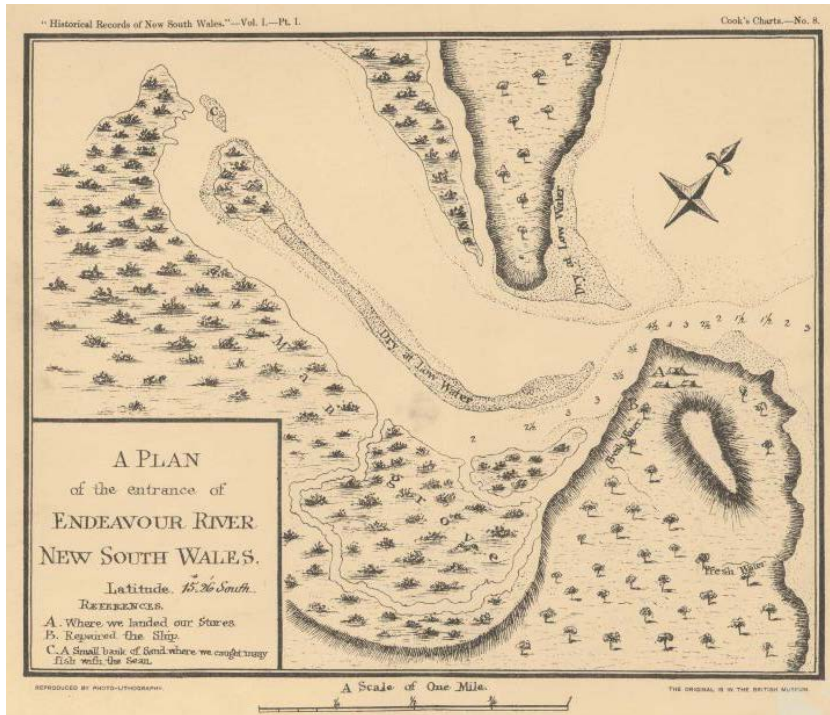




# Ports North



## LONG-TERM MAINTENANCE DREDGING MANAGEMENT PLAN

### PORT OF COOKTOWN

JUNE 2019

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# 1. Introduction

The Port of Cooktown is located at Cooktown on the Endeavour River in Far North Queensland. The Harbour is adjacent to the Cairns/Cooktown Management Area of the Great Barrier Reef Marine Park. Figure 1 shows the location of the harbour, the offshore disposal site and reclamation area that may be utilised for dredging and placement.

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, non-trading port.

The Department of Transport and Main Roads, (TMR) on behalf of the State of Queensland, is responsible for the maintenance dredging of the main access channel and swing basin to meet needs of recreational boating activities. The Cook Shire Council (CSC) also has a role in managing a number of moorings in the harbour at the Port. Dredging works are periodically required at Cooktown to provide safe navigational access and permit have been granted for these works by the Great Barrier Reef Marine Authority on prior occasions and works managed by TMR.

TMR undertook development and consultation on a long-term dredging strategy for Cooktown in 2010 with the target of a 20-year strategy, and at that time it was considered that the outcomes of the Great Barrier Reef Marine Park Strategic review would be required to be considered before a long-term strategy could be effectively implemented. This Plan draws on portions of content from the TMR draft strategy, and the EMP for the 2014 works.

## 1.1. Purpose and Objectives

The purpose of this Long-term Maintenance Dredging Management Plan (LMDMP) is to document the status of responsibilities for managing natural sediment accumulation at the Port, in a way that ensures the safe and efficient operation of the Port and the ongoing protection of local environmental values and the Outstanding Universal Value (OUV) of the GBRWHA.

The objectives of the LMDMP are to:

- Document responsibilities for Maintenance Dredging at the Port
- Maintain local environmental values, including the Outstanding Universal Value of the GBRWHA.
- Outline responsibility for establishment of a robust, transparent long-term planning approach to managing port sediment.
- Outline operational, planning, consultation and monitoring arrangements.

## 1.2. Policy Context

The plan respects the dredging associated principles, elements, and objectives described in:

- Reef 2050 Long-Term Sustainability Plan
- Environmental Code of Practice for Dredging and Dredged Material Management
- Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports
- National Assessment Guidelines for Dredging (NAGD)

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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 (shown 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**

- 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 guidance provided by NAGD should any disposal of maintenance material at sea be considered.*

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### 1.3. Legislation Pertaining to Maintenance Dredging

Maintenance dredging programs at the Port of 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 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.

