



Ports North



LONG-TERM MAINTENANCE DREDGING MANAGEMENT PLAN

PORT OF MOURILYAN

JUNE 2019

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1. Introduction

The Port of Mourilyan is one of the trading ports managed by Ports North. It is situated at the mouth of the Moresby River and is approximately 1,600km north of Brisbane and 20km to the south of the city of Innisfail.

The Port of Mourilyan was established in 1892. The precinct covers approximately 204 hectares, of which 121 hectares is rainforest, 30.8 hectares reclaimed vacant land, and 26 hectares is below high water mark. The remaining 26.1 hectares is currently used for port operations and port related residential purposes.

The port exports raw sugar and molasses from the Innisfail, Babinda, Tully, and Atherton Tableland sugar growing districts. It comprises onshore sugar and molasses handling and storage facilities, stockpiling area, and a single sugar loader and associated wharf located within a sheltered natural harbour. A new state-of-the-art stockpile facility has facilitated the export of iron ore from a local mine (first shipment in May 2016). The port also includes a livestock export facility and has the capacity to expand into new medium-bulk cargo exports or imports (e.g. minerals, and fuel). The port has and continues to play a vital role in the export of regional products.

The Port of Mourilyan is in an area of high visual amenity associated with co-occurrence of the Wet Tropics World Heritage Area rainforest with the adjoining the marine waters of the Great Barrier Reef World Heritage Area (GBRWHA). There is a very high level of terrestrial rainforest species diversity, and an adjacent high diversity of marine flora and fauna, including the mangrove species within estuarine area.

Sediment accumulates in the swing basin and berth at the port and needs to be managed to ensure designated depths are maintained to enable ships safe access and the efficient operation of the Port.

The Port is presently maintained via bed levelling, and no actual maintenance dredging (removal from the water and relocation of material) is therefore conducted. Ports North has however, developed this Long-term Maintenance Dredging Management Plan (LMDMP) to outline how the bed levelling process (which has similar aspects and impacts to that of actual dredging) so as to ensure that process is documented for bed levelling, and also for any future maintenance dredging (if it were ever required), whilst ensuring that the environmental values of the region are not adversely impacted.

1.1. Purpose, Objectives and Scope

The purpose of this LMDMP is to document the long-term strategy for managing the accumulation of sediment within navigable waterways at the Port of Mourilyan.

The LMDMP strategy has been developed to achieve the following objectives;

- Ensuring that maintenance of navigable depths does not adversely impact upon local environmental values, including the Outstanding Universal Value of the GBRWHA.
- Detailing a robust, transparent long-term planning approach to managing port sediment
- Outlining operational, planning, consultation and monitoring arrangements to inform stakeholders.

The LMDMP relates specifically to the Port of Mourilyan and associated maintenance of the swing basin, berth and entrance channel.

1.2. LMDMP Review Time Frame and Process

The LMDMP has a long-term (5-10 year) focus incorporating continual improvement processes. It will be periodically reviewed as part of campaign-specific Environmental Management Plan (EMP) preparation/implementation and regular internal audits associated with the Port's Environmental Management System (EMS). Such reviews will occur on at least a 5 yearly basis.

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1.3. Policy Context

The plan is aligned with the:

- i. **The Reef 2050 Long-term Sustainability Plan (Reef 2050 Plan)** was released by the Australian and Queensland governments in March 2015 and is the overarching framework for protecting and managing the Reef until 2050. The Plan sets clear actions, targets, objectives, and outcomes to drive and guide the short, medium, and long-term management of the Reef. The Reef 2050 Plan includes a number of port related actions that make clear the need for port authorities to understand the sedimentation characteristics of their ports, avoid and reduce impacts of sediment management where possible, and establish sustainable long-term management arrangements.

This LMDMP is consistent with the strategic objectives of the Reef 2050 Plan which seek to ensure Great Barrier Reef World Heritage Area (GBRWhA) port's adopt a long-term approach to the planning, consultation, monitoring and reporting of maintenance dredging activities.

- ii. **Queensland's Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports** provides a framework (as depicted in Figure 1) for management of maintenance dredging at ports and requires ports within the GBRWhA to develop and implement long-term maintenance dredging management plans. The framework builds on the current regulatory requirements to ensure the ongoing protection of the Reef's values and the continued operating efficiency of ports within the GBRWhA.

This LMDMP fulfils the expectations of the Queensland's Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports in terms of long-term maintenance dredging management plans.



Figure 1 The Long term Maintenance Dredging Management framework (MDS Framework, 2017)

- iii. **The Ports Australia Environmental Code of Practice for Dredging and Dredged Material Management** sets out a number of environmental principles that Australian ports meet when undertaking dredging and disposal of dredged material. The principles have been defined on the basis of ecologically sustainable development principles.

This LMDMP has been developed to ensure alignment with the environmental principles of the Environmental Code of Practice for Dredging and Dredged Material Management.

- iv. **The National Assessment Guidelines for Dredging (NAGD)** established a scientific assessment framework to determine if dredge material is suitable for ocean disposal. The Guidelines include an assessment framework that is applied to ensure the impacts of dredged material loading and disposal are adequately assessed.

This LMDMP requires the adoption of the NAGD should any disposal of maintenance material at sea be considered.

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1.4. Legislation relating to Maintenance Dredging

Maintenance dredging programs at the Port of Mourilyan is subject to Commonwealth and Queensland government laws. The relevance of particular legislation and approvals processes that apply to a proposed dredging project are assessed in the initial planning stage of any proposed campaign, and depend upon the specific nature of each proposed dredging program. The following legislation may be relevant.

- i. **Environment Protection (Sea Dumping) Act 1981:** applies when dredged material is proposed to be placed at sea.
- ii. **Environment Protection and Biodiversity Conservation Act 1999:** triggered when a development proposal, which could include maintenance dredging, has the potential to have a significant impact on MNES
- iii. **Great Barrier Reef Marine Park Act 1975:** dredging or placement of material inside the Marine Park requires a permit issued by GBRMPA.
- iv. **Queensland Planning Act 2016:** approvals for operational works and environmental authorities (EAs) related to maintenance dredging.
- v. **Queensland Marine Parks Act 2004:** some port operational works at the Port of Mourilyan occurs within the GBR Coast Marine Park and approvals may be required depending upon the specific location of the activity proposed.
- vi. **Queensland Environment Protection Act 1994:** regulates activities that may impact upon environmental values and/or cause environmental harm.
- vii. **Queensland Sustainable Ports Development Act 2015:** mandates master planning for priority ports and their surrounding land and marine areas including areas potentially used for the placement of maintenance dredging material.
- viii. **Queensland Coastal Protection and Management Act 1995:** provides for the regulation of dredging, tidal works and other activities in the coastal zone, particularly in coastal management districts and erosion prone areas. Additionally, the Act regulates the removal of material from tidal water, such as may occur with maintenance dredging, which typically requires a development permit.
- ix. **Queensland Fisheries Act 1994:** regulates activities that may impact upon both fisheries resources and also fisheries habitats. A series of departmental policies and guidelines outline the requirements for approvals that address social, cultural, commercial, and recreational use of the fisheries resource. Where dredging activity is likely to affect such fisheries habitats, resources or values, a development permit is typically required.

1.5. Existing Maintenance Dredging Approvals

Ports North has adopted a strategy involving bed levelling to manage the siltation of the port channel, swing basin and berth without the need for maintenance dredging and the placement of dredged material on land or at sea. This is undertaken by Ports North as a port authority under the *Transport infrastructure Act 1994*, allowing maintenance of existing lawful structures (design channel, swing basin and berth pockets). It is anticipated that this strategy will be appropriate for the future.

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If maintenance dredging or placement of extracted material on land or at sea were to be contemplated at the Port of Mourilyan in the future, likely approvals/permits that would involve resolution with the respective agencies could include:

- Environmental Authority - undertake maintenance dredging of navigational infrastructure
- Operational Works (Tidal Works) approval - disposal of dredged material below high-water mark
- Marine Park Permit - maintenance dredging and disposal in marine park
- Sea Dumping Permit - maintenance dredging and disposal at sea
- Planning Act approval- placement of dredged material on land.

