Environmental Approval & Compliance Solutions

Mission Beach Clump Point Boating Infrastructure Project: Water Quality Monitoring Program

MGN Civil Pty Ltd

Document Control Summary

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Report Summary	
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Abstract	Water Quality Monitoring Program for construction project at Clump Point Boat Ramp, north of Mission Beach. Includes water quality monitoring of erosion and sediment control structures.

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1. Introduction

This Water Quality Monitoring Program (WQMP) has been developed by NRA Environmental Consultants (NRA) on behalf of MGN Civil Pty Ltd (MGN) for the Mission Beach Clump Point Boating Infrastructure Project (the Project). The works are being undertaken by MGN for the Queensland Department of Transport and Main Roads (TMR) (contract number CN-10244).

As the Contractor, MGN is responsible for (amongst other things) the management of water quality to meet contractual and legislative requirements, and not cause environmental harm or environmental nuisance to waterways within the Project site or adjacent waters into which the Project site discharges.

The WQMP addresses water quality monitoring aspects of:

- the TMR technical specification MRTS51 *Environmental Management* and Annexure MRTS51.1 *Specific Contract Requirements* (for contract CN-10244), which references the CEMP prepared by BMT WBM (2018)
- the TMR technical specification MRTS52 *Erosion and Sediment Control* and Annexure MRTS52.1 *Specific Contract Requirements* (for contract CN-10244)
- Environmental Authority (the EA) EPPR03740716 issued for maintenance dredging during the Project.
- Queensland Government *Monitoring and Sampling Manual* (DES 2018).

1.1 Project details

The Project consists of the following works:

- construction of a new detached breakwater
- upgrade of existing breakwater, including removal of existing breakwater return and reclamation of intertidal and subtidal land
- upgrade of northern carpark
- upgrade of boat launching facility, including extension of the existing ramp, new heavy-duty boat ramp, and treatment of inner breakwater to bind armour
- construction of a composting toilet
- installation of solar-powered navigational lighting and public access lighting.

The location of the Project is shown on **Figure 1**, and the development footprint and spatial extent of the monitoring program is shown on **Figure 2**.

1.2 Objective

The objective of the WQMP is to verify the effective management of water quality during the Project, and identify Project related water quality issues that may require further action.