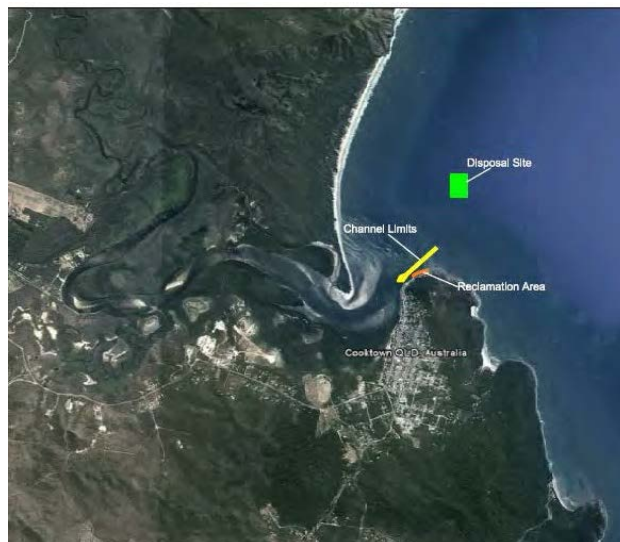
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### 1.4. Maintenance Dredging Approvals

There are a number of State and Federal approvals that are necessary to enable conduct of maintenance dredging (extraction and removal from tidal waters) or disposal (extraction and placement on land or other areas under tidal waters) at the Port, and as an example, for the 2014 works the following approvals were obtained by TMR for conduct of that work:

- Environmental Authority EPPR01467413
- Allocation of Quarry Material
- GBRMPA Marine Park Permit
- Sea Dumping Permit
- Tidal Works approval for dredging and offshore spoil placement area
- Tidal Works approval section 86 (or equivalent) for dredge channels
- Tidal Works Approval for reclamation site
- Marine Plant Permit



**Figure 2 General Location of Dredging and Placement (2014)**

### 1.5. Current Approvals

Dredging of the port is currently managed by DTMR and Cook Shire Council, with TMR maintaining a range of approvals in anticipation of next dredging requirement, or obtaining certain ones on an as needed basis, so as to undertake actions to maintain the existing portions of the channel as an authority under the *Transport Infrastructure Act 1994*.

It is understood that an Environmental Authority (EPPR02005514) was granted to commence from 20 July 2018, for the conduct of Environmentally Relevant Activity 16-(1b) Dredging >10,000t but <100,000t/yr, and would continue to have effect if annual fee and return were completed.

Copies of details of other approvals are held and available via TMR upon request.

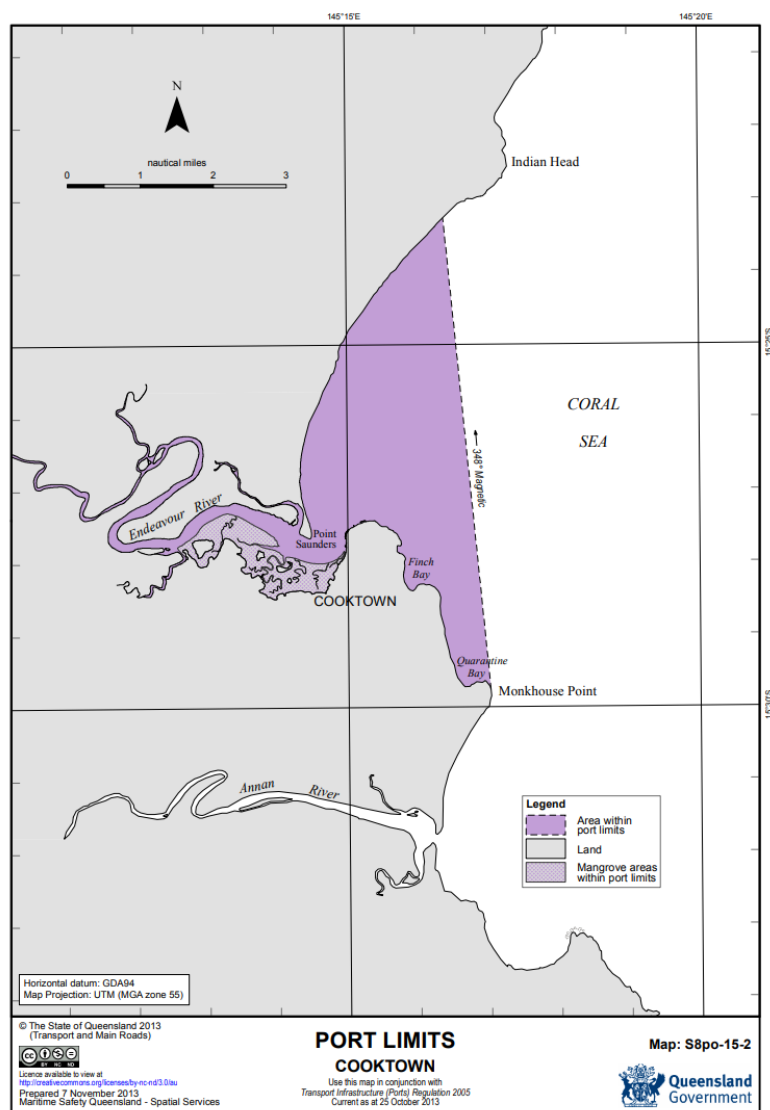
### 1.6. Roles and Responsibilities of Port Authority and Port Customer

