFSR (v2) has been run for a 38-year period from 1979 to near-present and provides a wind dataset with 1-hourly frequency. CFSRv2 data was extracted for an offshore grid-point located about 10 km north-east of Bowen (-19.932 °, 148.295 °). Following a review of both datasets, the CFSRv2 was adopted as providing the most suitable basis for this study. TC-events were filtered from the wind dataset prior to undertaking the extreme value analysis.

A directional windspeed extreme analysis was performed using BMT's 'Exceedence Duration Analysis' (EDA) method. The Weibull distribution is used as a model in the EDA method for the tails of distribution functions of wind speed. BMT's directional extreme value analysis uses a modification of the approach set out by Forristall (2004)¹.

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¹ Forristall G.Z., 2004. "On the use of directional wave criteria", Journal of Waterway, Port, Coastal and Ocean Engineering.

The non-TC directional extreme wind speeds (10 m elevation, 1 hour average) are summarised in Table 2-2 and illustrated in Figure 2-1. The highest wind speeds are from the SE sector (112.5 – 157.5 degrees).

Table 2-2 Non-TC wind speeds (m/s, 10 m elevation, 1 hour average)

Directional			ARI	(years)		
sector (degrees)	1	5	10	50	100	200
337.5 - 22.5	10.3	12.4	13.3	15.7	16.8	17.9
22.5 - 67.5	8.7	11.3	12.5	15.1	16.3	<u>1</u> 7.5
67.5 - 112.5	12.3	14.9	15.9	18.2	19.1	20.0
112.5 - 157.5	14.6	17.4	18.5	20.8	21.8	22.7
157.5 - 202.5	10.2	12.0	12.8	14.7	15.5	16.3
202.5 - 247.5	8.5	9.6	10.1	11.1	11.6	12.0
247.5 - 292.5	6.3	8.2	8.8	9.8	10.1	10.5
292.5 - 337.5	9.7	11.4	12.2	14.2	/> 15.1	16.0
omni	14.6	17.4	18.5	20.8	21.8	22.7

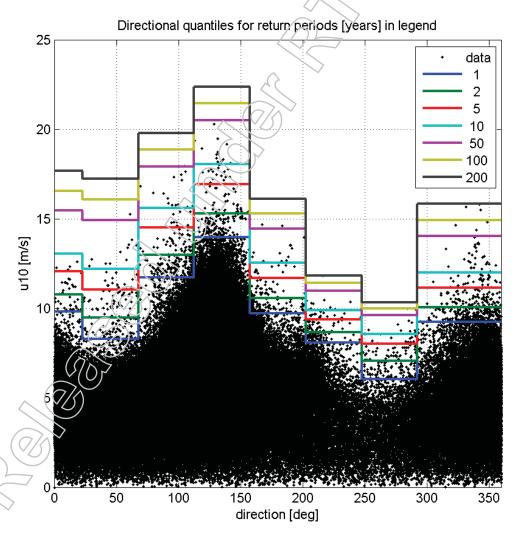


Figure 2-1 Non-TC directional wind speed quantiles

2.3 Waves

Non-TC extreme waves were predicted by applying the derived wind speeds (Section 2.2) to the SWAN wave model developed for the BWHS (BMT 2018). The BWHS SWAN model grid resolution was 250 m within Edgecumbe Bay, which was not sufficiently refined for the Bowen breakwater project. For the Bowen harbour breakwater assessment higher resolution nested SWAN grids (60 m and 20 m) were developed to translate the waves into the breakwater reporting locations.

The SWAN model was used to run stationary simulations to calculate fully-developed wave fields within Edgecumbe Bay for the non-TC wind extremes. The critical wind direction for generating the highest wave heights at Bowen harbour was 140°.

Due to the relatively shallow bathymetry offshore of Bowen harbour the wave conditions at the breakwater reporting locations are sensitive to water level assumptions. The current study has not developed a concurrent hindcast of water levels and waves and therefore has not been able to derive joint probability statistics for these variables. However, a sensitivity approach has been applied whereby non-TC wave conditions have been derived for both a MHWS water level and also for the water level extremes reported in Table 2-1 plus a 0.3 m SLR allowance.

The non-TC significant wave height (Hs) and peak period (Tp) for the MHWS water level conditions are provided in Table 2-3. The associated peak period has been derived at the offshore point B81 but this result is also applicable at the breakwater locations. The corresponding results for the extreme water level assumption including SLR are provided in Table 2-4.

The results have been provided for three (3) reporting locations along each of the two proposed breakwater alignments (Figure 1-1). Locations A and D correspond to the eastern and western breakwater heads respectively, while the remaining points are located further inshore. It is notable that the breakwater head wave heights are marginally lower than the inshore reporting points. The spatial distribution of wave heights is discussed further in Section 3.5.

Water **ARI** Hs (m) Level Tp(s) (years) (m AHD) **B81** В C D 1.05 0.72 0.57 0.58 0.59 0.53 0.55 0.56 4.1 2 1.05 0.78 Ø.62 0.63 0.64 0.57 0.60 0.61 4.3 0.89 5 1.05 0.69 0.71 0.71 0.64 0.67 0.69 4.4 10 1.05 0.95 0.74 0.75 0.75 0.68 0.72 0.74 4.5 1.05 1.09 0.83 0.83 0.82 0.77 0.83 0.84 4.7 50 1.15 100 1.05 0.87 0.87 0.84 0.81 0.87 0.89 4.8 1.05 200 1.21 0.84 0.90 0.89 0.86 0.91 0.92 4.9

Table 2-3 Non-TC wave conditions, assuming MHWS water level

Table 2-4 Non-TC wave conditions, assuming extreme water levels

ARI	Water Level				Hs (m)				Tp (s)
(years)	(m AHD)	B81	Α	В	С	D	Е	F	
1	2.17	0.74	0.62	0.63	0.64	0.59	0.60	0.60	4.1
2	2.20	0.82	0.69	0.69	0.70	0.65	0.66	0.66	4.3
5	2.26	0.93	0.77	0.79	0.79	0.72	0.74	0.75	4.6
10	2.30	1.00	0.83	0.84	0.86	0.77	0.79	0.80	4.6
50	2.40	1.17	0.96	0.98	1.00	0.89	0.92	0.94	4.9
100	2.44	1.24	1.02	1.04	1.06	0.94	0.98	7.00	5.1
200	2.53	1.30	1.07	1.10	1.11	0.99	1.03	1.05	5.1

• Water level includes 0.3 m SLR allowance.



3 TC Extremes

3.1 BWHS Methodology

The TC extremes are based on the BWHS (BMT 2018). The BWHS undertook analyses using the SEAsim model, which is a variant of the real-time storm tide forecasting model SEAtide (SEA 2016) currently utilised by the Bureau of Meteorology (BoM) in Queensland and the Northern territory and also the Queensland State Government. SEAtide is a further development of BoM-sponsored parametric tropical cyclone (TC) storm surge model development following the Queensland Climate Change Study initiative (e.g. Harper 2001; SEA 2002).

SEAsim simulates the long-term statistical storm tide response across many coastal locations. It achieves this by coupling with an Australia-wide synthetic climatology of TCs (Harper and Mason 2016). SEAsim utilises a synthetic TC climatology founded on a 'double Holland' wind profile that has produced well-verified extreme winds speeds across Australia (refer Harper and Mason 2016). Figure 2-2 shows a comparison between historical TC tracks for Australia and an equivalent period of the synthetic tracks.

The SEAsim model was used to generate surge plus tide timeseries for synthetic TC events encountered during a 50,000 year simulation period. The simulated events were ranked and those above a threshold approximating the 1 in 100 year storm tide event were subsequently modelled using detailed deterministic hydrodynamic and wave models, which had been separately calibrated against historic event datasets. The BWHS nearshore reporting locations near Bowen harbour were shown in Figure 1-2, with B81 the closest location to the Bowen harbour entrance.

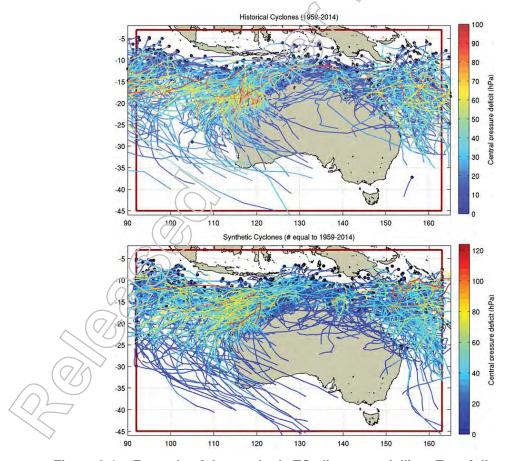


Figure 3-1 Example of the synthetic TC climate modelling; Top: full sample of the BoM historical tracks and intensities; Bottom: equivalent year sample extract from the synthetically generated dataset. The colour scale is intensity in MSL central pressure deficit.

3.2 SWAN Modelling

Higher resolution nested SWAN modelling has been undertaken for the Bowen breakwater project to translate the BWHS TC event wave conditions to the breakwater reporting locations (Figure 1-1).

Prior to undertaking the higher resolution modelling BWHS synthetic events were ranked by Hs at reporting location B81. For each of the 100 and 200 year ARIs, five (5) synthetic TC events were selected and modelled. An intermediate nest (60 m resolution) SWAN model provided boundary conditions to a high-resolution (20 m) model. The reporting in this technical note is from the 20 m resolution model.

3.3 Associated Water Levels

As part of the BWHS water level statistics were derived from the synthetic events representing 50,000 years of Tropical Cyclone activity. These TC 'surge plus tide' water level statistics were subsequently combined with non-TC water level statistics (BMT 2017).

For the Bowen breakwater project, the design parameters of primary interest are the wave height and the peak water levels associated with these wave conditions. Table 3-1 summarises the synthetic event subset Hs and associated event peak water levels (at reporting location B81). Also shown are the BWHS independent ARI water levels. These results suggest that the assumption of using the independent ARI water level is reasonable in the context of TC events in Bowen.

The refined SWAN modelling was therefore undertaken using the independent ARI water level, plus a 0.3 m SLR allowance. This simplifying assumption is likely to be only slightly conservative in this context.

Table 3-1 Simulated BWHS synthetic event Hs and associated peak water level. The independent water level ARI is provided for comparison.

BWHS Synthetic Events	Peak Hs	Associated peak water level (m AHD)	Independent ARI water level (m AHD)
100 year ARI wave e	vents		
SYN_54184	1.38	1.69	2.14
SYN_62065	1.40	2.18	
SYN_1015769	1.38	1.18	
SYN_2021024	1.41	2.24	
SYN_4042595	1.41	2.29	
200 year ARI wave e	vents		
SYN_18864	1.72	1.89	2.23
SYN_1026793	1.73	2.07	
SYN_1011394	1.72	2.03	
SYN_1017234	1.72	2.13	
SYN_1013536	1.73	2.63	

3.4 Wave Height and Period

The maximum significant wave height (across all five ARI events) at the Bowen breakwater reporting points is summarised in Table 3-2. The spatial distribution of wave heights is discussed further in Section 3.5.

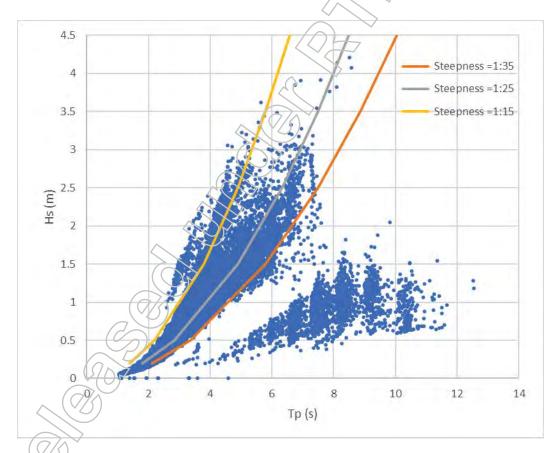
A scatter plot of wave period versus significant wave height compiled from all BWHS synthetic event timesteps is also shown in Figure 3-2. This figure includes all events, including those which ranked higher than a 200 year ARI. A second band of higher peak-energy wave periods (up to 12.5 s) is seen in this plot but is generally associated with lower wave heights at B81.

Using this output as a guide it is suggested that a wave steepness of around 1 in 30 would be a reasonable estimate of peak wave period for design conditions greater than or equal to the 100 year ARI. This corresponds to wave periods of 5.2 and 5.8 s for the 100 and 200 year ARIs respectively.

Water **ARI** Hs (m) Level Tp (s) C (years) (m AHD) **B81** 100 2.44 1.42 1.17 1.21 1.23 1.06 1.10 1.13 5.2 1.43 200 2.53 1.76 1.48 1.50 1.49 1.35 1.46 5.8

Table 3-2 TC wave conditions, assuming independent extreme water levels

- Water level includes 0.3 m SLR allowance.
- Reported Hs is maximum from ensemble of 5 events simulated for each ARI.
- Tp is based on a wave steepness of 1 in 30 (refer Figure 3-2).



序igure 3-2 Wave height vs period scatter plot (data from BWHS, location B81)

3.5 Spatial Variation

The results have been provided for three (3) reporting locations along each of the two proposed breakwater alignments (Figure 1-1). Locations A and D correspond to the eastern and western

breakwater heads respectively, while the remaining points are located further inshore. It is notable that the breakwater head wave heights are marginally lower than the inshore reporting points.

The spatial distribution of wave height and direction for the critical 200 year ARI wave event is shown in Figure 3-3. The influence of offshore bathymetry in refracting and focussing wave energy is apparent in the vicinity of the BWHS (B81) reporting location. Furthermore, the influence of the harbour entrance channel in refracting wave energy is apparent in the vicinity of the breakwater reporting locations. Higher wave heights are predicted on both the eastern and western flanks of the entrance channel. The variation in predicted wave heights between the six breakwater reporting locations is largely a result of the predicted wave focussing behaviour.

Some caution should be applied when interpreting a phase-averaged spectral wave model (such as SWAN) where results are being influenced by bathymetric variations much shorter than a wavelength. The Bowen harbour entrance channel is currently 30 m wide and the channel edge batters occur over an even shorter distance, while wave lengths under design conditions are around 50 m (1:30 wave steepness). This potential limitation in the model underlying physics is not related to the grid resolution and can be exacerbated by adopting a very fine grid resolution.

In the absence of undertaking a more detailed investigation with a phase-resolving wave model (e.g. Boussinesq or non-hydrostatic shallow water model) it is recommended that the upper bound wave heights from the SWAN modelling are used in limit state breakwater design.

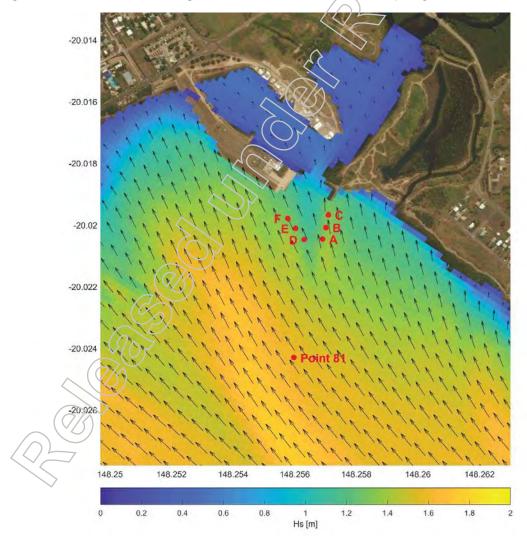


Figure 3-3 Modelled wave field for the critical 200 year ARI event, showing reporting locations.

4 Summary

The recommended wave and water level conditions for design of the Bowen breakwater project are summarised in Table 4-1 below.

Table 4-1 Bowen Harbour Breakwater Design Condition Summary

Return Period (years)	Water Level (m AHD)	Hs (m)	Peak Wave Period (s)
1	2.17	0.64	4.1
5	2.20	0.70	4.3
10	2.26	0.79	4.5
20	2.30	0.86	4.6
50	2.40	1.00	4.8
100	2.44	1.23	5.2
200	2.53	1.50	5.8/

- · Water level includes 0.3 m SLR allowance.
- Summary Hs is maximum of both non-TC and TC conditions and is maximum of all breakwater reporting locations (refer Section 3.5)



5 Qualifications

BMT Eastern Australia Pty Ltd (BMT) has prepared this document for the Queensland Department of Transport and Main Roads and specifically to provide design wave estimates for detailed design of the Bowen breakwater project.

Our analysis and overall approach has been specifically designed for the requirements of the Bowen breakwater project, and may not be applicable beyond this scope.

BMT has relied on the following information supplied by others:

- Bathymetric data from multiple sources;
- Wind data from the Commonwealth Bureau of Meteorology;
- Global wind and wave model data sourced from NOAA;
- Bowen storm tide gauge data supplied by DSITI; and
- Bowen Breakwaters concept layout as shown in Figure 1-1.

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6 References

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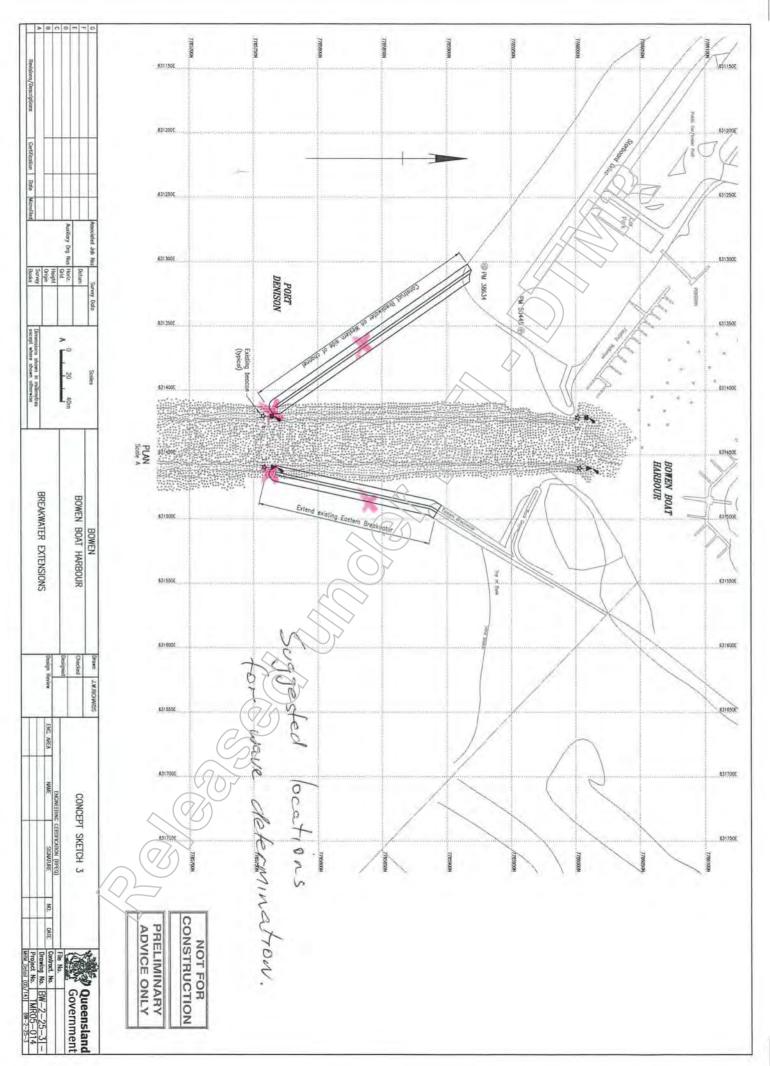
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SEA (2016) SEAtide V3.2 user guide (Qld-Gulf). Feb, 76pp.

TMR (2018). Consultants Brief for PMD83/17 – Extension of Breakwaters at Bowen Harbour. End of Document **BMT** October 2018



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Charles-Dean A Sorbello

From: @smec.com>
Sent: Tuesday, 30 October 2018 12:16 PM

To: Trevor B Carter

Cc: Charles-Dean A Sorbello

Subject: Queries - Bowen Harbour Breakwater Extensions **Attachments:** 2018-10-30 TJC Channel Batter Sketch.pdf

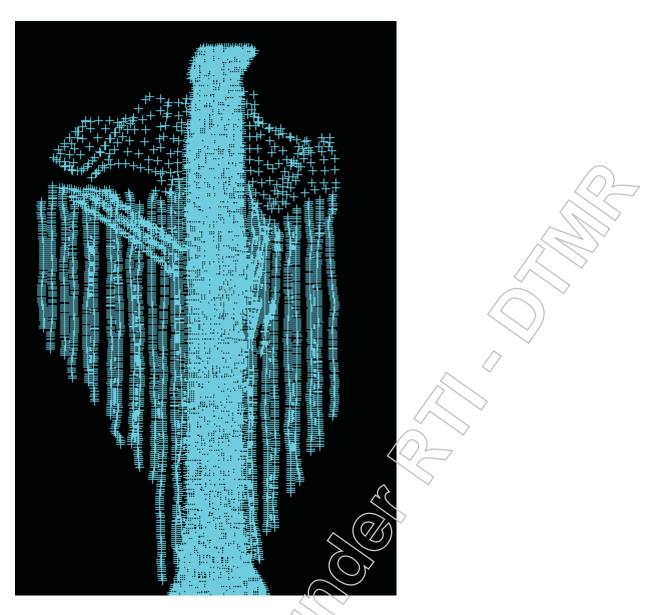
Good afternoon Trevor,

As part of our assembly of the design basis criteria, we've started looking at the supplied survey xyz data in 12d modelling software. We have imported the survey data and also the TMR Concept 3 CAD drawing of the proposed alignment of the breakwaters.

I have a couple of questions, the 3D image snips generated by SMEC In 12d have been inserted below each question:

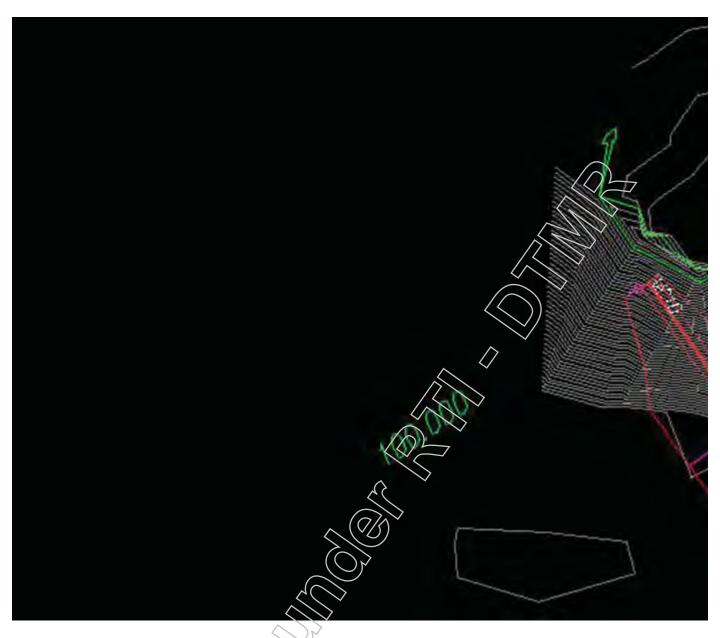
1. Does TMR have an existing survey digital terrain model (DTM) already assembled in AutoCAD 3D or 12d format? As can be seen below the XYZ data isn't triangulating properly, we can fix this within the model, but it will take time. So, if TMR has already done this work of importing the points into a triangulated model, it will save time.





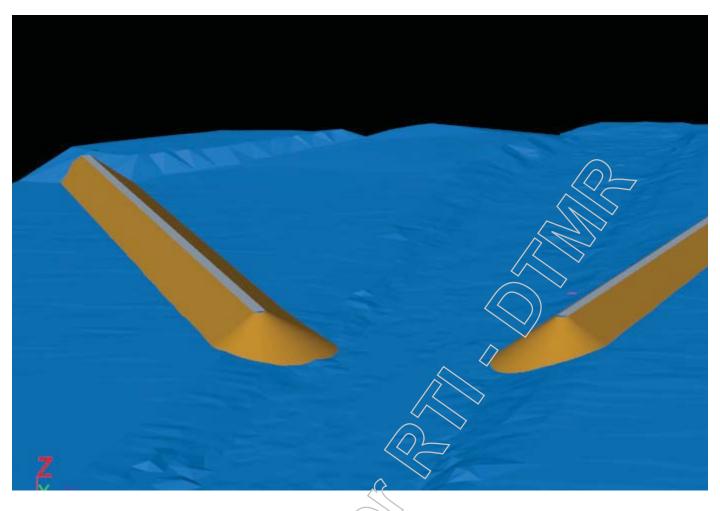
2. The western breakwater doesn't tie-in exactly at the corner of the Starboard Drive seawall, would you like us to realign the alignment of this breakwater trunk so that it ties in with this corner of the seawall?





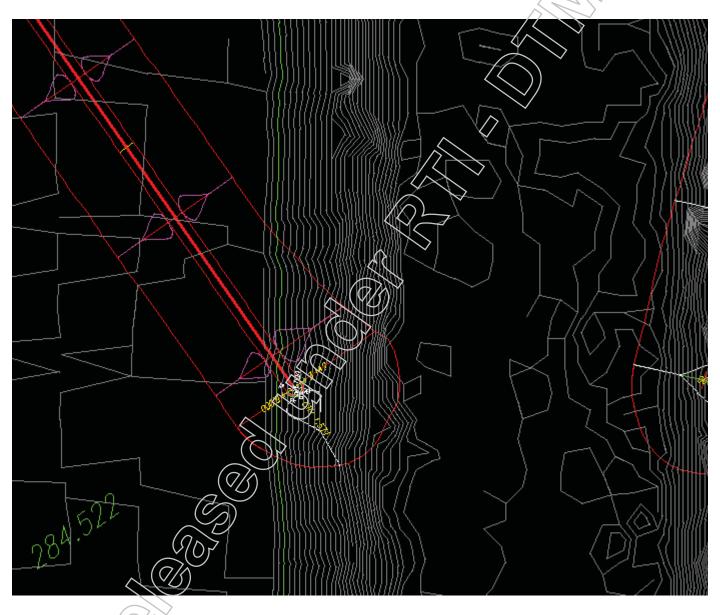
3. If following the TMR concept plan lay-out precisely, both breakwater heads are too far into the dredged channel, the alignment of each breakwater will need to change slightly so that the breakwater heads can be moved away from the channel.





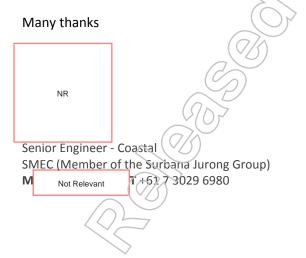


4. SMEC acknowledge that it was a requirement in the Consultancy Design Brief to try to keep the gap between the breakwater heads as narrow as possible, by terminating the toe of each breakwater head 5.0 m from the bottom toe of the dredged channel batter slope. Part of each breakwater slope will then need to be built on the slope of the dredged batter. This introduces a risk of armour rocks rolling into the dredged channel during construction and also it is possible that rocks may roll down the channel batter slope during the operational life of the structure, unless the dredged batter is excavated and the toe rocks are "keyed into" the dredged slope. Excavation of seabed during the works may be seen by the regulators as "dredging activities". Are we able to adjust the alignment slightly and move the breakwaters away from the dredged batter, to prevent this risk of rocks entering the dredged channel? I have also attached a hand sketch of this issue, for further discussion.





Do you have a few minutes this afternoon to run through these queries on the telephone?



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Charles-Dean A Sorbello

www.smec.com | Linkedin

From: @smec.com> Sent: Friday, 9 November 2018 3:39 PM Trevor B Carter To: Charles-Dean A Sorbello Cc: **Subject:** TMR - Bowen Harbour Breakwater Extensions - Approvals Register Report **Attachments:** 30032293-ENV-0001 ApprovalsRegisterReport_BowenHarbour_Final.pdf Hi Trevor, Please find attached our Approvals Register Report. I'd like to arrange a teleconference or meeting with yourself and your TMR environmental approvals specialist for mid-next week if they are available, to discuss the contents of this report. Can you please forward the name and contact details of the TMR Environmental Officer who is covering for Tonia Richard Not Relevant Many thanks NR Senior Engineer - Coastal T+61 7 3029 6980 M @smec.com **Local People, Global Experience** SMEC (Member of the Surbana Jurong Group) Level 6, 480 St Pauls Tce, Fortitude Valley, QLD, 4006, Australia

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Revision Number:	01				

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REVISION NO.	DATE	
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Signature:

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ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

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Roads (TMR)

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Environmental Planning and Statutory Requirements Register

1.1 Introduction

The Department of Transport and Main Roads (TMR) are seeking to increase the tranquillity within Bowen Harbour by reducing the incoming wave energy which propagates through the harbour's entrance from a range of southerly directions. TMR aims to do this by constructing a new rubble mound breakwater structure on the western side of the established dredged navigation access channel, and extending the existing rubble mound breakwater structure on the eastern side of this channel.

A summary of the potential federal, state and local government environmental planning and statutory requirements pertaining to the proposed breakwater construction works at Bowen Harbour, is provided below in **Table 1**. The environmental values of the project area have been identified through desktop investigation and site walkover. Planning and statutory requirements have been identified based on the design footprint in Concept Sketch 3' (BW-2-25-31) (TMR) (see **Appendix A**).

1.2 Method

A desktop assessment of the project area was undertaken using existing reports, publicly available databases and mapping. Data sources included:

- Department of State Development, Manufacturing, Infrastructure and Pianning (DSDMIP) Development Assessment Mapping System
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (PMST)
- Department of Environment and Science (DES) Wildlife Online database search
- DES Protected Plants Flora Trigger Mapping
- Department of Natural Resources, Mines and Energy (DNRME) online mapping and historical imagery (QImagery)
- CSIRO ASRIS mapping
- Queensland Globe data
- Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) cultural heritage database
- Queensland Heritage Register
- Whitsunday Regional Council Planning Scheme 2017.

Searches were conducted using a 1 km radius from the following coordinates central to the site: -20.0195, 148.2566. The resulting search results are located in **Appendix B**.

1.3 Potential Approvals

The nature and extent of works was assessed against the context of the project area and results from the desktop assessment. This assessment resulted in the identification of potential statutory approval, offset and legislative notification requirements including:

- Significant impact assessment against the Significant Impact Guidelines 1.1 (DoEE, 2013) for potential impacts to a World Heritage Property and National Heritage Place
- Operational works permit for Tidal Works or works within a Coastal Management District (CMD)
- Operational works permit for the removal, destruction or damage of marine plants
- Environmental offsets for clearing of marine plants
- Native title notification.

Pre-lodgement advice should be sought from relevant statutory authorities to confirm requirements for the above operational works permits. If the scope of works or project area changes, this register should be revised and updated to reflect these changes.

Table 1: Environmental Planning and Statutory Requirements Register

APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE		
Commonwealth Legislation	Commonwealth Legislation					
Referral under the Environment Protection and Biodiversity Conservation Act 1999 and, if a "controlled action", approval from the Minister	Significant impact assessment recommended	Environment Protection and Biodiversity Conservation Act 1999	Significant impact on Matters of National Environmental Significance (MNES) including: • nationally threatened species and ecological communities • migratory species protected under international agreements including JAMBA and CAMBA • World Heritage Properties • National Heritage Places.	Due to the small project footprint and minimal vegetation clearing required, it is considered unlikely that the project will result in a significant impact on any threatened or migratory species and communities. The project area occurs within the boundary of a World Heritage Property and National Heritage Place (Great Barrier Reef) (see Appendix B). Therefore, a significant impact assessment for the proposed works is recommended using the Significant Impact Guidelines 1.1 (DoEE, 2013) as guidance. Note that the Federal Heritage Great Barrier Reef Boundary differs from the QLD State Great Barrier Reef Marine Park Boundary, in that the Federal Boundary includes the coastline around the Bowen Foreshore of Port Denison and the footprint of the TMR Bowen Boat Harbour dredged navigation access channel.		
State Legislation						
Marine Parks Permit	No permit required	Marine Parks Act 2004	 Permits may be required for: most tourism activities and commercial whale watching construction of jetties and pontoons installation and operation of structures, including moorings any work such as repairs to structures dredging and dumping waste discharge from a fixed structure 	The project area does not occur in a marine park protected under this Act.		

ENVIRONMENTAL PLANNING AND STATUTORY
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Bowen Harbour Breakwater
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APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
			 anchoring and mooring for an extended period education programs research collecting traditional hunting. 	
Operational works permit for works Tidal Works or works within a Coastal Management District (CMD)	Permit required	Coastal Protection and Management Act 1995	Tidal Works or works completely or partially within a CMD	The project is the construction of two new breakwaters at the entrance of Bowen Harbour. Breakwaters are considered tidal works under the Coastal Protection and Management Act 1995.
Operational works permit for the removal, destruction or damage of marine plants	Permit required	Fisheries Act 1994	For removal, destruction or damage of marine plants	Marine plant species (seagrasses) have been identified within and adjacent to the project area in 2014 by BMT WBM and confirmed again in 2018 by SMEC. The works will result in the removal of an area of these marine plants.
Riverine Protection Permit	No permit required	Water Act 2000	Excavating; placing fill; or destroying native vegetation in any watercourse, lake or spring	Not applicable. Works are within a tidal environment.
Water license	No license required	Water Act 2000	Taking or interfering with water in a watercourse as identified under the <i>Water Act</i> 2000	Not applicable. Works are within a tidal environment. If water is required to be taken from surrounding fresh water bodies the works should comply with the minimum requirements outlined in the 'Exemption requirements for constructing authorities for the take of water without a water entitlement' (WSS/2013/666) (DNRME, 2017).
Operational works permit for constructing or raising a waterway barrier	No permit required	Fisheries Act 1994	Constructing or raising a waterway barrier within a Department of Agriculture and Fisheries (DAF) identified waterway	The project area is located in a mapped tidal waterway. Concept design has been assessed and the current design does not create a barrier to fish passage. Following completion of the 50% design, the design's potential to create a barrier for fish passage will reassessed.

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER
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APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
Species Management Program (SMP) for Least Concern Fauna SMP for Endangered, Vulnerable or Near Threatened (EVNT), special least concern or colonial breeders.	No SMP required	Nature Conservation Act 1992 (NC Act)	Tampering with the breeding place of protected animals that are classified as extinct in the wild, EVNT, special least concern, colonial breeder, or least concern	EVNT, special least concern, colonial breeder and least concern species have been recorded within a 1 km radius of the project area as per NC Act 'Wildlife Online and ERBC Act 'Protected Matters' searches completed on 19 October 2018. The works are within a marine environment and will not impact on any animal breeding places. An SMP will not be required for the works.
Protected plants clearing permit	No permit required	Nature Conservation Act 1992	Clearing of EVNT flora	The project area does not intersect a high risk area for protected plants as per the Flora Survey Trigger Mapping. Therefore, a flora survey in accordance with the NC Act protected plant survey guidelines and subsequent clearing permit will not be required.
Operational works permit for clearing regulated vegetation	No permit required	Vegetation Management Act 1999	Clearing regulated vegetation	No vegetation regulated by the <i>Vegetation Management Act 1999</i> occurs within the project area.
Clearing Koala Habitat	No requirements	Planning Act 2016	Clearing South-East Queensland koala habitat	No koala habitat occurs within the project area.
Clearing Koala Habitat	No environmental offset required	Environmental Offset Act 2014	Clearing South-East Queensland koala habitat	No koala habitat occurs within the project area.
Environmental Offset	Environmental offsets may be required	Environmental Offset Act 2014	Provision of an environmental offset for a significant residual impact upon a matter of state environmental significance (MSES)	Marine plants occur within and adjacent to the project area. The works may have an impact on this MSES. The requirement for environmental offsets should be reviewed during preparation of the relevant development application.
Disposal permit for contaminated soil	No Disposal Permit required	Environmental Protection Act 1994	Movement or disposal of contaminated soil from an allotment listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).	The project area occurs over freehold lot 310 SP198022 and state coastal land. If excavation is required during construction to provide localised stability to the breakwater in the

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APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
				dredged channel batters, this excavation will be minor and excavated material will be reused as fill material within the breakwater. Therefore excavated material will not require disposal offsite. If the proposed scope of works changes, and excavation and disposal of material from within the project area becomes necessary to facilitate construction, a search of the EMR/CLR for lot 310 SP198022 should be completed prior to disposal of material from this lot offsite.
Management of invasive pests	No approval required	Biosecurity Act 2014	Pest weed and animal management during construction	Construction works will be required to comply with the General Biosecurity obligation under the <i>Biosecurity Act 2014</i> for management of invasive pests at the site.
Cultural Heritage Management Plan (CHMP)	No approval or CHMP required	Aboriginal Cultural Heritage Act 2003	Impacting on items or places of cultural heritage significance	The proposed works are a Category 4 under the Aboriginal Cultural Heritage Act 2003 Cultural Heritage Duty of Care Guidelines. New works will be conducted in an area that has been previously subject to ground disturbance. In addition, no ground disturbing activities will be undertaken as part of the works. Disturbance to an item of cultural heritage significance is therefore unlikely. A search of the Aboriginal and Torres Strait Islander Cultural Heritage Database and register found no items or places of cultural heritage significance within the project area.
Operational works permit for development on a Queensland Heritage Place	No approval required	Queensland Heritage Act 1992	Impacting on a place of heritage significance under the <i>Queensland Heritage Act 1992</i>	There are no places of heritage significance under the <i>Queensland Heritage Act 1992</i> within the project area.

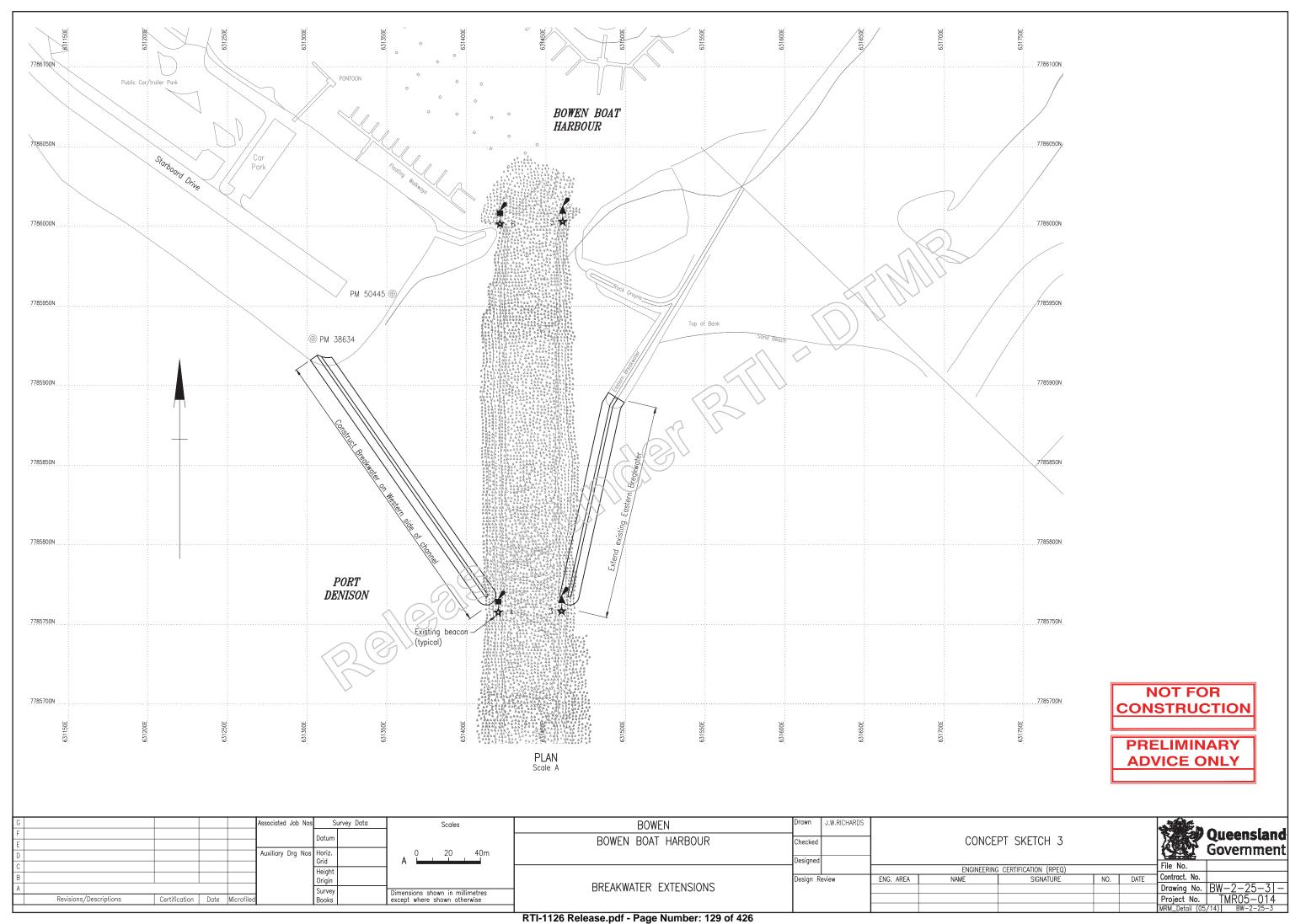
ENVIRONMENTAL PLANNING AND STATUTORY
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APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
Native Title	Native title notification	Native Title (Queensland) Act 1993	Impacting on land subject to a native title claim	A native title determination exists over parts of the project area for the 'Juru People (Part A)' (Tribunal No. QCD2014/014). The project area is a combination of freehold and unallocated state land. Native title is extinguished over freehold land dedicated before 1993. The southern section of the project area is coastal land (unallocated state land). The proposed works meet the definition of 'Facilities for services to the public' Under s.24KA of the <i>Native Title Act 1993</i> . In accordance with the requirements of s.24KA, notification of the works should be provided to the relevant native title parties. Should the project area or works change, native title requirements should be re-assessed.

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Appendix A: Design Drawings





Appendix B: Desktop Searches



Figure 1 Federal Government Protected Matters Search Tool - note foreshore of Bowen/Port Denison is included within Great Barrier Reef National Heritage Places Boundary footprint

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER

Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

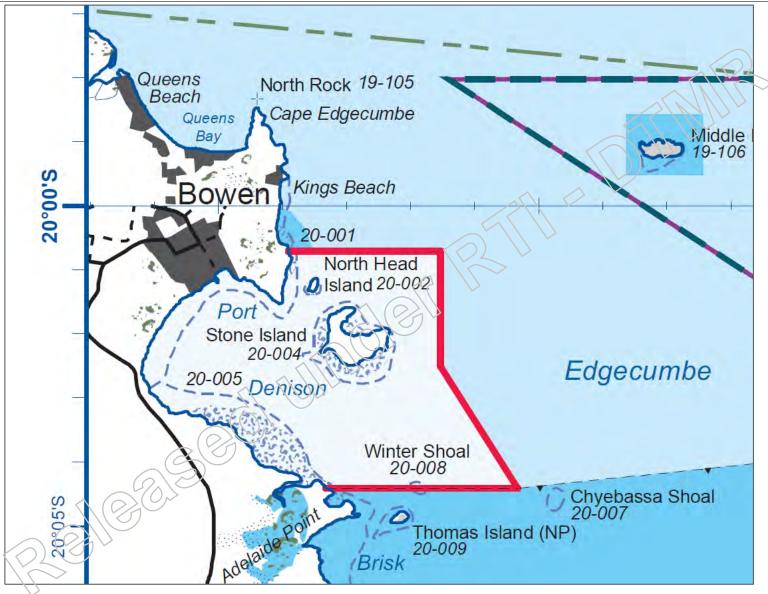


Figure 2 Great Barrier Reef Marine Parks Zoning MAP 10 - Whitsunday. Note Port Denison, Bowen Foreshore and Bowen Boat Harbour are outside of Marine Park Boundary footprint.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

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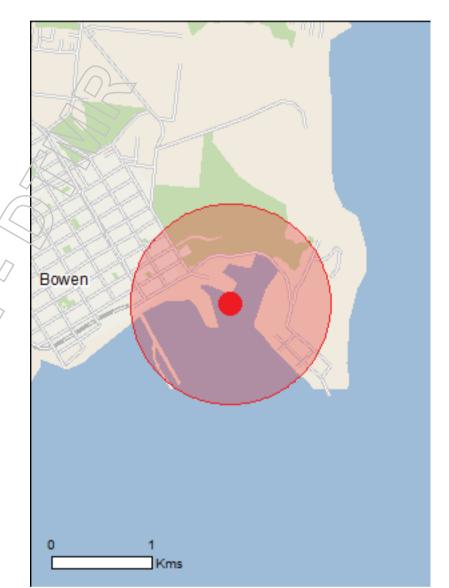
Summary

Details

Matters of NES
Other Matters Protected by the EPBC Act
Extra Information

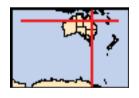
Caveat

<u>Acknowledgements</u>



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	36
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A <u>permit</u> may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	102
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
Great Barrier Reef	QLD	Declared property
National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Great Barrier Reef	QLD	Listed place

[Resource Information]

may occur within area

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
<u>Calidris canutus</u>		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea	~	
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<u>Calidris tenuirostris</u>		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
<u>Charadrius mongolus</u>		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
<u>Limosa lapponica baueri</u> Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat

Name	Status	Type of Presence
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat likely to occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	NSW and the ACT) Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Plants		
<u>Dichanthium setosum</u> bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Omphalea celata [64586]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Chalania mudaa	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765] Denisonia maculata	Vulnerable	Breeding known to occur within area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat may occur within

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Name	Status	Type of Presence
		area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<u>Lepidochelys olivacea</u> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		Within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information
* Species is listed under a different scientific name on	the EPBC Act - Threatened	
Name	Threatened	Type of Presence
		,,,
Migratory Marine Birds		
Migratory Marine Birds <u>Anous stolidus</u>		
		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678]		·
Anous stolidus Common Noddy [825] Apus pacificus		known to occur within area Species or species habitat
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area Species or species habitat area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013]	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849]	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849] Migratory Marine Species	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Anous stolidus Common Noddy [825] Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849] Migratory Marine Species Anoxypristis cuspidata	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat may occur within area

Name	Threatened	Type of Presence
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<u>Caretta caretta</u>		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<u>Chelonia mydas</u> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
		Kilowii to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]	7/5)	Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish	Vulnerable	Breeding likely to occur within area
[68442] Rhincodon typus		within area
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Page Number: 137 of 426	Species or species

Name	Threatened	Type of Presence
Monarcha melanopsis		habitat likely to occur within area
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		Charies ar anasias habitat
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Puddy Turnstone (872)		Poosting known to occur
Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba		within area
Sanderling [875]		Roosting known to occur within area
Calidris canutus		within area
Red Knot, Knot [855]	Endangered	Species or species habitat
		known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
		movii to occur maini area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat
		likely to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur
Calidria tanuiraatria		within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur
		within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur
Greater Garia Flover, Large Sana Flover [677]	Valificiable	within area
Charadrius mongolus Legar Sand Player Mangalian Player [970]	Endangered	Deacting known to occur
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala		aroa
Swinhoe's Snipe [864]		Roosting likely to occur
Gallinago stenura		within area
Pin-tailed Snipe [841]		Roosting likely to occur within area
<u>Limosa lapponica</u>		within area
Bar-tailed Godwit [844]		Species or species habitat
		known to occur within area
<u>Limosa limosa</u>		
Black-tailed Godwit [845]		Roosting known to occur within area
		within alva

Name	Threatened	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numerius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Other Matters Protected by the EPBC Act		
Listed Marine Species		[Resource Information
* Species is listed under a different scientific name on	the FDRC Act - Threatened	l Snecies list
•		•
Name	Threatened	Type of Presence
Name Birds		•
Name Birds Actitis hypoleucos Common Sandpiper [59309]		•
Name Birds Actitis hypoleucos		Type of Presence Species or species habitat
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus		Type of Presence Species or species habitat known to occur within area Species or species habitat
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678] Ardea alba Great Egret, White Egret [59541] Ardea ibis Cattle Egret [59542] Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678] Ardea alba Great Egret, White Egret [59541] Ardea ibis Cattle Egret [59542]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur
<u>Charadrius leschenaultii</u> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
<u>Charadrius mongolus</u> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Limosa limosa		
Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis	Onitionally Franks and	On saise an anasiae babitat
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur
		within area
Pandion haliaetus Osprey [952]		Breeding known to occur
		within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Recurvirostra novaehollandiae		
Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat
		likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat
		may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat
		known to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat
Shortpodent yginy r ipenoise [66167]		may occur within area
Campichthys tryoni		
Tryon's Pipefish [66193]		Species or species habitat may occur within area
Choeroichthys brachysoma		
Pacific Short-bodied Pipefish, Short-bodied Pipefish		Species or species habitat
[66194]	Page Number: 141 of 426	may occur within

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Name	Threatened	Type of Presence
		area
<u>Choeroichthys suillus</u>		
Pig-snouted Pipefish [66198]		Species or species habitat
		may occur within area
Corythoichthys amplexus		
Fijian Banded Pipefish, Brown-banded Pipefish		Species or species habitat
[66199]		may occur within area
Corythoichthys flavofasciatus Reticulate Dipefiels Vellow banded Dipefiels Network		Chasias ar anasias habitat
Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
1 100200]		may occar within area
<u>Corythoichthys intestinalis</u>		
Australian Messmate Pipefish, Banded Pipefish		Species or species habitat
[66202]		may occur within area
Corythoichthys ocellatus		
Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat
		may occur within area
		-
Corythoichthys paxtoni		• • • • • • • • • • • • • • • • • • • •
Paxton's Pipefish [66204]		Species or species habitat
		may occur within area
Corythoichthys schultzi		
Schultz's Pipefish [66205]		Species or species habitat
		may occur within area
Coomoonia	\nearrow	
Cosmocampus darrosanus D'Arros Dipofich [66207]		Species or appoins habitat
D'Arros Pipefish [66207]		Species or species habitat may occur within area
		may occur within area
Doryrhamphus excisus		
Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific	A	Species or species habitat
Blue-stripe Pipefish [66211]	7/0	may occur within area
Festucalex cinctus		
Girdled Pipefish [66214])	Species or species habitat
		may occur within area
Halicampus dunckeri		
Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat
Trod Hall Fipolicii, Balloker o'i ipolicii [co224]		may occur within area
		·
Halicampus grayi		
Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
		may occur within area
Halicampus nitidus		
Glittering Pipefish [66224]		Species or species habitat
		may occur within area
Halicampus eniniroetris		
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat
Spiriy-shout r ipensir [00223]		may occur within area
		may cood. mam. area
Hippichthys cyanospilos		
Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat
		may occur within area
Hippichthys heptagonus		
Madura Pipefish, Reticulated Freshwater Pipefish		Species or species habitat
[66229]		may occur within area
Llippiohthya papiaillya		
Hippichthys penicillus Ready Pipefish, Steep-nosed Pipefish [66231]		Species or species behitet
Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
		may occar within alea
Hippocampus bargibanti		
Pygmy Seahorse [66721]		Species or species habitat
		may occur within area

Name	Threatened Type of Presence
Hippocampus kuda	
Spotted Seahorse, Yellow Seahorse [66237]	Species or species habitat may occur within area
Hippocampus planifrons	
Flat-face Seahorse [66238]	Species or species habitat may occur within area
<u>Hippocampus zebra</u>	
Zebra Seahorse [66241]	Species or species habitat may occur within area
Micrognathus andersonii	
Anderson's Pipefish, Shortnose Pipefish [66253]	Species or species habitat may occur within area
Micrognathus brevirostris	
thorntail Pipefish, Thorn-tailed Pipefish [66254]	Species or species habitat may occur within area
Nannocampus pictus	
Painted Pipefish, Reef Pipefish [66263]	Species or species habitat may occur within area
Solegnathus hardwickii	
Pallid Pipehorse, Hardwick's Pipehorse [66272]	Species or species habitat may occur within area
Solenostomus cyanopterus	
Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]	Species or species habitat may occur within area
Solenostomus paradoxus	
Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]	Species or species habitat may occur within area
Syngnathoides biaculeatus (7)	3)
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus	
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]	Species or species habitat may occur within area
Trachyrhamphus longirostris	
Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]	Species or species habitat may occur within area
Mammals	
<u>Dugong dugon</u>	
Dugong [28]	Species or species habitat known to occur within area
Reptiles	
Acalyptophis peronii	
Horned Seasnake [1114]	Species or species habitat may occur within area
Aipysurus duboisii	
Dubois' Seasnake [1116]	Species or species habitat may occur within area
Aipysurus eydouxii	
Spine-tailed Seasnake [1117]	Species or species habitat may occur within area
Aipysurus laevis	
Olive Seasnake [1120]	Species or species habitat may occur within area
Astrotia stokesii	
Stokes' Seasnake [1122]	Species or species habitat
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Name	Threatened	Type of Presence
		area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur
		within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur
<u>Crocodylus porosus</u>		within area
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
<u>Disteira major</u>		
Olive-headed Seasnake [1124]		Species or species habitat
		may occur within area
Enhydrina schistosa		
Beaked Seasnake [1126]		Species or species habitat
		may occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat
		known to occur within area
Hydrophis elegans		
Elegant Seasnake [1104]		Species or species habitat
		may occur within area
Hydrophis mcdowelli		
null [25926]		Species or species habitat
		may occur within area
Hydrophis ornatus	7	
Spotted Seasnake, Ornate Reef Seasnake [1141]		Species or species habitat may occur within area
		may occur within area
Lapemis hardwickii Spine halliad Spannaka [4442]		Chasias ar species habitat
Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
907		,
Laticauda colubrina a sea krait [1092]		Species or species habitat
a sea kiait [1092]		may occur within area
		·
a sea krait [1093]		Species or species habitat
		may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur
Notator depressus		within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur
rational ratio [00207]	Valiforable	within area
Pelamis platurus Vallow ballind Saganaka [1001]		Chasias ar anasias habitat
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minko Whole [22]		Charina ar angaing babitat
Minke Whale [33]		Species or species habitat may occur within
		•

Name	Status	Type of Presence
Balaenoptera edeni		area
Bryde's Whale [35]		Species or species habitat
		may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat
	aago.oa	may occur within area
<u>Delphinus delphis</u>		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat
		may occur within area
<u>Grampus griseus</u>		
Risso's Dolphin, Grampus [64]		Species or species habitat
		may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat
		known to occur within area
Orcaella brevirostris		
Irrawaddy Dolphin [45]		Species or species habitat
		likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat
		may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata		within area
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat
		may occur within area
<u>Tursiops aduncus</u>	75)	
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose	>	Species or species habitat
Dolphin [68418]		likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat
		may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803	3]	Species or species

Name	Status	Type of Presence
		habitat likely to occur within
		area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat
Nutrieg Maririkii [399]		likely to occur within area
		, ,
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
		incry to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat
		likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat
		likely to occur within area
Frogs		
Rhinella marina		
Cane Toad [83218]		Species or species habitat known to occur within area
		MIOWIT to occur within alea
Mammals		
Bos taurus Domestic Cattle [16]		Opening on angeles held to
Domestic Cattle [16]		Species or species habitat likely to occur within area
		intoly to occur within a ca
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat
		likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat
		likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat
		likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat
		likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat
(907		likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat
		likely to occur within area
Plants		
Acacia nilotica subsp. indica		
Prickly Acacia [6196]		Species or species habitat
		may occur within area
Asparagus aethiopicus		
Asparagus Fern, Ground Asparagus, Basket		Species or species habitat
Sprengi's Fern, Bushy Asparagus, Emerald	Asparagus	likely to occur within area
[62425] Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine		Species or species habitat
Rubbervine, Palay Rubbervine, Purple Allam	nanda	likely to occur within area
[18913] Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Sta	argrass,	Species or species habitat
West Indian Grass, West Indian Marsh Gras		likely to occur within area
latropha gossynifolia		
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, (Cotton-leaf	Species or species habitat
Physic Nut, Cotton-leaf Jatropha, Black Physic		likely to occur within area
[7507]		
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Niema	Otation	T (D
Name	Status	Type of Presence
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Mimosa pigra		Species or species habitat likely to occur within area
Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223] Parkinsonia aculeata		Species or species habitat likely to occur within area
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Lepidodactylus lugubris Mourning Gecko [1712]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the gualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.017 148.25683

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- -Australian Government Australian Antarctic Data Centre
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gailery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment

GPO Box 787

Canberra ACT 2601 Australia

+61 2 6274 1111



Wildlife Online Extract

Search Criteria: Species List for a Specified Point

Species: All Type: All Status: All Records: All

Date: Since 1980 Latitude: -20.0195 Longitude: 148.2566

Distance: 1

Email NR @smec.com

Date submitted: Friday 19 Oct 2018 09:27:15 Date extracted: Friday 19 Oct 2018 09:30:39

The number of records retrieved = 165

<u>Disclaimer</u>

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

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No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate the control of the information and all liability (including without limitation, liability in negligence) for all expenses, damages and costs you may incur as a result of the information being inaccurate the costs of this information.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	Α	Records
animals	birds	Accipitridae	Milvus migrans	black kite		С		14
animals	birds	Accipitridae	Haliastur indus	brahminy kite		С		12
animals	birds	Accipitridae	Elanus axillaris	black-shouldered kite		С		1
animals	birds	Accipitridae	Pandion cristatus	eastern osprey		SL		6
animals	birds	Accipitridae	Aviceda subcristata	Pacific baza		С		1
animals	birds	Accipitridae	Haliastur sphenurus	whistling kite		\ C		5
animals	birds	Accipitridae	Accipiter cirrocephalus	collared sparrowhawk	\sim	<u> </u>		1
animals	birds	Accipitridae	Haliaeetus leucogaster	white-bellied sea-eagle		$\langle c \rangle$		4
animals	birds	Anatidae	Dendrocygna arcuata	wandering whistling-duck		С		1
animals	birds	Anatidae	Dendrocygna eytoni	plumed whistling-duck	1/1/	С		6
animals	birds	Anatidae	Anas superciliosa	Pacific black duck		С		6
animals	birds	Anatidae	Aythya australis	hardhead		С		5
animals	birds	Anatidae	Tadorna radjah	radjah shelduck		С		1
animals	birds	Anatidae	Anas gracilis	grey teal		С		6
animals	birds	Anatidae	Cygnus atratus	black swan		С		4
animals	birds	Anhingidae	Anhinga novaehollandiae	Australasian darrer		С		4
animals	birds	Ardeidae	Egretta novaehollandiae	white-faced heron		С		8
animals	birds	Ardeidae	Bubulcus ibis	cattle egret		С		2
animals	birds	Ardeidae	Egretta sacra	eastern reef egret		С		4
animals	birds	Ardeidae	Ardea intermedia	intermediate egret		С		4
animals	birds	Ardeidae	Egretta garzetta	little egret		С		5
animals	birds	Ardeidae	Butorides striata	striated heron		С		3
animals	birds	Ardeidae	Ardea alba modesta	eastern great egret		С		4
animals	birds	Artamidae	Artamus cinereus	black-faced woodswallow		С		3
animals	birds	Artamidae	Cracticus tibicen	Australian magpie		С		13
animals	birds	Artamidae	Cracticus nigrogularis	pied butcherbird		С		14
animals	birds	Artamidae	Artamus leucorynchus	white-breasted woodswallow		С		9
animals	birds	Artamidae	Cracticus torquatus	grey butcherbird		С		1
animals	birds	Artamidae	Strepera graculina	pied currawong		С		5
animals	birds	Burhinidae	Esacus magnirostris	beach stone-curlew		V		5
animals	birds	Burhinidae	Burhinus grallarius	bush stone-curlew		С		1
animals	birds	Cacatuidae	Calyptornynchus banksii	red-tailed black-cockatoo		С		10
animals	birds	Cacatuidae	Calyptorhynchus lathami erebus	glossy black-cockatoo (northern)		V		1
animals	birds	Cacatuidae	Nymphicus hollandicus	cockatiel		С		7
animals	birds	Cacatuidae	Eolophus roseicapilla	galah		С		4
animals	birds	Cacatuidae	Cacatua sanguinea	little corella		С		1
animals	birds	Campephagidae	Coracina novaehollandiae	black-faced cuckoo-shrike		С		11
animals	birds	Campephagidae	Lalage tricolor	white-winged triller		С		1
animals	birds	Campephagidae	Lalage leucomela	varied triller		С		3
animals	birds	Charadriidae	Charadrius ruficapillus	red-capped plover		С		9
animals	birds	Charadriidae	Vanellus miles	masked lapwing		С		13
animals	birds	Charadriidae	Elseyornis melanops	black-fronted dotterel		С		1
animals	birds	Ciconiidae	Ephippiorhynchus asiaticus	black-necked stork		С		1
animals	birds	Cisticolidae	Cisticola exilis	golden-headed cisticola		С		2
animals	birds	Columbidae	Geopelia humeralis	bar-shouldered dove		С		6
animals	birds	Columbidae	Ocyphaps lophotes	crested pigeon		С		10