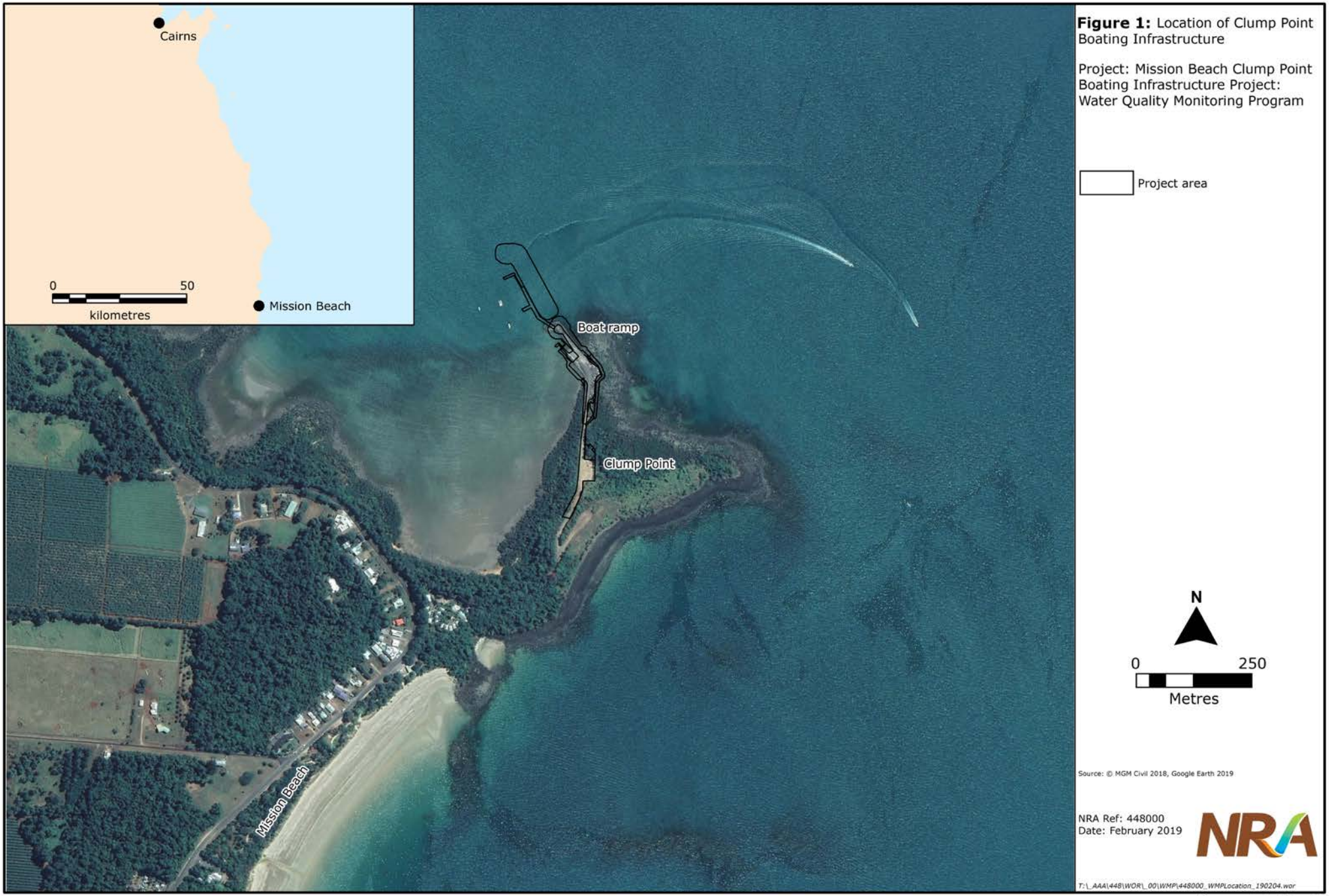

Figure 1: Location of Clump Point Boating Infrastructure

Project: Mission Beach Clump Point Boating Infrastructure Project: Water Quality Monitoring Program

Project area

Source: © MGM Civil 2018, Google Earth 2019

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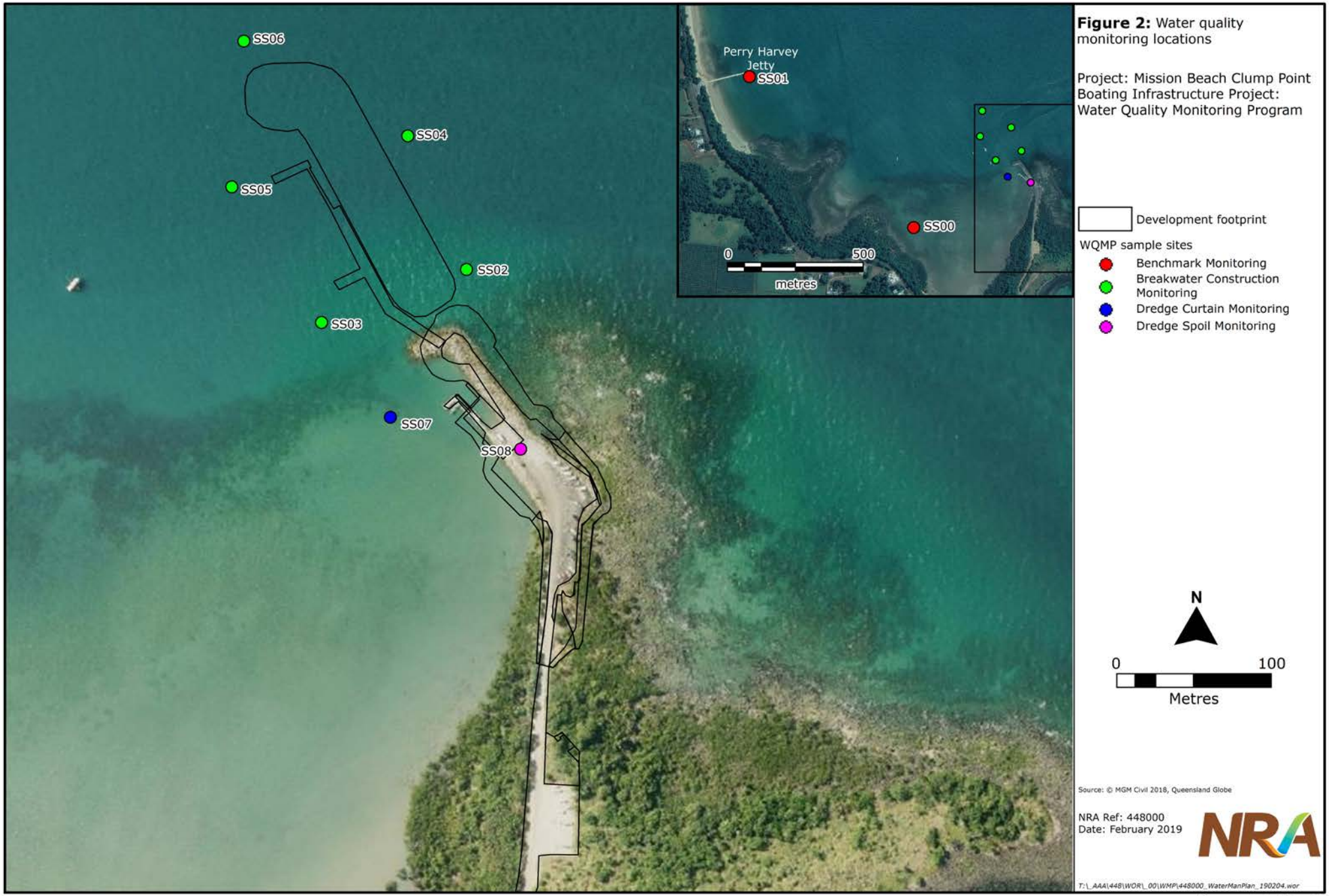