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, non-trading port. The Department of Transport and Main Roads, (TMR) on behalf of the State of Queensland, is responsible for the maintenance dredging of the main access channel and swing basin to meet needs of recreational boating activities. The Cook Shire Council (CSC) also has a role in managing a number of moorings in the harbour at the Port. Dredging works are periodically required at Cooktown to provide safe navigational access and permit have been granted for these works by the Great Barrier Reef Marine Authority on prior occasions and works managed by TMR. These responsibilities are outlined further below:

#### 1.6.1. Port Authority

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Ports North is a government owned corporation that reports to two Government Shareholding Ministers (Minister for Transport and Main Roads and the Treasurer). A Board of Directors oversee the governance and direction of the organisation. As the declared port authority for the Port under the *Transport Infrastructure (Ports) Regulation 2016*, Ports North has responsibilities conferred on it by State legislation (*Transport Infrastructure Act 1994* and *Transport Operations (Marine Pollution) Act 1994*) for the safe and efficient management of the port and its infrastructure, and for managing pollution from shipping activities. As there is no defined Strategic Port Land at the Port of Cooktown, the jurisdiction of Ports North applies to all waters within designated port limits. Port Limits are shown in Figure 3.



**Figure 3 Port Limits**

Operations and Commercial staff from Ports North engage periodically and on an as needed basis with the various port customers and prospective users who seek access to the channel, wharves, berths or ramps and any issues with depth would become apparent via that mechanism. The Port may then confer with the Regional Harbour Master in regard to matters pertaining to management of channel and access depths, and status of dredging program or future requirements.

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### 1.6.2. Department of Transport and Main Roads

For the Port of Cooktown, survey program is managed via the TMR Hydrographic Survey Department, and conducted utilising the vessel “*OGV Norfolk*”. Overall supervision of dredging or bed levelling contract rests with TMR and it’s appointed commercial contractor.

Oversight of the environmental management inclusive of approvals compliance, EMP, and monitoring programs rests with the environment staff within the Boating and Infrastructure section of TMR. Their management also provides coverage of stakeholder engagement in regard to approval agencies, and to interested and affected parties, and also includes oversight of environmental consultants utilised for monitoring or environmental surveys where applicable.

### 1.6.3. Cook Shire Council

Council staff engages regularly with the various users of the jetty, ramp and inshore facilities and the more frequent users on regular basis and any issues with depth would become apparent via that mechanism. The Council provides feedback on activities to TMR and generally provides the response to any public queries, acting as a point of contact for any queries around the entrance depth or ramp conditions.

### 1.6.4. Port Customers

Port activities carried out by either port users or operator 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 operation of the port does not provide any umbrella approvals for the individual activities of port users. Port users are required to hold all the relevant environmental authorities or licences issued by state administering agencies, including those issued by Cook Shire Council for their day-to-day activities, which might include environmentally relevant activities such as fuel or chemical storage, or boat repair and maintenance.

