Rosslyn Bay Maintenance Dredging

Environmental Management Plan

September 2022

Queensland Government

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Document control sheet

Contact for enquiries and proposed changes:

Contact Officer	Viviana Gamboa
Title	Senior Advisor (Environmental Management)
Phone	(07) 5563 6424
Email	Boating.infrastructure@msq.qld.gov.au

Version history

Version no.	Date	Changed by	Nature of amendment
1	8/3/2022	Bob Brunner	Initial preparation for 2022 Dredging
2	7/4/2022	Bob Brunner	Changes as recommended by TACC
3	22/4/2022	Bob Brunner	Revised wording regarding 2022 sediment testing results in Sections 3.1 & 3.3. Removal of specific Dredging Contractor sign-off on p3 and replaced by addition of wording in the Statement of Commitment and in the Preface for the Dredging Contractor to implement the approved EMP.
4	1/08/2022	Hineora Braddock	Formatting of document, minor amendments. Review of document.
5	12/09/2022	Viviana Gamboa	Inclusion of GBRMPA amendment recommendations, and Environmental sign-off

Document sign off:

The following GBRMPA officer has **endorsed** this document.

Name [redacted]

Agency Great Barrier Reef Marine Park Authority

Position [redacted]

Statement of Commitment

The Maritime Safety Queensland and its Contractors/sub-contractors commit to achieving the environmental objectives outlined in this Environmental Management Plan and ensuring the management actions herein are implemented.

Maritime Safety Queensland

Name Viviana Gamboa

Position Senior Advisor (Environmental Management)

Signature [redacted] Date: 12/09/2022

A COPY OF THIS ENVIRONMENTAL MANAGEMENT PLAN SHALL BE KEPT ON SITE AND BE AVAILABLE TO ALL STAFF ASSOCIATED WITH THIS PROJECT.

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Preface

This Environmental Management Plan – dredging (EMP) details all elements of the Environmental Management Strategy to achieve best-practice environmental management for the maintenance dredging of Rosslyn Bay Boat Harbour in 2022. This plan reflects the strategies outlined in the Long-Term Management and Monitoring Plan (LTMMP) developed by Marine Safety Queensland (MSQ) for the long-term management of maintenance dredging in Rosslyn Bay Boat Harbour.

This EMP covers the dredging works proposed for 2022 in the Rosslyn Bay Boat Harbour following natural channel infilling. MSQ has undertaken a significant volume of work to support long term permits for the maintenance of Rosslyn Bay Boat Harbour. Coastal processes understanding and modelling predictions have been validated via detailed monitoring from past dredging exercises. Because of the extensive investigative work undertaken, backed by detailed monitoring of the previous dredging campaigns, maintenance dredging at Rosslyn Bay Boat Harbour is considered a low-risk activity.

Transport and Main Roads (TMR) / MSQ holds a number of environmental approvals for dredging and spoil placement operations in Rosslyn Bay and these are detailed in Section 1.1 with copies in Appendix D. This EMP has been developed to ensure the dredging and spoil placement activities comply with all approval conditions.

The EMP is a live document that will be reviewed as required to ensure it continues to meet best- practice environmental management.

This EMP fulfils the function of an EMP (Marine Planning) in TMR's Environmental Management System (EMS) and must be approved by Great Barrier Reef Marine Park Authority (GBRMPA) prior to commencement of dredging. This EMP is to be implemented by the dredging contractor and all personnel involved in the project.

The dredging contractor is to prepare an addendum to this EMP. The addendum will detail additional equipment measures that are detailed in Section 5. The dredging contractor will commit to implementing this EMP in that addendum. This addendum by the dredging contractor, together with this EMP, fulfils the function of a Dredge Management Plan (also known as an EMP – Construction Dredging) as recommended by the Department of Environment & Science (DES) for dredging.

1 Background and Purpose

1.1 Project Background

Rosslyn Bay Boat Harbour (RBBH) is one of 14 State Boat Harbours strategically positioned along the Queensland Coast to provide sheltered havens for recreational and commercial boating. It is located on the central Queensland coast, in the Rockhampton Regional Local Government Area, approximately 8 km south of the township of Yeppoon. The harbour is within Keppel Bay and close to the Mackay / Capricorn management area of the Great Barrier Reef Marine Park (GBRMP).

Maritime Safety Queensland (MSQ) manages Rosslyn Bay Boat Harbour on behalf of the State of Queensland and is responsible for maintenance dredging of the entrance and internal navigation channels to the public boating facilities in the harbour and the public mooring area. Maintenance dredging of water leases and marina areas is the responsibility of harbour lessees and is not part of the proposed dredging works by MSQ.

TMR/ MSQ holds the following approvals for dredging and spoil placement operations in the Rosslyn Bay Boat Harbour (RBBH):

- GBRMPA permit No. G16/38147.1
- (Commonwealth) *Sea Dumping Act* Approval No. SD16/001
- Environmental Authority Permit No. EPPR02005514
- Tidal Works approval No. SPDC02622311

Copies of the approvals are enclosed in Appendix D.

This EMP and the permit conditions in Appendix D make up the environmental management framework to guide MSQ and its contractors in the best practice dredging of Rosslyn Bay Boat Harbour for this 2022 dredging campaign. Figure 1 shows the location of the harbour, the offshore disposal site and the nearest identified sensitive sites (receptors) to dredging and disposal sites.

Figure 1 **Location of Rosslyn Bay Boat Harbour, Disposal site & two Sensitive Sites (Wreck point, Bluff Rock)**

1.2 Dredging Need

1.2.1 Dredging History for RBBH

The harbour requires maintenance dredging every 2 to 5 years to maintain access to the harbour and its internal public channels. The driver for the frequent maintenance is the sediment escaping the Fitzroy River, south of the harbour and its transport north via natural coastal processes. Historically, maintenance dredging campaigns of the harbour have typically been less than 40,000 m^3. The volumes of material extracted by previous dredging campaigns are summarized in Table 1.

Table 1 Historical dredged material volumes

Year	Total (m^3)	Comments
1976	unknown	Original harbour dredging
1977	unknown	Harbour dredged again due to cyclone "David"
1983	approx. 10,000	maintenance dredging of access channels to the public jetty and public boat ramp
1987/1988	approx. 52,000	Combined capital and maintenance dredging of the channels and the mooring area. This was the first time the existing offshore disposal site was used.
1991	unknown	Commercial Marina Capital Dredging – used for reclamation
1991/1992	approx. 26,000	maintenance dredging- pipeline to existing offshore disposal site
1997	approx. 31,100	maintenance dredging - pipeline to existing offshore disposal site
2002	approx. 29,200	maintenance dredging - bottom dumping barge to existing offshore disposal site
2006	approx. 31,000	Maintenance dredging – Trailing Suction Hopper Dredge
2009	approx. 24,000	Maintenance dredging – Trailing Suction Hopper Dredge
2012-13	approx. 78,000	Maintenance dredging – Cutter suction Dredge and Pipeline
2016	approx. 58,300	Maintenance dredging – Cutter suction Dredge and Pipeline
2019	approx. 21,800	Maintenance dredging – Cutter suction Dredge and Pipeline

As can be seen from the table, typical dredging need is around 30,000 – 40,000 m^3 every three years, however natural events such as cyclones have occasionally increased the dredging need to 60,000 to 80,000 m^3 for dredging campaigns.

1.2.2 Permit Volume Allowances

The Marine Park Permit and Sea Dumping Permit allows disposal of up to 210,000 m3 of maintenance dredge material over a ten-year period from its commencement in March 2016, with a limit of 60,000 m3 in a year. The permits also provide an additional allowance for contingency maintenance requirements from events such as cyclones of up to 70,000 m3.

1.2.3 Dredging Need for 2022

Recent hydrographic surveys indicate that the harbour again requires dredging in 2022. Figure 2 shows the latest hydrographic surveys of the area, with the areas in red representing points where the water depth is less than the design depth, indicating that siltation build-up will need to be removed in those areas.

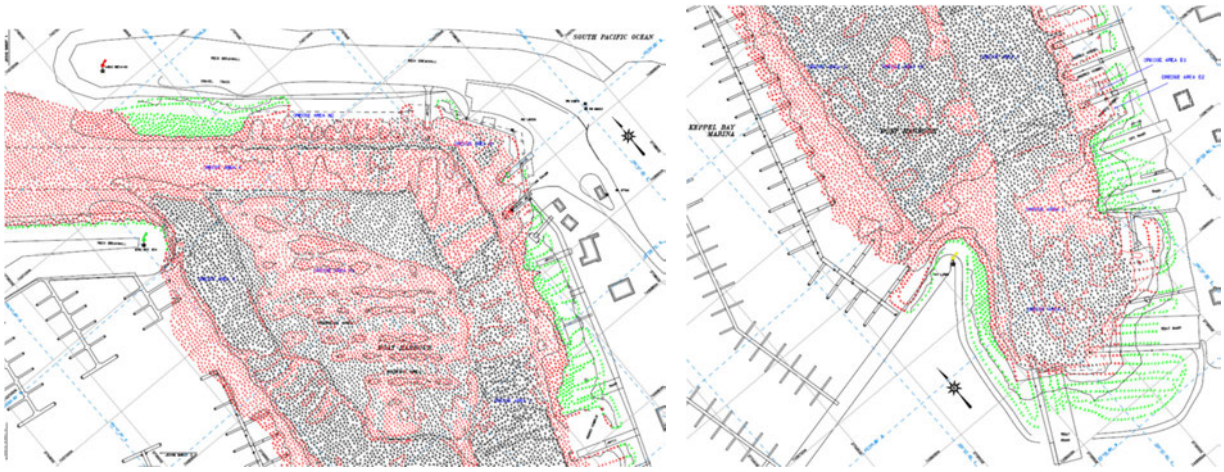

Figure 2 Hydrographic Surveys of the Harbour

The expected volume of material to be dredged in 2022 has been estimated to be up to 37,000 m^3 of in-situ material by the time the dredging is undertaken.

1.2.4 Permit Volume Limits

The proposed dredging volume for 2022 of up to 37,000 m^3 is well below the annual limit of 60,000 m^3 in the permits.

With a maximum allowed disposal of 210,000 m^3 over the permit period of 2016 to 2026, there remains approval to dispose of up to 129,900 m^3 based on the volumes dredged in 2016 and 2019. The expected dredging volume in the current proposed dredging can be easily accommodated under the existing permits (GBRMPA and Sea Dumping Permits).

1.2.5 Timing of Dredging

Subject to approval of both the EMP and sediment testing, by GBRMPA, at time of writing the dredging is proposed to commence in June 2022 and it is expected to take in the order of four months to complete. Actual timing will be dependent on the dredging equipment used and the weather.

1.2.6 Disposal Site

Dredge spoil will be relocated to the previously used offshore disposal site which is located 1.1 km offshore of the harbour entrance (Figure 1). Plumes resulting from the dredging and disposal activities have been shown from modelling and monitoring over a number of RBBH dredging campaigns to be contained locally and not impact on nearby sensitive receptors at Bluff Rock and Wreck Point.

Wind and wave action mobilises sediment in Rosslyn Bay that has deposited from material brought down by the Fitzroy River. The sea disposal site is a dispersive site. These same wind and wave conditions remobilise sediment from the disposal site back into the northerly longshore transport system, returning the sediment to the offshore sediment movement system.

1.2.7 Supporting Studies

TMR / MSQ has previously undertaken an assessment of dredge material management options given the proposed dredging need over the 10-year planning period of the permits. Detailed plume and sediment redistribution modelling was carried out (BMT WBM (2012)) to assess the short and long-term fate of the dredge material and its potential for impact on potential sensitive receptors in the vicinity of the works area. This assessment has resulted in the recommendation of continued use of the existing offshore disposal site (TMR, 2012).

This modelling has been used along with previous monitoring investigations in the development of a monitoring framework which contributes to the overall Long Term Environmental Management Strategy. This Environmental Management Plan (EMP) details all elements of the Environmental Management Strategy to achieve best-practice environmental management for the maintenance dredging of Rosslyn Bay Boat Harbour.

Proper implementation of this EMP will minimise the risk of impact to the environment surrounding the dredging and disposal sites. Data from environmental monitoring will supportcontinuous improvement in environmental performance through refinement of the EMP and LTMMP.

1.3 Management Plan Framework

The National Assessment Guidelines for Dredging (DEWHA 2009) details what EMPs for dredging should include and this has been used as the basis for this document:

i. ***Overall management framework*** – describe how the EMP integrates with theoverall management framework

ii. ***Context*** – put the proposal in the context of the local environment, including the history of dredging and dredge material placement at the disposal site.

iii. ***Description of the project*** – provide information on dredging and disposal for the term of the plan or permit, including the location, staging, and timing of activities.

iv. ***Information on approvals*** – provide details of any approvals, relevant conditions and any other statutory requirements.

v. ***Description of the existing environment*** – characterise the dredging and disposal sites and adjacent areas, including its water column, sediments, biota, resources and other uses (existing and potential) of the area.

vi. ***Description of potential impacts*** – address both potential short-term and long-term impacts and any uncertainties regarding the predicted impacts.

vii. ***Management strategies and actions*** – describe strategies and actions to mitigate impacts – including specific and auditable measures; performance indicators; monitoring requirements; corrective actions; and responsibilities and timing for management and monitoring activities.

viii. ***Contingency arrangements*** – identify corrective actions and contingency plans, should undesirable or unforeseen impacts occur.

ix. ***Continuous improvement*** – identify opportunities for continuous improvement to prevent, minimise or mitigate environmental impacts in the longer term.

x. ***Auditing requirements and reporting*** – outline reporting and documentationstandards, timing and responsibility of any auditing or reporting.

xi. ***Review of management plan*** – make provisions for a review of the management plan, including consultation with the TACC, to ensure it remains current.

This EMP Dredging has been developed as a stand-alone operational document that ties together all aspects of maintenance dredging at Rosslyn Bay Boat Harbour for the 2022 dredging campaign.

1.4 Legislative Context

The Rosslyn Bay Boat Harbour dredging and placement of the resultant dredged material at sea within the Great Barrier Reef Marine Park requires approvals under both Commonwealth and State legislation. These are described below, and copies of the approvals can be found in Appendix D.

1.4.1 Commonwealth Legislation

Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act) was enacted to fulfil Australia's international responsibilities under the London Convention of 1972 and has been amended to implement the 1996 Protocol to the London Convention (which Australia ratified in 2001).

The Sea Dumping Act regulates the deliberate loading and dumping of wastes and other matter at sea. It applies to all vessels, aircraft or platforms in Australian waters and to all Australian vessels or aircraft in any part of the sea. The Act states that only uncontaminated dredged material may be disposed at sea. The then Department of Environment, Water, Heritage and the Arts (DEWHA) has issued guidelines for sampling and testing sediment, which must be followed in order for a sea dumping permit to be issued.

The *Sea Dumping Act* applies in respect of all Australian waters (other than waters within the limits of a State or the Northern Territory inland waters), from the low water mark out to the limits of the Exclusive Economic Zone EEZ). The Act is currently administered by the Department of Agriculture, Water and the Environment (DAWE) or the GBRMPA if dumping is to take place within the GBRMP.

In assessing any proposal under the *Sea Dumping Act*, the proposal is also assessed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

MSQ's continued use of the existing ocean disposal site or alternative ocean disposal site necessitates the need for a sea dumping permit for the maximum period of 10 years. MSQ holds this permit (SD16/001) which is valid to 2026. See Appendix D.

1.4.2 Great Barrier Reef Marine Park Act 1975

The *Great Barrier Reef Marine Park Act 1975* (GBRMP Act) established a framework for the establishment, control, management and development of the GBRMP. The Act is administeredby the GBRMPA. GBRMPA in deciding whether or not to grant a permission in relation to an application, and whether or not to impose any conditions on the permission, must assess any proposal that has the potential to impact on the environment and on the social, cultural and heritage values of the Marine Park or a part of the Marine Park. The assessment is undertaken in accordance with the requirement of Regulations 88Q and 88R.

State marine park legislation is also assessed, and a joint Marine Parks permit is considered where boundaries overlap.

MSQ's continued use of the existing ocean disposal site or alternative ocean disposal site within the GBRMP necessitates the need for a permit under the GBRMP Act. This permit is held by MSQ and it is valid to 2026. The permit number is G16/38147.1. See Appendix D.

1.4.3 State Legislation

Planning Act 2016

The *Planning Act 2016* (Planning Act) was enacted to establish "an efficient, effective, transparent, integrated, coordinated, and accountable system of land use planning, development assessment and related matters that facilitates the achievement of ecological sustainability." It coordinates and integrates planning at the three levels - State, Regional & local planning. MSQ holds appropriate State approvals under the *Planning Act 2016*.

Coastal Protection and Management Act 1995

The Coastal Protection and Management Act 1995 (CP&M Act) provides for "the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity." It ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. Assessments are undertaken under development assessment processes under the Planning Act 2016.

MSQ has operational works approvals which last in perpetuity for dredging within the Harbour and placement of this dredged material within the extent of the existing defined disposal facility. Any change to the dredge area or footprint of the disposal area would require additional development approval under the *Planning Act 2016*.

Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides a framework for Environmentally Relevant Activities including dredging and disposal of dredged material. The regulatory mechanisms are administered under the *Planning Act 2016*.

Dredging is an Environmentally Relevant Activity (ERA) designated as ERA 16 (1). An assessment under the EP Act is triggered in relation to any application for dredging.

MSQ currently holds an Environmental Authority for ERA 16 (1) (b) allowing the dredging and placement of up to 100,000 t of dredge material a year.

Transport Infrastructure Act 1994*, *Transport Operations (Marine Safety) Act 1994*, *Transport Operations (Marine Safety) Regulation 2004

Maritime Safety Queensland (MSQ) is a Concurrence Agency for dredging approvals and disposal works which may impact on maritime navigation. The Regional Harbour Master places conditions on any Development Approval to ensure Marine Safety is achieved.

MSQ has conditions in its overall development approvals to cover maritime safety and is required to notify the RHM prior to the start of any works and seek advice and take direction from the RHM on any element of the project associated with navigational safety.

Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) and the *Torres Strait Islander Cultural Heritage Act 2003* came into force on 16 April 2004. Underpinning the Act is a “cultural heritage duty of care”, which requires that a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage.

The Act establishes a framework for the conduct and assessment of cultural heritage impact and processes to be undertaken in preparing Cultural Heritage Management Plans (CHMP) which will be followed by MSQ during the course of any dredging campaign. The dredging of the harbour has been undertaken on many occasions and the 2022 dredging should not pose any risk to cultural heritage values.

2. Environmental Features

2.1 Regional Setting

Rosslyn Bay is a small embayment which forms part of the larger Keppel Bay. Keppel Bay is relatively shallow with water depth slowly increasing seaward. Its offshore extent is approximately 20 km and the distance between its southern end near the mouth of the Fitzroy Estuary to Great Keppel Island is approximately 40 km. Depths near the offshore boundary are approximately 15 m. The Fitzroy River is the major river discharging into Keppel Bay, with the tidal volume of the main channel estimated at 250,000,000 m^3 at mid tide.

The catchment of the Fitzroy River is the largest catchment discharging to the Great Barrier Reef Lagoon. Sediments and nutrients together with anthropogenic pollutants originating upstream in the catchment are discharged from the Fitzroy River into the Fitzroy Estuary andultimately into Keppel Bay and the Great Barrier Reef lagoon (see Figure 3).

It is clear from Figure 3 that the impact on water quality from the natural discharge of the Fitzroy River is a very significant factor in the existing condition of the Keppel Bay area and is the primary driver of siltation within Rosslyn Bay Boat Harbour and the reason for its relativelyfrequent dredging requirement.

Figure 3 - Landsat image of Fitzroy Estuary and Keppel Bay showing the plume of turbid water resulting from the 1989 flood event (Webster et al. 2006)

The Great Barrier Reef Marine Park Authority (GBRMPA) classifies the reef environments surrounding the broader Keppel Bay region as Coastal Southern Fringing Reefs. These systems are heavily influenced by episodic Fitzroy River flood plumes.

2.1.1 Sediment Deposition

The Rosslyn Bay Boat Harbour is in the Great Barrier Reef's High Nutrients Coastal Strip. Thisarea is characterised by muddy sediments with elevated nutrient content introduced from the neighbouring Fitzroy River catchment.

Within Keppel Bay, the concentration of total suspended solids is highly variable in both space and time. However, in general, the distribution of areas with high total suspended solids (TSS) tends to follow the distribution of bottom sediments with a high proportion of mud. These areas include the mouth of the Fitzroy Estuary, and the shallow foreshore along the western side of Keppel Bay extending north past Rosslyn Bay. The western side of Keppel Bay is relatively shallow and subject to waves from the east and south-east. These wave currents, combined with background tidal and wind currents, resuspend sediment into the water column. In addition, turbid water from the mouth of the Fitzroy Estuary is moved north-west to the western side of Keppel Bay by the prevailing currents (*Webster et al* 2006). Sediment transport modelling by BMT WBM (2012) consultancy confirms these trends.

Fine sediments, or fine silts and clays with a particle size < 63 µm, are the greatest contributors to turbidity, as they are readily suspended by currents within the bay and have relatively slow settling rates. Coarser sandy sediments (> 63 µm) are not easily suspended, settle relatively quickly, and consequently do not contribute so much to turbidity. *Webster et al* (2006) indicates that estimates of silt and clay delivery to Keppel bay from the Fitzroy River vary between 1.86 Mt per year and 10.47 Mt per year. From historical sedimentation records, it has been estimated that an average of 0.47 Mt per year of silt and clay have been deposited in Keppel Bay west of the Fitzroy River (*Webster et al* 2006).

This data confirms that the Fitzroy River plays a significant role in the existing Keppel Bay environment and is the primary source of sedimentation in Rosslyn Bay Boat Harbour given the harbour has no erodible catchment of its own. The shallow geography of Keppel Bay combinedwith significant sediment input from the Fitzroy River result in dominant wind, tide and wave conditions generating significant suspension of fine sediments into the water column. These typical conditions allow substantial volumes of fine sediment to enter the harbour and the calm conditions within the harbour facilitate the siltation process that drives the ongoing need for maintenance dredging.

Given the above processes, the most appropriate management measure is to return the uncontaminated sediment back to the coastal system from where it was sourced. This strategydoes not increase the sediment load within the Keppel Bay system - rather it maintains a condition consistent with Rosslyn Bay without a boat harbour that catches the sediment.

Previous modelling and monitoring outcomes show that the dredging and placement activity does not impact on sensitive receptors. Modelling in 2012 showed that for the placement of 120,000 m^3 of material to the offshore site, the resuspension process which occurs during highwind and wave events resulted in a very minor increase against background levels. Subsequent monitoring in 2012-13 and 2016 supported this prediction with it not being possible to quantify resuspension impacts against background levels. For the above reasons, MSQ's strategy going forward is to focus on data collection to better understand the resuspension and redistribution processes from the placement ground in order to guide future dredging works.

The long-term strategy going forward is to test the sediment to ensure it is clean, then place itback into the coastal system which it was sourced in the best way possible to minimise the impact of the redistribution process back to natural sediment flux levels.

2.1.2 Aquatic Habitats in Rosslyn Bay

Although the boat harbour is excluded from the GBRMP, the surrounding waters are within its boundary and a range of marine habitats have been identified in the wider Keppel Bay Region.

The specific characteristics of these habitats surrounding the dredging and disposal areas have been described in detail by GHD (2005). Sub-tidal habitats near Rosslyn Bay Boat Harbour and the disposal area consist primarily of soft sediments that provide habitat for benthic epifauna and infauna (GHD 2006). Epiflora and fauna at the spoil disposal area are characterised by soft coral communities and infaunal communities by annelid worms and arthropods (GHD 2006). In 2005, the infaunal community at the disposal ground was considered to be healthy and diverse, despite spoil having been disposed there since 1987 (GHD 2006).

Potential sensitive habitats near the boat harbour and existing spoil ground primarily include saltmarsh, mangrove and seagrass. Fringing reefs at Bluff Rock and Wreck Point, south and north of the harbour

respectively and a couple of kilometers from the disposal site (Figure 1), have also been identified as receptors for consideration.

The modelling and previous monitoring of dredging campaigns all concluded that the receptor sites of Bluff Rock and Wreck Point were too distant from the disposal site to be impacted by the dredging and placement works for dredging, even for dredging volumes up to 120,000 m^3. The 2012 Modelling of re-distribution trends from the placement site indicated a minor increase above background conditions for turbidity and sedimentation. Monitoring in 2012 during the summer dredging campaign reflected the modelling predictions with the control site 11 km south of the site reflecting the same turbidity trends as the receptor sites.

The 2012 model (BMT WBM, 2012) was calibrated against two monitoring datasets and included sediment and freshwater input from the Fitzroy River, providing a model that accurately reflects coastal processes that deliver sediment to Rosslyn Bay Boat Harbour and the background sediment transport processes in Keppel Bay. The model showed that the prevailingwind, tide, wave and freshwater input to Keppel Bay during the summer months result in significantly elevated background turbidity during this period (up to 200 NTU). This model prediction is supported by the field data collected by BMT WBM and Central Queensland University (CQU). The calibrated model also shows that the winter months as previously understood have lower background turbidity levels than in summer, however these turbidity levels are still quite high in comparison to other parts of the Great Barrier Reef. These results indicate that the aquatic habitats in Rosslyn Bay are accustomed to naturally high and variable turbidity levels.

2.1.3 Saltmarsh

There are saltmarsh communities to the west of the harbour within an extensive low-lying area.The proposed dredging method and location of the spoil disposal ground will not impact these communities.

2.1.4 Mangroves

There are some scattered mangroves immediately adjacent to the harbour dominated by the mangroves; *Avicennia marina*, with the occasional individual *Rhizophora stylosa* trees. This western foreshore of the Bay is relatively high energy, and mangrove communities are restricted to more sheltered areas in the lee of Rosslyn Bay headland and associated outcrops. Mangroves along this foreshore grow in a narrow band in relatively marginal habitat that is restricted by the tidal range and prevailing sediment characteristics. The proposed dredging method and location of the spoil disposal ground will not impact upon these adjacent mangrove communities.

2.1.5 Seagrass

Although seagrass has been identified within the offshore waters surrounding the Islands of Keppel Bay, inshore waters provide poor conditions for the establishment of extensive seagrass beds. Previous benthic biota surveys have only identified a small area of *Halophilaovalis* (~2 m^2) within the centre of the existing disposal area. Wider surveys of the disposal ground and adjacent reference sites failed to encounter additional seagrass.

2.1.6 Fringing Coral Reefs

There are 16 islands in Keppel Bay, and several prominent rocky outcrops. Many of these are surrounded by fringing coastal reefs, with most areas dominated by fast growing Acropora corals that extend into shallow waters. These species are particularly susceptible to thermal stress and bleaching (GBRMPA 2007). Reefs within the Keppel Bay region have been impacted by both flooding from the Fitzroy River 40 km to the south, and bleaching (GBRMPA2007).

The rocky reef environments of Bluff Rock and Wreck Point have been identified as the most appropriate trigger points in managing the dredging works given their susceptibility to potentialimpacts.

2.1.7 Mobile Marine Fauna

In addition to these specific habitats, there is potential for the dredging and disposal works to conflict with large marine fauna including dugongs, whales and turtles. Visual monitoring andoperating procedures have been developed to mitigate potential impacts.

3. Description of Works

For the 2022 campaign, it is estimated that MSQ may need to dredge up to 37,000 m^3.The final dredge volume for the project will be assessed on the difference between pre and post hydrographic surveys. A map of the area to be dredged is provided in Appendix A.

It is proposed to dispose the dredged material at the approved off-shore disposal site located 1.1 km north east of the Rosslyn Bay Boat Harbour entry beacon at 23° 9.13" South, 150° 47.8" East (GDA94 - Zone 56).

3.1 Proposed Dredging Methods

The Marine Park Permit requires a Cutter Suction Dredge with a pipeline to the disposal site, unless otherwise approved by GBRMPA. The dredging works for the 2022 campaign will be undertaken by this method, unless there is a strong justification to change this, and any change would need to be approved by GBRMPA.

3.1.1 Cutter suction dredge and pipeline

A cutter suction dredge is a non-propelled floating vessel. It consists of a combined pontoon structure of approximately 26m x 6.2m. The dredge contains a gravel pump driven by an onboard diesel engine. Material is dredged by the use of a hydraulically driven cutter head, onthe end of the dredge ladder, which is lowered to the seabed and while stirring/loosening the material, it is sucked into the pipeline and transferred to the disposal area through the pipeline.The dredge is positioned and manoeuvred via anchors and wires. This dredging method takes some time to establish and remove pipelines and the works are much more impacted by weather than the Trailing Hopper Suction Dredge (TSHD).

3.2 Dredge Area

The system allows for accurate and efficient dredging. The material disturbance and turbidity created at the dredge area is minimal as compared to other dredging methods as the majority of the disturbed material is immediately sucked into the pipeline and transferred to the disposal area. However, careful management is still required during spring ebb tides where turbid water may escape the harbour.

3.2.1 Disposal Site

The discharge pipeline will be positioned below the water surface to ensure sediment dischargeas close as practical to the seafloor at the disposal site and moved periodically to spread the material to gain the required finish levels. Because the dredged material is placed down in the water column, it will result in less turbidity in the visual upper parts of the water column.

The transfer of sediment from the dredge area to the disposal area will be via a continuously sealed pipeline. This removes any impact from the sediment in between the dredge and disposal areas. The continuous placement of sediment does however generate slightly larger impact footprint than a Trailing Hopper Suction Dredge (TSHD), but this footprint is still very localised.

3.3 Dredging Methodology

The dredge positioning will use a combination of Differential global positioning system (DGPS) and manual markings with depths manually checked to accurately dredge within the dredge area and monitor progress. In channelareas, the dredge will be positioned on one side of the channel and swing across the channel to dredge that area. This means that other vessels will be able to pass the dredge on each swing back to its side of the channel.

For most areas within the harbour, dredging will not be affected by the weather. Dredging of theentrance channel may be affected at times when prevailing winds or swells create conditions too rough for the dredge to operate. In most cases when this occurs, the dredge will be relocated to amore sheltered area so dredging can continue.

The dredge operates at a very slow swing speed and continually operates in the one area (does not traverse long runs like a THSD). The dredge crew will undertake visual monitoring for mobile marine fauna as detailed in Table 4.1. Due to the distance from the dredge areas to the disposal area, a booster pump will be required. The booster will likely be located towards the end of the eastern breakwall. The booster will consist of a diesel engine and fuel tank with the pump direct coupled to the engine but immediately outside the container. The booster fuel tank shall be bunded to avoid hydrocarbon spills and a detailed refuelling procedure for the booster pump and dredge will be provided in standard procedures documents to avoid spill events.

The discharge pipeline will be a combination of polyethylene and flexible rubber pipe fitted as required. A floating pipeline of approx 80m will be attached to the rear of the dredge to provide manoeuvrability. The remaining pipeline will be submerged and rest on the seabed. The pipeline will be laid over the rock wall where it accesses the booster.

Dredging is to be undertaken Monday to Saturday only.

The dredge, large workboat and onshore plant will be equipped with emergency spill cleanup kits. Detailed procedures as to reporting and steps to control the discharge will be included in the Oil Pollution Emergency Plans in standard procedures documents.

The Emergency Strategy to be implemented by the contractor should a cyclone threaten the site will be defined in the dredge contractor's standard procedures documents.

3.3.1 Disposal Methodology

The pipeline from the booster to the discharge area will be submerged and rest on the seabed. A flexible section near the end will allow for transition to a floating discharge pontoon and for manoeuvring of the discharge outlet. The discharge will consist of a small pontoon with the pipe discharge end attached under the pontoon.

The pipeline outlet shall be anchored and positioned using DGPS and moved intermittently tospread material evenly across the site. Periodic soundings or surveys will be undertaken to monitor the build-up of material in the disposal area.