Figure 2: Water quality monitoring locations

Project: Mission Beach Clump Point Boating Infrastructure Project: Water Quality Monitoring Program

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2. Monitoring

Due to the nature and duration of the construction activities, a range of monitoring approaches will be used, as follows.

- Visual monitoring during all 'in-water' activities[1].
- Response monitoring when turbid plumes are identified by the visual monitoring.
- Routine monitoring during the breakwater construction, maintenance dredging and boat ramp upgrade.
- Event monitoring of erosion and sediment control measures.

The parameters to target during the monitoring are:

- pH
- turbidity[2]
- total suspended solids (TSS)
- hydrocarbons (*eg* fuel, oil, lubricants), tannins and paint
- waste (*eg* waste generated by on-site construction activities and litter).

These parameters were identified for the Project by BMT WBM (2018) and MRTS51.

Monitoring sites are shown on **Figure 2** and include:

- assessment sites, *ie* sites selected to monitor construction activities
- benchmark sites, *ie* sites located outside of the area likely to be affected by the construction activities.
  Note that there are two benchmarks sites (SS00 and SS01). SS00 is located in enclosed coastal waters, and is to be used when monitoring construction activities in Boat Bay (*ie* maintenance dredging, boat ramp upgrade, existing breakwater upgrade). SS01 is located off the end of the Perry Harvey Jetty and is to be used when monitoring construction activities in open waters (*ie* breakwater construction)[3].

Details for the monitoring are provided below, and summarised in **Table 1.**

Monitoring records will be recorded on a field sheet (**Appendix A**).

Some of the monitoring sites will require water craft (*eg* a boat) to access. Suitable training will be provided to monitoring staff regarding boat and over-water safety. Monitoring will only be conducted when safe to do so.

[1] 'In-water' activities are those where construction will take place in the sea water. These include maintenance dredging, placing of geofabric and rock (*eg* on the breakwater and boat ramp), and removal of rock from the existing breakwater.

[2] Monitoring of turbidity using 'Secchi disc depth' is identified in BMT WBM (2018). Secchi disc depth measurements are subjective, and better methods of measuring turbidity exist. Secchi disc depth is not included in this program. In its place, turbidity will be measured using a turbidity meter.

[3] Perry Harvey Jetty was selected as the open water benchmark site as it matched the existing baseline data for the Project and provided a fixed point for regular monitoring in open coastal waters.

2.1 Visual monitoring

Constant visual monitoring will be conducted for all in-water activities. The monitoring will be undertaken by personnel visually inspecting the works area around the in-water activities, looking specifically for:

- turbid plumes beyond the sediment control systems (*eg* silt curtains)
- turbid plume more than 10 m from the in-water construction activities.

To ensure that the receiving environment is constantly monitoring during in-water works, the monitoring will be undertaken by the following personnel.

- Marine Mammal and Protected Reptile Observers during their routine observations.
- Excavator operator undertaking the in-water works.
- All staff through their general duties.

If turbid water is observed beyond the sediment control systems, or more than 10 m from the construction activities, the person observing the turbid plume will notify the Site Engineer immediately.

All works likely to be causing the plume will be ceased immediately, and corrective actions will be investigated and implemented where appropriate.

A turbid plume beyond the sediment control systems, or more than 10 m from the in-water construction activities, will trigger Response monitoring (see **Section 2.2**).

Observations, including where no plumes were observed, shall be recorded in daily diaries as evidence of the visual observations being undertaken for in-water activities.

2.2 Response monitoring

If turbid water is observed beyond the silt curtains, or more than 10 m from the in-water activity, then response monitoring will commence. The purpose of the response monitoring is to collect water quality data to determine potential risks of the turbid plume on the receiving environment.

When a plume is observed (refer to section 2.1), monitoring will be undertaken within two hours of the plume being observed at:

- the benchmark site(s)[4]
- relevant response monitoring site(s)[5].