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## 2. Port Locality, Setting, and Shipping

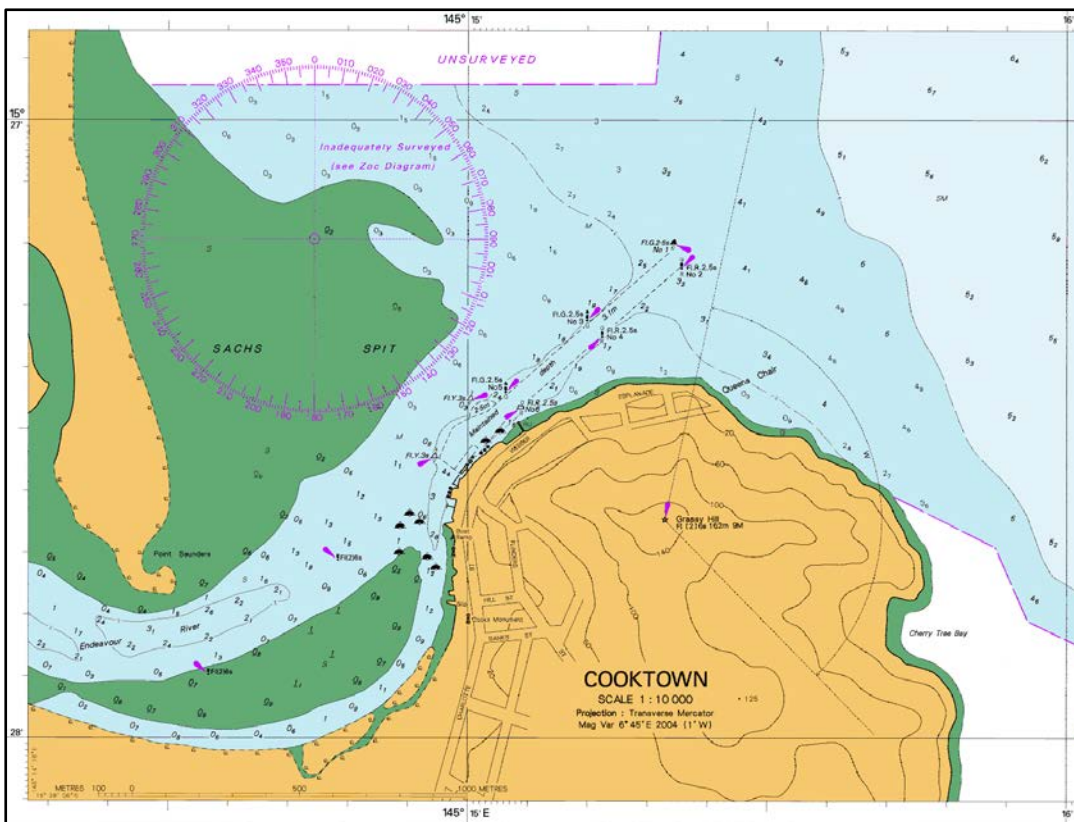
The Port of Cooktown is located at the mouth of the Endeavour River on the Eastern side of Cape York, and as a result of the stability of ecological communities being largely influenced by seasonal monsoon events the primary habitat in the nearshore environment consists of seagrass, coastal dunes, mangroves, and saltmarsh communities (TMR 2014).

### 2.1. Port Navigational Infrastructure

The Port has seen a vast variety of historical colonisation and construction of infrastructure to support the initial gold rush of the 1880's, the subsequent decline in the township, and now the stable tourism and services industries. Port infrastructure has ebbed and flowed to meet these changes, and the summary below outlines the status of port infrastructure since the original harbour dredging of the Port in around 1997.

The Dept. of Transport and Main Roads is responsible for the dredging and maintenance of the main access channel and swing basin to meet the needs of recreational boating activities. The Cook Shire Council also has a role in managing a number of moorings in the harbour. The two lane public boat ramp, a public jetty and public pontoon are available for recreational boating public in the Endeavour River. These facilities are categorised as small-scale boating infrastructure, rather than commercial port infrastructure, and hence maintenance of access to such infrastructure rests with DTMR.

The Channel is approximately 1km long, and has a design depth of -3.4m LAT, and the swing basin adjoining the main wharf to -4.3m LAT.