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	Α	Records
animals	birds	Columbidae	Columba livia	rock dove	Υ			2
animals	birds	Columbidae	Geopelia striata	peaceful dove		С		13
animals	birds	Coraciidae	Eurystomus orientalis	dollarbird		С		1
animals	birds	Corvidae	Corvus coronoides	Australian raven		С		2
animals	birds	Corvidae	Corvus orru	Torresian crow		С		12
animals	birds	Cuculidae	Centropus phasianinus	pheasant coucal		\ C		3
animals	birds	Dicruridae	Dicrurus bracteatus	spangled drongo		2C		13
animals	birds	Estrildidae	Lonchura punctulata	nutmeg mannikin	// /Y	\		1
animals	birds	Falconidae	Falco longipennis	Australian hobby	$\times / / / / \times$	C		2
animals	birds	Falconidae	Falco cenchroides	nankeen kestrel	1/4/17	С		11
animals	birds	Haematopodidae	Haematopus fuliginosus	sooty oystercatcher		С		8
animals	birds	Haematopodidae	Haematopus longirostris	Australian pied oystercatcher		С		15
animals	birds	Halcyonidae	Todiramphus sordidus	Torresian kingfisher		С		1
animals	birds	Halcyonidae	Todiramphus sanctus	sacred kingfisher		CCC		7
animals	birds	Halcyonidae	Dacelo novaeguineae	laughing kookaburra		C C		5
animals	birds	Halcyonidae	Todiramphus macleayii	forest kingfisher		С		1
animals	birds	Hirundinidae	Hirundo neoxena	welcome swallow		С		11
animals	birds	Hirundinidae	Petrochelidon ariel	fairy martin		С		4
animals	birds	Laridae	Thalasseus bergii	crested tern		SL		2
animals	birds	Laridae	Hydroprogne caspia	Caspian tern		SL		5
animals	birds	Laridae	Chroicocephalus novaehollandiae	silver gull		С		18
animals	birds	Laridae	Gelochelidon nilotica	gull-billed tern		SL		4
animals	birds	Laridae	Sternula albifrons	little tern		SL		1
animals	birds	Maluridae	Malurus melanocephalus	red-backed fairy-wren		С		2
animals	birds	Megaluridae	Cincloramphus mathewsi	rufous songlark		CCC		1
animals	birds	Megapodiidae	Alectura lathami	Australian brush-turkey		С		1
animals	birds	Meliphagidae	Stomiopera flava	yellow honeyeater		С		14
animals	birds	Meliphagidae	Philemon buceroides	helmeted friarbird		CCC		5
animals	birds	Meliphagidae	Meliphaga lewinii	Lewin's honeyeater		С		1
animals	birds	Meliphagidae	Caligavis chrysops	yellow-faced honeyeater		С		1
animals	birds	Meliphagidae	Entomyzen cyanotis	blue-faced honeyeater		CCC		13
animals	birds	Meliphagidae	Gavicalis fasciogularis	mangrove honeyeater		С		5
animals	birds	Meliphagidae	Philemon citreogularis	little friarbird		CCC		1
animals	birds	Meliphagidae	Manorina melanocephala	noisy miner		С		1
animals	birds	Meliphagidae	Philemon corniculatus	noisy friarbird		С		1
animals	birds	Meliphagidae	Lichmera indistincta	brown honeyeater		C C		11
animals	birds	Meliphagidae	Myzomela obscura	dusky honeyeater		С		3
animals	birds	Meliphagidae	Gavicalis virescens	singing honeyeater		С		2
animals	birds	Meliphagidae	Manorina flavigula	yellow-throated miner		С		3
animals	birds	Meropidae	Merops ornatus	rainbow bee-eater		С		7
animals	birds	Menarchidae	Grallina cyanoleuca	magpie-lark		С		19
animals	birds	Monarchidae	Myiagra rubecula	leaden flycatcher		C C		3
animals	birds	Motacillidae	Anthus novaeseelandiae	Australasian pipit		С		8
animals	birds	Nectariniidae	Nectarinia jugularis	olive-backed sunbird		С		12
animals	birds	Nectariniidae	Dicaeum hirundinaceum	mistletoebird		С		5
animals	birds	Oriolidae	Sphecotheres vieilloti	Australasian figbird		С		12
				•				

Kingdom	Class	Family	Scientific Name	Common Name	I Q	А	Records
animals	birds	Pachycephalidae	Pachycephala rufiventris	rufous whistler	С		1
animals	birds	Pachycephalidae	Colluricincla megarhyncha	little shrike-thrush	С		1
animals	birds	Pardalotidae	Pardalotus striatus	striated pardalote	С		1
animals	birds	Passeridae	Passer domesticus	house sparrow	Υ		11
animals	birds	Pelecanidae	Pelecanus conspicillatus	Australian pelican	С		1
animals	birds	Phalacrocoracidae	Microcarbo melanoleucos	little pied cormorant	C		2
animals	birds	Phalacrocoracidae	Phalacrocorax carbo	great cormorant	~ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		1
animals	birds	Phalacrocoracidae	Phalacrocorax sulcirostris	little black cormorant	1///	>	5
animals	birds	Phasianidae	Coturnix ypsilophora	brown quail	///// C		4
animals	birds	Podicipedidae	Tachybaptus novaehollandiae	Australasian grebe	, //> C		5
animals	birds	Psittacidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet	C		1
animals	birds	Psittacidae	Trichoglossus haematodus moluccanus	rainbow lorikeet	C		15
animals	birds	Psittacidae	Platycercus adscitus	pale-headed rosella	С		5
animals	birds	Ptilonorhynchidae	Ptilonorhynchus nuchalis	great bowerbird	С		10
animals	birds	Rallidae	Porphyrio melanotus	purple swamphen	С		5
animals	birds	Rallidae	Gallinula tenebrosa	dusky moorhen	С		5
animals	birds	Rallidae	Fulica atra	Eurasian coot	С		3
animals	birds	Recurvirostridae	Himantopus himantopus	black-winged stilt	С		5
animals	birds	Rhipiduridae	Rhipidura albiscapa	grey fantail	С		1
animals	birds	Rhipiduridae	Rhipidura leucophrys	willie wagtail	С		9
animals	birds	Scolopacidae	Numenius phaeopus	whimbrel	SL		7
animals	birds	Scolopacidae	Tringa brevipes	grey-tailed tattler	SL		3
animals	birds	Scolopacidae	Arenaria interpres	ruddy turnstone	SL		2 2
animals	birds	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	SL	_	2
animals	birds	Scolopacidae	Limosa lapponica baueri	Western Alaskan bar-tailed godwit	V	V	3
animals	birds	Scolopacidae	Numenius madagascariensis	eastern curlew	E	CE	7
animals	birds	Strigidae	Ninox boobook	southern boobook	С		1
animals	birds	Sulidae	Sula leucogaster	brown booby	SL	_	1
animals	birds	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis	C C		13
animals	birds	Threskiornithidae	Platalea regia	royal spoonbill	С		2
animals	birds	Threskiornithidae	Threskiornis molucca	Australian white ibis	С		9
animals	birds	Timaliidae	Zosterops lateralis	silvereye	C C		1
plants	higher dicots	Acanthaceae	Avicennia marina subsp. eucalyptifolia		С		1/1
plants	higher dicots	Asteraceae	Glossocardia bidens	native cobbler's pegs	С		1/1
plants	higher dicots	Byttneriaceae) Waltheria indica		С		1/1
plants	higher dicots	Caesalpiniaceae	Erythrostemon gilliesii		Υ		1/1
plants	higher dicots	Clusiaceae	Calophyllum inophyllum	beach calophyllum	С		1/1
plants	higher dicots	Euphorbiaceae	Microstachys chamaelea		С		1/1
plants	higher dicots	Euphorbiaceae	Croton arnhemicus		С		1/1
plants	higher dicots	Fabaceae	Aphyllodium biarticulatum		С		1/1
plants	higher dicots	Fabaceae	Aeschynomene brevifolia		С		1/1
plants	higher dicots	Fabaceae	Tephrosia filipes subsp. filipes		С		1/1
plants	higher dicots	Fabaceae	Tephrosia leptoclada		С		1/1
plants	higher dicots	Fabaceae	Abrus precatorius subsp. precatorius		С		1/1
plants	higher dicots	Fabaceae	Clitoria ternatea	butterfly pea	Υ		1/1
plants	higher dicots	Fabaceae	Cajanus marmoratus		С		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I Q A	Records
plants	higher dicots	Fabaceae	Desmodium pullenii		С	1/1
plants	higher dicots	Fabaceae	Indigofera colutea	sticky indigo	С	1/1
plants	higher dicots	Fabaceae	Crotalaria calycina	, 0	С	1/1
plants	higher dicots	Meliaceae	Xylocarpus moluccensis		С	1/1
plants	higher dicots	Mimosaceae	Vachellia nilotica	prickly acacia	Υ	1/1
plants	higher dicots	Myrtaceae	Osbornia octodonta	myrtle mangrove	C	1/1
plants	higher dicots	Phyllanthaceae	Phyllanthus virgatus	,	~ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1/1
plants	higher dicots	Rhamnaceae	Alphitonia excelsa	soap tree		1/1
plants	higher dicots	Rhizophoraceae	Bruguiera exaristata		~(~\\\\\) C	1/1
plants	higher dicots	Rhizophoraceae	Ceriops tagal	yellow mangrove	,//// C	1/1
plants	higher dicots	Rubiaceae	Dentella repens	dentella	\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1/1
plants	higher dicots	Rubiaceae	Psydrax odorata subsp. australiana		C	1/1
plants	higher dicots	Sapindaceae	Ganophyllum falcatum		C	1/1
plants	higher dicots	Sapotaceae	Planchonella pohlmaniana		С	1/1
plants	higher dicots	Sapotaceae	Mimusops elengi		С	1/1
plants	lower dicots	Apocynaceae	Tabernaemontana orientalis		С	1/1
plants	lower dicots	Apocynaceae	Parsonsia plaesiophylla		С	1/1
plants	lower dicots	Convolvulaceae	Argyreia nervosa		Υ	1/1
plants	lower dicots	Convolvulaceae	Distimake quinatus		С	1/1
plants	lower dicots	Convolvulaceae	Distimake quinquefolius		Υ	1/1
plants	lower dicots	Convolvulaceae	Jacquemontia paniculata		С	1/1
plants	monocots	Commelinaceae	Commelina diffusa	wandering jew	С	1/1
plants	monocots	Poaceae	Sporobolus coromandelianus	\\	Υ	1/1
plants	monocots	Poaceae	Heteropogon contortus	black speargrass	С	1/1
plants	monocots	Poaceae	Eragrostis mexicana	Mexican lovegrass	Υ	1/1
plants	monocots	Poaceae	Sehima nervosum	-	С	1/1
plants	monocots	Poaceae	Setaria pumila subsp. subtesselata		Υ	1/1

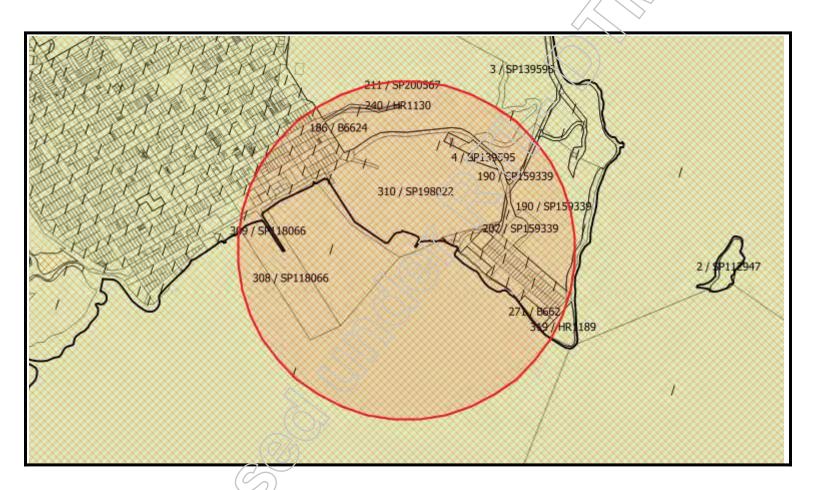
CODES

- I Y indicates that the taxon is introduced to Queensland and has naturalised.
- Q Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().
- A Indicates the Australian conservation status of each axon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon. This number is output as 999 if it equals or exceeds this value.

Reference Number:	44302	
Latitude:	-20.019500	
Longitude:	148.256600	
Buffer Distance:	1000 metres	



There are no Aboriginal or Torres Strait Islander cultural heritage site points recorded in your specific search area.

There are no Aboriginal or Torres Strait Islander cultural heritage site polygons recorded in your specific search area.

Cultural heritage party for the area is:

QC Ref Number	QUD Ref Number	Party Name	Contact Details
QCD2014/014 DET	QUD554/2010	Juru People (Part A)	Grant Thornton Australia Not Pelevant 15 Lake Street CAIRNS QLD 4870 Phone: 07 4046 8888
QCD2015/006 DET	QUD554/2010	Juru People (Part B)	Grant Thornton Australia Not Relevant 15 Lake Street CAIRNS QLD 4870 Phone: 07 4046 8888

Cultural heritage body for the area is:

Cultural Heritage body for the area is.	
Name	Contact Details
Kyburra Munda Yalga Aboriginal Corporation RNTBC	Grant Thornton Australia Not Relevant 15 Lake Street CAIRNS QLD 4870
	Phone: 07 4046 8888 Fax: 07 4775 2228

There are no cultural heritage management plans recorded in your specific search area.

There are no Designated Landscape Areas (DLA) recorded in your specific search area.

There are no Registered Cultural Heritage Study Areas in your specific search area.

Regional Coordinator:

11081011011				
Name	Position	Phone	Mobile	Email
Leigh Preston	S	07 4799 7562	Not Relevant	Leigh.Preston@datsip.qld.gov.au
	Coordinator North Region			

I refer to your submission in which you requested advice regarding Aboriginal or Torres Strait Islander cultural heritage recorded at your nominated location.

The Cultural Heritage Database and Register have been searched in accordance with the location description provided, and the results are set out in the above report.

Aboriginal or Torres Strait Islander cultural heritage which may exist within the search area is protected under the terms of the *Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003*, even if the Department of Aboriginal and Torres Strait Islander Partnerships has no records relating to it.

Under the legislation a person carrying out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal or Torres Strait Islander cultural heritage. This applies whether or not such places are recorded in an official register and whether or not they are located on private land.

Please refer to our website https://www.datsip.qld.gov.au/people-communities/aboriginal-torres-strait-islander-cultural-heritage for a copy of the gazetted Cultural Heritage Duty of Care Guidelines, which set out reasonable and practicable measure for meeting the cultural heritage duty of care.

In order to meet your duty of care, any land-use activity within the vicinity of recorded cultural heritage should not proceed without the agreement of the Aboriginal or Torres Strait Islander Party for the area, or by developing a Cultural Heritage Management Plan under Part 7 of the legislation.

If your proposed activity is deemed a Category 5 activity pursuant to the Duty of Care Guidelines, there is generally a high risk that it may harm cultural heritage. In these circumstances, the activity should not proceed without cultural heritage assessment.

Where a category 5 activity is proposed, it is necessary to notify the Aboriginal or Torres Strait Islander Party and seek:

- a. Advice as to whether the area is culturally significant;
- b. If it is, agreement on how best the activity may be managed to avoid or minimise harm to any cultural heritage values.

The extent to which the person has complied with Cultural Heritage Duty of Care Guidelines and the extent the person consulted Aboriginal or Torres Strait Islander Parties about carrying out the activity – and the results of the consultation – are factors a court may consider when determining if a land user has complied with the cultural heritage duty of care.

19 Oct 2018 09:54

Should you have any further queries, please do not hesitate to contact the Search Approval Officer on 1300 378 401.

Kind regards

The Director

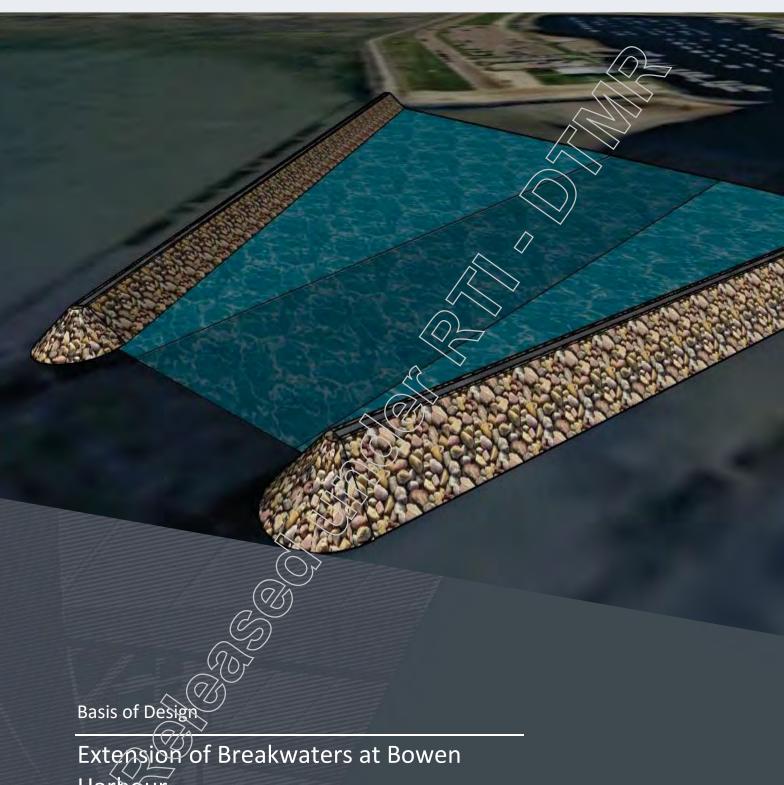
Cultural Heritage | Community Participation | Department of Aboriginal and Torres Strait Islander Partnerships



local people global experience







Harbour

Reference No. 30032293-BOD-001 Prepared for Department of Transport and Main Roads 22 November 2018

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Project Number:	30032293
Revision Number:	0

Revision History

REVISION NO.	DATE	PREPARED BY	REVIEWED BY	/> `	APPROVED FOR ISSUE BY
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Approved by:

Address:

480 St Pauls Tce, Fortitude Valley, QLD, 4006

Signature:

Tel:

07 3029 6989

Mob:

Not Relevant

Website: www.smec.com

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This report must be read as a whole. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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Appendices

APPENDIX A TMR - BREAKWATER EXTENSIONS CONCEPT DRAWING (UNDATED)

APPENDIX B TMR – BATHYMETRIC SURVEY FOR BOWEN HARBOUR ENTRANCE CHANNEL (AUGUST 2017)

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1 Introduction

1.1 Introduction

The Department of Transport and Main Roads (TMR) seeks to increase the tranquillity within Bowen Harbour by reducing the incoming wave energy which propagates through the harbour's dredged navigation access channel entrance from a range of southerly directions. TMR aims to do this by constructing a new rubble mound breakwater structure on the western side of the established dredged channel, and extending the existing rubble mound breakwater structure on the eastern of this channel.

TMR has requested the development of the detailed design for the new breakwater structures. Concept designs have been developed by TMR, which will be progressed to preliminary design and then detailed design by SMEC. The purpose of this document is to develop the design criteria for the new breakwaters, in a way that collaborative agreement on the criteria between TMR and SMEC can be achieved, prior to the commencement of the remainder of the design process.

1.2 Report Structure

This report summarises the proposed design criteria for the extensions of breakwaters at Bowen Harbour. The structure of this design criteria summary presented within this report, is as follows:

- Geometric constraints
 - Site extents
 - Structure survey datum
 - Site survey
 - Breakwater crest height and crest width
- Breakwater structure performance criteria
 - Design life
 - Rock armour maintenance
 - Design risk profile
 - Rock stability performance criteria
 - Overtopping performance criteria
 - Scour profile response
- Metocean parameters
 - Tidal planes
 - Total storm tide levels
 - Storm tide persistence duration
 - Non-cyclonic (ambient) wave characteristics
 - Wave characteristics (extreme cyclonic conditions),

1.3 Assumptions

The design criteria for the breakwaters has been prepared for two structures consisting of rock material.

1.4 Drafting Standards

Drawings will be produced to TMR Standards within the standard TMR title block.

2 Geometric Constraints

2.1 Site Extents

The proposed extents of the breakwater extensions at Bowen Harbour, to inform detailed design, are shown in Appendix A – TMR drawing BW-2-25-3 (Project TMR05-014). The exact footprint of each breakwater will be optimised to suit both the tie-ins to the existing western seawall and eastern breakwater, and to minimise the gap the breakwater heads while minimising the navigation risks to vessels within the Bowen Harbour dredged access channel.

2.2 Structure Vertical Datum

The breakwater structures will be designed to Lowest Astronomical Tide Datum (LAT).

2.3 Structure Horizontal Datum

The breakwater structures will be designed to Map Grid of Australia 1994 (MGA94), Zone 56.

2.4 Site Survey

Bathymetric survey of the entrance channel and surrounding tidal flats was captured by TMR on 2 August 2017. This survey plan is included for reference purposes in Appendix B – TMR Plan No. H007-071 (Job No. BW020026).

2.5 Breakwater Crest Height and Crest Width

SMEC has discussed the crest height and the crest width of each breakwater with TMR. For preliminary design purposes, the following dimensions in Table 2-1 have been agreed upon. Justification for each of these dimension parameters is also included in Table 2-1.

The detailed design analysis will be undertaken utilising these breakwater dimensions. If these dimensions are found to require alteration through the detailed design process, this will be discussed with TMR prior to such alterations being implemented.

Table 2-1: Nominated crest height and crest width of each breakwater

BREAKWATER	PARAMETER	VALUE	JUSTIFICATION
Eastern	Crest Height	5.0 m LAT	Matches crest height of existing seawall on Starboard Drive.
Eastern	Crest Width	4.0 m	Sufficient width to facilitate machinery access for post storm maintenance of rock armour layers.
Western /	Crest Height	5.0 m LAT	Matches crest height of existing seawall on Starboard Drive.
Western	Crest Width	4.0 m	Sufficient width for 2.0 m pedestrian footpath, with 1.5m wide rock crest on each side of this footpath. Also facilitates machinery access for post storm maintenance of rock armour layers.

3 Performance Criteria for Breakwater Structures

3.1 Design Life

A 50-year design life, for the year 2068, is proposed in accordance with:

- 1. Reference [2], Australian Standard (AS) 4997-2005, Guidelines for the design of maritime structures, for normal maritime structures', with a function category of 1, this category description being "Structures presenting a low degree of hazard to life or property".
- 2. Reference [7], Building and engineering standards for tidal works, by Department of Environment and Heritage Protection, now known as Department of Environment and Science.
- 3. Reference [9], TMR Consultants Brief for PMD83/17.

3.2 Rock Quality and Testing Criteria

SMEC understands that good quality rock is available in close proximity to Bowen, and that this rock has a minimum dry density of 2,550 kg/m³. Reference [6] provides guidance in the interpretation of rock quality, providing four (4) classes or rock quality. This guidance has been duplicated below for reference:

Excellent – ideal and sometimes available. This material, with reference to this specific attribute, can be used without any risk of degradation with time over a typical design life.

Good – better than average. In normal situations, no specific attention need be paid to this attribute. It will generally not lead to any significant degradation although it may show progressive signs of degradation over a typical design life in certain circumstances.

Marginal – lower than average. Without specific attention, the attribute may lead to significant degradation. It should be studied. If necessary, production, construction or design should be adapted by using appropriate blasting techniques, increased quality control or by oversizing armours tone size using appropriate prediction of the degradation, for example. This may be associated with short periods where loss of performance is more severe.

Poor – much lower than average. If possible, the material should not be used where exposure may affect the attribute and lead to rapid degradation. If it is used, specific attention should be paid, as for *marginal* attributes. However, a specific survey of the structure will generally be required and heavy maintenance may be necessary.

For the construction of the Bowen harbour breakwater extensions, SMEC will specify that "good" quality rock is utilised, and the rock quality testing requirements shall be in accordance with reference [6].

3.3 Rock Stability Performance Criteria

In keeping with guidance provided in Table 5.4 of reference [2], ultimate limit state rock stability design will be governed by the most conservative outcome from either:

- A design event equivalent to a 200-year average recurrence interval (ARI) storm, combined with a revetment damage factor (S_d) of 2 (initial damage, in accordance with van der Meer's (1998) notional permeability coefficients). Initial damage is defined as 0% to 5% of armour units displaced during the design event. It is proposed to define displacement, as armour displacing by an equivalent distance of one (1) diameter (D₅₀).
- For storm generating waves in excess of the specified design conditions, post event maintenance of each breakwater's primary armour layer may be required.

3.4 Design Risk Profile

Engineering design conditions for varying phenomena within nature (such as wind, waves, earthquakes) integrate the parameters of:

- 1. \('design working life (n)'; and
- 2. "acceptable risk of conditions occurring within the life of the infrastructure (p)", to establish the concept of an "average return period (TR)" for the proposed design conditions.

The theoretical relationship between these parameters as plotted below in Figure 3-1.

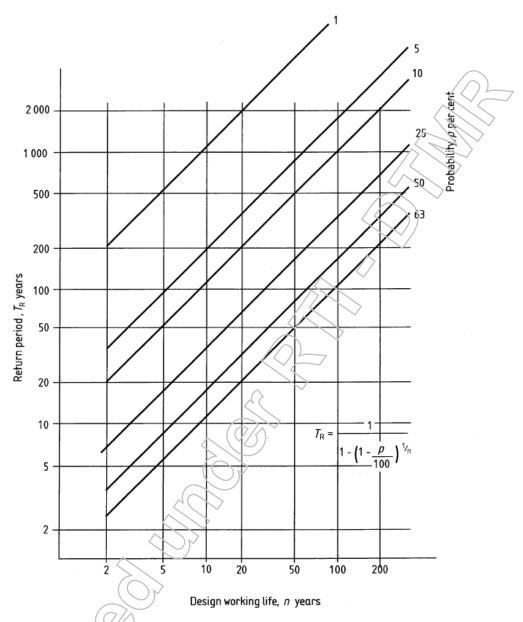


Figure 3-1: Relationship between "design life" (n)", "probability of conditions occurring within the life (p)" and "average return period (TR)" (Extract from British Standard 6349 Part 1, Figure 4, [4])

The CIRIA Rock Manual, reference [6], provides an alternative presentation of the percentage chance of a particular return event occurring during the design life of a structure, this data is shown below in Table 3-1.

Table 3-1: Relationship between "design life (n)", "probability of conditions occurring within the life (p)" and "average return period (TR)" (Extract from CIRIA Rock Manual [6])

DESIGN		EVENT F	PROBABILITY	(PER CENT) FOR VARIO	US RETURN	PERIODS (Y	EARS)	
LIFE (YEARS)	20	25	50	100	150	200	250	500	1000
1	5.0%	4.0%	2.0%	1.0%	0.7%	0.5%	0.4%	0.2%	0.1%
2	9.8%	7.8%	4.0%	2.0%	1.3%	1.0%	0,8%	0.4%	0.2%
5	22.6%	18.5%	9.6%	4.9%	3.3%	2.5%	2.0%	1.0%	0.5%
10	40.1%	33.5%	18.3%	9.6%	6.5%	4.9%	3.9%	2.0%	1.0%
15	53.7%	45.8%	26.1%	14.0%	9.5%	7.2%	5.8%	3.0%	1.5%
20	64.2%	55.8%	33.2%	18.2%	12.5%	9.5%	7.7%	3.9%	2.0%
25	72.3%	64.0%	39.7%	22.2%	15.4%)	11.8%	9.5%	4.9%	2.5%
50	92.3%	87.0%	63.6%	39.5%	28.4%	22.2%	18.2%	9.5%	4.9%
100	99.4%	98.3%	86.7%	63.4%	48.8%	39.4%	33.0%	18.1%	9.5%

Both Figure 3-1 and Table 3-1 show that there is a 22.2% chance of an ARI₂₀₀ design event occurring over a 50-year design life.

It is common for coastal structures, consisting of rock material, to be designed based on the above performance criteria, based on the following considerations:

- Rock revetment structures are 'flexible' in nature. Extreme events which exceed the design event typically lead to a greater amount of damage, however design event exceedance does not necessarily equate to structural failure.
- The consequence of rock stability failure presents 'a degree of hazard to life or property', as per Table 5.4 of reference [2]. Any failure of the breakwaters is likely to be storm event driven. Persons frequenting the breakwaters during an extreme event is highly unlikely and will be mitigated through signage. SMEC also recommends that the TMR Infrastructure Property Management State Boat Harbours Emergency Management Plan 2018/2019 (reference [16]), and/or the Bowen Harbour specific Emergency Management Plan is updated as required to include breakwater access restrictions during periods of predicted inclement weather. The loss of life, due to breakwater failure (rock instability under wave load) is a very low risk.
- Rock breakwater and revetment structures can be maintained and groomed, particularly in response to
 extreme events, with relative ease and without significant capital outlay.

The overall design risk profile philosophy adopted as mentioned above is in accordance with reference [8].

3.5 Breakwater Maintenance

Like all structures exposed to the marine environment, it is expected that there will be maintenance requirements for the breakwater structures. Based on the governing performance criteria proposed in 3.3, maintenance demand is expected to correlate with damage response due to extreme events.

3.6 Overtopping Performance Criteria

For ultimate limit state (ULS) design, it is proposed to limit the overtopping volume to 50 litres/s/m, in accordance with Figure 3-2 below, for an ARI₂₀₀ storm event, as determined by of a joint probability of total storm tide level and wave. Numerical modelling to determine joint probability of storm tide and wave has been undertaken by others, reference [1].

The width of each breakwater crest will be designed for overtopping.

A check of safety, under for ambient serviceability limit state (SLS) conditions, will be undertaken, SMEC will provide TMR with an indication of offshore wave conditions beyond which pedestrian safety on the breakwater access footpath will be considered unsafe. Reference [14] provides guidance on overtopping volumes, this guidance is included below in Figure 3-1 for reference, and recommends that overtopping volumes of to 0.1 litres/s/m be considered unsafe conditions for pedestrian access.

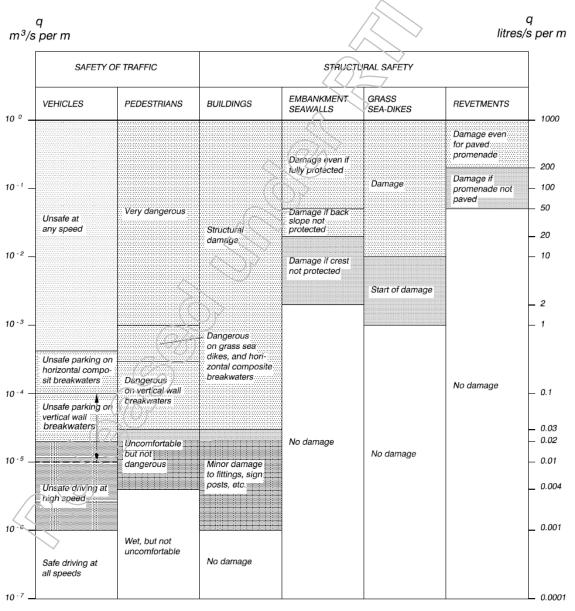


Figure 3-2: Overtopping Guidance by USACE, CEM Table VI-5-6 [14]

3.7 Pedestrian Pathway on Western Breakwater

To facilitate public access along the new western breakwater, TMR has instructed that SMEC include a pedestrian pathway along the crest of the breakwater. It is envisioned that this pathway will be in accordance with Whitsunday Regional Council Standard Drawing R-0065, "Concrete Strip Footpaths", with the design parameters as listed below in Table 3-2, however these parameters will be reviewed during the detailed design process.

Table 3-2: Suggested concrete pathway design parameters

PARAMETER	VALUE
Suggested pathway width	2.0 m
Concrete grade	N40
Slab thickness	125 mm
Reinforcement mesh	SL72
Subgrade	TMR Type 2.3

SMEC will not undertake a structural design for this pathway, which is to be constructed on the western breakwater crest. TMR have acknowledged that under extreme conditions, this pathway may become damaged. TMR will be consulted during the design process.

4 Metocean Parameters

4.1 Tidal Planes

Maritime Safety Queensland (MSQ) 2018 tidal planes for Bowen are displayed below in Table 4-1 and have been adopted for the detailed design. Tidal plane levels in Australian Height Datum (AHD) are also included in this table for reference purposes.

Table 4-1: MSQ tidal planes, Bowen 2018

TIDAL PLANE	LAT (m)	AHDYM
HAT	3.73	1.95
MHWS	2.83	1.05
MHWN	2.21	0.43
AHD	1.78	0.00
MSL	1.76	-0.02
MLWN	1.31	-0.47
MLWS	0.67	-1.11
LAT	0.00	-1.78

4.2 Numerical Modelling of Waves and Water Levels

TMR has engaged BMT to undertake numerical modelling of wave and water level design criteria for the breakwater extensions at Bowen Harbour project. The following document has been produced by BMT, and is an extension of previous numerical modelling carried out by BMT in the waters surrounding Bowen:

Reference [1], BMT (2018), Bowen Harbour Breakwater Metocean Criteria

4.3 Total Storm Tide Levels

Storm tide levels, inclusive of storm surge and wave set-up, as provided in reference [1] for Bowen Harbour, are currently proposed.

Sea level rise allowance of 0.3 m for 2068 is proposed for the detailed design, in accordance with Queensland Government guidelines within reference [7]. Note that this sea level rise allowance of 0.3 m for 2068 has been adopted by BMT in the numerical modelling process, reference [1].

Summary of total storm tide levels is provided below in Table 4-2.

Table 4-2: Total storm tide level summary

RETURN PERIOD (YEARS)	STILL WATER LEVEL (m LAT)	SEA LEVEL RISE (m)	DESIGN WATER LEVEL (m LAT)
1	3.65	0.30	3.95
5	3.68	0.30	3.98
107/5)	3.74	0.30	4.04
20	3.78	0.30	4.08
50	3.88	0.30	4.18
100	3.92	0.30	4.22
200	4.01	0.30	4.31

4.4 Storm Tide Persistence Durations

SMEC has confirmed with BMT, the authors of reference [1], that the following storm tide persistence durations are suitable as detailed design input parameters.

Table 4-3: Storm tide persistence durations

STORM TIDE EVENT	DURATION (HRS)
ARI ₅₀	3.0
ARI ₂₀₀	3.0

4.5 Wave Characteristics and Nearshore Bathymetry

BMT has confirmed that they have utilised bathymetry from multiple sources, including:

- (a) Hydrographic survey data of Bowen Harbour, (TMR, September 2016)
- (b) Australian Electronic Navigational Charts (AusENC) data; and
- (c) James Cook University Project 3DGBR

These have been combined within BMT's numerical model, reference [1]. Wave transformation has been undertaken by BMT to provide unbroken wave heights at 6 separate locations along the two breakwaters, labelled alphabetically A to G, refer Figure 4-1 below.

TMR captured bathymetry is displayed on the TMR breakwater concept design, see Appendix A for bathymetry relative to the proposed breakwater extents.

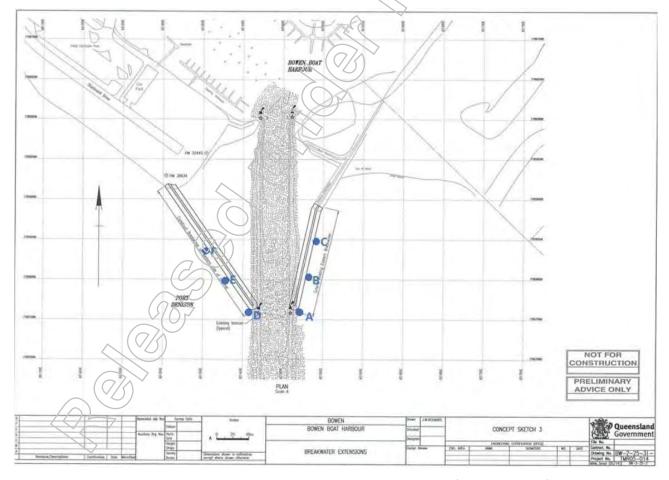


Figure 4-1: TMR Concept Sketch 3 with nominated wave modelling output locations A to G (source BMT, 2018).

4.6 Nearshore Wave Height Distribution (Non-cyclonic Conditions)

BMT has extracted wave heights for non-cyclonic conditions from its numerical model for the 6 nominated locations displayed above in Figure 4-1. This non-cyclonic wave height data and the corresponding water levels are shown below in Table 4-4.

Table 4-4: Non-TC wave conditions (assuming extreme water levels), water levels in LAT Datum and includes 0.3 m SLR allowance

RETURN	STILL	H _s AT NOMINATED MODELLED WAVE MEASUREMENT LOCATIONS (m)							
PERIOD (YEARS)	WATER LEVEL (m LAT)	А	В	С	D	E		T _p (s)	
1	3.95	0.62	0.63	0.64	0.59	0.60	0.60	4.1	
5	3.98	0.69	0.69	0.70	0.65	0.66	0.66	4.3	
10	4.04	0.77	0.79	0.79	0.72	0.74	0.75	4.6	
20	4.08	0.83	0.84	0.86	0.77	0.79	0.80	4.6	
50	4.18	0.96	0.98	1.00	0.89	0.92	0.94	4.9	
100	4.22	1.02	1.04	1.06	0.94	0.98	1.00	5.1	
200	4.31	1.07	1.10	1.11	0.99	1.03	1.05	5.1	

4.7 Nearshore Wave Height Distribution (Cyclonic Conditions)

BMT has extracted wave heights for cyclonic conditions from its numerical model for the 6 nominated locations displayed above in Figure 4-1. This cyclonic wave height data and the corresponding water levels are shown below in Table 4-5.

Table 4-5: TC wave conditions (assuming independent extreme water levels), water levels in LAT Datum and includes 0.3 m SLR allowance

RETURN PERIOD (YEARS)	STILL WATER LEVEL (m LAT)	Hs AT NOMINATED MODELLED WAVE MEASUREMENT LOCATIONS (m)						
		А	937	C	D	E	F	T _p (s)
100	4.22	1.17	1.21	1.23	1.06	1.10	1.13	5.2
200	4.31	1.48	1.50	1.49	1.35	1.43	1.46	5.8

It is noted that BMT have acquired wave periods for the design wave recommendations as described in Sections 3.2, 3.3 and 3.4 of reference [1]. Specifically, a scatter plot of wave period versus significant wave height was compiled, and a wave steepness of 1 in 30 was considered a reasonable estimate of peak wave period for the design conditions greater than or equal to the 100 year ARI event. This scatter plot is included in Figure 4-2 below for reference purposes.

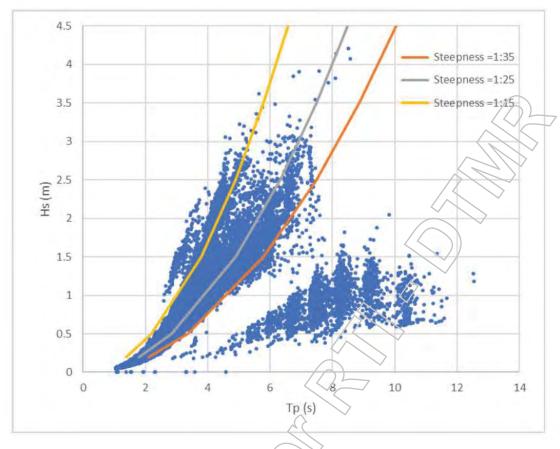


Figure 4-2: BMT scatter plot of wave period versus significant wave neight, for synthetic design cyclonic storm events, reference [1] SMEC considers that this approach to determining the representative design storm wave period is conservative.

4.8 Design waves

The BMT recommended design waves for each storm return period event are shown below in Table 4-6, this table presents a combination of both non-cyclonic and cyclonic storm conditions.

Table 4-6: BMT recommended design wave heights, peak wave periods and water levels

RETURN PERIOD (YEARS)	STILL WATER LEVEL (m LAT)	SEA LEVEL RISE (m)	DESIGN WATER LEVEL (m LAT)	H _s (m)	PEAK WAVE PERIOD (s)
1	3.65	0.30	3.95	0.64	4.1
5	3.68	0.30	3.98	0.70	4.3
10	3.74	0.30	4.04	0.79	4.5
20	3.78	0.30	4.08	0.86	4.6
50	3.88	0.30	4.18	1.00	4.8
100	3.92	0.30	4.22	1.23	5.2
200	4.01	0.30	4.31	1.50	5.8

It has been observed from the survey that the seabed slope in directly in front of each proposed breakwater is a large intertidal flat with has a slope of over 1:1000, and can be considered to be horizontal at this location. Therefore, wave breaking induced due to sloped bathymetry is not considered to occur on this tidal flat, and it is proposed to utilise the unbroken significant wave heights nominated by BMT for all rock sizing and overtopping detailed design calculations.

5 Geotechnical Information

5.1 Available Data

The following geotechnical information has been provided by TMR:

- 1. Trial excavation of intertidal flat for determination of characteristics for dredging purposes
- 2. Penetrometer testing of soil using a Variable Energy Dynamic Cone Penetrometer (VEDCP_PANDA)

These reports are included in Appendix C and Appendix D of this design criteria report.

5.2 Geotechnical Modelling

The stability of each new breakwater sides of the dredged channel will be modelled by SMEC's geotechnical engineering team. This modelling work will be undertaken to determine the risk of slope failure of the dredged channel batters, due to the static loading of the breakwater during both the construction and operational phases of the breakwater's design life.

An example of slope failure computational model output is displayed below in Figure 5-1.

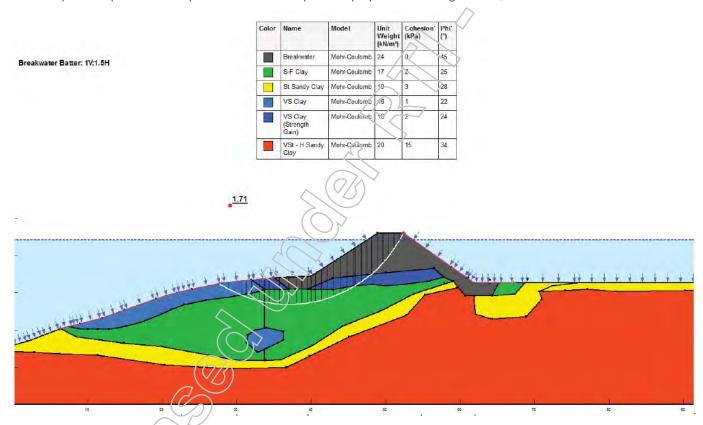


Figure 5-1: Geotechnical slope stability modelling example output

6 Regulatory Approvals

As part of this consultancy, SMEC will be preparing and submitting the regulatory approvals applications to permit the construction of the breakwater extensions for TMR. TMR will be responsible for the payment of all regulatory application submission fees, directly to each applicable assessment agency. An Approvals Register Report has been assembled by SMEC for this purpose, which will be a separate document submission to this basis of design document.



7 References

- [1] BMT (22/10/2018), Bowen Harbour Breakwater Metocean Criteria, Rev O.
- [2] Standards Australia, AS4997-2005, Guidelines for the design of maritime structures.
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- [5] CERC (1984) Shoreline Protection Manual. Vol 1 & 2, CERC Dept. of the Army, U.S. Army Corps of Engineers, Washington.
- [6] CIRIA (2007), C683 The Rock Manual.
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- [16] van Gent, MRA; van den Boogaard, HFP; Pozueta, B and JR Medina (2007), "Neural network modelling of wave overtopping at coastal structures", Coastal Engineering, Vol. 54, pp. 586-593.
- [17] TMR (2018) Infrastructure Property Management, State Boat Harbours Emergency Management Plan, 2018/2019



Appendix A TMR – Breakwater Extensions Concept Drawing (undated)



Appendix B TMR – Bathymetric Survey for Bowen Harbour Entrance Channel (August 2017)



Appendix C TMR – Trial Excavation Report – Bowen Harbour (undated)



Appendix D TMR – PANDA Penetrometer Memorandum – Bowen Boat Harbour Access Channels (June 2015)



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SMEC Company Details

APPROVED BY:

Address:

Level 6, 480 St Pauls Terrace, Fortitude Valley, QLD 4006

Signature:

Tel:

07 3029 6980

Email:

NR

@smec.com

Website:

www.smec.com

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ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

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Environmental Planning and Statutory Requirements Register

1.1 Introduction

The Department of Transport and Main Roads (TMR) are seeking to increase the tranquillity within Bowen Harbour by reducing the incoming wave energy which propagates through the harbour's entrance from a range of southerly directions. TMR aims to do this by constructing a new rubble mound breakwater structure on the western side of the established dredged navigation access channel, and extending the existing rubble mound breakwater structure on the eastern side of this channel.

A summary of the potential federal, state and local government environmental planning and statutory requirements pertaining to the proposed breakwater construction works at Bowen Harbour, is provided below in **Table 1**. The environmental values of the project area have been identified through desktop investigation and site walkover. Planning and statutory requirements have been identified based on the design footprint in Concept Sketch 3' (BW-2-25-31) (TMR) (see **Appendix A**).

1.2 Method

A desktop assessment of the project area was undertaken using existing reports, publicly available databases and mapping. Data sources included:

- Department of State Development, Manufacturing, Infrastructure and Pianning (DSDMIP) Development Assessment Mapping System
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (PMST)
- Department of Environment and Science (DES) Wildlife Online database search
- DES Protected Plants Flora Trigger Mapping
- Department of Natural Resources, Mines and Energy (DNRME) online mapping and historical imagery (QImagery)
- CSIRO ASRIS mapping
- Queensland Globe data
- Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) cultural heritage database
- Queensland Heritage Register
- Whitsunday Regional Council Planning Scheme 2017.

Searches were conducted using a 1 km radius from the following coordinates central to the site: -20.0195, 148.2566. The resulting search results are located in **Appendix B**.

1.3 Potential Approvals

The nature and extent of works was assessed against the context of the project area and results from the desktop assessment. This assessment resulted in the identification of potential statutory approval, offset and legislative notification requirements including:

- Significant impact assessment against the Significant Impact Guidelines 1.1 (DoEE, 2013) for potential impacts to a World Heritage Property and National Heritage Place
- Owner's consent from DNRME
- Operational works permit for Tidal Works or works within a Coastal Management District (CMD)
- Operational works permit for the removal, destruction or damage of marine plants
- Environmental offsets for clearing of marine plants
- Native title notification.

Pre-lodgement advice should be sought from relevant statutory authorities to confirm requirements for the above operational works permits. If the scope of works or project area changes, this register should be revised and updated to reflect these changes.

Table 1: Environmental Planning and Statutory Requirements Register

APPROVAL/ PERMIT	APPROVAL/ PERMIT REQUIREMENT ACT		TRIGGER	RELEVANCE	
Commonwealth Legislation					
Referral under the Environment Protection and Biodiversity Conservation Act 1999 and, if a "controlled action", approval from the Minister	irronment Protection and diversity Conservation assessment recommended Protection and Biodiversity Conservation Act 1999		Significant impact on Matters of National Environmental Significance (MNES) including: • nationally threatened species and ecological communities • migratory species protected under international agreements including JAMBA and CAMBA • World Heritage Properties • National Heritage Places.	Due to the small project footprint and minimal vegetation clearing required, it is considered unlikely that the project will result in a significant impact on any threatened or migratory species and communities. The project area occurs within the boundary of a World Heritage Property and National Heritage Place (Great Barrier Reef) (see Appendix B). Therefore, a significant impact assessment for the proposed works is recommended using the Significant Impact Guidelines 1.1 (DoEE, 2013) as guidance. Note that the Federal Heritage Great Barrier Reef Boundary differs from the QLD State Great Barrier Reef Marine Park Boundary, in that the Federal Boundary includes the coastline around the Bowen Foreshore of Port Denison and the footprint of the TMR Bowen Boat Harbour dredged navigation access channel.	
State Legislation		$O_{\mathcal{O}}$			
Marine Parks Permit No permit required Act 2004		 Permits may be required for: most tourism activities and commercial whale watching construction of jetties and pontoons installation and operation of structures, including moorings any work such as repairs to structures dredging and dumping waste discharge from a fixed structure 	The project area does not occur in a marine par protected under this Act.		

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTERBowen Harbour Breakwater

Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
			 anchoring and mooring for an extended period education programs research collecting traditional hunting. 	
Environmental authority (EA) for dredging more than 1,000t of material per year	No permit required	Environmental Protection Act 1994	Capital or maintenance dredging of more than 1,000t of material per year	The works will require dredging of less than 1,000t of material per year and will therefore not require an EA.
Quarry material allocation	No allocation required	Coastal Protection and Management Act 1995	Removing quarry material from State coastal land under tidal water	The project will involve the excavation of quarry material on State coastal land under tidal water. However, this material will remain below the high-water mark and will be used insitu as part of the proposed breakwater structure.
Quarry material allocation	No allocation required	Forestry Act 1959	Removing quarry material from trust or leasehold land under tidal water	The project will involve the excavation of quarry material on leasehold land under tidal water. However, this material will remain below the high-water mark and will be used insitu as part of the proposed breakwater structure.
Owners consent	Owners consent required	Coastal Protection and Management Act 1995	Work on land below the high-water mark and outside a canal as defined under the Coastal Protection and Management Act 1995.	The works will occur over state coastal land, being Port Denison. Owners consent from DNRME will be required for the works to proceed.
Operational works permit for Tidal Works or works within a Coastal Management District (CMD)	Permit required	Coastal Protection and Management Act 1995	Tidal Works or works completely or partially within a CMD	The project is the construction of two new breakwaters at the entrance of Bowen Harbour. Breakwaters are considered tidal works under the Coastal Protection and Management Act 1995.
Operational works permit for the removal, destruction or damage of marine plants	Permit required	Fisheries Act 1994	For removal, destruction or damage of marine plants	Marine plant species (seagrasses) have been identified within and adjacent to the project area in 2014 by BMT WBM and confirmed again

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER
Bowen Harbour Breakwater
Prepared for Department of Transport and Main Roads (TMR)

APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
				in 2018 by SMEC. The works will result in the removal of an area of these marine plants.
Riverine Protection Permit	No permit required	Water Act 2000	Excavating; placing fill; or destroying native vegetation in any watercourse, lake or spring	Not applicable. Works are within a tidal environment.
Water license	No license required	Water Act 2000	Taking or interfering with water in a watercourse as identified under the <i>Water Act</i> 2000	Not applicable. Works are within a tidal environment. If water is required to be taken from surrounding fresh water bodies the works should comply with the minimum requirements outlined in the 'Exemption requirements for constructing authorities for the take of water without a water entitlement' (WSS/2013/666) (DNRME, 2017).
Operational works permit for constructing or raising a waterway barrier	No permit required	Fisheries Act 1994	Constructing or raising a waterway barrier within a Department of Agriculture and Fisheries (DAF) identified waterway	The project area is located in a mapped tidal waterway. The concept design has been assessed and the current design does not create a barrier to fish passage.
Operational works permit for development in a declared fish habitat area (FHA)	No permit required	Fisheries Act 1994	Constructing works within a DAF declared FHA	The project area is not located within a declared FHA.
Species Management Program (SMP) for Least Concern Fauna SMP for Endangered, Vulnerable or Near Threatened (EVNT), special least concern or colonial breeders.	No SMP required	Nature Conservation Act 1992 (NC Act)	Tampering with the breeding place of protected animals that are classified as extinct in the wild, EVNT, special least concern, colonial breeder, or least concern	EVNT, special least concern, colonial breeder and least concern species have been recorded within a 1 km radius of the project area as per NC Act 'Wildlife Online' and EPBC Act 'Protected Matters' searches completed on 19 October 2018. The works are within a marine environment and will not impact on any animal breeding places. An SMP will not be required for the works.

ENVIRONMENTAL PLANNING AND STATUTORY
APPROVALS REGISTER
Bowen Harbour Breakwater
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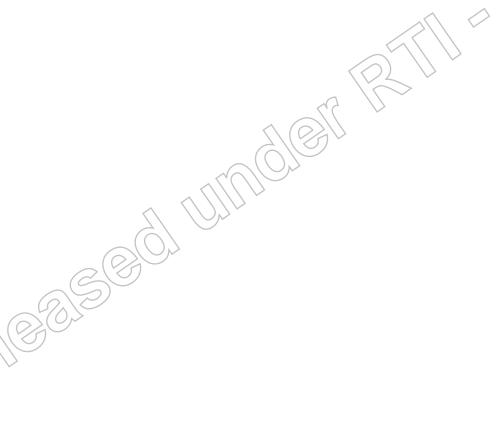
APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
Protected plants clearing permit	No permit required	Nature Conservation Act 1992	Clearing of EVNT flora	The project area does not intersect a high risk area for protected plants as per the Flora Survey Trigger Mapping. Therefore, a flora survey in accordance with the NC Act protected plant survey guidelines and subsequent clearing permit will not be required.
Operational works permit for clearing regulated vegetation	No permit required	Vegetation Management Act 1999	Clearing regulated vegetation	No vegetation regulated by the <i>Vegetation Management Act 1999</i> occurs within the project area.
Clearing Koala Habitat	No requirements	Planning Act 2016	Clearing South-East Queensland koala habitat	No koala habitat occurs within the project area.
Clearing Koala Habitat	No environmental offset required	Environmental Offset Act 2014	Clearing South-East Queensiand koala habitat	No koala habitat occurs within the project area.
Environmental Offset	Environmental offsets may be required	Environmental Offset Act 2014	Provision of an environmental offset for a significant residual impact upon a matter of state environmental significance (MSES)	Marine plants occur within and adjacent to the project area. The works may have an impact on this MSES. The requirement for environmental offsets should be reviewed during preparation of the relevant development application.
Disposal permit for contaminated soil	No Disposal Permit required	Environmental Protection Act 1994	Movement or disposal of contaminated soil from an allotment listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).	The project area occurs over freehold lot 310 SP198022 and state coastal land. Minor excavation is required during construction to provide localised stability to the breakwater in the dredged channel batters, this excavation will be minor and excavated material will be reused as fill material within the breakwater. Therefore, excavated material will not require disposal offsite.
	D Y			If the proposed scope of works changes, and excavation and disposal of material from within the project area becomes necessary to facilitate construction, a search of the EMR/CLR for lot

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER
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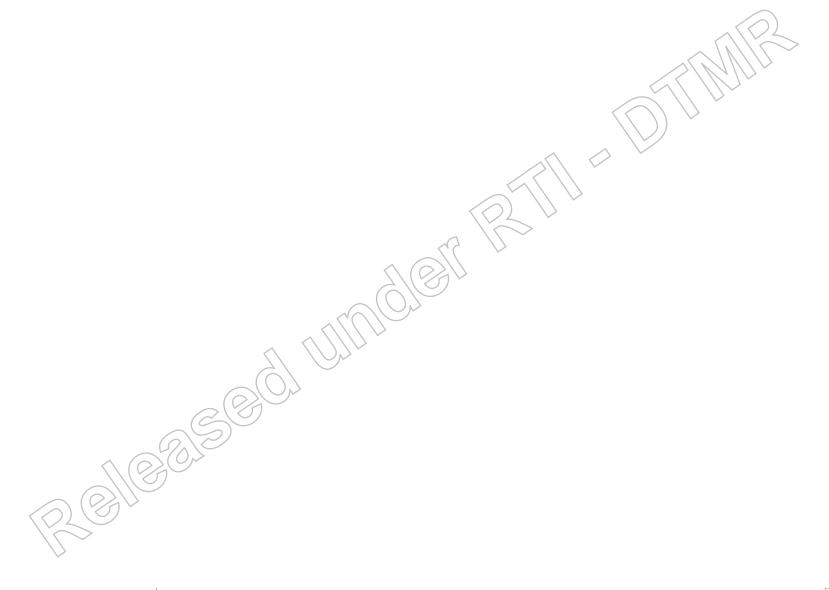
APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
				310 SP198022 should be completed prior to disposal of material from this lot offsite.
Management of invasive pests	No approval required	Biosecurity Act 2014	Pest weed and animal management during construction	Construction works will be required to comply with the General Biosecurity obligation under the <i>Biosecurity Act 2014</i> for management of invasive pests at the site.
Cultural Heritage Management Plan (CHMP)	No approval or CHMP required	Aboriginal Cultural Heritage Act 2003	Impacting on items or places of cultural heritage significance	The proposed works are a Category 4 under the Aborigmol Cultural Heritage Act 2003 Cultural Heritage Duty of Care Guidelines. New works will be conducted in an area that has been previously subject to ground disturbance. In addition, no ground disturbing activities will be undertaken as part of the works. Disturbance to an item of cultural heritage significance is therefore unlikely. A search of the Aboriginal and Torres Strait Islander Cultural Heritage Database and register found no items or places of cultural heritage significance within the project area.
Operational works permit for development on a Queensland Heritage Place	No approval required	Queensland Heritage Act 1992	Impacting on a place of heritage significance under the <i>Queensland Heritage Act 1992</i>	There are no places of heritage significance under the <i>Queensland Heritage Act 1992</i> within the project area.
Native Title	Native title notification	Native Title (Queensland) Act 1993	Impacting on land subject to a native title claim	A native title determination exists over parts of the project area for the 'Juru People (Part A)' (Tribunal No. QCD2014/014). The project area is a combination of Lands Lease and unallocated state land. The southern section of the project area is coastal land (unallocated state land). The proposed works meet the definition of 'Facilities for services to the public' Under s.24KA of the <i>Native Title Act 1993</i> . In accordance with the

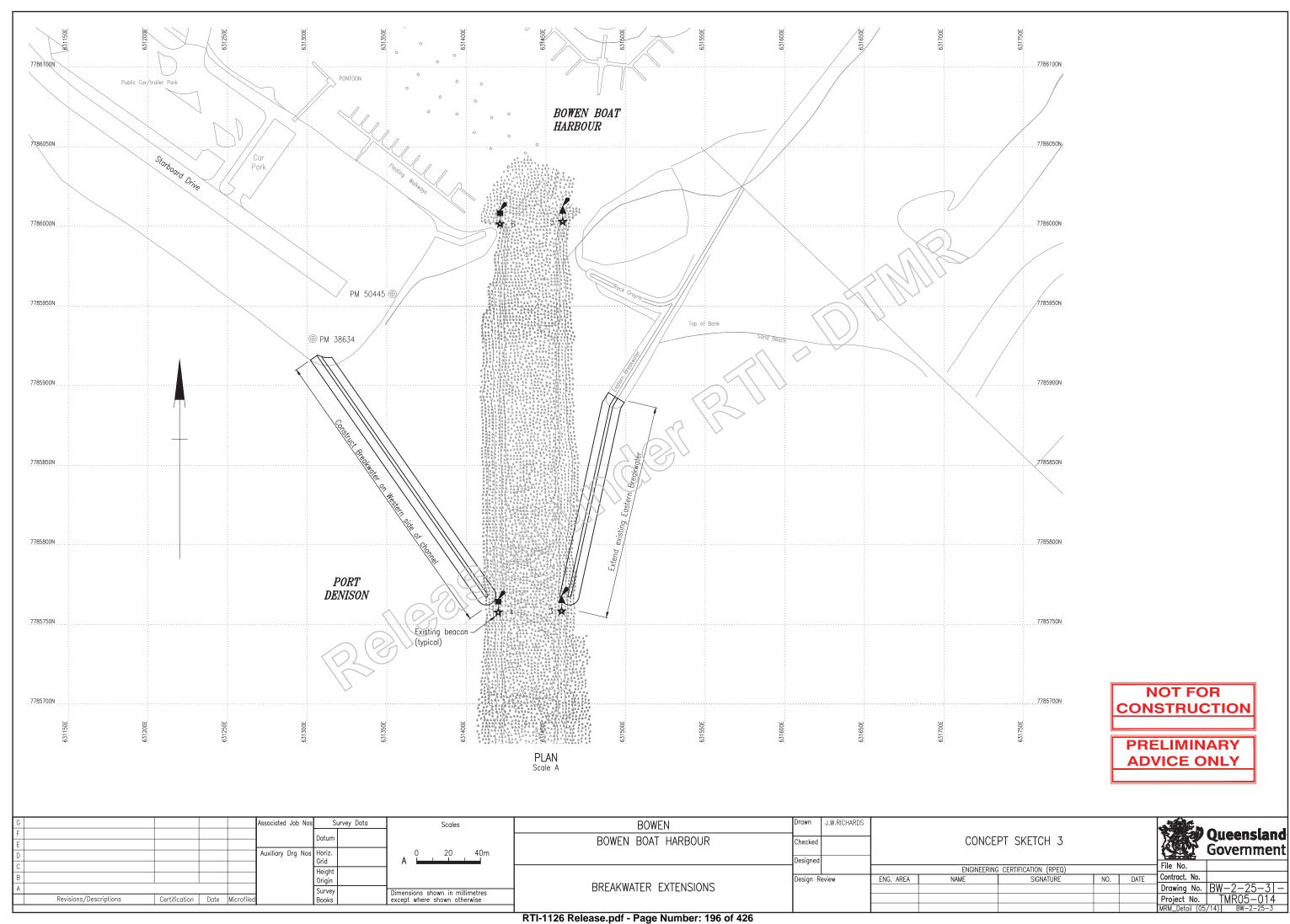
ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

APPROVAL/ PERMIT	REQUIREMENT	ACT	TRIGGER	RELEVANCE
				requirements of s.24KA, notification of the works should be provided to the relevant native title parties. Should the project area or works change, native title requirements should be re-assessed.