Periodic inspection of the pipeline will be undertaken by the dredge contractor and maintenance carried out to ensure itsintegrity between the dredge and the placement area.

3.4 Potential Dredging Risks

Given that the same areas will be dredged and used for disposal as have been historically used, the risks are well understood, and effective management measures have been developed. The large dredging project undertaken in 2012-13, which used predictive modelling that was supported by the associated detailed monitoring program, further supports confidence in the understanding of the long-term management of the site. Based on this knowledge the long-term management and monitoring strategy has been developed.

The primary risks associated with dredging of Rosslyn Bay Boat Harbour and offshore disposalrelate to:

1. Seabed disturbance including:
    a. the physical removal of the substrate and its associated flora and fauna from the dredge site; and
    b. the smothering of the seabed at the dredge spoil placement site.

(*Note:* These impacts are unavoidable in order to carry out the approved works so are accepted impacts, given any habitat developed at these sites has recovered from multiple previous disturbances).

2. The suspension of fine sediment in the water column which can form plumes ‘down current’ of the harbour and the spoil disposal area, as a result of dredging and placementworks, and the resulting blanketing and water quality impacts from the settling of sediment in the plume areas. (Modelling predictions have been validated by 3 monitoring events with placement up to 120,000 m^3, showing that impacts during the dredging and placement works do not impact sensitive receptors).
3. The re-suspension of fine sediment from the disposal site and the potential for blanketing and water quality impacts on sensitive areas.
4. The possibility of contaminants in some of the sediment to be released at the disposal site. While

historical sediment sampling campaigns show that material dredged from Rosslyn Bay Boat Harbour is suitable for unconfined ocean disposal, there remains a risk that future material may not meet these requirements if it were not to be tested. For this reason, MSQ is having the sediment tested again under the requirements in the *National Assessment Guidelines for Dredging (2009)* for the 2022 dredging.

5. Translocation of marine pests on dredging plant / machinery. (MSQ uses small local vessels that rarely travel outside of Australian Waters so this risk is extremely low, but procedures for this have been prepared in any case.)
6. Marine incidents involving vessels, oil or fuel spills, collisions with large marine fauna, or spillage/leaks of material in transit to the disposal site.

3.5 Stakeholder Consultation

Following approval of MSQ's Long-Term Management and Monitoring Strategies and the subsequent issuing of a ten-year maintenance permit, MSQ created a Technical Advisory and Consultative Committee (TACC) in which to consult with appropriate stakeholders for the 10-year duration of our management strategy to ensure continuous improvement.

The TACC membership is intended to be made up of the following:

- GBRMPA Representative
- DES Representatives
- DAF Representative
- MSQ Harbour Master Representative
- MSQ (Maritime Assets & Infrastructure) Representatives
- If available, two representatives from the Local Marine Advisory Committee

MSQ last held a TACC meeting and also presented to the local marine advisory committee (LMAC) in 2019 prior to the proposed maintenance dredging campaign. The history and monitoring outcomes of the Rosslyn Bay Boat Harbour dredging was discussed, along with further background on coastal processes and modelling predictions.

A TACC meeting will be held in early 2022 as part of the planning associated with the upcoming dredging campaign. The meeting will discuss the outcomes of monitoring and review after the 2019 dredging as well as the proposed dredging works and the proposed monitoring for the upcoming dredging. This EMP will be provided to the TACC to obtain their input prior to submission to GBRMPA.

Once approved, the final EMP document will be placed on MSQ's website for public information and contact details.

4. Review of 2019 Dredging

4.1 Water Quality and Benthic Monitoring 2019

FRC Environmental carried out both water quality monitoring and benthic monitoring of the 2019 dredging campaign. Monitoring was carried out before, during and after the dredging works.

The FRC report (FRC Environmental, 2019) will be provided to the 2022 TACC for information. The outcomes of the monitoring are summarised below.

4.1.1 Water Quality Testing

Results from the water quality testing throughout all events indicate there was no impact on nutrient concentrations at the sensitive receptor sites (Bluff Rock and Wreck Point) due to dredging activities. Post-dredging, the concentration of total nitrogen was similar at all sites, and less than or equal to the Water Quality Objective (WQO) at every site; and the concentration of total phosphorus was below the WQO at all sites.

There did not appear to be any impact on the concentration of any metal at the sensitive receptor sites (Bluff Rock and Wreck Point) due to dredging. Metal concentrations were below Australian and New Zealand Environment and Conservation Council (ANZECC) trigger levels at each site in every event, with the exceptions of copper and lead at the control site (Zilzie Point) during the first compliance event.

4.1.2 Compliance Monitoring

Monitoring confirmed the predicted models, with the plume from neither the dredge nor deposition site, significantly extending towards sensitive receptors.

Mid-campaign plumes extended up to 700 m from the dredge during ebb tides, but as this was recorded only approaching the turning of the tide, no remedial action was deemed necessary. A tear in the spoil delivery pipe caused dredging to cease for a number of hours on 13 August. Repairs were affected and no impact to water quality at the sensitive receptor sites was observed. Maximum recorded total suspended solids concentrations were 17, 25.6, and 70.2 mg/L at surface, mid, and bottom water respectively, decreasing rapidly with distance from the dredge. Conductivity, pH and temperature values at all sites were comparable with corresponding background levels.

4.1.3 Benthic Monitoring

4.1.3.1 Reef Monitoring

Reef monitoring was constrained by very low in-water visibility both pre- and post-dredging. Diver observations indicated that dredging had no discernible impact on either substrate character or floral and faunal community structure. No accumulation of fine sediment was observed post-dredging.

4.1.3.2 Benthic Infauna

Benthic community structure varied both temporally and spatially. Whilst soft-sediment benthic in-faunal communities typically exhibit significant temporal variation, an unavoidable change in sieve mesh size between events is likely to have contributed to the temporal variation observed. Analysis of spatial data strongly indicates that dredging had no discernible impact on either the abundance or structure of benthic invertebrate communities. The variation between impact and reference sites recorded post-dredging broadly reflected that recorded pre-dredging.

When considering species richness and diversity, impact sites showed comparable or greater diversity and richness than reference sites. While these indices decreased post-dredging, impact sites remained at least comparable with reference sites. Taxonomic groups that were most abundant pre-dredging (amphipods and polychaetes) continued to dominate the fauna post-dredging.

4.1.3.3 Particle Size Distribution in the Vicinity of the Disposal Site and at Lammermoor Beach

Multivariate analysis indicated that dredging had no significant impact on sediment particle size distribution either in the vicinity of the disposal site or at Lammermoor Beach.

4.2 Water Quality and Benthic Monitoring Review

TMR/MSQ has undertaken significant monitoring of potential dredging impacts since the commencement of dredging in Rosslyn Bay. The environmental monitoring of the 2019 dredging was undertaken utilizing strategies developed for the Long-Term Management and Monitoring Plan (LTMMP). Since development of this plan at the commencement of the current Marine Park Permit, significant additional monitoring work has been undertaken of subsequent dredging campaigns.

The LTMMP necessarily dealt with the uncertainties associated with site environmental processes which existed at the time by applying a conservative approach to monitoring tasks and frequencies. The program design identified that the monitoring program would be re-evaluated and updated as a better understanding of site environmental processes was obtained through direct measurement of outcomes.

As part of the continuous improvement program required under the LTMMP, following the 2019 dredging, TMR engaged KBR consultants to undertake a full review of past monitoring results and programs to recommend further improvements to the water quality and benthic monitoring programs, KBR completed this comprehensive review in November 2020. A copy of the full report is to be provided to the 2022 TACC to support their review of this EMP. The summary of changes to monitoring locations is in Figure 4.

KBR made the following conclusions:

- The results of the monitoring programs completed since 2006 show that dredging and dredged material disposal are not causing any adverse environmental impacts beyond the limit of the approved works.
- As site processes and the effect of dredging and dredged material disposal are now better understood and defined by measured data, it was concluded that the risk associated with a number of the potential impact mechanisms in the LTMMP which were previously of concern (prior to the collection of measured data) was low.
- This report recommended a number of refinements that would improve the efficiency of the monitoring program without exposing the environment to increased risk.

The revised monitoring program recommended by KBR is provided in Table 2.

Table 2 Revised monitoring program recommended by KBR

Monitoring task	Monitoring location	Parameters	Frequency
Visual plume monitoring	Visual inspection of turbid plume from the dredge and from vessels in the placement area.	Visual turbid plume (Visual plume to be kept within 500 m ofthe source)	Daily during dredging
Vessel based plume monitoring (WQB)	D1 – Transect along centre line of plume from harbour entrance south (Dredge area) *Interval distance along transect to be no less than 40m as determined by the specialist monitoring team*	Depth profile – surface, middle and bottom capturing the following parameters: Nephelometric Turbidity Units (NTU), Total Suspended Solids (TSS) (calculated)*	• Monitoring to occur on the first three days of dredging, then onceper month for three days for the duration of the dredging contract. • Monitoring is to be conducted during a spring tide period duringthe ebb tide.

Monitoring task	Monitoring location	Parameters	Frequency
	DS1 - Transect along centre line of plume from dump point (Disposal area) *Interval distance along transect to be no less than 40m as determined by the specialist monitoring team*	* *Collect and analyse a representative number of TSS samples to establish relationship between NTU & TSS*	• Trigger: NTU ≤ calculated 80th percentile baseline turbidity (seasonal) 500m from the dredge location **Confirm relationship between NTU & TSS*
Coral monitoring	Wreck Point 2 (WP2)	Underwater Dive Transects / Towed Camera Survey at each location, involving: • 4 x 25m long transects in shallow water (landward side of reef)	• Pre-dredge monitoring to be undertaken at all shallow water sites (WP, BR, ZP). • Do not conduct data processing or post dredge coral monitoring unless a turbidity exceedance of the calculated 80th percentile baseline turbidity value (seasonal), attributable to dredging or dredge material disposal, is recorded at a sensitive receptor during vessel-based plume transect monitoring. • If post dredge coral monitoring is required, it should be undertaken between one and two months after the completion of dredging. This monitoring is to be conducted at the same locations as the pre-dredge survey.
	Bluff Rock 2 (BR2)		
	Zilzie Point 2 (ZP2)		

The report concluded: "*Based on the outcomes of the extensive monitoring conducted to date, the proposed changes to the monitoring tasks would not compromise the effectiveness of environmental monitoring at Rosslyn Bay. The amendments proposed would retain the ability to identify adverse changes in the environmental conditions of the site as a result of dredging and dredged material disposal operations.*"

The report's recommendations have been incorporated into this EMP.

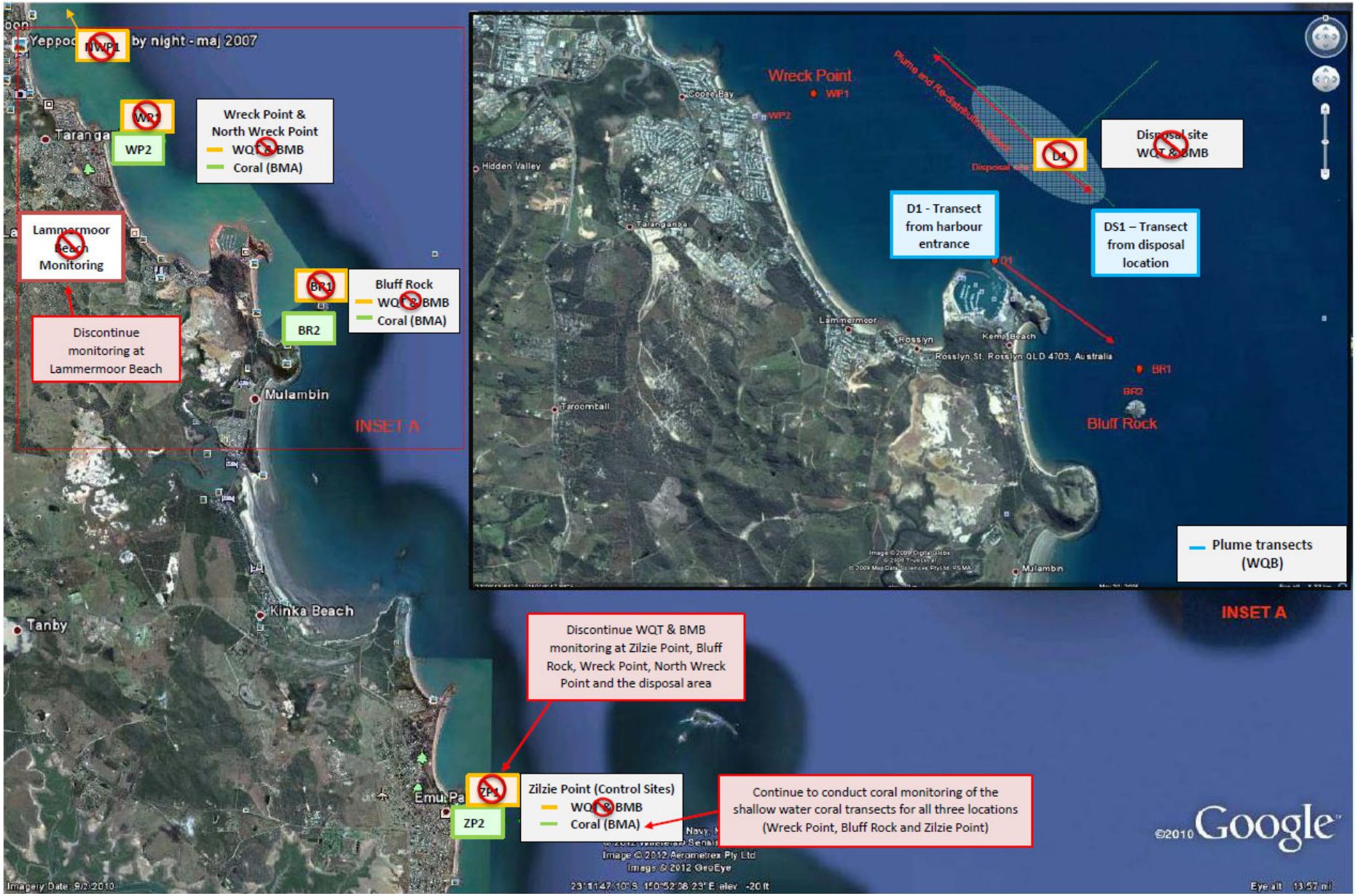

Figure 4 Proposed refinements to monitoring locations (figure amended from EMP, 2019 by KBR's report: Rosslyn Bay Boat Harbour Long Term Dredging Strategy - Water Quality and Benthic Monitoring Review, 13 November 2020).

4.3 EMP management strategies

This component of the EMP outlines mitigation strategies for the protection of specific environmental values that may be affected by dredging and disposal of dredged sediment.

Individual management strategies have been prepared for:

- Sediment characteristics
- marine flora and fauna
- water quality
- waste management
- spill response and emergency procedures
- air and noise.

The following parties have responsibilities under this EMP:

MSQ	MSQ (Maritime Assets & Infrastructure)
Superintendent	MSQ
Contractor	Appointed Dredge Contractor
MSQ environmental consultant	Environmental Consultant appointed by MSQ
ESS	Environmental Site Supervisor – GBRMPA/DES

Management strategies may be revised and updated based on experience. Any changes will be approved by approval agencies. It is intended that specific work instructions be prepared for staff and contractors as the details of dredging methods and conditions of approval for each project are finalised. The following management measures will be implemented to minimise these impacts.

4.3.1 Sediment Characteristics - Addresses Primary Risk 4

4.3.1.1 Objectives

To ensure material proposed to be dredged and placed at the offshore disposal site has similarphysical and chemical properties to the surrounding sediments in Rosslyn Bay.

To ensure the material proposed to be placed in the offshore disposal ground is free of contaminants.

4.3.1.2 Environmental Risk

Given Rosslyn Bay Boat Harbour has considerable boat traffic, boat maintenance facilities and a significant volume of hardstand parking area draining to the harbour, there is a risk although small that some of the sediment within the harbour could become contaminated.

4.3.1.3 Historical Sediment Quality

Sampling and Testing for the 2012 Dredging

Sediment composition comprised of silts and clays, with low Total Organic Carbon (TOC) levels. All metals except nickel were below NAGD screening levels. All Tributyltin (TBT), Mechanical-biological treatment (MBT), and Dibutyltin (DBT) concentrations were below NAGD screening levels.

Sediment was considered suitable for unconfined ocean placement.

Sampling and testing for the 2016 Dredging

Sediment was again tested for the 2016 dredging. Sampling and testing was undertaken by KBR. The testing found sediment composition comprised of fine grained sands, silts and clays, with low total organic carbon (TOC) levels. All metals except nickel were below NAGD screening levels. Nickel concentrations were below the NAGD Sediment Quality Guideline High (SQG-High) value, consistent with previous investigations. These concentrations are considered to be naturally occurring across the region.

Mean concentrations of total nitrogen and total phosphorus recorded as lower than previous results. No screening levels or guidelines available for nutrients in sediments.

Total Polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH) were below the NAGD screening levels.

TBT was recorded above screening levels at some locations, principally near the public boat ramp, however Phase III NAGD testing (pore water and elutriate testing) confirmed sediment was suitable for unconfined ocean placement.

Sampling and testing for the 2019 Dredging

Sediment was generally comprised of fine sediments and coarser sands. All metals were below NAGD guideline levels. Organotin and PAH compounds were below the Limit of Reporting values.

The sediment was classified as suitable for unconfined ocean disposal under the NAGD.

4.3.1.4 Sampling and testing for the 2022 Dredging

A Sediment Sampling and Analysis Plan (SAP) has been submitted to the GBRMPA as the basis for the sampling and testing program for the 2022 program. The SAP Implementation Report, which will detail the results of the sediment sampling and testing, will be submitted on completion to GBRMPA for approval.

Under Condition 11 of the GBRMPA Permit Number G16/38147.1, no works may occur within the Marine Park unless GBRMPA has approved both the SAP and SAP Implementation Report, with the testing demonstrating that the sediments are suitable for unconfined ocean disposal.

Table 3 Sediment Characteristics Assessment Strategies

Action	Responsibility
MSQ undertakes regular (every 1-2 years) hydrographic surveys to assess the volume of siltation in the navigational channels in order to plan for dredging campaigns. When siltation rates reach a level that require dredging and if no current sediment sampling results exists, a consultant will be commissioned to develop a Sediment Sampling Analysis Plan (SAP) for the extent of the proposed dredging area in accordance with NAGD (2009) in the event.	MSQ
MSQ will forward a copy of the SAP to GBRMPA for review andapproval prior to commencement of sampling.	MSQ
Subject to concurrence from GBRMPA on the content of the SAP, sediment sampling and testing will be undertaken and a report drafted on sediment characteristics. This report will assess the sediment in accordance with the NAGD (2009). Dredge material cannot be placed to the offshoresite unless it meets NAGD (2009) and the sediment analysis has been approved by GBRMPA.	MSQ's consultant

4.3.1.5 Performance indicators

Sediments must be suitable for ocean disposal in accordance with NAGD (2009).

4.3.1.6 Monitoring and reporting

A final sediment sampling report shall be provided to GBRMPA and DES prior to the commencement of each dredging campaign. All samples must have contaminant concentrations at levels low enough to be suitable for unconfined offshore placement in accordance with the NAGD (2009).

4.3.1.7 Corrective action/contingency plan

In situations where the performance criteria cannot be met, alternative disposal options must be utilised.

4.3.2 Marine Flora and Fauna - Addresses Primary Risks 2, 3 and 5

4.3.2.1 Objectives

To minimise direct and indirect disturbance to marine flora and fauna other than within theimmediate works areas.

To ensure turbid plumes from the works and re-suspension of material from the disposal site do not impact the ecological character and integrity of the adjacent sensitive receptors.

Gain further knowledge on impacts on marine flora and fauna associated with the resuspension process from thedisposal site.

4.3.2.2 Environmental Risk

The material dredged from Rosslyn Bay Boat Harbour is sourced from the adjacent coastal system in Rosslyn Bay and hence placement of this material back into the littoral system is notincreasing the sediment within the system. For this reason, the environmental risks of these works are broken down into the following:

1. Direct impacts on Marine Fauna from the dredging and disposal works.
2. Direct impacts at the dredge and disposal areas due to substrate removal andsmothering.
3. The potential for short-term impacts of plume transport from dredging and disposalactivities on sensitive receptors.
4. The potential for short/medium-term impacts associated with the re-distribution ofdredged sediment from the disposal site on sensitive areas.
5. Potential for marine pests to be introduced to site if using overseas vessels.

GHD (2006) identified no sensitive environments in the immediate vicinity of the proposed dredging and disposal works. Their investigations identified the sensitive fringing rocky habitats of Wreck Point and Bluff Rock (Iron Pot) as of most significance in the general vicinity of the works. Their monitoring and the 2012-13 monitoring also concluded that benthic epiflora and infauna within and immediately adjacent to the placement site recovered rapidly between dredging events. Monitoring undertaken by MSQ during the 2006, 2009, 2012-13, 2016 and 2019 dredging campaigns confirmed that these sites were not impacted by dredging and disposal works, and that the turbidity plume returned to background levels within 200 m of the disposal site. Given the above findings, risk item 3 has been shown to be negligible for the extent of works previously undertaken.

4.3.2.3 Dredging in the Harbour

BMTWBM (2012) modelling indicates that for the worst-case summer peak spring tides when turbidity is created by dredging (or excessive vessel movements), there is a potential for the associated plume to reach Bluff Rock at TSS levels between 5 and 10mg/l above background. The winter simulation indicates that such a plume would not reach Bluff Rock. Given summer conditions represent the period of highest natural turbidity and the time of exposure is very short, and because it takes the full extent of the tide to reach the site the extent of impact would be very small. The monitoring data from 2006 and 2009 indicated the model was generally overestimating the plume extent and the monitoring from 2012-13 did not show impacts at the Bluff Rock site logger as a result of plume release. However, monitoring did show that a visible plume did escape the harbour and was transported a significant distance towards Bluff Rock before the tide changed. Given the modelling indicated that for the worst-case tidal conditions the plume could just reach Bluff Rock and monitoring supported this prediction, then there is justification for further mitigation measures and monitoring to ensure this does not occur.

It is important to note that such a plume event that has potential to reach Bluff Rock only occurs in the worst-case scenario and would be very short lived, because the ebb currents driving the plume in the direction of Bluff Rock only last for a couple of hours. As the natural variability of water quality in the Bluff Rock area is high, the potential impacts from a short- lived, relatively low concentration turbidity plume are likely to be minor.

The volumes proposed for any dredging campaign will not change the impacts from the dredging site other than increasing the number of spring ebb events where dredging may beoccurring, due to the increased duration of the campaign.

However, this outcome indicates the need to install mitigation measures to reduce the release of plumes during these tidal conditions and undertake compliance monitoring to ensure that any potential impacts are being appropriately mitigated.

4.3.2.4 Dredge Material Placement Site

BMTWBM (2012) modelling was undertaken to assess the impacts of a 40,000m^3 dredging project, an 80,000 m^3 project and a 120,000 m^3 project starting in summer and winter at the disposal site. The modelling period extended for 12 months including the period for dredging works up to 120,000 m^3 and the remaining period modelled the continued redistribution process from the disposal site. Previous monitoring in 2006 and 2009 indicated that for a dredged volume of up to 31,000 m^3, plume impacts (associated with the placement process) above background were contained within 100m of the disposal site. The 2012 modelling indicated for a summer commencement of the dredging campaign, the material was redistributed faster than for the winter commencement. This resulted from the differing seasonal wave climate however, after the 12-month period, the resulting disposal site condition was very similar for both simulations.

Note: The 2022 dredging volume will be up to 37,000 m^3.

Both simulations showed that the sediment redistributed from the disposal site did not result in accumulation of sediment and associated smothering of areas outside the near vicinity of the disposal site (i.e. 1 mm of sedimentation extended a maximum of 300 m from the boundary of the disposal site for the worst case). The model trend was that the sediment when mobilised from the disposal site was dispersed rapidly by the dominant wave and current conditions returning to the littoral system at concentrations consistent with background fluxes. Once the material escaped the disposal site back into the coastal system, it behaved largely as it had before entering the harbour, moving in response to the natural forcing mechanisms. Given this outcome,the primary transport mechanism is away from Bluff Rock and hence no impacts are predicted for this site from disposal works. The redistribution process is north-north-west however the modelling indicates that the anthropogenic impacts of the placement at the disposal site and subsequent redistribution are not likely to impact Wreck Point. However, Wreck Point is the sensitive receptor with the highest potential for impacts and hence should be a focus for monitoring.

4.3.2.5 Risks Identified from the Modelling and Monitoring

1. The overall risks of dredging works of up to 120,000m3 are that there is a small potential for Bluff Rock to be impacted by turbidity from the dredging works escaping during peak spring ebb tidal flow. This does not present a significant risk given the much smaller volumes required for the 2022 dredging works, the small magnitude, and the short time period it could occur in. However mitigating measures and monitoring are still to be used to best manage this low risk.
2. Other than that, discussed above, the dredging and placement works themselves have been shown by modelling and monitoring results to date to be contained very locally to the works area and do not represent a risk to the sensitive areas.
3. Modelling did not predict significant impacts to the identified sensitive receptors resulting from the redistribution of dredged material from the disposal site and monitoring in 2012-13, 2016 and 2019 confirmed this prediction. The wind and wave events which apply sufficient forces to resuspend the placed material also resuspend the natural seabed as part of the natural sediment transport processes. This resulted in the potential impact sites showing the same turbidity/light trends as the control site. The outcome of the previous monitoring is that the impacts from redistribution are small as they cannot be clearly detected above background. However, going forward, MSQ wishes to continue to confirm the redistribution impact extent in order to keep improving environmental management in our long-term maintenance strategy.

Mobile marine fauna such as fish, dugong, turtles and cetaceans will generally avoid areas that are temporarily impacted by turbid plumes generated by dredging and spoil disposal activities. The dredging campaign will be

relatively short, therefore the impacts of any localised reduction in water quality will be temporary. There is little likelihood for substantial numbers of turtles, crocodiles, dolphins, whales and dugong to be present within the vicinity of dredging and ocean disposal activities. However, should these fauna be present during dredging, there is the potential for injuries to occur through individuals being disturbed or struck. In order to minimise this potential, visual monitoring will be undertaken by the contractor for the duration of the campaign.

Operational risks of the dredging program to marine mammals and reptiles and their associated mitigation measures are summarised below. More detailed strategies are given to protect dolphin, dugong and turtles, as it is considered that whilst the risk is low, these are the most likely to be encountered. The risk management strategy is underpinned by a constant visual monitoring of the water area surrounding the dredge for the presence of marine mammals and turtles. Any injured marine mammals or turtles will be reported immediately to the Department of Environment and Science (DES) Hotline - Ph:1300 130 372 (Option 1).

4.3.2.6 Reporting

The contractor is to record any observed cetaceans in the dredge log outlining date, time and general location.

Table 4 Marine Fauna and Flora Management Strategies

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
General					
				Maintain the extent of the turbidity plumes close to the dredging and disposal areas to minimise impacts on marine fauna habitat.	**MSQ & Contractor**
				Visually observe for large marine fauna such as dugong, whales, crocodiles or turtles in the works areas. Follow procedures below, and as directed by ESS.	**Contractor**
				In the event that a marine mega-fauna is injured, adopt procedures outlined in Section 4.8.6.	**Contractor**
				If the death of a listed species is suspected to have occurred in or near the works area, adopt procedures outlined in Section 4.8.6.	**Contractor**
				Inspect dredge hull and niche areas of vessel for marine pests prior to travelling to site if vessels from outside Australia are to be used. A vessel inspection report is to be provided to the Managing Agency prior to vessels establishing to site in this case.	**Contractor**

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
Cetaceans/Dolphins					
Dredging	Interaction between Cetaceans and dredge head	Very Low	Cetaceans likely to temporarily move away from dredge area at commencement of works	• An observation zone extending no less than a radius of 300 metres around the in-water works is established, and monitored by a Marine Mammal Observer during all works; • In-water works shall not commence if marine mammals or protected species are sighted within the observation zone based on a minimum pre-works observation time of 20 minutes and ongoing monitoring during works; • "soft start" of works shall commence at least 10 minutes prior to the operational use of dredge; • In-water works shall cease if a marine mammal or protected reptile is observed within the observation zone; • In-water works shall not recommence until the marine mammal or protected species sighted within the observation zone is observed to leave the observation zone, or is not sighted for at least 20 minutes.	Contractor
	Noise associated impacts	Very Low	Noise associated with dredging activities is typically constant rather than intermittent. Noise generated by dredging is likely to be at low frequency due to the nature of the seabed and dredging equipment.	None	Contractor

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
	Physical injury of dolphins due to vessel strike	Very Low	Dolphins are highly mobile and are commonly observed bow riding marine vessels	None	Contractor
	Separation of pod / younger animals	Very Low	Dolphins are highly mobile and are commonly observed bow riding marine vessels	None	Contractor
	Physical injury of dolphins during disposal of dredge spoil	Very Low	Dolphins are highly mobile and are likely to move away during spoil disposal	Delay spoil disposal if dolphins are in the area.	Contractor
	Reduction in food availability	Very Low	Fish stocks are mobile and although they may move from the immediate works area, are expected to return upon cessation of works.	None	Contractor
	Changes to water quality	Very Low	Turbidity-associated changes to water quality with dredging / disposal activities are likely to have little impact on dolphin populations. Increased turbidity may lead to increased predation on fish by dolphins.	None	Contractor

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
Dugongs					
Dredging	Interaction between dugong and dredge head	Very Low	Dugongs are unlikely to occur in the proposed dredging area due to sparse seagrass cover in this area	Same strategy as "Interaction between Cetaceans and dredge head" above.	Contractor
Dredging	Noise associated impacts	Very low	Dugongs are less acoustically sensitive than dolphins. Noise associated with dredging activities is typically constant rather than intermittent. Noise generated by dredging is likely to be at low frequency due to the nature of the seabed and dredging equipment.	Same strategy as "Interaction between Cetaceans and dredge head" above.	Contractor
Dredge under steam to / from spoil ground	Physical injury to dugong due tovessel strike	Very Low	Dugong mobile and are likely to move away from vessel	Vessel to slow down if dugongs aresighted in transit to / from the spoil disposal site.	Contractor
Dredge under steam to / from spoil ground	Separation of mother and calf	Very Low	Few dugong are expected to occur in the areaas seagrass cover is sparse across the dredging and disposal sites.	Vessel to slow down if dugongs aresighted in transit to / from the spoil disposal site.	Contractor
Dredging / spoil disposal	Physical injury due to disposal operations	Very Low	Dugongs are unlikely to occur in the proposed disposal area, due to low abundance of seagrass. Dugongs are mobile and are likely to move away	None	Contractor

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
			from vessel		
Dredging / spoil disposal	Degradation of feeding grounds	Very Low	Seagrass cover is sparse within proposed dredging and spoil disposal area. Halophila ovalis (the dominant species of the study area) is a colonising species and is expected to quickly re-colonise disturbed areas.	None	Contractor
Turtles					
Dredging	Interaction between turtle and dredge head	Moderate	Turtles are unlikely to occur in proposed dredging area due to lack of habitat and food sources in this area. The cutter suction dredge is two pontoons with a suction pump between that inches forward in a sweeping motion. This process occurs so slowly that it does not present a risk to turtles unlike a trailing arm Hopper Dredge (TSHD) that is underway where TED's are typically required.	Same strategy as "Interaction between Cetaceans and dredge head" above except observation zone is 50 m.	Contractor
Dredging	Noise associated impacts	Very Low	Turtles are not acoustically sensitive.	None	Contractor

Taxa and Operation	Risk	Likelihood of Risk	Justification	Risk Mitigation Strategy	Responsibility
Dredge under steam to / from spoil ground	Physical injury to turtles due tovessel strike	Moderate	Turtles are susceptible to boat strike. However, the dredge will be moving relatively slowly when compared to other boats in the area.	Vessel to slow down if turtle are sightedin transit to / from the spoil disposal site.	Contractor
Dredging / spoil disposal	Physical injury due to disposal operations	Low	Turtles are mobile and likely to move away from the area	None	Contractor

4.3.3 Performance indicators

Physical disturbance to the substrate does not extend beyond the footprint of the dredgingarea shown on permit applications.