**Figure 4 Port of Cooktown AusChart**

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### 3. Port Environmental Values

Environmental values are documented and best summarised in the 2014 Environmental Management Plan for Cooktown dredging (TMR, 2014, and extract summary of relevant information is shown in Table 1 for the Port of Cooktown, including a summary of known distribution and seasonal and temporal trends.

**Table 1 Summary of Environmental, Social, and Economic Values for the Port**

Environmental Values	Distribution	Temporal Trends – Environmental Windows
<b>HABITATS</b>		
Seagrass Meadows	Cooktown is composed of two different intertidal communities of seagrass located near Archer Point. The primary community is dominated by <i>H. uninervis</i> / <i>H. ovalis</i> with <i>Cymodocea</i> / <i>T. hemprichii</i> and the second composed of <i>H. uninervis</i> / <i>H. ovalis</i> with <i>C. rotundata</i> (McKenzie et al., 2007; GBRMPA, 2012). In 2005 a seagrass survey of the Endeavour River identified sparse patches of <i>H. ovalis</i> in Chinamans creek and dense patches on the northern intertidal banks of the river (McKenzie and Yoshida, 2014). <i>Zostera capricorni</i> was also observed on the exposed banks and narrow intertidal banks known as Sash's Spit (McKenzie and Yoshida, 2014), on the southern banks of the endeavour river since 1985. There is no consistent monitoring north of Cooktown, but aerial surveys in the Princess Charlotte Bay region supports other evidence that seagrass in the northern Great Barrier Reef is stable (GBRMPA, 2012).. Seagrass communities observed by GHD (2006) in the north- eastern corner of the DMPA were found to be of moderate density, composed of <i>Zostera capricorni</i> and <i>Halodule uninervis</i> in an area of approximately 10m <sup>2</sup> (BMT WBM, 2010).	Since 2003 seasonal variability has been observed within the <i>H. uninervis</i> and <i>H. ovalis</i> beds south of Cooktown ranging from 20% in winter to 35% in spring. Annual declines have also been noted in assemblages between 2003 and 2006 surveys as well as between 2009 and 2011, although the decadal trend is suggested to be relatively stable (McKenzie et al., 2007; GBRMPA, 2012).
Coral Reefs	Cooktown has a number of inshore reefs (starting ~15km from Cooktown) which are primarily composed of hard coral (40.4%) and algae (41.5%), with a ~5% soft corals. The dominant coral assemblages are <i>Acroporidae</i> , <i>Favidae</i> , <i>Pocilloporidae</i> and <i>Poritidae</i> (Sweatman et al., 2008).	There appears to be no long-term trends with most fluctuations driven by increases or decreases in the abundance of hard coral (Sweatman et al., 2008).
Macroalgal Beds	NA	Macroalgae generally increases in spring/early summer, but has remained well below the GBR long-term average for reef habitat since 2006 (McKenzie and Yoshida, 2014).
<b>FAUNA</b>		
Sea Turtles	Loggerhead, Green, Flatback and Hawksbill turtles are known to inhabit the area (Garcon et al., 2010). The Hawksbill is regularly found in the Howick reef	NA
	group to the north of Cooktown (Bell et al., 2012).	

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Environmental Values	Distribution	Temporal Trends – Environmental Windows
Dugongs	The World Heritage Area has been subdivided into two parts: north of Cooktown and south of Cooktown. North of Cooktown, surveys were carried out in 1984, 1985, 1990 and 1995, suggesting that Cooktown may represent a population break (Env 2015). The extensive seagrass meadows north of Cooktown and lack of anthropogenic influences in the region are suggested to allow dugong populations to persist in strong numbers (Marsh et al., 1995).	Dugong numbers have declined significantly in recent years possibly as a consequence to both natural and human-induced changes to the health and ecology of seagrass beds. From 1984 to 1995 the northern dugong population was stable, with the minimum population estimate from 1995 being 8190 (+/- standard error of 1172) dugongs (Marsh et al., 1995; Env 2015).
Cetaceans	A number of inshore dolphins are have been recorded in the Cooktown area including; Australian snubfin ( <i>Orcaella heinsohni</i> ), Indo-Pacific humpback ( <i>Sousa chinensis</i> ) and Bottlenose dolphin ( <i>Tursiops truncatus / aduncus</i> ) (Fisheries Queensland, 2011). The dwarf minke whale, <i>Balaenoptera acutorostrat</i> is a migratory whale species that is also known to frequent the offshore area off Cooktown, particularly Lizard Island (Britles et al., 2008; 2014).	Swim-with-whale operators in the area have undertaken ongoing monitoring of <i>B. acutorostrat</i> populations. The Ribbon 9/10 reefs north of Cooktown account for the majority of sightings for the species along the east coast of Australia (Britles et al., 2008; 2014). The number of encounters increased by 90% from 2003 to 2008, which are likely a reflection of increased visitation and knowledge on occurrence (Britles et al., 2008; 2014).
Benthic infauna and epifauna	The Port of Cooktown is characterised by unstable, highly turbid waters that is driven by the seasonal monsoon rains that are reflective of benthic fauna identified (FRC 2000, WMB 1996). Benthic fauna investigations undertaken by FRC (2000) identified a lack of sponges and soft coral. The benthic infauna surrounding the Port of Cooktown and spoil ground is dominated by opportunistic species such as polychaete's and amphipods (FRC 2000; WMB 1996).	There appears to be no noticeable qualitative changes between historic infauna investigations (FRC 2000, WMB 1996).