1.6. Roles and Responsibilities of Port Authority and Port Customers

Far North Queensland Ports Corporation Ltd, trading as Ports North, has management responsibility as the Port Authority under the *Transport Infrastructure Act 1994*, as the location is defined as a gazetted, trading port. These responsibilities are outlined further below:

1.6.1. Port Authority

Ports North, a government owned corporation, has a Board of Directors oversee the governance and direction of the organisation. Ports North is responsible for the maintenance of port facilities including shipping channels and berth pockets as the declared port authority for the Port of Mourilyan under the Transport Infrastructure (Ports) Regulation 2016. As such, Ports North is the holder of any permits related to maintenance dredging at the Port of Mourilyan.

The port undertakes comprehensive consultation with affected and interested stakeholders in relation to port operation and maintenance dredging as detailed in Section 4.0. This has included meetings with the Port Advisory Group (November 2018) as part of development of this LMDMP. The Group has provided feedback on key items on which they consider important and would require future consultation (see Section 4.0).

Ports North have a stated policy to manage its ports, including the Port of Mourilyan, in a pro-active manner to minimise any impacts from port operations or new developments. Ports North have a structured environmental program that involves environmental assessment, monitoring, protection, and rehabilitation. It strives for continual improvement in the control of port and port user activities to maintain a healthy port environment. Independent experts are typically engaged to provide input to and review management approaches, including LMDMPs. The detailed environmental policy, procedures, and practices are documented in the Environmental Management System (EMS), which is based on the international standard ISO 14001. The EMS includes a process for regular internal reviews and audits.

Ports North have responsibilities for ensuring that declared navigation areas are maintained at depths designated by the Regional Harbour Master.

A regular hydrographic survey program of declared navigation areas (channel, berth, and swing basin) at the Port of Mourilyan is undertaken by the accredited Ports North Surveyor, who, in liaison with the Regional Harbour Master considers the survey outcomes to define maintenance dredging requirements. This advice is provided to the General Manager Planning and Infrastructure on the likely need for annual maintenance works.

Overall supervision of the dredging or bed levelling contract between Ports North and the contractor is managed by the General Manager- Planning and Infrastructure. The Hydrographic Surveyor oversees the day-to-day supervision of the contract.

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Oversight of the environmental management, inclusive of approvals compliance, EMP, and monitoring programs is provided by the Environment Manager. The Environment Manager also coordinates stakeholder engagement in regard to approval agencies, and to interested and affected parties in conjunction with staff from the Corporate Services section where applicable.

Port Operations staff and the Port Pilots engage regularly with the various levels of port customers and users, and the Manager Operations or Manager-Operations Compliance and Security facilitates the Port Advisory Group (Section 4.0). Port Operations staff or the Port Supervisor provide on-site feedback on activities during the port maintenance works and can respond to any public queries, acting as a local point of contact for the community.

1.6.2. Port Users

Ports North operation of the Port of Mourilyan does not provide any “umbrella approvals” for the individual activities of port users. Port activities carried out by either port users or operators must comply with all relevant government legislation. The key State legislation for protection of the environment is the Queensland *Environment Protection Act 1994*. The Queensland Department of Environment and Science (DES) are responsible for ensuring compliance with this Act. Ports North strongly promote the need for environmental compliance to all tenants.

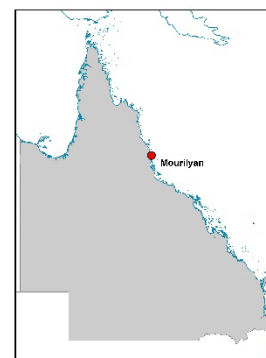
Port users are required to hold all the relevant environmental authorities or licences issued by state administering agencies for their day-to-day activities, which might include Environmentally Relevant Activities such as stockpiling, loading, or unloading in bulk, fuel or chemical storage, sewage treatment and maintenance.

2. Port Locality, Setting and Shipping

2.1. Port setting and limits

The Port of Mourilyan is one of several trading ports managed by Ports North. The port is located approximately 100 km south of Cairns and 17km south of Innisfail surrounded by cane farms and national parks, at a latitude of 17°36’S and longitude of 146°07’E.

The port limits are defined in the regulations of the *Transport Infrastructure (Ports) Regulation 2005* and are shown in Figure 2. The port limits includes the lower Moresby River and stretch along the coast from just north of Goodman Point, south to Double Point.



The port activities are concentrated in Mourilyan Harbour (no intensive port activity occurs outside this area) at the mouth of the Moresby River. The commercial facilities in the harbour consist of a bulk sugar and molasses terminal with an enclosed conveyor to a single ship loader and a single loading berth supported by stockpiling areas. Other facilities within the harbour include a pilot boat jetty, Coast Guard jetty, public jetty, boat ramp, and commercial vessel mooring piles.

The Port of Mourilyan is located in one of the highest rainfall zones in Queensland and consequently is subject to highly variable seasonal salinity regimes. The Moresby River catchment covers approximately 147 km² of coastal plain less than 10 m Australia Height Datum, with over half of the area still undeveloped. Sugar cane, beef cattle, and tropical fruit farms account for over 40% of the land use in the catchment. Approximately one quarter of the Moresby catchment is

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wetland or mangrove communities. The majority of the coastal wetland areas are listed as part of the World Heritage Wet Tropics Estate or State Marine Park (see Section 3.0).

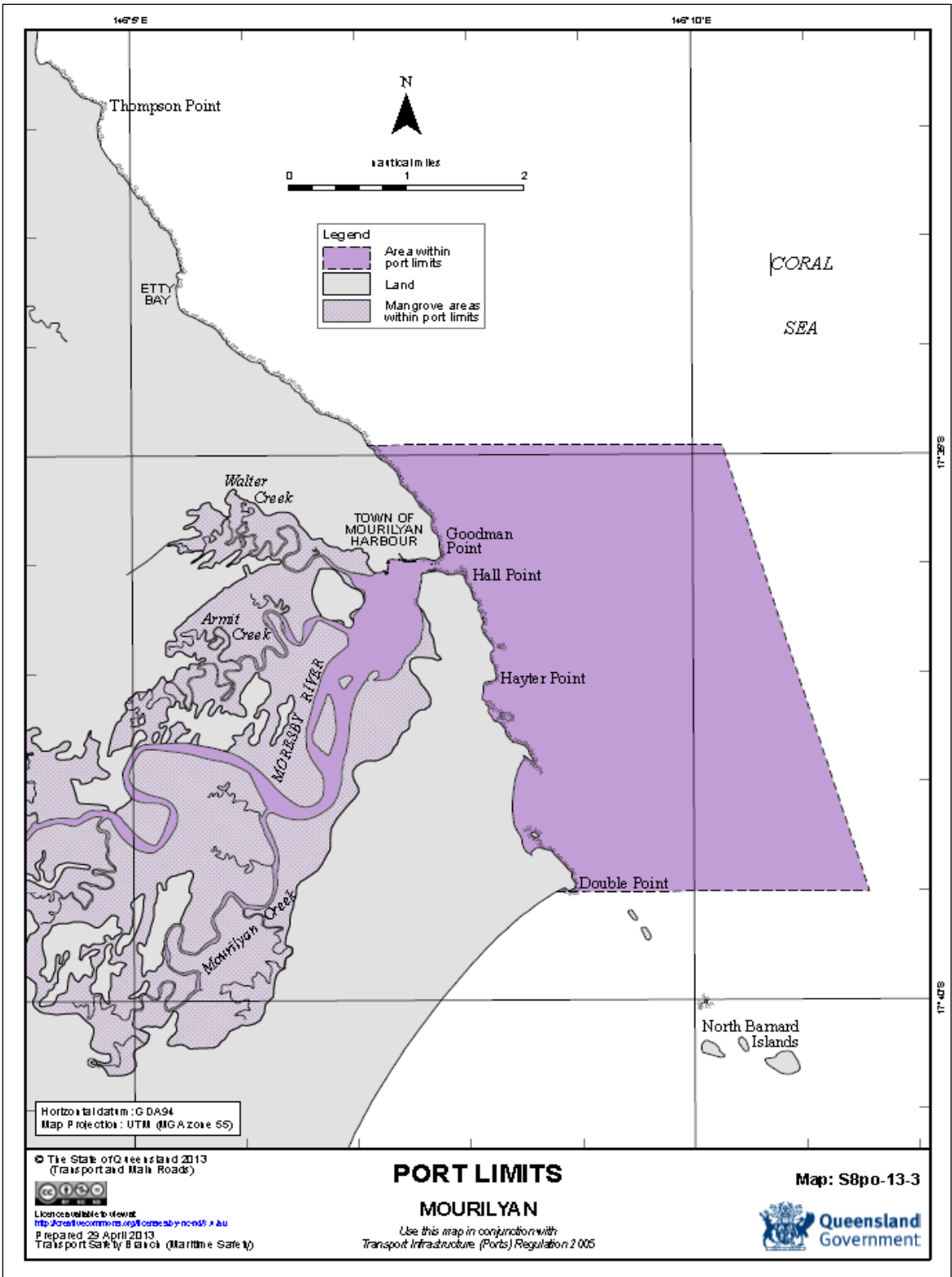


Figure 2 Location of Port and Port Limits

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2.2. Role and Uses

The port primarily serves to support the export of regional agricultural and mineral products. The role of the port and the nature of export products are unlikely to change significantly in the next 5 years.