Appendix A: Design Drawings





Appendix B: Desktop Searches



Figure 1 Federal Government Protected Matters Search Tool - note foreshore of Bowen/Port Denison is included within Great Barrier Reef National Heritage Places Boundary footprint.

ENVIRONMENTAL PLANNING AND STATUTORY APPROVALS REGISTER

Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads (TMR)

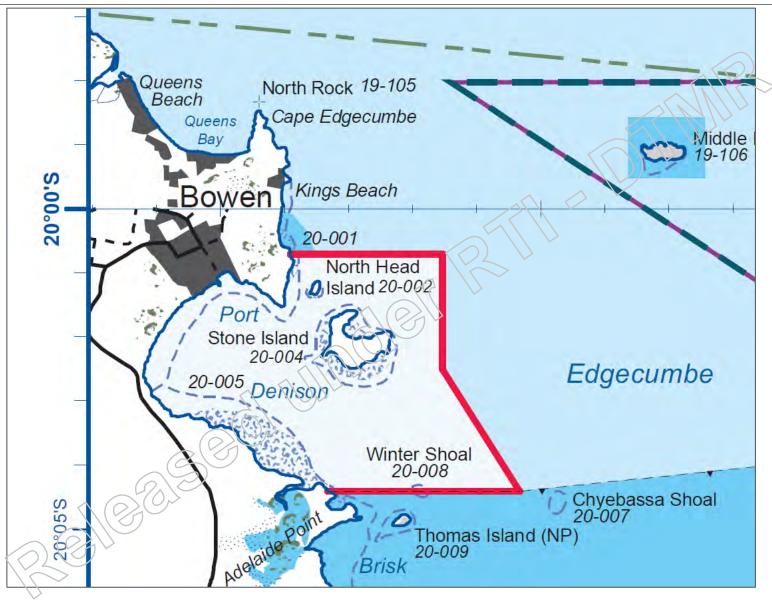


Figure 2 Great Barrier Reef Marine Parks Zoning MAP 10 - Whitsunday. Note Port Denison, Bowen Foreshore and Bowen Boat Harbour are outside of Marine Park Boundary footprint.

ENVIRONMENTAL PLANNING AND STATUTORY
APPROVALS REGISTER
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Wildlife Online Extract

Search Criteria: Species List for a Specified Point

Species: All Type: All Status: All Records: All

Date: Since 1980 Latitude: -20.0195 Longitude: 148.2566

Distance: 1

Email: NR @smec.com

Date submitted: Friday 19 Oct 2018 09:27:15 Date extracted: Friday 19 Oct 2018 09:30:39

The number of records retrieved = 165

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccuracy or completeness of this information.

Kingdom	Class	Family		Scientific Name		Common Name	I	Q	Α	Records
animals	birds	Accipitri	dae	Milvus migrans		black kite		С		14
animals	birds	Accipitri		Haliastur indus		brahminy kite		С		12
animals	birds	Accipitri		Elanus axillaris		black-shouldered kite		С		1
animals	birds	Accipitri	dae	Pandion cristatus		eastern osprey		SL		6
animals	birds	Accipitri	dae	Aviceda subcristata		Pacific baza		С		1
animals	birds	Accipitri	dae	Haliastur sphenurus		whistling kite		\ C		5
animals	birds	Accipitri	dae	Accipiter cirrocephalus		collared sparrowhawk		2C		1
animals	birds	Accipitri	dae	Haliaeetus leucogaster		white-bellied sea-eagle		$\langle c \rangle$		4
animals	birds	Anatida	е	Dendrocygna arcuata		wandering whistling-duck		C		1
animals	birds	Anatida	е	Dendrocygna eytoni		plumed whistling-duck	1/4/17	С		6
animals	birds	Anatida	е	Anas superciliosa		Pacific black duck		С		6
animals	birds	Anatida	е	Aythya australis		hardhead		С		5
animals	birds	Anatida		Tadorna radjah		radjah shelduck		CCC		1
animals	birds	Anatida	е	Anas gracilis		grey teal		С		6
animals	birds	Anatida		Cygnus atratus		black swan		С		4
animals	birds	Anhingi		Anhinga novaehollandiae		Australasian darter		С		4
animals	birds	Ardeida		Egretta novaehollandiae		white-faced heron		С		8
animals	birds	Ardeida	е	Bubulcus ibis		cattle egret		С		2
animals	birds	Ardeida	е	Egretta sacra		eastern reef egret		CCC		4
animals	birds	Ardeida		Ardea intermedia		intermediate egret		С		4
animals	birds	Ardeida	е	Egretta garzetta		little egret		С		5
animals	birds	Ardeida	е	Butorides striata	- (()	striated heron		С		3
animals	birds	Ardeida		Ardea alba modesta		eastern great egret		С		4
animals	birds	Artamid	ae	Artamus cinereus		black-faced woodswallow		С		3
animals	birds	Artamid	ae	Cracticus tibicen		Australian magpie		C C		13
animals	birds	Artamid	ae	Cracticus nigrogularis		pied butcherbird		С		14
animals	birds	Artamid		Artamus leucorynchus		white-breasted woodswallow		С		9
animals	birds	Artamid		Cracticus torquatus		grey butcherbird		С		1
animals	birds	Artamid	ae	Strepera graculina		pied currawong		С		5
animals	birds	Burhinic	lae	Esacus magnirostris		beach stone-curlew		V		5
animals	birds	Burhinic		Burhinus grallarius		bush stone-curlew		С		1
animals	birds	Cacatui	dae	Calyptorhynchus banksii		red-tailed black-cockatoo		С		10
animals	birds	Cacatui	dae	Calyptorhynchus lathami erebus		glossy black-cockatoo (northern)		V		1
animals	birds	Cacatui	dae	Nymphicus hollandicus		cockatiel		С		7
animals	birds	Cacatui	dae 🕜	Eolophus roseicapilla		galah		С		4
animals	birds	Cacatui		Cacatua sanguinea		little corella		С		1
animals	birds	Camper	hagidae	Coracina novaehollandiae		black-faced cuckoo-shrike		С		11
animals	birds	Camper	hagidae	Lalage tricolor		white-winged triller		С		1
animals	birds	Camper	hagidae	Lalage leucomela		varied triller		С		3
animals	birds	Charadi		Charadrius ruficapillus		red-capped plover		С		9
animals	birds	Charadi		Vanellus miles		masked lapwing		С		13
animals	birds	Charadi		Elseyornis melanops		black-fronted dotterel		С		1
animals	birds	Ciconiid		Ephippiorhynchus asiaticus		black-necked stork		С		1
animals	birds	Cisticoli		Cisticola exilis		golden-headed cisticola		С		2
animals	birds	Columb	idae	Geopelia humeralis		bar-shouldered dove		С		6
animals	birds	Columb		Ocyphaps lophotes		crested pigeon		С		10
				• • •						

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	Α	Records
animals	birds	Columbidae	Columba livia	rock dove	Υ			2
animals	birds	Columbidae	Geopelia striata	peaceful dove		С		13
animals	birds	Coraciidae	Eurystomus orientalis	dollarbird		С		1
animals	birds	Corvidae	Corvus coronoides	Australian raven		С		2
animals	birds	Corvidae	Corvus orru	Torresian crow		С		12
animals	birds	Cuculidae	Centropus phasianinus	pheasant coucal		\ C		3
animals	birds	Dicruridae	Dicrurus bracteatus	spangled drongo		2C		13
animals	birds	Estrildidae	Lonchura punctulata	nutmeg mannikin	// /Y	\		1
animals	birds	Falconidae	Falco longipennis	Australian hobby	$\times / / / / \times$	C		2
animals	birds	Falconidae	Falco cenchroides	nankeen kestrel	1/4/17	С		11
animals	birds	Haematopodidae	Haematopus fuliginosus	sooty oystercatcher		С		8
animals	birds	Haematopodidae	Haematopus longirostris	Australian pied oystercatcher		С		15
animals	birds	Halcyonidae	Todiramphus sordidus	Torresian kingfisher		С		1
animals	birds	Halcyonidae	Todiramphus sanctus	sacred kingfisher		CCC		7
animals	birds	Halcyonidae	Dacelo novaeguineae	laughing kookaburra		C C		5
animals	birds	Halcyonidae	Todiramphus macleayii	forest kingfisher		С		1
animals	birds	Hirundinidae	Hirundo neoxena	welcome swallow		С		11
animals	birds	Hirundinidae	Petrochelidon ariel	fairy martin		С		4
animals	birds	Laridae	Thalasseus bergii	crested tern		SL		2
animals	birds	Laridae	Hydroprogne caspia	Caspian tern		SL		5
animals	birds	Laridae	Chroicocephalus novaehollandiae	silver gull		С		18
animals	birds	Laridae	Gelochelidon nilotica	gull-billed tern		SL		4
animals	birds	Laridae	Sternula albifrons	little tern		SL		1
animals	birds	Maluridae	Malurus melanocephalus	red-backed fairy-wren		С		2
animals	birds	Megaluridae	Cincloramphus mathewsi	rufous songlark		CCC		1
animals	birds	Megapodiidae	Alectura lathami	Australian brush-turkey		С		1
animals	birds	Meliphagidae	Stomiopera flava	yellow honeyeater		С		14
animals	birds	Meliphagidae	Philemon buceroides	helmeted friarbird		CCC		5
animals	birds	Meliphagidae	Meliphaga lewinii	Lewin's honeyeater		С		1
animals	birds	Meliphagidae	Caligavis chrysops	yellow-faced honeyeater		С		1
animals	birds	Meliphagidae	Entomyzen cyanotis	blue-faced honeyeater		CCC		13
animals	birds	Meliphagidae	Gavicalis fasciogularis	mangrove honeyeater		С		5
animals	birds	Meliphagidae	Philemon citreogularis	little friarbird		CCC		1
animals	birds	Meliphagidae	Manorina melanocephala	noisy miner		С		1
animals	birds	Meliphagidae	Philemon corniculatus	noisy friarbird		С		1
animals	birds	Meliphagidae	Lichmera indistincta	brown honeyeater		C C		11
animals	birds	Meliphagidae	Myzomela obscura	dusky honeyeater		С		3
animals	birds	Meliphagidae	Gavicalis virescens	singing honeyeater		С		2
animals	birds	Meliphagidae	Manorina flavigula	yellow-throated miner		С		3
animals	birds	Meropidae	Merops ornatus	rainbow bee-eater		С		7
animals	birds	Menarchidae	Grallina cyanoleuca	magpie-lark		С		19
animals	birds	Monarchidae	Myiagra rubecula	leaden flycatcher		C C		3
animals	birds	Motacillidae	Anthus novaeseelandiae	Australasian pipit		С		8
animals	birds	Nectariniidae	Nectarinia jugularis	olive-backed sunbird		С		12
animals	birds	Nectariniidae	Dicaeum hirundinaceum	mistletoebird		С		5
animals	birds	Oriolidae	Sphecotheres vieilloti	Australasian figbird		С		12
				•				

Kingdom	Class	Family	Scientific Name	Common Name	I Q	Α	Records
animals	birds	Pachycephalidae	Pachycephala rufiventris	rufous whistler	С		1
animals	birds	Pachycephalidae	Colluricincla megarhyncha	little shrike-thrush	С		1
animals	birds	Pardalotidae	Pardalotus striatus	striated pardalote	С		1
animals	birds	Passeridae	Passer domesticus	house sparrow	Υ		11
animals	birds	Pelecanidae	Pelecanus conspicillatus	Australian pelican	С		1
animals	birds	Phalacrocoracidae	Microcarbo melanoleucos	little pied cormorant	C		2
animals	birds	Phalacrocoracidae	Phalacrocorax carbo	great cormorant	~ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		1
animals	birds	Phalacrocoracidae	Phalacrocorax sulcirostris	little black cormorant	1///	>	5
animals	birds	Phasianidae	Coturnix ypsilophora	brown quail	///// C		4
animals	birds	Podicipedidae	Tachybaptus novaehollandiae	Australasian grebe	, //> C		5
animals	birds	Psittacidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet	C		1
animals	birds	Psittacidae	Trichoglossus haematodus moluccanus	rainbow lorikeet	C		15
animals	birds	Psittacidae	Platycercus adscitus	pale-headed rosella	С		5
animals	birds	Ptilonorhynchidae	Ptilonorhynchus nuchalis	great bowerbird	С		10
animals	birds	Rallidae	Porphyrio melanotus	purple swamphen	С		5
animals	birds	Rallidae	Gallinula tenebrosa	dusky moorhen	С		5
animals	birds	Rallidae	Fulica atra	Eurasian coot	С		3
animals	birds	Recurvirostridae	Himantopus himantopus	black-winged stilt	С		5
animals	birds	Rhipiduridae	Rhipidura albiscapa	grey fantail	С		1
animals	birds	Rhipiduridae	Rhipidura leucophrys	willie wagtail	С		9
animals	birds	Scolopacidae	Numenius phaeopus	whimbrel	SL		7
animals	birds	Scolopacidae	Tringa brevipes	grey-tailed tattler	SL		3
animals	birds	Scolopacidae	Arenaria interpres	ruddy turnstone	SL		2 2
animals	birds	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	SL	_	2
animals	birds	Scolopacidae	Limosa lapponica baueri	Western Alaskan bar-tailed godwit	V	V	3
animals	birds	Scolopacidae	Numenius madagascariensis	eastern curlew	E	CE	7
animals	birds	Strigidae	Ninox boobook	southern boobook	С		1
animals	birds	Sulidae	Sula leucogaster	brown booby	SL	_	1
animals	birds	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis	C C		13
animals	birds	Threskiornithidae	Platalea regia	royal spoonbill	С		2
animals	birds	Threskiornithidae	Threskiornis molucca	Australian white ibis	С		9
animals	birds	Timaliidae	Zosterops lateralis	silvereye	C C		1
plants	higher dicots	Acanthaceae	Avicennia marina subsp. eucalyptifolia		С		1/1
plants	higher dicots	Asteraceae	Glossocardia bidens	native cobbler's pegs	С		1/1
plants	higher dicots	Byttneriaceae) Waltheria indica		С		1/1
plants	higher dicots	Caesalpiniaceae	Erythrostemon gilliesii		Υ		1/1
plants	higher dicots	Clusiaceae	Calophyllum inophyllum	beach calophyllum	С		1/1
plants	higher dicots	Euphorbiaceae	Microstachys chamaelea		С		1/1
plants	higher dicots	Euphorbiaceae	Croton arnhemicus		С		1/1
plants	higher dicots	Fabaceae	Aphyllodium biarticulatum		С		1/1
plants	higher dicots	Fabaceae	Aeschynomene brevifolia		С		1/1
plants	higher dicots	Fabaceae	Tephrosia filipes subsp. filipes		С		1/1
plants	higher dicots	Fabaceae	Tephrosia leptoclada		С		1/1
plants	higher dicots	Fabaceae	Abrus precatorius subsp. precatorius		С		1/1
plants	higher dicots	Fabaceae	Clitoria ternatea	butterfly pea	Υ		1/1
plants	higher dicots	Fabaceae	Cajanus marmoratus		С		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I Q A	Records
plants	higher dicots	Fabaceae	Desmodium pullenii		С	1/1
plants	higher dicots	Fabaceae	Indigofera colutea	sticky indigo	С	1/1
plants	higher dicots	Fabaceae	Crotalaria calycina	, 3	С	1/1
plants	higher dicots	Meliaceae	Xylocarpus moluccensis		C	1/1
plants	higher dicots	Mimosaceae	Vachellia nilotica	prickly acacia	Υ	1/1
plants	higher dicots	Myrtaceae	Osbornia octodonta	myrtle mangrove	C	1/1
plants	higher dicots	Phyllanthaceae	Phyllanthus virgatus	,	~ < < < c	1/1
plants	higher dicots	Rhamnaceae	Alphitonia excelsa	soap tree		1/1
plants	higher dicots	Rhizophoraceae	Bruguiera exaristata	'	1 C	1/1
plants	higher dicots	Rhizophoraceae	Ceriops tagal	yellow mangrove	,///// C	1/1
plants	higher dicots	Rubiaceae	Dentella repens	dentella	\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1/1
plants	higher dicots	Rubiaceae	Psydrax odorata subsp. australiana		C	1/1
plants	higher dicots	Sapindaceae	Ganophyllum falcatum		C	1/1
plants	higher dicots	Sapotaceae	Planchonella pohlmaniana		С	1/1
plants	higher dicots	Sapotaceae	Mimusops elengi		С	1/1
plants	lower dicots	Apocynaceae	Tabernaemontana orientalis		С	1/1
plants	lower dicots	Apocynaceae	Parsonsia plaesiophylla		С	1/1
plants	lower dicots	Convolvulaceae	Argyreia nervosa		Υ	1/1
plants	lower dicots	Convolvulaceae	Distimake quinatus		С	1/1
plants	lower dicots	Convolvulaceae	Distimake quinquefolius		Υ	1/1
plants	lower dicots	Convolvulaceae	Jacquemontia paniculata		С	1/1
plants	monocots	Commelinaceae	Commelina diffusa	wandering jew	С	1/1
plants	monocots	Poaceae	Sporobolus coromandelianus	>//	Υ	1/1
plants	monocots	Poaceae	Heteropogon contortus	black speargrass	С	1/1
plants	monocots	Poaceae	Eragrostis mexicana	Mexican lovegrass	Υ	1/1
plants	monocots	Poaceae	Sehima nervosum	-	С	1/1
plants	monocots	Poaceae	Setaria pumila subsp. subtesselata		Υ	1/1

CODES

- Y indicates that the taxon is introduced to Queensland and has naturalised.
- Q Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().
- A Indicates the Australian conservation status of each axon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon. This number is output as 999 if it equals or exceeds this value.

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 19/10/18 10:36:13

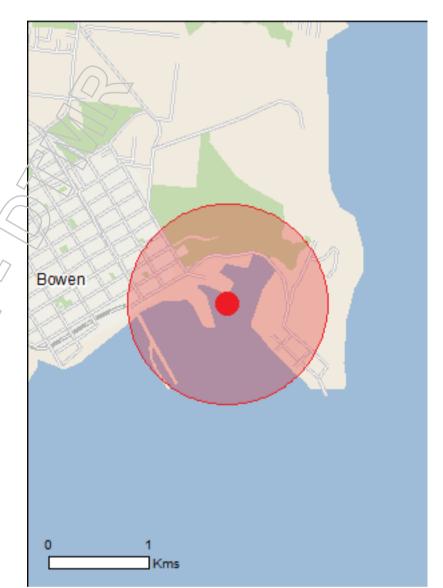
Summary

Details

Matters of NES
Other Matters Protected by the EPBC Act
Extra Information

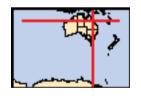
Caveat

<u>Acknowledgements</u>



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	36
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A <u>permit</u> may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	102
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
Great Barrier Reef	QLD	Declared property
National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Great Barrier Reef	QLD	Listed place

[Resource Information]

may occur within area

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
<u>Calidris canutus</u>		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<u>Calidris tenuirostris</u>		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur
Greater Sand Flover, Large Sand Flover [077]	Vullerable	within area
<u>Charadrius mongolus</u>		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat
		likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-	Vulnerable	Species or species habitat
bellied Storm-Petrel (Australasian) [64438]	Vullierable	likely to occur within area
		•
Limosa lapponica baueri Par tailod Codwit (baueri) Western Maskan Bar tailod	Vulnerable	Species or species habitat
Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vullerable	Species or species habitat likely to occur within area
		,
Limosa lapponica menzbieri Northern Siberian Per tailed Codwit Per tailed Codwit	Critically Endangered	Charles or anasias babitat
Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
·		
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat

Name	Status	Type of Presence
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat likely to occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	NSW and the ACT) Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Virrkoo [66]	Vulnerable	Species or species habitat may occur within area
Plants		
<u>Dichanthium setosum</u> bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Omphalea celata [64586]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765] Denisonia maculata	Vulnerable	Breeding known to occur within area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat may occur within

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Name	Status	Type of Presence
		area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		Within aroa
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information
* Species is listed under a different scientific name on	the EDBC Act - Threatened	
Name	Threatened	Type of Presence
Migratory Marine Birds	A	Type of Frederice
Anous stolidus		
Common Noddy [825]		Species or species habitat known to occur within area
Common Noddy [825] Apus pacificus Fork-tailed Swift [678]		·
Apus pacificus		known to occur within area Species or species habitat
Apus pacificus Fork-tailed Swift [678] Fregata ariel		Species or species habitat likely to occur within area Species or species habitat area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849] Migratory Marine Species	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849]	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678] Fregata ariel Lesser Frigatebird, Least Frigatebird [1012] Fregata minor Great Frigatebird, Greater Frigatebird [1013] Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060] Sternula albifrons Little Tern [82849] Migratory Marine Species Anoxypristis cuspidata	Endangered	Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat may occur within area

Name	Threatened	Type of Presence
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<u>Caretta caretta</u>		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<u>Chelonia mydas</u> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<u>Dermochelys coriacea</u> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]	7/5)	Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682] RTI-1126 Release.pdf - I	Page Number: 209 of 426	Species or species

Name	Threatened	Type of Presence
Manaraha malanansis		habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872] Calidris acuminata		Roosting known to occur within area
Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
<u>Charadrius mongolus</u> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<u>Limosa limosa</u> Black-tailed Godwit [845]		Roosting known to occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numerius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Other Matters Protected by the EPBC Act		
Listed Marine Species		[Resource Information
* Species is listed under a different scientific name on	the EPRC Act - Threatened	l Species list
•		•
Name	Threatened	Type of Presence
Name Birds		•
Name Birds Actitis hypoleucos Common Sandpiper [59309]		•
Name Birds Actitis hypoleucos		Type of Presence Species or species habitat
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus		Type of Presence Species or species habitat known to occur within area Species or species habitat
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat may occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678] Ardea alba Great Egret, White Egret [59541] Ardea ibis Cattle Egret [59542] Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area
Name Birds Actitis hypoleucos Common Sandpiper [59309] Anous stolidus Common Noddy [825] Anseranas semipalmata Magpie Goose [978] Apus pacificus Fork-tailed Swift [678] Ardea alba Great Egret, White Egret [59541] Ardea ibis Cattle Egret [59542]		Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat known to occur within area Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur
<u>Charadrius leschenaultii</u> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
<u>Charadrius mongolus</u> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
<u>Limosa Iapponica</u> Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Limosa limosa		
Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis	Oritically, Food on a	On saiss an anasias babitat
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur
		within area
Pandion haliaetus Osprey [952]		Breeding known to occur
		within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur
Pocurvirostro povochellandiae		within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Pufous Fantail [502]		Species or species habitat
Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat
Tainted Onipe [003]	Litaarigerea	may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat
		known to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Fish		William Grou
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat
Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni		
Tryon's Pipefish [66193]		Species or species habitat may occur within area
Choeroichthys brachysoma		
Pacific Short-bodied Pipefish, Short-bodied Pipefish		Species or species habitat
[66194]	Page Number: 213 of 426	may occur within

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Name	Threatened Type of Pres	sence
	area	
<u>Choeroichthys suillus</u>		
Pig-snouted Pipefish [66198]	•	pecies habitat
	may occur w	ilnin area
Corythoichthys amplexus		
Fijian Banded Pipefish, Brown-banded Pipefish	Species or s	pecies habitat
[66199]	may occur w	
Corythoichthys flavofasciatus Deticulate Dinefiels Velleys handed Dinefiels Network	Chaoine ar a	nacios babitat
Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]	Species or s may occur w	pecies habitat
ripelish [00200]	may occur w	illilli alea
Corythoichthys intestinalis		
Australian Messmate Pipefish, Banded Pipefish	Species or s	pecies habitat
[66202]	may occur w	rithin area
Comuthoichthus		
Corythoichthys ocellatus Orange spotted Pipefish Ocellated Pipefish [66203]	Species or s	nacios habitat
Orange-spotted Pipefish, Ocellated Pipefish [66203]	may occur w	pecies habitat
	may coodi w	itimi aroa
Corythoichthys paxtoni		
Paxton's Pipefish [66204]	· · · · · · · · · · · · · · · · · · ·	pecies habitat
	may occur w	rithin area
Corythoichthys schultzi Cabultala Dinafiah [CC205]	Charles and	naciae babitat
Schultz's Pipefish [66205]	may occur w	pecies habitat
	may occur w	itilii arca
Cosmocampus darrosanus		
D'Arros Pipefish [66207]	Species or s	pecies habitat
	may occur w	ithin area
Dorumbamphus avaigus		
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific	Species or s	pecies habitat
Blue-stripe Pipelish, Indian Blue-stripe Pipelish, Pacific Blue-stripe Pipelish [66211]	may occur w	•
) may cood! W	iliiii aroa
Festucalex cinctus		
Girdled Pipefish [66214]	•	pecies habitat
	may occur w	ithin area
Halicampus dunckeri		
Red-hair Pipefish, Duncker's Pipefish [66220]	Species or s	pecies habitat
	may occur w	ithin area
Halicampus grayi Maral Dinafiah Oranda Dinafiah (20004)	0	a a sia a la alaitat
Mud Pipefish, Gray's Pipefish [66221]	Species or s may occur w	pecies habitat
	may occur w	itilii area
Halicampus nitidus		
Glittering Pipefish [66224]	Species or s	pecies habitat
	may occur w	ithin area
Halicampus eniniroetrie		
Halicampus spinirostris Spiny-snout Pipefish [66225]	Species or s	pecies habitat
Opiny-shout ripensin [00223]	may occur w	•
	may cood. II	mm area
<u>Hippichthys cyanospilos</u>		
Blue-speckled Pipefish, Blue-spotted Pipefish [66228]	•	pecies habitat
	may occur w	ithin area
Hippichthys heptagonus		
Madura Pipefish, Reticulated Freshwater Pipefish	Species or s	pecies habitat
[66229]	may occur w	•
L - J	ay oodar w	
Hippichthys penicillus		
Beady Pipefish, Steep-nosed Pipefish [66231]	•	pecies habitat
	may occur w	ithin area
Hippocampus bargibanti		
Pygmy Seahorse [66721]	Snaciae or e	pecies habitat
. 791117	may occur w	•
	a, coda w	

Name	Threatened	Type of Presence
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat
Hippocampus zebra		may occur within area
Zebra Seahorse [66241]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Nannocampus pictus Painted Pipefish, Reef Pipefish [66263]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]	df - Page Number: 215 of 426	Species or species habitat may occur within

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Name	Threatened	Type of Presence
		area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related
		behaviour known to occur within area
Chelonia mydas		Within aroa
Green Turtle [1765]	Vulnerable	Breeding known to occur
		within area
Crocodylus porosus Caltavatar Oracadila Fatuarina Oracadila [4774]		On a sing on an asing habitat
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
		incry to occur within area
<u>Dermochelys coriacea</u>		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur
Dictoire kingii		within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat
opeolacied ocasitate [1120]		may occur within area
		,
<u>Disteira major</u>		
Olive-headed Seasnake [1124]		Species or species habitat
		may occur within area
Enhydrina schistosa		
Beaked Seasnake [1126]		Species or species habitat
		may occur within area
Erotmocholys imbricata		
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat
Trawksbiii Turtie [1700]	Vullierable	known to occur within area
Hydrophis elegans		
Elegant Seasnake [1104]		Species or species habitat
		may occur within area
Hydrophis mcdowelli		
null [25926]	(5)	Species or species habitat
	7	may occur within area
Hydrophis ornatus		
Spotted Seasnake, Ornate Reef Seasnake [1141]		Species or species habitat
		may occur within area
Lapemis hardwickii		
Spine-bellied Seasnake [1113]		Species or species habitat
Spirio Boillog Godoridiko [1110]		may occur within area
SOF		•
<u>Laticauda colubrina</u>		
a sea krait [1092]		Species or species habitat
		may occur within area
Laticauda laticaudata		
a sea krait [1093]		Species or species habitat
		may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur
onvolvano, radio radio radio [1707]	Endangoroa	within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur
Pelamis platurus		within area
Yellow-bellied Seasnake [1091]		Species or species habitat
		may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat
		may occur within

Name	Status	Type of Presence
Balaenoptera edeni		area
Bryde's Whale [35]		Species or species habitat
		may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat
	aago.oa	may occur within area
<u>Delphinus delphis</u>		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat
		may occur within area
<u>Grampus griseus</u>		
Risso's Dolphin, Grampus [64]		Species or species habitat
		may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat
		known to occur within area
Orcaella brevirostris		
Irrawaddy Dolphin [45]		Species or species habitat
		likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat
		may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata		within area
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat
		may occur within area
<u>Tursiops aduncus</u>	75)	
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose	>	Species or species habitat
Dolphin [68418]		likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat
		may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within
Landhura nunatulata		area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat
Nutrieg Marinkin [599]		likely to occur within area
		•
Passer domesticus		0
House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis		Charies or anasias habitat
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris		Charles or anasias habitat
Common Starling [389]		Species or species habitat likely to occur within area
_		
Frogs Phinalla marina		
Rhinella marina Cane Toad [83218]		Species or species habitat
		known to occur within area
Mammala		
Mammals Bos taurus		
Domestic Cattle [16]		Species or species habitat
		likely to occur within area
Cania lunua familiaria		
Canis lupus familiaris	/7	Species or species habitat
Domestic Dog [82654]		Species or species habitat likely to occur within area
		,
Felis catus		Consider or opening habitat
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
		mioly to occur minim aloa
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		Charies or anasias habitat
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
		,
Sus scrofa		On a sing on an asing babitat
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Pad Fav [48]		Consider an appaire habitat
Red Fox, Fox [18]		Species or species habitat likely to occur within area
		michy to occur minim and
Plants A continuo di la tina di la continuo di la		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat
Frickly Acacia [0190]		may occur within area
		•
Asparagus aethiopicus	Forn	Charles or angeles habitat
Asparagus Fern, Ground Asparagus, Basket Sprengi's Fern, Bushy Asparagus, Emerald A		Species or species habitat likely to occur within area
[62425]		
Cryptostegia grandiflora	1 P	
Rubber Vine, Rubbervine, India Rubber Vine Rubbervine, Palay Rubbervine, Purple Allam		Species or species habitat likely to occur within area
[18913]	anda	intory to occur within area
Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Sta		Species or species habitat
West Indian Grass, West Indian Marsh Grass	S [31/54]	likely to occur within area
Jatropha gossypifolia		
Cotton-leaved Physic-Nut, Bellyache Bush, C		Species or species habitat
Physic Nut, Cotton-leaf Jatropha, Black Phys	sic Nut	likely to occur within area
[7507]	26 Release.pdf - Page Number: 218 of 426	

	0.1	T (D
Name	Status	Type of Presence
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Mimosa pigra		Species or species habitat likely to occur within area
Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223] Parkinsonia aculeata		Species or species habitat likely to occur within area
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Lepidodactylus lugubris Mourning Gecko [1712]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.017 148.25683

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- -Australian Government Australian Antarctic Data Centre
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gailery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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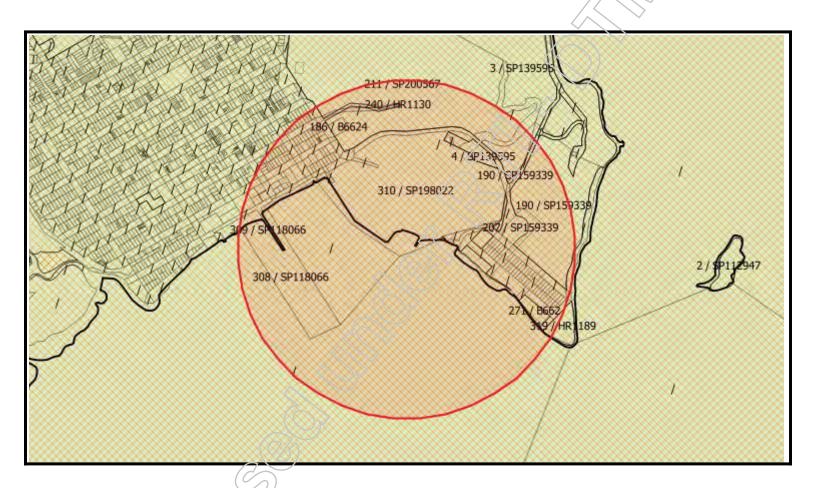
Department of the Environment

GPO Box 787

Canberra ACT 2601 Australia

+61 2 6274 1111

Reference Number:	44302	
Latitude:	-20.019500	
Longitude:	148.256600	
Buffer Distance:	1000 metres	



There are no Aboriginal or Torres Strait Islander cultural heritage site points recorded in your specific search area.

There are no Aboriginal or Torres Strait Islander cultural heritage site polygons recorded in your specific search area.

Cultural heritage party for the area is:

QC Ref Number	QUD Ref Number	Party Name	Contact Details
QCD2014/014 DET	QUD554/2010	Juru People (Part A)	Grant Thornton Australia Not Relevant 15 Lake Street CAIRNS QLD 4870 Phone: 07 4046 8888
QCD2015/006 DET	QUD554/2010	Juru People (Part B)	Grant Thornton Australia Not Relevant 15 Lake Street CAIRNS QLD 4870 Phone: 07 4046 8888

Cultural heritage body for the area is:

Cultural fielitage body for the area is.	
Name	Contact Details
Kyburra Munda Yalga Aboriginal Corporation RNTBC	Grant Thornton Australia Not Relevant 15 Lake Street CAIRNS QLD 4870 Phone: 07 4046 8888
	Fax: 07 4775 2228

There are no cultural heritage management plans recorded in your specific search area.

There are no Designated Landscape Areas (DLA) recorded in your specific search area.

There are no Registered Cultural Heritage Study Areas in your specific search area.

Regional Coordinator:

11081011011				
Name	Position	Phone	Mobile	Email
0	O	07 4799 7562	NR	Leigh.Preston@datsip.qld.gov.au
	Coordinator North Region			

I refer to your submission in which you requested advice regarding Aboriginal or Torres Strait Islander cultural heritage recorded at your nominated location.

The Cultural Heritage Database and Register have been searched in accordance with the location description provided, and the results are set out in the above report.

Aboriginal or Torres Strait Islander cultural heritage which may exist within the search area is protected under the terms of the *Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003*, even if the Department of Aboriginal and Torres Strait Islander Partnerships has no records relating to it.

Under the legislation a person carrying out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal or Torres Strait Islander cultural heritage. This applies whether or not such places are recorded in an official register and whether or not they are located on private land.

Please refer to our website https://www.datsip.qld.gov.au/people-communities/aboriginal-torres-strait-islander-cultural-heritage for a copy of the gazetted Cultural Heritage Duty of Care Guidelines, which set out reasonable and practicable measure for meeting the cultural heritage duty of care.

In order to meet your duty of care, any land-use activity within the vicinity of recorded cultural heritage should not proceed without the agreement of the Aboriginal or Torres Strait Islander Party for the area, or by developing a Cultural Heritage Management Plan under Part 7 of the legislation.

If your proposed activity is deemed a Category 5 activity pursuant to the Duty of Care Guidelines, there is generally a high risk that it may harm cultural heritage. In these circumstances, the activity should not proceed without cultural heritage assessment.

Where a category 5 activity is proposed, it is necessary to notify the Aboriginal or Torres Strait Islander Party and seek:

- a. Advice as to whether the area is culturally significant;
- b. If it is, agreement on how best the activity may be managed to avoid or minimise harm to any cultural heritage values.

The extent to which the person has complied with Cultural Heritage Duty of Care Guidelines and the extent the person consulted Aboriginal or Torres Strait Islander Parties about carrying out the activity – and the results of the consultation – are factors a court may consider when determining if a land user has complied with the cultural heritage duty of care.

19 Oct 2018 09:54

Should you have any further queries, please do not hesitate to contact the Search Approval Officer on 1300 378 401.

Kind regards

The Director

Cultural Heritage | Community Participation | Department of Aboriginal and Torres Strait Islander Partnerships

local people global experience



Form: Environment & Heritage **Service Request**

Revision Number: 13

Effective Date: 2/4/15

The Environment & Heritage Service Request form is used to engage an Environmental and/or Heritage Officer to undertake works for an Infrastructure Project. The form may be used to initiate a single activity (eg. Environmental Scoping Report) or a package of activities for a project management phase (eg. Environmental Assessment Report, Environmental Design Report & Develop Construction Contract (Environmental). The Project Manager is to complete and send to Manager (Technical Services) / Team Leader Environment. A delegated Environmental and / or Heritage Officer (Component Manager (CM) (Environment)) will review the Service Request and develop a Service Agreement in response with the Project Manager.

PROJECT MANAGER TO COMPLETE:

PROJECT DETAILS				
TMR District	Central Queensland Region / Mackay/Whitsunday District			
Project Name / Description	Bowen Breakwater Extension			
Project Number	PMD83/17			
Project Location	Bowen Boat Harbour, Henry Darwen Drive, Bowen 4805 Nearest adjacent lot Lot 310 on SP198022			
Local Government Area	Whitsunday Regional Council	QTRIP WBS	52-01009960.C.DE.2.2	
Road No / Facility No	Bower State Boat Harbour	DMS Reference	215/01502	
Requested by:	Scott McKinnon	Request Date:	3 December 2018	
PROJECT STATUS				
Project Funding / Type	Marine Infrastructure Investment Program			
Project Phase	Planning			
Design Delivery Method	External (Consultant) SMEC Australia Pty Ltd NR (Senior Engineer – Coatstal) – ph. 3029 6980			
Construction Contract Type	TBA			
Construction Contract Administration	ТВА			

Forecasted Project	Tenders Called: April 2019			Constr	uction Start: Jur	ne 2019
Milestones	Contract Award: May 2019			Constr	uction Complete	d: Sept 2019
Proposed Funding for Whole of Project (\$'000)	Prior	Current Next Final		ancial	2 Financial Years ahead	PROJECT BUDGET
Funding available to overall project costs incl. internal, contingency, overheads etc.	\$200	\$1,000	\$2,000		(Leave "0" if nil)	\$3,200

PROJECT SCOPE SUMMARY

- The project aims to construct a new (approximately 200m long) western breakwater and upgrade and extend (by approximately 130m) the existing eastern breakwater at the entrance to the Bowen Boat Harbour (refer to **Attachment 1** for a concept plan). The works are required to provide increased protection from wave action for vessels moored inside the harbour.
- Rock for the breakwaters will be obtained from a yet to be determined quarry and will be delivered to site via public roads.
- The new western breakwater will extend from existing reclaimed boat harbour land located at the end of Starboard Drive. The land area to which this breakwater will connect is clear of vegetation and has ample area for vehicle access, site offices and construction material laydown areas.
- The eastern breakwater works will involve upgrade and extension of the existing breakwater in this location. The land to which the eastern breakwater connects was reclaimed in the early 1990s, is within the State Boat Harbour and was recently (2016) used as a disposal location for dredge material dredge extracted from maintenance dredging of the harbour entrance channel. Trucks will deliver rock to the eastern breakwater site via Peter Wyche Drive and the existing haul roads within the site that have been previously used by heavy construction vehicle will be utilised (refer to aerial image Attachment 2).
- The expected breakwater construction methodology will be to place geofabric on the seafloor within the
 footprint of the breakwaters. Core rock will then be dumped on the geofabric, extending out from the
 land, to form the breakwater. The core rock will then be encapsulated in an outer shell of large armour
 rock which will be placed with an excavator.
- The footprint of both breakwaters will extend beyond the boundary of the boat harbour lease area (Lot 310 on SP198022) into Unallocated State Land of Edgecumbe Bay.
- The environmental approvals for the project are being obtained by consultancy firm, SMEC

Scope of Work Required from Regional Environment and Heritage staff;

Undertake an internal Cultural Heritage Risk Assessment (CHRA) to determine what duty of care
Category the works are and whether any heritage places (Aboriginal and/or Historical) are in and/or
near the works area, including provide future management recommendations based on the CHRA
results. Note - Attachment 3 is a CH Field Assessment that was undertaken in 2016 for the boat
harbour dredging project.

NOTE: If changes to the project scope occur after finalisation of the Service Request, a Project Scope Change Review form must be completed so that the impacts of the change can be identified and considered as part of the environmental component.

SCOPE IDENTIFICATION CHECKLIST			
PROJECT ASPECTS	YES	NO	DETAILS / LOCATION
PLANNING SITE INVESTIGATIONS	•	•	
Will any of the following potentially be required geotechnical) -	ired to fa	acilitate _l	preliminary investigations (eg. survey,
Clearing of vegetation (incl. trimming)			Geotech and wave studies for the project have already been completed
Ground disturbance outside the existing footprint (ie beyond table drains)			
Construction of temporary access causeways across tidal land			
DESIGN FEATURES			
Will any of the following potentially form pa	rt of pro	ject worl	KS-
Works outside of existing transport corridor			Works will be within the boat harbour lease area (Lot 310 on SP198022) and within the Unallocated State Land of Edgecumbe Bay
Works outside of existing formation			Refer above
Modification or construction of batters		\boxtimes	
Works extending below the level of Mear High Water Spring			
Drainage structures (culverts, bridges, table / catch drains etc), including extension, replacement, modification			
Road / marine furniture		\boxtimes	
Electrical installation (eg lighting, conduits)			Breakwaters will require installation of navigation aids to mark the channel entrance
Service / Utilities installation or relocations			
Removal of existing structures		\boxtimes	

SCOPE IDENTIFICATION CHECKLIST			
PROJECT ASPECTS	YES	NO	DETAILS / LOCATION
Interference with any historic features on or surrounding the site		\boxtimes	
CONSTRUCTION & ANCILLARY ACTIVIT	TIES	•	
Will any of the following potentially be requ	ired to fa	acilitate (construction -
Clearing of vegetation (terrestrial or marine)			Some seagrass is present within the breakwater footprint
Ground disturbance and/or earthworks	\boxtimes		
Dredging of material from watercourse or marine waters		\boxtimes	No material extraction should be required
Stockpiling of material	\boxtimes		Some rock stockpiling may be required although most of the construction rock is expected to be trucked and directly dumped on to the breakwater formation.
Site compound/s	\boxtimes	70	
Material source and / or disposal sites (eg borrow pits, stockpile sites)		M	Rock will most likely be purchased from a commercial quarry
Access / side tracks (incl. across waterways) and / or haul routes		96 ,	Eastern breakwater construction will utilise existing haul road across reclamation area. Western break water will be accessed directly from public roads.
Placement of any material in a waterway or marine waters (temporary and or permanent)			Breakwater will be entirely constructed from rock placed within marine waters.
Burning of vegetation / lighting fires		\boxtimes	
Significant vibration and/or noise generating activities (eg rolling, hard ripping, blasting)			
Taking of water from waterway or bore		\boxtimes	
Generation, storage and / or transportation of regulated waste		\boxtimes	
Creation of clear zones / sight-visibility clearing			

SCOPE IDENTIFICATION CHECKLIST				
PROJECT ASPECTS	YES	NO	DETAILS / LOCATION	
MARINE - SPECIFIC	•	•		
Inclusion of design features to maintain coastal processes		\boxtimes	Extensive wave / hydrodynamic modelling of the structures has been undertaken to ensure impacts on coastal processes have been minimised and wave protection has been maximised.	
Navigational Aids	\boxtimes			
OTHER DETAILS:				
Other, please specify]				
PROJECT INFORMATION SUPPLIED				

PROJECT INFORMATION S	PROJECT INFORMATION SUPPLIED				
Where possible, please provi	Where possible, please provide access to the following project/information				
Project Documentation	☐ Project Proposal				
	☐ Options Analysis	☐ Recreational Boating Forecast			
	☐ Business Case	Study			
	☐ Preliminary Design Report	☐ Maritime Asset Database Report			
	Site photos	☐ Existing permits for project /			
	☐ Project schedule	facility			
	□ Froject scheddle	☐ Existing Cultural Heritage			
		Management Plan / Agreement			
Design Documentation	☐ Layouts / sketches / design drawing	gs / maps [select latest produced]			
	Survey Information, if available				
C	Geotechnical Investigation Results / Report, if available				
Planning / Design	☐ Draft Design Brief / Functional Specification, if applicable				
Contract Documentation	☐ Consultant's Offer for Services, if applicable				
The above documentation is attached					

PROJECT TEAM & COMMUNICATIONS			
Project Manager	Trevor Carter / Principal Engineer (Coastal) Program Delivery and Operations	CM (Geospatial)	[name / organisation]

PROJECT TEAM & COMMUNICATIONS			
	Ph:3066 3620		
CM (Design)	[name / organisation]	CM (Materials)	[name / organisation]
Communications	Project Manager and Scott McKinnon (A/Senior Advisor – Environmental management)		
Progress Reporting	⊠ Required □ Not required		
Format	Email: trevor.b.carter@tmr.qld.gov.au Freque ncy fortnightly		
			<u> </u>

FACILITY MANAGER DETAILS (Marine Facility / Quarry etc)			
Organisation	TMR		
Contact Officer Name	Mike Smith Position Boat Harbour Controller		
Phone	47861966 Email michael.j.smith@tmr.qld.gov.au		
Facility Manager role	□ Design		
in delivery	□ Approvals		
	□ Construction □ Co		
	□ Commissioning and Perform □ Commissioning and Perform	st Constructi	on Operation

STAKEHOLDER DETAILS (INTERAL & EXTERNAL)			
Organisation / Council / Port Authority	Contact Details	Interest	
Regional Harbour Master	Frank D'Souza – 07 4421 8106	Maritime safety / Navigation	
907			

ENVIRONMENTAL OFFICER TO COMPLETE

ENVIRONMENT & HERITAGE ASSESSMENT DETERMINATION		
Based on the completed Scope Identification Checklist in the Service Request, an Environmental Scoping Report or other project environmental assessment –		
☐ Assessment is required.	Based on identified scope. Project is considered likely to be medium or high risk. Go to Environment & Heritage Deliverables table below.	
□ Further environmental assessment is not	Project does not trigger any of the above scope risks and is assessed negligible or low risk (Refer to Guidance Note: TMR Environmental Risk	

Rating for projects). No further environmental assessment is required during the Planning and Preconstruction phases of the project. Environment and

heritage management of works during Construction is to proceed in accordance with the standard requirements of the contract and any

Recommendations for Project:

required.

Project works will be largely under the water. The Bowen Boat Harbour area was extensively modified during the 1980s. Previous cultural heritage assessments conducted in the area were assessed as having a low risk of harming Aboriginal cultural heritage (Davey, C. [2016]. Bowen Boat Harbour Dredging Project. Cultural Heritage Field Assessment. A report by Niche Environment and Heritage for QLD Department of Transport and Main Roads).

recommendations included below.

If at any point during the project works Aboriginal cultural heritage is suspected to have been discovered, TMR's Find-Stop-Notify-Manage procedure is to be followed.

Not Relevant

11.01/19

Elizabeth McFarlane (Cultural Heritage Officer, Mackay/Whitsunday District)

ENVIRONMENT & HERITAGE DELIVERABLES

The CM (Environment) shall identify the actions and sub-tasks for the outputs required using the Environment & Her tage Work Breakdown Structure (E&H WBS). An estimate of costs associated with the outputs shall be provided with deliverable dates determined in consultation with the Project Manager.

NOTE: If changes to the project scope occur after finalisation of the Service Agreement, a Project Scope Change Review form must be completed so that the impacts of the change can be identified and considered as part of the environmental component.

ENVIRONMENT & HERITAGE DELIVERABLES				
OUTPUTS^	ACTIONS / SUB-TASKS	DELIVERY DATE	TIME / COST	
ie Environmental Scoping Report		3/3/16		
Field Assessment	Field trip & report writing	10/6/16		
Prepare permit applications		15/7/16	Sch.4 Part 4 s.7(1)(c) Business/comme	
Cultural heritage risk assessment		3/3/16		
Cultural heritage field assessment	Incl payment for TO's	10/6/16		
		Total Cost	~\$14,000 + extras	



Level 1, Building C, 6 Innovation Parkway Birtinya QLD 4575

Australia

T +61 7 5341 9551 **E**

NR

@smec.com

www.smec.com

Technical Note

To: Mr. Trevor Carter

From: Not Relevant

Date: 09 January 2019

No. Pages: 9

Reference: Bowen Harbour Breakwater Extension – Significant/Impact Assessment under *Environment*

Protection and Biodiversity Conservation Act 1999

1.0 Introduction and Background

The Department of Transport and Main Roads (TMR) seeks to increase the safety and tranquillity within Bowen Harbour by reducing the incoming wave energy which propagates through the harbour's entrance from a range of southerly directions. TMR aim to do this by constructing a new rubble mound breakwater structure on the western side of the established dredged navigation access channel, and extending the existing rubble mound breakwater structure on the eastern side of this channel.

The southern extent of the proposed breakwater structures extends into Port Denison. At this location Port Denison is mapped as a World Heritage property and National Heritage place under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The specific protected matter at this location is the Great Barrier Reef (GBR). While the Project area and Port Denison are recognised as part of the GBR for World Heritage property and National Heritage place purposes, the Project area and Port Denison are excluded from the Great Barrier Reef Marine Park Area as per the Great Barrier Reef Marine Park Authority's mapping (see **Attachment A**).

Port Denison is currently used for recreational/commercial boating purposes. Historical aerial photography shows that the Project area was previously a small natural inlet at the mouth of Magazine Creek (see Attachment B). At some time between 1960 and 1978 Bowen Harbour was established at this location. The construction of Bowen Harbour has significantly altered local tidal processes and estuarine connectivity within the Project area (Attachment B). This change in land use combined with continued use by recreational and commercial boats has diminished the Project area's value as a natural estuarine habitat.

2.0 Purpose of this Technical Note

During construction, the proposed breakwater extension has the potential to cause temporary disturbances to the surrounding natural environment. These disturbances may include increased sedimentation and pollutant loads entering the GBR and potential harm to local ecological values.

The purpose of this technical note is to assess the Project against the 'Significant impact guidelines 1.1 – Matters of National Environmental Significance' (Department of the Environment, 2013) criteria for World Heritage properties and National Heritage places, to determine if the proposed works will have, or are likely to have a significant impact on the natural heritage values of these places. The findings of this assessment will inform whether the Project will require referral to the Australian Government environment minister for further assessment under the EPBC Act.

3.0 Results of Assessment of Significance

The Project has been assessed against the significant impact criteria for World Heritage properties and National Heritage places (Department of the Environment, 2013). The findings of this assessment are provided in **Table 1**. The assessment found that the proposed development is not expected to have a significant impact on the GBR. Mitigation measures will be implemented during construction via the Contractor's Environmental Management Plan (Construction) (EMP(C)). Relevant mitigation measures are provided in **Attachment C** as a guide and are expected to be sufficient to protect the environmental values and water quality of the receiving environment. Based on the findings of this assessment, the project does not need to be referred for further assessment under the EPBC Act. The results of this assessment are only valid with respect to the Project footprint in **Attachment A**. If the extent of works changes significantly the outcomes of this technical note will need to be revised.

Table 1: Significant Impact Assessment of Great Barrier Reef World Heritage property/National Heritage place

World Herit	World Heritage properties with natural heritage values		
Item no.	Significant Impact Criteria	Assessment of Potential Impacts	
Values asso	ciated with the geology or landscape		
1a	Damage, modify, alter or obscure important geological formations in a World Heritage property/National Heritage place	No Significant Impact The proposed development does not occur near, nor will it alter or obscure any important geological formations.	
1b	Damage, modify, alter or obscure landforms or landscape features, for example, by excavation or infilling of the land surface in a World Heritage property/National Heritage place	No Significant impact The proposed development does not occur near, nor will it alter or obscure any important landscape features.	
1c	Modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilising mobile landforms, such as sand dunes, in a World Heritage property/National Heritage place	No Significant Impact The development is a coastal protection structure (breakwater). The development will minimise the impacts of coastal erosion by protecting the adjacent landward area from incoming wave action. The development will extend from existing rock wall structures. The development is not expected to exacerbate existing coastal erosion processes within or adjacent to the Project area. The development will not stabilise any mobile landforms such as dunes.	
1d	Divert, impound or channelise a river, we'tland or other water body in a World Heritage property/National Heritage place	No Significant Impact The proposed development will not impound or channelise a water body within a World Heritage property.	
1e	Substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons, or other pollutants or substances in a river, wetland or water body in a World Heritage property/National Heritage place	No Significant Impact Sediment sampling completed by BMT WBM (2015) found that sediments within the Project area did not contain contaminants above levels specified in the National Assessment Guidelines for Dredging 2009 (NAGD). Acid sulfate soil (ASS) testing was also completed as part of this sampling. No ASS was detected; however, PASS is potentially present (BMT WBM, 2015). It is noted	

World Herit	World Heritage properties with natural heritage values			
Item no.	Significant Impact Criteria	Assessment of Potential Impacts		
		that at present, all excavated material will be used insitu as part of the breakwaters and will remain saturated below highest astronomical tide (HAT), therefore having no opportunity to oxidise. However, in the unlikely event that removal of excavated material is required offsite, a nominal lime treatment of 3-5 kg CaCO3/t would still be recommended as a precautionary measure.		
		To ensure the development does not negatively impact local water quality during construction, an EMP(C) will be implemented by the chosen Contractor. Sedimentation and hazardous substances associated with construction works will be managed in accordance with an EMP(C). Daily visual inspections will be undertaken throughout the construction scope of works to confirm that the controls outlined in an EMP(C) are effective. Although unlikely, should water quality impact be detected which is attributable to the construction works, works in the area will cease and an investigation will be undertaken to determine the source and cause of the sedimentation or contamination. In this scenario, relevant authorities will also be notified.		
		To assist the Contractor in preparing their EMP(C), a Preliminary EMP (PEMP) has been prepared to support the Project. The PEMP is provided as Attachment B of this technical note. The PEMP further details how impacts to water quality and the receiving environment will be managed during construction.		
		Once operational the Project will not have ongoing impacts on the local water quality.		
Biology and	ecological values			
2a	Modify or inhibit ecological processes in a World Heritage property/National Heritage place	No Significant Impact Minor impacts to local ecological processes may occur during construction activities. Impacts may include temporary changes in local water quality and the removal of marine plants. To ensure the development does not negatively impact local water quality during construction, an EMP(C) will be implemented by the chosen Contractor.		

World Heri	World Heritage properties with natural heritage values			
Item no.	Significant Impact Criteria	Assessment of Potential Impacts		
		To assist the Contractor in preparing their EMP(C), a PEMP has been prepared to support the Project. The PEMP is provided as Attachment B of this technical note. The PEMP further details how impacts to water quality and the receiving environment will be managed during construction.		
		Impacts to marine plants will be managed through minimising the design footprint and providing offsets. This is discussed in more detail in 2b below.		
		Once operational the Project will not have ongoing impacts on local ecological processes.		
2b	Reduce the diversity or modify the composition of plant and animal species in a World Heritage property/National Heritage place	No Significant Impact The development's location is constrained by the location of the existing entrance to Bowen Harbour. Despite this existing constraint, efforts have been made during the design process to reduce the footprint of the works and therefore its impact on marine plants to the greatest extent possible. It is noted, for the purposes of assessing impacts to marine plants, a 5.0 m buffer has been provided around the proposed design to allow for construction activities.		
		The total area of marine plant disturbance is 1337.7 m², of which 811.6 m² will be for permanent works and 521.1 m² will be for temporary works. Marine plants within temporary work areas will be left to naturally regenerate following construction. The profile of the tidal flat adjacent to the breakwater structure will be left in a similar condition to its pre-works scenario to facilitate any natural regeneration. The Project will provide an offset to mitigate the impacts of the development on marine plants. The type and delivery of this offset will be determined through discussions between TMR and DAF.		
		The impacts to marine fauna are expected to be minor and temporary in nature. Suitable management measures will be included in the contractor's EMP(C) to minimise any potential impacts on marine fauna. As a minimum, these will include the presence of a fauna spotter, stop work requirements and fish kill procedures.		