### 3.1. Marine Parks, World Heritage Area, and Areas of Significance

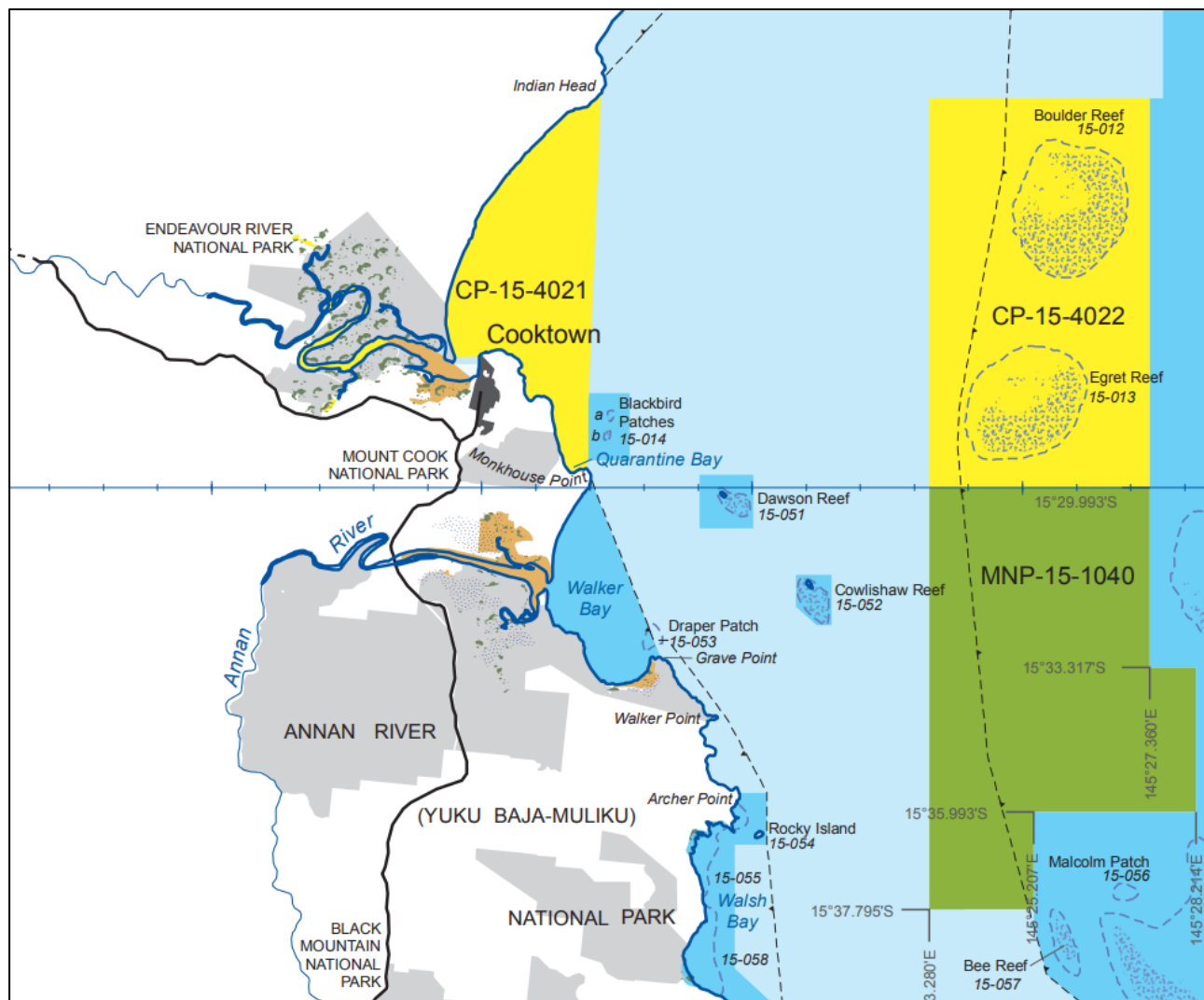
The Great Barrier Reef WHA (WHA) in and around the Port, whilst the Wet Tropics WHA finishes to the south of Cooktown, and hence does not extends into the port limits. There is no Strategic Port Land present to be included within the GBR World Heritage Area.