The port serves the sugar industry mills at the towns of Mourilyan, South Johnstone, and Tully. The main product exported from the port is raw sugar with volumes ranging from 640,000 to 795,000 tonnes over the past 10 years. There are four molasses storage tanks with a capacity of 39,000 tonnes. A new state-of-the-art stockpile facility has facilitated the export of iron ore from a magnetite mine at nearby Mt Garnet, the first shipment of which left for Southern China for steel production in May 2016. The port also has a live-cattle loading facility (exports began in 1995) and a laydown storage facility. Other product exports have included pine logs and pine woodchips, and minerals. New export opportunities are continuously sought by Ports North to support regional development.

The Port of Mourilyan Land Use Plan (LUP) is a statutory document prepared under the *Transport Infrastructure Act 1994* that provides the planning framework for development on all strategic port land at the Port of Mourilyan. Port land is designated as a land use type (a precinct-based approach) to facilitate the location of preferred or acceptable land uses.

Several Port Development Codes support the implementation of the Port of Mourilyan LUP and guide the construction and operation of different types of development and activities on strategic port land. They ensure that any development will achieve the Desired Environmental Outcomes and precinct principles described in the Port of Mourilyan LUP. Both the Port of Mourilyan Land Use Plan and associated Port Development Codes are available on the Port North website.

2.3. Port Infrastructure History

Development of the harbour started in 1883 and the Port of Mourilyan was officially established in 1892. Construction of a concrete wharf was commenced in 1958. The bulk sugar terminal was officially opened on 1 October 1960. The first molasses storage tank was erected in 1965. In 1973, the sugar storage shed was increased in size due to record tonnages being processed.

The channel is a naturally deep and “self-cleaning or scouring” and hence there has been minimal need for major capital or maintenance works throughout the port’s history. Minor channel deepening and widening occurred in the mid-1990’s. A campaign of rock blasting and use of a grab and cutter suction dredges removed material to a land based reclamation area within the inner harbour. This is now the site of the public boat ramp coast guard, magnetite facility and an area of vacant grassed land for future port development.

Historic Harbours and Marine and Transport and Main Roads survey drawings show the presence of an established marked entrance channel and designation of offshore areas as dredge material placement areas at least 30 years ago. The use of the offshore placement of dredge material areas is uncertain (has not occurred for at least 30 years) but is not anticipated to have been significant or frequent.

The port has been subject of approximately annual bed levelling activity since the early 1990s.

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2.4. Existing Port Navigational Infrastructure

The Port of is the located at the mouth of the Moresby River, and as a result of the stability of ecological communities being largely influenced by seasonal monsoon events the primary habitat in the nearshore environment consists of seagrass, coastal dunes, mangroves, and saltmarsh communities (TMR 2014). Figure 3 shows some of the Port infrastructure.

Channel and berths

There is one shipping access channel to Mourilyan Harbour which is narrow, between two hills, and not easily distinguishable from seawards. The channel enters the port between Goodman Point on the north headland and Hall Point on the South headland.

The channel is approximately 96 m wide at its narrowest point between the two headlands, and is approximately 700 m long. The channel extends beyond the harbour entrance for 100 m. A second natural channel diverges northeast from the first channel for 1,100 m before turning East at the marker buoy toward deeper water.



Figure 3 Wharf Infrastructure

The swing basin is adjacent to the main wharf, extending west approximately 180 m, extending south approximately 300 m and is bordered on the southern side by three special marks.

Table 1 provides designated depths for the Port of Mourilyan. These depths are subject to change throughout the year and the relevant Notices to Mariners provides for advice on latest information.

Table 1 – Designated depths

Berth	Design depth (metres)
Departure channel	9.6
Arrival swing basin	6.7 (diameter 300 m)
Sugar berth (Government wharf)	10.1
Tourist wharf	Currently inoperable

Land based infrastructure

Key port land based infrastructure includes the sugar shed, molasses tanks, and travelling gantry with luffing boom used to load sugar (average loading capacity: 1600 tph).

Anchorage area

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There is no designated shipping anchorage within the harbour. A designated anchorage area is located outside the harbour entrance on the southern side of the access channel. Ships anchor 2-4 nautical miles offshore to accept pilots or orders prior to entering the port. There is good holding ground in a soft mud bottom.

Shipping restrictions

Due to the strength and set of the currents, and the confined swinging basin, large ocean going ships (> 175 m LOA) can only berth and sail at high or low water slack. Minimum Under Keel Clearances and night movement restrictions apply and are defined by the Regional Harbour Master.

The prevailing southeast trade winds may blow strongly at times and heavy summer rains may make navigation of the narrow entrance difficult and berthing may be delayed.

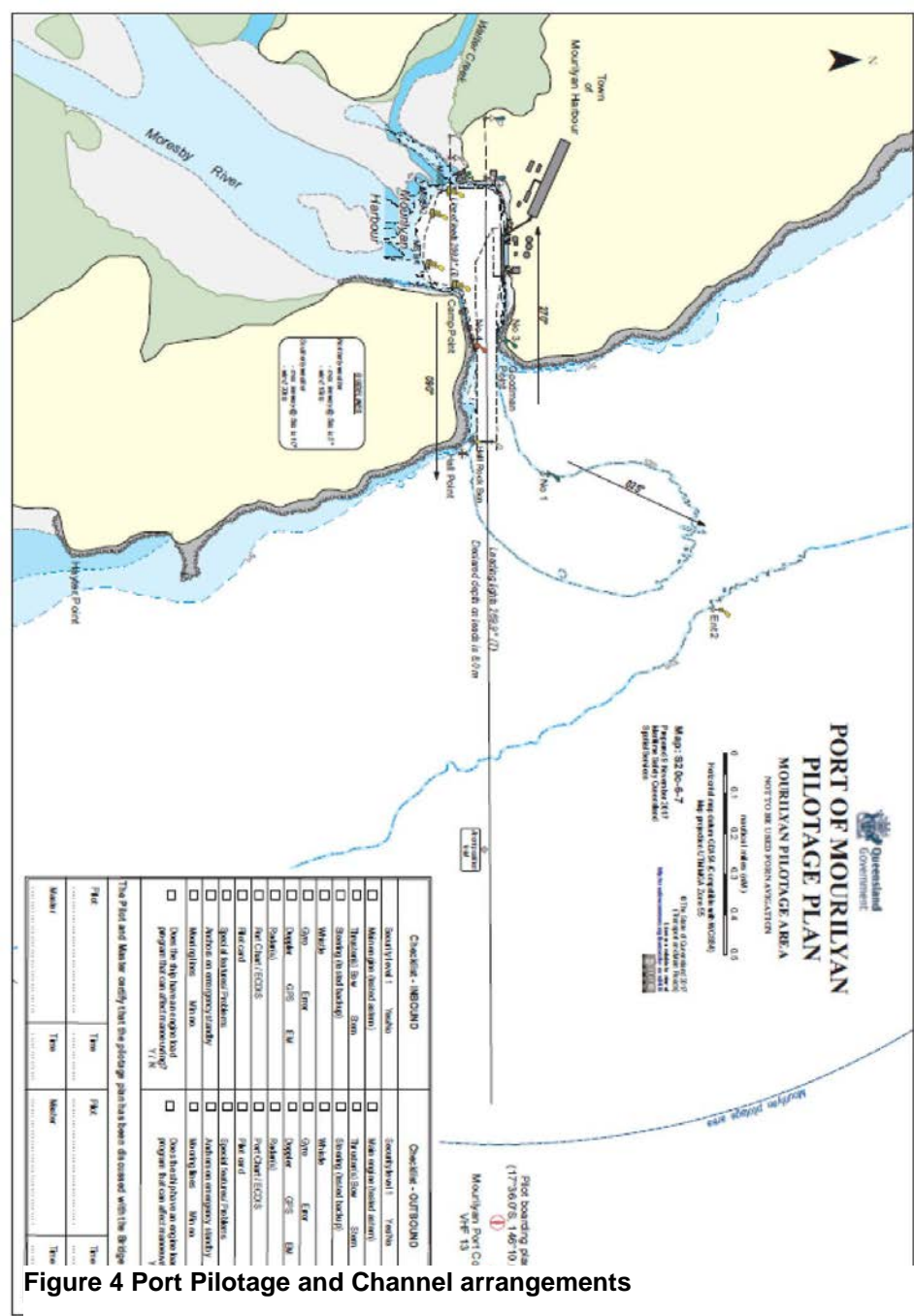


Figure 4 Port Pilotage and Channel arrangements

3. Port environmental values

The Port of Mourilyan and surrounding port limits comprise of a diverse range of ecosystems. Figures 3, 4 and 5 show the key environmental resources of the area, protected areas, and key habitats.