Physical disturbance (smothering) at the disposal site to be contained within the areapredicted by the modelling.

No marine fauna incidents.

Sightings of rare, endangered, and threatened animals likely to be impacted by the works are reported to the Superintendent and the ESS.

4.3.4 Monitoring and reporting

All sightings of rare, endangered and threatened animals including marine mammals, turtles and crocodiles, which could possibly have been impacted by the works, will be recorded and reported to the Superintendent, who will forward details to the DES and the ESS.

Pre and post Hydrographic surveys to be undertaken to confirm dredging area and extent ofchanges at disposal site and surrounding areas in accordance with modelling outcomes.

A program of benthic monitoring is to be undertaken in accordance with Table 12 to assess potential impacts and extent of impacts from resuspension and recovery.

These reports shall be provided to GBRMPA or DES within 60 days following the completion of the monitoring program.

4.3.5 Corrective action/contingency plan

All incidents involving flora or fauna are to be reported to the Superintendent and the ESS.

Dredging outside of approved areas is a breach of approval conditions and shall be reportedto the Superintendent and the ESS and remediation works shall be undertaken to the satisfaction of approval agencies.

Disposal of material outside the designated disposal site is a breach of approval conditionsand shall be reported to the Superintendent and the ESS and remediation works shall be undertaken to the satisfaction of approval agencies.

4.4 Water Quality

The *Water Quality Guidelines for the Great Barrier Reef Marine Park (2010)* indicate the need for the following framework:

- Identify Environmental Values
- Set Water Quality Objectives
- Put in Place Monitoring and Assessment Programs
- Management Response based on outcomes

MSQ's previous long-term dredge strategy identified the fringing rocky reefs of Wreck Pointand Bluff Rock as Environmental Values of most concern and susceptibility in the vicinity ofthe dredging and disposal works. For this reason, MSQ has maintained the focus on these elements.

The GBRMP WQ guidelines specify the following measurement parameters: Water Clarity,Suspended Solids, Sedimentation and Contaminants. Historical and current sediment sampling events (2000, 2005, 2009, 2011, 2015 and 2019) have shown that the dredge material is suitable for offshore placement in accordance with the NAGD (2009). Sediment is being tested again in 2022 for the current dredging program. Disposal of sediment in the Marine Park cannot occur without GBRMPA's approval of the SAP and SAP Implementation Report and the material is demonstrated by the testing to be suitable for unconfined ocean disposal.

Significant background Water Quality monitoring effort has occurred to define appropriate impact trigger levels at the sensitive receptors. In addition, historical monitoring events in 2006, 2009, 2013, 2016 and 2019 verify modelling predictions that water quality impacts are localised and do not present a risk to sensitive receptors.

Periodic water samples will also be collected prior to, during and following the dredging project and tested for heavy metals and nutrients as a second verification. MSQ plans to undertake 2 vessel-based compliance monitoring campaigns during the 2022 dredging event in which to confirm past monitoring outcomes associated with the localised impacts from the dredging and placement. In the very unlikely event trigger values are exceeded at either of the sensitive sites as a result of the dredging or placement, then more intensive monitoring works will be implemented as outlined in this section to ensure sensitive receptors are not impacted. The implementation of more intensive monitoring will occur in consultation with the ESS and DES.

Modelling and previous monitoring indicates that there is a potential for a plume to just reach Bluff Rock during peak spring ebb tides from dredging works (escaping the harbour)however if it was to occur, it would be very short lived. Although this presents a very low risk of environmental impact, it could be perceived negatively by the community. For this reason and to mitigate these risks, **entrance channel dredging works are NOT to occur during peak spring ebb tide flows** to reduce the potential for plume transport from the harbour towards Bluff Rock.

In the event the plume associated with the dredging or placement extends (i.e. above background levels) beyond 500m from the source, dredging works are to be altered to reducethe plume extent. If the plume extends to the identified sensitive sites and creates turbidity levels above the 80th percentile for that season for four consecutive 3 hour readings, the dredging works are to cease until background conditions are returned. If this occurs then higher intensity monitoring works (as per section 5.2) will be undertaken for the remaining dredging project.

Using the available data in accordance with the Queensland Water Quality Guidelines, the80th percentile exceedance has been calculated which are being used for both potential impact sites (see section 5.2). MSQ intends to use TSS as the main compliance trigger forimpacts at the two sensitive receptors. However as indicated, during the five past monitoring events, no impacts have been identified and hence are very unlikely during this small scale dredging campaign.

4.4.1 Objective

To provide protection to the biological integrity of waterways adjacent to the work site.

4.4.2 Environmental Risk

BMT WBM (2012) undertook a modelling investigation to assess the following potential impacts based on dredging projects of 40,000m^3, 80,000m^3 and 120,000m^3 in summer and winter:

1. Extent of turbidity impacts from the dredging in the harbour;
2. Extent of turbidity impacts from the disposal of dredged material; and
3. Extent of re-suspension impacts of material from the disposal site.The results of this investigation are detailed in BMT WBM (2012).

GHD (2006) identified no sensitive environments in the immediate vicinity of the proposeddredging and disposal works. Their investigations identified the rocky reefs of Wreck Pointand Bluff Rock (Iron Pot) as of most significance in the general vicinity of the works.

Monitoring undertaken by MSQ during the 2006, 2009, 2012-13, 2016 & 2019 dredging campaigns confirmed that these sites were not impacted by dredging and placement worksfor dredging volumes up to 120,000m^3 and that the plume returned to background levelswithin 200m of the disposal site. The dredging volume for 2022 is only up to 30,000 m^3.

Although ASS testing is included in the detailed sediment sampling and testing being undertaken, the *National Assessment Guidelines for Dredging* indicates that the disposal of sediments classified as containing ASS in the open marine environment is unlikely to significantly alter the acidity and release of quantities of metals to the extent that water quality guideline values are exceeded due to the extensive

volume and pH buffering capacity provided by seawater. In addition, the proposed methodology of using a cutter suction dredge and pumping the material through a pipeline to the disposal ground with underwater discharge ensures there is no possible exposure of the sediment to oxidization from air contact. Consequently, there is minimal risk of impacts from ASS and no further controls are deemed necessary.

4.4.2.1 Dredging in the Harbour

BMT WBM (2012) modelling indicated that for the worst-case summer peak spring tides, there is a potential for the associated plume to reach Bluff Rock at TSS levels between 5 and10 mg/l above background. The winter simulation indicates that such a plume would not reach Bluff Rock. The monitoring data from 2006 and 2009 indicates the model is generallyoverestimating the plume extent so for this reason can be considered a worst-case potential.

It is important to note that such a plume event that has potential to reach Bluff Rock only occurs in the worst-case scenario and would be very short lived, as the ebb currents drivingthe plume in the direction of Bluff Rock only last for a couple of hours. As the natural variability of water quality in the Bluff Rock area is high the potential impacts from a shortlived, relatively low concentration turbidity plume are likely to be minor, however monitoring is being undertaken to further confirm that impacts are not occurring.

From previous monitoring campaigns, potential impacts can be further mitigated by avoiding dredging near the harbour entrance during peak ebb spring tidal flows.

4.4.2.2 Dredge Material Placement Site

BMT WBM (2012) modelling was undertaken to assess the impacts of a 40,000m^3 project,an 80,000m^3 project and a 120,000m^3 project starting in summer and in winter at the disposal site. The modelling period extended for 12 months including the period for dredging works up to 120,000m^3 and the remaining period modelled the continued redistribution process from the disposal site. Previous monitoring in 2006 and 2009 indicated that for a dredged volume of up to 31,000m^3 plume impacts above background were contained within 100 m of the disposal site. The 2012-13 modelling indicated for a summer commencement of the dredging campaign; the material was redistributed faster than for the winter commencement. This resulted from the differing seasonal wave climate however, after the 12-month period the resulting disposal site condition was very similar for both simulations.

Both simulations showed that the sediment redistributed from the disposal site did not resultin accumulation of sediment and associated smothering of areas outside the near vicinity of the disposal site (that is, 1mm of sedimentation extended a maximum of 300m from the boundary of the disposal site for the worst case). The model trend was that the sediment when mobilised from the disposal site was dispersed rapidly by the dominant wave and current conditions returning to the littoral system at concentrations consistent with background fluxes. Once the material escaped the disposal site back into the coastal system, it behaved largely as it had before entering the harbour, moving in response to the natural forcing mechanisms. Given this outcome, the primary transport mechanism is away from Bluff Rock and hence no impacts are predicted for this site from resuspension from disposalsite. The redistribution process is generally north-north-west however the modelling indicates that the anthropogenic impacts of the placement at the disposal site and subsequentredistribution are not likely to impact Wreck Point. However, Wreck Point is the sensitive receptor with the highest potential for impacts from redistribution from the disposal site and hence is the main focus of monitoring.

4.4.2.3 Risks Identified from the Modelling

The overall risks of dredging works of up to 120,000m^3 are that there is a small potential for Bluff Rock to be impacted by turbidity from the dredging works for the worst-case peakspring ebb tidal flow.

Within the near vicinity of the disposal site the redistribution process is predicted to elevateturbidity levels. Therefore, the extent of impact in this area needs to be assessed. Previous impact assessments indicate that areas in the near vicinity of the disposal ground were not significantly impacted by the redistribution process between dredging events. This is likely due to the impacts being short-term and temporary, with background turbidity levels likely returning soon after the completion of disposal.

Modelling does not predict impacts to water quality at sensitive receptors (Bluff Rock and Wreck Point) resulting from the placement and redistribution of dredged material at the disposal site however monitoring is continuing to further confirm this, with the focus on theredistribution processes.

4.4.2.4 Additional Risks Identified from Previous Dredging Campaigns

An additional risk to water quality identified from the 2019 dredging is from leak or failure of the pipeline that could result in an uncontrolled discharge of a sediment plume. This risk can be minimized through a high standard of maintenance of the pipeline and frequent inspections of the pipeline, Table 5.

Table 5 Water Quality Management Strategies

Action	Responsibility
Undertake monitoring as detailed in Section 4.2.	MSQ Consultant/Contractor
No dredging near the harbour entrance during peak spring tideebb flow events to reduce the escape of plumes from the harbour.	Contractor
Ensure a high standard of maintenance of the discharge pipeline to prevent leaks. Undertake frequent inspections of the pipeline for early detection of pipeline integrity issues.	Contractor
Ensure safe and effective fuel, oil and chemical storage andhandling.	Contractor
Contain any fuel, oil or chemical spills and clean up immediately.	Contractor
Ensure dredge material is placed within the disposal area via the positioning of the pipeline outlet via DGPS and checking thelocation with GPS twice a week and immediately after significant weather events.	Contractor
Ensure dredge material is spread over the disposal area to avoid mounding.	Contractor
Alert Level If the visible dredge plume extends beyond 250 metres from either the dredge site or disposal site, undertake more frequent visual monitoring of the plume and investigate options to reduce the plume. Record plume distance in daily performance logs.	Contractor
Trigger Level If the visible dredge plume extends beyond 350 metres from either the dredge site or disposal site, dredging works are to be altered to reduce the plume extent. Actions taken are to be recorded.	Contractor
Licence Limits Ensure the dredge plume does not extend beyond 500 metres of either the dredging site or the disposal site. Temporarily cease dredging if necessary to ensure the limit is not exceeded.	Contractor
If the plume extends to the identified sensitive sites and creates turbidity levels above the 80th percentile for that season for four consecutive 3 hour readings, the dredging works are to cease until background conditions are returned. If this occurs then higher intensity monitoring works (as per section 5.2) will be undertaken for the remaining dredging project.	Contractor / MSQ

4.4.2.5 Performance indicators

1. the requirements of Section 4.8 of this EMP have been satisfied
2. compliance with the “Spill Response & Emergency Procedures” Strategy
3. monitoring extent of plume impact does not extend to sensitive receptors
4. satisfactory results of EMP implementation audits.

4.4.2.6 Monitoring and reporting

The results of the monitoring program will be available to the Contractor, ESS, MSQ, DES and GBRMPA throughout the dredging campaign on request and the final monitoring report will be provided to DES and GBRMPA within 60 businessdays of the completion of any monitoring program.

4.4.2.7 Corrective action/contingency plan

1. In the event of Non-Compliance, the response will be as per section 5.2
2. Adopt procedures outlined in Section 4.8.6 Incident and Non-ConformanceReporting.

4.5 Waste Management

4.5.1 Objective

To minimise the production of waste and ensure waste that is produced is stored anddisposed of lawfully.

4.5.2 Environmental Risk

All MSQ contractors are required to manage waste in accordance with Environmental Protection Policy (Waste) and for this reason environmental risk associated with wastemanagement is low.

Table 6 Waste Management Strategies

Action	Responsibility
On vessels, allocate areas for solid and liquid waste storage. Waste will not be stored outside these areas. Any waste fuels, oils or other chemicals shall be collected in separate drums andtransported to an approved facility for disposal	Contractor
If wastes listed as ‘trackable wastes’ are handled or transferred, documentation in accordance with Environmental Protection Policy (Waste) will apply (refer EPP Waste).	Contractor
Waste will be removed from vessels and disposed of at an approved facility.	Contractor
Housekeeping procedures, including spillage control, will be implemented to minimise the generation of waste.	Contractor
All waste awaiting disposal will be stored appropriately	Contractor

4.5.2.1 Performance indicators

1. Appropriate waste receptacles are on board.

2. All waste is disposed of lawfully.

4.5.2.2 Monitoring and reporting

A record/manifest will be maintained for general and regulated waste disposal.The manifest shall record the type of waste, and the point and date of disposal.

4.5.2.3 Corrective action/contingency plan

Failure to meet the performance criteria shall be recorded as a non-conformanceincident and be dealt with in accordance with Section 4.8.6.

4.6 Spill Response and Emergency Procedures

4.6.1 Objective

1. To minimise the risk of spills or unplanned situations that might causeenvironmental harm.
2. To ensure that contingency measures are in place and implemented in the event ofsuch spills or unplanned situations.

4.6.2 Environmental Risk

All MSQ contractors are required to confirm Emergency Response Procedures, via trainingprior to the commencement of works and for this reason environmental risk associated withspill response and emergency procedures is low.

The Contractors vessels shall be equipped with suitable spill kits and will be operated in accordance with the Maritime Safety Queensland (MSQ) approved Oil Pollution EmergencyPlan.

In addition, MSQ have in store at the harbour comprehensive oil spillage equipment. This includes 195 m of 300 mm high fence boom, 250 m of absorbent boom, one mini skimmer with pump, anchor kit for boom, 10,000 litre portable tank and absorbent pads.

Table 7 Spill Response and Emergency Procedure Management Strategies

Action	Responsibility
All refueling is to be done by licensed fuel suppliers inaccordance with their Standard Operating Procedures.	Contractor
Refueling will take place at wharves suited to tanker access. In the event that it is necessary for the contractor to refuel vessels orplant in the works area, operations will be in accordance with industry standards.	Contractor
Provide a Construction Workplace Plan, prior to the commencement of any works.	Contractor
Maintain an Emergency Contact List with an up-to-date copyretained.	Contractor
Minimise the stored volumes of fuel, lubricants and oil in discrete containers on board vessels. When required they will be stored in a secure area and any spills will be cleaned immediately. Any visible or reasonably suspected fuel, lubricantor hydraulic fluid loss will be treated as an ‘incident’ and handled in accordance with Section 3.7.6.	Contractor

Vessel crew are to regularly check equipment for evidence ofleaks and fitness of hydraulic hoses and seals, and conduct maintenance or repairs as necessary to prevent drips, leaks orlikely equipment failures.	Contractor
For minor spills, provide spill kit including bilge socks, heavyduty absorbent polypropylene pads, floating booms and blowback refueling collars on vessels for use in the event a substance is spilled either on deck or to waters to handle a spillof up to 160 liters.	Contractor
For major spills, undertake actions as specified in the MSQ approved Shipboard Oil Pollution Emergency Plan. Contact Harbour Controller (phone 49336182 or mobile 0417728354 seven days per week) to access shore-based oil spill equipment.	Contractor
A register of Materials Safety Data Sheets (MSDS) relating to allhazardous substances on board, will be maintained	Contractor

4.6.2.1 Performance indicators

1. Documented procedures for emergency response are available and up to date.
2. All vessels carry response equipment appropriate to the level of risk. The kits arerestocked and accessible.
3. Staff has been trained in the use of the kits and in emergency response.
4. Contractor's Standard Operating Procedures for Refuelling available andimplemented.
5. No spills—if any spills do occur, they are effectively contained and cleaned up.
6. Incident reports accurately describe any spills and response actions.
7. A register of Safety Data Sheets for each chemical used on site is available.

4.6.2.2 Monitoring and reporting

The contractor will undertake audits which include:

1. ensuring that emergency response plans and equipment and materials are available, working and unobstructed.
2. ensuring firefighting equipment has been serviced when required.
3. updating the emergency response contacts list when required.
4. hazardous materials are appropriately stored; and
5. Safety Data Sheets are appropriate to the material stored.
6. If emergency response procedures are initiated, or any spills of hazardous materials occur, the action will be regarded as an incident and reported as described in Section 4.8.6.
7. Equipment that uses fuel, lubricants, and/or hydraulic fluid, will be inspected during scheduled maintenance for the condition of hoses, valves, seals and reservoirs.
8. Storage areas, containers, transfer hoses and valves for fuel/lubricants/hydraulic fluids will be inspected during maintenance.

4.6.2.3 Corrective action/contingency plan

1. Failure to meet the performance criteria shall be recorded as a non-conformance incident and be dealt with in accordance with Section 4.8.6.
2. In the event of a spill, the spill source will be immediately isolated, stopped and contained.

4.7 Noise and Air Quality

4.7.1 Objectives

1. To minimise the impact of dredging and disposal of dredged material on noise-sensitive receptors.
2. To minimise the impacts of the proposed dredging works on air quality.

4.7.2 Environmental Risk

Low, provided management strategies in Table 8 are followed:

Table 8 Noise and Air Quality Management Strategies

Action	Responsibility
Conduct all works during hours agreed by GBRMPA and DES prior tostart of dredging project No audible noise on Sundays or public holidays.	Contractor
Notify all nearby businesses and residences of the work hours and give apoint of contact for any questions or problems.	MSQ
Equipment will be maintained and operated to ensure that unnecessary noise or air emissions will be prevented in accordance with approvals in Appendix D.	Contractor
In the event that a complaint is received, the relevant details will berecorded on the Complaints/Query Report Form.	Contractor
All vessels are to be suitably maintained and fit for the work to be undertaken.	Contractor

4.7.2.1 Performance indicators

1. All nearby businesses are notified prior to commencement of the works.
2. Response to all complaints about noise or air quality issues initiated within 24hours of receipt.
3. Machinery is operating in a fit-for-purpose manner.

4.7.2.2 Monitoring and reporting

All complaints will be recorded on the Complaints/Query Report Form andreferred to MSQ.

4.7.2.3 Corrective action/contingency plan

1. Failure to meet the performance indicators shall be recorded as a non-conformance and will be dealt with in accordance with Section 4.8.6.
2. All complaints received will be investigated immediately, taking note of prevailing wind conditions and

noting any evidence that relates to the complaint.

3. Defective vessels are to be repaired prior to continuing work.
4. Changes to hours of work or dredging procedures should be considered ifpractical and potentially beneficial.

4.8 Environmental Management Plan Procedures

This component of the EMP establishes the procedures for implementation of the environmental management plan.

4.8.1 Responsibility and Implementation

No.	Procedure/Action	Responsibility
1.1	Amend/revise EMP document when required, gain GBRMPAsign off and supply a copy to any contractors to whom it is relevant and publish on MSQ website.	MSQ
1.2	Ensure satisfaction with the EMP and all conditions containedin all permits (Appendix D) that relate to the works.	Contractor
1.3	Oversee dredging and ensure compliance with the monitoring program.	MSQ / Superintendent
1.4	Conduct hydrographic surveys as needed.	Superintendent

4.8.2 Communication and Reporting

No.	Procedure/Action	Responsibility
2.0	Notifications to DES, GBRMPA and MSQ are to be madeas required prior to commencement and following the completion of works in accordance with approvals Appendix E	Superintendent/ MSQ
2.1	All project staff will heed any lawful direction by the Environmental Site Supervisor or any duly Authorised Officer of the State or Commonwealth. (The ESS can instruct the contractor to cease works and provide permission to restart works on environmental grounds).	Contractor/ Superintendent/ MSQ
2.2	Any actions required under the EMP procedures shall beduly documented.	Contractor/ Superintendent/ MSQ
2.3	Copies of dredge logs, dredge and placement locations, wind conditions and a summary of dredging progress shall be provided to the ESS on request.	Contractor
2.4	Copies of the field notes from the water quality monitoringwill be provided to the ESS on request.	MSQ
2.5	A final report following completion of the works will be forwarded within 60 business days to DES and GBRMPA.This report will include the items in Appendix F.	Contractor/MSQ /Superintendent

4.8.3 Documentation and Record Keeping

No.	Procedure/Action	Responsibility
3.1	Primary control of EMP document.	MSQ
3.2	Ensure the EMP and associated specific project instructions are readily accessible to personnel carrying out activities associated with dredging.	Contractor
3.3	Ensure records are maintained with respect to non-conformance and incidents, environmental training, complaints and results of any audits.	Contractor
3.4	Plant maintenance records are kept and used to program repairs and vessel/plant maintenance as required	Contractor

4.8.4 Environmental Awareness Training

No.	Procedure/Action	Responsibility
4.1	Ensure all personnel performing activities related to environmental management of dredging are trained, qualifiedand competent.	Contractor
4.2	Ensure all personnel performing activities are aware of their responsibilities under the EMP and all associated permits.	Contractor
4.3	Ensure all personnel performing activities have PPE and are trained in spill response and emergency procedure management strategies.	Contractor

4.8.5 Complaint Handling Procedures

No.	Procedure/Action	Responsibility
5.1	Main point of contact for complaints: provide a contact number to Contractor to refer complaints.	Superintendent
5.2	Ensure complaints are forwarded to MSQ representative.	Contractor
5.3	Upon receipt of a complaint, all relevant details will be obtained and documented on the Complaints/Queries ReportForm	Superintendent
5.4	All complaints responded to within 24 hours.	Superintendent

4.8.6 Incident and Non-Conformance Reporting

No.	Procedure/Action	Responsibility
6.1	In the event of an environmental incident, take immediate action to secure safe conditions and prevent further environmental harm, and then immediately notify the Superintendent, the Harbour Master and the ESS of the typeand extent of the incident. Details of the incident will be taken and provided to the ESS in accordance with Condition16, permit No. G16/38147.1 (see Appendix E)	Contractor
6.2	In the event of an environmental incident, details of the incident shall be recorded on the Environmental Incident/Non-conformance Report Form.	Contractor
6.3	Notify DES and GBRMPA representatives of the incident within 24 hours of the incident.	MSQ / Superintendent
6.4	Cases of non-conformance with the EMP will be recordedon the Environmental Incident/Non-conformance Report form and reported to MSQ within 24 hours of the incident.	Contractor

5. Environmental Monitoring

5.1 Monitoring programs

An environmental monitoring program has been established to support this EMP. The implementation of the monitoring program will ensure that the requirements of the EMP arebeing met. All monitoring will be undertaken by suitably qualified persons in accordance with the monitoring requirements. MSQ will submit a summary report of the monitoring outcomes at the conclusion of the dredging campaign or at the conclusion of the specified monitoring period to GBRMPA and DES.

There are a number of components for which environmental monitoring is required, including:

1. sediment characteristics
2. water quality
3. flora and fauna
4. access arrangements
5. noise
6. air quality
7. waste management
8. hazardous substances
9. community consultation.

Table 9 Table 4.1 Environmental Monitoring Program – Rosslyn Bay Boat Harbour Dredging

Issue	Monitoring	Frequency / timing	Performance criteria	Responsibility
Sediment Characteristics	Prior to each dredging event, ensure current sediment sampling is available in accordance with NAGD (2009) see details Table 3.	Prior to each dredging event	Sediments must be suitable for ocean placement in accordance with NAGD (2009)	MSQ
Water Quality 1	Visual inspection of turbid plume from the dredge and placement area.	During works	Visual plume to be kept within 500m of the source.	Contractor
Water Quality 2	Refer to Table 10 and section 5.2 for the water quality monitoring strategy - WQB vessel based plume monitoring	Refer to table 10 and section 5.2 of the EMP	No impact on surrounding ecological features	MSQ Consultant

Issue	Monitoring	Frequency / timing	Performance criteria	Responsibility
Fauna and Flora	Visual inspection for any sign of marine flora and fauna (turtles, dolphins, dugongs, crocodiles and whales) in accordance with table 4	Refer to table 10 and section 5.2	No deaths/injuries attributable to works. Report any observations in the dredge logs in accordance with section 3.2	Contractor
Access arrangements	Visual inspection to ensure harbour navigation is not restricted	Daily (during dredging works)	Minimal restriction to access	Contractor / MSQ
Noise	Investigation of noise complaints	As required in response to any noise complaints. (during dredging works)	Complaint responded to within 24 hours and all complaints resolved	Contractor and Superintendent
	Aural inspection of equipment for excessive noise	Weekly (during dredging works)	Noise levels in accordance with equipment specification	Contractor
Waste management	Visual inspection of disposal area for litter	Daily (during dredging works)	No uncontained litter /waste	Contractor
Hazardous substances	Visual inspection of the vessel, disposal area and immediate vicinity of dredge for evidence of spills	Daily (during dredging works)	No spills.	Contractor
Hazardous substances	Visual inspection of chemical storage areas	Weekly and following substantial rainfall events (during dredging works)	Storage capacity sufficient to contain spills and no breach of storage area. Materials stored as per relevant standards.	Contractor

Issue	Monitoring	Frequency / timing	Performance criteria	Responsibility
	Review of complaints records for any increasing trend in number of complaints Outcomes of specific dredging events to be discussed with TACC	Weekly (during dredging works) Each Campaign	No increasing trend in number of complaints. All complaints addressed within 24 hours. Gain feedback for ongoing improved strategy development	Superintendent / Contractor

Table 10 Campaign Specific Monitoring Strategy

Campaign	Water Quality Monitoring	Benthic Monitoring	Disposal site seabed Monitoring
2022	**WQB**– vessel based plume and compliance monitoring (x2) **WQT** –testing for metals and nutrients	**BMA, BMB, BMC** and **BMD** – Pre, During and Post Dredge.	**SM** – pre, post and annually between dredge events **LB_PSD** – monitoring sediment distribution changes on Lammermoor beach **A_PSD** – collect PSD data along benthic transects

5.2 Water Quality Monitoring

BMT WBM (2012) modelling did not predict that the identified sensitive receptors of WreckPoint and Bluff Rock will be impacted by the dredging and placement of even up to 120,000m^3 of dredge material at the existing disposal site. The 2012 monitoring event supported this prediction and hence for this much smaller dredging campaign. A targeted monitoring program has been developed to ensure potential impacts are measured, assessed and mitigated. This program is designed to also build on existing knowledge for the effective long-term management of Rosslyn Bay Boat Harbour.

The two primary objectives of the program are:

1. to undertake vessel-based compliance monitoring to further confirm that plumes generated from the dredging and disposal works do not impact on sensitive receptors **(WQB)**
2. to collect and assess water chemistry changes prior to, during and post dredging works to continue to build a dataset of trends associated with the dredging works **(WQT)**

5.2.1 Description of WQB - Compliance Monitoring

Monitoring in 2006 and 2009 showed that plumes (from dredging and placement works) were contained locally and remote from sensitive sites. The 2012 Modelling supported this monitoring and then the dredging and placement of 120,000m^3 and associated monitoring further supported this outcome. It can be confidently concluded that with the exception of entrance channel dredging during extreme spring ebb tidal flows, that plumes from the actual dredging and placement works are kept local and do not present a risk to sensitive receptors. For this reason, the compliance monitoring proposed is two vessel-based events (of 4 days each, total 8 days) focusing on spring tides. In the very unlikely event compliance triggers are breached as a result of dredging or placement, then this compliance monitoring element will be extended for the remainder of the works.

The four-day vessel-based monitoring campaigns will be undertaken at the start and then again towards the middle of the dredging campaign to assess and map the plume impacts from dredging and disposal area.

The vessel-based monitoring campaigns will focus on mapping the extent of plumes and performing a compliance check on previous understanding:

1. escaping the harbour during peak spring ebb tides from D1
2. migrating from the disposal site (From DS1 to the extent of the plume above background)

(Both mapping exercises will utilise an up-drift control site as a background)

Both these assessments will be undertaken via transects (at minimum 40m intervals) as indicated in figure 5 and detailed in table 4.2.

At each sample site, three replicates will be taken at depths of 1m (surface), mid water column (middle) and within 1m of the seabed (bottom). The following parameters will be recorded at each site:

1. GPS location
2. Turbidity

3. Suspended Solids
4. pH
5. Salinity
6. Conductivity
7. Temperature

Weather and sea conditions, and other observations, will also be recorded at each site.This compliance monitoring will be applied as follows:

1. Undertake transects from the harbour entrance D1 (for spring ebb tide events) andthe disposal site DS1 (both ebb and flood flow events) mapping the plume extent against up-current background levels.
2. If the plume extends 500m from the source site, notify the dredge operator, to amendoperations to reduce plume extents and continue to monitor plume extents and every3 hours sample at the sensitive site in the direction of the plume (either WP or BR).
3. In the event the water quality (TSS) is above the identified 80th percentile trigger forthe sensitive receptor and is above background levels (i.e. the increase is a result of the dredging or placement works) for four consecutive 3 hourly readings then dredging and placement works will cease until background TSS is returned.
4. In the event trigger item 3 occurs field monitoring works will be extended until thesource is identified and addressed.
5. If action item 4 is applied, 3 monitoring of both sites will occur. In the event triggerlevels are exceeded for 2x 3 hourly readings above the 80th percentile, the control site data will be reviewed to assess if the impact is a natural trend or associated withthe dredging or placement works. If the impact is associated with dredging, works will be amended to mitigate the impact to reduce the TSS to below the 80th percentile or to background levels consistent with CS1.
6. In the event levels are not reduced to below trigger conditions 24 hours after changesto dredging works have been implemented (attributed to dredging works), dredging works are to cease until levels fall below trigger levels or to levels consistent with CS1.

Possible actions should item 2 or 5 be instigated (this list is not exhaustive but is intended as a starting point for guiding actions, depending on the source and extent of impact):

1. Relocate the dredge to minimise plume transport during certain phases of thetide.
2. Plan timing of dredging works for certain phases of the tide to minimize plume transport.
3. Relocate the pipeline outlet/dump locations where possible during springtide flows to minimise plume transport impacts.
4. Minimise the use of the dredge cutter head where practical to minimize plume generation.
5. Slow the production rate of dredging to minimise plume distribution.

5.2.2 Water Quality Baseline Triggers

5.2.2.1 BLUFF ROCK

Bluff Rock was not impacted by dredging works or redistribution processes in 2012-13 and for this reason the previous logger dataset for Bluff Rock was used to define an 80th percentile exceedance of Total Suspended Solids (TSS) for summer and winter conditions for the 2016 dredging campaign, as per below. (Summer data period 24/9/12 to 31/3/2013 and winter data being 1/4/2013 to 9/7/2013).