World Herit	World Heritage properties with natural heritage values			
Item no.	Significant Impact Criteria	Assessment of Potential Impacts		
		An extended list of site specific management measures is included in Attachment B . These will be included in the contractor's EMP(C). Once operational the Project will not have ongoing impacts on local ecological		
		processes.		
2c	Fragment or damage habitat important for the conservation of biological diversity in a World Heritage property/National Heritage place	No Significant Impact Refer to 2b.		
2d	Cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property/National Heritage place	No Significant impact Refer to 2b.		
2e	Fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property/National Heritage place	No Significant Impact Refer to 2b.		
Wilderness,	, natural beauty or rare or unique environmental values			
3a	Involve construction of buildings, roads or other structures, vegetation	No Significant Impact		
	clearance, or other actions with substantial and/or long-term impacts on relevant values	Marine plants will require removal to facilitate the works. The development's location is constrained by the location of the existing entrance to Bowen Harbour. Efforts have been made during the design process to reduce the footprint of the works and therefore its impact on marine plants to the greatest extent possible.		
		Marine plants within temporary work areas will be left to naturally regenerate following construction. The profile of the tidal flat adjacent to the breakwater structure will be left in a similar condition to its pre-works scenario to facilitate ar natural regeneration. The Project will provide an offset to mitigate the impacts of the development on marine plants. The type and delivery of this offset will be determined through discussions between TMR and DAF.		

World Heri	tage properties with natural heritage values		
Item no.	Significant Impact Criteria	Assessment of Potential Impacts	
		The impacts to marine fauna are expected to be minor and temporary in nature. Suitable management measures will be included in the contractor's EMP(C) to minimise any potential impacts on marine fauna. As a minimum, these will include the presence of a fauna spotter, stop work requirements and fish kill procedures. An extended list of site specific management measures is included in Attachment B . These will be included in the contractor's EMP(C). Once operational the Project will not have ongoing impacts on local ecological values.	
3b	Introduce noise, odours, pollutants or other intrusive elements with substantial and/or long-term impacts on relevant values	No Significant Impact To ensure the development does not negatively impact local water quality during construction, an EMP(C) will be implemented by the chosen Contractor. Sedimentation and hazardous substances associated with construction works will be managed in accordance with an EMP(C). Daily visual inspections will be undertaken throughout the construction scope of works to confirm that the controls outlined in an EMP(C) are effective. Although unlikely, should water quality impact be detected which is attributable to the construction works, works in the area will cease and an investigation will be undertaken to determine the source and cause of the sedimentation or contamination. In this scenario, relevant authorities will also be notified.	
		Increased noise levels are expected to be temporary and limited to the construction of the breakwaters. This noise will be managed via the Contractors EMP(C). Background noise levels are not expected to increase once the breakwaters are operational.	
		To assist the Contractor in preparing their EMP(C), a PEMP has been prepared to support the Project. The PEMP is provided in Attachment B of this technical note. The PEMP further details how impacts to water quality and the receiving environment will be managed during construction.	

Important Note

This report is provided solely for the purposes of assessing the proposed works against the significant impact criteria for World Heritage properties and National Heritage places (Department of Environment, 2013). This report is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited ("SMEC") and the Department of Transport and Main Roads (TMR), under which SMEC undertook to perform a specific and limited task for TMR. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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References

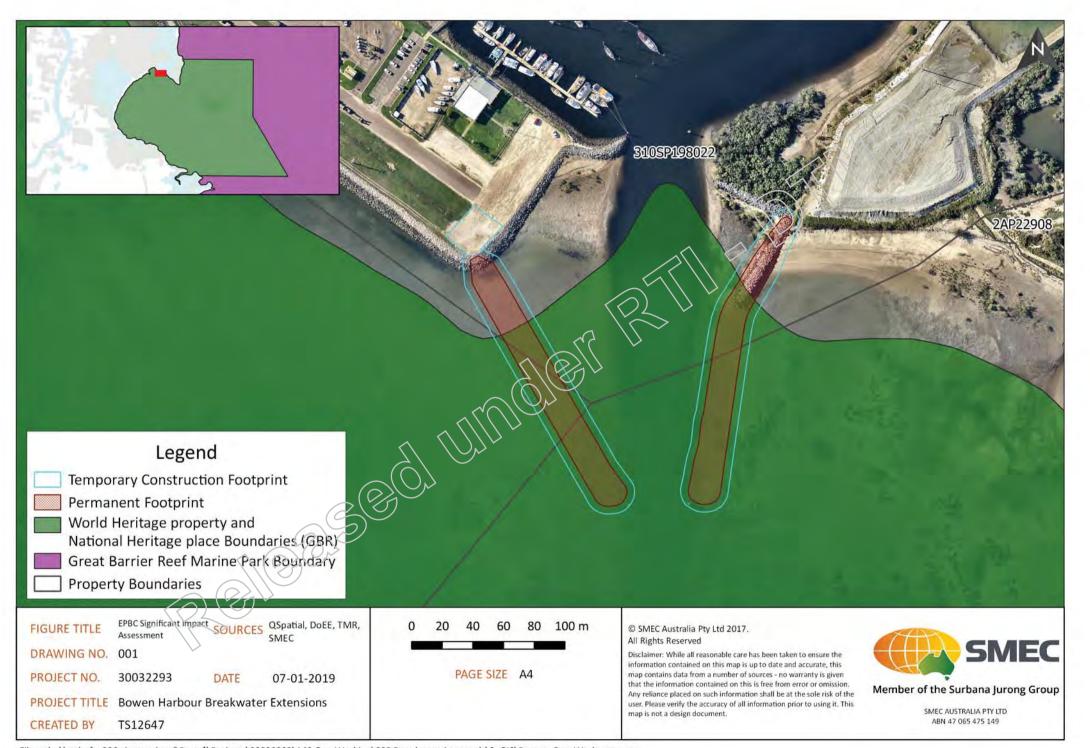
BMT WBM. (2015). Bowen Boat Harbour - Sediment Quality Report.

Department of the Environment. (2013). *Matters of National Environmental Significance: Significant impact guidelines 1.1.* Canberra: Australian Government.



Attachment A - Site Locality





Attachment B - Historical Aerial Imagery





Imagery ID: 09 September 1960, Bowen Q1039, Scale 1; 12,000.



Imagery ID: 29 November 1978, St.Lawrence-Townsville QP3437, Scale 1: 12,000.

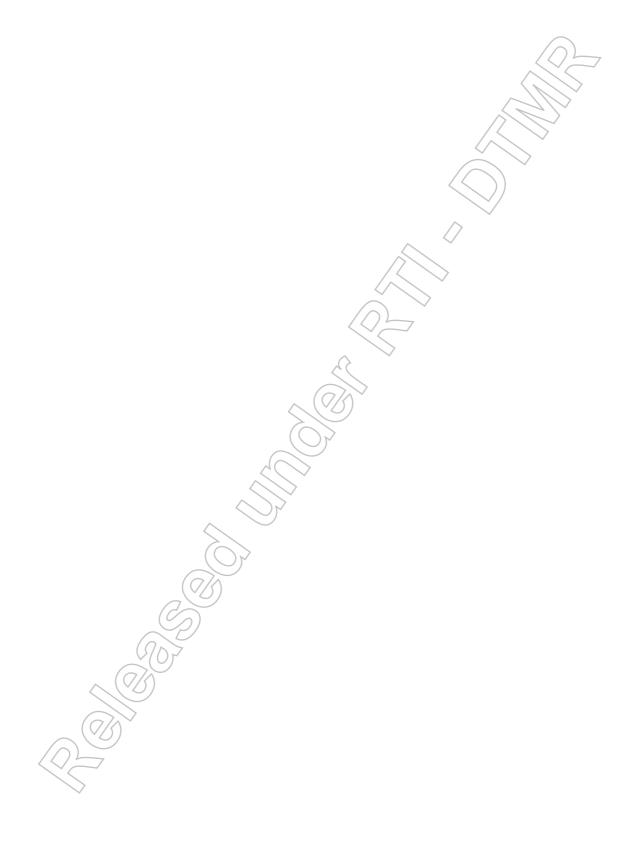


Imagery ID: 28 June 1985, St.Lawrence-Townsville QP4472, Scale 1: 12,000.



Imagery ID: 09 June 1998, Bowen Boat Harbour, Scale 1: 7,500.

Attachment C – Preliminary Environmental Management Plan







Document Control

Document:	Preliminary Environmental Management Plan		
File Location:	\\aubnfsv006.sjgroup.local\Ports\$\Projects\30032293\140 Ops-Working\005 Regulatory Approvals\5. Approvals Documentation\9. Appendices		
Project Name:	Bowen Harbour Breakwater		
Project Number:	30032293		
Revision Number:	Draft A		

Revision History

REVISION NO.	DATE	PREPARED BY	REVIEWED BY	APPROVED FOR ISSU	UE BY
Draft A	17 December 2018	Not Relevant			

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SMEC Company Details

Approved by: NR Address:

Level 6, 480 St Pauls Terrace, Fortitude Valley, QLD 4006

Signature: NR 07 3029 6980 Tel:

Email: smed.com Website: www.smec.com

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TMR and SMEC



Prepared for Department of Transport and Main Roads

SMEC Internal Ref. 30032293 20 December 2018

Important Notice

This report is confidential and is provided solely to inform the design of the Bowen Harbour Breakwater. This report is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited ("SMEC") and Department of Transport and Main Roads, under which SMEC undertook to perform a specific and limited task for Department of Transport and Main Roads. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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1 Introduction

1.1 Project Background and Location

The Department of Transport and Main Roads (TMR) is planning to construct a new rubble mound breakwater structure on the western side of the established dredged navigation access channel in Bowen Harbour, and extend the existing rubble mound breakwater structure on the eastern side of the channel (Appendix A). The purpose of the breakwater construction and extension is to increase the safety and tranquillity of the harbour by reducing incoming wave energy through the harbour's entrance. By constructing breakwaters on either side of the dredged navigation access channel, the directional spread of incoming wave energy that is able to penetrate into the boat harbour will be greatly reduced. This will provide greater protection to marina infrastructure and vessels inside the boat harbour.

The Project is located in Bowen Harbour along Boat Harbour Drive, Bowen at Lot 310 in SP198022, -20.0195, 148.2566. The project area consists of the breakwater design footprint with an additional 5.0 m buffer to allow for construction activities. The Project area falls entirely within the coastal management district.

This draft preliminary Environmental Management Plan (PEMP) has been prepared to support a development application for operational work that is 'tidal works' and the 'removal, destruction or damage of marine plants'. The purpose of this draft PEMP is to demonstrate adequate environmental management during the construction and extension of the breakwaters.

This PEMP will be reviewed and updated by the chosen Construction Contractor into a final EMP (construction), before works commence.

1.2 Description of Works

The works include both permanent and temporary works, with an:

- 1. Eastern breakwater extension of approximately 130 m
- 2. New western breakwater of approximately 185 m extending from the existing seawall.

The breakwaters will be constructed directly on top of the intertidal flat. Works to be undertaken include:

- Removal, damage or destruction of marine plants from the breakwater footprint and disposal outside of tidal lands and declared Fish Habitat Areas
- Establishing a site compound near the works site
- End-tipping the core material into position along the footprint of the extended breakwaters as foundation material
- Trimming the core material to the lines and levels of the detailed design by an excavator
- Placing of secondary armour and primary armour using the excavator, closely following the core material placement to ensure that the core is protected from wave action during the construction period

The eastern breakwater will be completed when all rock material has been placed and the dimensions are confirmed by survey to meet the design tolerances nominated in the construction specifications.

The western breakwater will be completed in a similar manner, but will also have a concrete footpath constructed along the majority of its crest.

1.3 Environmental Approvals

A development approval has been obtained to undertake the works. Approval was granted on [INSERT APPROVAL DATE] for Operational Work that is Removing, Destroying or Damaging a Marine Plant [INSERT REFERENCE NUMBER] and on [INSERT APPROVAL DATE] for Operational Work that is Tidal Works [INSERT REFERENCE NUMBER]. A copy of the development approvals is provided in Appendix B, and the conditions of approval are summarised in Section 3. All works will be undertaken in accordance with the conditions of approval.

1.4 Document Structure

This PEMP comprises two parts; the environmental management framework and the environmental management sub-plans.

The environmental management framework governing the activity provides the following information:

- Objectives of the draft PEMP
- Management structure and responsibilities
- Procedures to respond to community complaints
- Procedures to investigate environmental incidents.

Environmental management sub-plans have been prepared for key environmental issues. Each sub-plan contains the following information:

- Policy statement
- Performance criteria
- Management measures
- Monitoring requirements
- Reporting requirements
- Incident response criteria
- Corrective actions.



2 Environmental Management Framework

2.1 Objectives

The objectives of the PEMP are to:

- Prescribe work practices, procedures and controls to minimise environmental harm and comply with approval conditions
- Encourage effective and efficient management by planning and continuous improvement of environmental practices
- Define day-to-day roles and environmental responsibilities for site personnel
- Define how the management of the environment is reported and performance evaluated
- Outline monitoring procedures required to identify impacts on the environment
- Establish procedures for response to actual or potential environmental concerns, community complaints and ensure corrective action is taken.

2.2 Management Structure

For the purposes of the PEMP, it is assumed that a Project Manager will be appointed by the Contractor and, unless otherwise stated in the final EMP, will hold overall responsibility for ensuring compliance with the EMP.

It is assumed that the Contractor will also appoint a Project Foreman who will be on site during all works, and will be responsible for the day to day implementation of the EMP.

2.3 Hours of Operation

Hours of operation of all activities will be limited to:

- Monday to Friday 7am to 6pm
- Saturday 7am to 4pm

No work will be undertaken on Sundays or public holidays

2.4 Complaints

In the event of a valid complaint, the following procedure will be adhered to:

- All community feedback received by the Project Foreman will be recorded in the Community Feedback Register (refer to Appendix C)
- The Community Feedback Register will be sent to the Project Manager within 24 hours of receipt of a complaint
- If corrective actions are required, a Corrective Action Form (refer to Appendix D) will be completed and sent to the Project Manager within 24 hours
- If the Project Foreman can take remedial action, then action must be taken as soon as reasonably practicable. If the remedial action required is beyond the Project Foreman's control, then the Project Foreman/Project Manager must contact a suitably qualified environmental consultant to initiate an investigation as soon as reasonably practicable
- The Project Manager is to advise the complainant of the actions taken to rectify the issue
- A record of community complaints and actions taken must be readily available for review by the Department of Environment and Science (DES) upon request

2.5 Incident Response

In the event of an environmental incident/accident or emergency the following procedure will be undertaken:

- Employees, sub-contractors and visitors to site will report all emergencies or incidents to the Project Foreman immediately
- The Project Foreman will notify the relevant emergency services, Project Manager and TMR representative immediately of an incident/emergency occurring

Roads

- The Project Foreman will complete a Corrective Action Request form (refer to Appendix D) and provide a copy of the information to the Project Manager and TMR. The incident will also be logged in the Corrective Action Register (refer to Appendix D)
- TMR will notify DES by phone within 24 hours of the emergency/incident
- TMR will submit to DES a written advice statement based on the information contained within the Corrective Action Register
- TMR will notify DES of the following:
 - The holder of the license/permit
 - Location of the emergency/incident, name and telephone number of the designated contact person, time
 of the emergency/incident
 - The environmental harm or nuisance caused, threatened, or to be caused by the incident/emergency
 - Actions taken to prevent further incidents/emergencies and mitigate any environmental harm and/or nuisance caused by the incident/emergency
 - Proposed actions to prevent a recurrence of incident/emergency
 - Outcomes of actions taken at the time to prevent or minimise environmental harm or nuisance.

Results of environmental monitoring performed in relation to the emergency or incident will be reported to DES. If an item of cultural heritage significance is uncovered, contact the Juru People (refer to Table 2-1).

Table 2-1: Emergency Contact Information

ORGANISATION	CONTACT	PHONE NUMBER		
TMR	Customer Service	07 3405 0985		
11411	Project Manager	5433 2677		
[INSERT CONTRACTOR]	Project Manager	[INSERT PHONE NUMBER]		
DES	24 hours Emergency Service (DES Pollution Hotline -Emergency Incidents Only)	1300 130 372		
Police	Emergency only	000		
Tonice	Bowen Police Station	07 4720 4555		
A 1 1	Emergency only	000		
Ambulance	Non Digent (Local Ambulance Service Network – Bowen)	07 4965 6601		
Fire Brigade	Emergency only	000		
The brigade	Bowen Fire Station	07 4786 1811		
Hospitals	Bowen	07 4786 8222		
Tiospitais	Proserpine	07 4813 9400		
Poisons Centre	24 hours Service	131 126		
Juru People	Grant Thornton Australia Not Relevant	07 4046 8888		

2.6 Continual Improvement

This PEMP will be reviewed and updated by the Construction Contractor into a final EMP (construction), before works commence.

3 Approval Conditions

The conditions of approval in Table 3-1 will be implemented during the construction phase.

Table 3-1: Conditions of Approval

APPROVAL	CONDITION	
Marine Plant Removal	[INSERT CONDITIONS	UPON RECEIPT OF APPROVAL]
ïdal Works	[INSERT CONDITIONS WORKS PERMIT	UPON RECEIPT OF TIDAL
		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
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4 Environmental Sub-Plans

4.1 Water Quality

Discharges to receiving waters are controlled by the *Environmental Protection Act 1994*, and the *Environmental Protection Policy (Water) 2009*. The Water Quality Sub-Plan (Table 4-1) outlines measures to manage any discharges to water from construction activities. The project requires the operation of machinery on land within tidal waters which may stir up benthic sediments, temporarily increasing turbidity in the immediate area. Machinery operating near the water's edge also increases the risk of hydrocarbon release into the waterway as a result of spills, mechanical failures such as hydraulic lines rupturing, and runoff from vehicle's surfaces.

CSIRO Australian Soil Resource Information System mapping identified a low probability and low confidence of acid sulfate soils (ASS) occurring in the project area (which is below 5 m AHD). BMT WBM (2015) determined that sediments are potential ASS, but that no liming would be required. The acid neutralising capacity (ANC) was in excess of the chromium reducible sulfur at all locations indicating sufficient capacity for neutralising acids upon oxidation. It is proposed that all excavated material will be used in situ as part of the breakwaters and will remain saturated below highest astronomical tide (HAT), with no opportunity to oxidise. However, in the event that disposal of excavated material is required offsite, a nominal lime treatment of 3-5 kg CaCO₃/t is recommended as a precautionary measure (BMT WBM, 2015).

Table 4-1: Water Quality Sub-Plan

ITEM	RESPONSE
Policy	To minimise the impacts of construction on surface water quality
Performance Criteria	 No degradation of the local aquatic environment occurs through: Increase in local turbidity (e.g. sediment plumes) visible turbidity plume extending more than 100 m either side of the Project area as a result of the works release of acidic material as a result of the works disturbance of fish resources removal of marine plants outside of the area defined in design drawings and marine plant developmental approval No contaminants shall be discharged to the environment.
Management Measures	include visual indicators of potential acid sulfate soils in environmental induction for staff to be working onsite. Use all excavated material in situ as part of the breakwaters where they will remain saturated below HAT, with no opportunity to oxidise.

ITEM		RESPONSE
		If spoil needs to be removed and disposed of off-site, a nominal lime treatment of 3-5 kg CaCO3/t should be applied as a precautionary measure and spoil taken to a licensed disposal facility (subject to any requirements specified by the receiving facility prior to receipt of the material). Ensure the receiving facility has capacity to receive material before exceptation.
		Sediment Plumes
		Ensure the sediment plumes do not expand beyond the above specified area.
		Select machinery to carry out maintenance works on the basis of the type and size that is required and capable of safe operation to achieve minimal impact to water quality.
		Refuelling and Storage of Flammable and Combustible Materials
		Refuelling of plant and equipment will not occur within 25 m of any waterbody.
		Site induction training will include appropriate information regarding the storage and handling of dangerous and hazardous substances, including instructions on emergency spill response procedures and the location of spill control equipment.
		Spill Response
		If the accidental release of material occurs (i.e. prescribed water contaminant), the following actions will be implemented:
		Immediately assess the size and origin of the spill
		Initiate actions to safely stop further release of the substance
		 Initiate actions to safely contain the spilled substance and prevent its distribution via natural coastal processes, using available spill containment equipment such as booms
		Implement actions to remove spilt substance, using available spill clean-up equipment
		Notify the following emergency response teams in the event of a major spill:
		MARITIME SAFETY QUEENSLAND – (07) 5477 8425
		MARDIMÉ SAFETY QUEENSLAND EMERGENCY AFTER HOURS – (07) 3305 1700
		• DES 1300 130 372
	\wedge	Follow the incident response procedure outlined in Section 2.5.
		Before works commence, inspect:
		Machinery for leaking fuel or oil or potential ruptures points in hydraulic hoses
Monitoring		Adequacy and quantity of spill control equipment
		Daily visual inspections for:
		Sediment plumes downstream of work site

PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

Bowen Harbour Breakwater Prepared for Department of Transport and Main Roads SMEC Internal Ref. 30032293 20 December 2018

ITEM	RESPONSE
	 Check visible films or grease on water within/downstream of work site Floating litter or other waste Ensure environmental flows are maintained.
Reporting	Maintain records of incidents involving the release of prescribed contaminants.
Identification of Incident or Failure to Comply	Release of prescribed contaminants.
Corrective Actions	If turbid plumes are observed extending more than 100 m from the site, or sediment is remaining suspended for more than one day, cease works and seek advice for appropriate treatment. This may include restricting works to periods of slack water, installing a silt curtain, or changing methodology and/or equipment in use. Should there be non-compliance with the aforementioned requirements, cease work and follow the incident response procedure outlined in Section 2.5.



Roads

4.2 Waste Management

The Environmental Protection Act 1994 and the associated Environmental Protection (Waste Management) Regulation 2000 provide the legislative and regulatory controls for the management of wastes on-site. Waste will be managed in accordance with the Waste Sub-plan (Table 4-2). Works activities may generate waste including plastic and cardboard packaging and padding, empty fuel containers and spare or used parts, in addition to personal litter from the Contractor's staff.

Table 4-2: Waste Management Sub-Plan

ITEM	RESPONSE
Policy	To minimise wastes produced on-site, and to ensure waste is disposed of in a lawful manner which prevents environmental harm.
Performance Criteria	Minimise waste production on-site and apply waste management hierarchy. No release of waste materials from the site of works. No contravention of local or state waste regulations.
Management Measures	Excavated material will be re-used on site. Marine plants and marine plant parts and other material authorised for removal will be disposed of outside of tidal lands and declared Fish Habitat Areas. Regulated wastes (i.e. waste oils) will be transported by a licenced contractor to an appropriate waste facility. Dispose of general wastes at an approved waste disposal facility. Store waste materials in receptacles with lids or otherwise suitably to contain and prevent contamination of adjacent sites. At the completion of the project leave the site clear of all rubbish and waste, and in a clean and tidy condition.
Monitoring	Conduct a daily visual inspection of the general work area for debris.
Reporting	Maintain the following records for any regulated wastes generated: Potential ASS – location and estimated volume of material, date/time the material was disturbed Date, quantity and type of wastes removed from site Name of waste transporter and/or disposal operator that removed waste from site Intended treatment/disposal destination of the waste.
Identification of Incident or Failure to Comply	Release of waste to the environment.

ITEM	RESPONSE
Corrective Actions	Remove or clean up any material dropped or spilled as soon as possible. Any waste disposed of inappropriately is to be retrieved and disposed of in accordance with all regulations and best practise waste management
	Should there be non-compliance with the aforementioned requirements, cease work and follow the incident response procedure outlined in Section 2.5.
	Review and if necessary revise waste management processes.



4.3 Aquatic Flora and Fauna

Protection of marine flora and fauna is controlled under the *Nature Conservation Act 1992*, *Fisheries Act 1994* and the *Environment Protection and Biodiversity Conservation Act 1999*. The Project area contains a small population of seagrass species. Desktop searches identified 11 records of threatened marine fauna within 1 km of the project area, although the Protected Matters Search relies on bioclimatic modelling and does not necessarily indicate the presence of a species. The marine vegetation may also provide habitat for a range of common fish, crustaceans and benthic fauna. Impacts to marine fauna are expected to be minor and temporary in nature. These impacts will be managed in accordance with the Aquatic Flora and Fauna Sub-plan (Table 4-3).

Table 4-3: Aquatic Flora and Fauna Sub-Plan

ITEM	RESPONSE
Policy	Avoid, where possible, impacts on native flora and fauna.
Performance Criteria	No vegetation to be disturbed outside of the approved extent of works as shown on Design Drawings. No fauna injuries or kills.
Management Measures	Fish trapped as a result of the works will be removed and released in accordance with the Fisheries Queensland Fish Salvage Guidelines. Handling of fish should be carried out by a suitably qualified professional or fauna spotter/catcher. The fauna spotter/catcher must hold a current Wildlife Rehabilitation Permit issued by DES. Clearly define clearing limits on site. Removal of marine plants will be limited to the approved extent of works (i.e. project footprint on design drawings). All pruning and trimming must be conducted according to the following requirements: Mangrove branches greater than 25 mm in diameter must be pre-cut to prevent splitting Cutting equipment is kept sharp and clean at all times Within the approved access path leave subsurface roots in-situ to minimise subsurface disturbance. Marine plants and marine plant parts and other material authorised for removal will be disposed of outside of tidal lands and declared Fish Habitat Areas. Chemicals shall not be used on marine plants. Marine plants will not be burned. Excavated material will not be side-casted onto marine plants.
Monitoring	Visual check of vehicles, vessels and equipment for fauna prior to starting machinery

ITEM	RESPONSE
	Following removal of marine plants, survey the project area to confirm that clearing has been limited to approved areas in accordance with design drawings and marine plant development approval.
Reporting	Record instances where marine plants are removed outside of the approved area.
Identification of Incident or Failure to Comply	Removal of vegetation outside of the approved area.
Corrective Actions	If clearing occurs beyond boundary, cease clearing operations. Reinstate clearing limit markers. Re-communicate limits with operators. Transport injured fauna to an appropriate veterinarian or carer as soon as possible. Report any fauna injuries or kill to DES.
	Should there be non-compliance with the aforementioned requirements, cease work and follow the incident response procedure outlined in Section 2.5.



PLAN

Roads

Bowen Harbour Breakwater

Appendix A Construction Drawings

(Supplied as a separate document within the development application)



Appendix B Project Approvals

1) Marine Plant Approval [INSERT UPON RECEIPT OF APPROVAL]

2) Tidal Works Approval [INSERT UPON RECEIPT OF APPROVAL]

Appendix C Community Feedback Register

DATE	TIME	NAME	ADDRESS	PHONE NO.	FEEDBACK RECEIVED	NAME OF INVESTIGATOR	DOES THE CAR NEED TO BE COMPLETED? Y/N	DATE CLOSED	SIGNATURE	FEEDBACK PROVIDED TO COMMUNITY MEMBER?
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Appendix D Corrective Action Request Form and Register

Corrective Action Request (CAR)



Corrective Action Register (CAR)

INCIDENT NO.	DATE	TYPE OF INCIDENT	REPORTED BY	THME	INVESTIGATOR	OPEN/CLOSED	SIGNATURE	DATE
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	(7/1)	\supset						
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local people global experience



NIR From: Trevor B Carter; Charles-Dean A Sorbello; Scott G McKinnon To: Cc: Subject: FW: 1901-9077 SDA application correspondence Date: Thursday, 28 March 2019 4:23:38 PM Attachments: 1901-9077 SDA - Approved plans.pdf 1901-9077 SDA - GE78-N Statement of reasons.pdf GE11-N Planning Act 2016 - Appeal provisions.pdf 1901-9077 SDA - AM10-N Decision - approval with conditions.pdf Good afternoon Trevor, Please find attached the formal regulatory approvals for the Bowen Boat Harbour Breakwater Project. Best regards NR Senior Engineer - Coastal Not Relevant **T** +61 7 3029 6980 @smec.com Local People, Global Experience SMEC (Member of the Surbana Jurong Group) Level 6, 480 St Pauls Tce, Fortitude Valley, QLD, 4006, Australia www.smec.com | Linkedin Disclaimer: The information contained in this e-mail and any attached file is confidential. It is intended solely for the addressee, and may not be used, reproduced, disclosed or distributed without SMEC's permission. SMEC accepts no liability for loss or damage (whether caused by negligence or not) resulting from the use of any attached files. From: MIWSARA < MIWSARA@dsdmip.gld.gov.au> Sent: Wednesday, 27 March 2019 8:42 AM Not Relevant To: @smec.com> Cc: 'info@whitsundayrc.qld.gov.au' < info@whitsundayrc.qld.gov.au> Subject: FW: 1901-9077 SDA application correspondence **Good Morning** Please take this email with the relevant attachments as the departments response for 1901-9077 SDA. There was an error in the email sent yesterday from MyDAS (internal document sent by mistake). Thanks in advance Odette From: No Reply notifications-prod2@qld.gov.au> Sent: Tuesday, 26 March 2019 3:19 PM To: MIWSARA < MIWSARA@dsdmip.gld.gov.au > @smec.com Cc: info@whitsundayrc.gld.gov.au Subject: 1901-9077 SDA application correspondence Please find attached a notice regarding application 1901-9077 SDA.

If you require any further information in relation to the application, please contact the Department of State Development, Manufacturing, Infrastructure and Planning on the details provided in the notice.

This is a system-generated message. Do not respond to this email.



Department of State Development,
Manufacturing, Infrastructure and Planning

Email Id: RFLG-0319-0004-3622

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Department of

State Development, Manufacturing, Infrastructure and Planning

Our reference:

1901-9077 SDA

Your reference:

Bowen Harbour Breakwater

26 March 2019

Department of Transport and Main Roads C/- SMEC

Level 1, Building C, 6 Innovation Parkway

BIRTINYA QLD 4575 NR @smec.com

Attention:

Not Relevant

Dear

NR

Decision notice—approved with conditions

(Given under section 63 of the Planning Act 2016)

The development application described below was properly made to the Department of State Development, Manufacturing, Infrastructure and Planning on 17 January 2019.

Applicant details

Applicant name: Department of Transport and Main Roads C/- SMEC

Applicant contact details: Level 1, Building C, 6 Innovation Parkway

BIRTINYA QLD 4575

@smec.com

Location details

Street address: Boat Harbour Drive, Bowen QLD 4805

Real property description: On and adjacent to Lot 310 on SP198022 (including Unallocated State

Land)

Local government area: Whitsunday Regional Council

Decision

Date of decision: 26 March 2019

Decision details: Approved subject to conditions

Approval details

Development permit Operational Work for Tidal Works or Works in a Coastal

Management District; and

Operational Work for the Removal, Destruction or Damage of a

Marine Plant.

Mackay Isaac Whitsunday regional office

Level 4, 44 Nelson Street, Mackay PO Box 257, Mackay QLD 4740

Page 1 of 8

Referral agencies

Not applicable.

Conditions

This approval is subject to:

the assessment manager conditions in Attachment 1

The department has, for conditions of this approval, nominated an entity to be the enforcement authority for that condition under the *Planning Act 2016*.

Advice to the applicant

The department offers advice about the application to the applicant in Attachment 2.

Properly made submissions

Not applicable—No part of the application required public notification.

Rights of appeal

The rights of applicants to appeal to a tribunal or the Planning and Environment Court against decisions about a development application are set out in chapter 6, part 1 of the *Planning Act 2016* (the Act). For particular applications, there may also be a right to make an application for a declaration from a tribunal (see chapter 6, part 2 of the Act).

Copies of the relevant appeal provisions are attached

Currency period for the approval

This development approval will lapse if development is not started within the currency periods stated in section 85 of the Act.

Native title considerations

A native title assessment was completed for this application under the *Native Title Act 1993* (Cth) and it was deemed that procedural rights do not apply. Further consideration of native title is not required, and a decision can be issued under the *Pianning Act 2016*.

Approved plans and specifications

Copies of the following approved plans and specifications are enclosed.

Drawing/report title	Prepared by	Date	Reference no.	Version/ issue						
Aspect of development: Operational Work										
Bowen Boat Harbour Proposed Breakwater Extensions General Arrangement	Queensland Government	11/12/18	02-TC-0002	Version 01						
Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater General Arrangement Plan	Queensland Government	18/12/18	03-GA-0001	Version 02						
Bowen Boat Harbour Proposed Breakwater Extensions Western	Queensland Government	18/12/18	03-GA-0011	Version 02						

Breakwater General Arrangement Plan				
Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater Details	Queensland Government	18/12/18	04-GD-0001	Version 02
Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater Details	Queensland Government	18/12/18	04-GD-0011	Version 02
Figure 4-3: Areas of narrowleaf seagrass (SMEC, 2018)	SMEC	20-12- 2018	30032293, Drawing No. 004	-
Figure 4-4: Areas of mangrove (SMEC, 2018)	SMEC	20-12- 2018	30032293, Drawing No. 005	-

For further information please contact

Principal Planning Officer, on (07) 4898 6816

or via email MIWSARA@dsdmip.qld.gov.au who will be pleased to assist,

Yours sincerely
NR

A/Manager (Planning)

Mackay Isaac Whitsunday Regional Office

cc Whitsunday Regional Council, info@whitsundayrc.qld.gov.au

enc Attachment 1—Assessment manager conditions

Attachment 2—Advice to the applicant

Appeal provisions

Approved plans and specifications

Statement of reasons

Attachment 1—Assessment manager conditions

No. Conditions of development approval Condition timing Development Permit for Operational Work for Tidal Works or Works in a Coastal Management District; and Operational Work for the Removal, Destruction or Damage of a Marine Plant Schedule 8, Table 4, Item 3(I)-Operational Work for Tidal Works or Works in a Coastal Management District-The chief executive administering the Planning Act 2016 nominates the Director General of the Department of Environment and Science to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions: 1. The construction of the breakwaters must be undertaken generally in For the duration of works. accordance with the following plans: Bowen Boat Harbour Proposed Breakwater Extensions General Arrangement prepared by Queensland Government dated 11/12/18, reference 02-TC-0002 and revision 0/1 Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/18, reference 03-GA-0001 and revision Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/18, reference 03-GA-0011 and revision 02 Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater Details prepared by Queensland Government dated 18/12/18, reference 04-GD-0001 and revision 02 Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater Details prepared by Queensland Government dated 18/12/18, reference 04-GD-0011 and revision 02. 2. For the proposed works, only use clean materials and ensure that the For the duration of works do not cause contamination. works. 3. Erosion and sediment control measures which are in accordance with For the duration of Best Practice Erosion and Sediment Control (BPESC) guidelines for works. Australia (International Erosion Control Association), are to be installed and maintained to prevent the release of sediment to tidal waters. Should the breakwater structures collapse, fail or otherwise suffer 4. As soon as structural consequences which impact their integrity or ability to reasonably function as intended, the works must be: practicable subsequent to the (a) reinstated in accordance with this development approval; or damage. (b) removed and disposed of at an appropriately licensed facility.

No.	Coı	nditions of development approval	Condition timing
5.	(a)	Obtain RPEQ certification confirming that the tidal works, have been constructed in accordance with the current version of the Department of Environment and Heritage Protection guideline 'Building and engineering standards for tidal works'.	For (a) and (b) within two (2) weeks of the completion of the works.
	(b)	Submit a copy of the "Certification" from part (a) of this condition and "As Constructed drawings" to palm@des.qld.gov.au or mail to:	
		Department of Environment and Science	
		Permit and License Management	
		Implementation and Support Unit	
		GPO Box 2454	
		Brisbane Qld 4001	
6.	(a)	In the event that the works cause disturbance or oxidisation of acid sulfate soil, the affected soil must be treated and thereafter managed (until the affected soil has been neutralised or contained) in accordance with the current Queensland Acid Sulfate Soil Technical Manual: Soil management guidelines, prepared by the Department of Science, Information Technology, Innovation and the Arts, 2014.	(a) Upon disturbance or oxidisation until the affected soil has been neutralised or contained.
	(b)	Certification by an appropriately qualified person(s), confirming that the affected soil has been neutralised or contained, in accordance with (a) above is to be provided to palm@des.qld.gov.au or mailed to	(b) At the time the soils have been neutralised or contained.
		Department of Environment and Science	contained.
		Permit and License Management	
		Implementation and Support Unit	
		GPO Box 2454	
		Brisbane Qld 4001	

Schedule 8, Table 4, Item 3(e)—Operational work for the removal, destruction or damage of a marine plant—The chief executive administering the *Planning Act 2016* nominates the Director General of the Department of Fisheries to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions:

7. The construction of the breakwaters must be undertaken generally in accordance with the following plans:

Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/2018, reference 03-GA-0001 and revision 02

Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/2018, reference 03-GA-0011 and revision 02

No.	Conditions of development approval	Condition timing
	 Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater Details prepared by Queensland Government dated 18/12/18, reference 04-GD-0001 and revision 02 Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater Details prepared by Queensland Government dated 18/12/18, reference 04-GD-0011 and revision 02. 	
8.	Development authorised under this approval is limited as follows: To destroy and remove marine plants being limited to 1,275.7m² of narrowleaf seagrass (<i>Halodule uninervis</i>) and one mature red mangrove (<i>Rhizophora stylosa</i>) covering an area of 62m² and shown in: • Figure 4-3: Areas of narrowleaf seagrass (SMEC,2018) prepared by SMEC dated 20-12-2018 reference 30032293 and Drawing No. 004 • Figure 4-4: Areas of mangrove (SMEC, 2018) prepared by SMEC dated 20-12-2018, reference 30032293 and Drawing No. 005.	At all times.
9.	Enter into an agreed delivery arrangement to deliver an environmental offset in accordance with the <i>Environmental Offsets Act 2014</i> to counterbalance the significant residual impacts on the matter of state environmental significance being 1,337.7m ² of marine plants.	Prior to commencing any works that impact marine plants.
10.	Provide written notice to notifications@daf.qld.gov.au, when the development authorised under this approval: (a) will start, and (b) when it has been completed. These notices must state this permit number 1901-9077 SDA.	 (a) At least 5 business days but no greater than 20 business days prior to the commencement of the works. (b) Within 15 business days of the completion of the fisheries development works.
11.	Spoil is not disposed of on tidal lands or within waterways, outside of the extent of the approved breakwater structures, and is managed to prevent acid soil development.	At all times.
12.	This fisheries development (as defined by the <i>Fisheries Act 1994</i>) constitutes a place that is required to be open for inspection by an inspector at all times, pursuant to section 145 of the <i>Fisheries Act 1994</i> .	At all times.

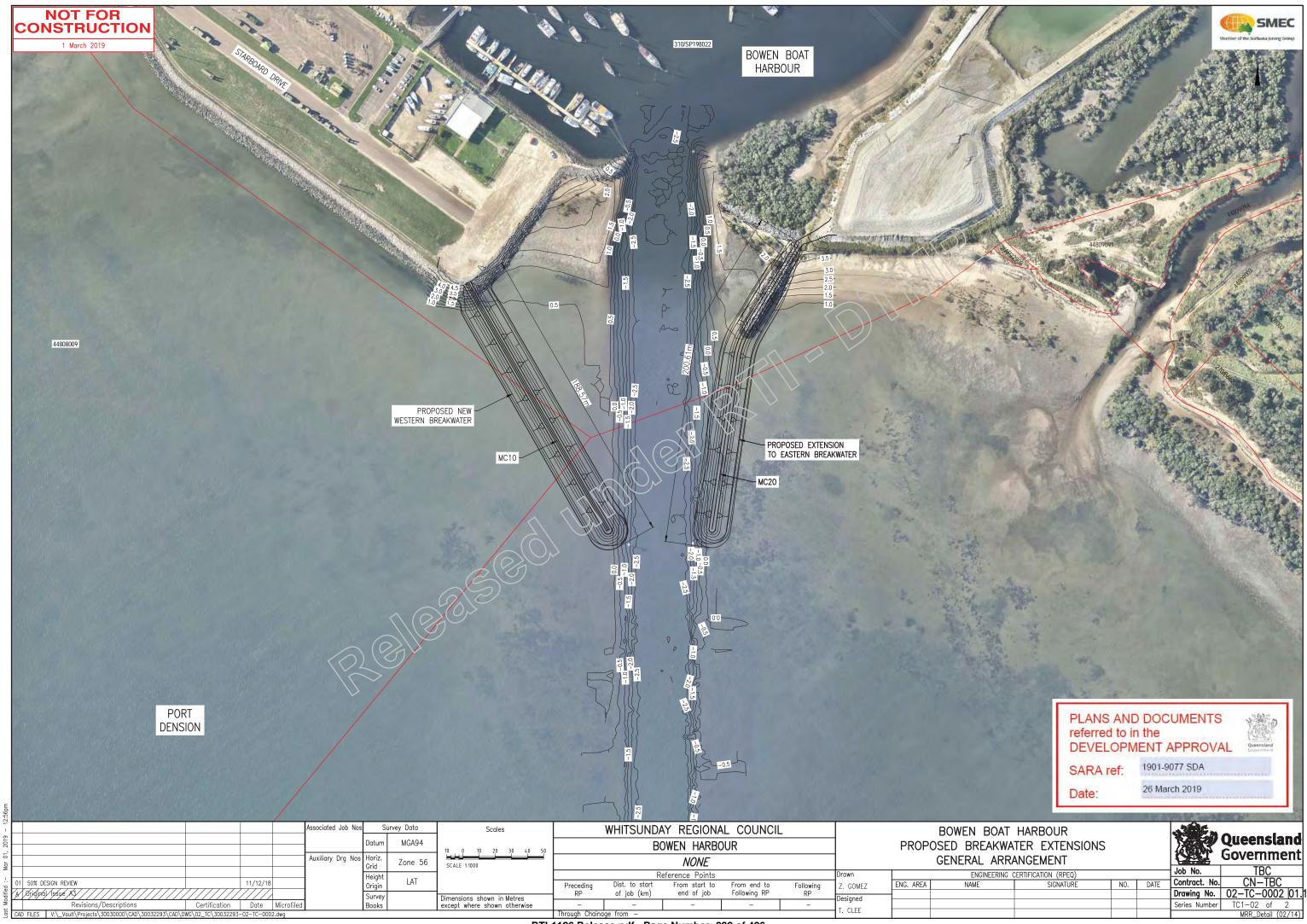
No.	Conditions of development approval	Condition timing
13.	Marine plants authorised for removal, namely the one mature red mangrove (<i>Rhizophora stylosa</i>), and other material used in the development (e.g. debris, construction material etc.) are to be promptly removed from the intertidal zone.	For the duration of the works the subject of this approval.
14.	Tidal land profiles that are temporarily disturbed by the development works must be promptly restored to pre-work profiles, other than those within the permanent development footprint, as shown on:	(, ' / /).
	Bowen Boat Harbour Proposed Breakwater Extensions Eastern Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/2018, reference 03-GA-0001 and revision 02	
	Bowen Boat Harbour Proposed Breakwater Extensions Western Breakwater General Arrangement Plan prepared by Queensland Government dated 18/12/2018, reference 03-GA-0011 and revision 02.	

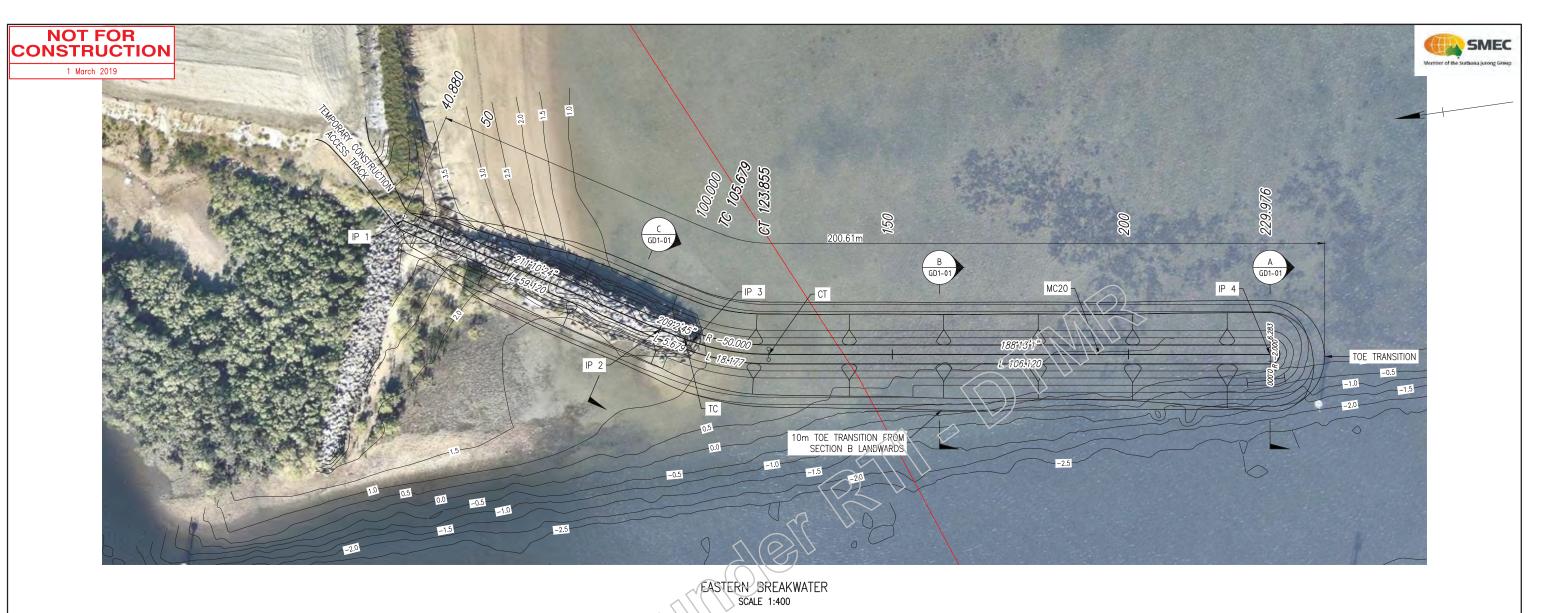
Attachment 2—Advice to the applicant

Appropriately qualified person - acid sulfate soil management

In respect to condition 6, appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills and experience relevant to soil chemistry or acid sulfate soil management and can give authoritative assessment, advice and analysis in relation to acid sulfate soil management using the relevant protocols, standards, methods or literature.







			CON	TROL LINE M	C20 SETOUT	TABLE			***
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	INTERSECTION POINT	40.880	631526.346	7785946.007	4.645	211°10'23.72"	(), (/	
		60.000	631516.449	7785929.648	5.000	211'10'23/12"	2(0)~		
		80.000	631506.097	7785912.536	5.000	211"10"23.72"			
IP 2	INTERSECTION POINT	100.000	631495.744	7785895.424	5.000	(S)			
		100.000	631495.744	7785895.423	5,000	209'02 44.55"			
TC	TANGENT TO CURVE	105.679	631492.987	7785890.459	5.000	209'02'44.55"			
IP 3	INTERSECTION POINT	114.767	631488.525	7785882.425	5.000		R = -50.000	18.177	20°49'44.04"
		120.000	631487.909	7785877.120	5.000	192*38'05.22"			
СТ	CURVE TO TANGENT	123.855	631487.212	7785873.330	5.000	188*13'00.51"			
		140.000	631484.904	7785857.351	5.000	188*13'00.51"			
		160.000	631482.046	7785837.556	5.000	188*13'00.51"			
		180.000	631479.188	7785817.761	5.000	188*13'00.51"			
		200.000	631476.329	7785797.967	5.000	188*13'00.51"			
		220.000	631473.471	7785778.172	5.000	188*13'00.51"			
IP 4	INTERSECTION POINT	229.976	631472.045	7785768.299	5.000	188*13'00.51"			

Certification Date Microfiled

PLANS AND DOCUMENTS referred to in the **DEVELOPMENT APPROVAL** 1901-9077 SDA SARA ref:

26 March 2019

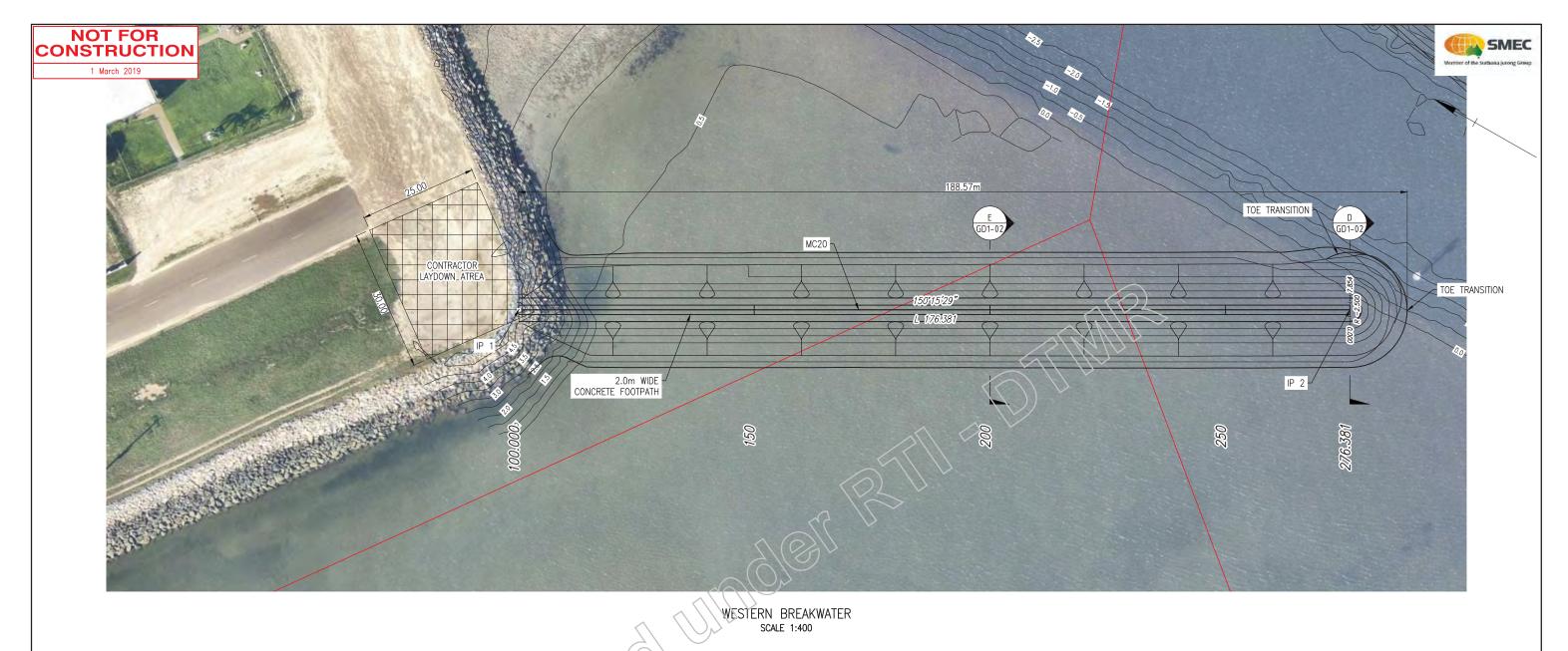
WHITSUNDAY REGIONAL COUNCIL BOWEN BOAT HARBOUR Scales MGA94 BOWEN HARBOUR PROPOSED BREAKWATER EXTENSIONS Auxiliary Drg Nos EASTERN BREAKWATER GENERAL ARRANGEMENT PLAN NONE Zone 56 50% DESIGN REVIEW - MINOR AMENDMENTS ADDED ENGINEERING CERTIFICATION (RPEQ) Reference Points LAT 50% DESIGN REVIEW 12/12/18 Dist. to start of job (km) From start to end of job ENG. AREA Z. GOMEZ

Dimensions shown in Metres except where shown otherwise

Queensland Government Contract. No. CN—TBC
Drawing No. 03—GA—0001 01. GA1-01 of MRR_Detail

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		CONTROL I	LINE MC10 S	SETOUT TABL	E	
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING
IP 1	INTERSECTION POINT	100.000	631319.966	7785920.863	5.000	150°15'28.85"
		120.000	631329.888	7785903.497	5.000	150°15'28.85"
		140.000	631339.810	7785886.132	5.000	150°15'28.85"
		160.000	631349.732	7785868.766	5.000	150°15'28.85"
		180.000	631359.654	7785851.401	5.000	150°15'28.85"
		200.000	631369.576	7785834.036	5.000	150°15'28.85"
		220.000	631379.498	7785816.670	5.000	150°15'28.85"
		240.000	631389.420	7785799.305	5.000	150°15'28.85"
		260.000	631399.342	7785781.940	5.000	150°15'28.85"
IP 2	INTERSECTION POINT	276.381	631407.468	7785767.717	5.000	150°15'28.85"

PLANS AND DOCUMENTS
referred to in the
DEVELOPMENT APPROVAL
SARA ref: 1901-9077 SDA

Date: 26 March 2019

- 12			Associated Job Nos	s Sur	rvey Data	Scales	WHITSUNDAY REGIONAL COUNCIL			BOWEN BOAT HARBOUR					330Fm				
, 2018				Datum	MGA94	4 0 4 8 12 16 20		ВС	WEN HARBO	UR			PROPOSED	BREAKWA1	TER EXTENSIONS	3			Queensland
Mar 01			Auxiliary Drg Nos	Horiz. Grid	Zone 56	SCALE 1:400			NONE			WESTE	RN BREAKW	ATER GENER	RAL ARRANGEME	ENT PL	_AN		Government
- 0:	50% DESIGN REVIEW — MINOR AMENDMENTS ADDED	18/12/18		Height		1		R	eference Points			Drawn		ENGINEERING CE	ERTIFICATION (RPEQ)			Job No.	IBC
÷ [0	50% DESIGN REVIEW	12/12/18		Origin	LAI		Preceding	Dist. to start	From start to	From end to	Following	Z. GOMEZ	ENG. AREA	NAME	SIGNATURE	NO.	DATE	Contract. No	
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ze C	D FILES V:_Vault\Projects\30030000\CAD\30032293\CAD\DW	G\03_GA\30032293-03-GA-0011.dwg	•	•		•	Through Chaina	ge from -				I. CLEE							MRR_Detail (02/14)







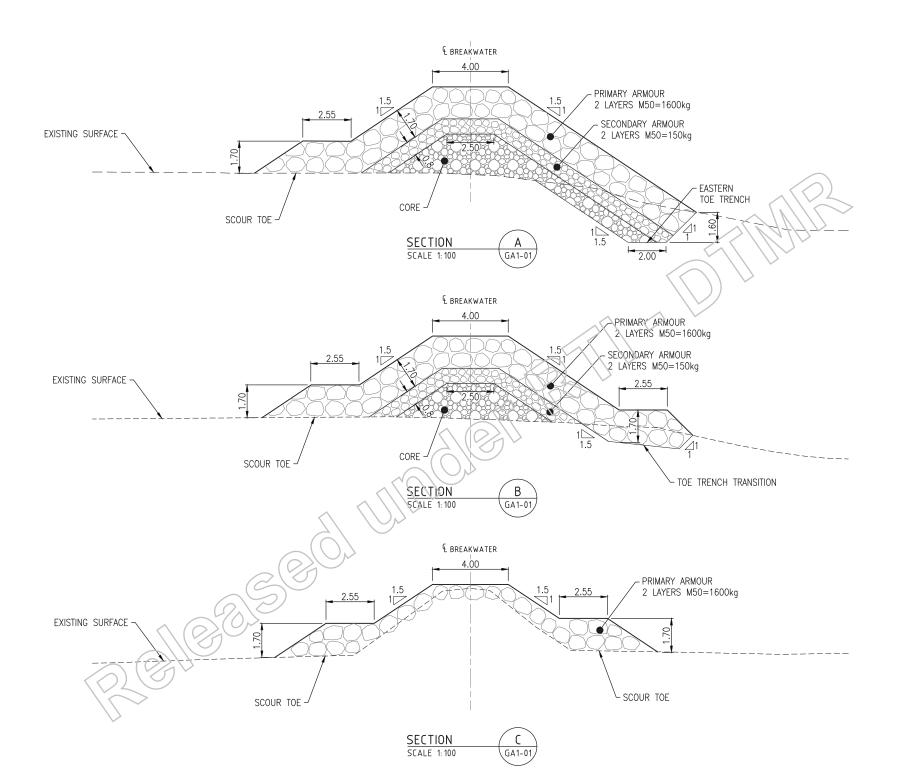
NOTE:

CONSTRUCTION OF BREAKWATER TOE

1. EXCAVATION OF TRENCH IN A TOE REGION.

2. PLACE ROCK FILL.

USE AN EXCAVATOR TO PUSH ROCK FILL TO PENETRATE INTO MARINE CLAY.



PLANS AND DOCUMENTS referred to in the **DEVELOPMENT APPROVAL**

SARA ref:

NO.