Habitats of significance to the area include the Wet Tropics and Great Barrier Reef World Heritage Areas, Moresby River, mangrove forests, rainforest, sandy beaches, rocky shores, mud flats, tidal wetlands, and seagrass meadows. These habitats support a range of flora and fauna, including a number of threatened and/or migratory species.

Habitats of relevance to maintenance dredging include intertidal sand and mudflats and seagrass communities whilst fauna of relevance include shore birds, turtles, and dugong.

The Port of Mourilyan Land Use Plan has designated areas of conservation value on port land as Environmental Buffer Area and seeks to protect these areas from development. The potential impact of development in areas adjacent to the environmental buffer zones are considered in project impact studies, to minimise any significant adverse impacts, such as a possible deterioration in the quality of stormwater run-off. Developments must due regard to the flora and fauna values documented in the LUP.

Ports North monitors the environmental values of the Port of Mourilyan through such processes as periodic monitoring programs, assessment of development applications, review of tenant provided environmental reports, staff observations and participation in regional bodies such as the Wet Tropics Healthy Waterways Partnership. Importantly, seagrass communities, the key environmental resource most likely to be influenced by waterway maintenance works at the port, are monitored on an annual basis (see Section 3).

3.1. World Heritage Area and Marine Parks

There are two World Heritage Areas (WHA) in and around the Port of Mourilyan: the Wet Tropics WHA and the Great Barrier Reef WHA. Whilst these areas partially overlap, they are not coincidental.

The Wet Tropics WHA extends into the port limits, though no Strategic Port Land is included within this World Heritage Area. The Great Barrier Reef WHA covers the waters to the low water mark along the coastline and extends into Mourilyan Harbour and the Moresby River. The majority of land above high water within the port is beyond the GBRWHA.

The Great Barrier Reef Marine Park is also located along the coastline but does not extend into Mourilyan Harbour, with an exclusion for the entrance channel. The seaward port limits are within the Marine Park, as are upstream estuarine areas, but the operational port area is excluded from GBR Marine Park zoning.

The GBR Region overlies the port limits, from the low water mark along the coast, but does not include the internal waters of the state, i.e. seaward of the territorial sea baseline which is mapped as a closing line across harbour entrance. The WHA and Great Barrier Reef Marine Park boundaries are mapped for the Port of Mourilyan in Figure 3.

The Great Barrier Reef World Heritage Area (GBRWH) which was listed as a World Heritage Area as it met four criteria for Outstanding Universal Value (OUV):

- Natural beauty and natural phenomena (Criterion (vii)).

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- Major stages of the Earth’s evolutionary history (Criterion (viii)).
- Ecological and biological processes (Criterion (ix)).
- Habitats for conservation of biodiversity (Criterion (x)).

The OUV of the GBRWHA are expressed in the Port of Mourilyan primarily through “Natural beauty and natural phenomena” and “Habitats for conservation of biodiversity”. The co-occurrence of the Wet Tropics rainforest adjoining the GBR waters, in a high visual amenity setting is one of the most striking features of the Port. There is a very high level of terrestrial rainforest species diversity, and an adjacent high diversity of marine flora and fauna, including the mangrove species within estuarine areas.

Detailed information regarding these values can be found in the *Port of Mourilyan Environmental Values Report*ⁱ as referenced in the Port EMP, 2014.

3.2. Intertidal Sand and Mud Flats

Intertidal habitats include rocky shores at the harbour entrance that extend partly into the harbour. With the exception of several small sandy beaches, the intertidal region upstream of the berth is predominately comprised of sand and mudflats and broad mangrove forests.

The large area of mangroves along the Moresby River provide habitat for saltwater crocodiles.

Yabby banks are present along the intertidal zone throughout the harbour. Polychaete worms, crustaceans, molluscs, and echinoderms can be found on, and in, these intertidal mud and sandbanks. Crabs, teleosts, amphipods, and gastropods are also present. Gastropod molluscs and crabs may be present on the upper banks adjacent to mangroves, while mudskippers and other species of gobies are obvious on sections closer to the water.

3.3. Seagrass

Seagrass meadows in Mourilyan Harbour are mostly low biomass along the shallow banks within the harbour and the periphery of Armit and Walter creeks. High biomass meadows are located along the Seaforth Valley mangrove fringe, the sand banks between Armit and Walter Creek mouths and adjacent to Lily and Bradshaw Islands (McKenzie et al, 1998).

Five species of seagrass have been identified. These species are *Halodule uninervis*, *Halophila decipiens*, *Halophila ovalis*, *Enhalus oeroides*, and *Zostera capricorni*. The *Halophila* dominated areas are more highly variable than the more stable *Zostera* dominated areas.

Seagrass in the Mourilyan Harbour has been monitored twice yearly between 1993 and 1997 as well as in 2000. An annual survey has taken place since December 2001. This program has been one of the most extensive seagrass monitoring programs undertaken in Queensland, providing valuable information on the natural variability in seagrass meadows. This long-term annual seagrass monitoring has been continued as an on-going indication of the environmental health of the port.

Seagrass meadows show variations between seasons and years, reflecting changes in environmental conditions. The area of seagrass in Mourilyan Harbour typically varies between 65 and 71 ha in summer and 47 to 68 ha in winter.

Seagrasses within the harbour have fluctuated significantly in recent years, with the one species *Zostera*, disappearing due to the extreme weather events following from around the time of Cyclone Larry, through to 2011. There is a low

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likelihood of natural recovery, due to the absence of adjacent areas able to provide natural stocks of seeds, and the enclosed nature of the harbour preventing seeds entering on prevailing longshore currents.

Findings from each of the annual seagrass reports indicates that the patterns of change within the harbour are unlikely to be related to port activities, or port maintenance such as bed levelling, and reflect the broader climate and seasonal patterns of seagrass ecology.

The extent of seagrass changes is demonstrated in Figure 6 for the period from 2006 to 2017.

3.4. Marine Fauna

The seagrass meadows in the Harbour could be used by turtles for feeding. Turtle species in the region include green turtles (*Chelonia midas*), flatback turtles (*Natator depressa*), hawksbill turtles (*Eretmochelys imbricata*) and loggerhead turtles (*Caretta caretta*). However, no turtle sightings have been reported and the area is not considered to provide a suitable nesting area for turtles.

The seagrass meadows in the Harbour represent a potential food source for dugongs, but none have been observed in the Harbour.

The large areas of mangroves along the Moresby River provide habitat for crocodiles (*Crocodylus porosus*) and these have been observed in the harbour. Crocodiles are listed as a vulnerable species in the regulations of the *Nature Conservation Act 1992*.