Bluff Rock triggers: Winter = 121.7mg/l and Summer = 107.0mg/l

The JCU logger data captured over 23 months (October 2015 to September 2017) provided the following 80th percentile TSS figures for Emu Point 11km south of the Harbour which isthe control for the Bluff Rock site. (**Summer:** October to March, **Winter:** April to September)

Emu Point 80th percentiles: Winter = 91.6 mg/l and Summer = 103.5mg/l

On this basis the trigger values above will be utilised for the 2022 event (Subject to reviewby the monitoring consultant).

5.2.2.2 WRECK POINT

Wreck Point: The data losses during the previous baseline monitoring at Wreck Point didn't provide a representative dataset for defining a trigger value and other methods had to be used to define a suitable trigger for the previous 2016 dredging campaign. However the 23 month dataset captured 2015-2017 provided the following 80th percentile triggers to be used in the 2021 event.

Wreck Point triggers: Winter = 38.8mg/l and Summer = 29 mg/l

On this basis the trigger values above will be utilised for the 2022 event (Subject to reviewby the monitoring consultant)

5.2.3 Water Quality Testing (WQT) - Disposal Site, Wreck Point and Bluff Rock

Water samples will be collected in accordance with the Queensland Water QualityGuidelines and tested for the following analytes to assess any water chemistry changes from the dredging and placement works:

1. 8 Heavy Metal Suite (As, Cd, Cu, Cr, Hg, Pb, Ni, Zn)
2. Total Nitrogen
3. Total Phosphorus
4. Frequency: Pre-dredge, 2 times during the dredging campaign and post-dredgefollowing the completion of works.

The water quality monitoring program will be in accordance with Table 11.

Figure 5 Monitoring Locations

Table 11 Proposed Water Quality Monitoring

WQB					
Site	**Description**	**Transect Distance/Interval**	**Depth**	**Replicates**	**Frequency**
D1 (transect from harbour entrance south)	Extent of plume from the dredging area to ensure compliance is met.	Interval distance shall be no less than 40m however shall be chosen by the consultant to appropriately map the plume extent in the direction of plume until background conditions are reached	Surface, Middle, Bottom	3 (NTU, SS*) ** Collect and analyse a representative number of SS samples to establish relationship between NTU & SS*	Monitoring to occur on the first five days of dredging and correlated with visual observations of the plume at the same time by the Dredging Contractor. The Dredging Contractor is to adjust their methodology for determining the visual extent of the plume based on the results obtained. MSQ to agree to revised performance parameters. Repeat once per month for three days for the duration of the dredging contract. Trigger value: NTU ≤ calculated 80th percentile baseline turbidity (seasonal) 500m from the dredge location Monitoring is to be conducted during a spring tide period to capture the ebb tide. **Confirm relationship between NTU & SS*
DS1 (Transect from Dump point)	Extent of plume from disposal site and ensure compliance is met	Interval distance shall be no less than 40m however shall be chosen by the consultant to appropriately map the plume extent in the direction of plume.	Surface, Middle, Bottom	3 (NTU, SS*) ** Collect and analyse a representative number of SS samples to establish relationship between NTU & SS*	Monitoring to occur on the first five days of dredging, then once per month for three days for the duration of the dredging contract. Trigger value: NTU ≤ calculated 80th percentile baseline turbidity (seasonal) 500m from the disposal location Monitoring is to be conducted during a spring tide period to capture both flood and ebb tides. **Confirm relationship between NTU & SS*

5.3 Benthic Monitoring

Benthic monitoring will focus on the following elements:

BMA:

- Monitoring of the condition of the fringing reef community at representative sites at Wreck Point and Bluff Rock (the two nearest sensitive receptors to the dredging and spoil disposal sites) against a Control site in the vicinity of Zilzie Point approximately 10km south of the harbour;

BMB:

- Monitoring of benthic infaunal assemblages and sediment particle size distribution adjacent to the spoil disposal site, within areas that will be potentially impacted by sediment re-suspension from the spoil ground and areas that will be unaffected.

5.3.1 BMA - Reef Monitoring at Wreck Point and Bluff Rock

Wreck Point (WP) and Bluff Rock (BR) are the nearest sensitive receptors to the dredging and spoil disposal sites. Hydrodynamic modelling and the results of water quality monitoring from previous dredging campaigns at Rosslyn Bay suggest that WP or BR are unlikely to be impacted by turbidity from dredging and spoil disposal, or impacts from any ongoing re-suspension of material from the spoil ground. To confirm this, monitoring of the condition of the fringing coral reef community will be undertaken at representative sites at WP and BR and at a control site in the vicinity of Zilzie Point (ZP). Monitoring will be conducted pre and post the dredging campaign.

At each monitoring site at WP, BR and ZP, fringing reefs will be documented using four line transects in each location:

- The transects will be in shallow water on the landward side of the fringing reef.
- Each of the transects will be 25m long and will be permanently marked using metre long sections of 12mm reinforcing rod driven into the bottom. Permanent transects give a much more powerful measure of change in the benthic community due to the same individual corals being monitored.
- A fibreglass survey tape will be stretched tightly between the marker stakes on each transect positioned as close to the bottom as possible and high resolution digital images will be recorded every 50cm along the shoreward side of each transect, for archive records.
- In addition, the length of intercept in centimetres with each benthic feature immediately beneath the tape will be recorded. Intercept lengths along each transect will be totalled for each benthic category and converted to a measure of percentage cover. A range of statistical analysis will be applied to the data as described below to describe the benthic community at each site and to identify any changes in the benthic community between the pre and post dredging monitoring events.
- Sediment depth will also be measured on a random selection of 25 corals along each transect. If sediment is present on a surface of a selected colony then the maximum depth of sediment will be measured to the nearest millimetre (mm). Health of hard coral colonies shall also be categorised that exist within a one metre strip centred on the transect Categories; healthy; bleached; partially bleached; disease present; sediment mortality present; recent partial mortality; recent total mortality.

5.3.2 BMB - Monitoring of Benthic Infaunal Assemblages and Sediment Particle Size Distribution Adjacent to the Spoil Disposal Site

The results of hydrographic modelling suggest that resuspension of material from the spoil ground will occur for some time after material placement has concluded, but that detectable impacts to the seafloor will extend only a short distance from the boundary of the spoil ground, primarily in the northwest and southeast directions.

***Benthic Infauna*:**

Eight monitoring events for benthic infauna over the previous three dredge campaigns (approx. 150 samples per event, 1,200 samples collected in total) show no evidence of disposal effects. This indicates that there is no impact mechanism beyond the disposal site.

Monitoring of benthic infauna is consequently not proposed for the 2022 dredging.

Particle Size Distribution at Lammermoor Beach:

Eight sampling events over 3 dredge campaigns (9 sites per event, approx. 72 samples collected in total) show no evidence of impact on Lammermoor Beach, indicating it is outside the impact domain of the dredging and disposal activity.

Monitoring of the Particle Size Distribution is consequently not proposed for the 2022 dredging.

Table 12 Benthic Monitoring 2022 Dredging Campaign

Description	Sites	Monitoring	Frequency	Performance Criteria
BMA Reef Monitoring	WP2, BR2 and ZP2	Underwater Dive Transects at each location, involving: − 4 x 25 m long transects in shallow water (landward side of reef) plus, Towed camera survey	Pre-dredge monitoring to be undertaken at all shallow water sites (WP, BR, ZP). Do not conduct data processing or post dredge coral monitoring unless a turbidity exceedance of the calculated 80th percentile baseline turbidity value (seasonal), attributable to dredging or dredge material disposal, is recorded at a sensitive receptor during vessel-based plume transect monitoring. If post dredge coral monitoring is required, it should be undertaken between one and two months after the completion of dredging. This monitoring is to be conducted at the same locations as the pre-dredge survey.	No impact attributed to dredging or disposal activities

5.4 Hydrographic Survey Monitoring

Modelling indicates that the Rosslyn Bay placement area is dispersive and for this reasonthere is a significant need to monitor the placement site to assess how much material has redistributed in order to effectively understand and interpret the water quality and benthicdata.

In order to achieve this, the following monitoring is proposed:

1. Undertake pre and post dredge bathymetric surveys of the disposal site and map the seabed in the vicinity of the disposal site.
2. Undertake annual surveys of the monitoring area as indicated in Figure 5.

Table 13 Disposal site monitoring

Location/Aspect	Sites	Monitoring	Frequency	Performance Criteria
Survey	Area defined in Appendix A and B	Bed level	Pre and postdredge + annual monitoring	Assess redistribution

5.4.1 Additional Monitoring - Lammermoor Beach

5.4.1.1 Particle Size Distribution changes - Lammermoor Beach

Monitoring of sediment particle size distribution (PSD) will be undertaken for three transectson Lammermoor Beach as was completed in 2012-13, 2016 & 2019, to assess any changes that could be associated with dredging and placement works.

Assessment of particle size distribution will be undertaken by wet sieving of the coarse fraction through a series of Australian standard sieves, with hydrometer analysis of the finefraction.

Particle size distribution will be compared between monitoring events to identify changesover time.

Visual observations of surface sediment characteristics will also be noted.

Frequency: Pre-dredging and Post-dredging

Extent: samples at high water line, mid water line and low water line will be collected at each transect for each event (9 samples per event)

6. Dredge Management Plan

The Department of Environment & Science recommends a Dredge Management Plan (DMP) to address specific matters around dredging management. The dredging contractor is to prepare an addendum to this EMP which will address equipment matters not already covered in this EMP. This EMP together with the Dredging Addendum will fulfil the role of the DMP.

Standard DMP matters already covered in this EMP include:

1. Clearly stated aims and objectives.
2. Maps or plans showing:
    a. legend, north arrow and scale;
    b. boundaries of dredging operation;
    c. estimated or modelled zone of influence of sediment plumes;
    d. location of designated disposal sites;
    e. location of sensitive receptors; and
    f. all monitoring locations.
3. A description of sediment plume-associated monitoring program including:
    a. sampling regime and methods; and
    b. monitoring sites.
4. Overview of Dredging:
    a. Volume of dredged material to be removed, and duration and timing of the dredging campaign;
    b. methods to be utilised for transporting dredged material; and
    c. dredged material disposal methods.

Matters to be addressed in the Dredging Addendum by the Dredging Contractor are:

1. Description of dredging operation including:
    a. type of equipment to be used in dredging;
    b. location of key equipment, in particular the booster pump and the work compound
2. Clearly set out the assessment methodology and evaluation procedures that demonstrate how exceedance of alert and trigger levels will be determined. In particular, how is the distance of the plume from the dredging and disposal sites to be accurately measured.
3. Management actions to be initiated if alert or trigger levels are exceeded.
4. Contractor contact numbers
5. Equipment-specific emergency procedures

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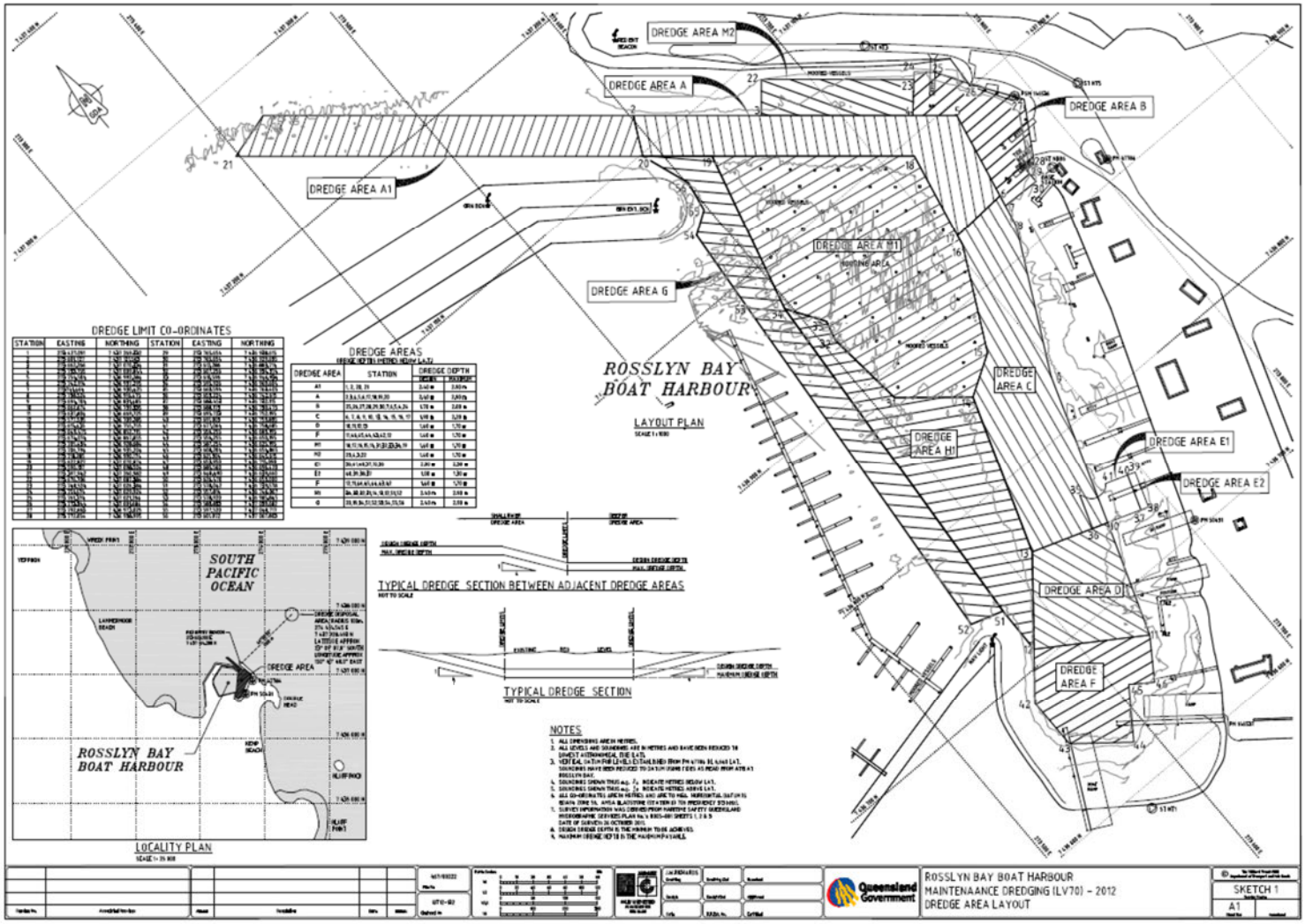
8. APPENDICES

Appendix A - Drawing of Approved Dredge Areas

Note: The above drawing depicts the approved areas for dredging. In the 2022 dredging campaign, only nine of these areas will be dredged. The other areas already have adequate depth. These areas are in the table below.



Dredge area	Description	min – max dredge depth (metres below LAT)
A1	Outer Entrance Channel	2.40 - 2.90
A	Inner Entrance Channel	2.40 - 2.90
B	Public Access Area	1.70 - 2.00
C	Inner Access Channel	1.90 - 2.20
D	Inner Access Channel	1.40 - 1.70
E1	Berthing Area	1.90 - 2.20
E2	Berthing Area	1.00 – 1.30
F	Inner Access Channel	1.40 - 1.70
M2	Pile Mooring Area	1.40 – 1.70

Appendix B – Dredge Material Placement Area (DMPA)

DMPA Location:

An area 100 metres radius, centred at the following location:

Latitude 23° 9.13' south and Longitude 150° 47.8' east (GDA Datum)

Alternatively: 274,414.26 East; 7,437,929.30 North (MGA94 Datum)

The location of the Dredge Material Placement Area is shown figuratively in Figure 1 in the main body of the report.

Appendix C – Sediment Sampling Report – 2022 Dredging

Rosslyn Bay Boat Harbour

Sediment Sampling and Analysis Plan (SAP): 2022

Prepared for: Maritime Safety Queensland

Prepared by Ecological Service Professionals Pty Ltd

April 2022

A| PO Box 5815 Manly QLD 4179 T| +61 428 118 496 E| info@ecosp.com.au W| ecosp.com.au ABN| 84 169 274 391

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Revised Final	2168.001V3	21/04/22	M. Hayes	L. Thorburn	L. Thorburn	Addresses GBRMPA comments

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List of Abbreviations and Acronyms

Abbreviation / Acronym	Description
95% UCL	95th percentile upper confidence limit of the mean
BTEXN	Benzene, Toluene, Ethylene, Xylene and Naphthalene
DEWHA	Former Commonwealth Department of Environment, Water, Heritage, and the Arts
ESP	Ecological Service Professionals
GBRMP	Great Barrier Reef Marine Park
LAT	Lowest Astronomical Tide
LOR	Limit of Reporting
MSQ	Maritime Safety Queensland
NAGD	National Assessment Guidelines for Dredging
PAH	Polycyclic Aromatic Hydrocarbons
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PSD	Particle Size Distribution
QA/QC	Quality assurance / quality control
SAP	Sampling and Analysis Plan
SD	Standard Deviation
TBT	Tributyltin
TMR	Queensland Department of Transport and Main Roads
US EPA	United States Environmental Protection Agency

1 Introduction

This report has been prepared by Ecological Service Professionals (ESP) for Maritime Safety Queensland, which is a division of the Queensland Department of Transport and Main Roads (TMR). It presents a sediment sampling and analysis plan (SAP) for proposed maintenance dredging of the Rosslyn Bay Boat Harbour. This SAP has been developed in accordance with the *National Assessment Guidelines for Dredging 2009* (NAGD) (DEWHA 2009). The objective of this SAP is to confirm that the sediment to be dredged is suitable for offshore disposal, by demonstrating that it is not contaminated.

1.1 Description of the Proposed Dredging and Spoil Disposal

The Rosslyn Bay Boat Harbour, located south of Yeppoon on the central Queensland coast, is one of 14 State boat harbours strategically positioned along the Queensland coast to provide sheltered havens for recreational and commercial boating. The Rosslyn Bay Boat Harbour and its entrance channel requires regular maintenance dredging (every 2–5 years) to maintain adequate depths for safe navigation, and was last dredged in 2019. Maritime Safety Queensland (MSQ), a branch of DTMR, is planning to undertake maintenance dredging in the entrance and internal channels and the public access and public mooring areas in mid-2022. Up to 37,000 cubic metres (m^3) of material is expected to be dredged.

The Harbour is a vital contributor to the economy of Yeppoon, the wider Rockhampton regional area and beyond. As the main point of access by sea to the Keppel group of islands, the Harbour supports a large tourist industry. There is also a heavy reliance on the Harbour by several other industries, most notably commercial fishing, recreational fishing, and boating. All these Harbour users depend on the maintenance of navigable depths in the Harbour entrance channel and internal lease areas. It is therefore essential to continue to carry out periodic maintenance dredging to preserve harbour function and the viability of the industries it supports.

The Harbour is located within Keppel Bay, close to (but not within) the Mackay / Capricorn management area of the Great Barrier Reef Marine Park (GBRMP). The designated Approved Dredge Spoil Disposal Area for dredge spoil, where it is uncontaminated, is within the Farnborough section of the GBRMP. Disposal of uncontaminated dredge spoil at this location is approved under a 10-year GBRMP permit and a Commonwealth Sea Dumping Permit held by MSQ. Both permits were issued by the respective agencies in 2016.

MSQ is responsible for maintenance dredging of the entrance and internal public navigation channels to the public boating facilities in the harbour and the public mooring area (around 30% of the total harbour area), while harbour lessees are responsible for maintenance dredging in their water leases.

1.1.1 Dredge Areas

For dredging, the parts of Rosslyn Bay Boat Harbour that are managed by MSQ are divided into key areas with respect to their use and dredge depth. The maximum dredge depth ranges from 1.3 – 2.9 m below lowest astronomical tide (LAT). The nine areas to be dredged in 2022 are listed in Table 1.1.

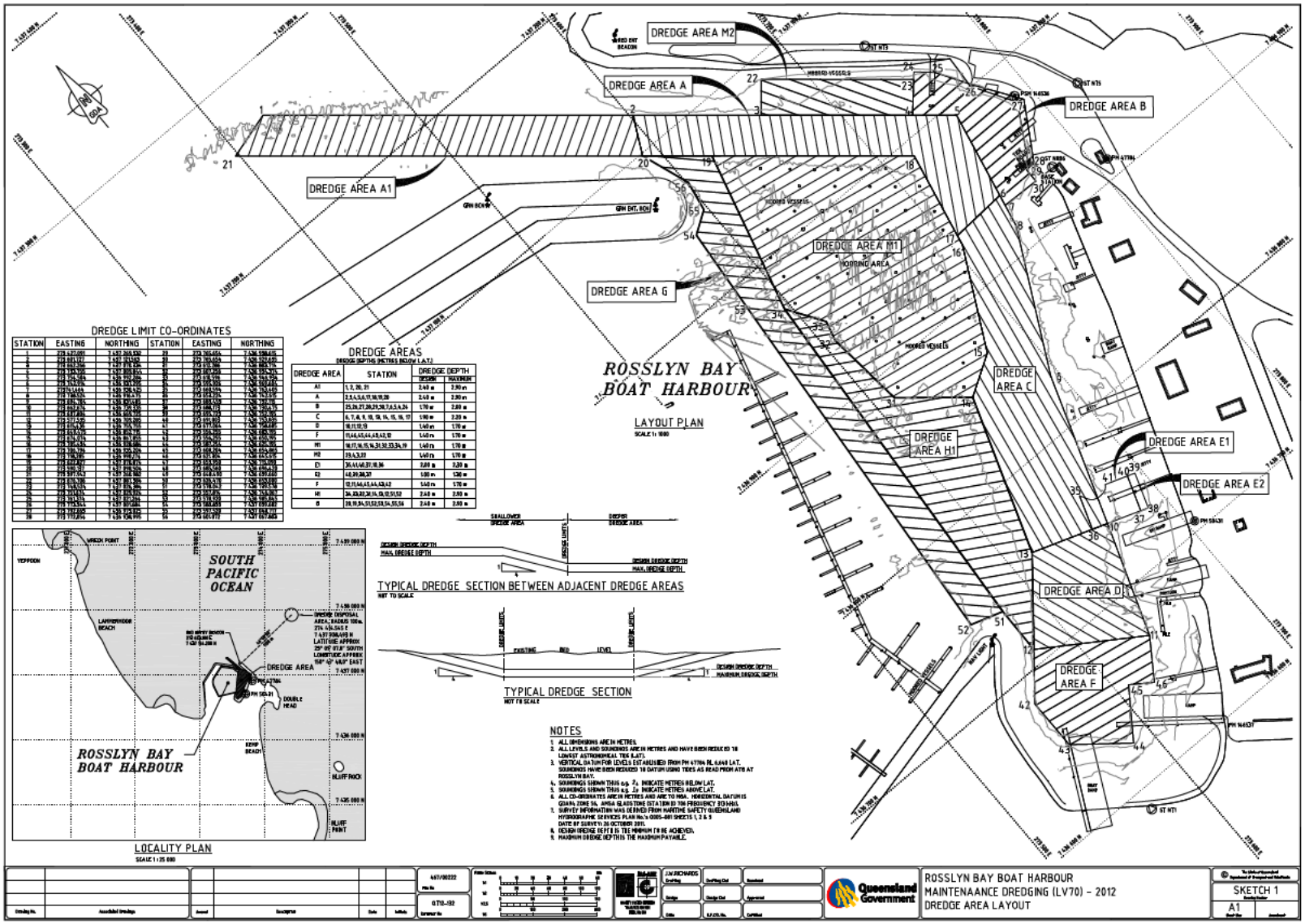


Figure 1.1 Dredge areas within the Rosslyn Bay Boat Harbour that are managed by MSQ

Table 1.1 Areas of the Rosslyn Bay Boat Harbour to be dredged by MSQ in 2022

Dredge Area	Description	Min – max* dredge depth (m below LAT)	Area (m^2)
A1	Outer Entrance Channel	2.40 – 2.90	6,040
A	Inner Entrance Channel	2.40 – 2.90	6,572
B	Public Access Area	1.70 – 2.00	2,776
C	Inner Access Channel	1.90 – 2.20	8,956
D	Inner Access Channel	1.40 – 1.70	3,996
E1	Berthing Area	1.90 – 2.20	726
E2	Berthing Area	1.00 – 1.30	115
F	Inner Access Channel	1.40 – 1.70	3,827
M2	Pile Mooring Area	1.40 – 1.70	2,090

* Max mum Dredge Depth = Des gn Dredge Depth + Dredg ng to erance (wh ch var es from 0.3 to 0.5 m).

1.2 Historical Sediment Quality

As there is regular maintenance dredging of Rosslyn Bay Boat Harbour, the sediment has been sampled and analysed regularly since the year 2000. In summary, the results of previous sediment sampling and analysis has confirmed that historically, the sediment that accumulates in the boat harbour is uncontaminated and suitable for offshore disposal. The good quality of the sediment allowed TMR to carry out maintenance dredging of the harbour in 2006, 2009, 2012, 2016 and 2019, with relocation of the material to an offshore disposal site, in accordance with permits held. A summary of the two most recent sediment sampling and analysis results (GHD 2019; KBR 2016) is provided below.

1.2.1 Physical Characteristics

The sediments that accumulate within the Rosslyn Bay Boat Harbour are generally comprised of fine sand (with some coarser sand in the entrance channel), silts and clays. Total organic carbon concentrations are low.

1.2.2 Metals and Metalloids

Concentrations of metals and metalloids are generally below the NAGD screening level. In 2016 (and also in 2012, MSQ pers. comm.), the concentration of nickel exceeded the screening level, but was below the sediment quality guideline (SQG)-High value (KBR 2016). Elevated nickel concentrations are naturally occurring in the region, and the concentrations of nickel in the material to be dredged were below background levels (KBR 2016). As such, the dredge spoil was still considered suitable for offshore disposal in accordance with the assessment framework outlined in the NAGD (refer to Section 2).

1.2.3 Other Contaminants

During the most recent sediment sampling and analysis (GHD 2019), the concentrations of other contaminants, including organotins, hydrocarbons, pesticides, herbicides and other organic compounds were below the laboratory limits of reporting (LORs) and NAGD screening levels, where available. In 2016 (KBR 2016), the concentrations of tributyltin (TBT) exceeded the screening level, but a Phase III assessment in accordance with the NAGD (pore water and elutriate testing) confirmed that sediment was suitable for unconfined ocean placement. TBT contamination was not present across the entire dredge area; rather, it was localised to samples collected from bores in dredge areas C, E1 and F (Figure 1.1). A recent clarification of the NAGD with respect to TBT (DAWE 2021) notes that the distribution of TBT in marine sediment is likely to be concentrated or localised. Additional sampling was completed in 2016 to confirm the representative concentration of TBT in these localised areas.

1.3 Contamination Status

Based on the results of recent sediment sampling and analysis events (including an event three years ago), and the suitability of the sediment accumulating in the boat harbour for offshore disposal since the year 2000, it is anticipated that the sediment to be dredged in 2022 will be suitable for offshore disposal. Because no major contamination incidents have occurred in the harbour in the three years since the last sediment testing, the material to be dredged could likely be classified as ‘probably clean’ in accordance with Appendix D of the NAGD. Despite this, a conservative approach to sampling and testing is recommended in this report, because of the sensitive receiving environment.

2 Sampling Design

The NAGD outlines the required approach for assessing potential contaminants (except TBT) in sediments to be dredged, as summarised in Figure 2.1. Updated procedures for assessing TBT in sediments (DAWE 2021) are summarised in Figure 2.2.

Section 1.2 above describes the existing information on sediment quality within the harbour. This section of SAP outlines the required sampling and analysis of sediment quality in accordance with Phase II of the NAGD and clarified NAGD TBT assessment process.

Where sampling and analysis completed in accordance with this SAP finds that any contaminants are at concentrations that exceed the relevant NAGD Screening Levels or background levels, further sampling and bioavailability testing and consideration of toxicity and bioaccumulation would be required, as detailed in Phases III–V of the NAGD and clarified NAGD TBT assessment process.

2.1 Sites

In accordance with Table 6 of the NAGD, 10 cores will be collected for analysis, as the dredge volume is 30,000 – 37,000 m^3. To account for possible localised TBT contamination, an additional 12 cores (four at each site) will be collected within 5 m of sites 1, 7 and 10, where elevated TBT were previously recorded in 2016 (KBR 2016). Samples from these cores will be held under appropriate conditions with no analysis required, unless TBT is found above screening levels in the initial 10 cores.

The proposed sampling sites (core locations) are described in Table 2.1 and shown in Figure 2.3. The locations of the sampling sites were assigned randomly, in accordance with the 'grid square' methodology outlined in Appendix D of the NAGD.