1901-9077 SDA

Date:

SIGNATURE

26 March 2019

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Auxiliary Drg Nos

12/12/18

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shown in Metres	_	_			Г

BOWEN BOAT HARBOUR
PROPOSED BREAKWATER EXTENSIONS
EASTERN BREAKWATER DETAILS
ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA

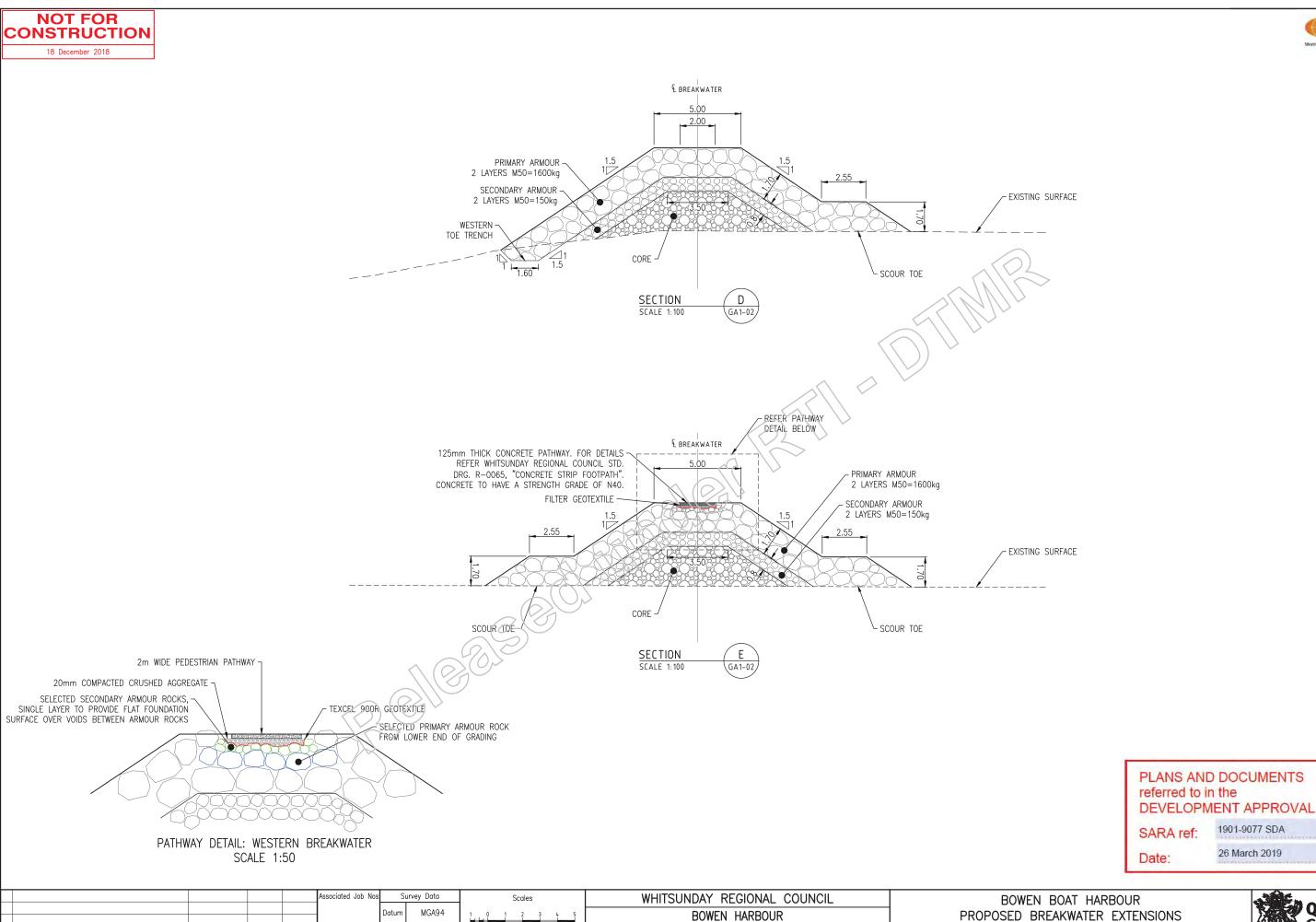
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	Drawing No.	04-GD-0001 0
	Series Number	GD1-01 of 2
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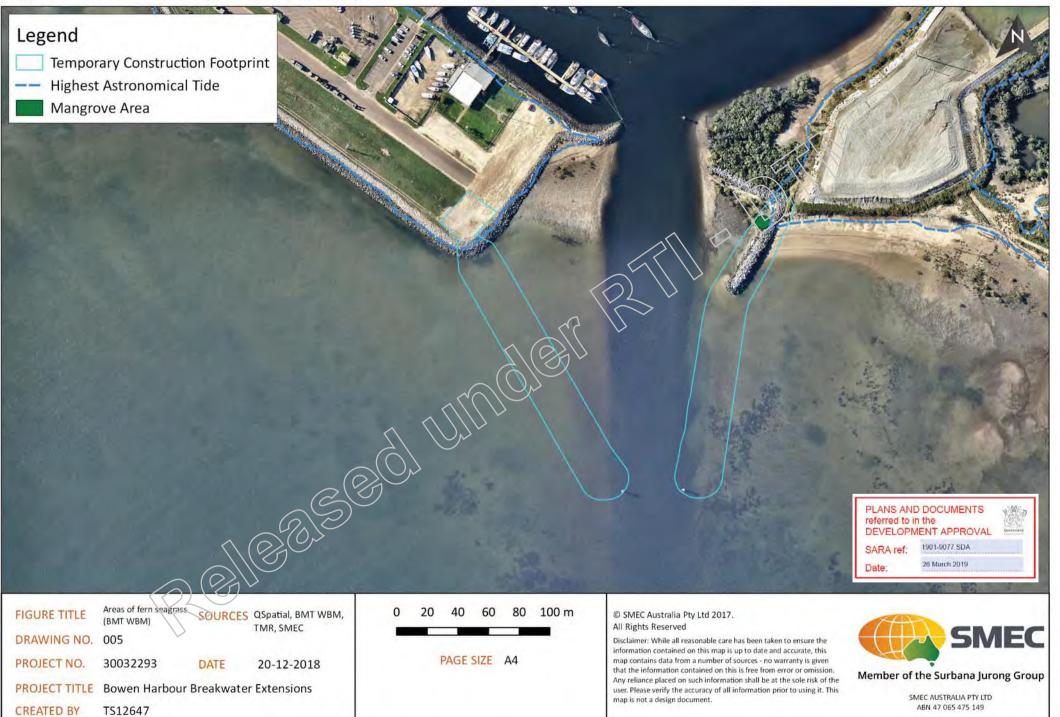
SMEC

🗗 Queensland BOWEN HARBOUR PROPOSED BREAKWATER EXTENSIONS Government Auxiliary Drg Nos WESTERN BREAKWATER DETAILS NONE Zone 56 Job No. MINOR AMENDMENTS FOLLOWING CLIENT REVIEW ENGINEERING CERTIFICATION (RPEQ) Reference Points Height Contract. No. CN—TBC
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Figure 4-3: Areas of narrowleaf seagrass (SMEC, 2018)



Figure 4-4: Areas of mangrove (SMEC, 2018)





Department of State Development,

Manufacturing, Infrastructure and Planning

Department of State Development, Manufacturing, Infrastructure and Planning Statement of reasons for application 1901-9077 SDA

(Given under section 63 of the Planning Act 2016)

Departmental role:

Assessment manager

Applicant details

Applicant name: Department of Transport and Main Roads C/- SMEC

Applicant contact details: Level 1, Building C, 6 Innovation Parkway

BIRTINYA QLD 4575

NR

@smec.com

Location details

Street address: Boat Harbour Drive, Bowen QLD 4805

Real property description: On and adjacent to Lot 310 on SP198022 (including Unallocated

State Land)

Local government area: Whitsunday Regional Council

Development details

Development permit Operational Work for Tidal Works or Works in a Coastal

Management District; and

Operational Work for the Removal, Destruction or Damage of a

Marine Plant.

Assessment matters

Aspect of development requiring code assessment	Applicable codes	
Operational Work	State Development Assessment Provisions, version 2.4	
	State code 8: Coastal development and tidal works	
	State code 11: Removal, destruction or damage of marine plants	

Reasons for the department's decision

The reasons for the decision are:

- The proposed development complies with the relevant provisions of State code 8: Coastal development and tidal works. Specifically, the development is designed and located to:
 - o protect infrastructure from the impacts of coastal erosion
 - o maintain coastal processes
 - conserve coastal resources

Mackay Isaac Whitsunday regional office Level 4, 44 Nelson Street, Mackay PO Box 257, Mackay QLD 4740

- o maintain appropriate public use of, and access to and along, state coastal land
- account for the projected impacts of climate change
- o minimise the impacts to matters of state environmental significance.
- The proposed development complies with the relevant provisions of State code 11: Removal, destruction or damage of marine plants. Specifically, the development:
 - o maintains the extent (outside of the development footprint), distribution, diversity and condition of marine plant communities and protects the ecological functions to which they contribute
 - o maintains the health and productivity of fisheries resources and fish habitat
 - o minimises impacts on the management, use, development and protection of fisheries resources and fish habitat
 - o minimises the impact to matters of state environmental significance and provides an offset for the identified significant residual impact.

Decision

Nature of Approval	Nature of Decision	Date of Decision
Development Permit for Operational Work for Tidal Works or Works in a Coastal Management District; and Operational Work for the Removal, Destruction or Damage of a Marine Plant	Decision Notice – approval with conditions	26 March 2019

Relevant Material

- Development application material, including responses to subsequent Information Requests
- State Development Assessment Provisions (version 2.4) published by the Department of State Development, Manufacturing, Infrastructure and Planning
- State Assessment and Referral Agency Development Assessment Mapping System
- Planning Act 2016
- Planning Regulation 2017
- Development Assessment Rules
- Whitsunday Regional Council Planning Scheme 2017
- Mackay, Isaac and Whitsunday Regional Plan 2012
- State Planning Policy 2017.

Planning Act 2016 – Appeal provisions

The following provisions are the **appeal rights** as defined in the Planning Act 2016, schedule 2.

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

- (1) Schedule 1 states—
 - (a) matters that may be appealed to-
 - (i) either a tribunal or the P&E Court; or
 - (ii) only a tribunal; or
 - (iii) only the P&E Court; and
 - (b) the person—
 - (i) who may appeal a matter (the appellant); and
 - (ii) who is a respondent in an appeal of the matter; and
 - (iii) who is a co-respondent in an appeal of the matter; and
 - (iv) who may elect to be a co-respondent in an appeal of the matter.
- (2) An appellant may start an appeal within the appeal period.
- (3) The appeal period is—
 - for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or
 - (b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or
 - (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
 - (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
 - (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
 - (f) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

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- (5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.
- (6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
 - (a) the adopted charge itself; or
 - (b) for a decision about an offset or refund—
 - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
 - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

- (1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—
 - (a) is in the approved form; and
 - (b) succinctly states the grounds of the appeal.
- (2) The notice of appeal must be accompanied by the required fee.
- (3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—
 - (a) the respondent for the appeal; and
 - (b) each co-respondent for the appeal; and
 - (c) for an appeal about a development application under schedule 1, table 1, item 1—each principal submitter for the development application; and
 - (d) for an appeal about a change application under schedule 1, table 1, item 2 —each principal submitter for the change application; and
 - (e) each person who may elect to become a co-respondent for the appeal, other than an eligible submitter who is not a principal submitter in an appeal under paragraph (c) or (d); and
 - (f) for an appeal to the P&E Court—the chief executive; and
 - (g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.
- (4) The **service period** is-
 - (a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or
 - (b) otherwise—10 business days after the appeal is started.
- (5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (5).
- (6) A person elects to be a co-respondent by filing a notice of election, in the approved form, within 10 business days after the notice of appeal is given to the person.
- (7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Other appeals

(1) Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

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- (2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.
- (3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.
- (4) In this section—

decision includes-

- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or the failure to make a decision; and
- (d) a purported decision; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter-

- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the Judicial Review Act 1991 or otherwise, whether by the Supreme Court, another court, a tribunal or another entity; and
- (c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, a tribunal or another entity on any ground.

232 Rules of the P&E Court

- (1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.
- (2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

Schedule 1 Appeals

1 Appeal rights and parties to appeals

- (1) Table 1 states the matters that may be appealed to—
 - (a) the P&E court; or
 - (b) a tribunal.
- (2) However, table 1 applies to a tribunal only if the matter involves—
 - (a) the refusal, or deemed refusal of a development application, for—
 - i a material change of use for a classified building; or
 - ii operational work associated with building work, a retaining wall, or a tennis court; or
 - (b) a provision of a development approval for
 - i a material change of use for a classified building; or
 - operational work associated with building work, a retaining wall, or a tennis court; or
 - (c) if a development permit was applied for—the decision to give a preliminary approval for
 - i a material change of use for a classified building; or
 - ii operational work associated with building work, a retaining wall, or a tennis court; or

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- (d) development condition if
 - the development approval is only for a material change of use that involves the use of a building classified under the Building Code as a class 2 building; and
 - ii the building is, or is proposed to be, not more than 3 storeys; and
 - iii the proposed development is for not more than 60 sole-occupancy units; or
- (e) a decision for, or a deemed refusal of, an extension application for a development approval that is only for a material change of use of a classified building; or
- (f) a decision for, or a deemed refusal of, a change application for a development approval that is only for a material change of use of a classified building; or
- (g) a matter under this Act, to the extent the matter relates to the Building Act, other than a matter under that Act that may or must decided by the Queensland Building and Construction Commission; or
- (h) a decision to give an enforcement notice
 - i in relation to a matter under paragraphs (a) to (g); or
 - ii under the Plumbing and Drainage Act; or
- (i) an infrastructure charges notice; or
- (j) the refusal, or deemed refusal, of a conversion application; or
- (k) a matter prescribed by regulation.
- (3) Also, table 1 does not apply to a tribunal if the matter involves—
 - (a) for a matter in subsection (2)(a) to (d)
 - i a development approval for which the development application required impact assessment; and
 - ii a development approval in relation to which the assessment manager received a properly made submission for the development application; or
 - (b) a provision of a development approval about the identification or inclusion, under a variation approval, of a matter for the development.
- (4) Table 2 states the matters that may be appealed only to the P&E Court.
- (5) Table 3 states the matters that may be appealed only to the tribunal.
- (6) In each table—
 - (a) column 1 states the appellant in the appeal; and
 - (b) column 2 states the respondent in the appeal; and
 - (c) column 3 states the co-respondent (if any) in the appeal; and
 - (d) column 4 states the co-respondents by election (if any) in the appeal.
- (7) If the chief executive receives a notice of appeal under section 230(3)(f), the chief executive may elect to be a co-respondent in the appeal.
- (8) In this section-

storey see the Building Code, part A1.1.

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Table 1 Appeals to the P&E Court and, for certain matters, to a tribunal

1. Development applications

For a development application other than a development application called in by the minister, an appeal may be made against—

- (a) the refusal of all or part of the development application; or
- (b) the deemed refusal of the development application; or
- (c) a provision of the development approval; or
- (d) if a development permit was applied for—the decision to give a preliminary approval.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The assessment manager	If the appeal is about a concurrence agency's referral response—the concurrence	A concurrence agency that is not a co- respondent
		agency	If a chosen assessment manager is the respondent—the prescribed assessment manager
			3. Any eligible advice agency for the application
			Any eligible submitter for the application

2. Change applications

For a change application other than a change application made to the P&E Court or called in by the Minister, an appeal may be made against—

- (a) the responsible entity's decision on the change application; or
- (b) a deemed refusal of a change application.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. The applicant 2. If the responsible entity is the assessment manager—an affected entity that gave a pre-request notice or response notice 1. The applicant 2. If the responsible entity is the assessment manager—an affected entity that gave a pre-request notice or response notice.	The responsible entity	If an affected entity starts the appeal—the applicant	1. A concurrence agency for the development application 2. If a chosen assessment manager is the respondent—the prescribed assessment manager 3. A private certifier for the development application 4. Any eligible advice agency for the change application 5. Any eligible submitter for the change application

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3. Extension applications

For an extension application other than an extension application called in by the Minister, an appeal may be made against—

- (a) The assessment manager's decision on the extension application; or
- (b) A deemed refusal of the extension application.

	umn 1 pellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1. 2.	The applicant For a matter other than a deemed refusal of an extension application—a concurrence agency, other than the chief executive, for the application	The assessment manager	If a concurrence agency starts the appeal—the applicant	If a chosen assessment manager is the respondent—the prescribed assessment manager

4. Infrastructure charges notices

An appeal may be made against an infrastructure charges notice on 1 or more of the following grounds—

- (a) the notice involved an error relating to-
 - (i) the application of the relevant adopted charge; or

Examples of errors in applying an adopted charge:

- the incorrect application of gross floor area for a non-residential development
- applying an incorrect 'use category', under a regulation, to the development
- (ii) the working out of extra demand, for section 120; of
- (iii) an offset or refund; or
- (b) there was no decision about an offset or refund; or
- (c) if the infrastructure charges notice states a refund will be given—the timing for giving the refund; or
- (d) the amount of the charge is so unreasonable that no reasonable relevant local government could have imposed the amount.

Column 1	Column 2	Column 3	Column 4 Co-respondent
Appellant	Respondent	Co-respondent	by election (if
		(if any)	any)
The person given the	The local government that gave		_
infrastructure charges notice	the infrastructure charges notice		
	b)		

5. Conversion applications

An appeal may be made against—

- (a) the refusal of a conversion application; or
- (b) a deemed refusal of a conversion application.

Column 1 Appellant	Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The local government to which the conversion application was made	_	_

6. Enforcement notices

An appeal may be made against the decision to give an enforcement notice.

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Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the enforcement notice	The enforcement authority		If the enforcement authority is not the local government for the premises in relation to which the offence is alleged to have happened—the local government
		Table 2	

Table 2 Appeals to the P&E Court only

1. Appeals from tribunal

An appeal may be made against a decision of a tribunal, other than a decision under section 252, on the ground of—

- (a) an error or mistake in law on the part of the tribunal; or
- (b) jurisdictional error.

Column 1 Appellant	Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A party to the proceedings for the decision	The other party to the proceedings for the decision		

2. Eligible submitter appeals

For a development application or change application other than an application decided by the P&E Court or called in by the Minister, an appeal may be made against the decision to approve the application, to the extent the decision relates to—

- (a) any part of the development application or change application that required impact assessment; or
- (b) a variation request

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co- respondent by election (if any)
For a development application—an eligible submitter for the development application For a change application—an eligible submitter for the change application	For a development application—the assessment manager For a change application—the responsible entity	The applicant If the appeal is about a concurrence agency's referral response—the concurrence agency	Another eligible submitter for the application

3. Eligible submitter and eligible advice agency appeals

For a development application or change application other than an application decided by the P&E Court or called in by the Minister, an appeal may be made against a provision of the development approval, or a failure to include a provision in the development approval, to the extent the matter relates to—

(a) any part of the development application or the change application, that required impact assessment; or

(a) any part of the deve(b) a variation request.

Column 1	Column 2	Column 3	Column 4 Co-respondent
Appellant	Respondent	Co-respondent	by election (if
		(if any)	any)

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For a development application—an eligib submitter for the development applicat		For a development application—the assessment manager	1. 2.	The applicant If the appeal is about a concurrence agency's referral response—the	Another eligible submitter for the application
2. For a change application an eligible submitter fundamental change application	tion—	For a change application— the responsible entity		concurrence agency	
3. An eligible advice age for the development application or change application					

4. Compensation claims

An appeal may be made against—

- (a) a decision under section 32 about a compensation claim; or(b) a decision under section 265 about a claim for compensation; or
- (c) a deemed refusal of a claim under paragraph (a) or (b).

Column 1 Appellant	Column 2 Respondent	Column/3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person dissatisfied with the decision	The local government to which the claim was made	- \	_

5. Registered premises

An appeal may be made against a decision of the Minister under chapter 7, part 4.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
 A person given a decision notice about the decision If the decision is to register premises or renew the registration of premises an owner or occupier of premises in the affected area for the registered premises who is dissatisfied with the decision 	The Minister		If an owner or occupier starts the appeal—the owner of the registered premises

6. Local laws

An appeal may be made against a decision of a local government, or conditions applied, under a local law about—

- (a) the use of premises, other than a use that is the natural and ordinary consequence of prohibited development; or
- (b) the erection of a building or other structure.

Page 8 of 10 GE11-N

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who— (a) applied for the decision; and (b) is dissatisfied with the decision or conditions.	The local government	_	-

Table 3 Appeals and tribunal only

1. Building advisory agency appeals

An appeal may be made against giving a development approval for building work to the extent the building work required code assessment against the building assessment provisions.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A building advisory agency for the development application related to the approval	The assessment manager	The applicant	A concurrence agency for the development application related to the approval
			2. A private certifier for the development application related to the approval

2. Inspection of building work

An appeal may be made against a decision of a building certifier or referral agency about the inspection of building work that is the subject of a building development approval under the Building Act.

Column 1 Appellant	Respondent		Column 4 Co-respondent by election (if any)
The applicant for the development approval	The person who made the decision	_	_

3. Certain decisions under the Building Act and the Plumbing and Drainage Act

An appeal may be made against

- (a) a decision under the Building Act, other than a decision made by the Queensland Building and Construction Commission, if an information notice about the decision was given or required to be given under that Act; or
- (b) a decision under the Flumbing and Drainage Act, part 4 or 5, if an information notice about the decision ws given or required to be given under that Act.

Column 1 Appellant	•	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who received, or was entitled to receive, an information notice about the decision	The person who made the decision	_	_

4. Local government failure to decide application under the Building Act

An appeal may be made against a local government's failure to decide an application under the Building Act within the period required under that Act.

Page 9 of 10 GE11-N

	Column 1 Appellant	Respondent	Co-respondent	Column 4 Co-respondent by election (if any)
- 1	A person who was entitled to eceive notice of the decision	The local government to which the application was made	_	_

Page 10 of 10 GE11-N

Natasha T Cook

From: Charles-Dean A Sorbello

Sent: Tuesday, 15 January 2019 3:08 PM

To: Frank R D'Souza

Cc: Trevor B Carter; Peter G Wood

Subject: Bowen Boat Harbour Breakwater Extensions - Clarification of Location of position of FLY 4 secs

lights

Attachments: Pre-lodgement Advice - DTMR.PDF; MISC-4-8-3B.pdf

Hi Frank,

Thanks for the clarification last week regarding the necessity of lighting at the Bowen Breakwater.

I have spoken with our designers regarding the navigation lighting for the eastern breakwater and they had some concerns about placing the light below the crest of the wall. They advised although more difficult to construct it should not be an issue, however they recommended placing the light at the top of the wall for ease of construction and also so it could be seen from both sides of the breakwater. Are you able to confirm if the outside face of the wall below the crest and above HAT is still the preferred location?

I have attached the standard drawing for the type 150 beacon which is what I would be asking the designers to include in their drawings.

Kind regards,

Charles-Dean Sorbello MEng BEng CPEng RPEQ NER MIEAust
A/Principal Engineer (Coastal) | Boating Infrastructure Unit
Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4000

(07) 30664349 | M: Not Relevant charles-dean.a.sorbello@tmr.qld.gov.au

www.tmr.qld.gov.au



Department of Transport and Main Roads

Prelodgement Advice

DSDMIP reference: 1811-8266 SPL
DSDMIP regional office: SARA North QLD

DSDMIP email: NQSARA@dsdmip.qld.gov.au

TA reference: TMR18-026167
TA contact name: Natasha Cook
TA contact details: (07) 4421 8112

TA approver: Captain Frank D'Souza

1.0 Application details

Street address: Santa Barbara Parade, Bowen QLD 4805

Real property description: 310SP198022

Local government area: Whitsunday Regional Council

Applicant name: Department of Transport and Main Roads

Applicant contact details: a

a QLD 4805

dsdmip.qld.gov.au

Description of Proposal: Construction of a new rubble mound breakwater structure.

2.0 Matters of interest to the state

The development application has the following matters of interest to the state under the provisions of the *Planning Regulation 2017*;

Trigger Mode	Trigger Number	Trigger Description
Maritime Safety	10.17.3.2.1)	Development application for operational work that is assessable development under section 28, other than work for government supported transport infrastructure or carried out by the Gold Coast Waterways Authority, if the work is in tidal waters and any of the following apply— (a) the work is tidal works, other than the following tidal works in Gold Coast waters— (i) a boat ramp, jetty or private pontoon; (ii) a drainage outlet; (iii) a stormwater outlet; (iv) a revetment wall associated tidal works in subparagraphs (i) to (iii); (b) the work is the disposal of dredge spoil, or other solid waste material, in tidal water; (c) the work is reclaiming land under tidal water; (d) the work is constructing a canal, if the canal relates to reconfiguring a lot

3.0 Documents considered

The following documentation was relied upon in providing this advice:

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Amended breakwater concept (1)	N/A]	N/A	N/A	N/A

4.0 Pre-lodgement advice

Our agency advices the following conditions will be applicable:

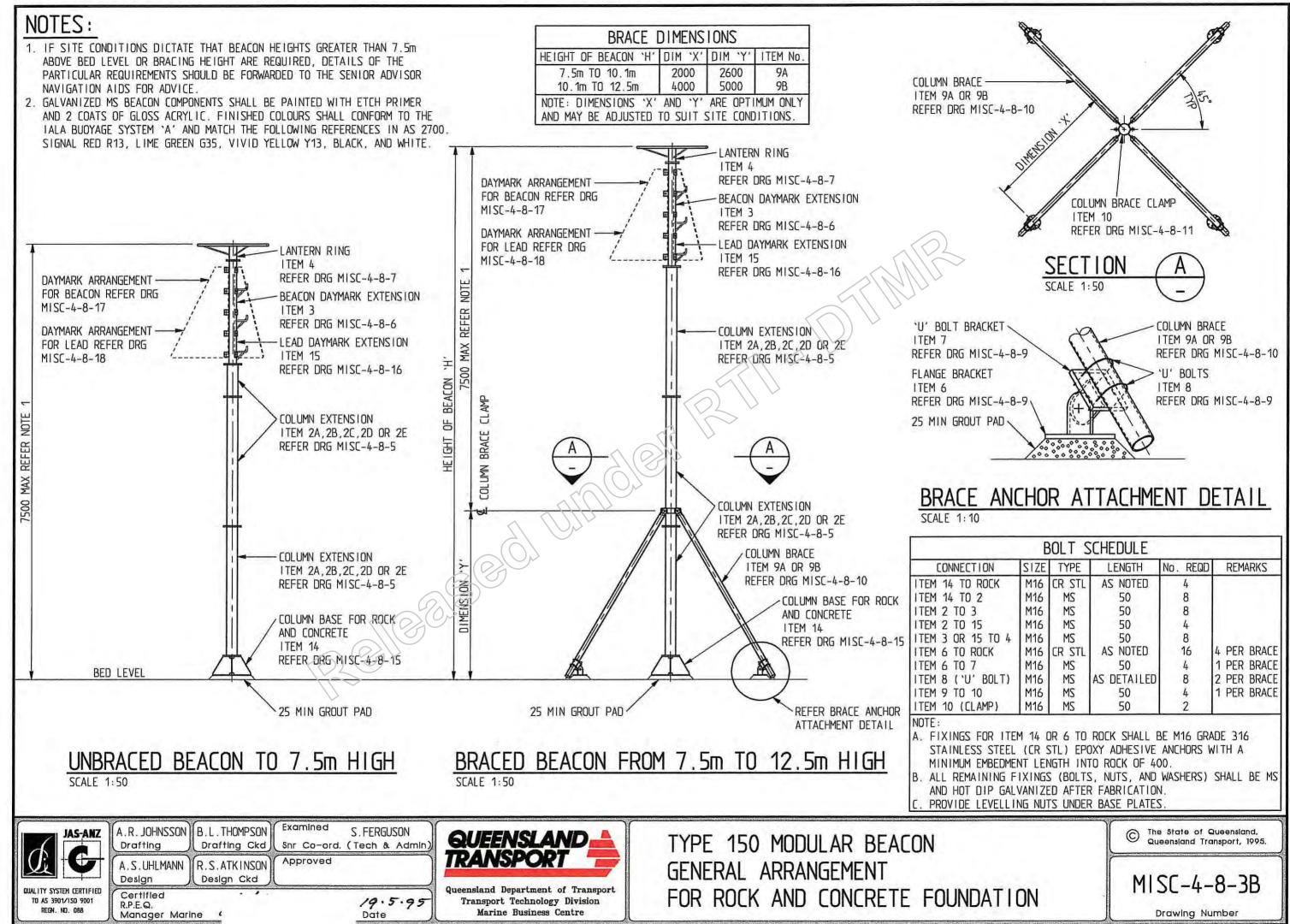
Aspe	Aspect of development: Operational Work				
Com	oliance timing				
Unles	Unless specified in the issues below the timing for all conditions should be: two (2) weeks				
No.	Condition ID	Issues to be addressed or variations to model condition			
1.	MS01	Provide written notice to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au when the development authorised under this approval is: (a) 2 weeks prior to commencement; and (b) when it has been completed. Timing: (a) At least two weeks prior to the commencement of the works (b) Within two weeks after the completion of works			
2.	MS02	Survey(s) of the authorised channel must be conducted to class C survey standards within two (2) weeks of the completion of the works, a copy of the resulting survey plan(s) must be provided to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E. RHMTownsville@msq.qld.gov.au Reason: Navigational safety, to confirm that after completion of the breakwater no rocks has rolled into the channel.			
3.	MS03	"As Constructed" drawings of the approved structure must be provided within two (2) weeks of the completion of the works to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Reason: Navigational safety, to update nautical charts.			

4. MS04 All vessels, structures, plant and equipment associated with the construction of the approved works must be lit/marked in accordance with the following specifications and requirements such that undertaking the construction works does not cause a risk to the safe navigation of ships: Floating plant and equipment is to be lit in accordance with the International Regulations for the Prevention of Collision at Sea. Mooring buoys are to be lit in accordance with IALA recommendations. Lighting must be provided in accordance with Section 3 of AS4282-1997 'Control of the obtrusive effects of outdoor lighting' to ensure safe navigation of other ships'. Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting **Timing:** While the works are occurring. Reason: Navigational safety The structure must be lit/marked in accordance with the following specifications, 5. **MS05** such that it does not cause a risk to the safe navigation of other ships: On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls Eastern breakwall2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Western breakwali...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting. Timing: During the hours of darkness.

		Reason: Navigational safety, to indicate the presence of new structure(s) (obstruction) in the waterway.	
6.	MS06	Any navigational aid that is damaged due to the construction, operation or maintenance of the approved development must be promptly repaired or replaced at the applicant's cost. In the event that any damage is caused to any aid to navigation, the Harbour Master must be immediately contacted at Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, Ground Floor, Townsville - Ross Street, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qid 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Timing: At all times.	
7.	MS08a	Any debris or similar obstruction encountered whilst undertaking the work must be suitably re-used or disposed of at the applicant's cost. Timing: While the works are occurring.	
8.		 The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length. Reason: Navigational safety. 	

Endorsement

Officer	Natasha Cook	Business Support Officer	4421 8112	msq_idas_townsville@msq.qld. gov.au
Approver	Frank D'Souza	Regional Harbour Master	4421 8106	msq_idas_townsville@msq.qld. gov.au



RTI-1126 Release.pdf - Page Number: 306 of 426

Natasha T Cook

From: Jordan E Tsang

Sent: Tuesday, 17 September 2019 2:07 PM

To: hg19-001_bowenboatharbour@hillerygroup.com.au

Cc: Tony J Giufre; RHMTownsville

Subject: CN-11936 - Bowen Boat Harbour Entrance Channel Breakwater Extension 2019 - Permission to

change of working hours

Attachments: CN-11936 - Permission to work daylight hours.pdf

Hi NR

As per our discussion during the pre-start meeting, please find attached a letter from the Administrator granting Hillery Group permission to work during daylight hours.

Kind regards,

Jordan Tsang

Engineer (Marine Engineering) | Structures

Engineering & Technology | Department of Transport and Main Roads

Floor 13 | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1412 | Brisbane City Qld 4000

P: (07) 3066 8257 M: Not Relevant
E: jordan.e.tsang@tmr.qld.gov.au

W: www.tmr.qld.gov.au



Department of Transport and Main Roads

Not Relevant Not Relevant Tony Giufré Director (Marine Engineering) **ADMINISTATOR**

> Engineering and Technology Branch Marine Engineering Section Level 13, 313 Adelaide St Brisbane Queensland 4000 GPO Box 1412 Brisbane Queensland 4001

Enquiries: Jordan E Tsang **Phone** (07) 3066 8257

Email jordan.e.tsang@rtmr.qld.gov.au

Natasha T Cook

From: Jordan E Tsang

Sent: Monday, 16 September 2019 1:28 PM

To: Frank R D'Souza **Cc:** Tony J Giufre

Subject: CN-11936 - Bowen Boat Harbour Entrance Channel Breakwater Extension 2019 - Permission to

change of working hours

Attachments: CN-11936 - Permission to work daylight hours.pdf

Hi Frank,

I hope that you are well.

With regards to this project, the Contractor Hillery Group has requested to amend the working hours to align with daylight hours. I've drafted and attached a letter for your reviewed and comment of the proposed change.

Kind regards,

Jordan Tsang

Engineer (Marine Engineering) | Structures

Engineering & Technology | Department of Transport and Main Roads

Floor 13 | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1412 | Brisbane City Old 4000

P: (07) 3066 8257 M: Not Relevant E: jordan.e.tsang@tmr.qld.gov.au

W: www.tmr.qld.gov.au



Department of Transport and Main Roads

Not Relevant Not Relevant Tony Giufré Director (Marine Engineering) **ADMINISTATOR**

> Engineering and Technology Branch Marine Engineering Section Level 13, 313 Adelaide St Brisbane Queensland 4000 GPO Box 1412 Brisbane Queensland 4001

Enquiries: Jordan E Tsang **Phone** (07) 3066 8257

Email jordan.e.tsang@rtmr.qld.gov.au

Natasha T Cook

From: Kurt S Sundholm

Sent: Monday, 6 April 2020 11:24 AM

To: Frank R D'Souza

Cc: Tony J Giufre; Charles-Dean A Sorbello; Jordan E Tsang

Subject: CN-11936 Bowen Boat Harbour Entrance Channel Breakwater Extensions - as constructed

drawing

Attachments: 400676 ASCON-01 Rev A.pdf

Hi Frank,

Following from your conversation with Tony Giufre today, please find attached the as-constructed drawing of the Bowen Boat Harbour Breakwater Extension works.

Practical Completion was reached on 20 February 2020 and the defects liability period ends on 20 August 2020.

Please let me know if you require a CAD version of the drawing file since there is no horizontal spatial grid shown on the drawing – I can request this from the contractor.

Thanks.

Kind Regards

Kurt Sundholm BE(Civil)(Hons) RPEQ RPEng (Civil) MIEAust
Manager (Marine Engineering) | Engineering and Technology Branch | Marine Engineering Section
Infrastructure Management & Delivery Division | Department of Transport and Main Roads

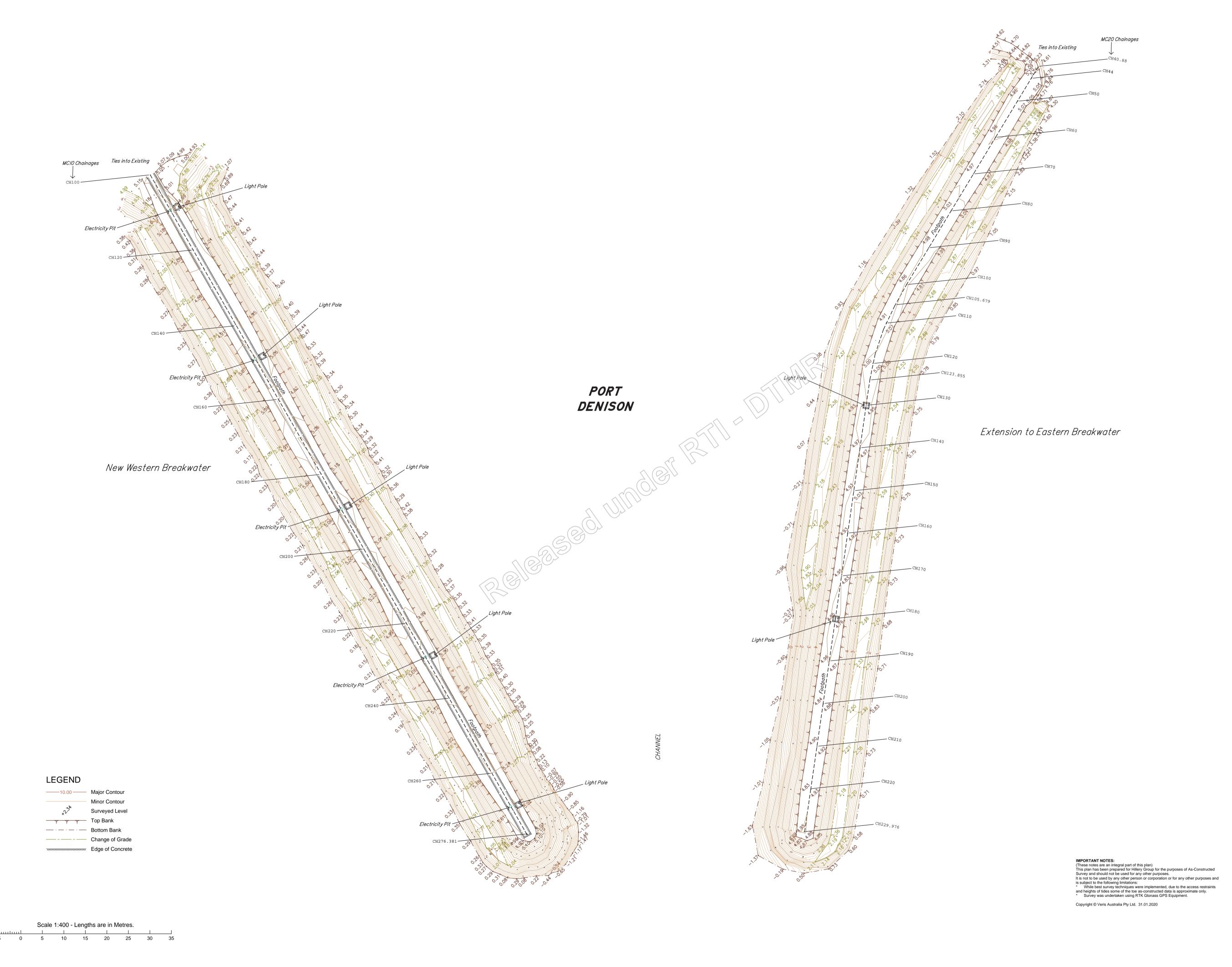
Level 13 | 313 Adelaide Street | Brisbane Qld 4000 GPO Box 1412 | Brisbane Qld 4001

P: (07) 30664206

E: kurt.s.sundholm@tmr.qld.gov.au

W: www.tmr.qld.gov.au





IMPORTANT NOTES:
(These notes are an integral part of this plan)
This plan has been prepared for Hillery Group
for the purposes of As-Constructed Survey.
It is not to be used by any other person or
corporation or for any other purposes and is
subject to the following limitations:
See notes on face

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Contour Interval:
Locality:
Bowel
Local Authority:
Corticular Meridian:
Vertical Level Datum:
Level Origin:
Scale:
Level Origin:
Level

As-Constructed Survey

of Breakwater Extenstions



BRISBANE WHITSUNDAYS (07) 3666 4700 (07) 4945 1722 MACKAY (07) 4951 2911 veris.com.au ACN 615 735 727 Veris Australia Pty Ltd

400676 ASCN-01 A

RTI-1126 Release.pdf - Page Number: 312 of 426

Natasha T Cook

From: Kurt S Sundholm

Sent: Thursday, 9 April 2020 5:44 PM **To:** Frank R D'Souza; MaritimeGIS

Cc: Tony J Giufre; Charles-Dean A Sorbello; Jordan E Tsang; Max Haste

Subject: CN-11936 Bowen Boat Harbour Entrance Channel Breakwater Extensions - as constructed

drawing CAD file for updating charts

Attachments: Bowen Breakwater Extension AutoCAD File.zip

Hi Frank,

Attached in the .zip file is the digital 3D AutoCAD model file of the Bowen Boat Harbour Breakwater Extensions I received from the contractor today.

Hopefully this digital data will allow MSQ's cartographic team to update the charts.

If they have any problems with the file, please refer them me.

Thanks.

Kind Regards

Kurt Sundholm BE(Civil)(Hons) RPEQ RPEng (Civil) MIEAust

Manager (Marine Engineering) | Engineering and Technology Branch | Marine Engineering Section | Infrastructure Management & Delivery Division | Department of Transport and Main Roads

Level 13 | 313 Adelaide Street | Brisbane Qld 4000

GPO Box 1412 | Brisbane Qld 4001

P: (07) 30664206 M: Not Relevant
E: kurt.s.sundholm@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Kurt S Sundholm

Sent: Thursday, 9 April 2020 8:41 AM

To: Frank R D'Souza ; MaritimeGIS

Cc: Tony J Giufre; Charles-Dean A Sorbello; Jordan E Tsang; Max Haste

Subject: RE: CN-11936 Bowen Boat Harbour Entrance Channel Breakwater Extensions - as constructed drawing

Hi Frank,

I'll request the CAD survey files from the contactor.

Thanks.

Kind Regards

Kurt Sundholm BE(Civil)(Hons) RPEQ RPEng (Civil) MIEAust

Manager (Marine Engineering) | Engineering and Technology Branch | Marine Engineering Section Infrastructure Management & Delivery Division | Department of Transport and Main Roads

Level 13 | 313 Adelaide Street | Brisbane Qld 4000

GPO Box 1412 | Brisbane Qld 4001

P: (07) 30664206

E: kurt.s.sundholm@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au >

Sent: Wednesday, 8 April 2020 5:57 PM

To: Kurt S Sundholm <kurt.s.sundholm@tmr.qld.gov.au>; MaritimeGIS <maritimegis@msq.qld.gov.au>

Cc: Tony J Giufre <tony.j.giufre@tmr.qld.gov.au>; Charles-Dean A Sorbello <Charles-

Dean.A.Sorbello@tmr.qld.gov.au>; Jordan E Tsang < Jordan.E.Tsang@tmr.qld.gov.au>; Max Haste

<Max.Z.HASTE@msq.qld.gov.au>

Subject: RE: CN-11936 Bowen Boat Harbour Entrance Channel Breakwater Extensions - as constructed drawing

Hi Kurt,

Can you insert some coordinates to this drawing either Latitude & longitude or Eastings/Northings so that I can provide to AHO for amending the charts, thanks

Alternately a drawing showing Bowen boat harbour with the new and extended breakwaters.

Regards

Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Kurt S Sundholm < kurt.s.sundholm@tmr.qld.gov.au>

Sent: Monday, 6 April 2020 11:24 AM

To: Frank R D'Souza <frank.r.dsouza@msq.qld.gov.au>

Cc: Tony J Giufre < tony.j.giufre@tmr.qld.gov.au >; Charles-Dean A Sorbello < Charles-Dean.A.Sorbello@tmr.qld.gov.au >; Jordan E Tsang < Jordan.E.Tsang@tmr.qld.gov.au >

Subject: CN-11936 Bowen Boat Harbour Entrance Channel Breakwater Extensions - as constructed drawing

Hi Frank,

Following from your conversation with Tony Giufre today, please find attached the as-constructed drawing of the Bowen Boat Harbour Breakwater Extension works.

Practical Completion was reached on 20 February 2020 and the defects liability period ends on 20 August 2020.

Please let me know if you require a CAD version of the drawing file since there is no horizontal spatial grid shown on the drawing – I can request this from the contractor.

Thanks.

Kind Regards

Kurt Sundholm BE(Civil)(Hons) RPEQ RPEng (Civil) MIEAust

Manager (Marine Engineering) | Éngineering and Technology Branch | Marine Engineering Section Infrastructure Management & Delivery Division | Department of Transport and Main Roads

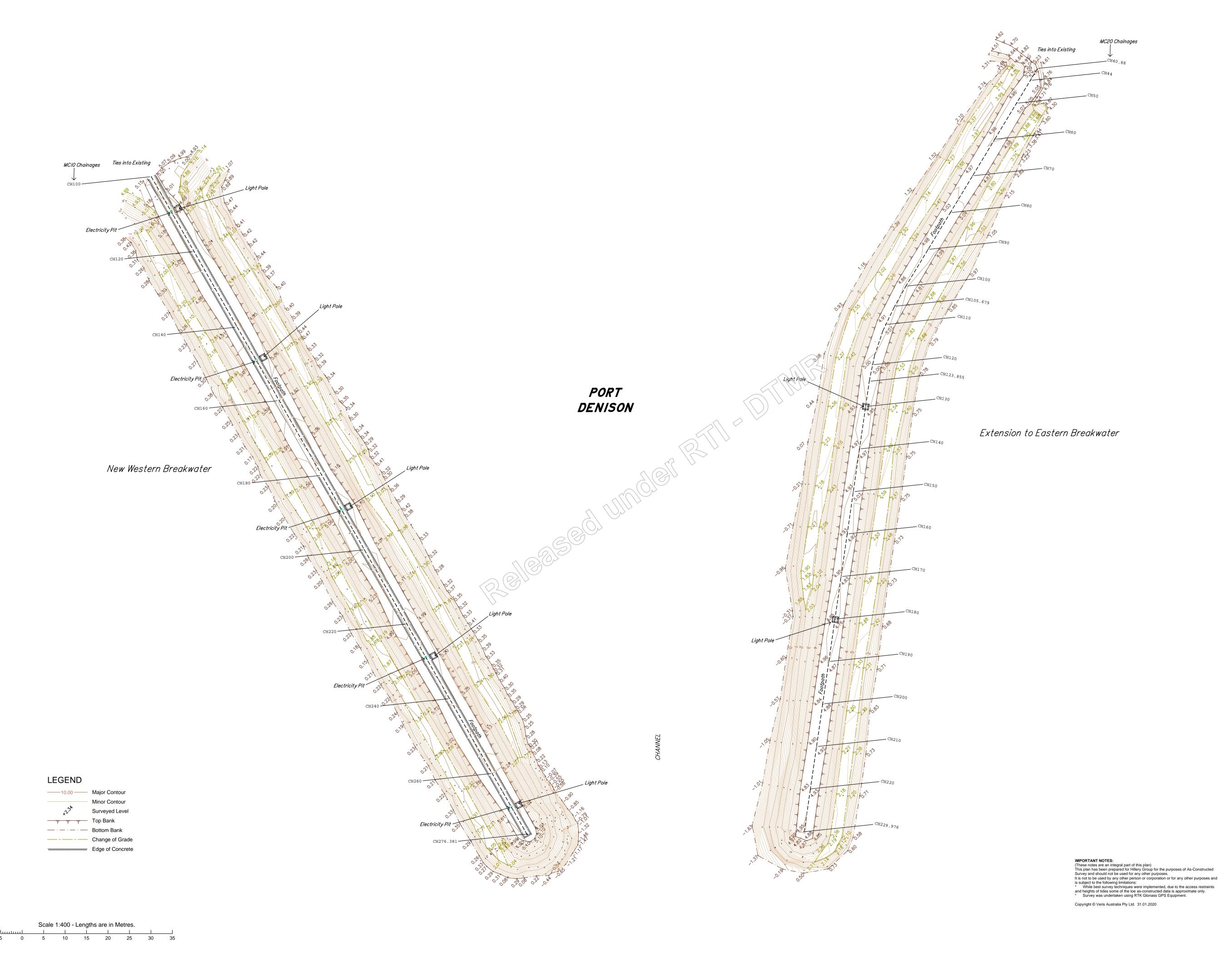
Level 13 | 313 Adelaide Street | Brisbane Qld 4000 GPO Box 1412 | Brisbane Qld 4001

P: (07) 30664206

E: kurt.s.sundholm@tmr.qld.gov.au

W: www.tmr.qld.gov.au





As-Constructed Survey of Breakwater Extenstions



MACKAY CAIRNS (07) 4951 2911 (07) 4051 6722

Veris.com.au

ACN 615 735 727

Veris Australia Pty Ltd

Drawing No Issue

400676 ASCN-01 A

RTI-1126 Release.pdf - Page Number: 316 of 426

Natasha T Cook

From: @dsdmip.qld.gov.au>

Sent: Friday, 4 January 2019 2:42 PM

To: Frank R D'Souza

Cc: MSQ_IDAS_Townsville; Dan Wagner

Subject: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Attachments: Breakwater aerial plans.pdf

Hi Frank,

Thank you for your time this afternoon regarding DTMR's breakwater proposal in Bowen, on and adjacent to Lot 310 on SP198022. As discussed, the department has identified that the development does not entail 'prescribed tidal works', instead being solely 'tidal works' (under the Coastal Protection and Management Regulation 2017 (section 15 (2)(b)(ii)), a public marine facility constructed by or for Queensland Transport is not prescribed tidal works). As such, SARA will be the assessment manager for the application, as opposed to Whitsunday Regional Council (as per Schedule 8, Table 4, Item 3(I)).

Looking at Schedule 10, Part 17, Division 2 of the Planning Regulation 2017 (Tidal works assessment manager section), there is no MSQ trigger for tidal works in tidal waters (like that under the referral agency section). Moreover, as discussed and shown in the screenshot below from the department's development assessment mapping system, the development area is mapped as being outside of the port limits.



Given the above information, my understanding would be that the MSQ trigger will not be picked up as part of the application. Junderstand that you would like to review this position with your Brisbane team to ensure that this stance is correct. Given that we received the application from DTMR yesterday (03/01/2019), I will need to validate the application by 17/01/2019. As such, can I ask that you review this information and raise any concerns with me prior to COB 14/01/2019. If you need further time, please let me know.

Thank you for your time and please let me know if you need anything further.

Kind Regards,



Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and

Development Services, Northern Region

Department of State Development,

Manufacturing, Infrastructure and Planning

P 07 4898 6815 Level 4, 44 Nelson Street, Mackay QLD 4740 PO Box 257, Mackay QLD 4740 www.dsdmip.qld.gov.au

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Department of

State Development, Manufacturing, Infrastructure and Planning

Our reference:

1811-8266 SPL

13 December 2018

Department of Transport and Main Roads Level 1, Building C, 6 Innovation Parkway Birtinya QLD 4575

@smec.com

Attention:

Dear

Pre-lodgement advice

Thank you for your correspondence received on 6 November 2018 in which you sought pre-lodgement advice from the Department of State Development, Manufacturing, Infrastructure and Planning regarding the proposed development described below.

Reference information

Departmental role:

Referral agency

Departmental jurisdiction:

10.17.3 1 — Tidal Works 10.6.3.3.1 — Marine Plants

10.17.3.2 - Maritime Safety

Location details

Street address:

Boat Harbour Drive, Bowen

Real property description:

Lot 310 on SP198022

Local government area:

Whitsunday Regional Council

Details of proposal

Development type:

Operational Work (Prescribed Tidal Works)

Development description:

Construction of a new rubble mound breakwater structure on the western side of the established dredged navigation access channel, and extending the existing rubble mound breakwater structure on the

eastern side of this channel.

Mackay Isaac Whitsunday regional office Level 4, 44 Nelson Street, Mackay PO Box 257, Mackay QLD 4740 The department has carried out a review of the information provided and the impacts of the proposal. The following advice outlines the matters of interest to the department and matters that should be addressed if you lodge your development application with the assessment manager.

Making an Operational Work Development Application

1. The proposed development for Operational Work will require a development application to be submitted under the *Planning Act 2016* (PA).

The Whitsunday Regional Council will be the assessment manager for the application and the department will be a referral agency.

Based on the information provided at the time of this advice, the department will be triggered as a referral agency for the following triggers under the Planning Regulation 2017 (PR):

- Schedule 10, Part 17, Division 3, Table 1 Tidal Works
 Fee current at the time of this advice: \$3,240.00
- Schedule 10, Part 6, Division 3, Subdivision 3, Table 1 Removal, Damage or Destruction of Marine Plants

Fee current at the time of this advice: less than 25m2 disturbance - \$3,240.00 25m2 to 500m2 - \$6,479.00 otherwise \$12,956.00

- Schedule 10, Part 17, Division 3, Table 2 Maritime Safety
 Fee current at the time of this advice: \$12,956.00
- 2. Referral to the department can be made via our online system, MyDAS2:

https://prod2.dev-assess.qld.gov.au.

- 3. Any development application made to the department for the above matters is required to provide the following mandatory information in accordance with Section 51 of the PA, including:
 - the consent of the owner of the land (where required under section 51(2) of the PA);
 - the prescribed fee under the PR;
 - DA Form 1; and
 - any supporting information the DA form states is mandatory supporting information for the application, including relevant plans of the development.
- 4. Copies of the DA forms are available from the resource section of the department's website:

https://planning.dsdmip.qld.gov.au/planning/resources.

State Development Interests

5. \(\tidal\) works - State Development Assessment Provisions (SDAP): State code 8

The department is required under the *Planning Act 2016* to assess development under Section 28 against the relevant State development assessment provisions (SDAP). The latest version of SDAP State codes is available at: https://planning.dsdmip.qld.gov.au/planning/better-development/the-development-assessment-provisions.

For more information regarding how to demonstrate compliance with the relevant State codes, please see: http://www.dilgp.qld.gov.au/resources/policy/sdap/v2/introductory-sections.pdf.

Please refer to the Guideline: State Development Assessment Provisions, State Code 8: Coastal development and tidal works (http://www.ehp.qld.gov.au/coastal/development/pdf/state-code8-coastal-development-tidal-works.pdf) in responding to State Code 8. The guideline provides background information and key concepts relevant for coastal processes and resources and coastal protection and management applicable to complying with the code. The guideline also contains information on how to respond to particular performance outcomes (PO) and specific information requirements. It should be noted that if the PO has no relevance to the proposed development a response of "not applicable" and a statement as to why it is not relevant is required. The guideline also provides information regarding the content of supporting documents that may be required to assess a development application against the code.

Development Description

Any application made should include a detailed description of the proposed development and a description of the existing site conditions of the proposed development location.

Description of the land intended to be developed should detail:

the property address, tenure and real property description of the land.

Description of the development should include:

- location of all built structures, or structures to be modified or demolished, as a result of the proposed development;
- description of any operational works occurring on site including expected timeframes;
- any machinery to be used or stored on the site; and
- staging of the development if applicable,

Location and Development Plan

Any application made should include a set of detailed and appropriately scaled 'for construction' drawings and/or plans which clearly identify the location of proposed development in relation to:

- adjacent real property boundaries
- adjacent riverbanks, walls, sandbanks, structures, the limit of vegetation, and/or other principal features of the immediate area;
- surrounding wetlands, including wetlands of high ecological significance and trigger areas;
- appropriate wetland buffer area as required;
- the location and setting out details for cross-sections;
- any other information required to accurately define the area and to allow the site to be readily identified from the plan.

Reasonable excuse for the removal of quarry material without an allocation notice

6. If a tidal works application is required as part of the proposed development, the proposed removal of quarry material may meet a reasonable excuse for the removal of quarry material without an allocation notice. What is considered a reasonable excuse for removing quarry material without an allocation notice is defined in 3.4.1 of the Dredging and Allocation of Quarry Material Guideline https://environment.des.qld.gov.au/assets/documents/regulation/cpm-gl-dredging.pdf

It is recommended to determine if the proposed removal of quarry material is able to meet the requirements of a reasonable excuse for removal of material without an allocation notice prior to lodging an application.

Please note, the reasonable excuse for the removal of quarry material without an allocation notice does not extend to any subsequent dredging required to maintain the approved tidal works. If, in the future, maintenance dredging is required, and the disposal of material will be outside of the active coastal system, an allocation of quarry material will be required.

Allocation of Quarry Material

7. If a tidal works application is not required for the proposed development, the proposed development would be considered to involve removing quarry material from land under tidal water for disposal outside of the active coastal system. This activity requires an allocation of quarry material under section 73 of the Coastal Management and Protection Act 1995 to be obtained prior to undertaking the activity.

The following information should accompany any application for an allocation of quarry material;

- Plans drawn to a suitable scale to show;
 - The boundaries of the land to be dredged, adjacent river banks, sand banks and shorelines, showing the line of high water mark (mean high water spring), the limit of vegetation and any other details to permit the identification of the tidal land on the ground
 - o A hydrographic survey of the land on lines not more than 20 metres apart
 - o A proposed area(s) where the quarry material will be taken ashore or transported over, and the proposed location of any stockpile, reclamation, disposal or fill areas
 - o Adjacent real property boundaries, roads and any esplanade
 - o Navigation channels, navigation aids, pipelines, cables, wharves and any other structures or harbour works located in or adjacent to the land to be dredged
- Plans showing the depth of dredging and the anticipated final alignment and slope of batters, together with an indication as to whether this work will result in a stable alignment or if recurrent maintenance dredging will be required
- Characteristics of quarry material to be removed. For material to be disposed of on land, the
 characteristics of the material and potential impacts at the disposal site, as required under the
 National Environment Protection (Assessment of Site Contamination) Amendment Measure
 (NEPM 1999): https://www.legisiation.gov.au/Details/F2013C00288. Please note that sediment
 cores must be taken and tested within the appropriate time period to the start of works, please
 see NEPM 1999 for further information.
- Purpose/use of the guarry material
- Methods of extraction of quarry material and disposal of dredge spoil (including equipment to be used).
- Maximum extraction rate of quarry material in cubic metres per year (including estimated over-dredge).
- Agreement form:
 - o Owner(s) of land on which the material is to be deposited or stockpiled; and
 - Owner(s) of land which the material will be transported either by pipeline or truck
- A statement addressing how the proposed works meet section 75 and 104 of the Coastal Management and Protection Act 1995.
- The views of a local government about the removal of the quarry material or placement of spoil
- The views of a harbour master about the effect the removal or placement may have on marine safety in tidal water
- If the removal or placement happens on land within the limits of a port—the views of the port authority or port operator for the land about the removal or placement

Verifiable methodology for measuring the volume (m³) of quarry material removed.

Further information on allocations of quarry material is available at the following site: https://www.qld.gov.au/environment/coasts-waterways/plans/development/tidal-works

Marine Plants - State Development Assessment Provisions (SDAP): State Code 11

- 8. If the works require marine plant disturbance, the applicant will need to provide the following in an application for a development approval:
 - A full response to the relevant sections of State Code 11 of the State Development Assessment Provisions (SDAP): Removal, destruction or damage of marine plants.
 - Relevant plans as per *DA Forms guide: Relevant plans*, including:
 - o the total amount of marine plants that will be disturbed, identifying portion of permanent and/or temporary disturbance (in square meters or hectares)
 - o the location of the marine plants to be disturbed in relation to the development works
 - o the level of HAT, mean high water spring tide, and low water spring tide
 - o location and extent of fish habitat within the development area, including creeks, sand and/or yabby banks, drainage lines, lagoons and marshes
 - o if applicable, a plan clearly showing the location of the marine plants to be disturbed that will result in a significant residual impact (SRI) as defined under the *Environmental Offsets Act 2014*.
- 9. Relevant sections of the State Code 11 for the proposed werks that the applicant should pay particular attention to include:
 - All development PO1 TO PO15. This section of the SDAP addresses critical issues relating to
 coastal development proposals which create the need to remove, destroy or damage marine
 plants. The applicant will need to respond to all relevant POs and is advised to pay particular
 attention to:
 - o (PO1) There is a demonstrated need for the development, and alternatives (locations and designs) which do not involve removal, destruction or damage of marine plants and impacts to fisheries resources and fish habitats are not viable.
 - Please clearly identify in detail the overall public need for the proposed breakwater extension and demonstrate why it is necessary. An application should also discuss any relevant studies addressing the problem.
 - Please demonstrate that the proposed location and design of the selected option is the least impact option reasible, and provide sound justification for the works. An analysis of the proposed option against other alternative designs that avoid or minimise impacts on fish habitats is required to address this PO.
 - o (PO2) Only those aspects of a development that have a functional requirement to be located on tidal land create the requirement to remove, destroy or damage marine plants. Ancillary elements (for example, car and trailer parks, rest rooms, offices) occur outside of tidal land.
 - (PO4) The spatial extent of disturbance to marine plants is minimised.
 - must be demonstrated that marine plants have been avoided to the greatest extent, and if there is an area of disturbance, it has been minimised to the smallest area practicable.
 - o (PO5) The timing of works avoids marine plant flowering, fish spawning and fish migration periods.