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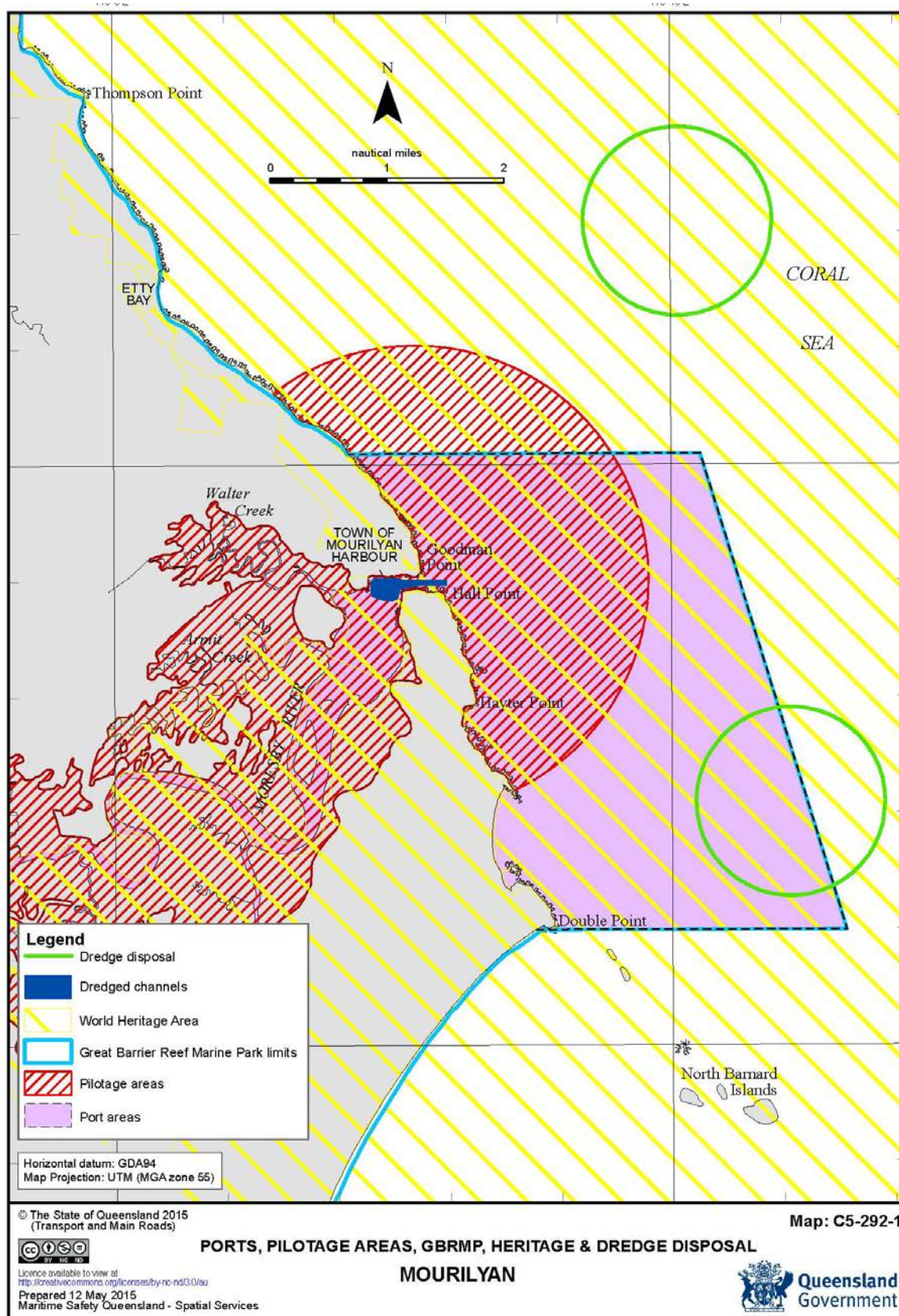


Figure 6 Port maintenance dredging areas, port limits, and GBRMP limits

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3.5. Coastal Vegetation

There are large areas of vegetation surrounding the port facilities. In the western areas of the port land holding, between Armit and Walter Creek, there are mangrove forests and an area of mesophyll vine forest on Ethel Hill. On the eastern side of the harbour, mangroves occur on strategic port land.

The mangrove zone varies in width from several metres at Camp Point (near the harbour entrance) to several hundred metres in the Seaforth Valley area. The mangrove zone becomes more extensive south of the permanent moorings further into the harbour.

Rainforest lies behind the mangroves. Rainforest exists at Goodman Point on the north-west side of the harbour entrance. Although the rainforest appears relatively intact, the occurrence of *Acacia* and *Eucalyptus* species amongst the more mesophytic (rainforest) species indicates past disturbance to the forest in this area.

A Vegetation Master Plan has been developed for the Port of Mourilyan (NRA, 1997). The Master Plan documents vegetation on port land and recommends areas of vegetation conservation importance in or adjacent to the port that has been used in the designation of areas for protection from development in the port Land Use Plan. The document also provides details of the flora and fauna surveys of these areas.

To help protect and revegetate areas upstream of the port, the Port supported revegetation efforts of the Johnstone Shire Council (now Cassowary Coast Regional Council) for several years in the riparian zone of the Moresby River catchment.

3.6. Terrestrial fauna and birdlife of conservation significance

The Federal government has identified a number of endangered species within the area which include the southern cassowary, painted snipe, semon's leaf-nosed bat, bare-rumped sheatail bat, lace-eyed frog, waterfall frog, common mistfrog, northern quoll, and spotted-tailed quoll.

Rainforest, mangrove communities, and transitional zones surrounding the port provide for a high diversity of wildlife synonymous with the wet tropics region including the southern cassowary (listed as endangered). In north Queensland, the highest known population densities of cassowaries occur around Mission Beach and Wopen Creek. Results of a fauna survey around Mourilyan Harbour by Natural Resource Assessments Pty Ltd (NRA, 1997), and existing data, suggest the possibility that the cassowary population in this area may be similar to that of Mission Beach. NRA recorded a total of 68 other bird species in the area during the same survey.

Foreshore intertidal mudflats and surrounding coastal wetlands are host to numerous species of resident and migratory wading birds, many with international conservation significance. Upstream of the harbour, the intertidal areas of the Moresby River and Armit Creek reportedly support one of the highest populations of whimbrels, a species protected under JAMBA and CAMBA, in Australia. The number of species utilising this area is potentially internationally significant. The area between Hall Point and Double Point, particularly Robinson's Beach and Brown's Beach, provide a staging site for the whimbrels each dawn and dusk prior to their flight to and from the North Barnard Islands for night-time roosting.

Beaches also support feeding and nesting sites for the protected Beach Stone Curlew which forages on small crabs that are abundant on the beaches.

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3.7. Natural Amenity

Mourilyan Harbour and the surrounding district are of significant value for their natural beauty. The lack of artificial structures along most parts of the river system present opportunities for people to experience some of the extensive, diverse aspects of the complex and relatively pristine rainforest and wetland systems contained within the small catchment.

The central reaches of the Moresby River and Mourilyan Creek are recognised for their natural environmental values and have been protected under conservation and National Park status. Local residents and tourists use the lookout points on Goodman Point to view the ocean and rainforest landscapes.

3.8. Social Values

The Port is popular for recreational fishing and boating. It provides a public jetty and boat ramp used by local fisherman to access the Moresby River and nearby coastal areas. The port supports a pilot boat jetty and a coast guard jetty.

It is used primarily for export of bulk sugar and molasses from the region's sugar mills. It has a sugar and molasses terminal with an enclosed conveyor to a ship loader and single loading berth, as well as onshore sugar and molasses storage facilities. The port also has a live-cattle loading facility and a laydown storage facility for export of minerals from a magnetite mine at Mt Garnet.

The Port supports community needs and interests, thru provision of access to regional cane growers and other industry and is also popular for recreational fishing and boating. It provides a public jetty and boat ramp, a pilot boat jetty, a coast guard jetty, and commercial vessel mooring piles.