Table 2.1 Location of the proposed sampling sites (cores)

Site	Easting*	Northing*	Survey Depth(m LAT)	Designated Dredge Area
1	273,592.2	7,436,659.0	-1.40	F
2	273,709.5	7,436,946.6	-2.30	A
3	273,709.5	7,436,911.6	-1.90	C
4	273,635.8	7,436,708.7	-1.10	D
5	273,532.1	7,437,172.1	-1.90	A1
6	273,744.5	7,437,016.6	-1.85	B
7	273,707.1	7,436,883.4	-1.90	C
8	273,628.5	7,437,072.0	-2.00	A
9	273,707.0	7,437,050.5	-1.00	M2
10	273,682.6	7,436,750.0	-1.30	E1

* GDA 94, Zone 56

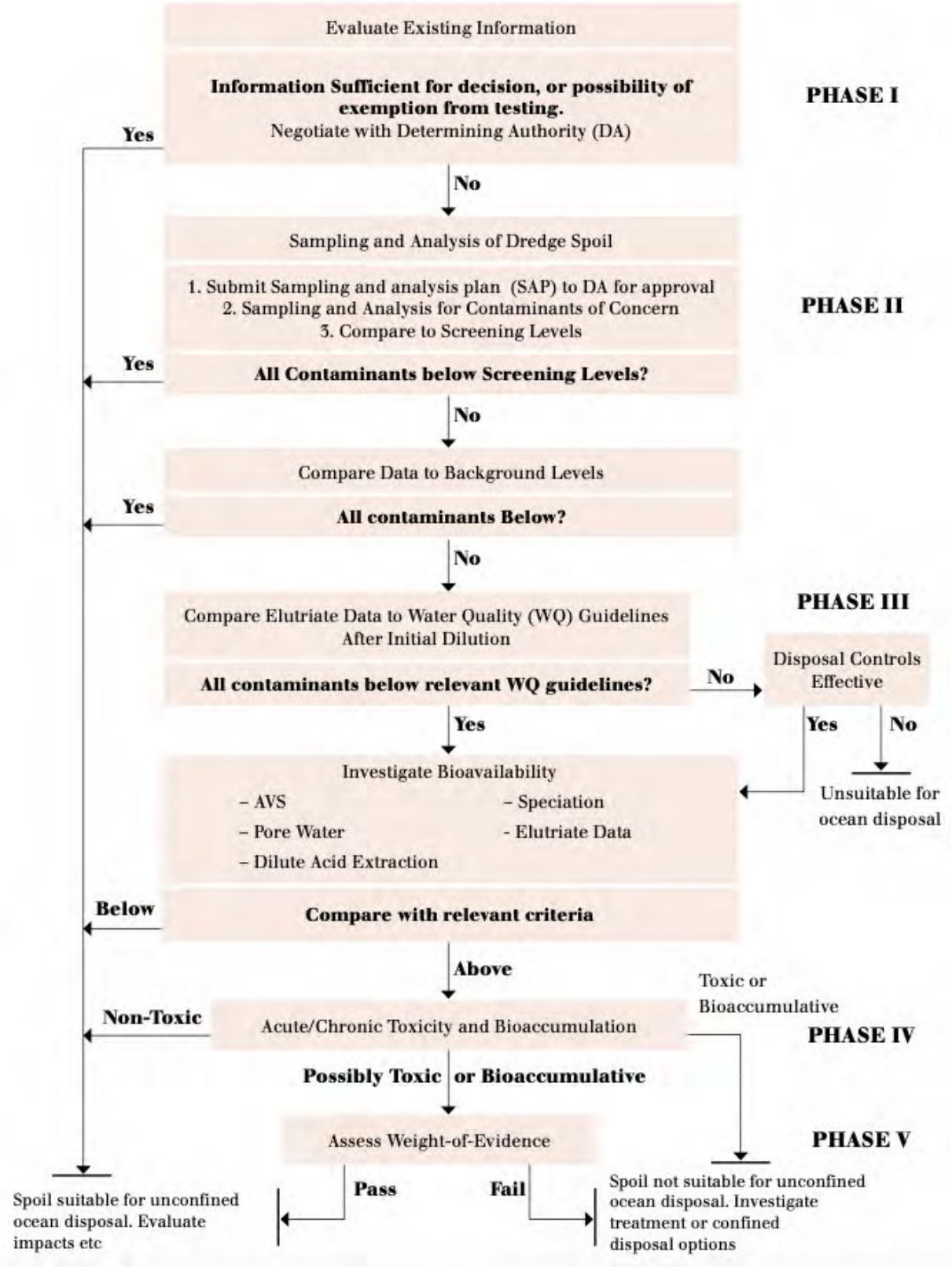


Figure 2.1 NAGD process for the assessment of potential contaminants (from DEWHA 2009)

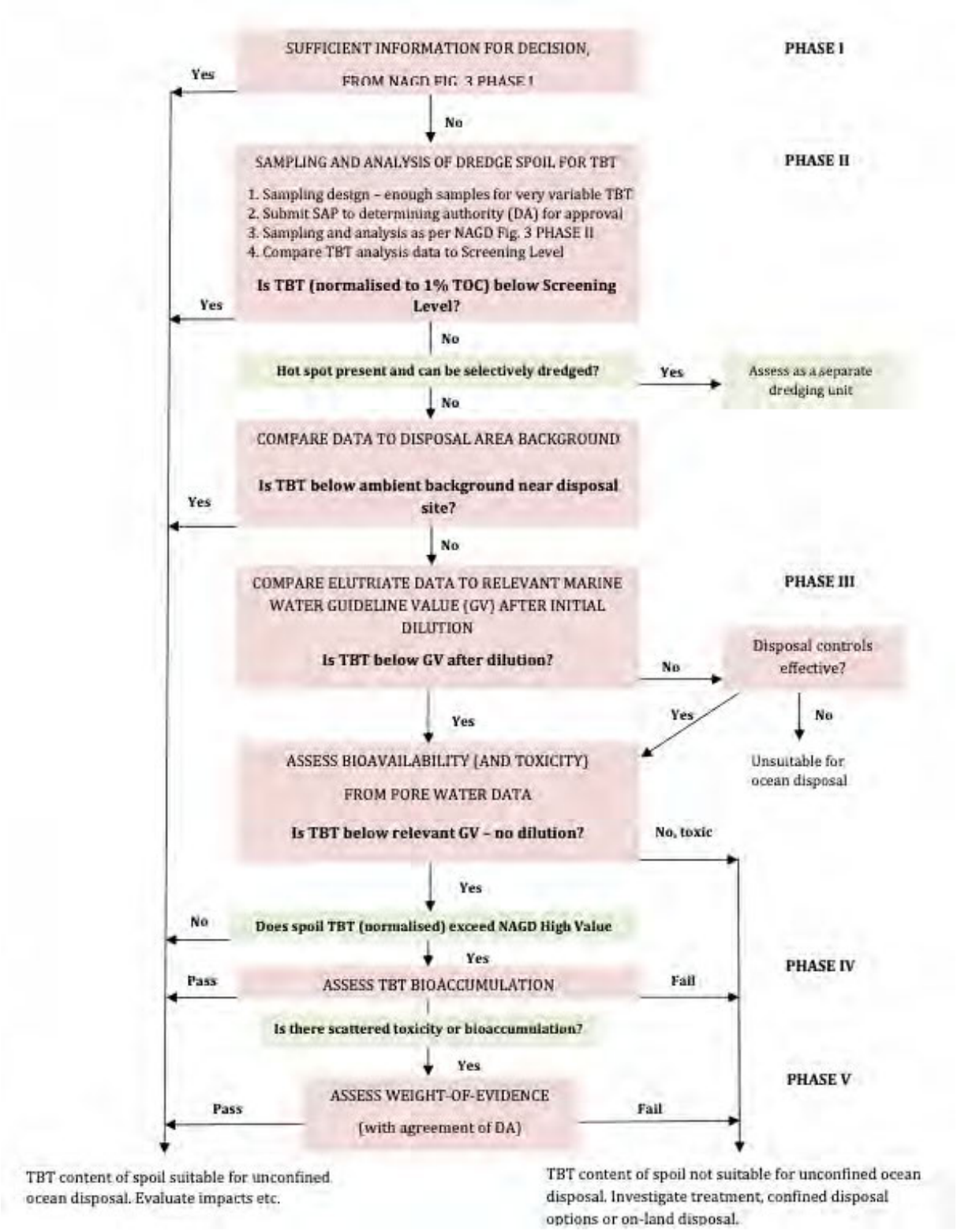


Figure 2.2 Clarification of the NAGD decision tree for assessment of TBT in dredge spoil (from DAWE 2021)

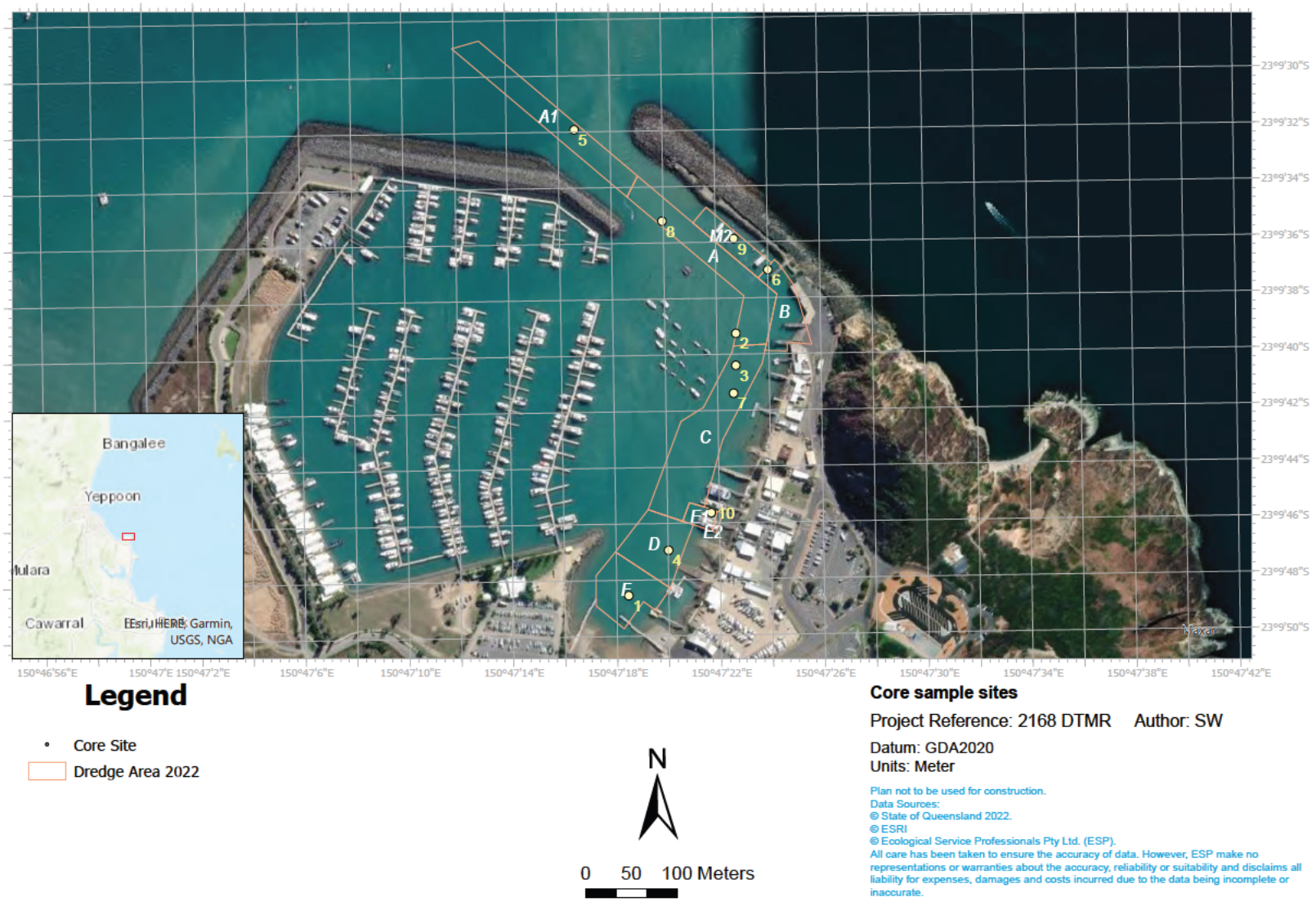


Figure 2.3 Core sampling sites for the Rosslyn Bay Boat Harbour in 2022

2.2 Core Lengths

The required length of each core has been calculated based on the current bed level depth at each site (based the hydrographic survey provided by MSQ, Appendix A) and the proposed maximum dredge depth of the relevant dredge area. Cores will be taken to 0.5 m below the maximum dredge depth. The required length of each core is presented in Table 2.2 and Figure 2.4.

Table 2.2 Length of core to be collected at each site

Site	Dredge Area	Surveyed Chart Depth (m LAT) ^	Max. Dredge Depth (m LAT)	Max. Dredge Depth + 0.5 m (m LAT)	Target Core Length (m)
1*	F	-1.40	-1.70	-2.20	0.80
2	A	-2.30	-2.90	-3.40	1.10
3	C	-1.90	-2.20	-2.70	0.80
4	D	-1.10	-1.70	-2.20	1.10
5	A1	-1.90	-2.90	-3.40	1.50
6	B	-1.85	-2.00	-2.50	0.65
7*	C	-1.90	-2.20	-2.70	0.80
8	A	-2.00	-2.90	-3.40	1.40
9	M2	-1.00	-1.70	-2.20	1.20
10*	E1	-1.30	-2.20	-2.70	1.40

^ From the August 2021 hydrograph c survey (Append x A), vert ca accuracy approx mate y ± 0.2 m

* Add t ona cores to be co ected from w th n 5 m of th s s te (to assess TBT contam nat on) w be the same engh as those co ected from the pr mary s te

2.2.1 On-site Confirmation

It is possible that further infilling of the harbour may have occurred since the hydrographic survey was completed in August 2021. As such, the field team is to measure the depth of the seabed relative to LAT at the time of sampling, using the tide board located in the harbour and the depth of water above the sediment. Where this check indicates that infilling has occurred, a deeper core should be taken, based on field calculations.

2.3 Core Subsampling

Three sub-samples will be collected from each core:

- subsample A samples will be the upper 0.5 m of the core (i.e. surface sediment)
- subsample B samples will be from 0.5 m to the maximum dredge depth, or up to 1 m along the core, and

- subsample C samples will be the remainder of the core (1 m to 0.5 m below the maximum dredge depth).

The subsamples to be collected, and the suite of parameters to be analysed (comprehensive or basic), are shown in Figure 2.4 and Table 3.1. Section 3.4 outlines the parameters to be analysed in the comprehensive suite and basic suite.

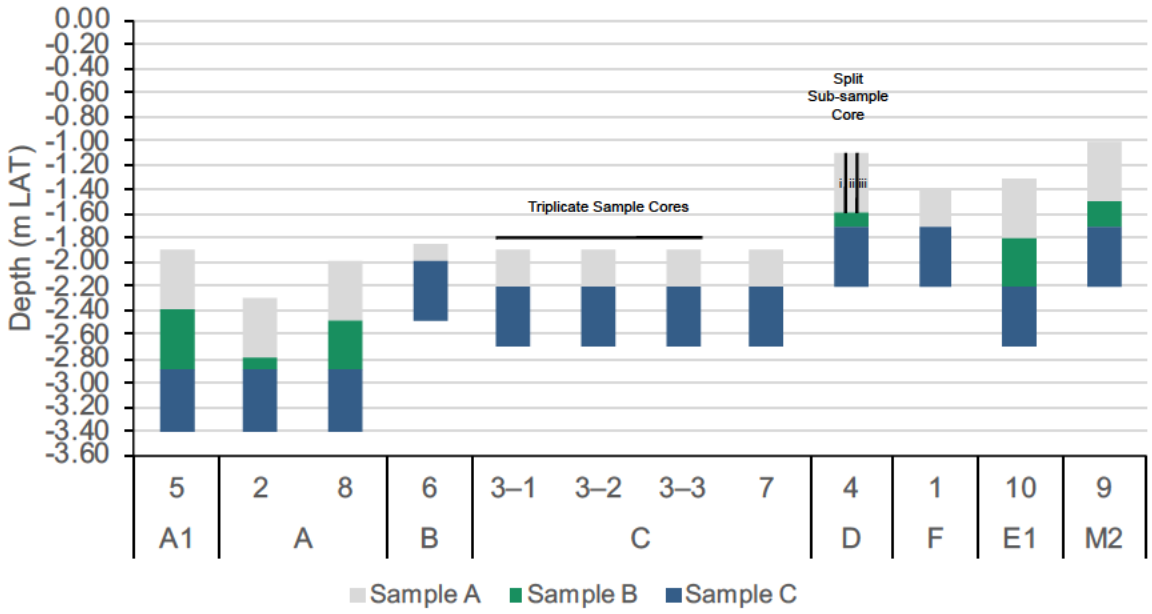


Figure 2.4 Cores within each dredge area, including core depths and subsample locations relative to LAT

Table 2.3 Subsamples to be collected at each site, and analysis suite for each subsample

Site	Subsample Name	Position Along Core (m)	Analysis Suite	Comment
1	1A	0.0-0.3	Comprehens ve	–
	1C	0.3-0.8	Bas c	–
2	2A	0.0-0.5	Comprehens ve	Pr mary samp e
	2A	0.0-0.5	Comprehens ve	QA/QC sp t sub-samp e, to be ana ysed by pr mary aboratory
	2A	0.0-0.5	Comprehens ve	QA/QC sp t sub-samp e, to be ana ysed by secondary aboratory
	2B	0.5-0.6	Bas c	Pr mary Samp e
	2C	0.6-1.1	Bas c	Pr mary Samp e
3	3A-1	0.0-0.3	Comprehens ve	Pr mary Samp e
	3C-1	0.3-0.8	Bas c	Pr mary Samp e
	3A-2	0.0-0.3	Comprehens ve	QAQC tr p cate core

Site	Subsample Name	Position Along Core (m)	Analysis Suite	Comment
	3C-2	0.3-0.8	Bas c	QAQC tr p cate core
	3A-3	0.0-0.3	Comprehens ve	QAQC tr p cate core
	3C-3	0.3-0.8	Bas c	QAQC tr p cate core
4	4A	0.0-0.5	Comprehens ve	–
	4B	0.5-0.6	Bas c	–
	4C	0.6-1.1	Bas c	–
5	5A	0.0-0.5	Comprehens ve	–
	5B	0.5-1.0	Bas c	–
	5C	1.0-1.5	Bas c	–
6	6A	0.0-0.15	Comprehens ve	–
	6C	0.15-0.65	Bas c	–
7	7A	0.0-0.3	Comprehens ve	–
	7C	0.3-0.8	Bas c	–
8	8A	0.0-0.5	Comprehens ve	–
	8B	0.5-0.9	Bas c	–
	8C	0.9-1.4	Bas c	–
9	9A	0.0-0.5	Comprehens ve	–
	9B	0.5-0.7	Bas c	
	9C	0.7-1.2	Bas c	–
10	10A	0.0-0.5	Comprehens ve	–
	10B	0.5-0.9	Bas c	–
	10C	0.9-1.4	Bas c	–

3 Sampling and Analysis Methods

3.1 Field Survey

Weather and tidal conditions are to be confirmed prior to mobilising for the field survey. Due to the large tidal range at Rosslyn Bay, sampling is to occur during a neap tide period. Field surveys are to be postponed in the case of adverse weather conditions (e.g. heavy rain or strong winds).

The sampling is to be completed by suitably-qualified environmental scientists, from a vessel in current commercial survey.

The field team will navigate to the sampling sites using a hand-held GPS with high-accuracy GNSS positioning. The final sampling location will be recorded on the GPS (eastings and northings, GDA 2020), with the accuracy of the GPS noted and included in the report (the expected accuracy of the GPS is <1 m).

3.2 Field Observations

At each sampling location, the following information is to be recorded:

- time and date of sampling
- core location
- water depth (m)
- tide and derived LAT height of core at a defined reference point
- time of nearest high or low tide
- wind, wave, current and weather conditions
- type of corer used
- total core length, and
- photograph of the core collected.

Every 25 cm along the core, the following observations are to be recorded:

- colour
- estimated particle size
- presence of shell grit / coral fragments
- odour, and
- any other observations e.g. rubbish present.

3.3 Core Collection

3.3.1 Coring Method

Based on the expected sediment characteristics (Section 1.2.1) and required core lengths (Section 2.2), samples are to be collected using a stainless-steel push core or modified vibracore in accordance with the methods outlined in Appendix D the NAGD. Cores are to be taken to the required depth outlined in Table 2.2, where possible. Where the required core length cannot be achieved (due to reaching the point of refusal or hitting hard bed material e.g. clay, coarse gravel or rock), the depth of refusal should be recorded, and a new core taken nearby (with the old core discarded). If hard material is encountered after several coring attempts, the core should be taken as deep as possible, and the core length achieved and the nature of the hard material at the bottom should be characterised and recorded.

If during the sampling, core retrieval is difficult or unsafe, the location of the core may be moved (to a location within the same dredge area, if possible). If core refusal occurs at the surface in multiple locations within the relevant dredge area, a large van Veen grab is to be used to gather surface sediments.

If required to obtain sufficient sediment for analysis, multiple cores are to be collected at each site.

3.3.2 Sample Handling

The corer is to be fitted with a clear, soft plastic tube liner prior to collection of each core, to prevent cross-contamination and to aid in subsampling.

Cores will be processed in the field using stainless steel trays on a clean surface. They will be split into subsamples in accordance with Section 2.3, prior to removal of the tube liner. The observations outlined in Section 3.2 will be collected. Where multiple cores are collected from a site, the sediment from all cores for each subsample will be fully homogenised using a stainless steel trowel, prior to placing sediment into the sampling containers provided by the analytical laboratory.

Where a subsample has clearly different physical/visual properties, the different sections will be sub-sampled separately.

Additional cores collected for further potential TBT analysis will be treated in the same manner as described above.

3.4 Sample Analysis

Samples are to be analysed by a National Association of Testing Authorities (NATA) accredited laboratory.

In accordance with Appendix D of the NAGD, surface samples (subsample A) samples are most likely to contain the highest concentrations of contaminants. As such, all subsample A samples will be analysed for a comprehensive suite of physical characteristics and contaminants (Table 3.1). The contaminants chosen for analysis are consistent with Table 1 of the NAGD, with the addition of Per- and poly-fluoroalkyl substances (PFAS), as required by GBRMPA for dredging and spoil disposal within the GBRMP.

Deeper subsamples (subsamples B and C) will be analysed for a basic suite of physical characteristics and contaminants, based on previous sediment sampling and analysis results for the harbour (Table 3.1). The contaminants chosen for analysis are based on the likely contaminant sources (harbour uses and localised runoff, without major inputs from agricultural or heavy industrial areas) and the results of previous sediment sampling events completed at Rosslyn Bay Boat Harbour (Section 1.2).

Subsamples from additional cores collected for further potential TBT analysis will be held under appropriate conditions (as advised by the analytical laboratory) and only analysed if required.

Table 3.1 Parameters to be analysed for the comprehensive suite and basic suite

Parameter	Units	Comprehensive Suite	Basic Suite	NAGD PQL [1]	NAGD Screening Level [2]	NAGD SQG-High [3]
Basic Sediment Characteristics						
Mo sture content	%	X	X	0.1	–	–
Part c e s ze d str but on (PSD)	%	X	X	–	–	–
Tota organ c carbon	%	X	X	0.1	–	–
Tota norgan c carbon	%	X	X	–	–	–
Tota carbon	%	X	X	–	–	–
Nutrients						
N tr te and n trate	mg/kg	X	X	0.1	–	–
Tota Kje dah n trogen	mg/kg	X	X	0.1	–	–
Ammon a	mg/kg	X	X	0.1	–	–
Tota n trogen	mg/kg	X	X	0.1	–	–
Tota phosphorus	mg/kg	X	X	0.1	–	–
Metals and Metalloids						
A um n um	mg/kg	X	X	200	–	–
Iron	mg/kg	X	X	100	–	–
Arsen c	mg/kg	X	X	1	20	70
Cadm um	mg/kg	X	X	0.1	1.5	10
Chrom um	mg/kg	X	X	1	80	370
Copper	mg/kg	X	X	1	65	270
Coba t	mg/kg	X	X	0.5	–	–
Lead	mg/kg	X	X	1	50	220
Manganese	mg/kg	X	X	10	–	–

Parameter	Units	Comprehensive Suite	Basic Suite	NAGD PQL [1]	NAGD Screening Level [2]	NAGD SQG-High [3]
N cke	mg/kg	X	X	1	21	52
Se en um	mg/kg	X	X	0.1	–	–
S ver	mg/kg	X	X	0.1	1	3.7
Vanad um	mg/kg	X	X	2	–	–
Z nc	mg/kg	X	X	1	200	410
Mercury	mg/kg	X	X	0.01	0.15	1
Organotin Compounds						
Monobuty t n, D buty t n	µgSn/kg	X	X	1	–	–
Tr buty t n	µgSn/kg	X	X	1	9 [4]	70
Polycyclic Aromatic Hydrocarbons (PAHs)						
Naptha ene, 2-methy naptha ene, acenaptha ene (each nd v dua spec es), acenapthene, F uorene, Phenanthene, Anthracene, Benz[b]f uoranthene, F uoranthene, Indeno[1,2,3-cd]pyrene, Benzo[k]f uoranthene, Chrysene, coronene, D benz[ah] anthracene, Benzo[e]pyrene, benzo[a]pyrene, pery ene, pyrene	µg/kg	X	–	5	–	–
Sum of PAHs	µg/kg	X	–	100	10,000	50,000
Petroleum Hydrocarbons						
C6-C9 fract on, C10-C14 fract on, C15-C28 fract on, C10-C36 fract on (sum)	mg/kg	X	–	100	550	–
BTEXN	µg/kg	X	–	200	–	–
Other Organ cs						
Cyan de	mg/kg	X	–	0.25	–	–
Organophosphorus Pesticides						
Bromophs-ethy , carbophenoth on, ch orfenv nphos (Z & E), ch orpyr fos, ch orpyr fos-methy , demeton-s-methy , d az non, d ch orvos, d methoate, eth on, fenam phos, fenth on, ma ath on, az nphos methy , monocrotophos,	µg/kg	X	–	10–100	–	–

Parameter	Units	Comprehensive Suite	Basic Suite	NAGD PQL [1]	NAGD Screening Level [2]	NAGD SQG-High [3]
parath on, parath on-methy , pr mphos-ethy , proth ofos						
Organochlorine Pesticides						
DDD	µg/kg	X	–	1	2	20
DDE	µg/kg	X	–	1	2.2	27
DDT	µg/kg	X	–	1	1.6	46
d e dr n	µg/kg	X	–	1	280	270
ch ordane	µg/kg	X	–	1	0.5	6
ndane	µg/kg	X	–	1	0.32	1
endr n	µg/kg	X	–	1	10	120
A dr n, BHC (a pha, beta, de ta), oxych ordane, heptach or, endu sofan, hexach orobenzene, methoxych or	µg/kg	X	–	1	–	–
Po ych or nated b pheny	µg/kg	X	–	5	23	–
Non-organochlorine Pesticides						
Pyrethro ds	mg/kg	X	–	0.01–0.1	–	–
Carbamates	mg/kg	X	–	0.01–0.1	–	–
Phenoxy-ac d Herb c des	mg/kg	X	–	0.01–0.1	–	–
Per- and poly-fluoroalkyl substances (PFAS)						
Sum of PFOS and PFHxS	mg/kg	X	–		20 [5]	
PFOA	mg/kg	X	–		10 [6]	50 [5]
PFOS	mg/kg	X	–		1 [6]	

1 Pract ca quant tat on m t from Tab e 1 of the NAGD
2 Screen ng eve from Tab e 2 of the NAGD
3 Sed ment Qua ty Gu de ne – H gh va ue from Tab e 3 of the NAGD
4 TBT concentrat ons are to be norma sed to 1% TOC when compar ng to the SL (DAWE 2021)
5 PFAS human hea th gu de ne va ues for eco og ca assessments of so s for ndustr a / commerc a and use. No PFAS gu de ne va ue s ava ab e for mar ne sed ments (HEPA 2020)
6 PFAS eco og ca gu de ne va ues for so (HEPA 2020)
X Ana ys s requ red
– Ana ys s not requ red

3.5 Quality Assurance / Quality Control

Quality Assurance / Quality Control (QA/QC) will be in accordance with the NAGD. Specific QA/QC procedures for the sampling and analysis must include the following:

- The corer is to be fully cleaned with ambient seawater prior to sampling each core.
- All work areas are to be covered with a clean plastic sheet at each site to avoid contamination from the vessel or cross contamination between sites.
- Samples should be drawn-off into clear, soft plastic tube liner to prevent contamination from the sampling surface and cross-contamination between cores.
- All personnel will not apply sunscreen containing metals (e.g. containing zinc and other elements) to their hands, and will wear powder-free latex gloves to collect the cores and to complete sub-sampling, with gloves changed between sub-samples.
- One trip blank will be transported to site and handled in the same way as the other sub-samples during the trip. This blank will be analysed for volatile hydrocarbons, to confirm that there has been no contamination from sample handling (e.g. from the vessel, ambient environment or personnel).
- Samples will be preserved under the appropriate storage conditions and adhere to the required holding times as advised by the analytical laboratory, and will be stored for two months following collection to allow for re-testing or additional testing if required.
- A field triplicate is to be collected from one location to assess variation within a sample (refer Figure 2.4).
- In addition, Subsample A from one location is to be divided into three sub-samples to assess laboratory accuracy (refer Figure 2.4). One sample shall be analysed normally as part of the batch of samples to be analysed by the primary laboratory, with a second sample analysed as a blind sample by the primary laboratory, with the third sent to a second laboratory to assess variation between NATA accredited laboratories.
- The laboratory is to follow all relevant QA/QC procedures in accordance with their NATA accreditation, including analysis of blanks, duplicates and spikes.

3.6 Data Analysis

Data analyses is to be completed in accordance with Appendix A of the NAGD. In summary:

- For parameters where all results are below the laboratory (LORs) for all sub-samples, no further analysis is required.
- For other parameters, the USEPA's ProUCL software (US EPA 2022) is to be used to calculate summary statistics for each sediment horizon (i.e. sub-samples A, sub-samples B and sub-samples C) of the dredge area, including the mean, standard deviation (SD) and upper 95th percentile confidence limit of the mean (95% UCL). Results below the LOR are to be halved for data analysis purposes.

- TBT concentrations are to be normalised to 1% TOC over the TOC range 0.2% to 10% (equates to multiplication factors of 5 times to 0.1 times, respectively) by dividing the TBT value by the % TOC value. Outside this range, use the end value which applies (e.g. for less than 0.2% TOC, use 5 times the TBT value measured) (DAWE 2021).
- Prior to calculating the summary statistics, the normality of data is to be tested using the Shapiro-Wilks Test. Where data are normally distributed or did not follow a discernible distribution, the arithmetic mean is to be reported. Where data re log-normally distributed, the geometric mean is to be reported, and the jackknife method is to be used to calculate the 95% UCL.
- The 95% UCL is to be compared to the screening levels, and SQG-High values if necessary, as listed in Table 3.1.

3.7 Reporting

A sediment sampling and analysis report addressing the requirements of Appendix B of the NAGD is to be prepared, including the following:

- Description of the study and summary of the SAP.
- Details of the quantities of litter (e.g. bottles, cans, plastics, etc.) found within the proposed dredge area.
- Details of the sampling methodology (including time and date of coring, tide and derived LAT height of core at a defined reference point, type of corer used, etc.).
- A map showing the precise location of the sampling locations.
- A table providing the coordinates of each sampling location.
- Description of cores (e.g. length and depth reached, colour, particle size, etc.) including photos.
- Description of any observations or anomalies during sampling and/or analysis.
- A table of laboratories used.
- A table of analytical methods used.
- Description of QA/QC measures applied to the sampling and analysis.
- PQLs & detection limits achieved (as applicable).
- A summary table of results highlighting any guideline exceedances, and text comparing the results to the relevant guidelines.
- Discussion of results and conclusions. The discussion will include a description of the sediment characteristics, and any ‘hot spots’ of contamination. The need for any further testing in accordance with the NAGD will be flagged.
- Appendices of raw results (e.g. core logs and laboratory certificates).

4 References

DEWHA 2009, *National Assessment Guidelines for Dredging 2009*, Australian Government, Department of Environment, Water, Heritage and the Arts, Canberra.

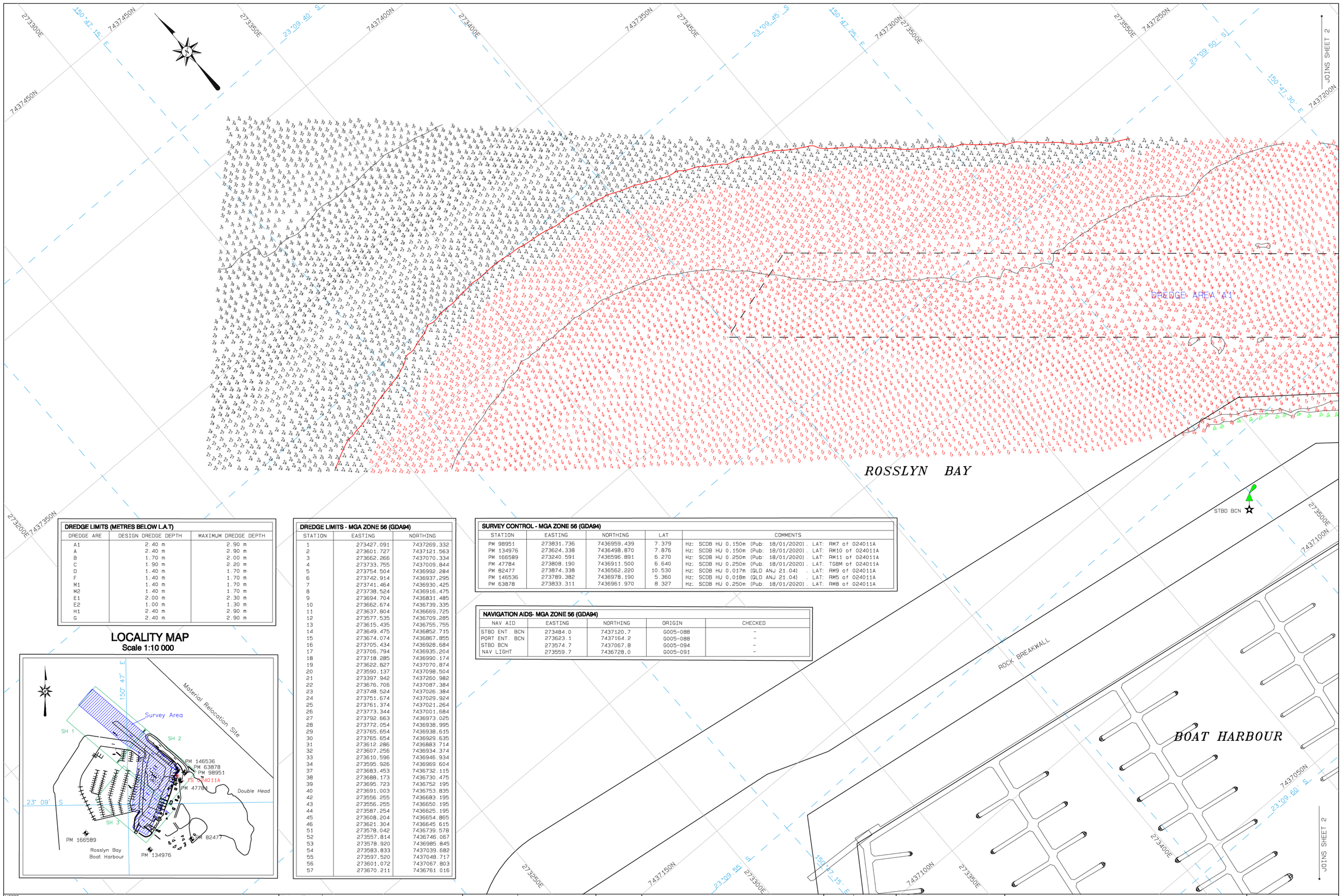
DAWE 2021, *Clarification of the National Assessment Guidelines for Dredging 2009: Decision tree and explanatory note for assessment of tributyltin (TBT) in dredge spoil*, Australian Government, Department of Agriculture, Water and the Environment.