The following parameters will be monitored for each response sampling event.

- pH (measured in the field using a calibrated water quality meter)
- turbidity (measured in the field using a calibrated water quality meter)
- total suspended solids (TSS) (sample collected for laboratory analysis)

[4] Two benchmark sites have been identified in the WQMP (**Figure 2**). For plumes in Boat Bay (*eg* from the maintenance dredging, boat ramp upgrade works and existing breakwater upgrade), the appropriate benchmark site is SS00. For plumes in open water (*eg* from breakwater construction), the appropriate benchmark site is SS01.

[5] The location of response monitoring sites have not been identified in this WQMP, as the locations will depend on the location of the plume, however they need to be located within the sediment plume.

- hydrocarbons, tannins, paint, waste and litter (visual observation recorded on a field sheet – **Appendix A**).
- Field observations (including location of the water quality sample(s), field measurements, photograph). Record on a field sheet (**Appendix A**).

If the plume continues for more than 24 hours, then monitoring will be undertaken daily.

Where exceedances of the water quality investigation criteria are identified, and corrective actions are implemented, response monitoring will be undertaken. The location of the monitoring and the parameters to monitor will be dependent on the nature of the exceedance.

2.3 Routine monitoring

Routine monitoring will be undertaken for specific activities for particular timeframes, as follows.

- New detached breakwater construction.
  - Weekly for the first four weeks (to assess the performance of controls).
  - Then once per month, if no exceedances were identified during the first four weeks of weekly sampling.
  - If exceedances of water quality criteria occur (at any stage), then weekly monitoring will be undertaken until two consecutive weeks of non-exceedances are demonstrated to occur.
  - Monitoring will cease when breakwater construction activities have been completed.
- Existing breakwater upgrade.
  - On the first day of commencing the existing breakwater upgrade.
  - Half-way through the existing breakwater upgrade.
  - Immediately after the existing breakwater upgrade activities have completed.
- Maintenance dredging.
  - On the first day of commencing maintenance dredging.
  - Half-way through maintenance dredging.
  - Immediately after maintenance dredging has been completed (while the silt curtain is still in place).
- Boat ramp upgrade.
  - On the first day of commencing boat ramp upgrade.
  - Weekly during the boat ramp upgrade.
  - Immediately after boat ramp upgrade activity has completed (while the silt curtain is still in place).
- Silt curtain in place (and above activities completed):
  - Weekly while the silt curtain is in place.

The monitoring will be undertaken at the relevant assessment sites (specific for each activity) and at the benchmark sites (refer to **Table 1** and **Figure 2**).

The following parameters will be monitored for each routine sampling event.

- pH (measured in the field using a calibrated water quality meter)
- turbidity (measured in the field using a calibrated water quality meter)
- total suspended solids (TSS) (sample collected for laboratory analysis)

- hydrocarbons, tannins, paint, waste and litter (visual observation recorded on a field sheet – **Appendix A**).
- Field observations (including location of the water quality sample(s), field measurements, photograph). Record on a field sheet (**Appendix A**).

2.4 Event monitoring

Event monitoring is triggered when the following event(s) occurs on-site[6].

- Discharge from an erosion and sediment control measure.
- Discharge from the dredged material dewatering bund.

The following parameters will be monitored for each event monitoring.

- Discharges from an erosion and sediment control measure:
  - Total suspended solids (TSS) (sample collected for laboratory analysis)
  - Field observations (including location of the water quality sample, ESC measure discharging, photograph). Record observations on a field sheet (**Appendix A**).
- Discharges from the dredged material dewatering bund:
  - pH (measured in the field at the point of discharge from the bund, and in the sea water within 10 m of where the discharge water enters the sea). Record measurements on a field sheet (**Appendix A**).
  - Field observations (including location of the water quality samples, photograph). Record observations on a field sheet (**Appendix A**).

[6] If the events do not occur, then the monitoring is not required.