3.9. Economic value

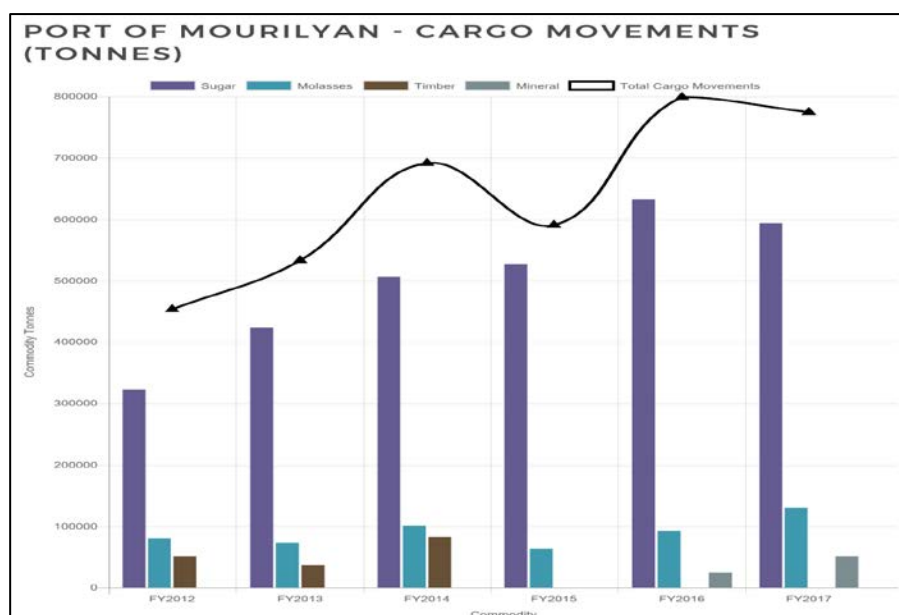
The Far North Queensland Regional Plan 2009 applies to the Port of Mourilyan. The regional plan acknowledges the port's mixed functions and economic role, including logistics and cargo handling, land based marine activities and commercial fishing, the port is considered an ideal export hub for targeted, medium-sized, bulk exports into the future.

Economic analyses ((Based on the report *Economic Impact 2013/14* by Cummings Economics on behalf of Ports North.) indicate

that the port directly contributes \$58 million to the regional economy with flow-on benefits of \$289 million (Gross Value Added \$205m). Key industries that rely upon the port are valued at \$230 million for sugar and molasses and \$1m for tourism.

A comprehensive outline of the economic values of the Cassowary Coast region, to which the Port has a role associated with the export of predominantly agricultural products, is accessible via the Council site

<https://economy.id.com.au/cassowary-coast/about>



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The Port has direct inland freight connections, and natural deep water access to the major shipping routes, as shown in Figure 7.



Figure 8 Road and Sea Connections to the Port of Mourilyan

3.10. Indigenous Cultural Heritage Places and Values

The port and surrounding region is the traditional country of the indigenous Ma:Mu groups. The rich abundance of the land, together with the presence of permanent watercourses, permitted local groups to establish semi-permanent ‘base camps’.

There are two areas of cultural heritage significance in or adjacent to the port as identified in Duke & Collins, 2001:

- The Camp Point area just inside the Harbour entrance (south side of harbour) is known to be associated with both traditional Mamu settlement and is also the area where the Dalrymple pitched his expedition party’s tent.
- A midden is located adjacent to the Seaforth Valley track from Mourilyan Harbour to Robinson’s Beach. This site is considered of both local and regional significance.

Both areas are designated for protection from development in the Port of Mourilyan Land Use Plan. Public access to the site is not allowed due to its cultural significance.

3.11. European History and Places of Significance

The first European contact with Mourilyan Harbour was by Captain John Moresby and Lieutenant Mourilyan in 1872 during a search for survivors from a shipwreck. The area was subsequently explored by an expedition led by George Dalrymple in 1873.

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Land clearing for agriculture was carried out near the harbour in 1883. Works in the harbour started in 1883 and the Port of Mourilyan was officially established in 1892. Port infrastructure has been progressively established since as described in Section 2.0.

The port itself is of regional historical significance for its importance to the north Queensland sugar industry. However, infrastructure in the port has changed to meet the changing industry needs and no existing buildings or structures are listed under the *Queensland Heritage Act 1992*.

3.12. Fisheries and Aquaculture

Trawlers outside of the Harbour trawl for tiger prawns, king prawns, banana prawns and endeavour prawns. The combined prawn catch is approximately 100 tonnes each year for the Moresby River coastal region. Commercial fishing activities within the harbour and Moresby River are restricted to gill netting, with target species being barramundi, grunter, and salmon. Mud crabs are also commercially sought.

Recreational fishers target fish species which include barramundi, grunter, salmon, mangrove jack, finger-mark, and silver bream. Mud crabs are also caught.

The National Park Zone of the Marine Park is closed to both recreational and commercial fishing. The Estuarine Conservation Zone of the Marine Park is open to all fishing except trawling. Recreational fishing is permitted outside the Marine Park National Park Zone.

Aquaculture is an expanding industry along the Queensland coast, with two aquaculture farms established in the Moresby River catchment area (barramundi and prawn hatcheries) with potential for expansion or new proposals for the area. Their operations are licensed under the *Environmental Protection Act 1994*, and the *Fisheries Act 1994* with new facilities also potentially requiring approval from the Great Barrier Reef Marine Park Authority. A water intake to one of the aquaculture farms is located within the upper harbour waters.

4. Consultation and Key Issues

4.1. Port Advisory Group

The key existing consultation forum in respect of the general port activities, operations, maintenance and development, including maintenance dredging activities at the Port of Mourilyan, is via the Port Advisory Group which is understood to have been established in the mid 1990's.

The Port of Mourilyan Advisory Group meets on an approximately twice per year, and has a broad cross section of potential attendees which includes around 40 regular invitees, with the potential invitee organisations described below. The Port Advisory Group has been consulted (most recently November 2018) in regard to the development of this Plan and how this integrates with the broader setting of the Reef 2050 Long term Sustainability Plan and the Queensland Maintenance Dredging Strategy.

Key outcomes of the consultation with the Group on the LMDMP have included:

- Support for the ongoing maintenance of the port
- Recognition of the need to maintain safe and efficient shipping access to the port
- Interest in the timing and extent of bed levelling activity
- Status of surrounding environmental attributes (especially seagrass condition)

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- Need for notification of any proposed bed levelling activity, especially those that could influence recreational and commercial fishing access, and;
- A desire to provide input to development of the LMDMP and involvement in future review stages.

4.2. Other Interested and Affected Parties

Ports North has engaged with various port users and community stakeholders for a range of purposes over recent years (such as Land Use Plan consultation, demand studies, new trade start up, and response to specific issues). The following entities are identified as having potential interests in present and future port maintenance activities;

- Cassowary Coast Regional Council
- Queensland Dept. Transport and Main Roads
- Sugar Industry (Tully, QSL, STL)
- Tablelands Mining Group
- Live cattle exporters
- Molasses suppliers
- Coast Guard
- Recreational fishers
- Commercial fishers
- Navy and Defence
- Stevedores
- Natural Resource Management and River Improvement Trust
- Johnstone Ecological Society

All have a standing invite to the Port Advisory Group. Ports North proactively invites a range of stakeholders from such entities when items of potential relevance are to be discussed at Group meetings. Additionally, Ports North's participation in regional bodies such as the Wet Tropics Healthy Waterways Partnership and other forums such as Local Marine Advisory Groups provides opportunities for broader community involvement.

4.3. Future Consultation

The existing consultation processes and stakeholders associated with the Port Advisory Group are considered appropriate for stakeholder input to the future management of bed levelling operations in the Port of Mourilyan. Consultation to date has not raised any significant issues and key items requiring future consultation have been identified.

In the event that channel maintenance operations could involve dredging and placement of dredged material at sea, there may be a need to establish a Technical Advisory and Consultative Committee (TACC) consistent with the approach outlined under the NAGD to assist in the consultation process required for a Sea Dumping Permit application. As there is no present or planned application for a Sea Dumping Permit, there is no existing TACC.

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5. Sediment Assessment

5.1. Port Sediment Quality

The Moresby River catchment has no major industries or sewage treatment plants that could adversely affect sediment quality. Large areas of the catchment are used for sugar cane production. There are currently two aquaculture farms discharging into the catchment area.

The outer entrance channel seabed is comprised of sands (a number of distinct sandbars prevail on the regular hydrographic surveys). The entrance to the harbour is comprised of two prominent rocky headlands and associated shelves and outcrops of hard rock that fringes the channel. The channel opens to the sheltered harbour, with the sediment within the main harbour adjacent to the wharf comprising sands, fine silts and some with a high organic content.

Sediments associated with the swing basin and outer channel bars are dominated by sand fractions often with a high organic content. The sediments of the upper harbour typically comprise organic laden fine silts and clays with the proportion of silt increasing with distance upstream.

No recent detailed analysis has been conducted of the sediments at the Port of Mourilyan as no at sea placement of dredged material has been proposed. A baseline survey of water and sediment quality was been carried out in the port in 1995-1996 and is documented in the PCQ *Ecoports Monograph Series No. 7* (*“Port of Mourilyan. Water and Sediment Quality Monitoring – Baseline Surveys”*).