GHD 2019, *Rosslyn Bay Boat Harbour, Sediment Sampling and* Analysis, report prepared for the Department of Transport and Main Roads.

HEPA 2020, *PFAS National Environmental Management Plan Version 2.0,* Heads of EPA's, Australia and New Zealand.

KBR 2016, *Rosslyn Bay Boat Harbour, Sediment Sampling and Analysis Results Report*, report prepared for the Department of Transport and Main Roads.

Appendix A August 2021 Hydrographic Survey



DREDGE LIMITS (METRES BELOW L.A.T)

DREDGE ARE	DESIGN DREDGE DEPTH	MAXIMUM DREDGE DEPTH
A1	2.40 m	2.90 m
A	2.40 m	2.90 m
B	1.70 m	2.00 m
C	1.90 m	2.20 m
D	1.40 m	1.70 m
F	1.40 m	1.70 m
M1	1.40 m	1.70 m
M2	1.40 m	1.70 m
E1	2.00 m	2.30 m
E2	1.00 m	1.30 m
H1	2.40 m	2.90 m
G	2.40 m	2.90 m

LOCALITY MAP
Scale 1:10 000

DREDGE LIMITS - MGA ZONE 56 (GDA94)

STATION	EASTING	NORTHING
1	273427.091	7437269.332
2	273601.727	7437121.563
3	273662.266	7437070.334
4	273733.755	7437009.844
5	273754.504	7436992.284
6	273742.914	7436937.295
7	273741.464	7436930.425
8	273738.524	7436916.475
9	273694.704	7436831.485
10	273662.674	7436739.335
11	273637.804	7436669.725
12	273577.535	7436709.285
13	273615.435	7436755.755
14	273649.475	7436852.715
15	273674.074	7436867.855
16	273705.434	7436928.684
17	273706.794	7436935.204
18	273718.285	7436990.174
19	273622.827	7437070.874
20	273590.137	7437098.504
21	273397.942	7437260.982
22	273676.706	7437087.384
23	273748.524	7437026.384
24	273751.674	7437029.924
25	273761.374	7437021.264
26	273773.344	7437001.684
27	273792.663	7436973.025
28	273772.054	7436938.995
29	273765.654	7436938.615
30	273765.654	7436929.635
31	273612.286	7436883.714
32	273607.256	7436934.374
33	273610.596	7436946.934
34	273595.926	7436969.604
37	273683.453	7436732.115
38	273688.173	7436730.475
39	273695.723	7436752.195
40	273691.003	7436753.835
42	273556.255	7436683.195
43	273556.255	7436650.195
44	273587.254	7436625.195
45	273608.204	7436654.865
46	273621.304	7436645.615
51	273578.042	7436739.578
52	273557.814	7436746.067
53	273578.920	7436985.845
54	273583.833	7437039.682
55	273597.520	7437048.717
56	273601.072	7437067.803
57	273670.211	7436761.016

SURVEY CONTROL - MGA ZONE 56 (GDA94)

STATION	EASTING	NORTHING	LAT	COMMENTS
PM 98951	273831.736	7436959.439	7.379	Hz: SCDB HU 0.150m (Pub: 18/01/2020). LAT: RM7 of 024011A
PM 134976	273624.338	7436498.870	7.876	Hz: SCDB HU 0.150m (Pub: 18/01/2020). LAT: RM10 of 024011A
PM 166589	273240.591	7436596.891	6.270	Hz: SCDB HU 0.250m (Pub: 18/01/2020). LAT: RM11 of 024011A
PM 47784	273808.190	7436911.500	6.640	Hz: SCDB HU 0.250m (Pub: 18/01/2020). LAT: TGBM of 024011A
PM 82477	273874.338	7436562.220	10.530	Hz: SCDB HU 0.017m (QLD ANJ 21.04) . LAT: RM9 of 024011A
PM 146536	273789.382	7436978.190	5.360	Hz: SCDB HU 0.018m (QLD ANJ 21.04) . LAT: RM5 of 024011A
PM 63878	273833.311	7436961.970	8.327	Hz: SCDB HU 0.250m (Pub: 18/01/2020). LAT: RM8 of 024011A

NAVIGATION AIDS- MGA ZONE 56 (GDA94)

NAV AID	EASTING	NORTHING	ORIGIN	CHECKED
STBD ENT. BCN	273484.0	7437120.7	G005-088	-
PORT ENT. BCN	273623.1	7437164.2	G005-088	-
STBD BCN	273574.7	7437067.8	G005-094	-
NAV LIGHT	273559.7	7436728.0	G005-091	-

NOTES:

1) This survey meets the mandatory class requirments as outlined in the MSQ document "Standards for Hydrographic Surveys within Queensland Waters v1.3"
2) Contours are computer generated to Hydrographic Standard (inclusive)
3) Soundings coloured for clearance purposes to dredge design depths (see table)
4) Dredge limits and dredge design depths as per drawing no.RS-1-30-1A
5) Coastline obtained from aerial photography is approximate only
6) Multibeam sounding data derived from CARIS HIPS & SIPS v11.4.2 Surface " RK040050_QpSm_Cube_FINAL.csar "
7) Single beam sounding data derived from QINSy v9.3.1 " RK040050_SB_ASCII.txt"
8) Multibeam data collected using kongsberg SIS +.all file format and reduced to LAT datum in CARIS HIPS & SIPS using an Ellipsoid to LAT separation value of 48.895 based on observations at PM 82477 (RM9)
9) Position and height check carried out over PM 82477 27/08/2021
10) Multibeam data surveyed to Class A

Horizontal Datum	MGA Zone 56 (GDA94)
Base Station	HxGN SmartNet RTK GNSS Corrections (Fixed Base Station ' RSBY ')
Vertical Datum	LAT based on TGBM PM 47784 RL 6.640m
Tide Notes	Soundings reduced to datum using RTK-GNSS and a single ELLIP-LAT Separation value of 48.895m based on observations at PM82477 (RM9) of TS024011A . 10.530m LAT) For tidal datum information please contact MSQ Tidal Unit (Tides@msq.qld.gov.au)
Depth Tolerance	0.15m
Horizontal Tolerance	1.5m
Weather	10 - 15 kts NE

Vessel	QG Norfolk QG Tom Thumb
Echo Sounder	Kongsberg EM2040C SU Version 1.8.0 CEESCOPE 100
Heavemeter	Applanix POSMV v5 f:4.10 2.0e 05.3 RTK-GNSS & PP-GNSS
Horizontal Positioning	Applanix POSMV v5 f:4.10 2.0e 05.3 RTK-GNSS & PP-GNSS HARN Westmac Corrections
Data Collection/Processing	QINSy 9.3.1 Terramodel v10.61 Caris HIPS & SIPS V11.4.2
Tidal Reference Station	TS 024011A

SOUNDINGS (m)
2_5 below datum
0_7 above datum

LEVELS (m)
$_{0.99}$ above datum
$_{\Delta 23}$ below datum

SCALE 1 : 500 AT A1
0 5 25 50

CLASS A/C *See Notes

CLIENT
MSQ-Maritime Assets & Infrastructure Unit

Signature	
Hydrographic Surveyor	
Surveyor	R GHAZANFARI
Checked	T REISE

Queensland Government
HYDROGRAPHIC SERVICES
Ph: (07) 3066 3500
Email: hydro@msq.qld.gov.au

ROSSLYN BAY
BOAT HARBOUR
HYDROGRAPHIC SURVEY
30 AUGUST 2021

Plot File. G005119P1.PDF
Job No. RK040050
Plan No. **G005-119**
SHEET 1 OF 3

SOUTH PACIFIC OCEAN

ROCK BREAKWALL

ROCK BREAKWALL

GRAVEL TRACK

BAD REC (N)

DREDGE AREA M2

DREDGE AREA A

DREDGE AREA M1

DREDGE AREA C

DREDGE AREA B

DREDGE AREA D

ROCK BREAKWALL

STBD ENT. BCN

MOORING AREA

MOORING AREA

BOAT HARBOUR

Jetty

Jetty

Tide Gauge

PUBLIC JETTY

Jetty

RAMP

MOORED VESSELS

Jetty

PM 63878

PM 98951

PM 146536

PM 47784

JOINS SHEET 1

JOINS SHEET 1

JOINS SHEET 3

273600E 273650E 273700E 273750E 273800E 273850E

7437200N 7437150N 7437100N 7437050N 7437000N

7436950N 7436900N 7436850N 7436800N

150°47'15" E

23°09'55" S

23°09'60" S

23°09'00" S

NOTES:

1) This survey meets the mandatory class requirements as outlined in the MSQ document 'Standards for for Hydrographic Surveys within Queensland Waters v1.3'
2) Contours are computer generated to Hydrographic Standard (inclusive)
3) Soundings coloured for clearance purposes to dredge design depths (see table)
4) Dredge limits and dredge design depths as per drawing no.RS-1-30-tA
5) Coastline obtained from aerial photography is approximate only
6) Multibeam sounding data derived from CARIS HIPS & SIPS v11.4.2 Surface : RK040050_05m_Cube_FINAL.csar
7) Single beam sounding data derived from QINSy v9.3.1 : RK040050_SB_ASCII.txt
8) Multibeam data collected using kongsberg SIS * all file format and reduced to LAT datum in CARIS HIPS & SIPS using an Ellipsoid to LAT separation value of 48.895 based on observations at PM 62477 (RM9)
9) Position and height check carried out over PM 62477 27/08/2021
10) Multibeam data surveyed to Class A

Horizontal Datum	MGA Zone 56 (GDA94)
Base Station	HxGN SmartNet RTK GNSS Corrections (Fixed Base Station ' RSBY ')
Vertical Datum	LAT based on TGBM PM 47784 RL 6.640m
Tide Notes	Soundings reduced to datum using RTK-GNSS and a single ELLIP-LAT Separation value of 48.895m based on observations at PM62477 (RM9 of TSQ24011A , 10.530m LAT) For tidal datum information please contact MSQ Tidal Unit(Tides@msq.qld.gov.au)
Depth Tolerance	0.15m
Horizontal Tolerance	1.5m
Weather	10 - 15 kts NE

Vessel	QG Norfolk QG Toe Thumb
Echo Sounder	Kongsberg EM2040C SU Version 7.8.0 CEE30QPC 100
Heavemeter	Applanix POSMV v5 fw:10.2.0e HP.2 Hw:1.0 Rev:0 GNSS
Horizontal Positioning	HxGN SmartNet GNSS Base Stations GDA94 Corrections
Data Collection/Processing	QINSy 9.3.1 Terramodel v10.61 Caris Hips & Sips V11.4.2
Tidal Reference Station	TS 024011A

SOUNDINGS (m)
2_5 below datum
0_7 above datum

LEVELS (m)
$_{0.99}$ above datum
$_{\times 23}$ below datum

SCALE 1 : 500 AT A1
0 5 25 50

CLASS A/C *See Notes

CLIENT: *MSQ-Maritime Assets & Infrastructure Unit*

Signature	
Hydrographic Surveyor	
Surveyor	A GHAZANFARI
Checked	T REISE

Queensland Government
HYDROGRAPHIC SERVICES
Ph: (07) 3066 3500
Email: hydro@msq.qld.gov.au

ROSSLYN BAY
BOAT HARBOUR
HYDROGRAPHIC SURVEY
30 AUGUST 2021

Plot File. G005119P2.PDF
Job No. RK040050
Plan No. **G005-119**
SHEET 2 OF 3

JOINS SHEET 2

KEPPEL BAY MARINA

BOAT HARBOUR

DREDGE AREA A

DREDGE AREA B

DREDGE AREA C

DREDGE AREA D

DREDGE AREA E1

DREDGE AREA E2

MOORED VESSEL

MOORED VESSEL

MOORED VESSEL

DPI RAMP

JETTY

RAMP

NAV LIGHT

BOAT RAMP

BOAT RAMP

273450E

273500E

273550E

273350E

273400E

273600E

273650E

273700E

273750E

7436950N

7436900N

7436850N

7436800N

7436750N

7436700N

7436650N

7436600N

7436550N

23°09.65' S

23°09.70' S

23°09.75' S

23°09.80' S

23°09.80' S

23°09.85' S

150°47.20' E

150°47.25' E

150°47.30' E

150°47.35' E

150°47.40' E

N

NOTES:

1) This survey meets the mandatory class requirements as outlined in the MSQ document "Standards for Hydrographic Surveys within Queensland Waters v1.3"
2) Contours are computer generated to Hydrographic Standard (inclusive)
3) Soundings coloured for clearance purposes to dredge design depths (see table)
4) Dredge limits and dredge design depths as per drawing no.RS-1-30-1A
5) Coastline obtained from aerial photography is approximate only
6) Multibeam sounding data derived from CARIS HIPS & SIPS v11.4.2 Surface : RK040050_05m_Cube_FINAL.csar
7) Single beam sounding data derived from QINSy v9.3.1 : RK040050_SB_ASCII.txt
8) Multibeam data collected using kongsberg SIS *.all file format and reduced to LAT datum in CARIS HIPS & SIPS using an Ellipsoid to LAT separation value of 48.895 based on observations at PM 82477 (RM9)
9) Position and height check carried out over PM 82477 27/08/2021
10) Multibeam data surveyed to Class A

Horizontal Datum	MGA Zone 56 (GDA94)
Base Station	HxGN SmartNet RTK GNSS Corrections (Fixed Base Station ' RSBY ')
Vertical Datum	LAT based on TGBM PM 47784 RL 6.640m
Tide Notes	Soundings reduced to datum using RTK-GNSS and a single ELLIP-LAT Separation value of 48.895m based on observations at PM82477 (RM9) of TS024011A (0.530m LAT). For tidal datum information please contact MSQ Tidal Unit (Tides@msq.qld.gov.au)
Depth Tolerance	0.15m
Horizontal Tolerance	1.5m
Weather	10 - 15 kts NE

Vessel	QG Norfolk QG Tom Thumb
Echo Sounder	Kongsberg EM2040C RU Version: 7.8.5 CEE80DFC 100
Heaveremeter	Applanix POSMV v5 FW:10.3.0e Hf:2 Mode: Real Time GNSS
Horizontal Positioning	HxGN SmartNet FW:10.3.0e Hf:2 Mode: Real Time Dynamic GGRN Smartnet corrections
Data Collection/Processing	QINSy 9.3.1 Terramodel v10.61 Caris HIPS & SIPS V11.4.2
Tidal Reference Station	TS 024011A

SOUNDINGS (m)
2_5 below datum
0_7 above datum

LEVELS (m)
$_{0.99}$ above datum
$_{\wedge 23}$ below datum

SCALE 1 : 500 AT A1
0 5 25 50

CLASS A/C *See Notes

CLIENT: *MSQ-Maritime Assets & Infrastructure Unit*

Signature	
Hydrographic Surveyor	
Surveyor	A GHAZANFARI
Checked	T REISE

Queensland Government
HYDROGRAPHIC SERVICES
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ROSSLYN BAY
BOAT HARBOUR
HYDROGRAPHIC SURVEY
30 AUGUST 2021

Plot File. G005119P3.PDF
Job No. RK040050
Plan No. **G005-119**
SHEET 3 OF 3

Appendix D – Approvals & Permit Conditions

Marine Parks | Australian Government, Great Barrier Reef Marine Park Authority | Queensland Government

PERMIT

Great Barrier Reef Marine Park Regulations 1983 (Commonwealth)
Marine Parks Regulation 2006 (Queensland)

G16/38147.1

These permissions remain in force, unless sooner surrendered or revoked, for the following period:

22 MAR 2016 TO **1-APR-2026**

Permission is granted to:

PERMITTEE: **STATE OF QUEENSLAND**
Acting Through the Department of Transport and Main Roads

ADDRESS: **GPO Box 2595**
BRISBANE QLD 4000

for use of and entry to zones in the **Amalgamated Great Barrier Reef Marine Park Section** (as established by the *Great Barrier Reef Marine Park Act 1975* (Cth)) and the **Great Barrier Reef Coast Marine Park** (as established by the *Marine Parks Act 2004* (Qld)) in accordance with the details set out herein.

..... Date 21/03/2016.....
Delegate of the
Great Barrier Reef Marine Park Authority

..... Date 22/03/16
Delegate of the Chief Executive of the
Department of National Parks, Sport and Racing

The purpose/s of use and entry may only be undertaken in the zone/s and location/s described below.

Zone/s and location/s to which the permission applies:

GENERAL USE ZONE, HABITAT PROTECTION ZONE and CONSERVATION PARK ZONE – the coastal strip between Wreck Point and Zilzie Point.

Purpose/s of use and entry authorised by the permission:

CARRYING OUT WORKS – being:

- the dumping of up to a maximum of 210,000 cubic metres of maintenance dredge spoil material within the Approved Dredge Spoil Disposal Area; and
- the dumping of up to a maximum of 70,000 cubic metres of contingency maintenance dredge spoil material within the Approved Dredge Spoil Disposal Area,

associated with maintenance dredging of the Rosslyn Bay Boat Harbour.

CONDUCT OF A RESEARCH PROGRAM – being surveying, sampling and monitoring of environmental variables associated with dredging and disposal.

STANDARD CONDITIONS

1 All activities conducted under this Permission must be undertaken in accordance with the provisions of the laws in force from time to time in the State of Queensland and the Commonwealth of Australia.

2 The Permittee must ensure that when operations are conducted in the Marine Parks under this permit, this permit (or a copy), and any related documents such as the approved Environmental Management Plan are held at the site or sites of operation.

3 The Permittee must inform all participants in the activities permitted herein (including, but not limited to, the employees, officers, sub-contractors, and agents of the Permittee) of any relevant restrictions or requirements applying under any zoning plans, plans of management, Marine Parks regulations, this permit, the Deed and the Environmental Management Plan.

DEED CONDITIONS

4 Within 30 business days of the date of commencement of this permit, the Permittee must execute, seal and deliver as a Deed to the Great Barrier Reef Marine Park Authority, a Deed in the form annexed to this permit, identified with the permit number, and marked 'Deed of Agreement.'

5 The Permittee must, upon execution of the Deed, observe and perform its obligations under and pursuant to the Deed. Any breach of the Deed shall be a breach of this condition.

DREDGE SPOIL DISPOSAL CONDITIONS

6 The Permittee must not dispose of more of than 210,000 cubic metres of maintenance dredge spoil material in total to the Approved Dredge Spoil Disposal Area.

7 The Permittee must not dispose of more than 60,000 cubic metres of maintenance dredge spoil material to the Approved Dredge Spoil Disposal Area per year.

8 The Permittee must not dispose of more than 70,000 cubic metres of contingency maintenance dredge spoil material in total to the Approved Dredge Spoil Disposal Area.

9 The Permittee must not undertake the disposal of contingency maintenance dredge spoil material to the Marine Parks unless:
   (i) the Managing Agency has received prior written notification; and
   (ii) the Permittee complies with any directions of the Managing Agency in relation to such works or activities.

10 The Permittee when undertaking works in the Marine Parks, must use a Cutter Suction Dredge and associated pipeline, unless otherwise advised in writing by the Managing Agency.

11 The Permittee must not carry out any works within the Marine Parks associated with the Dredge Area unless the Managing Agency has advised the Permittee in writing that the relevant components of the Sampling and Analysis Plan and Sampling and Analysis Plan Report have been approved and the sediments are demonstrated to be suitable for unconfined ocean disposal.

12 The Permittee must not undertake the disposal of maintenance dredge spoil material to the Marine Parks without a permit for the works issued under the *Environment Protection (Sea Dumping) Act 1981*.

13 The Permittee must provide bathymetric surveys of the Approved Dredge Spoil Disposal Area to the Managing Agency within two (2) months of the completion of each disposal campaign authorised under this permit.

14 The Permittee must provide to the Managing Agency *in-situ* calculations of spoil material disposed to the Approved Dredge Spoil Disposal Area within two (2) months of the completion of each disposal campaign authorised under this permit. The volume calculations must be based on bathymetric surveys undertaken prior to work commencing and following the completion of dredging and disposal activities.

ENVIRONMENTAL HARM CONDITIONS

15 The Permittee must take all reasonable steps to ensure that activities carried out under this permit do not cause harm to the environment.

16 The Permittee must notify the Managing Agency, within 24 hours, of all incidents. The notification must include:
- (i) details of the incident including date, time, location, cause and nature of the incident;
- (ii) the name and contact details of the person(s) witnessing, reporting and/or responsible for the incident;
- (iii) the type, estimated volume and concentration of any pollutants involved;
- (iv) measures taken or proposed to be taken to manage the impact and the success of those measures in addressing the incident; and
- (v) any monitoring and reporting that will be undertaken.

17 The Permittee must keep a record of all incidents and produce the record for inspection upon request by the Managing Agency. Such records must be kept and made available for the term of the permit.

ENVIRONMENTAL MANAGEMENT PLAN CONDITIONS

18 The Permittee must submit to the Managing Agency for approval, an Environmental Management Plan, no later than 40 business days prior to the commencement of works or operations.

19 The Permittee must not commence any works or operations unless the Managing Agency has advised the Permittee in writing that the Environmental Management Plan has been approved.

20 The Permittee must comply with the current Environmental Management Plan as approved in writing by the Managing Agency.

21 The Managing Agency may request the Permittee to make revisions to the Environmental Management Plan, if required to meet the objects of the *Great Barrier Reef Marine Park Act 1975*.

22 The Permittee must ensure that any revisions to the Environmental Management Plan are approved in writing by the Managing Agency prior to implementation.

ENVIRONMENTAL SITE SUPERVISOR CONDITIONS

23 Where the Permittee is advised in writing by the Managing Agency that environmental site supervision of works is required, the Permittee must:
- (i) provide the 24-hour contact details of an on-site liaison officer whom the Environmental Site Supervisor can contact; and
- (ii) provide the Environmental Site supervisor with access to the works as and when they require.

24 The Environmental Site Supervisor is authorised to stop or suspend or modify works, which in their opinion have caused or are likely to cause environmental harm.

25 Where the Environmental Site Supervisor has directed the Permittee to cease works under condition 24, the Permittee must not recommence works unless authorised in writing by the Environmental Site Supervisor.

26 Where the Environmental Site Supervisor directs the Permittee to cease or modify works under condition 24, the conduct of the Permittee when complying with the order must be in accordance with: (i) any directions given by the Environmental Site Supervisor; or (ii) best environmental practice (where (i) does not apply).

27 The Permittee and its employees, contractors and subcontractors and agents must comply with any reasonable direction given by the Environmental Site Supervisor for the purpose of ensuring compliance with the Permit, Deed of Agreement, Environmental Management Plan or any direction considered necessary by the Environmental Site Supervisor for the conservation, protection and preservation of the Marine Parks and property in the Marine Park

INTERPRETATION AND DEFINITIONS

INTERPRETATION

This permit extends to all employees of the Permittee, or other persons, who are acting on behalf of, or at the direction of, the Permittee for the purposes specified in this permit.

This permit is not intended to extinguish any native title.

A law shall be taken to be a law in force in the State of Queensland notwithstanding that it applies to only part of the State.

A word or phrase in this permit has the same meaning as the word or phrase has in the *Great Barrier Reef Marine Park Act 1975*, the *Great Barrier Reef Marine Park Regulations 1983* (Cth), the *Marine Parks Act 2004 (Qld)*, the *Marine Parks Regulation 2006* (Qld), Zoning Plans or Plans of Management, unless the contrary intention appears.

A note or heading may be used to give assistance in interpreting conditions in case of ambiguity.

A reference to a date includes that date.

DEFINITIONS

'**Dredge Area**' is defined as the Rosslyn Bay Boat Harbour outer and inner entrance channel, internal public navigation channels, berthing areas, the secondary public channel and pile mooring area.

'Approved Dredge Spoil Disposal Area' is defined by the following coordinates (GDA94 datum): an area of 100 metre radius centred on Latitude 23° 9.13' south and Longitude 150° 47.8' east.

'coastal strip' means that area between the landward boundary of the Great Barrier Reef Coast Marine Park and a line every point of which is three (3) nautical miles from that boundary.

'contingency maintenance dredge spoil' means additional dredge spoil disposal other than regular maintenance disposal required to maintain existing facilities and navigable depths as a result of unexpected severe weather conditions.

'environment' includes:
(a) ecosystems and their constituent parts;
(b) natural and physical resources; and
(c) the qualities and characteristics of locations, places and areas, that contribute to their:
    (i) biodiversity and ecological integrity; or
    (ii) intrinsic or attributed aesthetic, cultural, heritage, ecological, economic, recreational, social, scientific value or interest or amenity.

'Environmental Management Plan' means the environmental management plan prepared by the Permittee (or at its direction), and approved by the Managing Agency in writing.

'Environmental Site Supervisor' means the person from time to time nominated in writing by the Managing Agency to the Permittee.

'harm' includes:
(a) any adverse effect;
(b) direct or indirect harm; and
(c) harm to which the person's use or entry has contr buted, to any extent (whether or not other matters have contr buted to the harm).

'harm' to the environment is material if:
(a) it involves actual or potential harm to the health or safety the environment that is not trivial and any act or omission that results in the pollution of the Marine Park; or
(b) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescr bed by the regulations). Loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment, that is not trivial or otherwise not authorised by this Permit.

'incident' means an event involving actual or potential harm to the ecosystem, including but not limited to:
(a) coral damage; or
(b) a cyclone; or
(c) any shipping event that requires notification to a relevant authority under the *Queensland Marine Act 1958* or the *Navigation Act 2012*; or
(d) any aircraft event that requires notification to the relevant Authority under the *Civil Aviation Act 1988*; or
(e) any discharge of more than five (5) litres of untreated sewage effluent; or
(f) any discharge of more than five (5) litres of hazardous chemicals, fuel or biotoxic products.

'maintenance' means all works to ensure that channels, berths or other port areas are maintained at their designed dimensions.

'Managing Agency' means:
(a) in relation to the Great Barrier Reef Marine Park, the Great Barrier Reef Marine Park Authority, a member of the staff of that Authority or a person referred to in Section 48A of the *Great Barrier Reef Marine Park Act 1975* (Cth) performing functions or exercising powers under that Act in accordance with an agreement referred to in that section; and
(b) in relation to a Great Barrier Reef Coast Marine Park, means the Chief Executive of the Department of National Parks, Sport and Racing, his/her Delegate, an officer of the Queensland Parks and Wildlife, or a person referred to in Section 52 of the *Marine Parks Act 2004* (Qld) appointed as an inspector.

'Marine Parks' means:
(a) the Great Barrier Reef Marine Park established by the *Great Barrier Reef Marine Park Act 1975* (Cth); and
(b) the Great Barrier Reef Coast Marine Park established pursuant to the *Marine Parks Act 2004* (Qld).

'Marine Parks regulations' means:
(a) in relation to the Great Barrier Reef Marine Park, the *Great Barrier Reef Marine Park Regulations 1983* (Cth); and
(b) in relation to the Great Barrier Reef Coast Marine Park, the *Marine Parks Regulation 2006* (Qld).

'per year' means each 12 month period starting from the commencement date of the permit.

'permit' means the permissions the subject of Permit Number G16/38147.1 granted to the Permittee pursuant to the *Great Barrier Reef Marine Park Regulations 1983* (Cth) and the *Marine Parks Regulation 2006* (Qld).

'Permittee' means STATE OF QUEENSLAND Acting Through the Department of Transport and Main Roads.

'Sampling and Analysis Plan' means a plan prepared in accordance with the *National Assessment Guidelines for Dredging 2009*.

Sampling and Analysis Plan Report means a report prepared in accordance with the *National Assessment Guidelines for Dredging 2009*.

'works' means all activities associated with installation, construction, maintenance and/or removal of all plant and materials comprising or used in connection with the permitted activities (including dredging, installations, structures, facilities, moorings, vessels or aircraft of any kind associated directly or indirectly with the permission) and the use (authorised or unauthorised) of the Marine Parks in connection with the permit.

'Zoning Plan' means:

(a) in relation to the Great Barrier Reef Marine Park, the Great Barrier Reef Marine Park Zoning Plan 2003 (Cth); and

(b) in relation to the Great Barrier Reef Coast Marine Park, the Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004 (Qld).

Commonwealth Sea Dumping Permit

Permit SD16/001

ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981 SEA DUMPING

PERMIT 16/001

for

State of Queensland acting through the Department of Transport and Main Roads

I, BRUCE ELLIOT, a delegate of the Minister for the Environment acting under Sections 19 and 21 of the *Environment Protection (Sea Dumping) Act 1981*, hereby grant a sea dumping permit to the State of Queensland acting through the Department of Transport and Main Roads, Brisbane, Queensland, to:

- load for the purposes of dumping, and to dump up to 210,000 cubic metres of seabed material, derived from maintenance dredging of the Rosslyn Bay Boat Harbour, and
- load for the purposes of dumping, and dump up to 70,000 cubic metres of seabed material, derived from contingency maintenance dredging of the Rosslyn Bay Boat Harbour,

commencing on the date of signature of this permit and extending until 1 April 2026, subject to conditions which are specified in Appendices 1 and 2.

DATE 21st day of March 2016

Bruce Elliot
Delegate of the Minister

This permit comprises nine (9) pages, including Appendices 1 and 2.

Appendix 1

CONDITIONS FOR DUMPING AT SEA OF SEABED MATERIAL DERIVED FROM MAINTENANCE DREDGING OF THE ROSSLYN BAY BOAT HARBOUR, QUEENSLAND

Definitions

In this permit:

the Act	means the *Environment Protection (Sea Dumping) Act 1981*;
Application	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* submitted by State of Queensland acting through Department of Transport and Main Roads on 16 February 2016;
Cetacean	means the migratory whales identified as of significance under the *Environment Protection and Biodiversity Conservation Act 1999*;
Contingency maintenance	means additional dredging other than regular maintenance dredging required to maintain existing facilities and navigable depths as a result of unexpected severe weather conditions;
Department	means the Department of the Environment or successor entities;
Disposal site	Means area bound by the following coordinates (GDA 94 Datum): an area of 100 metre radius centred on Latitude 23° 9.13' south and Longitude 150° 47.8' east.
Dumping activities	means all activities associated with the dumping permitted under this permit, including: (i) the loading for the purpose of dumping of dredged material; (ii) the dumping of the material at the prescribed disposal site;
Environmental incident	means any event which has the potential to, or does impact, on the environment;
Environmental risk	means any risk, which has the potential to, or does impact, on the environment
GPS	Global Positioning System;
Managing Agency	means: a) the Great Barrier Reef Marine Park Authority; and b) a member of the staff of that Authority or a person referred to in s.43 of the *Great Barrier Reef Marine Park Act 1975* performing functions or

	exercising powers under that Act In accordance with an agreement referred to in that section;
Marine Park	means the Great Barrier Reef Marine Park established by the *Great Barrier Reef Marine Park Act 1975*;
the Minister	means the Australian Government Minister who administers the *Environment Protection (Sea Dumping) Act 1981* and includes a delegate of the Minister;
monitoring zone	means the area within 300 metres of any point on the dredging/dumping run about to be commenced;
per year	means each 12 month period starting from the commencement date of the permit.
Vessel	means any vessel or vessels used for or in connection with the loading and/or dumping activities.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.