- (PO6) Development of or adjacent to, fish habitats avoids the unnecessary loss, degradation or fragmentation of fish habitats and their values and the loss of fish movement.
 - Discuss the expected impacts to marine plants, fish habitats and their values and any loss of fish movement. Where impacts on fish habitats cannot be avoided, demonstrate that tidal and freshwater inundation and drainage patterns, extent and timing are maintained such that ecological values and process continue.
- o (PO8) Works are undertaken to encourage fish habitats and fisheries resource values to naturally regenerate.
 - For areas disturbed outside of the breakwater footprint the applicant should demonstrate that the works will allow for the natural regeneration of marine plants through the reinstatement of suitable profiles to encourage natural recruitment back to the target area.
- o (PO10) Tidal and freshwater inundation and drainage patterns, extent and timing are maintained or restored such that ecological processes continue and associated fish habitat values and condition are maintained.
 - Please confirm if the duration of tidal inundation or hydrological regime will change as a result of the works and detail and quantify the impacts to marine plants upstream of the harbour.
- o (PO11) Development does not result in increased risk of waterway bed or bank scour or erosion or shoreline or foreshore erosion.
 - Please provide a discussion detailing how the development will not result in increased or accelerated erosion or scouring of waterway bed and banks or shoreline or foreshore erosion.
- o (PO12) The development is designed, sited and constructed to ensure its long-term use and operability will not result in ongoing adverse impacts or new adverse impacts or additional development including: dredging to maintain access, trimming of marine plants, warning signs of protective structures.
 - Please provide a discussion detailing how the proposed design, location and construction methodology has considered these natural processes and will ensure that the long term operability can be achieved with minimal ongoing works or impacts to tidal fish habitats and marine plants. Reference should be made to ongoing maintenance activities as well as a description of any additional signage or navigational aids associated with the development.
- (PO13) Development does not restrict or reduce public use of or access to tidal land and waterways.
 - Provide supporting information demonstrating that the public use of and access to tidal land and waterways will be maintained.
- o (PO14) Development does not adversely impact on community access to fisheries resources and fish habitats.
 - Please outline current access arrangements and identify existing fishing activities and stakeholders. Identify and discuss any elements of the location, design, construction methods or operation of the proposed development that have the potential to adversely impact on community access to fisheries resources, specifically recreational and indigenous fishing activities.

- Temporary works PO26 to PO28. Temporary disturbance or temporary structures involving the removal, destruction or damage of marine plants can have both direct and indirect impacts and cause the loss of fisheries productivity. If temporary works involving marine plant disturbance are proposed, the applicant must demonstrate compliance with the following POs:
 - o (PO26) Impacted fish habitats and fisheries resources are restored to pre-existing or improved condition and extent.
 - Marine plant disturbance associated with the construction of the breakwaters (e.g. to surrounding areas) could be considered temporary if marine plants are expected to return to pre-disturbance condition within 5 years.
 - o (PO27) Development will be in place or is undertaken for a specified period and for the shortest time possible.
 - Please outline the expected time period for the operational works to occur.
 - (PO28) a temporary structure is in place for a specified period and is designed to be completely removed.
 - This PO is unlikely to apply to the construction of the breakwaters, however if temporary structures are required during the construction phase and will impact on marine plants, then this PO will apply.
- Matters of state environmental significance (PO31). Marine plants are a matter of State
 environmental significance (MSES) under the Environment Offsets Act 2014. All applications
 must demonstrate full consideration of the 'avoid, minimise (mitigate), offset' hierarchy and must
 comply with:
 - The 'avoid, minimise (mitigate), offset framework. This framework requires in the first instance that impacts to marine plants are avoided; where avoidance cannot be achieved, it must be demonstrated that impacts have been carefully managed and minimised. Notwithstanding any measures to avoid or mitigate marine plant disturbance, the works may still result in a Significant Residual Impact (SRI), in which case an offset will be required. Any rehabilitation of marine plants on site may help to reduce the scale of the SRI. Options to mitigate the SRI to marine plants must be pursued before an offset can be considered. The applicant may find the following guideline useful in determining the likelihood (or otherwise) of SRI: Significant Residual Impact Guideline (see Section 3.9).

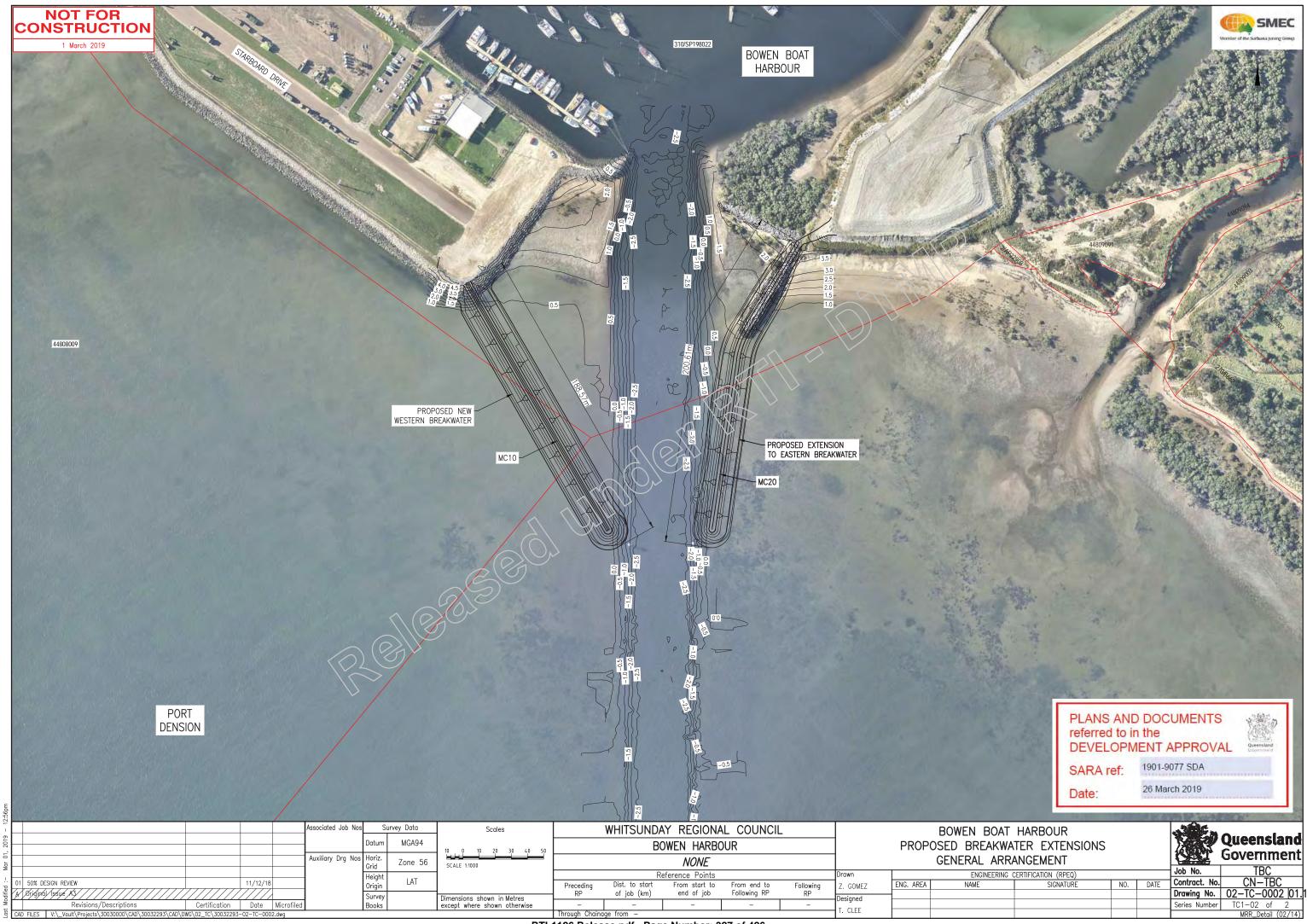
Maritime Safety - State Development Assessment Provisions (SDAP): State Code 7

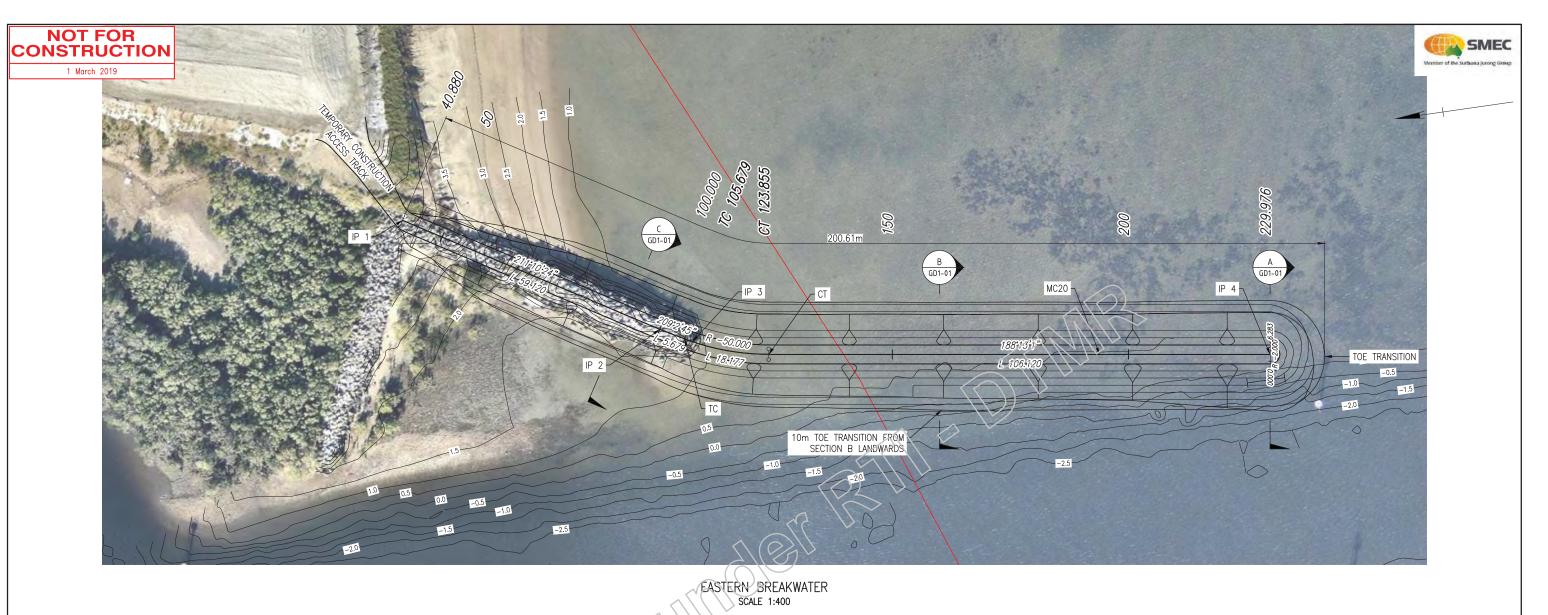
No major issues were identified relating to the proposal and maritime safety. Standard conditions
relating to adequate lighting of structures and pre-post construction notification to Maritime Safety
Queensland are likely to be imposed on any concurrence agency response given by the
department.

This pre-lodgement advice does not constitute an approval or an endorsement that the department supports the development proposal. Additional information may be required to allow the department to properly assess the development proposal when a formal application has been lodged.

For further information please contact Ainsley Sullivan, Principal Planning Officer, on (07) 4898 6813 or via email MIWSARA@dsdmip.qld.gov.au who will be pleased to assist.







			CON	TROL LINE M	C20 SETOUT	TABLE			***
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	INTERSECTION POINT	40.880	631526.346	7785946.007	4.645	211°10'23.72"	()	/	
		60.000	631516.449	7785929.648	5.000	211'10'23/12"	2(0)~		
		80.000	631506.097	7785912.536	5.000	211"10"23.72"			
IP 2	INTERSECTION POINT	100.000	631495.744	7785895.424	5.000	(S)			
		100.000	631495.744	7785895.423	5,000	209'02 44.55"			
TC	TANGENT TO CURVE	105.679	631492.987	7785890.459	5.000	209'02'44.55"			
IP 3	INTERSECTION POINT	114.767	631488.525	7785882.425	5.000		R = -50.000	18.177	20°49'44.04"
		120.000	631487.909	7785877.120	5.000	192*38'05.22"			
СТ	CURVE TO TANGENT	123.855	631487.212	7785873.330	5.000	188*13'00.51"			
		140.000	631484.904	7785857.351	5.000	188*13'00.51"			
		160.000	631482.046	7785837.556	5.000	188*13'00.51"			
		180.000	631479.188	7785817.761	5.000	188*13'00.51"			
		200.000	631476.329	7785797.967	5.000	188*13'00.51"			
		220.000	631473.471	7785778.172	5.000	188*13'00.51"			
IP 4	INTERSECTION POINT	229.976	631472.045	7785768.299	5.000	188*13'00.51"			

Certification Date Microfile

PLANS AND DOCUMENTS referred to in the **DEVELOPMENT APPROVAL** 1901-9077 SDA SARA ref:

26 March 2019

Queensland

Government

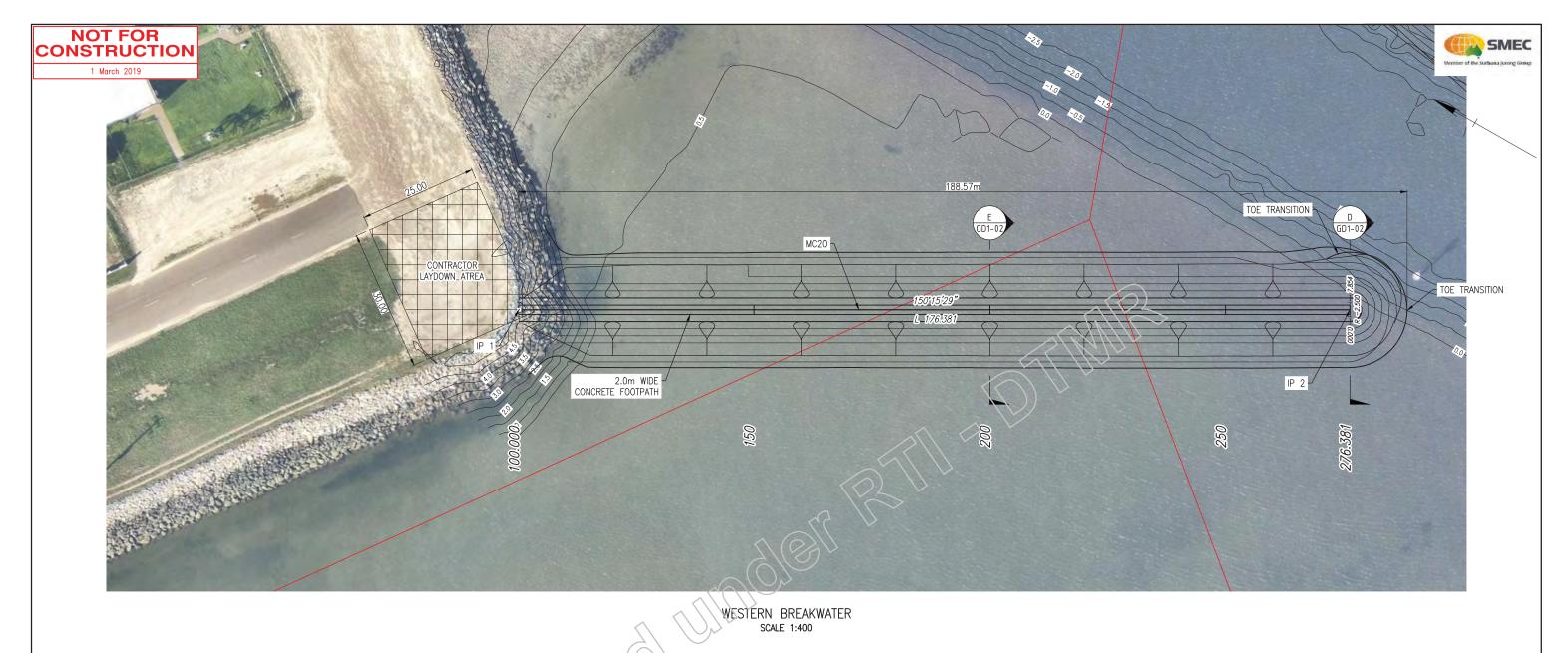
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WHITSUNDAY REGIONAL COUNCIL BOWEN BOAT HARBOUR Scales MGA94 BOWEN HARBOUR PROPOSED BREAKWATER EXTENSIONS Auxiliary Drg Nos EASTERN BREAKWATER GENERAL ARRANGEMENT PLAN NONE Zone 56 50% DESIGN REVIEW - MINOR AMENDMENTS ADDED ENGINEERING CERTIFICATION (RPEQ) Reference Points Contract. No. CN—TBC
Drawing No. 03—GA—0001 01. LAT 50% DESIGN REVIEW 12/12/18 Dist. to start of job (km) From start to end of job ENG. AREA Z. GOMEZ

Dimensions shown in Metres except where shown otherwise

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		CONTROL I	LINE MC10 S	SETOUT TABL	E	
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING
IP 1	INTERSECTION POINT	100.000	631319.966	7785920.863	5.000	150°15'28.85"
		120.000	631329.888	7785903.497	5.000	150°15'28.85"
		140.000	631339.810	7785886.132	5.000	150°15'28.85"
		160.000	631349.732	7785868.766	5.000	150°15'28.85"
		180.000	631359.654	7785851.401	5.000	150°15'28.85"
		200.000	631369.576	7785834.036	5.000	150°15'28.85"
		220.000	631379.498	7785816.670	5.000	150°15'28.85"
		240.000	631389.420	7785799.305	5.000	150°15'28.85"
		260.000	631399.342	7785781.940	5.000	150°15'28.85"
IP 2	INTERSECTION POINT	276.381	631407.468	7785767.717	5.000	150'15'28.85"

PLANS AND DOCUMENTS referred to in the **DEVELOPMENT APPROVAL** 1901-9077 SDA SARA ref: 26 March 2019 Date:

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				Drawing No.	03-GA-0011 01.1







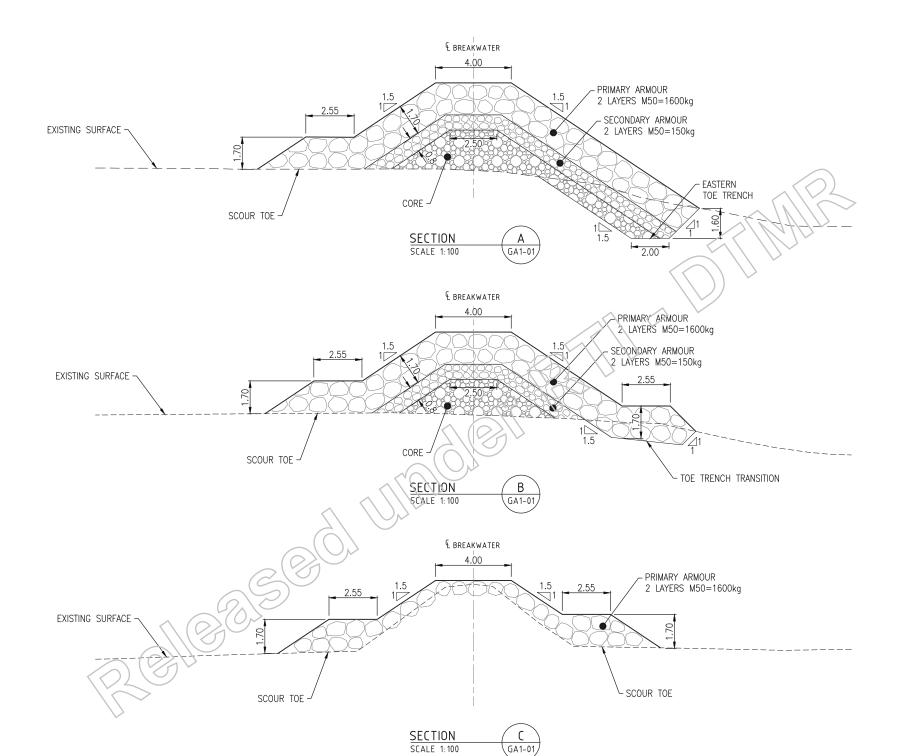
NOTE:

CONSTRUCTION OF BREAKWATER TOE

1. EXCAVATION OF TRENCH IN A TOE REGION.

PLACE ROCK FILL.

USE AN EXCAVATOR TO PUSH ROCK FILL TO PENETRATE INTO MARINE CLAY.





SARA ref:

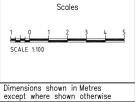
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Date:

26 March 2019

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BOWEN BOAT HARBOUR
PROPOSED BREAKWATER EXTENSIONS
EASTERN BREAKWATER DETAILS
ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA

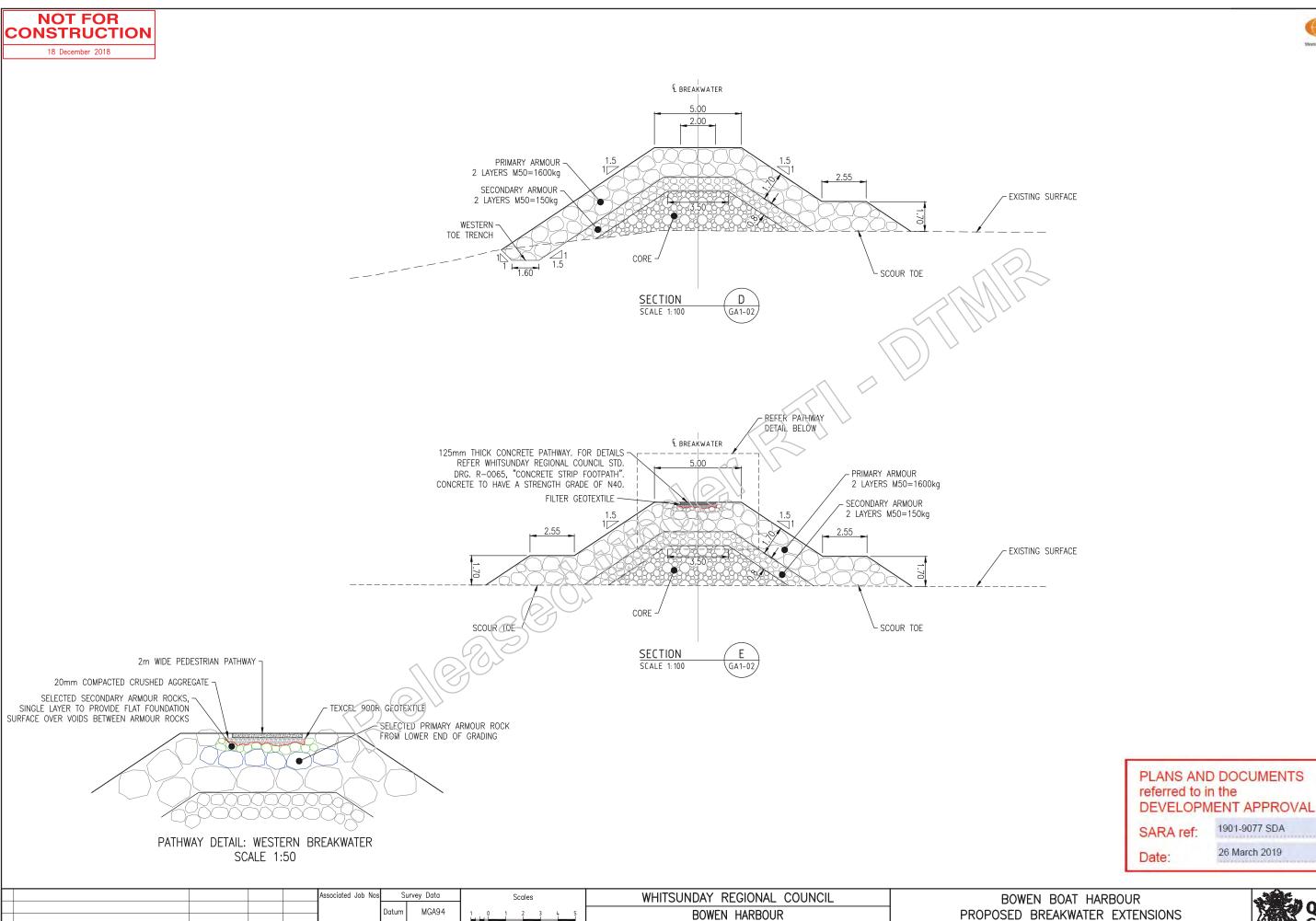
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-	Job No.	l TBC

Contract. No. CN—TBC
Drawing No. 04—GD—0001 02 Series Number GD1-01 of 2 MRR_Detail (02/1



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of job (km)

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From start to

end of job

Reference Points

Auxiliary Drg Nos

12/12/18

MINOR AMENDMENTS FOLLOWING CLIENT REVIEW

50% DESIGN REVIEW

Zone 56

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Dimensions shown in Metres except where shown otherwise

Height

Queensland Government

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PROPOSED BREAKWATER EXTENSIONS WESTERN BREAKWATER DETAILS ENGINEERING CERTIFICATION (RPEQ)

SIGNATURE

Job No. Contract. No. CN—TBC
Drawing No. 04—GD—0011 02

Series Number GD1-02 of 2

NO. DATE

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Figure 4-3: Areas of narrowleaf seagrass (SMEC, 2018)

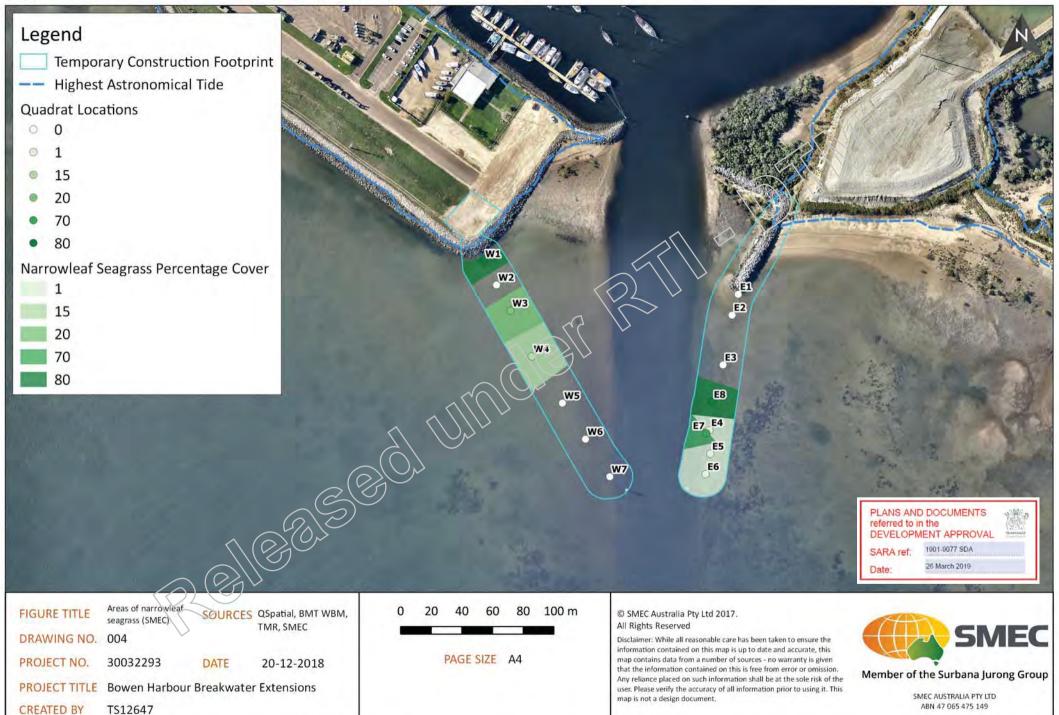
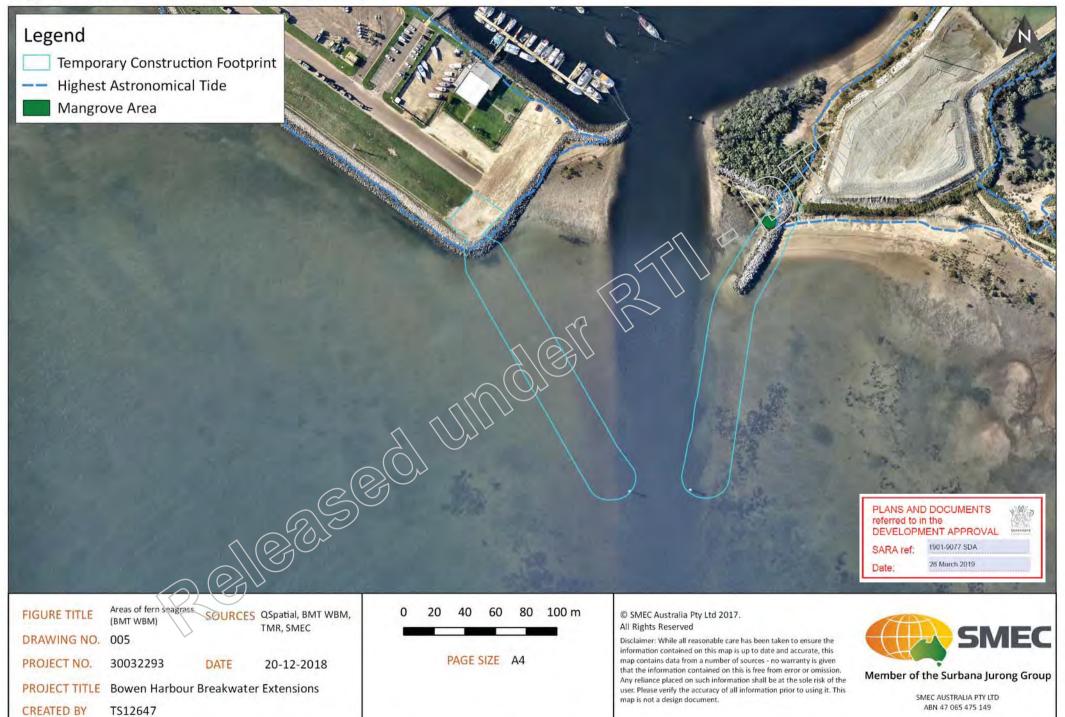
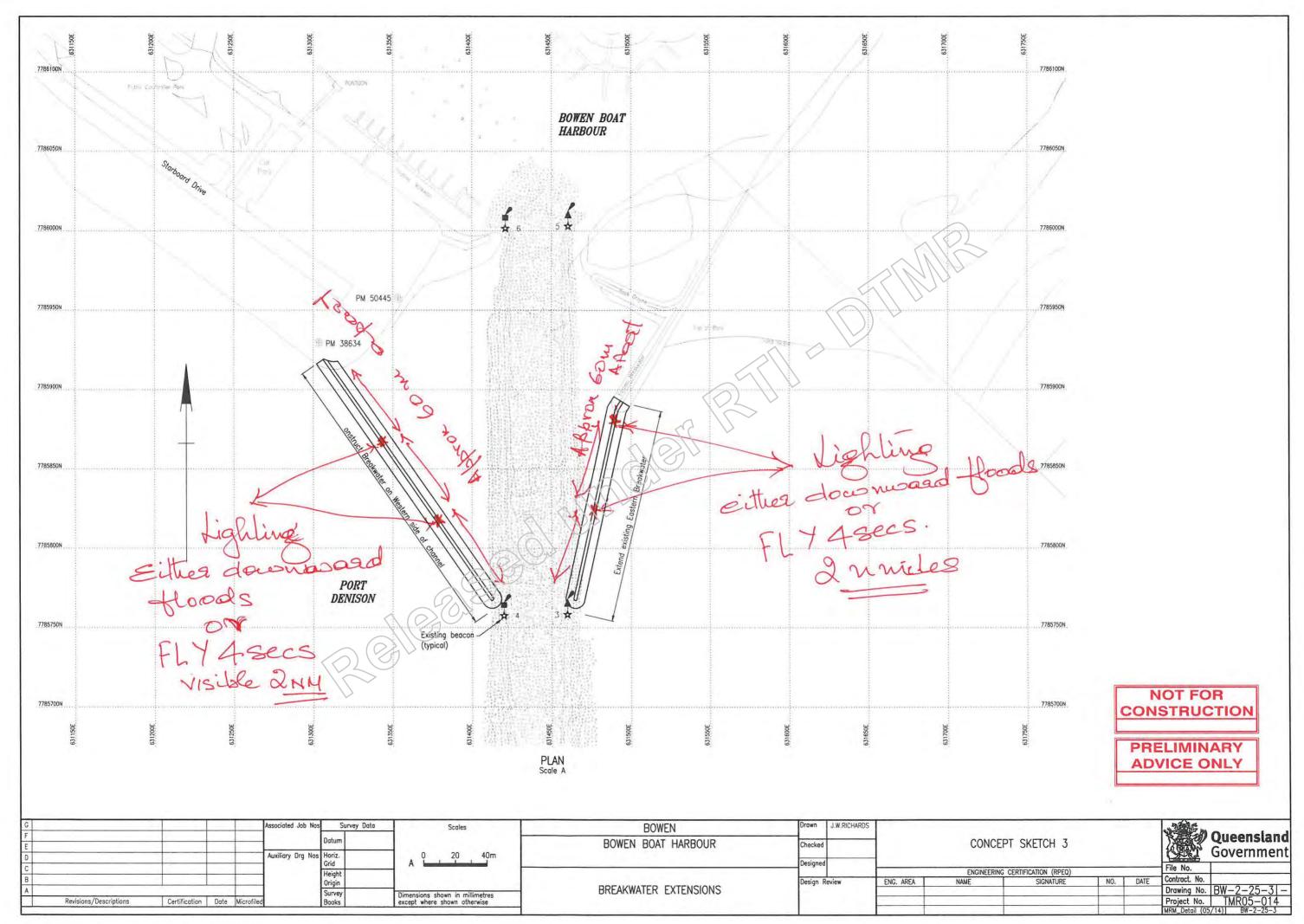
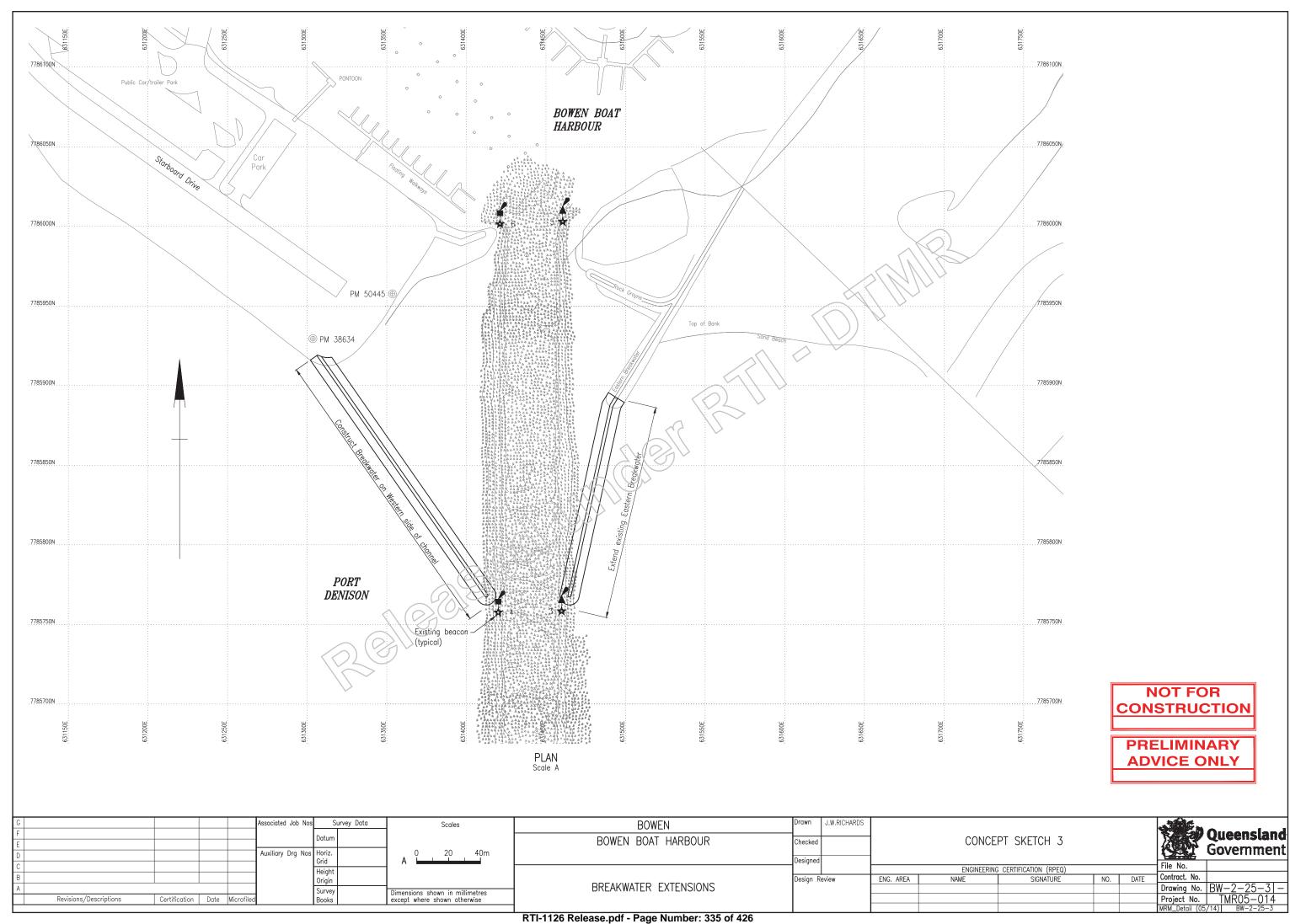
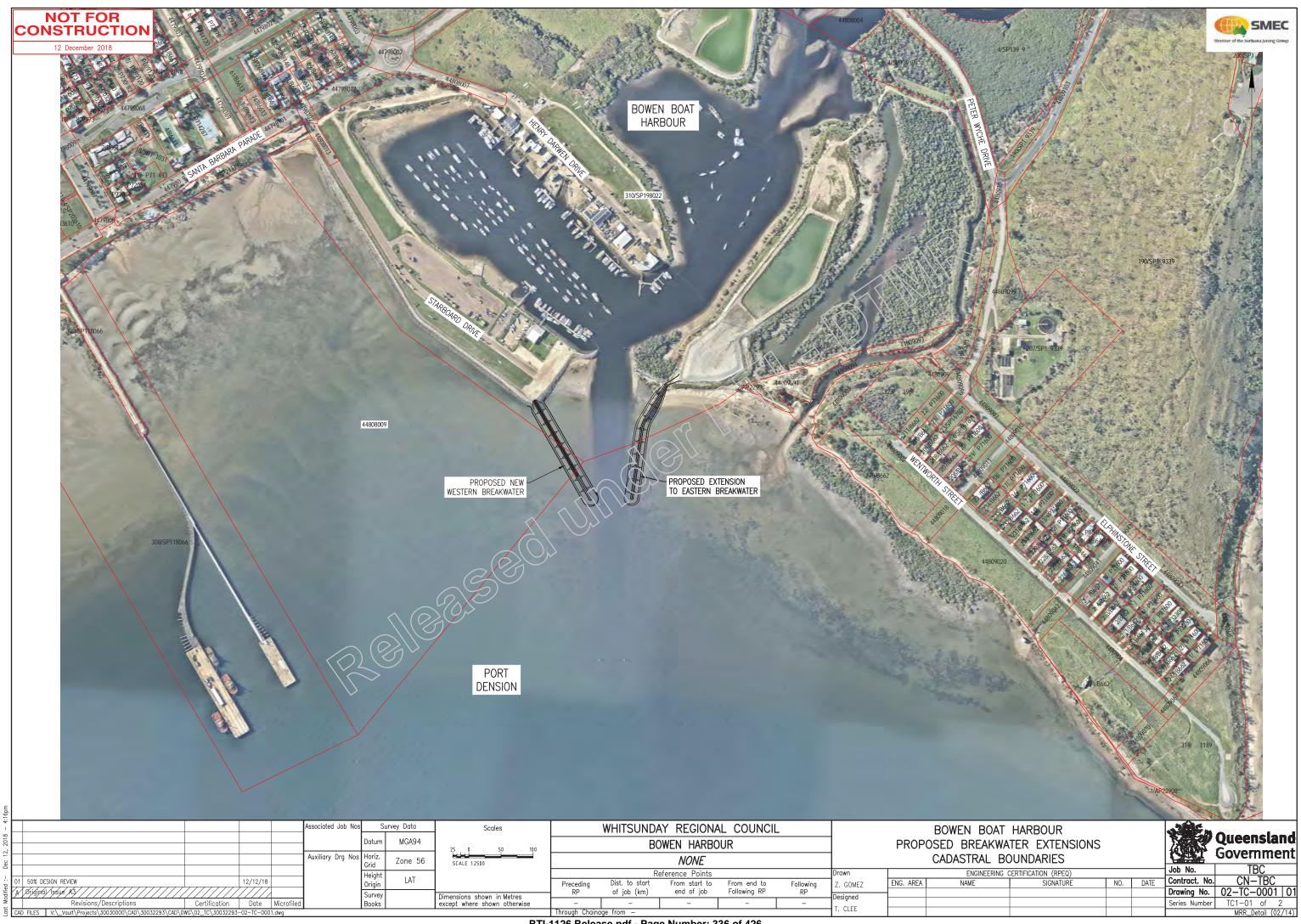


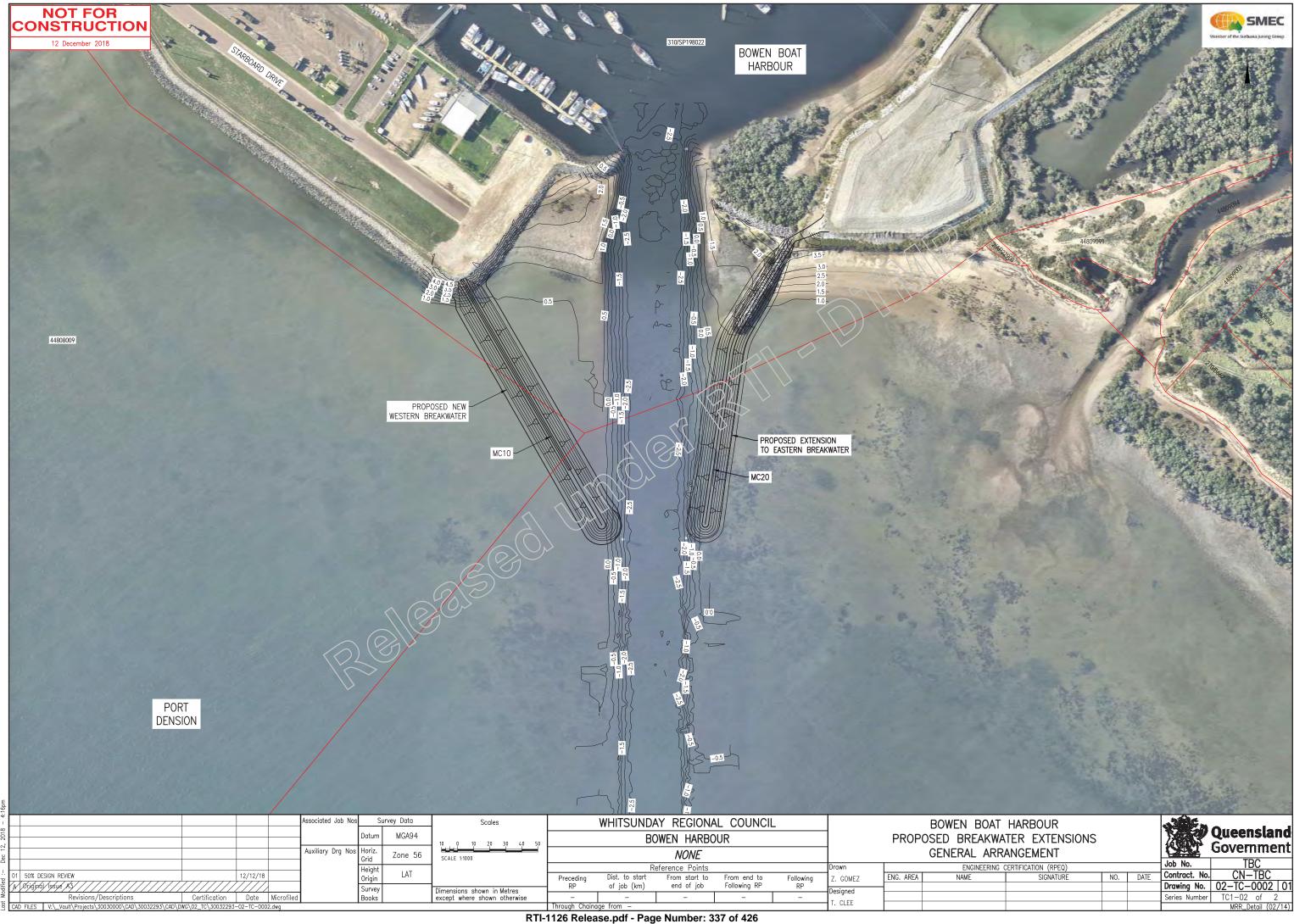
Figure 4-4: Areas of mangrove (SMEC, 2018)

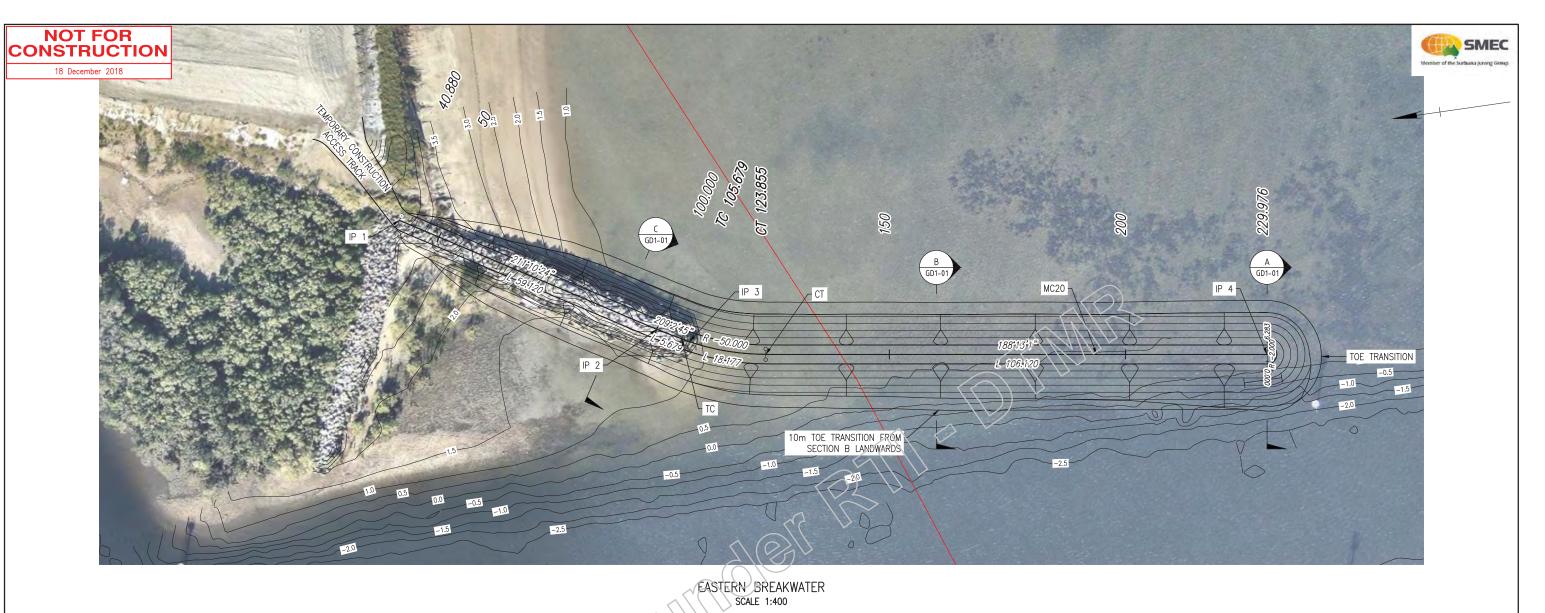












			CON	TROL LINE M	C20 SETOUT	TABLE			p
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
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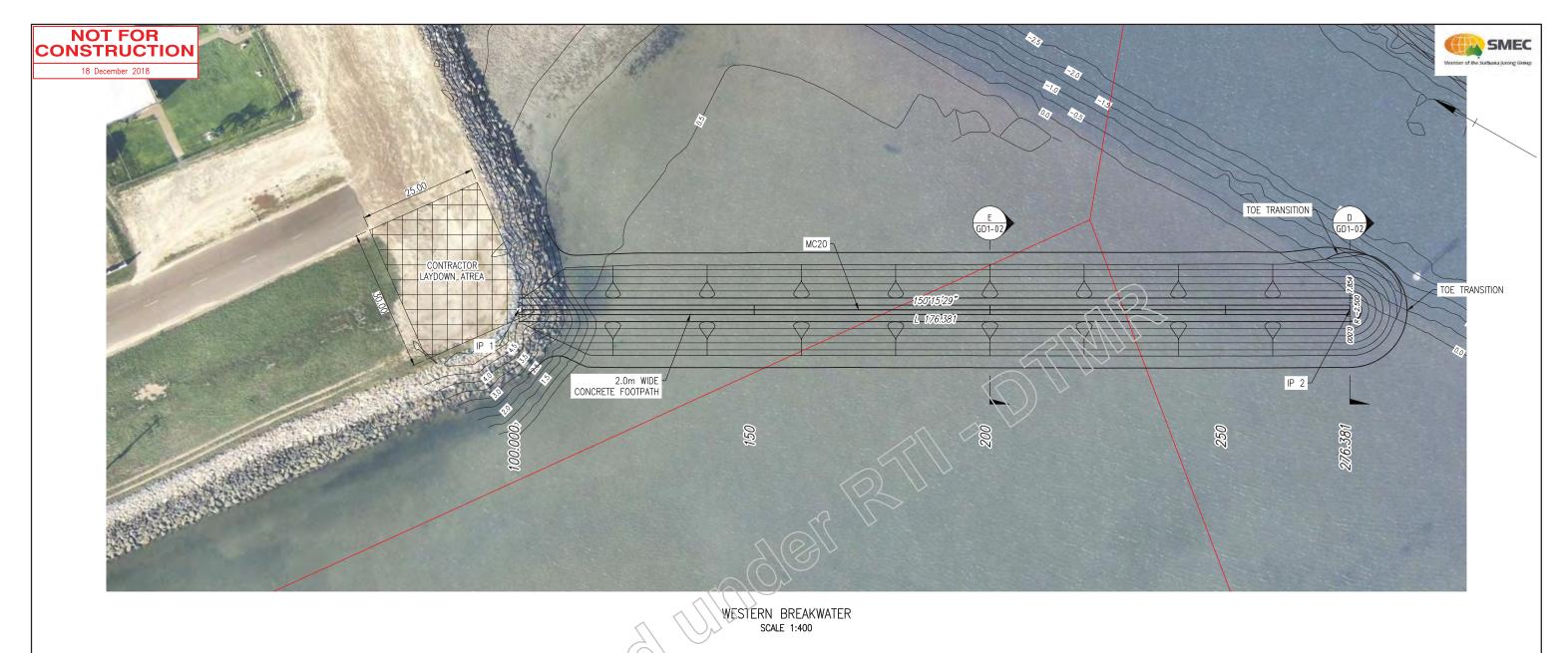
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IP 4 INTERSECTION POINT

WHITSUNDAY REGIONAL COUNCIL BOWEN BOAT HARBOUR Scales Queensland MGA94 BOWEN HARBOUR PROPOSED BREAKWATER EXTENSIONS Government Auxiliary Drg Nos EASTERN BREAKWATER GENERAL ARRANGEMENT PLAN NONE Zone 56 MINOR AMENDMENTS FOLLOWING CLIENT REVIEW ENGINEERING CERTIFICATION (RPEQ)
NAME SIGNATURE Reference Points Contract. No. CN—TBC
Drawing No. 03—GA—0001 02 LAT 50% DESIGN REVIEW 12/12/18 Dist. to start of job (km) From start to end of job ENG. AREA Z. GOMEZ Dimensions shown in Metres except where shown otherwise Certification Date Microfiled . CLEE



		CONTROL L	INE MC10 S	SETOUT TABL	E	
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IP 2	INTERSECTION POINT	276.381	631407.468	7785767.717	5.000	150°15'28.85"

					Associated Job Nos	Sı	urvey Data	
						Datum	MGA94	
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	Queensland Government
Joh No.	TRC

State Assessment and Referral Agency

Date: 06/11/2018



Department of State Development Manufacturing, Infrastructure and Planning

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Matters of Interest for all selected Lot Plans

Regulated vegetation management map (Category A and B extract)

Coastal management district

Coastal area - erosion prone area

Coastal area - medium storm tide inundation area

Coastal area - high storm tide inundation area

Matters of Interest by Lot Plan

Lot Plan: 310SP198022 (Area: 555,000 m²)

Regulated vegetation management map (Category A and B extract)

Coastal management district

Coastal area - erosion prone area

Coastal area - medium storm tide inundation area

Coastal area - high storm tide inundation area





Department of State Development Legend Manufacturing, Infrastructure Regulated vegetation management map and Planning (Category A and B extract) Queensland © The State of Queensland 2018. Category A on the regulated vegetation Government management map Category B on the regulated vegetation 640 160 320 480 management map

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Metres



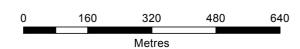


Legend

Coastal management district

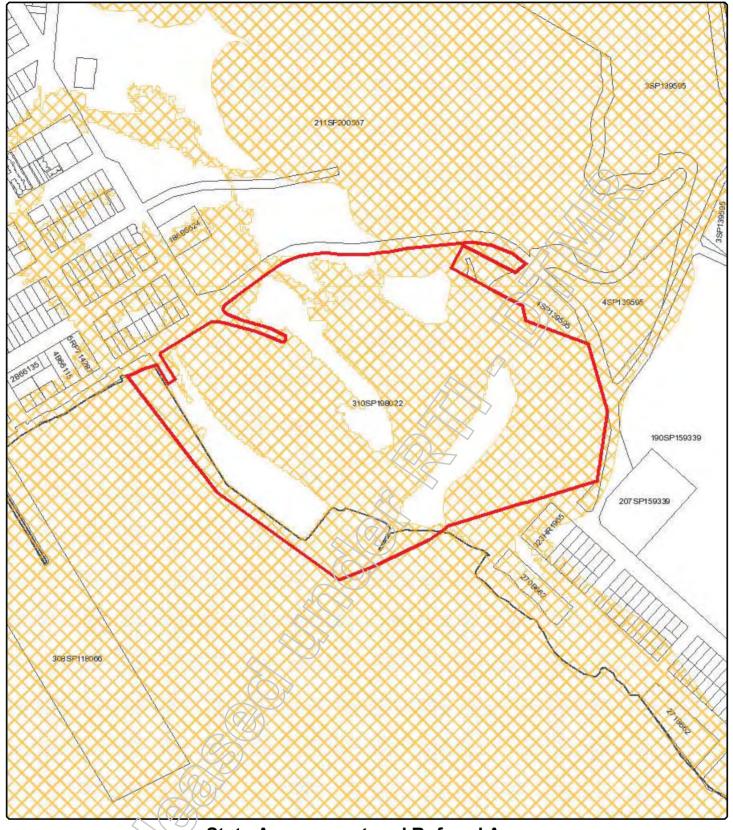


Coastal management district



Government

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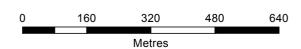


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Coastal area - erosion prone area

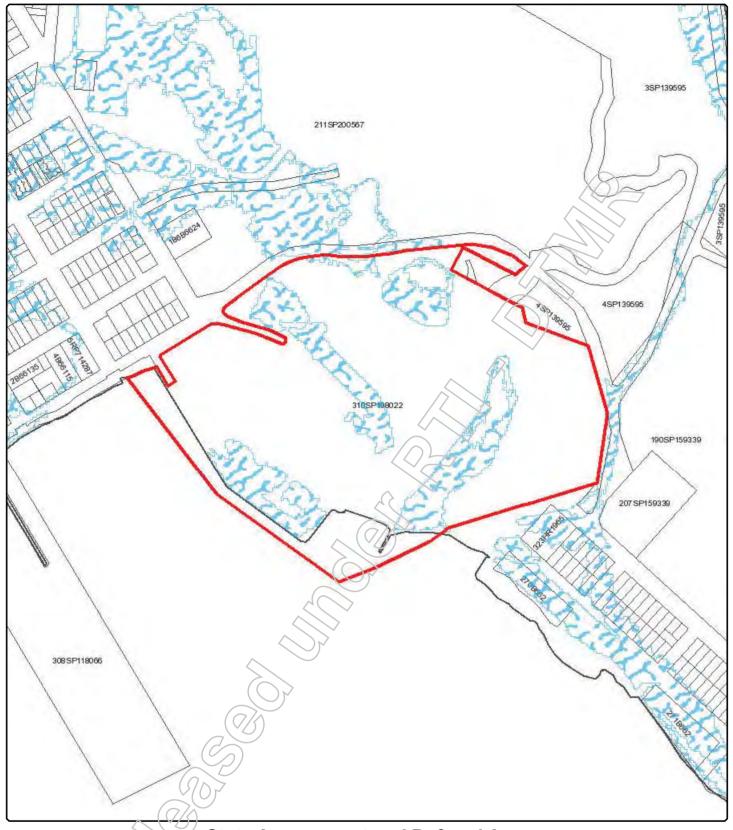


Coastal area - erosion prone area



Government

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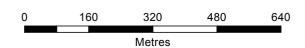
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Legend

Coastal area - medium storm tide inundation



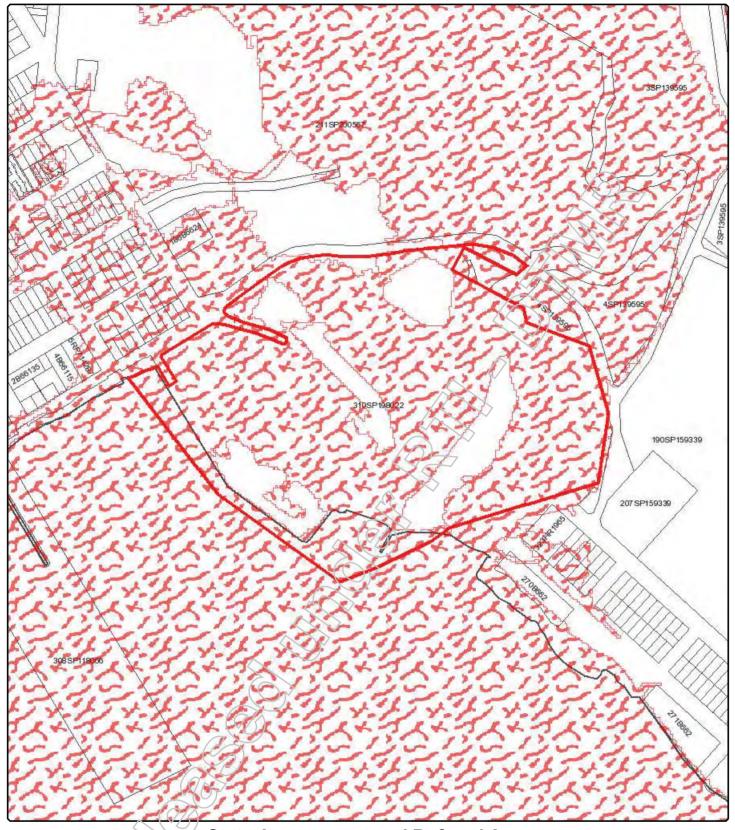
Coastal area - medium storm tide



Queensland

Government

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Department of State Development Manufacturing, Infrastructure and Planning Queensland

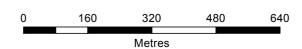
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Legend

Coastal area - high storm tide inundation area



Coastal area - high storm tide inundation



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Department of Transport and Main Roads

Prelodgement Advice

DSDMIP reference: 1811-8266 SPL
DSDMIP regional office: SARA North QLD

DSDMIP email: NQSARA@dsdmip.qld.gov.au

TA reference: TMR18-026167
TA contact name: Natasha Cook
TA contact details: (07) 4421 8112

TA approver: Captain Frank D'Souza

1.0 Application details

Street address: Santa Barbara Parade, Bowen QLD 4805

Real property description: 310SP198022

Local government area: Whitsunday Regional Council

Applicant name: Department of Transport and Main Roads

Applicant contact details: a

a QLD 4805

miwsara@dsdmip.qld.gov.au

Description of Proposal: Construction of a new rubble mound breakwater structure.