The results of the survey indicated that the overall water and sediment quality was generally of high quality reflecting the lack of significant contaminant inputs. Water nutrient levels however can be elevated in the upper estuary on occasions, possibly related to agricultural run-off or seepage from septic systems. No changes in catchment or port practices have occurred since then that are likely to have resulted in a change to the contamination status of sediments.

Seabed surveys undertaken the port tenant’s involved in iron ore export indicated sediment quality results from 2017 are consistent with baseline information which informed the Environmental Authority limits, and reflecting the prevailing sediment chemistry.

Ports North may plan for the conduct of monitoring for water and sediment parameters as part of work in collaboration with the Wet tropics Healthy Waterways Partnership to define a program commensurate with the scale of port activity and evaluation of risk.

5.2. Volume and Areas of Deposition

Regular hydrographic surveys over many years at the Port of Mourilyan indicate that sediment accumulates in the berths and swing basin only. The entrance channel is “self-scouring” and does not experience sediment accumulation.

Observations over the past decades suggest that sediment accumulation in the swing basin and berth is the result of natural processes transporting sediments from nearby shallower areas into the deeper navigation areas and ship propeller wash influences redistributing the bed sediment in localised areas.

A summary of recent volumes of material needing to be moved from navigable areas is provided in Table 1. Volumes vary in response to extent/magnitude of sediment accumulation, budget, and vessel availability.

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Table 1 Recent History of Bed level Activity

Year	2014	2015	2016	2017	2018
Area	Berth, Swing Basin	Berth, Swing Basin	Berth, Swing Basin	Berth, Swing Basin	Berth, Swing Basin and overrun area
Number of Days	~5	5	3	5	19
Est volume	<i>10,000</i>	<i>10,000</i>	<i>6,000</i>	<i>10,000</i>	38,000

Footnote: Values shown in italics are an estimate based on 2,500 cu.m insitu moved per day, derived from 2018 figures

5.3. Dredging needs and minimization of sediment accumulation

Sediment does not tend to accumulate in the port entrance channel due to its self-scouring capacity. Swing basin/berth depths have been maintained by bed levelling. This involves dragging a large beam (or bar) along the seabed to move accumulated material to a natural deep hole in the centre of the harbour near the entrance channel. Hydrographic surveys indicate material moved into the deep hole disperses over time.

Bed levelling works typically takes place annually over a brief period (1-3 weeks) with the duration depending upon the extent and magnitude of siltation. The volumes of material requiring to be bed levelled (see above) are relatively minor and hence there is little benefit in constructing structures to trap/redirect sediment or to alter existing efficient ship docking techniques.

5.4. Maintenance dredging and disposal requirements

The Port of Mourilyan has not required any maintenance dredging for at least 30 years. Even though the port is located at the mouth of the Moresby River, no sedimentation has been observed over this period that has necessitated the need for any works beyond bed levelling to move sediment from within the berth pocket and swing basin into the adjacent deeper section.

The only likely future requirement for maintenance dredging would be associated with a large flood or cyclonic event that resulted in sediment accumulation that could not be adequately addressed by the current program of bed levelling. In such a scenario, Ports North would be responsible for restoring navigable depth in the Port of Mourilyan shipping channel and harbour. Options for dredging equipment and relocation of dredged material would need be assessed at that time when potential dredging requirements (e.g. volume and location) are better understood. The most likely options are;

- A small hopper dredge with relocation of material to the designated at-sea areas or a land based site. The limited manoeuvring room available within the harbour could constrain the size of dredge.
- A cutter suction dredge that pumped material to a land based site.

Such activities would require various approvals, consultation and monitoring as described in other Sections of this Plan.

5.5. Examination of reuse, recycle and disposal options

Bed levelling to maintain designated swing basin and berth depths retains accumulated material in the local sediment regime. It avoids the need for dredging and sediment relocation to a sea or land based site, reuse, or recycling, all of which would result in environmental, social, and economic impacts greater than associated with bed levelling.

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As noted above, there may be a need to undertake maintenance dredging should extreme flood or cyclonic activity result in sediment accumulation beyond the capacity of bed levelling. Reuse, recycle and disposal options would need to be assessed at that time as these would depend upon the volume, sediment type, and location of deposited sediment. Material transported ashore could be used for reclamation, landfill, or reuse depending upon its nature (e.g. proportion of sand).

5.6. Selected future dredging and disposal strategy

Bed levelling will be adopted at the Port of Mourilyan to maintain navigable depths in the swing basin and berth for the foreseeable future (5 - 10 years). This is expected to take 1-3 weeks each year. Equipment used will depend upon its availability but will typically involve a vessel similar to that shown in Figure 8. No alternative viable techniques have been identified during consultation associated with this LMDMP.

Bed levelling at the scale required has much lower costs and environmental risks compared to alternate maintenance techniques such as hopper dredging with relocation of dredged material to an at-sea or land-based placement site. The technique is readily adaptable to variations in the sediment accumulation levels and can be economically scheduled to fit with the availability of a suitable vessels. The process is very efficient for the type of material moved.

Bed levelling results in short term water quality and ecological impacts largely restricted to port navigation areas. Opportunities to minimise these minor impacts are considered as part of a risk assessment undertaken as part of planning each bed levelling campaign consistent with the approach described in Ports North Environmental Management System (Section 6-8).

Ports North will work with the Regional Harbour Master to define the volumes of material and specific areas to be subject to bed levelling activities. Opportunities to minimise bed levelling will be reviewed as part pf this process.

Any capital dredging (e.g. channel widening or deepening) will be subject to a specific approval process.



Figure 9 Pacific Conquest - Bed levelling vessel

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6. Risk Assessment Framework

Risk assessments of the bed levelling activity have been undertaken as part of the Port North Environmental Management System (which is consistent with ISO 14001 (and the ISO 31000 standard for risk assessment where applicable) for many years and are undertaken prior to each specific campaign.

Bed levelling is typically undertaken midyear when weather conditions are calm. Specific scheduling of bed levelling includes consideration of environmental factors and the need for any management actions such as environmental windows. Ports North undertakes a risk assessment for scheduling as part of planning a bed levelling campaign based on the approach adopted for the *Great Barrier Reef Region Strategic Assessment* (Strategic assessment report, GBRMPA, Townsville (GBRMPA, 2014) which is in accordance with the Queensland Maintenance Dredging Strategy (TMR, 2016).

Risk assessments of potential impacts to environmental, social, or cultural values are undertaken prior to each dredging campaign. The assessments help determine the level of potential harm to such values from the proposed dredging program and identify where management measures are required to avoid, reduce, or mitigate impacts. Identified measures can then be incorporated into the campaign specific Environmental Management Plan (EMP).

7. Identification and Treatment of Key Risks

Risk assessments conclude that bed levelling is a negligible or low risk to the environmental values of the Port of Mourilyan given the;

- area influenced is largely restricted to the swing basin, berth and channel entrance, areas which are routinely disturbed by shipping
- period of influence is short (daylight hours over 1-3 weeks)
- uncontaminated nature of sediments involved
- negligible hydrodynamic impacts
- lack of ecological communities of high conservation value likely to be adversely affected (including turtles and dugong)
- use of regionally based bed levelling equipment (low risk of imported marine pest introduction)
- contractor environmental performance and reporting requirements described in the EMP specifically prepared for each bed levelling campaign

Whilst risk assessments indicate that there are no significant risks to the environmental values of the Port of Mourilyan associated with bed levelling (sufficient so as to require specific management actions), there may be fishing and port operational risks related to vessel interaction. Ongoing consultation with stakeholders (particularly the Port Advisory

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Group) associated with development of the bed levelling EMP will enable identification of project-specific risks and appropriate management actions.

Ports North is committed to minimising and managing potential risks from bed levelling activities. Identified risks will be addressed and managed through the implementation of an EMP for each bed levelling campaign either developed by the contractor, or by Ports North and to which the contractor adheres. This management approach has been successfully adopted for the past 10 years and is updated to reflect the experience of each campaign by Ports North Environment staff.

Bed levelling operations, whilst unlikely the result in any significant impacts, are proposed to be managed wherever possible to minimise the potential for turbidity plumes to influence nearby seagrass beds (e.g. by appropriate siting of operations at different tides). This will be largely be under the control of the bed level operator and as it will depend upon area-specific tidal currents and winds.