Material to be dumped

2. The State of Queensland acting through the Department of Transport and Main Roads must not dump more than 210,000 cubic metres of maintenance dredge spoil material in total to the **disposal site**.

3. The State of Queensland acting through the Department of Transport and Main Roads must not dump more than 60,000 cubic metres of maintenance dredge spoil material to the **disposal site**, **per year**.

4. The State of Queensland acting through the Department of Transport and Main Roads must not dump more than 70,000 cubic metres of **contingency maintenance** dredge spoil material in total to the **disposal site**.

5. The State of Queensland acting through the Department of Transport and Main Roads must not undertake **dumping activities** associated with **contingency maintenance** dredge spoil material unless:

   a. the **Managing Agency** has received prior written notification; and

   b. the State of Queensland acting through the Department of Transport and Main Roads complies with any directions of the **Managing Agency** in relation to such works or activities.

6. The State of Queensland acting through the Department of Transport and Main Roads must not carry out **dumping activities** unless the Managing Agency has advised the State of Queensland acting through the Department of Transport and Main Roads in writing that the relevant components of the Sampling and Analysis Plan and Sampling and Analysis Plan Reports have

been approved and the sediments are demonstrated to be suitable for unconfined ocean disposal in accordance with the *National Assessment Guidelines for Dredging 2009*.

Disposal Site

7. The State of Queensland acting through the Department of Transport and Main Roads must only dump within the **disposal site**.

8. The State of Queensland acting through the Department of Transport and Main Roads when undertaking **disposal activities** must use a Cutter Suction Dredge and associated pipeline, unless otherwise advised in writing by the Managing Agency.

9. The State of Queensland acting through the Department of Transport and Main Roads must establish by **GPS** that, prior to dumping; the **vessel** is within the **disposal site**.

Environmental Management Plan

10. The State of Queensland acting through the Department of Transport and Main Roads must develop and submit for the **Managing Agency** approval an Environmental Management Plan for managing the impacts on the environment from **dumping activities**. **Dumping activities** must not commence until an Environmental Management Plan is approved.
11. The State of Queensland acting through the Department of Transport and Main Roads must implement the approved Environmental Management Plan.

12. The State of Queensland acting through the Department of Transport and Main Roads may submit for the **Managing Agency** approval a revised version of the an Environmental Management Plan specified under Condition 10. If the **Managing Agency** approves such a revised Environmental Management Plan, the revised an Environmental Management Plan must be implemented.
13. If the **Managing Agency** believes that it is necessary or desirable for the better protection of the environment to do so, the **Managing Agency** may request the State of Queensland acting through the Department of Transport and Main Roads to make specified revisions to the Environmental Management Plan approved under Condition 10 and submit the revised Environmental Management Plan for the Minister's approval. If the **Managing Agency** approves a revised Environmental Management Plan pursuant to this condition, the State of Queensland acting through the Department of Transport and Main Roads must implement that Environmental Management Plan.

14. The Environmental Management Plan must be made available for the permit duration (electronically) on the State of Queensland acting through the Department of Transport and Main Roads website within 30 days of the Environmental Management Plan being approved by the **Managing Agency.**

Mitigation Measures for Protection of Marine Species

15. Before beginning **dumping activities**, the State of Queensland acting through the Department of Transport and Main Roads must check, using binoculars from the vessel, for **cetaceans** and/or dugongs within the **monitoring zone**.

16. If any **cetaceans** and/or dugongs are sighted in the **monitoring zone**, **dumping activities** must not commence in the **monitoring zone** until 20 minutes after the last **cetacean** and/or dugong is observed to leave the **monitoring zone** or the **vessel** is to move to another area of the **disposal site** to maintain a minimum distance of 300 metres between the vessel and any **cetacean** and/or dugong.

Environmental Risk and Incidents

17. If, at any time during the course of the dumping activities, an **environmental incident** occurs or **environmental risk** is identified, all measures must be taken immediately by the State of Queensland acting through the Department of Transport and Main Roads to minimise or mitigate the risk or the impact. The State of Queensland acting through the Department of Transport and Main Roads must provide a report on the environmental incident or environmental risk to the **Managing Agency** within 24 hours, with details of the incident or risk, the measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.

18. The State of Queensland acting through the Department of Transport and Main Roads must document any incidents involving the **dumping activities** that result in injury or death to any **cetacean** or dugong. The time and nature of each incident and the species involved, if known, must be recorded and the incident is to be reported to the **Managing Agency** within 24 hours.

Compliance of all Parties engaged in dumping activities

19. The State of Queensland acting through the Department of Transport and Main Roads must ensure that all persons engaged in the **dumping activities** under this permit, including the owner(s) and/or person(s) in charge of the **vessel**, comply with this permit and the requirements of the Act. The fulfilment of these conditions remains the responsibility of the State of Queensland acting through Department of Transport and Main Roads.

Access for Observers

20. If requested by the **Managing Agency** the State of Queensland acting through the Department of Transport and Main Roads must provide access for at least two nominees of the **Managing Agency** to witness, inspect, examine and/or audit any part of the operations, including any **dumping activities** or monitoring activities, the **vessel** or any other equipment, or any documented records. The State of Queensland acting through the Department of Transport and Main Roads must provide all reasonable assistance to the nominees of the **Managing Agency** for carrying out their duties.

Reporting

21. State of Queensland acting through the Department of Transport and Main Roads must make and retain records comprising either weekly plotting sheets or a certified extract of the ship's log which detail:

    a. the dates and times of when each dumping run commenced and finished;

    b. the position (as determined by **GPS**) of the dumping **vessel** at the beginning and end of each dumping run, including the path of each dumping run;

    c. the volume of dredged material (in-situ cubic metres) dumped and quantity in dry tonnes for the specified operational period and compared to the total amount permitted under the permit;

    d. the person(s) undertaking the marine species observation required in Condition 15 and any **cetaceans** and/or dugongs observed within the **monitoring zone** for each run, including the date, time and approximate distance from the **vessel**, and the action taken to comply with Condition 16; and

    e. the persons(s) responsible for the operation of the **vessel** at any time during **dumping activities**.

22. The State of Queensland acting through the Department of Transport and Main Roads must retain the records required by Conditions 17, 18 and 21 for verification and audit purposes.

23. The State of Queensland acting through the Department of Transport and Main Roads must ensure that a bathymetric survey of the disposal site is undertaken by a suitably qualified person:

a. prior to the commencement of **dumping activities** under this permit; and

b. within one month of the completion of **dumping activities** authorised under this permit.

24. Within two (2) months of the final bathymetric survey being undertaken, the State of Queensland acting through the Department of Transport and Main Roads must provide a digital copy of each of the bathymetric surveys to the Australian Hydrographic Office, Locked Bag 8801, Wollongong, NSW 2500.

25. The State of Queensland acting through the Department of Transport and Main Roads must provide a report on the bathymetry to the **Managing Agency** within two (2) months of the final bathymetric survey being undertaken. The report must include a chart showing the change in sea floor bathymetry as a result of dumping and include written commentary on the volumes of dumped material that appear to have been retained within the **disposal site**.

26. To facilitate annual reporting to the International Maritime Organization, State of Queensland acting through the Department of Transport and Main Roads must report to the **Department** and the **Managing Agency** by 31 January each year, including on the day of the expiry of the permit or completion of all **dumping activities** under this permit, information at Appendix 2 to this permit, or in a format as approved by the **Department** from time to time.

Appendix 2: Sea Dumping Permit International Reporting Requirements

Please fill in this form and return it by **email** to the Department of the Environment and the Great Barrier Reef Marine Park Authority, **by 31 January each year**. This information is required for Australia's international reporting obligations under the London Protocol.
Email: seadumping@environment.gov.au, and assessments@gbrmpa.gov.au quoting the permit reference number

Permit Holder: The State of Queensland acting through the Department of Transport and Main Roads
Address:
Submitted by:
Phone:
Email: Date: (/ /)

Permit Details:

1) Sea Dumping Permit number: SD16-001

2) Permit start date: (/ /) Permit end date: *(01/04/2026)*

3) Description of material *Please tick relevant box or boxes*

Capital Dredged Material ☐, Maintenance Dredged Material ☐, Fish Waste ☐,
Vessels ☐, Platforms or other man-made structures ☐, Sewage Sludge ☐,
CO_2 ☐, Organic Material of Natural Origin ☐, Bulky Waste ☐, Inert-Inorganic Geological Material ☐

4) Total permit quantity (cubic metres/number):

5) Approved disposal site/s: Geodetic Datum:

Latitude (North/South degrees, minutes, seconds)	**Longitude** (East/West degrees, minutes, seconds)

Annual Report:

6) Specify the calendar year this report applies to: _____

7) Quantity dumped in the specified calendar year. Please complete either section A or B.

A. For dredged material disposed please report against all of the following:

Quantity in in-situ cubic metres _____

_____

Quantity in dry weight tonnes _____

Remaining permit quantity

Briefly describe any conversion rates used:

B. Other wastes (number/volume/type):

8) Additional comments:

9) [redacted]
Yes ☐ No ☐

If yes, please complete questions 10-13 of this form.

Monitoring of the disposal site

10) What type(s) of field monitoring was undertaken?

Biological ☐, Geological ☐, Chemical ☐, Physical ☐, Other ☐ (explain)

11) When was field monitoring conducted?

Before dumping ☐, During dumping ☐, After Dumping ☐, Other ☐ (explain, provide dates)

12) Where any adverse impact(s) found beyond those that were predicted?
Yes ☐, No ☐
If yes, briefly describe the impacts (e.g. physical, chemical or biological) and their spatial or temporal variation.

13) Provide a website/URL link to Field Monitoring Reports, or any additional information.

ENVIRONMENTAL AUTHORITY FOR DREDGING

Part 8 of Permit EPPR02005514

Permit

Environmental Protection Act 1994

Environmental authority EPPR02005514

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPPR02005514

Environmental authority takes effect on: the day of approval.

The anniversary date of this environmental authority is **25 July**.

Environmental authority holder

Name	Registered address
Department of Transport and Main Roads T/A Maritime Safety Queensland	Floor 18, 313 Adelaide Street, BRISBANE QLD 4001

Environmentally relevant activity and location details

Environmentally relevant activities	Locations
16-(1b) Dredging >10000t but <100000t/yr	Bowen Boat Harbour Channel Adjacent to Lot 310 Plan SP198022
16-(1b) Dredging >10000t but <100000t/yr	864 Buccaneer Drive and Urangan Adjacent to Lot 253 Plan SP166261 and Adjacent to Lot 254 Plan SP150280
16-(1c) Dredging more than 100,000t but not more than 1,000,000t/yr	Boundary Street, Railway Estate QLD 481, Ross River Adjacent to Lot 5 on AP20194, Adjacent to Lot 792 on EP1518, Adjacent to Lot 56 on RP703354, Adjacent to Lot 791 on EP2348, Adjacent to Lot 773 on SP223346
16-(1b) Dredging >10000t but <100000t/yr	Cabbage Tree Creek Boat Harbour and Allpass Parade SHORNCLIFFE Adjacent to Lot 426 Plan SP158144
16-(1b) Dredging >10000t but <100000t/yr	Bird O'Passage Parade, Scarborough Adjacent to Lot 859 Plan SP158152 Location indicated in the submitted Queensland Transport and Main Roads drawings: BN-11-28-1 and BN-11-28-2
16-(1b) Dredging >10000t but <100000t/yr	Glenora Street, Wynnum Adjacent to Lot 508 Plan SP258083
16-(1c) Dredging >100000t but <1000000t/yr	Burnett River adjacent to 253 Kirbys Road, Kalkie Adjacent to Lot 1 Plan RP76219
16-(1b) Dredging >10000t but <100000t/yr	Rosslyn Bay Boat Harbour Adjacent to Lot 105 Plan SP161849 and Adjacent to Lot 106 Plan SP161849

Environmentally relevant activities	Locations
16-(1b) Dredging >10000t but <100000t/yr	470 Royal Esplanade MANLY QLD 4179 Adjacent to Lot 687 Plan SP172860
16-(1b) Dredging >10000t but <100000t/yr	Port of Cooktown Adjacent to Lot 83 Plan BS161 and Adjacent to Lot 82 Plan BS246 Webber Esplanade, Cooktown QLD
16-(1a) Dredging >1000t but <10000t/yr	Mossman River, Newell Beach Adjacent to Lot 382 SR864
16-(1b) Dredging >10000t but <100000t/yr	Port Douglas Boat Harbour Land on or adjacent to: Adjacent to Lot 126 Plan SR868, Adjacent to Lot 3 Plan SP183025, Adjacent to Lot 29 Plan USL8686, Adjacent to Lot 7 Plan RP846941, Adjacent to Lot 4 Plan SP158389, Adjacent to Lot 115 Plan SR632, Adjacent to Lot 6 Plan SP183013, Adjacent to Lot 136 Plan CP867066, Adjacent to Lot 138 Plan CP851586, Adjacent to Lot 122 Plan CP890712 and Adjacent to Lot 113 Plan SP105910
16-(1a) Dredging >1000t but <10000t/yr	Dredge Area-entrance channel to Pelican Park and CLONTARF QLD Adjacent to Lot 610 Plan CP859632
16-(1b) Dredging >10000t but <100000t/yr	Mooloolaba Boat Harbour Lot 1 Plan SP143293; and Coral Sea offshore: 513 356.000E - 7 049 180.000N 513 275.000E – 7 049 165.000N 513 204.153E – 7 049 114.802N 513 187.158E – 7 049 051.396N 513 491.828E – 7 048 782.532N 513 414.116E – 7 048 781.926N 513 173.678E – 7 048 994.107N 513 100.000E – 7 048 800.000N 512 800.000E – 7 048 800.000N 512 800.000E – 7 049 100.000N 513 356.000E – 7 049 358.604N
16-(1b) Dredging >10000t but <100000t/yr	Manly Boat Harbour, Manly 4179 Lot 687 Plan SP172860
16-(1b) Dredging >10000t but <100000t/yr	9 William Street Raby Bay Cleveland Lot 130 Plan SP120286
16-(1b) Dredging >10000t but <100000t/yr	Kedron Brook Lot 3 Plan SP224394

16-(1b) Dredging >10000t but <100000t/yr	Pumicestone Passage, opposite public boat ramp at Bellara, Bribie Island Adjacent to Lot 187 Plan SP172976
16-(1b) Dredging >10000t but <100000t/yr	Port Douglas Boat Harbour Adjacent to Lot 126 Plan SR868
16-(1a) Dredging >1000t but <10000t/yr	Adjacent to Lot 1860 Plan SP264300
Environmentally relevant activities	**Locations**
16-(1b) Dredging >10000t but <100000t/yr	Port of Hay Point HAYPOINT QLD 4740 Lot 126 Plan SP123776, Lot 143 Plan SP121683 and Lot 95 Plan SP194657
16-(2a) Extractive >5000t but <100 000t yr 16-(3a) Screening >5000t but <100 000t yr	Kinka Quarry Lot 1 Plan RP612846

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days)

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or

b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or

c) otherwise- one the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Planning Act 2016* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.
If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

11 August 2021

Signature Date

Liz Clarke
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Utilities and Government Organisations Assessment
Department of Environment and Science
Phone: 1300 130 372
Email: palm@des.qld.gov.au

Part 8 – EPPR02005514 (Former EPPR03292815)

Location: Rosslyn Bay Boat Harbour
Lot 105 on Plan SP161849 and Lot 106 on Plan SP161849

Relevant activity:
16-(1b) Dredging >10000t but <100000t yr

The environmentally relevant activity conducted at the locations as described above must be conducted in accordance with the following site specific conditions of approval.

Agency interest: General	
Condition number	**Condition**
P8-G1	Activities conducted under this environmental authority must be conducted in accordance with approved drawings as specified in *Part 8 – Approved Plans*.
P8-G2	All reasonable and practicable **measures** must be taken to minimise the likelihood of environmental harm being caused.
P8-G3	Any breach of a condition of this environmental authority, must be reported to the **administering authority** as soon as practicable, or at most, within 24 hours of **you** becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
P8-G4	Other than as permitted by this environmental authority, the **release of a contaminant into the environment** must not occur.
P8-G5	All information and records that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. Environmental monitoring results must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the **administering authority** upon request.
P8-G6	An **appropriately qualified person(s)** must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
P8-G7	All analyses required under this environmental authority must be carried out by a laboratory that has **NATA** certification, or an equivalent certification, for such analyses.
P8-G8	When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority**, to investigate a complaint that is not considered by the **administering authority** to be frivolous or vexatious, of environmental nuisance arising from the **activity**. The monitoring results must be provided to the **administering authority** upon request.
P8-G9	The **activity** must be undertaken in accordance with written procedures that: 1. identify potential risks to the environment from the **activity** during routine operations, closure and an emergency; 2. establish and maintain control **measures** that minimise the potential for environmental harm; 3. ensure plant, equipment and **measures** are maintained in a proper and effective condition;

	4. ensure plant, equipment and **measures** are operated in a proper and effective manner; 5. ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994;* and 6. ensure that reviews of environmental performance are undertaken at least annually.
P8-G10	Provide to the **administering authority** written notification of the date when **dredging** will commence at least five (5) business days prior to establishing a new **dredging activity**.

Agency interest: Air

Condition number	Condition
P8-A1	Odours or airborne contaminants which are **noxious** or **offensive** or otherwise unreasonably disruptive to public amenity or safety must not cause nuisance to any **sensitive place** or **commercial place**.

Agency interest: Water

Condition number	Condition
P8-WT1	The only contaminants to be released to surface **waters** are sediment extracted from the dredged areas of the Rosslyn Bay Boat Harbour and disposed of to the offshore disposal area in accordance with the relevant drawings specified in condition P8-G1.
P8-WT2	Dredging must not result in a visible sediment plume beyond 500m of the **dredging** site.
P8-WT3	The offshore disposal of sediment must not result in a visible plume beyond 500m of the placement area.
P8-WT4	In addition to P8-WT1, the release to **waters** must not: 1. have any other properties at a concentration that is capable of causing environmental harm; 2. produce any slick or other visible evidence of oil or grease, nor contain visible floating oil, grease, scum, litter or other visibly objectionable matter.

Agency interest: Noise

Condition number	Condition
P8-N1	Noise from the **activity** must not cause environmental nuisance to any **sensitive place** or **commercial place**.
P8-N2	The method of measurement and reporting of noise levels must comply with the latest edition of the **administering authority** noise measurement manual.

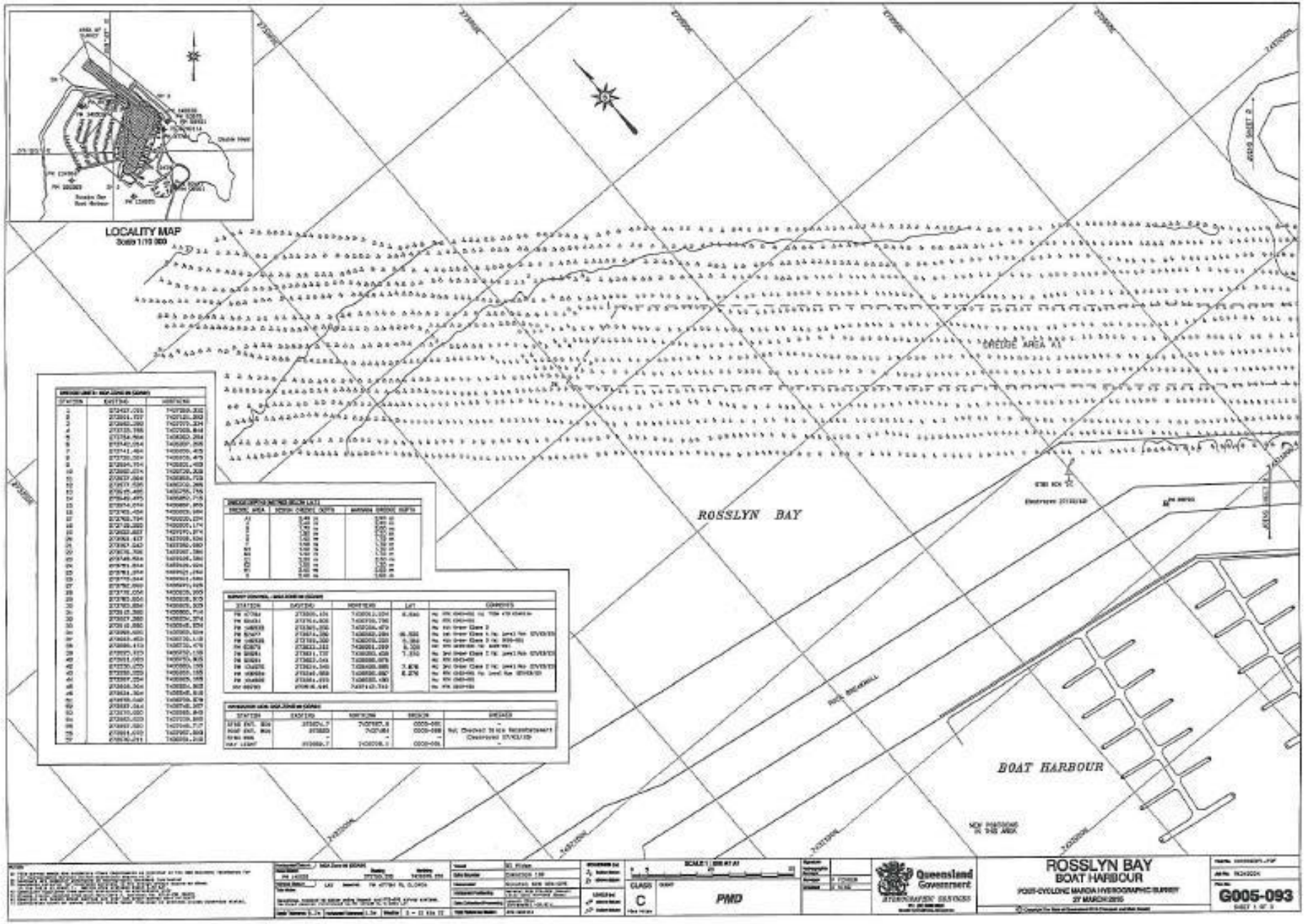
Agency interest: Land	
Condition number	**Condition**
P8-L1	Treatment and management of acid sulfate soils must comply with the current edition of the *Queensland Acid Sulfate Soil Technical Manual.*

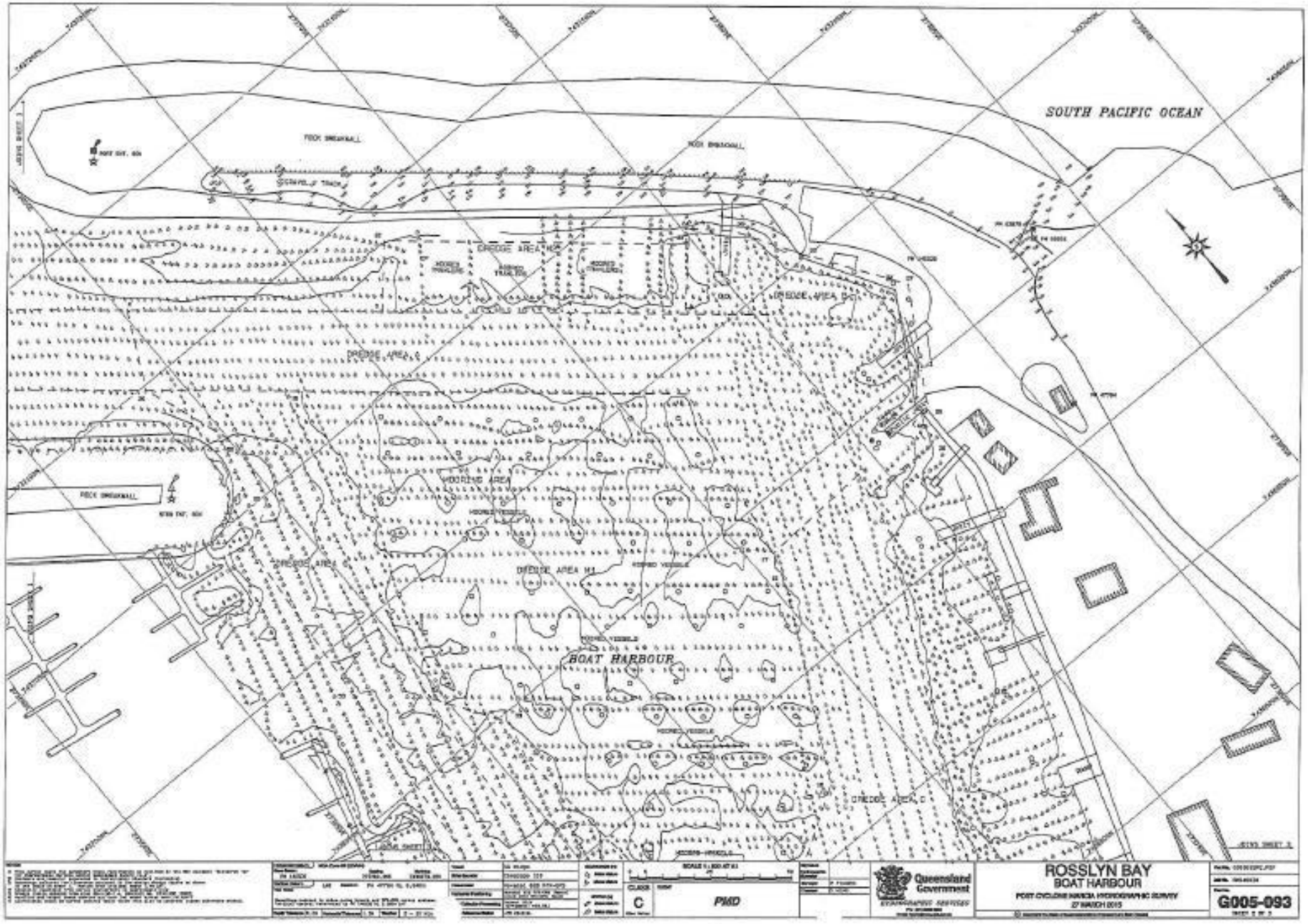
Agency interest: Waste	
Condition number	**Condition**
P8-WS1	All waste generated in carrying out the **activity** must be reused, recycled or removed to a facility that can lawfully accept the waste.

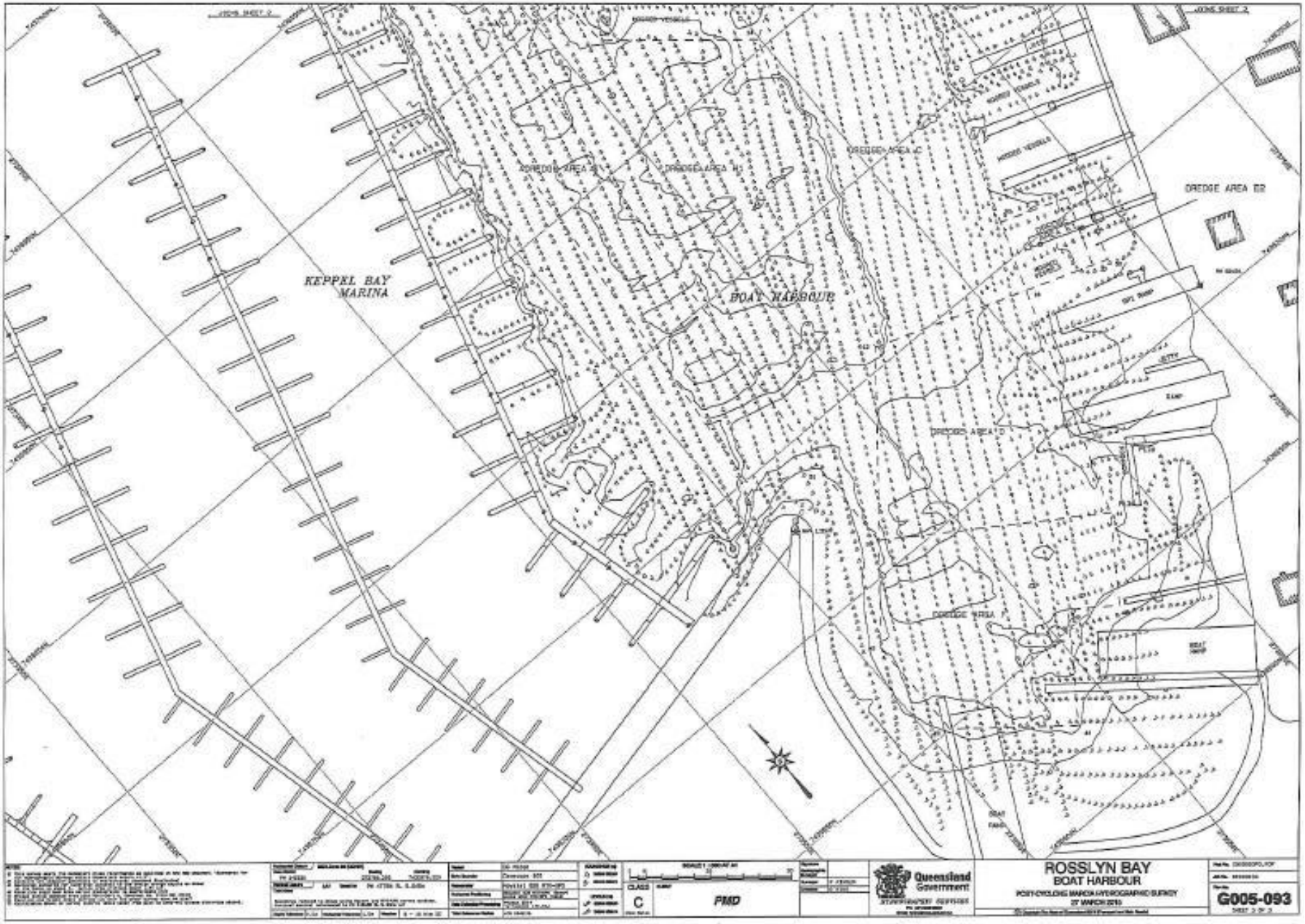
Part 8 – Approved Plans (Sheets 1-5)

Activities conducted under this environmental authority must be conducted in accordance with the following approved drawings.

a. Job Number RK040034, Plan Number G005-093, titled 'Post–Cyclone Hydrographic Survey', prepared by PMD for Department of Transport and Main Roads, dated 27 March 2015, Sheet 1 of 3.
b. Job Number RK040034, Plan Number G005-093, titled 'Post–Cyclone Hydrographic Survey', prepared by PMD for Department of Transport and Main Roads, dated 27 March 2015, Sheet 2 of 3.
c. Job Number RK040034, Plan Number G005-093, titled 'Post–Cyclone Hydrographic Survey', prepared by PMD for Department of Transport and Main Roads, dated 27 March 2015, Sheet 3 of 3.
d. File Number 467/00222, Contract Number QT12-132, Drawing Number Sketch 1, titled 'Maintenaance Dredging (LV70) – 2012 Dredge Area Layout'.
e. Job Number RK020021, Plan Number G005-069, titled Spoil Ground Pre-Dredge Hydrographic Survey', prepared by Transport Infrastructure Branch Queensland Government, dated 19-22 April 2006.