Table 1: Water quality monitoring details and requirements

Purpose	Site(s)	Parameters	Trigger to Monitor	Frequency
Visual monitoring				
To determine if in-water activities[1] are causing a turbid plume outside of the silt curtains, or beyond 10 m of the construction activity.	• Perimeter of the silt curtain. • 10 m from the in-water activities.	• Visual observation of turbid plume.	• When in-water activities are being undertaken.	• Constant monitoring for the duration of all in-water activities.
Response monitoring				
To collect water quality data to quantify potential impacts from turbid plumes generated by the construction activity.	• To be determined based on the location of the turbid water plume. • Benchmark sites (either SS00 or SS01, depending on the location of the turbid plume)[2].	• pH • Turbidity • TSS • Hydrocarbons, tannins and paint • Waste (and litter)	When visual monitoring observes a turbid plume: • Outside the silt curtain • More than 10 m from the in-water activity.	• Within 2 hours of the turbid plume being observed. • Daily for the duration of the turbid plume.
To determine the effectiveness of corrective actions (where implemented).	• To be determined based on the exceedance and the corrective action implemented.	• To be determined based on the nature of the exceedance.	When corrective actions have been implemented to address an exceedance identified by other monitoring.	• Once, after the corrective action has been implemented, or where otherwise identified for new breakwater construction (see below).
Routine monitoring				
To collect water quality data specific to the construction activity being undertaken.	New breakwater construction[3]: • SS02 • SS03 • SS04 • SS04 • SS06 • SS01 (benchmark site)	• pH • Turbidity • TSS • Hydrocarbons, tannins and paint • Waste (and litter)	When in-water activities are undertaken for: • New breakwater construction.	• Weekly for the first 4 weeks to assess site impacts. • If no exceedances of the water quality investigation criteria are identified in 4 consecutive weeks of monitoring, reduce frequency to once every 4 weeks • If exceedances are identified (at any time in the routine monitoring), monitoring will revert to weekly until 2 consecutive weeks demonstrate non-exceedances.
	Existing breakwater upgrade: • SS03 • SS07 • SS00 (benchmark site) • SS01 (benchmark site)	• pH • Turbidity • TSS • Hydrocarbons, tannins and paint • Waste (and litter)	When in-water activities are undertaken for: • Existing breakwater upgrade.	• On the first day of commencing the existing breakwater upgrade. • Half-way through the existing breakwater upgrade. • Immediately after the existing breakwater upgrade activities have completed.
	Maintenance dredging and boat ramp upgrade[4]: • SS07 • SS00 (benchmark site)	• pH • Turbidity • TSS • Hydrocarbons, tannins and paint • Waste (and litter)	When in-water activities are undertaken for: • maintenance dredging • boat ramp upgrade • at all times when the silt curtain(s) are in place.	For maintenance dredging: • On the first day of commencing maintenance dredging. • Half-way through dredging. • At the completion of dredging. For boat ramp upgrade: • On the first day of commencing boat ramp upgrade. • Weekly during the boat ramp upgrade. • Immediately after boat ramp upgrade activity has completed (while the silt curtain is still in place). Silt curtain in place (and other activities completed): • Weekly while the silt curtain is in place.
Event monitoring				
Monitor the quality of water discharging from the construction activities.	Erosion and sediment control (ESC) measures (on land): • At the point of discharge from the ESC measure.	• Total Suspended Solids (TSS)	• When rainfall events cause a discharge through the ESC measures.	• As soon as practicable from the commencement of the discharge, and while water is discharging from the ESC measure.
	Dredged material bund: • At the point of discharge from the bund. • In the sea water, within 10 m of where the discharge enters the sea.	• pH	• When drainage waters discharge from the bund.	• As soon as practicable from the commencement of the discharge, and while water is discharging from the bund.

3. Monitoring procedure

3.1 Good monitoring practices

The following good monitoring practices will be implemented to reduce the risk of compromising the monitoring data.

- Routine monitoring will be conducted on an outgoing tide.
- Response monitoring (*eg* due to observed turbid plumes) will be undertaken when the plume is observed.
- Apply sunscreen and insect repellent prior to leaving for monitoring and ensure that hands and wrists are washed with soap and water to remove any excess product.
- Do not smoke or eat when monitoring.
- It is preferable to collect samples directly into the laboratory sample container, where possible. A sampling pole will be used when sampling from a boat, or a bank where it is not safe to enter the water. Use the maximum safe extension of a sampling pole to collect water.
- Rinse the sampling container on the sampling pole with water from the sampling site by filling and emptying the sampling container three times.
- Label sample bottles (as much as possible) before going into the field.
- Keep sample bottles closed until ready to be filled.

3.2 At the commencement of the Project

- Contact the laboratory before monitoring is to commence to:
  - discuss sample analysis requirements and identify any special sample constraints (*eg* sample holding times, laboratory operating hours)
  - order sample bottles.
- Ensure all sampling gear is available (sample bottles, pH meter, turbidity meter, calibration solutions, sample pole, field sheets, GPS).
- Arrange a boat.
- Train personnel in the WQMP.

3.3 Before monitoring

- Calibrate water quality meters (for turbidity and pH) using standards appropriate to the conditions to be monitored and record the details of the calibration on a record sheet.
- Conduct a risk assessment and ensure it is safe to monitor. Only monitor when safe to do so.