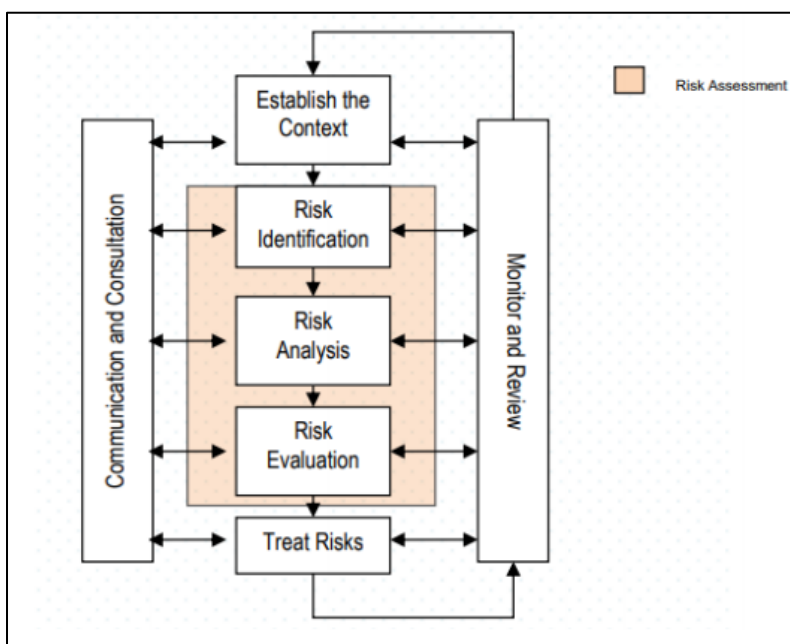


Figure 10 Risk Management Process (from MDS, 2017)

8. Environmental Management

No significant environmental risks are likely to be associated with the bed levelling strategy proposed to maintain berth, swing basin and channel depths at the Port of Mourilyan. There may be opportunities to minimise the low risks through enhanced operational techniques and these will be continuously reviewed by Ports North staff.

The key management mechanism for bed levelling in the future will be a project-specific EMP consistent with Ports North EMS and current legislative requirements. An EMP provides the operational practices required for bed levelling activities to meet environmental standards (e.g. pollution, emergency response). The EMP forms the operational control document to ensure all site-specific environmental issues are adequately addressed.

Stakeholder consultation will occur as part of planning (including EMP development), works execution, and any monitoring of bed levelling works.

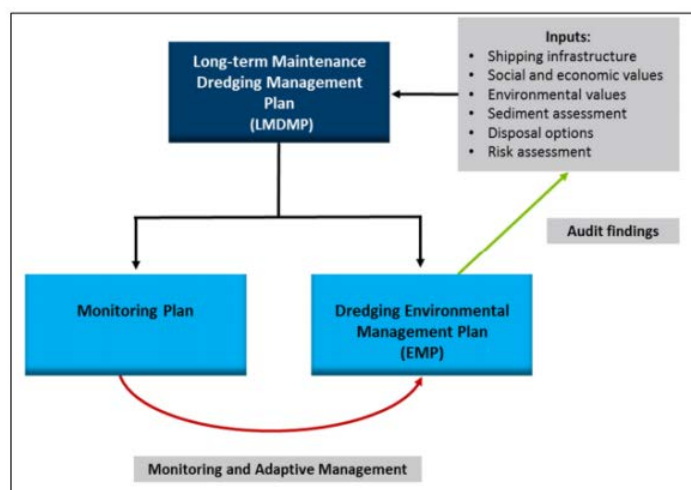


Figure 11 Dredge Management and Monitoring elements (MDS, 2017)

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Ports North has a Port Supervisor located in the Port (an authorised officer under the Transport Infrastructure (Ports) Regulation 1994) who may issue directives to vessels to ensure the safety or efficient operation of the port or to enforce port regulations or the requirements of *Transport Operations (Marine Pollution) Act*.

8.1. Operational Control

In respect of the operational control by Ports North of contractors involved in maintenance activity, namely conduct of bed levelling, includes the contract with the bed level vessel operator, and the EMP, as described below;

An EMP provides the operational practices required for dredging activities to meet environmental standards. The EMP forms the operational control document to ensure all site-specific environmental issues are adequately addressed. The EMP covers all aspects of the dredging operations and will contain:

- Location and description of the activities
- Timing of the dredging operations
- Measures to meet permit conditions
- Standard management measures relating to:
 - Waste management
 - Ballast water management
 - Bunkering of fuel
 - Vessel wash down
- Adaptive management measures relating to:
 - Water quality
 - Marine fauna
 - Climate conditions
- Operation and incident reporting
- Emergency procedures and contacts

8.2. Adaptive Management

Adaptive management provides for continuous monitoring, evaluation and adjustment of management response measures based on monitoring and environmental conditions.

Based on an understanding of acceptable environmental conditions and thresholds for impact a series of responses can be established and then monitored to ensure that conditions that may produce environmental harm are avoided or ceased before impacts occur.

Feedback from the primary monitoring program for the port – namely the long-term Mourilyan Harbour seagrass monitoring program has informed the management of past bed levelling campaigns, including consideration of the use of tidal specific windows for works to minimise extent of sediment plumes from works extending through the harbour to the seagrass meadows.

Adaptive monitoring may be implemented for each maintenance dredging campaign, informed by the scale and duration of works. The program would focus on collection and analysis of data to detect impending environmental harm and undertake corrective action where necessary. This is a key step in impact avoidance and management. Such approach would be reflected in the monitoring plan component of the EMP for any such future maintenance dredging works.

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9. Monitoring Framework

Ports North periodically monitors water quality during bed levelling operations to confirm the results of risk assessments and operational observations. This is complimented by the long term monitoring of the health of the seagrass meadows within the Moresby River adjacent to port infrastructure. Environmental monitoring activities are detailed in the Port of Mourilyan Environmental Management Plan (Port North, 2016) and the campaign-specific EMPs for bed levelling activity.

Monitoring of past bed levelling events in 2009 and 2010 included aerial surveillance and recording of plume extent from a light aircraft (e.g. Figures 9 and 10). This confirmed observations by operators and port staff over many years that the plume extent was tidally influenced, persisted for a short period (several hours) and was generally confirmed to the areas in the lower portions of the harbour.

Ports North also contributes to regular ambient monitoring (long-term monitoring) for the harbour and Moresby River catchment via the Wet Tropics Healthy Waterways Partnership.

Ports North reviews the reports provided by port tenants, who have obligations for conduct of receiving environmental monitoring programs under their Environmental Authorities. Such monitoring is a compliance action overseen by the State Environment Department. However, leases on port land may be required to provide periodic reporting to Ports North on the outcomes of such monitoring. This informs Ports North's understanding of the activities and possible contributions from those activities into the broader harbour environment.



Figure 12 Aerial Image of bed-level activity in 2009

(Localised surface plume evident in swing basin, ambient harbour water clarity at mouth of Walter Creek, and plume from prior passes of the bed level vessel toward wharf and pile moorings).

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Figure 13 Aerial Image of bed-level activity in 2010

Surface plume evident along wharf and into mouth of Walter Creek from berth bed levelling, tannin stained harbour waters present on left of image)

10. Performance Review

Hydrographic surveys are to be conducted to the satisfaction of the Regional Harbour Master who will confirm that designated channel, berth and swing basin depths are being maintained.

The environmental and social performance of this LMDMP will largely be determined by compliance with the campaign-specific EMP and feedback from stakeholders (particularly those that relate to environmental issues, shipping, fishing, and port operational issues). This will be achieved as a result of Ports North internal review processes and the provision of regular updates to the Port Advisory Group on any planned or conducted bed levelling activities.

Periodic internal auditing of the status of implementation of this Plan, and also campaign- specific EMP implementation are to be addressed within the audit cycle outlined in the Port's Environmental Management System. Records and outcomes of such audits will be maintained so as to assist potential external audit regimes, or in the event that there is a need to demonstrate effectiveness of the process.

Ports North will include an annual report on the Ports North website detailing bed levelling in the past 12 months, results of any environmental monitoring associated with dredging actions and indications of any possible upcoming dredging activities.

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11. Supporting Information

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