LOCALITY MAP
Scale 1:10 000
ROSSLYN BAY
BOAT HARBOUR
PMD
ROSSLYN BAY
BOAT HARBOUR
Queensland Government
G005-093


SOUTH PACIFIC OCEAN
DREDGE AREA H
DREDGE AREA G
DREDGE AREA F
DREDGE AREA H1
DREDGE AREA C
BOAT HARBOUR
ROCK BREAKWALL
HOOKED VESSELS
Queensland Government
ROSSLYN BAY
BOAT HARBOUR
POST CYCLONE NANCY HYDROGRAPHIC SURVEY
27 MARCH 2015
G005-093
PWD


KEPPEL BAY
MARINA
BOAT HARBOUR
DREDGE AREA B
DREDGE AREA C
DREDGE AREA D
DREDGE AREA E
DREDGE AREA
Queensland
Government
ROSSLYN BAY
BOAT HARBOUR
POST-CYCLONE MARCIA HYDROGRAPHIC SURVEY
27 MARCH 2015
G005-093
CLASS
C
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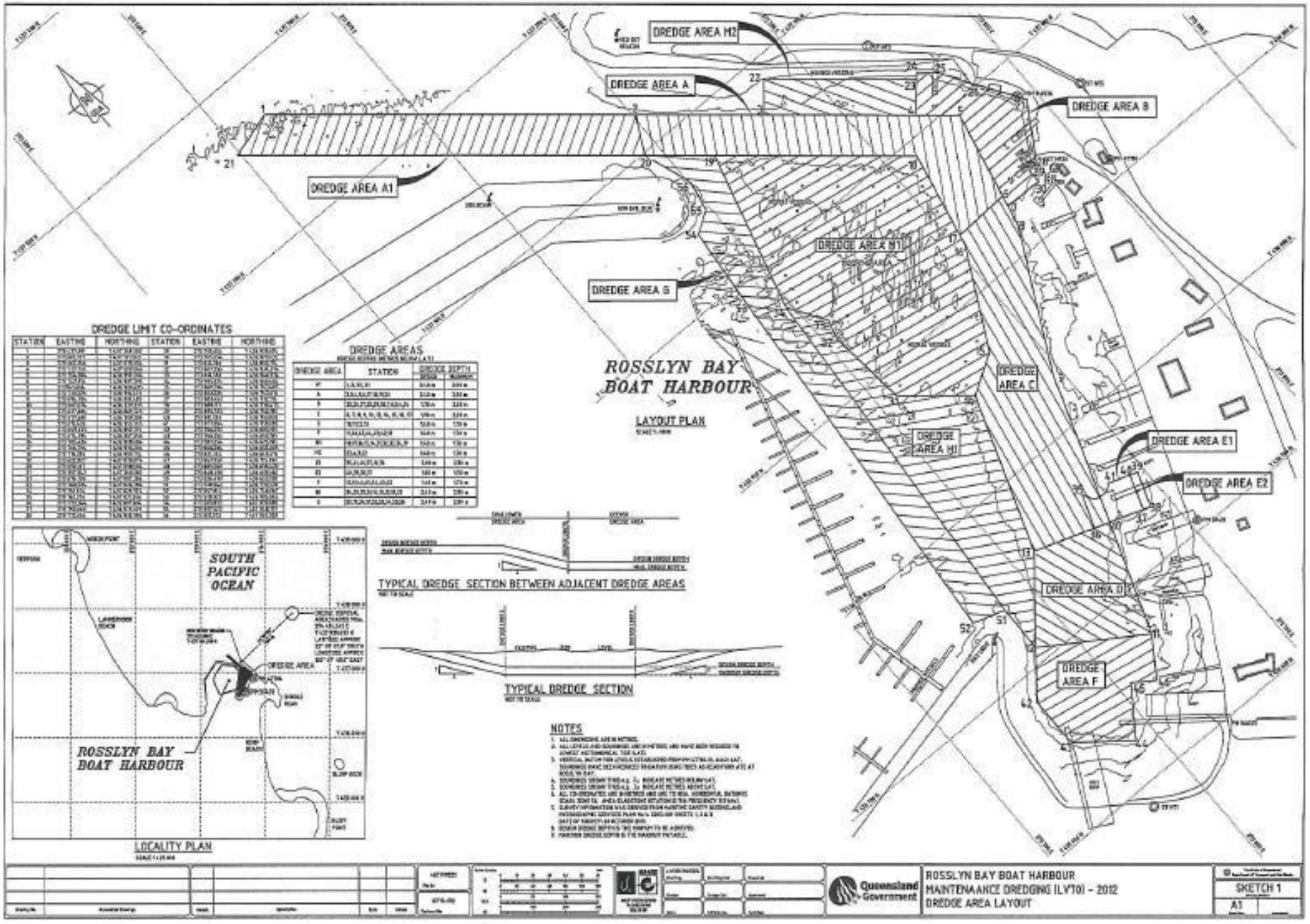
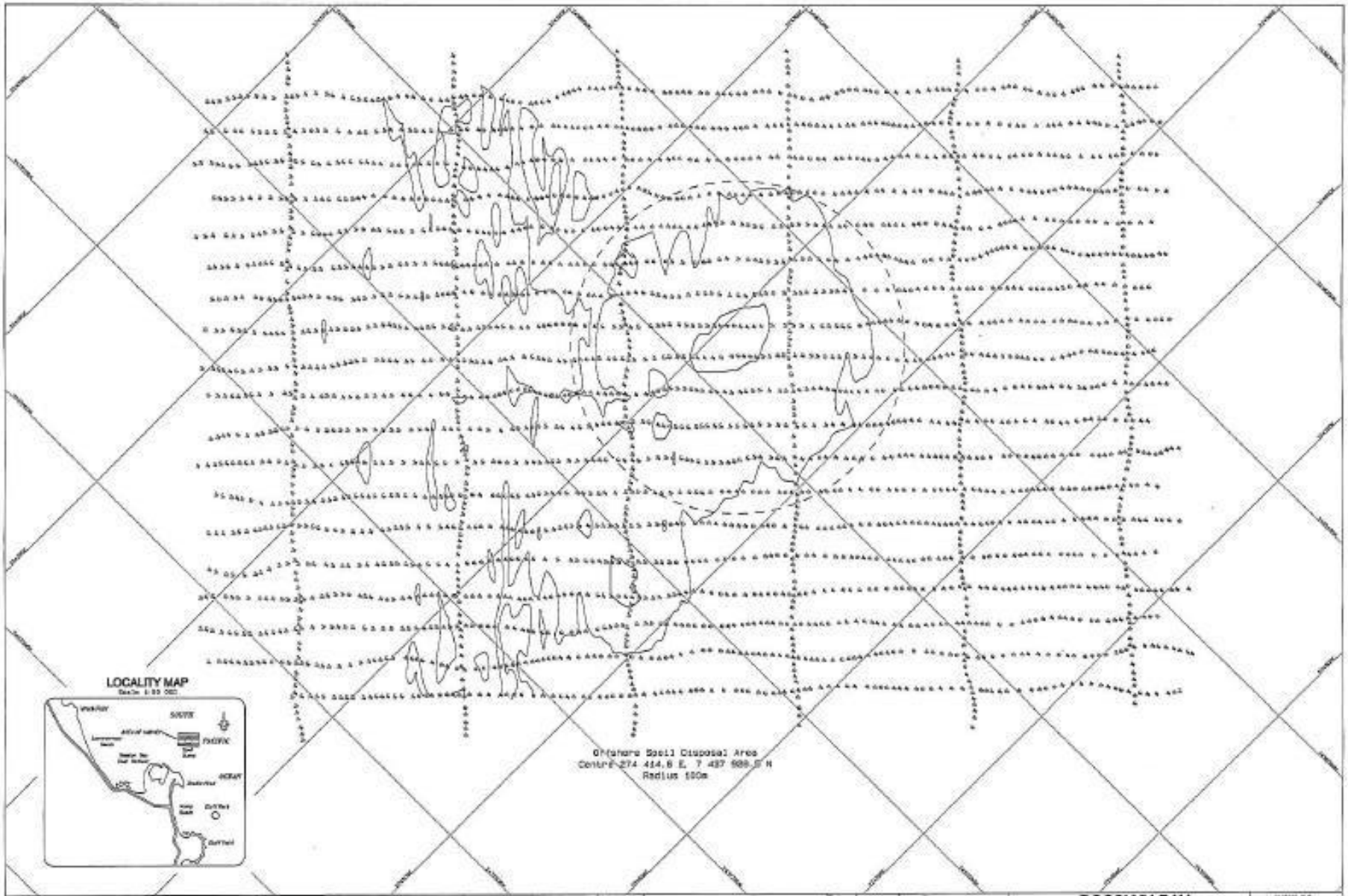

DREDGE AREA H2
DREDGE AREA A
DREDGE AREA B
DREDGE AREA A1
DREDGE AREA H1
DREDGE AREA G
DREDGE AREA C
DREDGE AREA E1
DREDGE AREA E2
DREDGE AREA D
DREDGE AREA F
ROSSLYN BAY BOAT HARBOUR
LAYOUT PLAN
DREDGE UNIT CO-ORDINATES
DREDGE AREAS
TYPICAL DREDGE SECTION BETWEEN ADJACENT DREDGE AREAS
TYPICAL DREDGE SECTION
NOTES
SOUTH PACIFIC OCEAN
ROSSLYN BAY BOAT HARBOUR
LOCALITY PLAN
Queensland Government
ROSSLYN BAY BOAT HARBOUR
MAINTENANCE DREDGING (LVT0) - 2012
DREDGE AREA LAYOUT
SKETCH 1
A1


LOCALITY MAP
Offshore Spoil Disposal Area
Centre 274 414.6 E, 7 487 989.0 N
Radius 500m
Queensland Government
HYDROGRAPHIC SURVEYS
ROSSLYN BAY
SPOIL GROUND
PRE-DREDGE HYDROGRAPHIC SURVEY
G005-069

STATE TIDAL WORKS APPROVAL

DERM Permit No. SPDC02622311 (December 2011)

Department of Environment
and Resource Management

CERTIFIED COPY
I hereby certify that this is a true and correct copy of the original document which I have sighted.
Signed:
Name: Sandra Joy Flanagan
Date: 12/01/12

COMMISSIONER FOR DECLARATIONS
DEPARTMENT OF JUSTICE AND ATTORNEY-GENERAL
Reg. No. 8880

RECEIVED
DATE 16/1/12 BY

Notice

Decision notice

Department of Environment
and Resource Management

This notice is issued by the Department of Environment and Resource Management pursuant to section 334 (decision notice) of the Sustainable Planning Act 2009 ("the Act').

Chris
for Felicity
16/1/12

The Department of Transport and Main Roads

GPO Box 2595
BRISBANE QLD 4000

Attn: Naomi Cleaves
Ref: 215/1250
Our reference: ROK6325

cc. Maritime Safety Queensland
PO Box 123
GLADSTONE QLD 4680
Attn: Mike Lutze
Ref: PI 5927

Re: Application for development approval

1 Application Details

Date application made to DERM: 25 August 2011

Development approval applied for: Development Approval

Aspect of development:

Operational work — For tidal works or work within a coastal management district	Sustainable Planning Regulation 2009 - Schedule 3, Part 1, Table 4, item 5	DERM ref. no.: 291327 DERM Permit No: SPDC02622311

Development description: Dredging within the Rosslyn Bay Harbour for a navigational channel and disposal of the dredge material offshore.

Property/Location description: Development Location: Lot 105 SP161849
Disposal Location: 100 metres radius from the centre point of:
274 414.6 E
437 928.5 N

2. The name and address of each referral agency is as follows.

Concurrence Agency	Concurrence Agency Ref. Number
Maritime Safety Queensland PO Box 123 GLADSTONE QLD 4680	PI 5927

3. The Chief Executive, Department of Environment and Resource Management (DERM) decision notice, for the aspect of development involved with the application the subject of this Notice is as follows.

The application was decided on 8 December 2011 and is approved subject to conditions.

Notice
Decision notice

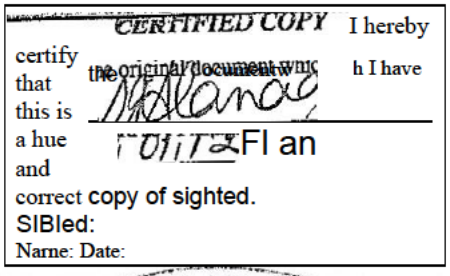
4. **Approved plans and specifications**

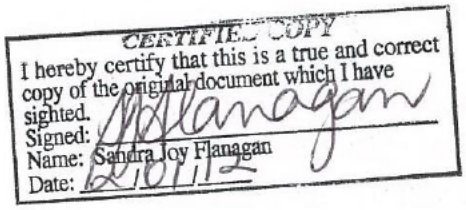
Document No.	Document Name	Date
RS-1-19-9	Offshore Disposal Area	2-5-96
RBBH- TW- 001	Tidal Works Layout – Area H	15-8-11

Delegate
Sandra Flanagan
Chief Executive administering Coastal Protection and Management Act 1995
Department of Environment and Resource
Management 8 December 2011

Attachments

Information Sheet — Appeals — Sustainable Planning Act 2009 (extract from the Sustainable Planning Act 2009) Approved plans and specifications
Concurrence agency conditions — Maritime Safety Queensland





Department of Environment and Resource Management

Sustainable Planning Act 2009

DERM Permit [1] number: SPDC02622311

Date application received:	25 August 2011
Permit type:	Development Approval
Date of decision:	8 December 2011
Decision:	For a decision notice the application is approved subject to conditions, and the assessment manager's conditions are stated in this permit, and any concurrence agency conditions are attached to this permit in the exact form given by the concurrence agency named on the attachment
Relevant laws and policies:	Sustainable Planning Act 2009 Coastal Protection and Management Act 1995
Jurisdiction(s):	

Operational work — For tidal works or work within a coastal management district	Sustainable Planning Regulation 2009 - Schedule 3, Part 1, Table 4, item 5	DERM ref. no.: 291327 DERM Permit No.: SPDC02622311

Development Description(s)

Property/Location	Development

<u>Development Location</u> Lot 105 SP161849	Tidal works in, on, or above tidal waters	Dredging within the Rosslyn Bay Harbour for a navigational channel and disposal of the dredge material offshore.
<u>Disposal Location</u> 100m radius from the centre point of: 274 414.6 E 437 928.5 N As shown on plan RS-I-19-9	Disposing of dredge spoil or other solid waste material in tidal waters (other than under an allocation notice under the Coastal Protection and Management Act 1995)	

Reason(s) for inclusion conditions

In accordance with section 289 of the Sustainable Planning Act 2009, the reason(s) for inclusion of conditions stated in this permit required by the concurrence agency response for the application are as follows:

The Department of Environment and Resource Management (DERM) is the assessment manager pursuant to Schedule 4, Table 4, Item 1 Sustainable Planning Regulation 2009 for the development and assesses the

[1] Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation administered by the Department of Environment and Resource Management.

application against the Coastal Protection and Management Act 1995 pursuant to Schedule 6, Table 4, Item 1 of the Sustainable Planning Regulation 2009 and can impose conditions pursuant to section 106 of the Coastal Protection and Management Act 1995.

The activity for which this development approval is issued is simply a reinstatement of the activity as prescribed in the legislation at the time of issuing this development approval. Where there is any conflict between the above description of the activity for which this development approval is issued and the conditions as specified in the development approval as to the scale, intensity or manner of carrying out of the activity, then such conditions prevail to the extent of the inconsistency.

This development approval authorises the activity. It does not authorise environmental harm unless a condition within this development approval explicitly authorises that harm. Where there is no condition or the development approval is silent on a matter, the lack of condition or silence shall not be construed.as authorising harm

This approval does not remove the need to obtain any further approval for this development, which may be required pursuant to this or other legislation, both State and Commonwealth. Applicants are advised to check with all relevant statutory authorities for such approvals as may be required.

Appeal Rights

Chapter 7, Part 1, Division 8 of the Sustainable Planning Act 2009 details your appeal rights regarding this decision. Please find attached as Attachment 1 .

Effectiveness periods

This development approval takes effect -

- From the time the decision notice is given, if there is no submitter and the applicant does not appeal the decision to the court; or
- When the submitter's appeal period ends, if there is a submitter and the applicant does not appeal the decision to the court; or
- Subject to the decision of the court, when the appeal is finally decided, if an appeal is made to the court

Currency periods Delegate Delegate **Sandra Flanagan**

Subject to section 341 of the Sustainable Planning Act 2009, the development approval will lapse unless the development is substantially started before 8 December 2013.

Chief Executive administering Coastal Protection and Management Act 1995,
Department of Environment and Resource Management
8 December 2011

CERTIFIED COPY
I hereby certify that this is a true and correct copy of the original document which I have sighted.
Signed:
Name: Sandra Joy Flanagan
Date: 12/01/12

COMMISSIONER FOR DECLARATIONS
DEPARTMENT OF JUSTICE AND ATTORNEY-GENERAL
Reg. No. 8880

and

CONDITIONS

General

1. The extractive operations must be confined to 'Area H' and the maximum quantity to be removed from 'Area H' is 30 000 cubic meters.

2. All dredge spoil must be deposited within a 100 metre radius of the central point of 274 414.6 E, 437 928.5

3. Any material subject to this application that is deposited outside of the approved location specified in Condition 3 must be removed.

Start of Works

4. The DERM is to be advised, by written communication, of the date of work commencement at least five (5) business days prior to the commencement date.

Construction

5. Construction of the works shall be carried out using suitable plant and equipment consistent with meeting the requirements of conditions of this approval and with preventing environmental harm.

6. Excavation must not extend past -2.9 metres below Lowest Astronomical Tide (LAT).

7. Contaminants must not be released or discharged directly or in-directly to any bed or banks of any watercourses or marine waters, groundwater or stormwater systems, including silt run-off, oil and grease spills from machinery, concrete truck washout and alike, unless otherwise permitted through this permit (e.g. wastewaters during disposal).

8. The chief executive administering the Coastal Protection and Management Act 1995 may order the applicant to take reasonable action or cease works if the delegate deems the operations are causing adverse effects on coastal management or adjoining ecological habitats.

Acid Sulfate Soils

9. If acid sulphate soils are found to be present in areas subject to excavation, or sediments within the dredge spoil, then the works must be managed to prevent release of acidic drain water to any natural waters in accordance with procedures outlined in the following documents:
   a. State Planning Policy 2/02 Guideline: Acid Sulfate Soils;
   b. Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998; and
   c. Queensland Acid Sulfate Soil Technical Manual Soil Management Guidelines, 2002

10. Construction activities shall not directly or indirectly cause the release of acidic water (pH less than 6.5) from the site to waters as a result of oxidation of potential acid sulfate soils resulting from excavation or displacement.

Water Pollution

'l l . All excavation incl disposal activities must be conducted so that changes in water chemistry will not impact on surrounding ecological values.

•32. Disposal operations must be carried out taking all suitable measures necessary to minimise the concentration of suspended solids released.

13. Where there are any signs of turbidity, suitable measures must be implemented to maintain water quality (e.g. silt booms) such that any suspended sediments and resulting contaminated water is prevented from dispersing through the tidal waters.

14. The dredge spoil must;

    a. not have any properties which are capable of causing environmental harm; and

    b. not produce any slick or other visible evidence of oil or grease, nor contain any visible floating oil, grease, scum, litter or other offensive matter.

15. The disposal operations must not result in a visible increase in water turbidity beyond the disposal site, being the 100 metres radius of central point of 274 414.6 E, 437 928.5 N.

16. If water turbidity extends past the 100 metres radius of central point of 274 414.6 E, 437 928.5 N, then the DERM is to be notified and action is to be taken to reduce turbidity plumes, which may include decreasing disposal frequency or ceasing disposal operations.

Monitoring

17. Water quality monitoring must be conducted in accordance with the methods prescribed in the DERM Monitoring and Sampling Manual 2009 or more recent editions or supplements to that document as such become available

18. Water quality monitoring results provided to DERM on a monthly basis for the duration of the works approved under this permit.

19. Daily visual monitoring and weekly photographic monitoring of the water quality originating at the excavation and disposal locations is to be undertaken and records retained at least for the period of the works. These photographs must be provided to DERM every fortnight.

Post-Construction

20. The DERM is to be advised within ten (10) days following completion of the works.

21. The permit holder must, within three (3) months of the completion of the works, submit to the DERM documents evidencing:-

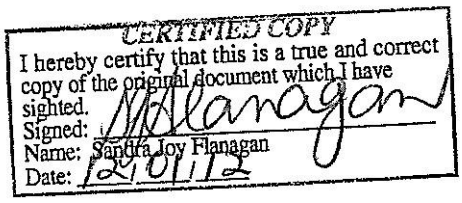
    a. The works have been constructed in accordance with the approved drawings and the conditions of this development approval;

    b. The works are adequate for anticipated usage; and

    c. Cross sectional bed level surveys of 'Area H' and the disposal location.

Maintenance

22. The chief executive administering the Coastal Protection incl Management Act 1995 may order the works to be modified, within a reasonable time, if the works have or are likely to have a significant effect on coastal management.



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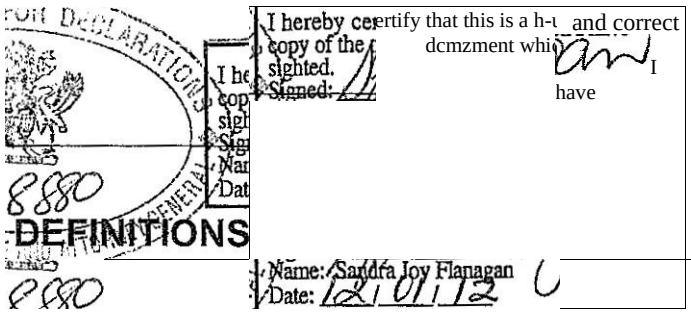


DEFINITIONS

DERM Permit number: SPDC02622311

"-Words•änd phrases used throughout this permit[l] are defined below. Where a definition for a term used in this permit[l] is sought and the term is not defined within this permit the definitions provided in the relevant legislation shall be used.

"administering authority" means the DERM or its successor.

"approval" means 'notice of development application decision' or 'notice of concurrence agency response' under the Sustainable Planning Act 2009.

"approved plans" means the plans and documents fisted in the approved plans section in the notice attached to this concurrence response.

"artificial waterway" means an artificial channel, lake or other body of water. Artificial waterway includes — ▪ an artificial channel that is formed because the land has been reclaimed from tidal water and is intended to allow boating access to allotments on subdivided land; ▪ other artificial channels subject to the ebb and flow of the tide; and ▪ any additions or alterations to an artificial waterway.

"canal" means an artificial waterway surrendered to the State. A canal is an artificial waterway connected, or intended to be connected, to tidal water; and from which boating access to the tidal water is not hindered by a lock, weir or similar structure.

"coastal dune" means a ridge or hillock of sand or other material on the coast and built up by the wind.

"commercial place" means a place used as an office or for business or commercial purposes.

"dredge spoil" means material taken from the bed or banks of waters by using dredging equipment or other equipment designed for use in extraction of earthen material.

"dwelling" means any of the following structures or vehicles that is principally used as a residence —

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

"Department of Environment and Resource Management (DERM)" means the department or agency (whatever called) administering the Coastal Protection and Management Act 1995 or the Environmental Protection Act 1994.

"erosion prone area" means an area declared to be an erosion prone area under section 70(1) of the Coastal Protection and Management Act 1995.

"high water mark" means the ordinary high water mark at spring tides.

"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"permit" includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation administered by the DERM and the Queensland Parks and Wildlife.

"ponded pasture" means a permanent or periodic pondage of water in which the dominant plant species are pasture species used for grazing or harvesting.

"protected area" means — a protected area under the Nature Conservation Act 1992; or a marine park under the Marine Parks Act 1992; or a World Heritage Area.

"quarry material" means material on State coastal land, other than a mineral within the meaning of any Act relating to mining. Material includes for example stone, gravel, sand, rock, clay, mud, silt and soil, unless it is removed from a culvert, stormwater drain or other drainage infrastructure as waste material'.

"site" means land or tidal waters on or in which it is proposed to carry out the development approved under this development approval.

"tidal water" means the sea and any part of a harbour or watercourse ordinarily within the ebb and flow of the tide at spring tides.

"watercourse" means a river, creek or stream in which water flows permanently or intermittently
- in a natural channel, whether artificially improved or not; or
- in an artificial channel that has changed the course of the watercourse.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part-thereof.

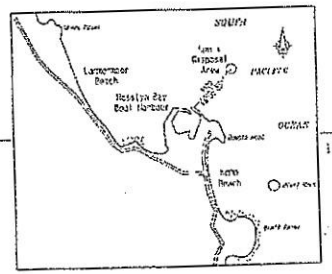
"waterway" includes a river, creek, stream, watercourse or inlet of the sea

"works" or "operation" means the development approved under this development approval.

"you" means the holder of this development approval or owner / occupier of the land which is the subject of this development approval.

END OF CONDITIONS

APPROVED



LOCALITY PLAN
SCALE 1:20 000

TIDAL DATUM NOTE

0.06

DATUM OF HYDROGRAPHIC SURVEY

NOTES

1. All dimensions are in metres.
2. All levels and soundings are in metres and have been reduced to Lowest Astronomical Tide (L.A.T.).
3. Vertical datum for levels across ridges and troughs is 6.6 L.A.T.
4. Soundings shown thus 6 are 6 decimal 7 metres below L.A.T.
5. Soundings presentation on this drawing has complied with Hydrographic Transport Drawing Number 0209-2nd (dated February 1978).
6. All coordinates are in metres and are in the Australian Map Grid.
   Horizontal datum is AGD 84 Zone 56.
   Base station - Boat Shed
   Eastings: 223 671.6
   Northing: 7 426 737.5

I certify a copy of this plan was duly certified pursuant to Section 99 of the Coastal Waters Act 1980 on the 1 day of May 19 96 subject to the conditions specified in the Department's letter dated 5th May 96

L.P.O. Bryant
Delegate of Director-General, Queensland Transport
Regional Director (Central Region)
Department of Transport

SPOIL DISPOSAL SITE PLAN
SCALE 1:5000

Drawing No.	Description	Date	Approved
RS-1-19-9	LAYOUT, SECTIONS, SITE PLAN AND NOTES		

Prepared Drawings

199-21-327	
1412-23	

Public Relations | Surface Protection

Designed: K.S. Sheehan, Drafting Officer
Checked: R.S.A., Senior Officer
Approved: R.S.A., Senior Officer
Engineering Officer: L.P.O. Bryant, Manager Mining
Date: 2-5-96

QUEENSLAND TRANSPORT
Queensland Department of Transport, Technology Division, Business Centre

ROSSLYN BAY BOAT HARBOUR
DREDGING 1996
OFFSHORE SPOIL DISPOSAL AREA

RS-1-19-9
Drawing Number

13.10.201 L

Queensland
Government

Trevor Carter
Principal Engineer (Dredging)

Department of Transport and Main Roads
Floor 20 Mineral House
4t George Street Brisbane QId 4000

Department of
Transport and Main Roads

Dear Trevor

Tidal Early Concurrence response application for dredging Rosslyn Bay State Boat Harbour, Rosslyn Bay (Lot 105 on SP161849 and Lot 106 on SP161849)

As a concurrence agency, Maritime Safety Queensland has no Objection to the proposal provided the following navigation and marine safety conditions are addressed.

1. The contractor must complete the dredging according to Jones Flint & Pike Drawing No RSI-19-5B, RS-I-19-3, attached to letter dated 19 September 2011.

2. The constructing authority must inform, in writing Maritime Safety Queensland, Regional Harbour Master, Gladstone at least 14 days prior to commencement of the works including the following:

a, The proposed date of commencement of construction or the establishment of plant on the site.

b. The proposed timetable associated with the works.

c. The name and address of the on-site contractor undertaking the works.

d. The name and telephone number (work and after hours) of a contact for the on-site contractor.

3. The constructing authority must issue any notices or advertisements as required by the Regional Harbour Master.

4. The applicant or his agent are responsible for the removal of any existing structure, must ensure all works, including debris containment, removal and disposal, do not compromise or impede safe navigation,

5. All floating plant and mooring for such plants shall be kept clear of navigation channels when working or mooring, and the moorings shall be marked and lit in accordance with the requirements of the Regional Harbour Master or his representative,

6. The, constructing authority must supply, install and maintain, at its own cost, any navigation lights, buoys, Inarks and any warning signs which the Regional Harbour Master, Gladstone . considers necessary. All navigation aids must be constructed and operated in •accordance with the requirements of Queensland Transport (Marine Operations).

7. All Flood lighting or other lighting, except navigation lighting, installed on the structures or surrounds must be shielded to seaward so as not to cause a navigation hazard to the satisfaction of the Regional Harbour Master, Gladstone.

8. The dredging must be carried out totally within the approved real property boundary line,

9. The proponent must ensure that all works are undertaken in accordance with the provision and conditions of any relevant International Conventions. .

10. All marine plant and equipment used by the constructing authority must:

    a. Carry the lights and shapes prescribed by The International Regulations for the Prevention of Collision at Sea 1972 and to the satisfaction of the Regional Harbour Master, Gladstone.
    b. Be in Queensland Registration as required by the transport Operations (Marine safety) Act 1994 and the Transport Operations (Marine Safety) Regulations 2004.
    c. Be fitted with effective silencing devices by the constructing authority to keep noise at a minimum.
    d. Be maintained by the constructing authority to minimise discharge of noxious fumes and pollutants.
    e. All operators of marine plant must hold the appropriate marine certificates of competency as prescribed by the above Act and Regulations.

11. Any ships using this structure must comply with the Transport Operations (Marine Safety) Act 1994 and the Transport Operations (Marine Safety) Regulation 2004.

12. The constructing authority must inform the Regional Harbour Master of completion of the works within 14 days of practical completion.

13. The constructing authority must comply with all instructions issued by the Regional Harbour Master, Gladstone or his representatives and. the works must be curtailed or cancelled if the Regional Harbour Master, Gladstone recommends such action.

14. Please ensure the property owner receives a copy of this letter.

15. The dredging must be carried out within one year from the date of this letter. If dredging is not completed, you will need additional or amended comments from the Regional Harbour Master.

Maritime Safety Queensland does not need to be further consulted if all of the above conditions are met.

Yours sincerely

Capt. M• e Lutze
Regional Harbour Master (Gladstone)

Appendix E– Post-Dredging Reporting Requirements

Hydrographic Survey:
Under the Sea Dumping Permit, the hydrographic survey of the disposal site must be completed within one month of the completion of dumping activities.

A digital copy of the hydrographic survey must then be provided to the Australian Hydrographic Office within two months of the survey's completion.

Reports:
Monthly water quality monitoring reports are to be provided to DES for the duration of works (requirement of DERM Permit No. SPDC02622311).

Within 2 months of completion of the hydrographic survey (as the nominal completion of the dredging campaign), a final report shall be provided to DES, Harbour Master and GBRMPA representatives including the following:

a. Detail of dredging and disposal locations
b. A copy of the pre and post dredge hydrographic surveys
c. Provide in-situ volume calculations outlining the volume of material dredged and placed. A short commentary will also be provided.
d. A short report of any observations during the works and suggestions for improvement
e. A summary sheet of spoil disposal data for International Maritime Organisation (IMO) as detailed in the Sea Dumping Permit template

Within 3 months of the completion of the dredging works, an interim monitoring report will be provided to DES and GBRMPA providing all the outcomes of the Water Quality and Coral/Benthic monitoring.

Following full completion of the monitoring program, a final report will be provided to DES and GBRMPA.

Appendix F – Work Notifications Requirements

Below are the agency notifications required for work commencement and completion under the various approvals.

Agency	Work Commencement	Work Completion
GBRMPA	No specific notification requirements in the Permit, but the EMP and Sediment Sampling and Analysis Report must have been approved before works commencement.	No specific notification requirements in the permit.
DES	Written notification of the date when dredging will commence at least five (5) business days prior to the commencement date.	No specific requirement.
Regional Harbour Master, Gladstone	Notification required at least 14 days prior to commencement of the works, including the establishment of plant on the site. The notification must include: a) The proposed timetable associated with the works. b) The name and address of the on-site contractor undertaking the works. c) The name and telephone number (work and after hours) of a contact for the on-site contractor.	Notification required within 14 days of practical completion.