3.4 Monitoring procedure

1. Record monitoring observations for the site on a field sheet (**Appendix A**), otherwise a dated note book or diary can be used. Observations must include presence/absence of:
   - visible trace of hydrocarbon (*eg* film), paint or tannins
   - odours
   - waste and litter
   - water turbidity by visual observation (*eg* clear/cloudy/murky).

2. Where practicable, photograph the site and record the photograph number on field sheet/notes.
3. Use a GPS to mark the monitoring location as a waypoint (for future reference) and record the co-ordinates of the monitoring point on the field sheet.
4. As required, measure field water quality parameters (*ie* pH and turbidity). Measurements should be made approximately 30 cm below the water surface[7] (where possible). Record measured values on the field sheet. Once measurements are complete, rinse the water quality measuring probes (pH meter) and jars (turbidity meter) with demineralised water. Note that taking measurements with a turbidity meter requires a stable surface. If monitoring from a boat, it may be beneficial to collect a small water sample for turbidity analysis when back on shore.
5. If required, collect samples for laboratory analysis. Water will be collected from approximately 30 cm below the surface[7] (where possible). Fill the sample bottle to the top and secure the lid. Label the bottle with the Project name, site ID, date and time. Chill samples immediately after collection (using an esky with ice, or a car fridge) and ensure they remain chilled until received by the laboratory. Samples must be analysed within laboratory set holdings times (*eg* for TSS, the holding time is 7 days, unless advised otherwise).
6. Complete a chain of custody (CoC) form for each batch of samples to be submitted to the laboratory. CoC forms are obtained from the laboratory. A partially pre-filled CoC is provided in **Appendix B**. The CoC is to be signed by the person relinquishing the samples to the laboratory, and signed to show acceptance of the samples by a representative of the laboratory. The form must stay with the samples at all times. Retain a copy (or take a photograph) of the CoC when delivering/relinquishing samples before leaving the laboratory.

3.5 Quality Assurance

For quality assurance purposes, field water quality meters will be calibrated as per the manufacturer's specifications, and records of the calibrations will be retained by MGN.

A NATA accredited laboratory will be used for TSS analysis, and the laboratory quality assurance results (reported with the certificate of analysis) will be reviewed to identify any potential concerns with the data.

Where unexpected water quality results are received, and which present a concern in terms of data quality, follow-up monitoring will be undertaken.

3.6 Rainfall

Site rainfall must be monitored using a proprietary rain gauge or meteorological station and a record of rainfall be maintained. Records must include rainfall (in mm) and duration (where possible). **Appendix C** includes a sheet for recording rainfall data.

[7] Depth profiling of water (as detailed in DES 2018) is not considered reasonable or practicable for this monitoring program. The action of a large excavator bucket repeatedly moving through the water profile while placing or removing material for the breakwater upgrade is expected to cause sufficient profile mixing for sediment (if disturbed). The maintenance dredging silt curtain site is located in relatively shallow waters and therefore depth profile sampling is considered not necessary. Benchmark sites for the breakwater and maintenance dredging monitoring will be taken at the same depth as the monitoring sites, to allow for comparison between the samples.

4. Water Quality Investigation Criteria

Water quality investigation criteria (**Table 2**) are used to interpret the results for the assessment sites. Where a result exceeds investigation criteria, the source of the exceedance will be investigated, and corrective actions identified and implemented where required (refer to **Section 6.1**).

A spreadsheet template is provided in **Appendix C** to assist with interpretation of water quality results.

Table 2: Water quality investigation criteria

Monitoring type	Investigation criteria
Visual monitoring	• Turbid water observed outside of sediment control measures (*ie* silt curtains). • Turbid water observed >10 m from in-water activities.
Response monitoring	Monitoring in open coastal waters (*eg* near assessment sites SS02 to SS06): • Turbidity: <1 NTU[§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • TSS: 1.6 mg/L (dry season)[1,§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • pH: within the range 8.1 – 8.4 (pH units)[§], or no more than 1 pH unit difference from site SS01 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity.
	Monitoring in enclosed coastal waters (*eg* near assessment site SS07): • Turbidity: <10 NTU[‡], or 10% increase from site SS00 for the same sample event[i], whichever is higher. • TSS: No more than 10% increase from site SS00 for the same sample event[i]. • pH: within the range 7.5 – 8.4 (pH units) [‡], or no more than 1 pH unit difference from site SS00 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity.
Routine monitoring	New breakwater construction (assessment sites SS02 to SS06): • Turbidity: <1 NTU[§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • TSS: 1.6 mg/L (dry season)[1,§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • pH: within the range 8.1 – 8.4 (pH units)[§], or no more than 1 pH unit difference from site SS01 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity.
	Existing breakwater upgrade (assessment site SS03): • Turbidity: <1 NTU[§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • TSS: 1.6 mg/L (dry season)[1,§], or 10% increase from site SS01 for the same sample event[i], whichever is higher. • pH: within the range 8.1 – 8.4 (pH units)[§], or no more than 1 pH unit