2.0 Matters of interest to the state

The development application has the following matters of interest to the state under the provisions of the *Planning Regulation 2017*;

Trigger Mode	Trigger Number	Trigger Description
Maritime Safety	10.17.3.2.1)	Development application for operational work that is assessable development under section 28, other than work for government supported transport infrastructure or carried out by the Gold Coast Waterways Authority, if the work is in tidal waters and any of the following apply— (a) the work is tidal works, other than the following tidal works in Gold Coast waters— (i) a boat ramp, jetty or private pontoon; (ii) a drainage outlet; (iii) a stormwater outlet; (iv) a revetment wall associated tidal works in subparagraphs (i) to (iii); (b) the work is the disposal of dredge spoil, or other solid waste material, in tidal water; (c) the work is reclaiming land under tidal water; (d) the work is constructing a canal, if the canal relates to reconfiguring a lot

3.0 Documents considered

The following documentation was relied upon in providing this advice:

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Amended breakwater concept (1)	N/A]	N/A	N/A	N/A

4.0 Pre-lodgement advice

Our agency advices the following conditions will be applicable:

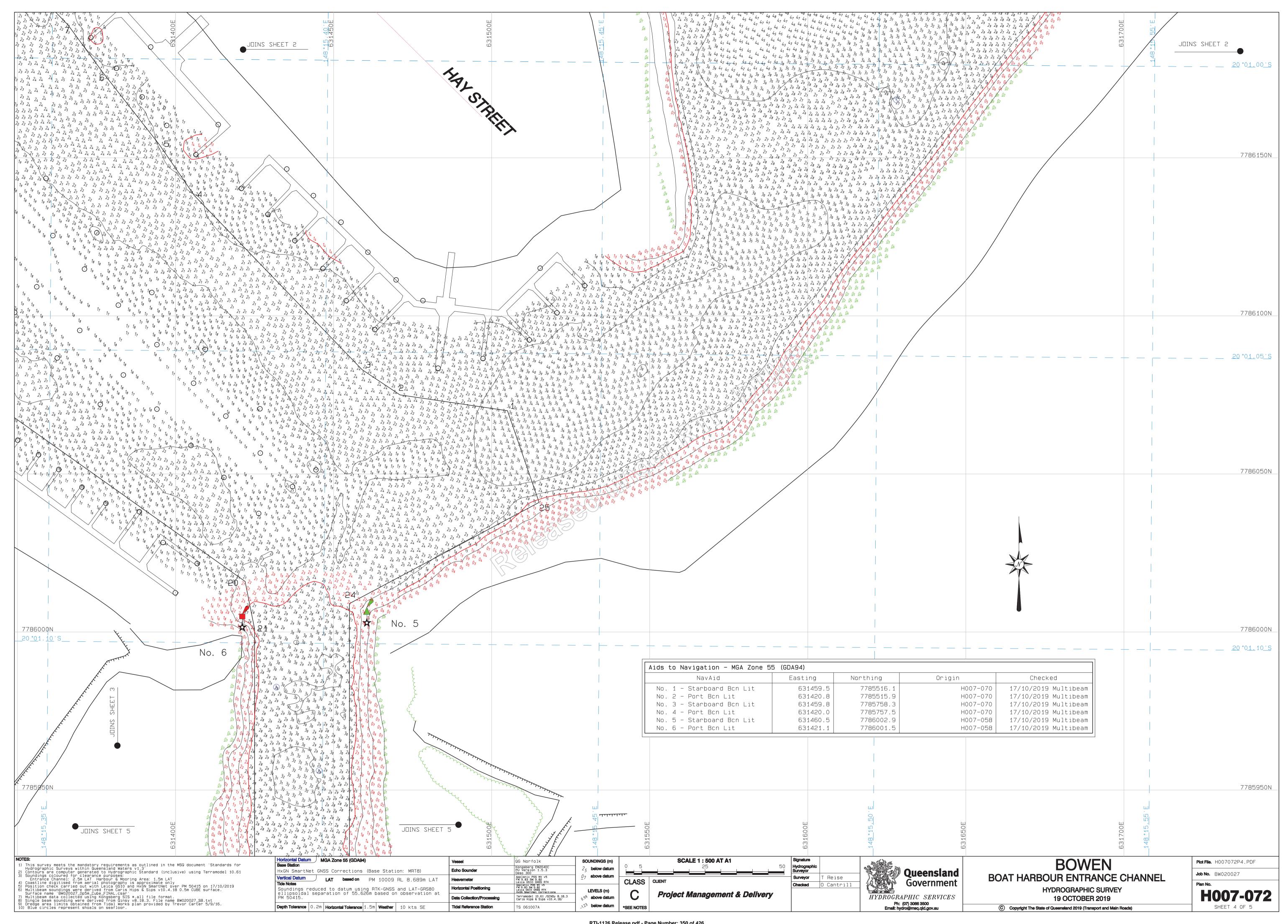
Aspe	Aspect of development: Operational Work					
	Compliance timing Unless specified in the issues below the timing for all conditions should be: two (2) weeks					
No. Condition ID Issues to be addressed or variations to model condition						
1.	MS01	Provide written notice to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au when the development authorised under this approval is: (a) 2 weeks prior to commencement; and (b) when it has been completed. Timing: (a) At least two weeks prior to the commencement of the works (b) Within two weeks after the completion of works				
2.	MS02	Survey(s) of the authorised channel must be conducted to class C survey standards within two (2) weeks of the completion of the works, a copy of the resulting survey plan(s) must be provided to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E. RHMTownsville@msq.qld.gov.au Reason: Navigational safety, to confirm that after completion of the breakwater no rocks has rolled into the channel.				
3.	MS03	"As Constructed" drawings of the approved structure must be provided within two (2) weeks of the completion of the works to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Reason: Navigational safety, to update nautical charts.				

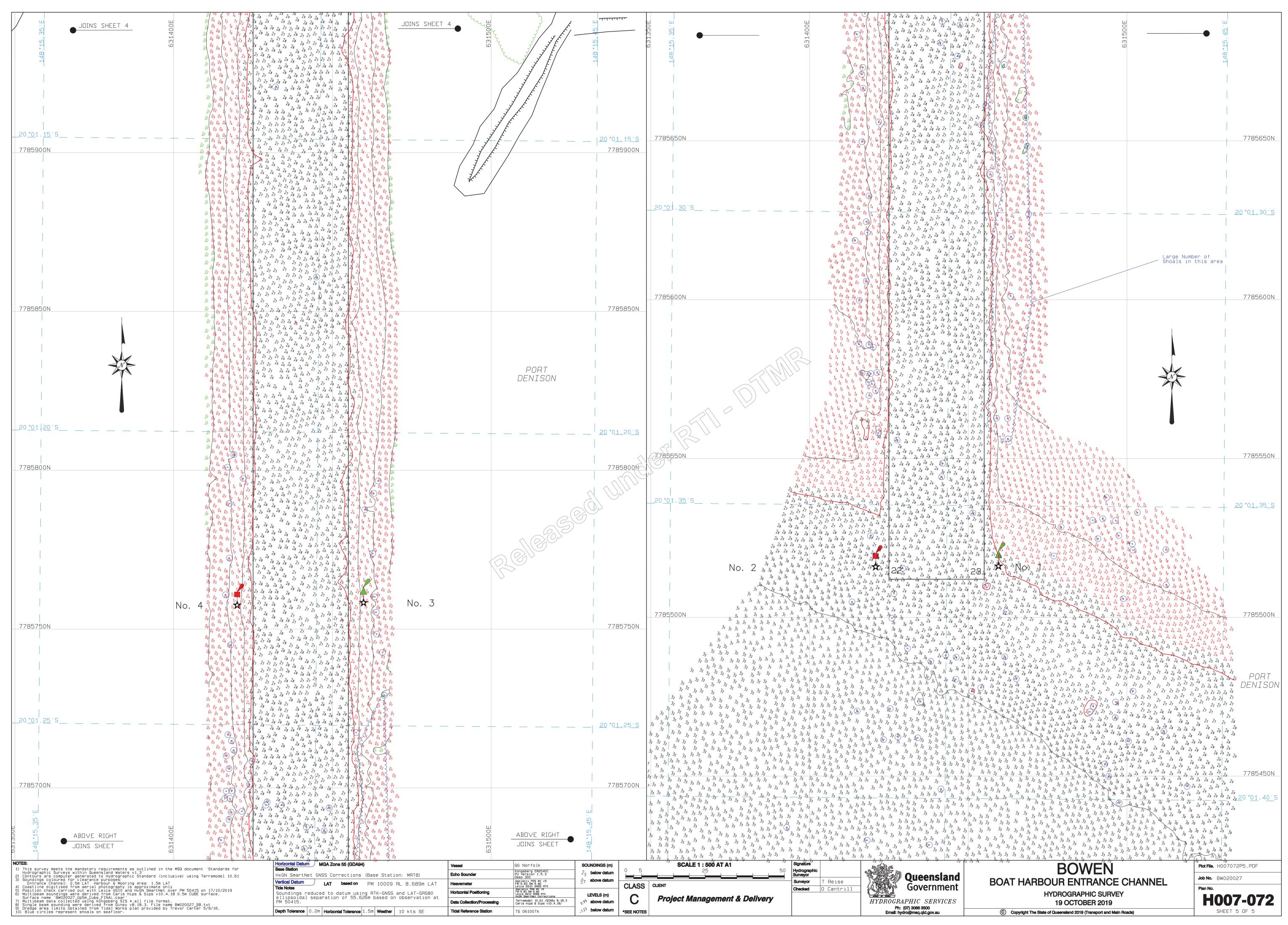
4. MS04 All vessels, structures, plant and equipment associated with the construction of the approved works must be lit/marked in accordance with the following specifications and requirements such that undertaking the construction works does not cause a risk to the safe navigation of ships: Floating plant and equipment is to be lit in accordance with the International Regulations for the Prevention of Collision at Sea. Mooring buoys are to be lit in accordance with IALA recommendations. Lighting must be provided in accordance with Section 3 of AS4282-1997 'Control of the obtrusive effects of outdoor lighting' to ensure safe navigation of other ships'. Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting **Timing:** While the works are occurring. Reason: Navigational safety The structure must be lit/marked in accordance with the following specifications, 5. **MS05** such that it does not cause a risk to the safe navigation of other ships: On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls Eastern breakwall2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Western breakwali...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting. Timing: During the hours of darkness.

Reason: Navigational safety, to indicate the presence of new structure(s) (obstruction) in the waterway. 6. MS06 Any navigational aid that is damaged due to the construction, operation or maintenance of the approved development must be promptly repaired or replaced at the applicant's cost. In the event that any damage is caused to any aid to navigation, the Harbour Master must be immediately contacted at Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, Ground Floor, Townsville Ross Street, 60 Ross Street, Townsville Qlid 4810 GPO Box 1921, Townsville Qid 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Timing: At all times. 7. MS08a Any debris or similar obstruction encountered whilst undertaking the work must be suitably re-used or disposed of at the applicant's cost. Timing: While the works are occurring. 8. The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. • During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. • The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length. Reason: Navigational safety.		1					
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Reason: Navigational safety.	8.		 The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the 				
			Reason: Navigational safety.				

Endorsement

Officer	Natasha Cook	Business Support Officer	4421 8112	msq_idas_townsville@msq.qld. gov.au
Approver	Frank D'Souza	Regional Harbour Master	4421 8106	msq_idas_townsville@msq.qld. gov.au





Natasha T Cook

From: Trevor B Carter

Sent: Friday, 8 June 2018 11:10 AM

To: Frank R D'Souza
Cc: Not Relevant

Subject: Meeting on Bowen Boat Harbour

Attachments: Att 1 - Bowen breakwater options.pptx; WBM proposal - Bowen breakwater options study.pdf

Frank

You would be aware of some of the discussions we have been having with the tenants in Bowen Harbour about the best means of protection from wave action in the harbour.

We decided to engage a consultant to look at the merits of various options. I've attached their proposal and the 4 options we've asked them to look at for your information. One of the tasks is to consult with you as well as the harbour tenants. Our tentative proposal at this stage is for the consultant and me to come to Townsville on Thursday 21 June to talk with you and then drive down to Bowen to talk with the harbour tenants on Friday 22 June.

Would you be available for about an hour some time on Thursday 21 June?

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

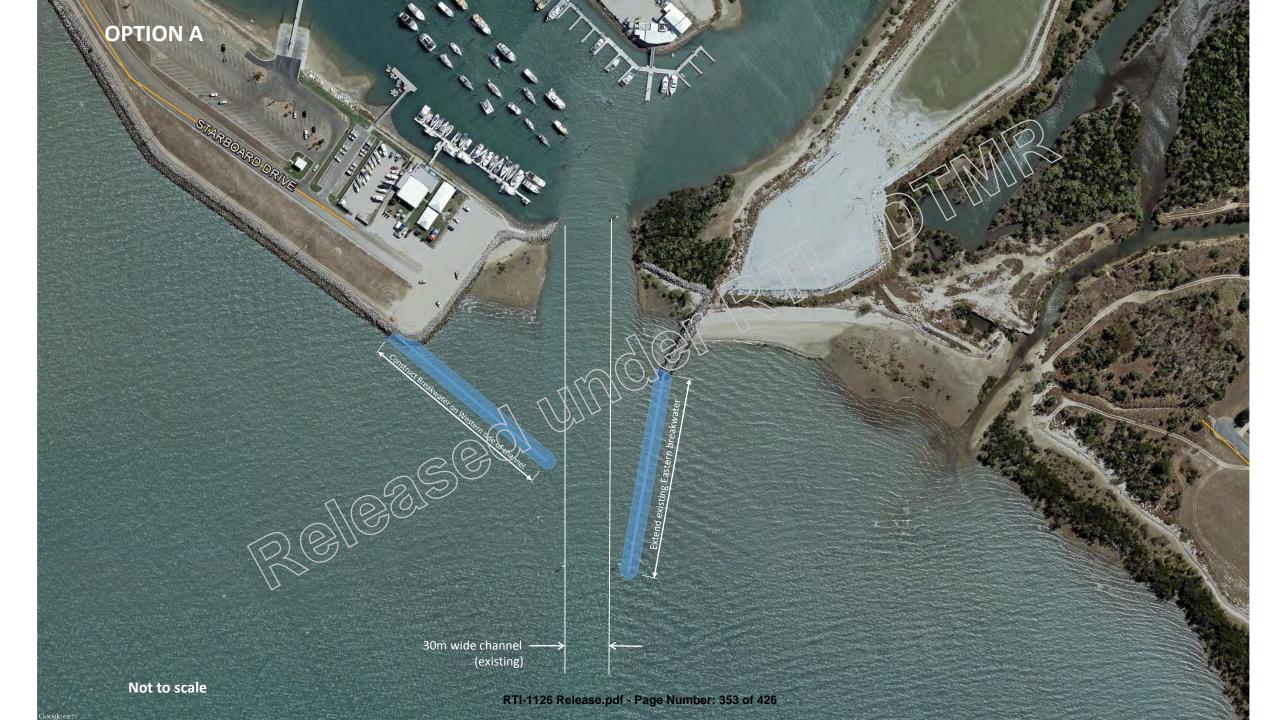
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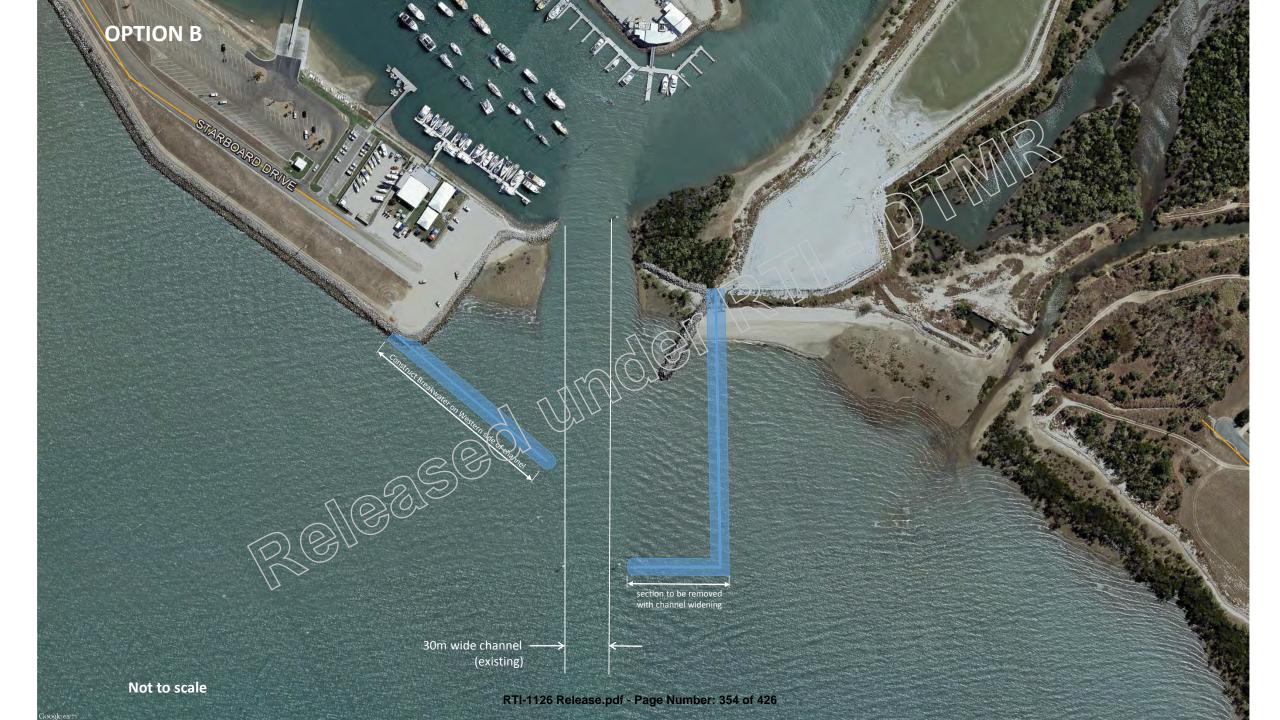
P: (07) 30664021 | F: (07) 30668305

M: Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au











BMT WBM Pty Ltd Level 8, 200 Creek Street Brisbane Qld 4000 Australia PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744 Fax: +61 7 3832 3627

ABN 54 010 830 421

www.bmt.org

Electronic Transmission

To:	Department of Transport and Main Roads					
Attention:	Trevor Carter		Date:	30 May 2018		
Email:	trevor.b.carter@tm	r.qld.gov.au	Document Ref:	L.B23279.001 Proposal.docx		
From:	NR		No. of pages:			

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Dear Trevor

RE: PROPOSAL FOR SERVICES: BOWEN BREAKWATERS FEASIBILITY STUDY

This document responds to the Department of Transport and Main Roads (TMR) brief for Bowen Breakwaters Feasibility Study. We understand that TMR is seeking a feasibility study on four different sets of breakwater configurations for the Bowen Boat Harbour entrance. This study would be an options assessment based on criteria identified by TMR in the brief and as otherwise considered appropriate.

This document sets out our proposed methodology, deliverables, work program, cost estimate and team to deliver this project. If further information is required, please contact me at <code>NR</code> <code>@bmtglobal.com</code> or 3831 6744.

Note, this proposal is valid for a period of 90 days.

1 Methodology, Deliverables and Work Program

Based on a review of the brief, we propose the following methodology:

- (1) Initial assessment of the four options against the relevant criteria. This would be a 'traffic light' assessment whereby each criteria for each option would be assigned a ranking of high, medium or low based on the likely outcome. See Table 2 and Table 3 for examples of this ranking system.
- (2) Meeting with Regional Harbour Master in Townsville to discuss the options and relevant maritime safety and navigability requirements.
- (3) Presenting of the options and the relevant assessment criteria at a stakeholder workshop in Bowen. The intent of this workshop will be to present the available options to relevant stakeholders as well as to raise awareness of the various criteria important to decision-making. The workshop will also provide an opportunity to understand first-hand the needs and desires of each stakeholder group.

It is assumed that TMR will make necessary arrangements for the workshop, i.e. organisation of venue and invitation to stakeholders to attend. BMT will act only as a presenter/engagement facilitator. The key groups for engagement are assumed to be the Bowen Marina and the Royal

Queensland Cruising Yacht Club but may also include representatives of North Queensland Bulk Ports and/or Whitsundays Regional Council, at the discretion of TMR.

BMT will record and report on the outcomes of this workshop to TMR.

Both	NR	and	NR	would participate in the Bowen/Townsville stakeholder meetings
------	----	-----	----	--

- (4) Detailed assessment of the four options, including development of more detailed data for the following assessment criteria:
 - (a) Wave action based on completed (and potentially optional see below) wave penetration assessments the acceptability of wave climate within the harbour would be assessed for locations relevant to key stakeholder groups. The harbour wave climate for Options C and D would be based on high-level interpretation of previous modelling results.
 - (b) Cost initial cost estimates for the works associated with each option (including breakwater, dredging, and additional studies/assessments) will be developed in consultation with TMR to provide an understanding of the variation between each option. This will be high level/orderof-magnitude only.
 - (c) Ease of navigability of the channel will be assessed for the range of potential existing and likely future vessels (in consultation with the Regional Harbour Master).
 - (d) Timeframe a collective timeframe based or design, approval and construction requirements for each option will be identified to provide an understanding of differences, particularly to understand the level of risk of particular options exceeding the preferred timeframe identified by TMR. This will be at a high level only.
 - (e) Environmental the range of environmental values and impacts for each option will be identified and assessed, including the likelihood of the option causing a 'significant impact' or 'significant residual impact' based on the relevant Commonwealth and Queensland guidelines.
 - (f) Approvals the likely approvals for each option will be identified together with the general consistency of the option with prevailing policy. This will integrate aspects of the environmental impact considerations (see above). This will provide an indication of both the complexity of approval requirements (i.e. multiple approvals) and difficulty of achieving approvals (i.e. consistency with government policy). This will not set out an approvals strategy, however, and may not be a comprehensive list since further approvals may be identified as the project design is refined.
 - (g) Dredge material placement sites a high level investigation into available options for dredge material placement will be conducted to provide an understanding of the ease/difficulty of accessing placement sites for dredge material associated with Options C and D.
 - (h) Future expansion wave climate widening and deepening of the entrance will result in increased wave action within the harbour. The implications to stakeholders and need for breakwater modifications to mitigate increased wave action will be qualitatively assessed.
- (5) Presentation of results to TMR.

Additionally, we propose the following two options:

- (6) Wave penetration modelling associated with Option B to allow comparison against Option A. The wave penetration assessment for option B would be based on the same modelling system, scenarios and reporting outputs as previously undertaken by BMT for TMR (M.B22333.003, 2 March 2018). The wave penetration modelling assessment for Option B would be reported in a brief technical memorandum. This assessment would inform the detailed assessment against the criteria for impact to wave action (see Step (4) above).
- (7) Presentation of the results of the feasibility study to stakeholders (attended by either or

These additional options have been costed separately to the base study scope

The deliverables from this methodology would be as follows:

- Memo-style report presenting outcomes of initial/traffic light assessment
- Report summarising stakeholder engagement outcomes
- Report presenting results of detailed assessment/feasibility study, including analysis against each of the relevant criteria.

Table 1 presents the proposed work program for this methodology. Note that timelines can be reduced if commissioning occurs earlier and/or if less time is required for TMR review of the detailed assessment report. Note also that this assumes stakeholder engagement can occur within week of 18 June.

Table 1 Proposed Work Program

Week beginning	Activity	Deliverable	
28 May	Submission of proposal	-	
4 June	Assessment by TMR	-	
11 June	Commissioning of work Initial assessment	Initial assessment report	
18 June	Meeting with RHM Stakeholder engagement	Report summarising stakeholder engagement	
25 June	Detailed assessment	-	
2 July	Detailed assessment	Detailed assessment report (first draft)	
9 July	TMR review	-	
16 July	Detailed assessment	Detailed assessment report (final)	

Table 2 Example of Traffic Light Assessment of Options

Criteria	Option A	Option B	Option C	Option D
Wave action				
Cost – breakwater				
Cost – other infrastructure				
Cost – studies				10-
Navigability				
Timeframe				
Environment			/>	\geqslant
Approvals				\vee
Future expansion*				
Future expansion wave climate*				

*While not included in the brief as a relevant criteria, it is recommended that the impact of the proposed breakwater option on ability to provide for a wider channel in the future be included as a criteria.



Table 3 Example of Descriptors for Criteria as Part of Traffic Light Assessment

Criteria	Descriptors		
	High outcome	Medium outcome	Low outcome
Wave action	Provides acceptable wave climate under 1-year ARI conditions	Provides acceptable wave climate most of the time	Does not provide acceptable wave climate most of the time
Cost – breakwater	Equal or lower cost comparative to original proposal	Additional cost comparative to original proposal	Significant additional cost comparative to original proposal
Cost – other infrastructure	Equal or lower cost comparative to original proposal	Additional cost comparative to original proposal	Significant additional cost comparative to original proposal
Cost – studies	Equal or lower cost comparative to original proposal	Additional cost comparative to original proposal	Significant additional cost comparative to original proposal
Navigability	Provides ease of navigability for present and likely future use	Provides ease of navigability for present use but will require modification for future use	Does not provide ease of navigability for all present uses
Timeframe	Can be completed within timeframe of original proposal	Additional time required comparative to original proposal	Significant additional time required comparative to original proposal
Environment	Equal or lower environmental impact comparative to original proposal	Additional impact comparative to original proposal	Significant additional impact comparative to original proposal
Approvals	Equal or lower approval requirements comparative to original proposal	Additional approval requirements and/or more difficult approval process comparative to original proposal	Significant additional approval requirements and/or significant more difficult approval process comparative to original proposal
Future expansion	Allows for future channel widening with no or little modification	Allows for future channel widening with some modification	Does not allow for future channel widening without significant reconfiguration and/or removal

2 Cost Estimate

We propose to undertake the study for a lump sum, fixed fee of \$22,285 excluding GST.

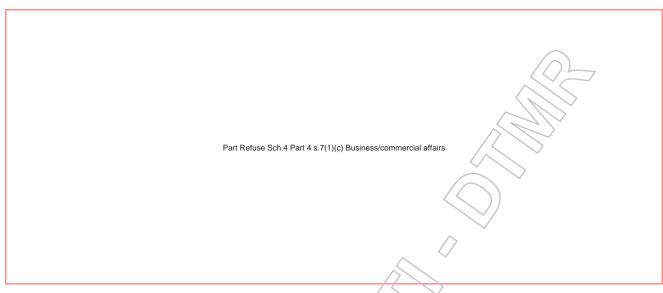
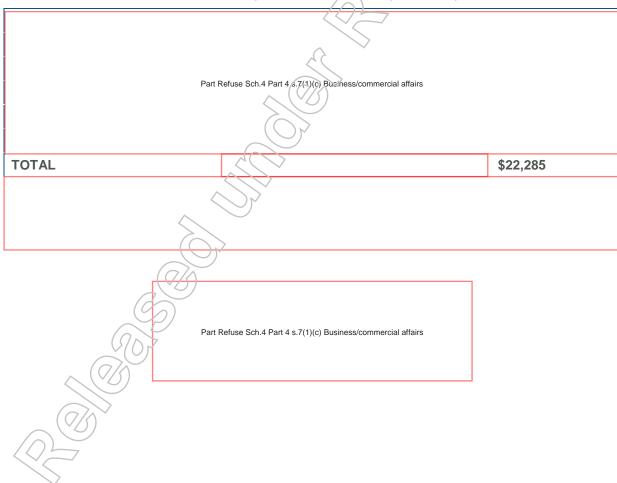


Table 4 Lump Sum Fee Schedule (Excl. GST)



3 Project Team

The work will be undertaken by the following personnel:

project manager and technical lead

NR environmental advisor and stakeholder engagement.

4 Limitations and Assumptions

The following limitations and assumptions underpin this proposal:

- TMR will coordinate stakeholder engagement, including organisation of a venue and invitation of relevant stakeholders
- TMR will assist to BMT in estimating costs for breakwater, dredging and other works based on relevant projects conducted by TMR at Bowen Boat Harbour and elsewhere
- Stakeholder engagement will focus on presentation of options and criteria and understanding stakeholder positions, but is not intended to facilitate the reaching of a consensus or agreed design approach
- Any indication of costs, assessment requirements and timeframes will be indicative/high-level only and
 for the purpose of making comparison. More detailed estimates can be determined only subject to more
 extensive investigations.



From: VTSTownsville

Sent: Tuesday, 24 September 2019 7:10 AM

To: NTMPublishing

Cc: RHMTownsville; MVTM Townsville; marinepilots@townsville-port.com.au

Subject: Notices to Mariners NtM 2019-427(T)

Attachments: 2019-427(T).pdf

Good morning,

Please promulgate the attached NtM 2019-427(T).

Regards,

Jacob Webber

Vessel Traffic Services Operator

Vessel Traffic Service | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main

Roads

1st Floor | 60 Ross Street | South Townsville Qld 4810

GPO Box 1921 | Townsville Qld 4810

PH: 1300721263

MB: Not Relevant Jacob.P.Webber@msq.qld.gov.au

Department of Transport and Main Roads - Maritime Safety Queensland

NOTICE TO MARINERS



427 (T) of 2019

Issued by Townsville Maritime Region on 24 September 2019

Area: Bowen pilotage area

Locality: Bowen Harbour, Breakwater

Activity: Construction of Breakwater Extension

Mariners are advised that construction of the Bowen Harbour Breakwater extension will take place between Monday, 23 September 2019 and Friday, 31 January 2020.

The seaward extremity of the Breakwater under construction will be illuminated by lights with characteristics FI Y 4secs as it progresses seaward at 60 metre intervals along the break wall.

Mariners are advised to navigate with caution in this area.

Refer to notice: none Cancel notice: none

AUS charts affected: Aus 268

Latitude and longitude positions are on WGS84 horizontal datum and are compatible with GDA94 datum.

For further information about this notice, please contact:

The Townsville Regional Harbour Master's office:

Phone 07 4421 8100 Email: vtstownsville@msq.qld.gov.au

Notice authorised by: Regional Harbour Master (Townsville) - Maritime Safety Queensland

From: Anita M Cook Sent: Tuesday, 24 September 2019 2:10 PM Frank R D'Souza To: **Subject:** Phone Message Hi Frank Can you please call Hillary Group RE: Bowen Breakwater product. They are taking possession of the site i veyor will be on site tomorrow. Mobile # Not Relevant Thanks. **Kind Regards Anita Cook** Business Support Officer | Marine Operations (Townsville Region) Maritime Safety Queensland Branch | Customer Services, Safety and Regula port and Main Roads Works: Mon, Tue, Wed, Thurs & Fri Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 4421 8101 anita.m.cook@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au

From: Trevor B Carter

Friday, 13 September 2019 11:53 AM
Frank R D'Souza; Charles-Dean A Sorbello
Max Haste; Jordan E Tsang; Kurt S Sundholm

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Attachments: Eastern breakwater.pdf; Western breakwater.pdf

Frank

The lighting requirements are incorporated in the breakwater contract and will be installed by the contractor. However for the eastern breakwater, the contractor is only required to install swing poles in locations as per your sketch. A standard solar light fitting will be arranged by TMR / MSQ.

The western breakwater incorporates a lit pathway with 5 street lights connected to mains power.

I've attached the plans showing the lighting layout.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4001

P: (07) 30664021 | F: (07) 30668305

M Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Friday, 13 September 2019 10:20 AM **To:** Trevor B Carter; Charles-Dean A Sorbello

Cc: Max Haste

Subject: FW: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Trevor,

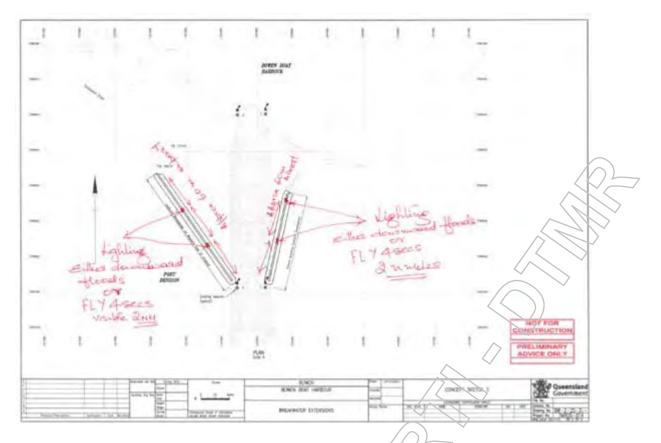
Has the contractor been notified of the final lighting requirements or is it being done independently by TMR/MSQ.

Final completion

The structure must be lit/marked in accordance with the following specifications, such that it does not cause a risk to the safe navigation of other ships:

On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls

- Eastern breakwall ...2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)
- Western breakwall...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)



If street lamp type (lampposts with floodlights directed downwards) - then TMR will have the standards.

If navigational lights flashing Yellow 4 secs – then please contact MSQ for design specifications.

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810

GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Friday, 13 September 2019 10:12 AM

To: NR @hillerygroup.com.au' NR @hillerygroup.com.au>

Cc NR Milerygroup.com.au; NR @hillerygroup.com.au NR @hillerygroup.com.au; RHMTownsville

<RHMTownsville@tmr.qld.gov.au>; Trevor B Carter <Trevor.B.Carter@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi NR

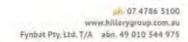
Thanks for the notification. We will issue a Notice to Mariners regarding the construction activity.

Please be advised during construction

- The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period.
- During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel.
- The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length.

Regards Frank
Captain Frank D'Souza Regional Harbour Master Marine Operations (Townsville Region) Maritime Safety Queensland Branch Customer Services, Safety and Regulation Division Department of Transport and Main Roads
Ground Floor 60 Ross Street South Townsville Qld 4810 GPO Box 1921 Townsville Qld 4810 (07) 44218100 RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au
From: NR @hillerygroup.com.au Sent: Thursday, 12 September 2019 3:35 PM To: Frank R D'Souza <frank.r.dsouza@msq.qld.gov.au>; RHMTownsville <rhmtownsville@tmr.qld.gov.au> Cc: NR @hillerygroup.com.au NR @hillerygroup.com.au NR @hillerygroup.com.au NR @hillerygroup.com.au Subject: Bowen Boat Harbour Breakwater Extension 2019 - Construction works</rhmtownsville@tmr.qld.gov.au></frank.r.dsouza@msq.qld.gov.au>
Good Afternoon Frank.
Thank you for calling me back yesterday afternoon.
This letter serves to notify you that Hillery Group is shortly going to start the construction of the Bowen Boat Harbour Breakwater extensions. I will attach our intended construction program for your perusal.
Our only intended works from a marine vessel is for the surveyor to survey the sea floor in the construction zone and to set-out markers, which we intend to start after the 23 rd of September 2019.
The construction procedure will be building the structure from the bank heading out progressively. We will be setting up a night light on the end of the constructed section to raise awareness to the general public that would be traveling by boat at night.
Please do not hesitate to contact me if you have any further querries.
Kind Regards
Project Manager Mob Not Relevant

Email: info@hillerygroup.com.au





Quality set in stone

Quarrying . Civil & Mining . Plant & Equipment Hire



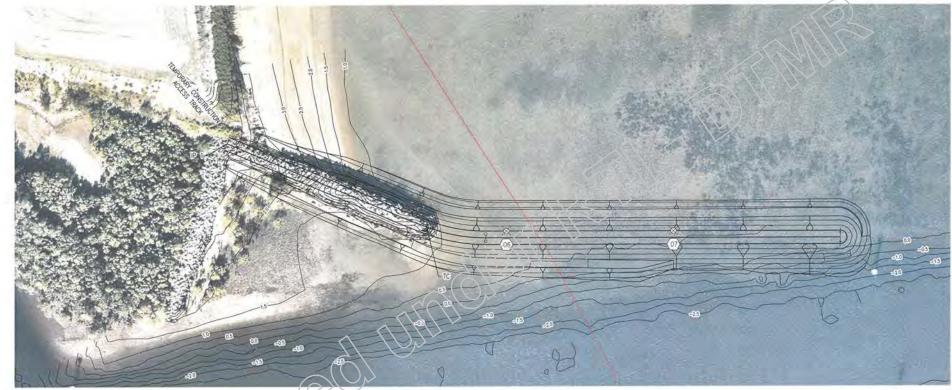


LEGEND

X

MSQ Yellow flashing beacon foundation Luminaire station number





EASTERN BREAKWATER Scole 1:400

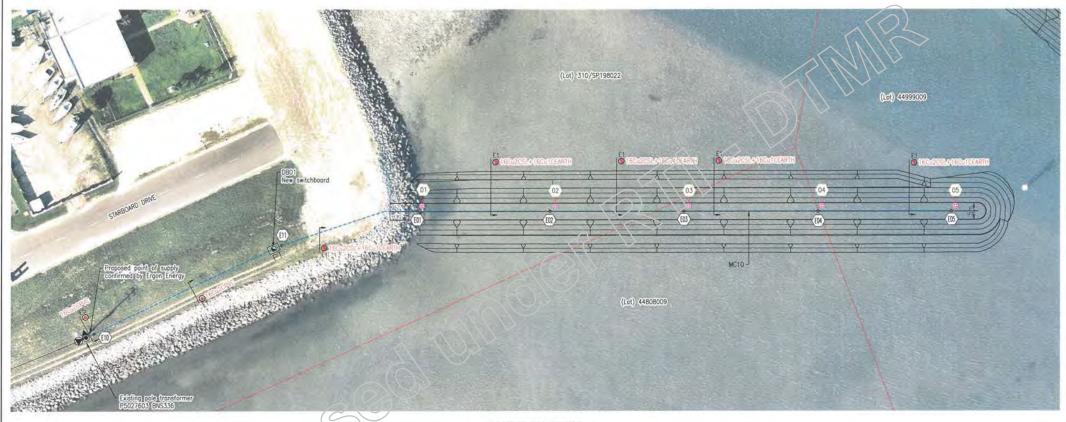
		POLE	PLACEMEN	T SCHEDULE
LOCATION	STM.		MORTHING	REMARKS
Eastern Breakwater	106	631488:319	7785867.003	New foundation to be installed as shown on Drawing Number 72479. New hinged pole to be installed (Ingal or Approved Eq.)
Eastern Breakwater	07	631481.167	7785817.476	New foundation to be installed as shown on Drowing Number 724793 New hinged pole to be installed (Ingal or Approved Eq.)

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WESTERN BREAKWATER Scole 1:400

Ergon Energy WR1479879

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S A	Original Issue A3				/ 1	Survey		Dimensions shown in Metres	RP.	of job (km)	end of job	Following RP	RP	Designed	ELECTRICAL 1	N, DIGBY		16072	13/06/19	Drawing No.	724793 A
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From: Frank R D'Souza Sent: Friday, 13 September 2019 10:12 AM To: @hillerygroup.com.au Cc: @hillerygroup.com.au; @hillerygroup.com.au @hillerygroup.com.au RHMTownsville; Trevor B Carter **Subject:** RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works **Attachments:** PA - Pre-lodgement - Advice_1.pdf NR Thanks for the notification. We will issue a Notice to Mariners regarding the construction activity. Please be advised during construction The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length. Regards Frank Captain Frank D'Souza Regional Harbour Master | Marine Operations (Townsville Region) Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads Ground Floor | 60 Ross Street | South Townsville Qld 486 GPO Box 1921 | Townsville Qld 4810 (07) 44218100 RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au @hillerygroup.com.au Sent: Thursday, 12 September 2019 3:35 PM To: Frank R D'Souza ; RHMTownsville @hillerygroup.com.au NR Cc: NR @hillerygroup.com,au; NR @hillervgroup.com.au Subject: Bowen Boat Harbour Breakwater Extension 2019 - Construction works Good Afternoon Frank

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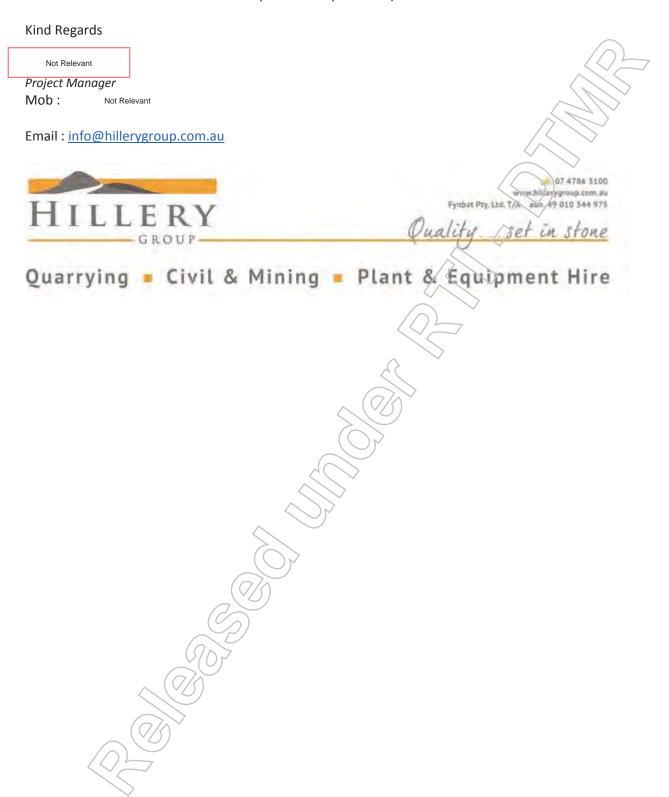
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Please do not hesitate to contact me if you have any further querries.





Department of Transport and Main Roads

Prelodgement Advice

DSDMIP reference: 1811-8266 SPL
DSDMIP regional office: SARA North QLD

DSDMIP email: NQSARA@dsdmip.qld.gov.au

TA reference: TMR18-026167
TA contact name: Natasha Cook
TA contact details: (07) 4421 8112

TA approver: Captain Frank D'Souza

1.0 Application details

Street address: Santa Barbara Parade, Bowen QLD 4805

Real property description: 310SP198022

Local government area: Whitsunday Regional Council

Applicant name: Department of Transport and Main Roads

Applicant contact details: a

a QLD 4805

miwsara@dsdmip.qld.gov.au

Description of Proposal: Construction of a new rubble mound breakwater structure.

2.0 Matters of interest to the state

The development application has the following matters of interest to the state under the provisions of the *Planning Regulation 2017*;

Trigger Mode	Trigger Number	राigger Description
Maritime Safety	10.17.3.2.1)	Development application for operational work that is assessable development under section 28, other than work for government supported transport infrastructure or carried out by the Gold Coast Waterways Authority, if the work is in tidal waters and any of the following apply— (a) the work is tidal works, other than the following tidal works in Gold Coast waters— (i) a boat ramp, jetty or private pontoon; (ii) a drainage outlet; (iii) a stormwater outlet; (iv) a revetment wall associated tidal works in subparagraphs (i) to (iii); (b) the work is the disposal of dredge spoil, or other solid waste material, in tidal water; (c) the work is reclaiming land under tidal water; (d) the work is constructing a canal, if the canal relates to reconfiguring a lot

3.0 Documents considered

The following documentation was relied upon in providing this advice:

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Amended breakwater concept (1)	N/A]	N/A	N/A	N/A

4.0 Pre-lodgement advice

Our agency advices the following conditions will be applicable:

Aspe	ct of developme	nt: Operational Work
	pliance timing	issues below the timing for all conditions should be: two (2) weeks
No.	Condition ID	Issues to be addressed or variations to model condition
1.	MS01	Provide written notice to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au when the development authorised under this approval is: (a) 2 weeks prior to commencement; and (b) when it has been completed. Timing: (a) At least two weeks prior to the commencement of the works (b) Within two weeks after the completion of works
2.	MS02	Survey(s) of the authorised channel must be conducted to class C survey standards within two (2) weeks of the completion of the works, a copy of the resulting survey plan(s) must be provided to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E. RHMTownsville@msq.qld.gov.au Reason: Navigational safety, to confirm that after completion of the breakwater no rocks has rolled into the channel.
3.	MS03	"As Constructed" drawings of the approved structure must be provided within two (2) weeks of the completion of the works to the Regional Harbour Master, Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, 60 Ross Street, Townsville Qld 4810 GPO Box 1921, Townsville Qld 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Reason: Navigational safety, to update nautical charts.

4. MS04 All vessels, structures, plant and equipment associated with the construction of the approved works must be lit/marked in accordance with the following specifications and requirements such that undertaking the construction works does not cause a risk to the safe navigation of ships: Floating plant and equipment is to be lit in accordance with the International Regulations for the Prevention of Collision at Sea. Mooring buoys are to be lit in accordance with IALA recommendations. Lighting must be provided in accordance with Section 3 of AS4282-1997 'Control of the obtrusive effects of outdoor lighting' to ensure safe navigation of other ships'. Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting **Timing:** While the works are occurring. Reason: Navigational safety The structure must be lit/marked in accordance with the following specifications, 5. **MS05** such that it does not cause a risk to the safe navigation of other ships: On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls Eastern breakwall2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Western breakwali...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 Lighting provided must not obscure, disguise or otherwise interfere with the effectiveness of navigational lighting. Timing: During the hours of darkness.

Reason: Navigational safety, to indicate the presence of new structure(s) (obstruction) in the waterway. 6. MS06 Any navigational aid that is damaged due to the construction, operation or maintenance of the approved development must be promptly repaired or replaced at the applicant's cost. In the event that any damage is caused to any aid to navigation, the Harbour Master must be immediately contacted at Marine Operations (Townsville Region), Maritime Safety Queensland, Department of Transport and Main Roads, Ground Floor, Townsville Ross Street, 60 Ross Street, Townsville Qlid 4810 GPO Box 1921, Townsville Qid 4810, P: (07) 4421 8100, F: (07) 4721 2028, E: RHMTownsville@msq.qld.gov.au. Timing: At all times. 7. MS08a Any debris or similar obstruction encountered whilst undertaking the work must be suitably re-used or disposed of at the applicant's cost. Timing: While the works are occurring. 8. The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. • During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. • The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length. Reason: Navigational safety.		1	
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			Reason: Navigational safety.

Endorsement

Officer	Natasha Cook	Business Support Officer	4421 8112	msq_idas_townsville@msq.qld. gov.au
Approver	Frank D'Souza	Regional Harbour Master	4421 8106	msq_idas_townsville@msq.qld. gov.au

From: Max Haste

Sent: Wednesday, 15 January 2020 8:34 AM

To: Charles-Dean A Sorbello

Cc: Jordan E Tsang; Kurt S Sundholm; Frank R D'Souza; Paul S Demopoulos

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Charles-Dean

We're happy to fit lights when structures are complete (pls advise timing of this).

Will we need a key for swing pole (how are they `swung'?). If they have a locking mechanisms we can fit lock post light fitting.

Pls advise.

Regards

Max Haste

Area Manager | Marine Operations Base (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Works: Mon, Tues, Wed, Thurs, Fri

60 Ross Street | Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

P: (07) 44218102 | F: (07) 47212028

M: Not Relevant

E: max.z.haste@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

Don't stow it, SHOW iT!

Wear your lifejacket to work day-25 October 2019



From: Charles-Dean A Sorbello < Charles-Dean.A. Sorbello @tmr.qld.gov.au>

Sent: Tuesday, 14 January 2020 1:19 PM

To: Max Haste <Max.Z.HASTE@msq.qld.gov.au>

D'Souza <frank.r.dsouza@msq.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Max,

The Bowen eastern breakwater is nearing completion and the Contractor Administrator has advised that the footings for the navigation lights should be in place during the week of the 27th January.

Are you able to advise if MSQ officers can possibly install the light unit, SL70 Fl yellow 4 secs onto the swing poles prior to their installation? Or these can be installed onto the poles after construction however it may be easier to install these before the go onto the breakwater.

Otherwise the lights can be provided to the Contractor to install however they just need to be advised the preferred orientation of the solar panels.

Kind regards,

Charles-Dean Sorbello MEng BEng CPEng RPEQ NER MIEAust
A/Principal Engineer (Coastal) | Boating Infrastructure Unit

Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Old 4000 (07) 30664349 | M: Not Relevant

charles-dean.a.sorbello@tmr.qld.gov.au

www.tmr.qld.gov.au

From: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au >

Sent: Friday, 13 September 2019 11:58 AM

To: Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au >; Charles-Dean A Sorbello < Charles-

Dean.A.Sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z.HASTE@msq.qld.gov.au >; Jordan E Tsang < Jordan.E.Tsang@tmr.qld.gov.au >; Kurt S Sundholm

<kurt.s.sundholm@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Trevor,

Excellent, thanks

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810

GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au

www.tmr.qld.gov.au

From: Trevor B Carter

Sent: Friday, 13 September 2019 11:53 AM

To: Frank R/D'Souza <frank.r.dsouza@msq.qld.gov.au>; Charles-Dean A Sorbello <charles-

dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z.Haste@msq.qld.gov.au >; Jordan E Tsang < Jordan.E.Tsang@tmr.qld.gov.au >; Kurt S Sundholm

< kurt.s.sundholm@tmr.qld.gov.au >

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Frank

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Regards,

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Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000 GPO Box 1549 | Brisbane City Qld 4001

P: <u>(07) 30664021 | F</u>: (07) 30668305

M Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Friday, 13 September 2019 10:20 AM

To: Trevor B Carter < Trevor.B. Carter@tmr.qld.gov.au>; Charles-Dean A Sorbello < charles-

dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z. Haste@msq.qld.gov.au>

Subject: FW: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Trevor,

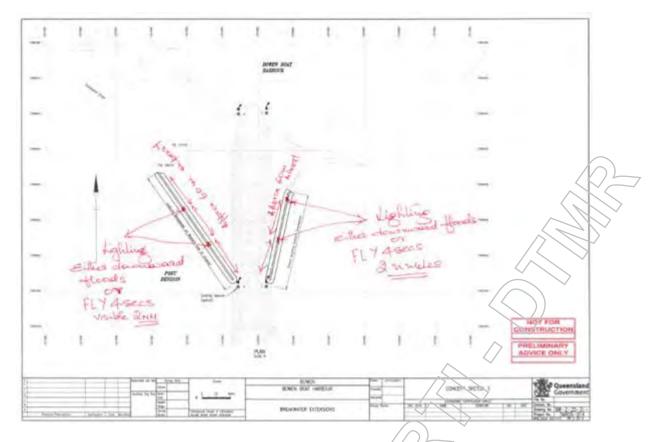
Has the contractor been notified of the final lighting requirements or is it being done independently by TMR/MSQ.

Final completion

The structure must be lit/marked in accordance with the following specifications, such that it does not cause a risk to the safe navigation of other ships:

On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls

- Eastern breakwall ...2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)
- Western breakwall...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)



If street lamp type (lampposts with floodlights directed downwards) - then TMR will have the standards.

If navigational lights flashing Yellow 4 secs – then please contact MSQ for design specifications.

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810

GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au www.msq.qld.gov.au

www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Friday, 13 September 2019 10:12 AM

To NR @hillerygroup.com.au' NR @hillerygroup.com.au>

Cc NR @hillerygroup.com.au; NR @hillerygroup.com.au NR @hillerygroup.com.au; RHMTownsville

<RHMTownsville@tmr.qld.gov.au>; Trevor B Carter <Trevor.B.Carter@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi NR

Thanks for the notification. We will issue a Notice to Mariners regarding the construction activity.

Please be advised during construction

- The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period.
- During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel.
- The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length.

Regards Frank
Captain Frank D'Souza Regional Harbour Master Marine Operations (Townsville Region) Maritime Safety Queensland Branch Customer Services, Safety and Regulation Division Department of Transport and Main Roads
Ground Floor 60 Ross Street South Townsville Qld 4810 GPO Box 1921 Townsville Qld 4810 (07) 44218100 RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au
From: NR
To: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au>; RHMTownsville < RHMTownsville@tmr.qld.gov.au>
Cc NR @hillerygroup.com.au NR @hillerygroup.com.au NR @hillerygroup.com.au
Subject: Bowen Boat Harbour Breakwater Extension 2019 - Construction works
Good Afternoon Frank.
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This letter serves to notify you that Hillery Group is shortly going to start the construction of the Bowen Boat Harbour Breakwater extensions.
I will attach our intended construction program for your perusal.
Our only intended works from a marine vessel is for the surveyor to survey the sea floor in the construction zone and to set-out markers, which we intend to start after the 23 rd of September 2019.
The construction procedure will be building the structure from the bank heading out progressively. We will be setting up a night light on the end of the constructed section to raise awareness to the general public that would be traveling by boat at night.
Please do not hesitate to contact me if you have any further querries.
Kind Regards

Email: info@hillerygroup.com.au

Not Relevant

Project Manager

Mob





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From: Jordan E Tsang Friday, 7 February 2020 2:12 PM Sent: To: Frank R D'Souza; Max Haste Paul S Demopoulos; Kurt S Sundholm; Charles-Dean A Sorbello Cc: RE: Bowen Boat Harbour Breakwater Extension 2019 - Install of navigation lighting **Subject: Attachments:** 20200206_110634.jpg; 20200206_110817.jpg Good afternoon Frank and Max, Just confirming that as of today the two (2) swing/hinge pole structures located on the new Eastern Breakwater at Bowen have been installed and are ready for the SL70 Fl yellow 4 secs navigation light fitting. The locking detail on the 3m light posts is a grub screw that requires an 8mm pin Hex Allen key H80-k, refer attached photos. Not Relevant The contractor's contact on site is please give me a call if you require any additional information or assistance. It's worth noting that staff from Marine Engineering are planning to visit the site to undertake the PC inspection on Thursday 12 February. Would MSQ also like to attend? I can confirm this date early next week. Kind regards, **Jordan Tsang** Project Engineer (CCB) | Brisbane Operations Unit RoadTek South | Infrastructure Management & Delivery | Department of Transport and Main Roads 1 University Road Nathan, QLD, 4111 Not Relevant P: (07) 3066 8257 M: jordan.e.tsang@tmr.qld.gov.au www.tmr.qld.gov.au From: Max Haste Sent: Wednesday, 15 January 2020 8:34 AM To: Charles-Dean A Sorbello Cc: Jordan E Tsang; Kurt S Sundholm; Frank R D'Souza; Paul S Demopoulos Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works Charles-Dean We're happy to fit lights when structures are complete (pls advise timing of this). Will we need a key for swing pole (how are they 'swung'?). If they have a locking mechanisms we can fit lock post light fitting. Pls advise. Regards **Max Haste**

1

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main

Area Manager | Marine Operations Base (Townsville Region)

Roads

Works: Mon, Tues, Wed, Thurs, Fri

60 Ross Street | Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

P: (07) 44218102 | F: (07) 47212028

M: Not Relevant

E: max.z.haste@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au



From: Charles-Dean A Sorbello < Charles-Dean.A.Sorbello@tmr.qld.gov.au >

Sent: Tuesday, 14 January 2020 1:19 PM

To: Max Haste < Max.Z.HASTE@msq.qld.gov.au >

Cc: Jordan E Tsang < Jordan.E. Tsang@tmr.qld.gov.au >; Kurt S Sundholm < kurt.s.sundholm@tmr.qld.gov.au >; Frank R

D'Souza <<u>frank.r.dsouza@msq.qld.gov.au</u>>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Max,

The Bowen eastern breakwater is nearing completion and the Contractor Administrator has advised that the footings for the navigation lights should be in place during the week of the 27th January.

Are you able to advise if MSQ officers can possibly install the light unit, SL70 Fl yellow 4 secs onto the swing poles prior to their installation? Or these can be installed onto the poles after construction however it may be easier to install these before the go onto the breakwater.

Otherwise the lights can be provided to the Contractor to install however they just need to be advised the preferred orientation of the solar panels.

Kind regards,

Charles-Dean Sorbello MEng BEng CPEng RPEQ NER MIEAust A/Principal Engineer (Coastal) | Boating Infrastructure Unit

Program Management and Delivery Department of Transport and Main Roads

Floor 17 | 313 Adelaide Street / Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Old 4000

(07) 30664349 | M: Not Relevant

charles-dean.a.sorbello@tmr.gld.gov.au

www.tmr.qld.gov.au

From: Frank R-D'Souza < frank.r.dsouza@msq.qld.gov.au>

Sent: Friday, 13 September 2019 11:58 AM

To: Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au >; Charles-Dean A Sorbello < Charles-

Dean.A.Sorbello@tmr.qld.gov.au>

Cc: Max Haste < <u>Max.Z.HASTE@msq.qld.gov.au</u>>; Jordan E Tsang < <u>Jordan.E.Tsang@tmr.qld.gov.au</u>>; Kurt S Sundholm

< kurt.s.sundholm@tmr.qld.gov.au >

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Trevor,

Excellent, thanks

Regards

Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main

Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Trevor B Carter

Sent: Friday, 13 September 2019 11:53 AM

To: Frank R D'Souza <frank.r.dsouza@msq.qld.gov.au>; Charles-Deán A Sorbello <charles-

dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z.Haste@msq.qld.gov.au >; Jordan E Tsang < Jordan E.Tsang@tmr.qld.gov.au >; Kurt S Sundholm

<kurt.s.sundholm@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 Construction works

Frank

The lighting requirements are incorporated in the breakwater contract and will be installed by the contractor. However for the eastern breakwater, the contractor is only required to install swing poles in locations as per your sketch. A standard solar light fitting will be arranged by TMR / MSQ.

The western breakwater incorporates a lit pathway with 5 street lights connected to mains power.