Monitoring type	Investigation criteria
	difference from site SS01 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity. Existing breakwater upgrade (assessment site SS07): • Turbidity: <10 NTU[‡], or 10% increase from site SS00 for the same sample event[i], whichever is higher. • TSS: No more than 10% increase from site SS00 for the same sample event[i]. • pH: within the range 7.5 – 8.4 (pH units)[‡], or no more than 1 pH unit difference from site SS00 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity.
	Maintenance dredging and boat ramp upgrade (assessment site SS07): • Turbidity for site SS07: <10 NTU[‡], or 10% increase from site SS00 for the same sample event[i], whichever is higher. • TSS for site SS07: No more than 10% increase from site SS00 for the same sample event[i]. • pH: within the range 7.5 – 8.4 (pH units)[‡], or no more than 1 pH unit difference from site SS00 for the same sample event[i], whichever is greater. • Hydrocarbons, tannins, paint, waste and litter: No visible trace[i] from the construction activity.
Event monitoring	Erosion and sediment control measures: • TSS: 50 mg/L[i, #]
	Dredged material bund: • pH: within the range 7.5 – 8.4 (pH units)[‡]

[1] If monitoring is undertaken during the wet season (November – April), the default trigger value is 2.4 mg/L.

[i] From Table 8.2.2 in MRTS51.

[§] From EHP 2017, Table 1 Wet Tropics Waters: Aquatic Ecosystem water quality objectives, for Moderately Disturbed Open Coastal Waters (excluding open coastal waters around Palm Island Group).

[‡] From EHP 2017, Table 1 Wet Tropics Waters: Aquatic Ecosystem water quality objectives, for Moderately Disturbed Enclosed Coastal Waters.

[#] Consistent with IECA (2008) performance measure for sediment control basins, noting that the performance measure has been applied to non-sediment basin controls for the Project.

5. Record Keeping

The following water quality monitoring records will be retained:

- daily diary notes for constant visual monitoring.
- field sheets and photographs (where taken) for each monitoring event
- calibration records for water quality meters
- laboratory documents (CoC, sample receipt notice, certificate of analysis, laboratory quality assurance reports) for each batch of samples submitted for analysis
- site water quality assessment sheets.

6. Reporting

Water quality results will be assessed as they become available (*ie* on immediate receipt/collection of monitoring results; and for field measurements, upon returning from monitoring events).

It should be noted that water clarity indicators (turbidity and TSS) are naturally highly variable in marine/coastal environments due to wind, waves and tides. Records of site conditions at the time of monitoring will be important when interpreting turbidity and TSS results, particularly during windy conditions.

The Project environmental reporting requirements will be used for reporting water quality monitoring events and results. The exception to this is where a non-conformance (or exceedance) of water quality investigation criteria are identified. TMR technical specification MRTS51 requires the Administrator and Administering Authority to be notified as soon as practicable where non-conformances with water quality investigation criteria are identified. Information to be included in the non-conformance report includes:

- the water quality parameter that exceeded investigation criteria
- the investigation criteria
- the value for the parameter from the assessment site
- the value for the parameter from the related benchmark sites (if relevant).

6.1 Corrective Actions

Monitoring data that is found to be a non-conformance with respect to the project water quality investigation criteria must be reported to the Administrator and Administering Authority, and the activity suspected of causing the non-conformance paused while the cause and mitigation measures are investigated. An investigation must be undertaken in accordance with *EHP's Procedural Guide Summary Sheet*[8] to review the possible cause of the non-conformance, and corrective actions developed and implemented to improve water quality and prevent re-occurrence of the monitoring non-conformance.

Corrective actions may include alteration to the construction method, timing, duration or material that caused the exceedance. Following corrective actions, Response monitoring will be conducted to determine the effectiveness of the implemented corrective actions.

To surmise, if an exceedance is identified:

1. Pause work on the activity suspected cause of the exceedance.
2. Report exceedance to the Administrator and Administering Authority.
3. Investigate the likely cause of the exceedance.
4. Alter the construction method, timing, duration or material (as needed).
5. Initiate response monitoring to confirm effectiveness of implemented corrective action.

If no alterations to construction activity controls are deemed effective based on Response monitoring data, a stop work must be implemented until an effective solution is found.

[8] EHP Procedural Guide, Summary Sheet – Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland EM1137 Version 1.

7. References

BMT WBM 2018, *Mission Beach Clump Point Boating Infrastructure Project: Construction Environmental Management Plan*, August 2018 (Reference: R.B22205.005.04.CEMP.docx).

DES 2018, *Monitoring and Sampling Manual: Environmental Protection (Water) Policy*, Department of Environment and Science, Queensland Government, June 2018

EHP 2017, *Draft environmental values and water quality objectives for Wet Tropics estuarine and coastal/marine waters*, Department of Environment and Heritage Protection, Queensland Government, September 2017.

IECA 2008, *Best Practice Erosion and Sediment Control*, Published by the International Erosion and Sediment Control Association (Australasian Chapter), Picton, NSW, Australia, November 2008.

Appendix A:
Example Field Sheet

MGN – Clump Point Boating Infrastructure Water Quality Monitoring FIELD SHEET

Date:		**Monitored by:**	
Cloud cover:	Sunny / Overcast	**Precipitation:**	None / Light rain / Heavy rain
Wind:	None / Light / Strong		
Sea conditions:	Heavy / Moderate / Calm		

Site				
GPS coordinate (GDA94)				
Monitoring time				
Water sample collected?	Y / N	Y / N	Y / N	Y / N
Water colour/clarity				
pH				
Turbidity (NTU)				
Hydrocarbon slick/odour				
Waste/litter				
Comments (eg tidal conditions)				
Photograph				

Appendix B:
Example Laboratory Chain of Custody

CLIENT: MGN Civil			FOR LABORATORY USE ONLY (Circle)
OFFICE: unit 10/1378 Lytton Rd, Hemmant QLD 4174			Custody Seal Intact? Yes No N/A
PROJECT: Clump Point	SGS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: ˚C
PROJECT MANAGER: CONTACT PH:		OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: SAMPLER MOBILE:	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Email Reports to	DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to				

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION	ANALYSIS							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TOTAL CONTAINERS	Total suspended solids (TSS)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SS00		w	1								
	SS01		w	1								
	SS02		w	1								
	SS03		w	1								
	SS04		w	1								
	SS05		w	1								
	SS06		w	1								
	SS07		w	1								
	SS08		w	1								
TOTAL												

Appendix C:
Water Quality Monitoring Results template

Project: Clump Point Boating Infrastructure
Sample trigger: (INSERT routine or event)

		Monitoring Event		Analyte			
	Site	**Date**	**Time**	**TSS**	**Turbidity**	**pH**	
Reference Site	SS01						
Investigation Criteria (IC)				Reference Site value + 10%	Reference Site value + 10%	Reference Site Value - 1 pH unit	Reference Site Value + 1 pH unit
IC Value							
IC Guideline				1.6 mg/L (May - Oct) 2.4 mg/L (Nov - Apr)	<1 NTU	8.1	8.4
IC Test				IC Value or IC Guideline (whichever is higher) greater than Assessment site value	IC Value or IC Guideline (whichever is higher) greater than Assessment site value	IC Value or IC Guideline (whichever is lower) lower than Assessment site value	IC Value or IC Guideline (whichever is higher) greater than Assessment site value
Assessment Sites	SS02 SS03 SS04 SS05 SS06						

Project: Clump Point Boating Infrastructure
Sample trigger: (INSERT routine or event)

		Monitoring Event		Analyte			
	Site	**Date**	**Time**	**TSS**	**Turbidity**	**pH**	
Reference Site	SS00						
Investigation Criteria (IC)				Reference Site value + 10%	Reference Site value + 10%	Reference Site Value - 1 pH unit	Reference Site Value + 1 pH unit
IC Value							
IC Guideline					<10 NTU	7.5	8.4
IC Test				IC Value greater than Assessment site value	IC Value or IC Guideline (whichever is higher) greater than Assessment site value	IC Value or IC Guideline (whichever is lower) lower than Assessment site value	IC Value or IC Guideline (whichever is higher) greater than Assessment site value
Assessment Sites	SS07						

Project:	Clump Point Boating Infrastructure
Sample trigger:	(INSERT routine or event)

		Monitoring Event			
	Site	**Date**	**Time**	**pH**	
Reference Site	none				
Investigation Criteria (IC)					
IC Value					
IC Guideline				7.5	8.4
IC Test				IC Guideline less than Assessment site value	IC Guideline greater than Assessment site value
Assessment Sites	SS08				

Project:	Clump Point Boating Infrastructure
Sample trigger:	(INSERT routine or event)

		Monitoring Event		Analyte
	Site	Date	Time	TSS
Reference Site	none			
Investigation Criteria (IC)				
IC Value				
IC Guideline				50 mg/L
IC Test				IC Value greater than Assessment site value
Assessment Sites (as defined in ESCP)				

Project:	Clump Point Boating Infrastructure
Site:	

Rainfall Event Date	Duration	(mm)

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