I've attached the plans showing the lighting layout.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4001 P:(07) 30664021 | F; (07) 30668305

Not Relevant M:

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From: Frank R D'Souza

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dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z. Haste@msq.qld.gov.au>

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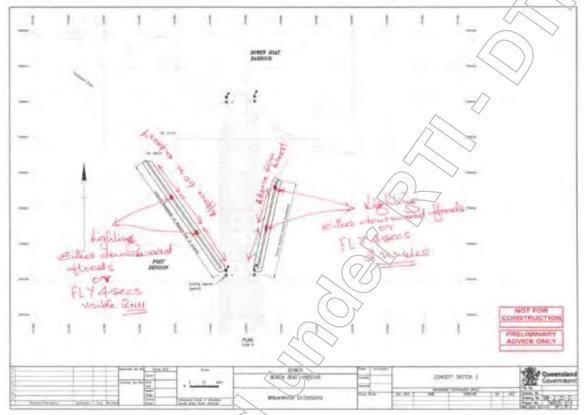
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Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Frank R D'Souza Sent: Friday, 13 September 2019 10:12 AM To: @hillerygroup.com.au' hillerygroup.com.au> Cc: NR @hillerygroup.com.au; @hillerygroup.com.au; NR hillerygroup.com.au; RHMTownsville <RHMTownsville@tmr.qld.gov.au>; Trevor B Carter <Trevor.B.Carter@tmr.qld.gov.au> Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works NR Thanks for the notification. We will issue a Notice to Mariners regarding the construction activity. Please be advised during construction The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period. During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel. The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length. Regards Frank Captain Frank D'Souza Regional Harbour Master | Marine Operations (Townsville Region) Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100 RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au @hillerygroup.com.au From hillerygroup.com.au> Sent: Thursday, 12 September 2019 3:35 PM To: Frank R D'Souza <frank.r.dsouza@msq.qld.gov.au>; RHMTownsville <RHMTownsville@tmr.qld.gov.au> hillerygroup.com.au; NR @hillerygroup.com.au NR @hillerygroup.com.au Subject: Bowen Boat Harbour Breakwater Extension 2019 - Construction works Good Afternoon Frank.

Thank you for calling me back yesterday afternoon.

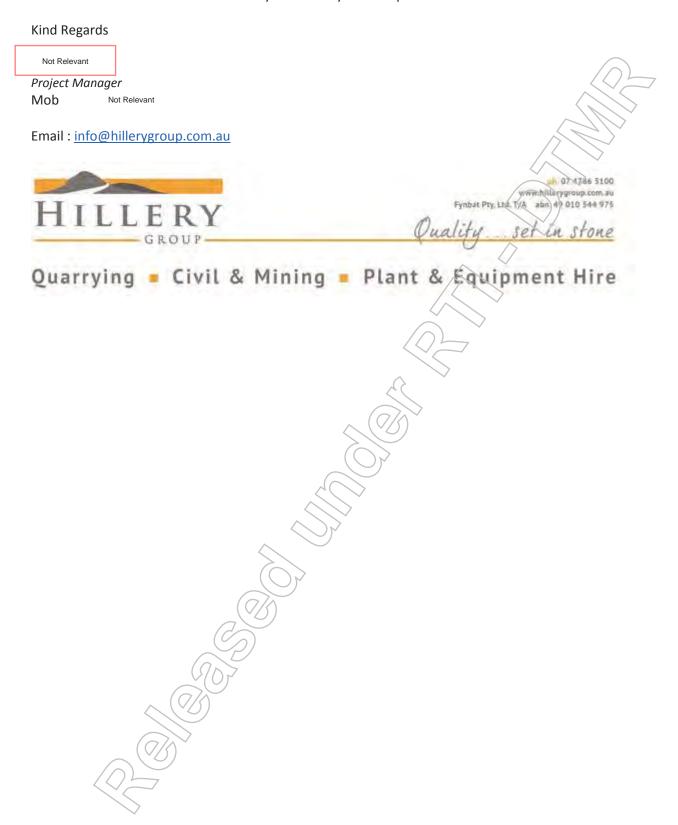
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Please do not hesitate to contact me if you have any further querries.







From: Frank R D'Souza

Sent: Monday, 7 January 2019 3:34 PM

To: Bradley F Lanagan
Cc: Natasha T Cook

Subject: RE: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Brad,

Noted, Thanks.

I'll get on to Trevor Carter and crowd to ensure MSQ recommendations are taken into consideration when submitting the DA to SARA.

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100

RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au

From: Bradley F Lanagan

Sent: Monday, 7 January 2019 10:12 AM

To: Frank R D'Souza

Subject: RE: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Frank,

As this project is being undertaken by TMR, there will not be a formal triggering of the DA to MSQ from SARA. The consultation process in relation to TMR driven projects is covered by an internal "Whole of Department – Maritime Safety Queensland Consultation Policy". This protocol has been in place for a few years now, as TMR was being charged fees for seeking MSQ's technical advice. So, the process is that the TMR people undertaking the construction of the break-walls are required to consult with MSQ and take our views into consideration when submitting the DA to SARA (a bit like a pre-lodgement meeting).

If you believe the comments you have already provided have not been taken into consideration in the DA we need to get onto the section of TMR that is building the break-wall and ensure that they are complying with the internal policy.

The policy is currently under review. The reviewing officer is on leave until next week, but I'll get a status update upon his return. The existing policy is still in force until the reviewed policy is ratified, but the general gist of the policy will remain unchanged.

Happy to discuss.
Cheers
Brad
Brad Lanagan Manager (Operational Policy) (Maritime Operations) Maritime Safety Queensland Customer Services, Safety and Regulation Division Department of Transport and Main Roads Floor 2 61 Mary Street Brisbane Qld 4000 PO Box 2595 Brisbane Qld 4001 (07) 3066 3923 M: Not Relevant bradley.f.lanagan@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au
From: Frank R D'Souza Sent: Monday, 7 January 2019 8:17 AM To: Bradley F Lanagan < bradley.f.lanagan@msq.qld.gov.au > Cc: Natasha T Cook < Natasha.T.Cook@tmr.qld.gov.au > Subject: FW: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters
Hi Brad,
Interesting issue – need to deal with this one asap.
Will call to discuss – but it looks like for some reason Bowen Pilotage/port area has slipped through the loop.
Kind regards Frank
Captain Frank D'Souza Regional Harbour Master Marine Operations (Townsville Region) Maritime Safety Queensland Branch Customer Services, Safety and Regulation Division Department of Transport and Main Roads
Ground Floor 60 Ross Street South Townsville Qld 4810 GPO Box 1921 Townsville Qld 4810 T (07) 44218106 M Not Relevant Frank.r.Dsouza@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au
From: @dsdmip.qld.gov.au> Sent: Friday, 4 January 2019 3:31 PM

To: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au>

Subject: FW: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Frank,

Further to our conversation just now, please see the below justification as to why the breakwater would be deemed as solely tidal works.

Section 15 (2)(b)(ii) of the Coastal Protection and Management Regulation 2017 states that works for a new or existing structure used for the operation of a *public marine facility* constructed by or for Queensland Transport are not prescribed tidal works, hence being tidal works.

Under Schedule 6 of the *Transport Infrastructure Act 1994*, a *public marine facility* is defined as shown below:

public marine facility means public marine transport infrastructure, including—

- (a) land or waters associated with the infrastructure that are affected by its use; and
- (b) land or waters specified for the infrastructure under a regulation made with the objective of clarifying what are the land or waters associated with the infrastructure that are affected by its use.

Example—

- an area of land and waters, specified under a regulation, that constitutes a boat harbour
- breakwaters, jetties, landings, mooring piles, pontoons, carparks and land or waters affected by the use of the infrastructure

As shown in the definition, breakwaters are specifically referred to and this is where the tidal works position has come from for this application.

I hope the above helps to clarify the matter.

Kind Regards,

Queensland Government Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and Development Services, Northern Region

Department of State Development,

Manufacturing, Infrastructure and Planning

P 07 4898 6815

Level 4, 44 Nelson Street, Mackay QLD 4740

PO Box 257, Mackay QLD 4740

www.dsdmip.qld.gov.au

From:

Sent: Friday, 4 January 2019 2:42 PM

To: 'frank.r.dsouza@msq.qld.gov.au' <frank.r.dsouza@msq.qld.gov.au>

Cc: 'MSQ_IDAS_Townsville@msq.qld.gov.au' < <u>msq_idas_townsville@msq.qld.gov.au</u>>; Dan Wagner

@dsdmip.qld.gov.au>

Subject: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Frank,

Thank you for your time this afternoon regarding DTMR's breakwater proposal in Bowen, on and adjacent to Lot 310 on SP198022. As discussed, the department has identified that the development does not entail 'prescribed tidal works', instead being solely 'tidal works' (under the Coastal Protection and Management Regulation 2017 (section 15 (2)(b)(ii)), a public marine facility constructed by or for Queensland Transport is not prescribed tidal works). As

such, SARA will be the assessment manager for the application, as opposed to Whitsunday Regional Council (as per Schedule 8, Table 4, Item 3(I)).

Looking at Schedule 10, Part 17, Division 2 of the Planning Regulation 2017 (Tidal works assessment manager section), there is no MSQ trigger for tidal works in tidal waters (like that under the referral agency section). Moreover, as discussed and shown in the screenshot below from the department's development assessment mapping system, the development area is mapped as being outside of the port limits.



Given the above information, my understanding would be that the MSQ trigger will not be picked up as part of the application. I understand that you would like to review this position with your Brisbane team to ensure that this stance is correct. Given that we received the application from DTMR yesterday (03/01/2019), I will need to validate the application by 17/01/2019. As such, can I ask that you review this information and raise any concerns with me prior to COB 14/01/2019. If you need further time, please let me know.

Thank you for your time and please let me know if you need anything further.

Kind Regards,

Oueensland Government

Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and Development Services, Northern Region

Department of State Development,

Manufacturing, Infrastructure and Planning

P 07 4898 6815

Level 4, 44 Nelson Street, Mackay QLD 4740 PO Box 257, Mackay QLD 4740

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From: dsdmip.qld.gov.au>

Sent: Friday, 4 January 2019 3:31 PM

To: Frank R D'Souza

Subject: FW: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Attachments: Breakwater aerial plans.pdf

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38 MONE AND	Planning Officer Mackay Isaac Whitsunday Regional Office, Planning an
	Development Services, Northern Region Department of State Development,
Queensland Government	Manufacturing, Infrastructure and Planning

ı

P 07 4898 6815 Level 4, 44 Nelson Street, Mackay QLD 4740 PO Box 257, Mackay QLD 4740 www.dsdmip.qld.gov.au

From

Sent: Friday, 4 January 2019 2:42 PM **To:** 'frank.r.dsouza@msq.qld.gov.au'

Cc: 'MSQ_IDAS_Townsville@msq.qld.gov.au'; Dan Wagner

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Thank you for your time and please let me know if you need anything further.

Kind Regards,



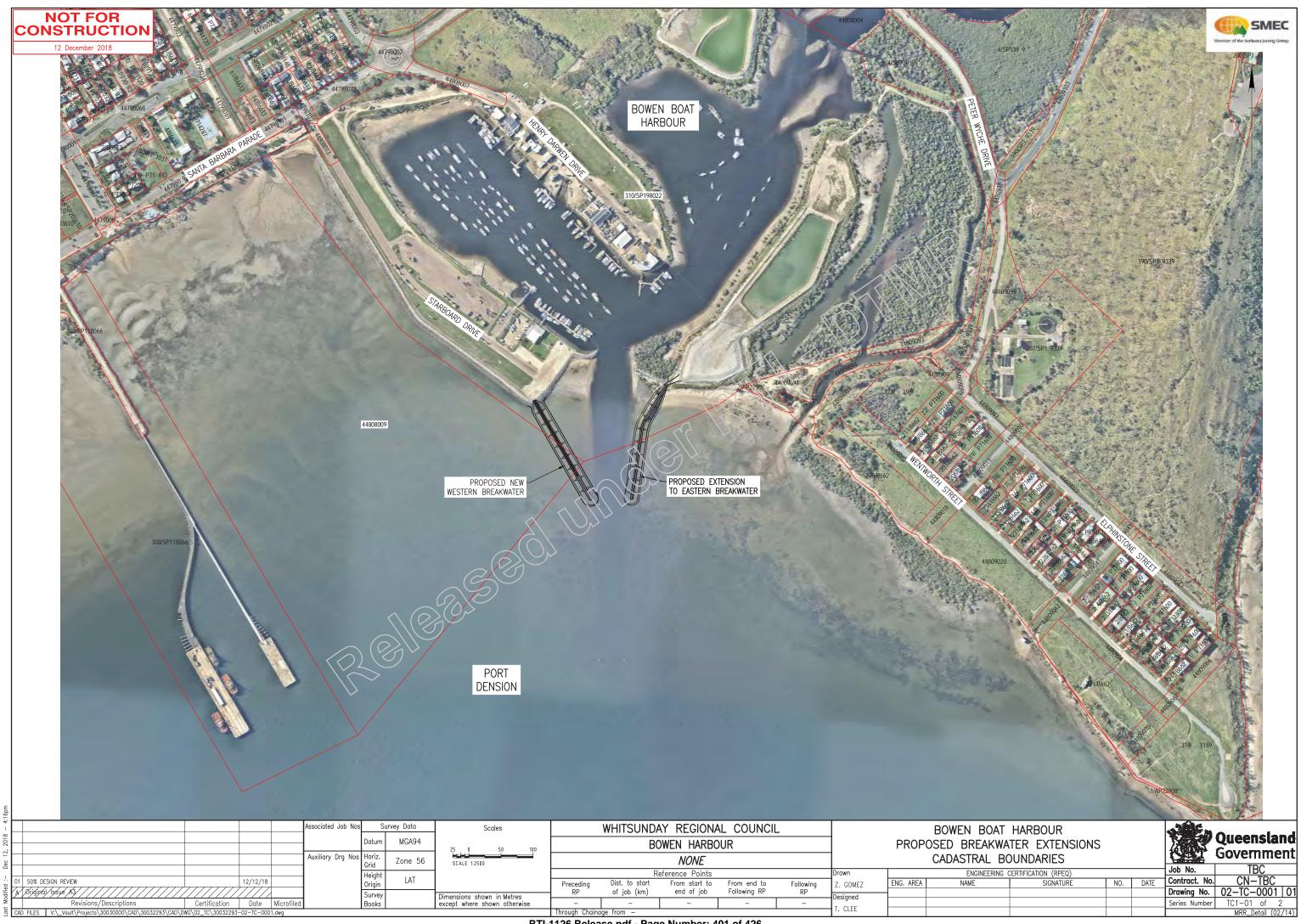
Planning Officer

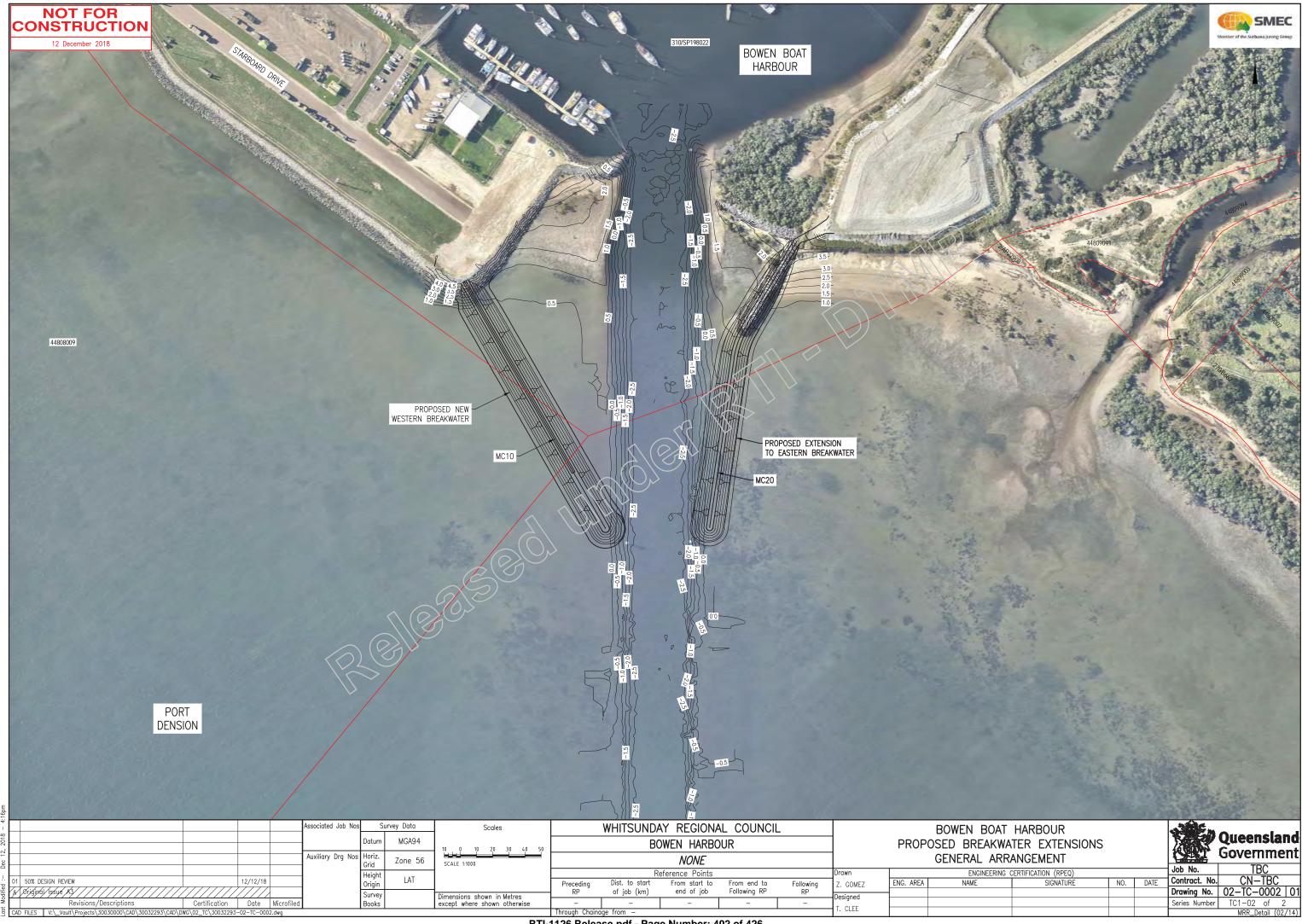
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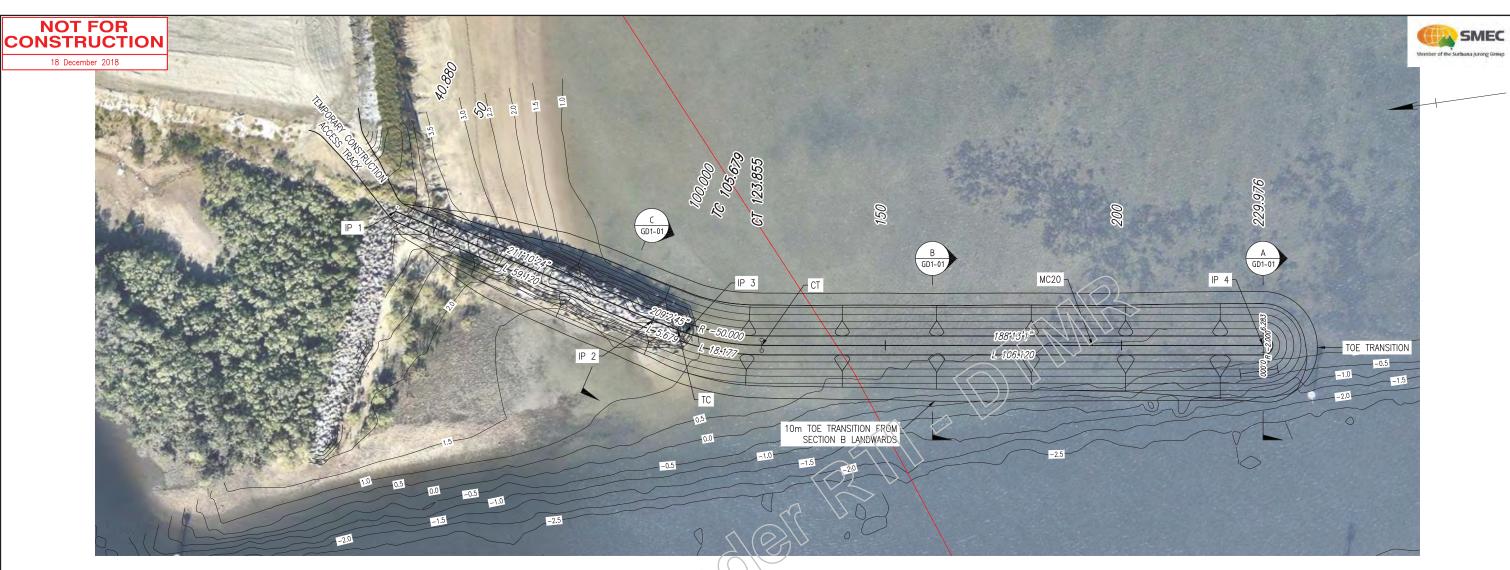
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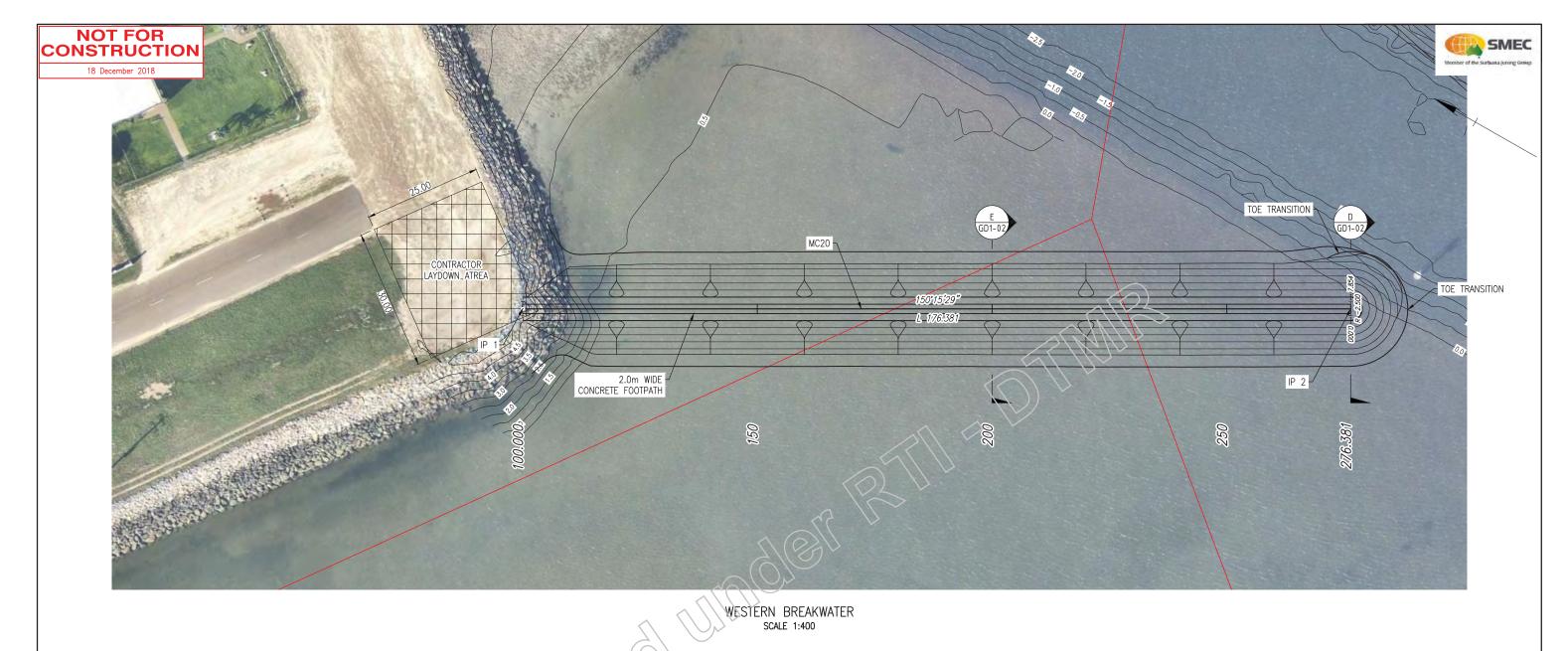


EASTERN BREAKWATER SCALE 1:400

			CON	TROL LINE M	C20 SETOUT	TABLE			p ^z
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 1	INTERSECTION POINT	40.880	631526.346	7785946.007	4.645	211*10'23.72"	(7)		
		60.000	631516.449	7785929.648	5.000	211'10'23/12")(O)		
		80.000	631506.097	7785912.536	5.000	211"10"23.72"			
IP 2	INTERSECTION POINT	100.000	631495.744	7785895.424	5.000				
		100.000	631495.744	7785895.423	5,000	209'02 44.55"			
TC	TANGENT TO CURVE	105.679	631492.987	7785890.459	5.000	209'02'44.55"			
IP 3	INTERSECTION POINT	114.767	631488.525	7785882.425	5.000		R = -50.000	18.177	20°49'44.04"
		120.000	631487.909	7785877.120	5.000	192*38'05.22"			
СТ	CURVE TO TANGENT	123.855	631487.212	7785873.330	5.000	188*13'00.51"			
		140.000	631484.904	7785857.351	5.000	188*13'00.51"			
		160.000	631482.046	7785837.556	5.000	188*13'00.51"			
		180.000	631479.188	7785817.761	5.000	188*13'00.51"			
		200.000	631476.329	7785797.967	5.000	188*13'00.51"			
		220.000	631473.471	7785778.172	5.000	188*13'00.51"			
IP 4	INTERSECTION POINT	229.976	631472.045	7785768.299	5.000	188*13'00.51"			

9.1																	
- 4				Associated Job No	s S	urvey Data	Scales		WHITSUNDA	Y REGIONA	L COUNCI	L			BOWEN BOAT	HARBOUR	
2018				_	Datum	MGA94	4 0 4 8 12 16 20		BC	WEN HARBO	UR		1	PROP	OSED BREAKWA	TER EXTENSIONS	
ec 18				Auxiliary Drg Nos	s Horiz. Grid	Zone 56	SCALE 1:400			NONE			EASTER	RN BRE	AKWATER GENE	RAL ARRANGEME	NT PL
<u> </u>	02 MINOR AMENDMENTS FOLLOWING CLIENT REVIEW	18/12/18		_	Height		1		Re	eference Points			Drawn		ENGINEERING	CERTIFICATION (RPEQ)	
.l.	01 50% DESIGN REVIEW	12/12/18			Origin	LAT		Preceding	Dist. to start	From start to	From end to	Following	Z. GOMEZ	ENG. AREA	NAME	SIGNATURE	NO.
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×	Revisions/Descriptions	Certification Date	Microfiled	1	Books		except where shown otherwise	-	-	-	-	_	1 1				
Last	AD FILES V:_Vault\Projects\30030000\CAD\30032293\CAD\DWG\03_GA\30032293-03-GA-0001.dwg						Through Chaina	ge from -			•	T. CLEE					

| Job No. | TBC | Contract. No. | CN-TBC | Drawing No. | 03-GA-0001 | 02



		CONTROL L	INE MC10 S	SETOUT TABL	E	
PT	DESCRIPTION	CHAINAGE	EASTING	NORTHING	HEIGHT	BEARING
IP 1	INTERSECTION POINT	100.000	631319.966	7785920.863	5.000	150°15'28.85"
		120.000	631329.888	7785903.497	5.000	150°15'28.85"
		140.000	631339.810	7785886.132	5.000	150°15'28.85"
		160.000	631349.732	7785868.766	5.000	150°15'28.85"
		180.000	631359.654	7785851.401	5.000	150°15'28.85"
		200.000	631369.576	7785834.036	5.000	150°15'28.85"
		220.000	631379.498	7785816.670	5.000	150°15'28.85"
		240.000	631389.420	7785799.305	5.000	150°15'28.85"
		260.000	631399.342	7785781.940	5.000	150°15'28.85"
IP 2	INTERSECTION POINT	276.381	631407.468	7785767.717	5.000	150°15'28.85"

					Associated Job Nos	Sı	urvey Data	
						Datum	MGA94	
					Auxiliary Drg Nos	Horiz. Grid	Zone 56	<u>+</u>
)2	MINOR AMENDMENTS FOLLOWING CLIENT REVIEW		18/12/18					
)1	50% DESIGN REVIEW		12/12/18			Height Origin	LAT	
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		WHITSUNDA	Y REGIONA	L COUNCIL	
12 16 20		BO	WEN HARBO	UR	
			NONE		
		Re	ference Points		
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BOWEN BOAT HARBOUR PROPOSED BREAKWATER EXTENSIONS WESTERN BREAKWATER GENERAL ARRANGEMENT PLAI ENGINEERING CERTIFICATION (RPEQ) NAME SIGNATURE

ENG. AREA

Z. GOMEZ

T. CLEE

ιN		Queensland Government
	Job No.	TBC
DATE	Contract. No.	CN-TBC

	Job No.	TBC				
	Contract. No.	CN-TBC				
DATE	Contract. No.					
	Drawing No.	03-GA-0011 02				
	Series Number	GA1-02 of 2				
		MRR Detail (02/14)				

From: @dsdmip.qld.gov.au>

Sent: Tuesday, 8 January 2019 8:13 AM

To: Frank R D'Souza

Cc: Dan Wagner; Felicity Tait

Subject: RE: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Good morning Frank,

Thank you for your email and prompt response. As you've indicated, generally applications for tidal works in tidal waters will involve MSQ as a technical agency, however the distinguishing factor in this application is that DTMR are the applicant and the works are not prescribed tidal works.

I'm glad to hear that DTMR will be able to address the interest internally to ensure that maritime safety matters are appropriately provided for in the design of the breakwater.

If you have any other questions or concerns, please feel free to give me a call.

Kind regards,



Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and

Development Services, Northern Region

Department of State Development,

Manufacturing, Infrastructure and Planning

P 07 4898 6815

Level 4, 44 Nelson Street, Mackay QLD 4740

PO Box 257, Mackay QLD 4740

www.dsdmip.qld.gov.au

From: Frank R D'Souza

Sent: Monday, 7 January 2019 4:11 PM

To:

Subject: RE: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi

The key factor for the change is that the applicant is DTMR, hence it is understood that we will consult internally.

I will provide MSQ recommendations to DTMR.

Regards

Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100 RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au

From: dsdmip.qld.gov.au>

Sent: Friday, 4 January 2019 3:31 PM

To: Frank R D'Souza <frank.r.dsouza@msq.qld.gov.au>

Subject: FW: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Frank,

Further to our conversation just now, please see the below justification as to why the breakwater would be deemed as solely tidal works.

Section 15 (2)(b)(ii) of the Coastal Protection and Management Regulation 2017 states that works for a new or existing structure used for the operation of a *public marine facility* constructed by or for Queensland Transport are not prescribed tidal works, hence being tidal works.

Under Schedule 6 of the *Transport Infrastructure Act 1994*, a *public marine facility* is defined as shown below:

public marine facility means public marine transport infrastructure, including—

- (a) land or waters associated with the infrastructure that are affected by its use; and
- (b) land or waters specified for the infrastructure under a regulation made with the objective of clarifying what are the land or waters associated with the infrastructure that are affected by its use.

Example—

- an area of land and waters, specified under a regulation, that constitutes a boat harbour
- breakwaters, jetties, landings, mooring piles, pontoons, carparks and land or waters affected by the use of the infrastructure

As shown in the definition, breakwaters are specifically referred to and this is where the tidal works position has come from for this application.

I hope the above helps to clarify the matter.

Kind Regards,



Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and Development Services, Northern Region

Department of State Development, Manufacturing, Infrastructure and Planning

P 07 4898 6815 Level 4, 44 Nelson Street, Mackay QLD 4740 PO Box 257, Mackay QLD 4740 www.dsdmip.qld.gov.au

From

Sent: Friday, 4 January 2019 2:42 PM

To: 'frank.r.dsouza@msq.qld.gov.au' < frank.r.dsouza@msq.qld.gov.au

Cc: 'MSQ_IDAS_Townsville@msq.qld.gov.au' <msq_idas_townsville@msq.qld.gov.au>; Dan Wagner

@dsdmip.qld.gov.au>

Subject: Bowen Breakwater application - Lot 310 on SP198022 - MSQ matters

Hi Frank,

Thank you for your time this afternoon regarding DTMR's breakwater proposal in Bowen, on and adjacent to Lot 310 on SP198022.

As discussed, the department has identified that the development does not entail 'prescribed tidal works', instead being solely 'tidal works' - under the Coastal Protection and Management Regulation 2017 (section 15 (2)(b)(ii)), a public marine facility constructed by or for Queensland Transport is not prescribed tidal works. As such, SARA will be the assessment manager for the application, as opposed to Whitsunday Regional Council (as per Schedule 8, Table 4, Item 3(I) of the Planning Regulation 2017).

Looking at Schedule 10, Part 17, Division 2 of the Planning Regulation 2017 (Tidal works assessment manager section), there is no MSQ trigger for tidal works in tidal waters (like that under the referral agency section). Moreover, as discussed and shown in the screenshot below from the department's development assessment mapping system, the development area is mapped as being outside of the port limits.



Given the above information, my understanding would be that the MSQ trigger will not be picked up as part of the application.

I understand that you would like to review this position with your Brisbane team to ensure that this stance is correct. Given that we received the application from DTMR yesterday (03/01/2019), I will need to validate the application by 17/01/2019. As such, can I ask that you review this information and raise any concerns with me prior to COB 14/01/2019. If you need further time, please let me know.

Thank you for your time and please let me know if you need anything further.

Kind Regards,



Planning Officer

Mackay Isaac Whitsunday Regional Office, Planning and Development Services, Northern Region

Department of State Development,

Manufacturing, Infrastructure and Planning

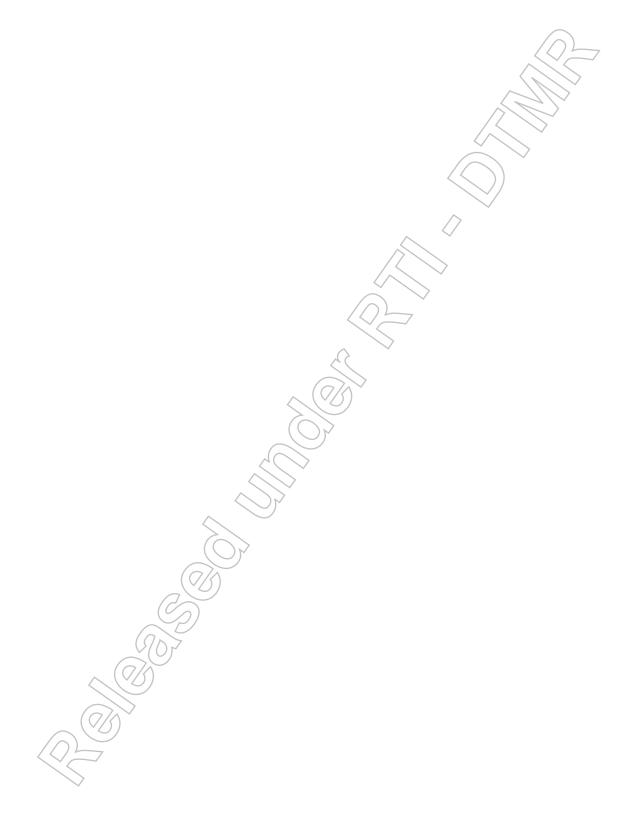
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From: Frank R D'Souza

Sent: Wednesday, 9 January 2019 10:19 AM

To: Frank R D'Souza

Subject: RE: Bowen Harbour - Breakwater Construction

Discussed with Charles - Dean A Sorbello - various options

Western Brk wtr - Flood lights & possibly Nav lights below rock wall level

Eastern Brk wtr - Nav lights - accessibility for servicing is a consideration to be addressed

Regards

Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main

Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Wednesday, 9 January 2019 9:17 AM

To: Frank R D'Souza

Subject: FW: Bowen Harbour - Breakwater Construction

From: Frank R D'Souza

Sent: Monday, 7 January 2019 4:11 PM

To: Peter G Wood peter.g.wood@tmr.qld.gov.au>; Trevor B Carter <<pre>Trevor.B.Carter@tmr.qld.gov.au>

Cc: Emma M Schumacher < Emma M. Schumacher@tmr.qld.gov.au>; Philip A Burns < philip.a.burns@tmr.qld.gov.au>;

Chris J Voisey < Chris. J. Voisey @thrr.qld.gov.au>; Natasha T Cook < Natasha.T.Cook@tmr.qld.gov.au>

Subject: Bowen Harbour - Breakwater Construction

Hi Peter,

Wish you all the very best for 2019.

As discussed, since the applicant is DTMR, there will not be a formal triggering of the DA to MSQ from SARA.

The consultation process in relation to TMR driven projects is covered by an internal "Whole of Department – Maritime Safety Queensland Consultation Policy".

So, the process is that the TMR people undertaking the construction of the break-walls are required to consult with MSQ and take our views into consideration when submitting the DA to SARA (a bit like a pre-lodgement meeting).

Based on the information provided in the initial SARA (1811-8266 SPL - PA6-L) Pre-lodgement advice – attached is the Pre-lodgement – Advice – Provided by MSQ.

If you have any queries, please contact me, thanks

Kind regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main

Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810

GPO Box 1921 | Townsville Qld 4810 T (07) 44218106 | M

Not Relevant

Frank.r.Dsouza@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Jordan E Tsang

Sent: Monday, 10 February 2020 7:28 AM

To: Max Haste

Cc: Frank R D'Souza; Paul S Demopoulos; Kurt S Sundholm; Charles-Dean A Sorbello

Subject: RE: CN-11936 - Bowen Boat Harbour Breakwater Extension 2019 - Install of navigation lighting

Morning Max,

My apologies for the confusion.

Confirming that we are aiming to undertake the PC inspection this week on Thursday 13 Feb but will confirm movements either later today or tomorrow.

Regardless the swing poles on the Eastern Breakwater are ready for the nav lights to be installed by MSQ.

Kind regards,

Jordan Tsang

Project Engineer (CCB) | Brisbane Operations Unit

RoadTek South | Infrastructure Management & Delivery | Department of Transport and Main Roads

1 University Road Nathan, QLD, 4111

P: (07) 3066 8257 M: Not Relevant

jordan.e.tsang@tmr.qld.gov.au

www.tmr.qld.gov.au

From: Max Haste

Sent: Friday, 7 February 2020 2:38 PM **To:** Jordan E Tsang; Frank R D'Souza

Cc: Paul S Demopoulos; Kurt S Sundholm; Charles Dean A Sorbello

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Install of navigation lighting

Hi Jordan

Can you pls confirm on-site inspection date. Is it Thursday 13 Feb, or Thursday 12 March? Your email a little confusing in this regard.

Cheers

Max Haste

Area Manager | Marine Operations Base (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Works: Mon, Tues, Wed, Thurs, Fri 60 Ross Street Lownsville Qld 4810

GPO Box 1921 | Townsville Qld 4810 P: (07) 44218 02 | F. (07) 47212028

M: Not Relevant

E: max.z.haste@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

1

From: Jordan E Tsang < Jordan. E. Tsang@tmr.qld.gov.au >

Sent: Friday, 7 February 2020 2:12 PM

To: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au; Max Haste < Max.Z.HASTE@msg.qld.gov.au

Cc: Paul S Demopoulos < <u>Paul.S.Demopoulos@msq.qld.gov.au</u>>; Kurt S Sundholm

<a href="mailto:ch

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Install of navigation lighting

Good afternoon Frank and Max,

Just confirming that as of today the two (2) swing/hinge pole structures located on the new Eastern Breakwater at Bowen have been installed and are ready for the SL70 Fl yellow 4 secs navigation light fitting.

The locking detail on the 3m light posts is a grub screw that requires an 8mm pin Hex Allen key H80-k, refer attached photos.

The contractor's contact on site is information or assistance.

Not Relevant

please give me a call if you require any additional

It's worth noting that staff from Marine Engineering are planning to visit the site to undertake the PC inspection on

Thursday 12 February. Would MSQ also like to attend? I can confirm this date early next week.

Kind regards,

Jordan Tsang

Project Engineer (CCB) | Brisbane Operations Unit

RoadTek South | Infrastructure Management & Delivery | Department of Transport and Main Roads

1 University Road Nathan, QLD, 4111

Not Relevant

P: (07) 3066 8257 M:

Not Relevar

jordan.e.tsang@tmr.qld.gov.au

www.tmr.qld.gov.au

From: Max Haste < Max.Z.HASTE@msq.qld.gov.au>
Sent: Wednesday, 15 January 2020 8:34 AM

To: Charles-Dean A Sorbello Charles-Dean.A.Sorbello@tmr.gld.gov.au>

Cc: Jordan E Tsang & Jordan E. Tsang@tmr.qld.gov.au>; Kurt S Sundholm < kurt.s.sundholm@tmr.qld.gov.au>; Frank R

D'Souza < rank.r.dsouza@msq.qld.gov.au>; Paul S Demopoulos < Paul.S.Demopoulos@msq.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Charles-Dean

We're happy to fit lights when structures are complete (pls advise timing of this).

Will we need a key for swing pole (how are they `swung'?). If they have a locking mechanisms we can fit lock post light fitting.

Pls advise.

Regards

Max Haste

Area Manager | Marine Operations Base (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Works: Mon, Tues, Wed, Thurs, Fri

60 Ross Street | Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 P: (07) 44218102 | F: (07) 47212028

M: Not Relevant

E: max.z.haste@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

Don't stow it, SHOW IT!

Wear your lifejacket to work day-25 October 2019



From: Charles-Dean A Sorbello < Charles-Dean.A.Sorbello@tmr.qld.gov.au

Sent: Tuesday, 14 January 2020 1:19 PM

To: Max Haste < Max.Z.HASTE@msq.qld.gov.au >

Cc: Jordan E Tsang < Jordan.E.Tsang@tmr.qld.gov.au >; Kurt \$ \$undholm < kurt.s.sundholm@tmr.qld.gov.au >; Frank R

D'Souza <frank.r.dsouza@msq.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Max,

The Bowen eastern breakwater is nearing completion and the Contractor Administrator has advised that the footings for the navigation lights should be in place during the week of the 27th January.

Are you able to advise if MSQ officers can possibly install the light unit, SL70 Fl yellow 4 secs onto the swing poles prior to their installation? Or these can be installed onto the poles after construction however it may be easier to install these before the go onto the breakwater.

Otherwise the lights can be provided to the Contractor to install however they just need to be advised the preferred orientation of the solar panels

Kind regards,

Charles-Dean Sorbello MEng BEng CPEng RPEQ NER MIEAust

A/Principal Engineer (Coastal) | Boating Infrastructure Unit

Program Management and Delivery | Department of Transport and Main Roads

Floor 17 | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Old 4000

(07) 30664349 | M: Not Relevant

charles-dean.a.sorbello@tmr.qld.gov.au

www.tmr.qld.gov.au

From: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au >

Sent: Friday, 13 September 2019 11:58 AM

To: Trevor B Carter < Trevor B Carter < Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au>; Charles-Dean A Sorbello < Charles-Dean A Sorbello Trevor.Dean A Sorbello Charles-Dean A Sorbello Ch

Dean.A.Sorbello@tmr.qld.gov.au>

Cc: Max Haste < <u>Max.Z.HASTE@msq.qld.gov.au</u>>; Jordan E Tsang < <u>Jordan.E.Tsang@tmr.qld.gov.au</u>>; Kurt S Sundholm < kurt.s.sundholm@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Trevor,

Excellent, thanks

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810

(07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

From: Trevor B Carter

Sent: Friday, 13 September 2019 11:53 AM

To: Frank R D'Souza < frank.r.dsouza@msq.qld.gov.au>; Charles-Dean A Sorbello < charles-

dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste <Max.Z.Haste@msq.qld.gov.au>; Jordan ETsang <Jordan.E.Tsang@tmr.qld.gov.au>; Kurt S Sundholm

<kurt.s.sundholm@tmr.qld.gov.au>

Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Frank

The lighting requirements are incorporated in the breakwater contract and will be installed by the contractor. However for the eastern breakwater, the contractor is only required to install swing poles in locations as per your sketch. A standard solar light fitting will be arranged by TMR / MSQ.

The western breakwater incorporates a lit pathway with 5 street lights connected to mains power.

I've attached the plans showing the lighting layout.

Regards,

Trevor Carter

Principal Engineer (Coastal) | Program Management and Delivery

Program Delivery and Operations | Department of Transport and Main Roads

Works: Mon, Tues, Thur & Fri

Floor 17 | Brisbane City - 313 Adelaide Street | 313 Adelaide Street | Brisbane City Qld 4000

GPO Box 1549 | Brisbane City Qld 4001

P: (07) 30664021 | F: (07) 30668305

M Not Relevant

E: trevor.b.carter@tmr.qld.gov.au

W: www.tmr.qld.gov.au

From: Frank R D'Souza

Sent: Friday, 13 September 2019 10:20 AM

To: Trevor B Carter <Trevor.B.Carter@tmr.qld.gov.au>; Charles-Dean A Sorbello <charles-

dean.a.sorbello@tmr.qld.gov.au>

Cc: Max Haste < Max.Z.Haste@msq.qld.gov.au >

Subject: FW: Bowen Boat Harbour Breakwater Extension 2019 - Construction works

Hi Trevor,

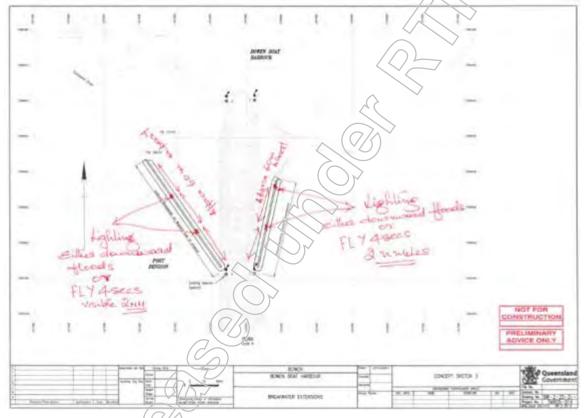
Has the contractor been notified of the final lighting requirements or is it being done independently by TMR/MSQ.

Final completion

The structure must be lit/marked in accordance with the following specifications, such that it does not cause a risk to the safe navigation of other ships:

On completion of the construction the proponent must install suitable lighting to indicate the presence of the breakwalls

- Eastern breakwall ...2 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)
- Western breakwall...3 lights (either lampposts with floodlights directed downwards 60 metres apart or navigational lights flashing Yellow 4 secs)



If street lamp type (lamposts with floodlights directed downwards) – then TMR will have the standards.

If navigational lights flashing Yellow 4 secs – then please contact MSQ for design specifications.

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100

RHMTown@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

Fro	m: Frank R D	'Souza					
Sen	t: Friday, 13	September 2019 10:12 Al	V				
To:	NR	@hillerygroup.com.au'	NR @hillerygroup.c <mark>om.au</mark> >				
Cc:	_{NR} @hiller	ygroup.com.au;	@hillerygroup.com.au NR hillerygroup.com.au; RHMTownsville				
< <u>R</u>	<rhmtownsville@tmr.qld.gov.au>; Trevor B Carter < Trevor.B.Carter@tmr.qld.gov.au></rhmtownsville@tmr.qld.gov.au>						
Subject: RE: Bowen Boat Harbour Breakwater Extension 2019 - Construction works							
୮							
Н	NR						

Thanks for the notification. We will issue a Notice to Mariners regarding the construction activity.

Please be advised during construction

- The construction of the breakwater should be undertaken in a manner to ensure the channel remains open to shipping throughout the construction period.
- During the works any rocks/rubble that may inadvertently fall into the channel should be removed immediately to ensure the safe passage of vessels using the channel.
- The progression of the seaward extremity of the breakwater(s) whilst under construction should be lit to warn seafarers of changes to the navigable waterway and at 60metre intervals along its length.

Regards Frank

Captain Frank D'Souza

Regional Harbour Master | Marine Operations (Townsville Region)

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Ground Floor | 60 Ross Street | South Townsville Qld 4810 GPO Box 1921 | Townsville Qld 4810 (07) 44218100

RHMTown@msq.qld.gov.au www.msq.qld.gov.au www.tmr.qld.gov.au

From NR @hillerygroup.com.au NR @hillerygroup.com.au>

Sent: Thursday, 12 September 2019 3:35 PM

To: Frank R D'Souza & frank.r.dsouza@msq.qld.gov.au>; RHMTownsville < RHMTownsville@tmr.qld.gov.au>

Cc: NR @hillerygroup.com.au Not Relevant hillerygroup.com.au NR hillerygroup.com.au

Subject: Bower Boat Harbour Breakwater Extension 2019 - Construction works

Good Afternoon Frank.

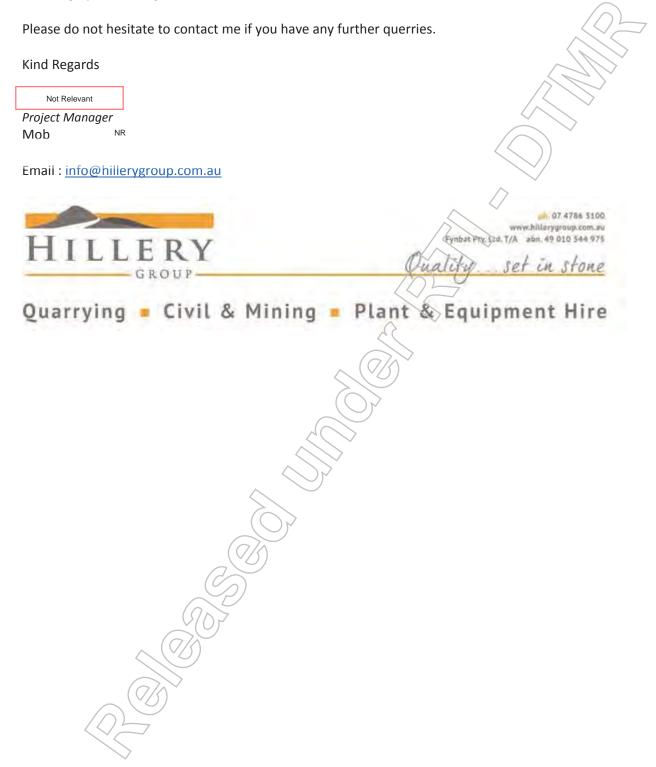
Thank you for calling me back yesterday afternoon.

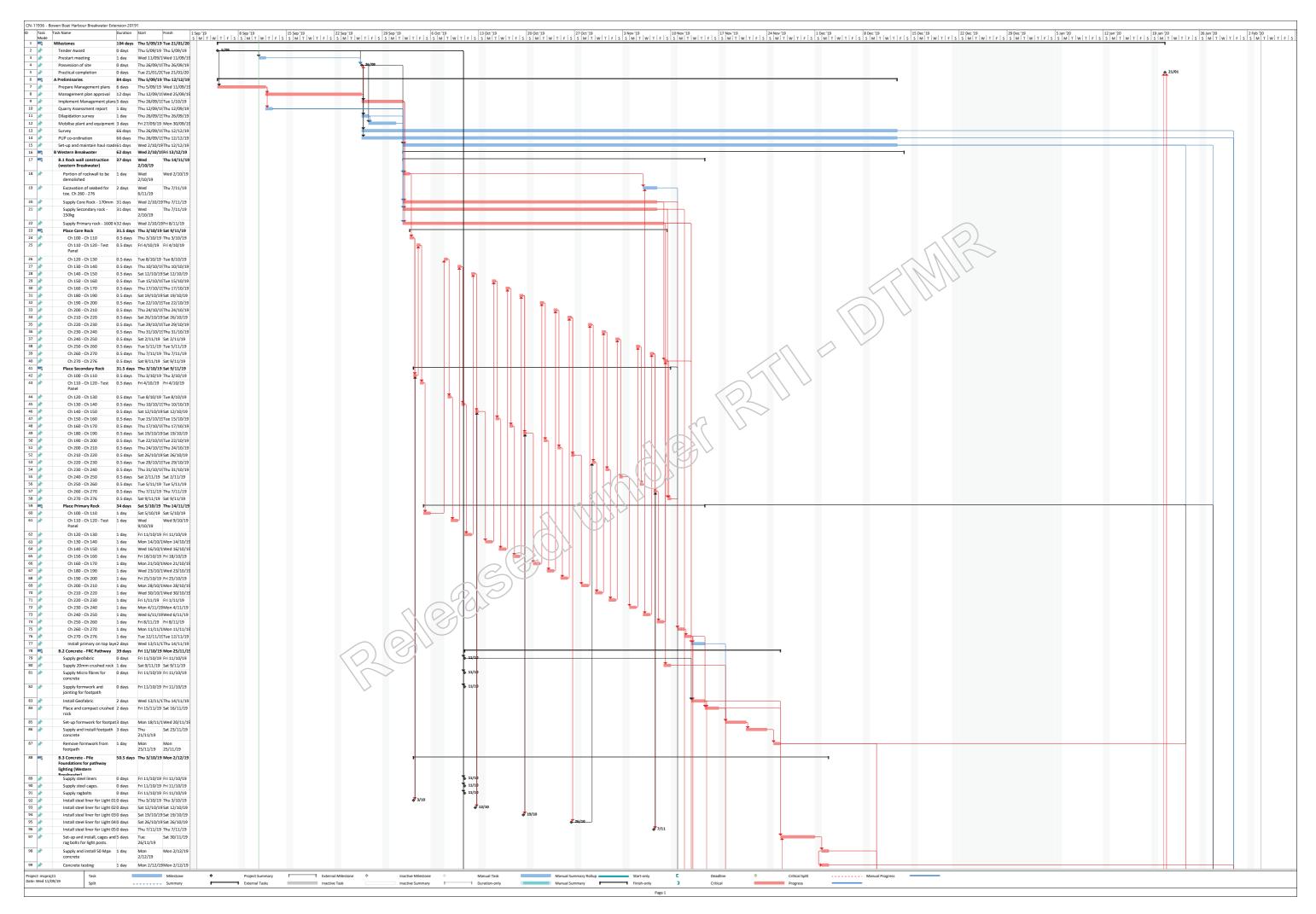
This letter serves to notify you that Hillery Group is shortly going to start the construction of the Bowen Boat Harbour Breakwater extensions.

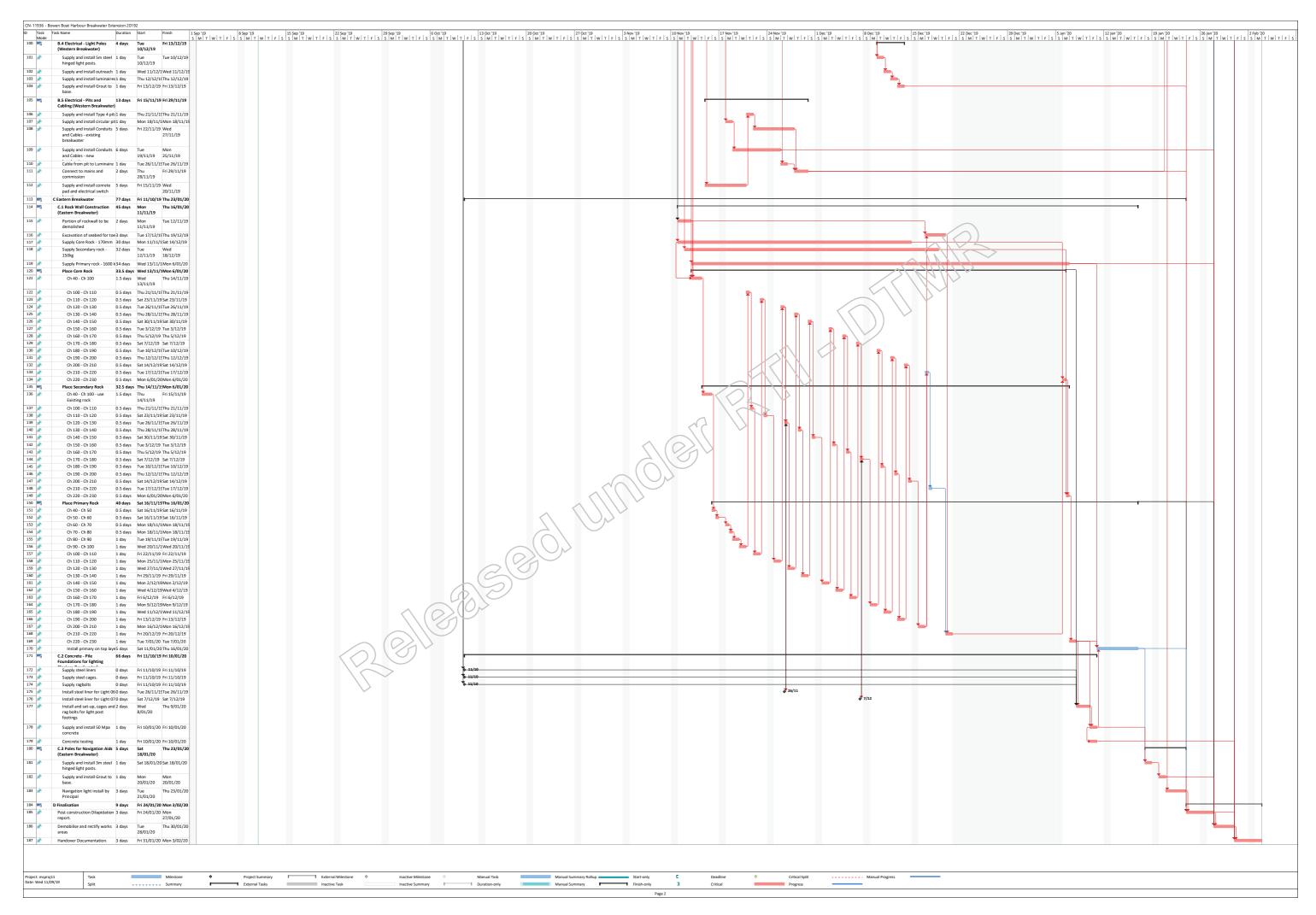
I will attach our intended construction program for your perusal.

Our only intended works from a marine vessel is for the surveyor to survey the sea floor in the construction zone and to set-out markers, which we intend to start after the 23rd of September 2019.

The construction procedure will be building the structure from the bank heading out progressively. We will be setting up a night light on the end of the constructed section to raise awareness to the general public that would be traveling by boat at night.







From: Hydro

Sent: Friday, 20 December 2019 9:23 AM

To: Boating Infrastructure

Cc: Peter G Wood; RHMTownsville **Subject:** Bowen Boat Harbour Survey

Attachments: H007072P2.pdf; H007072P3.pdf; H007072P4.pdf; H007072P5.pdf; H007072P1.pdf; H007072P1.pdf;

dwg.zip

Hi

Please find attached the recent survey of Bowen Boat Harbour and Entrance Channel

Kind regards,

Toby Reise

Principal Hydrographic Surveyor (CPHS1) | Hydrographic Services

Maritime Safety Queensland Branch | Customer Services, Safety and Regulation Division | Department of Transport and Main Roads

Floor 2 | 61 Mary Street | Brisbane Qld 4000

PO Box 2595 | Brisbane Qld 4001

(07) 3066 3509 | M: Not Relevant

anthony.t.reise@msq.qld.gov.au

www.msq.qld.gov.au www.tmr.qld.gov.au