The Great Barrier Reef WHA covers the waters to the low water mark along the coastline and extends up the Endeavour River. The majority of land above high water within the port is beyond the GBR WHA.

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.

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**Figure 5 Coastal Resources and Zoning**

The Port is in or partly within the GBRWHA (listed as a World Heritage Area in 1981). The GBRWHA is listed based on it meeting four World Heritage criteria for OUV:

- Natural beauty and natural phenomena (Criterion (vii)).
- Major stages of the Earth's evolutionary history (Criterion (viii)).
- Ecological and biological processes (Criterion (ix)).
- Habitats for conservation of biodiversity (Criterion (x)).

Of the important environmental values present in the region, three are considered to contribute significantly to the OUV of the GBRWHA. These are:

- Internationally recognised migratory shorebird roosting sites;
- A core aggregation/calving area for the east-coast population of humpback whales offshore from the port.
- A high diversity of mangrove species within estuarine areas.

To effectively manage sediment and dredging activities at the Port it is essential to understand the environmental, social and cultural values of the Port and the surrounding area. The commercial activities were discussed previously in Section 2.

The focus is on values that are considered important or notable at a national, regional, or local level. The aim is to provide a useful level of detail and relevance to management planning. Values are described for the broader area

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incorporating the port limits and adjacent environs. More detailed information regarding these values can be found in the TMR EMP, 2014.

### 3.2. Social Values

The Port of Cooktown is at the mouth of the Endeavour River, on Cape York Peninsula in Far North Queensland where James Cook beached his ship, the Endeavour, for repairs in 1770. It is one of the few large towns in the Cape York Peninsula.

It is a seaport limited to small vessels and is mainly a base for fishing and tourist vessels and periodic visits by cruise ships, yachts, trading and work vessels and navy patrol boats.

Community needs and interests: Cooktown is a service centre for the district including the Aboriginal communities of Hopevale, 47 kilometres to the northwest, and Wujal Wujal, 72 kilometres (45 mi) to the south. The region has a rich historical significance and is a popular tourist destination.

Economic values are variable, and of minor income to the Port Authority, with a minimal number of dutiable vessels utilising the port.

### 3.3. Cultural Heritage Places and Value

The port and surrounding region is the traditional country of various indigenous groups at various stages of native title determination, with the Port and surrounds an area of significance to the adjacent Hopevale community. The rich abundance of the land, together with the presence of permanent watercourses, permitted local groups to establish semi-permanent 'base camps'. The Endeavour River area is also the location of one of first points of contacts between Europeans and Aboriginals. The first European contact with Cooktown was by Captain James Cook in 1770, where the earliest port infrastructure, a rudimentary slipway, was established. There are likely to be a number of areas of cultural heritage significance in or adjacent to the port were identified in past cultural heritage surveys.

### 3.4. Coastal Process

The Port of Cooktown is located in a small embayment of the far northern part of the Great Barrier Reef Lagoon. The seabed in the region is relatively shallow with depths typically less than 6m below LAT in the near vicinity of the harbour graduating to about 10m below LAT approximately 5km offshore. The Endeavour River discharges into this embayment which is a source of sand into the coastal system. The primarily sandy material that infills the navigational channels and necessitates the need for maintenance dredging is a result of mobilisation of sediment in the local coastal system via large wave events, usually associated with cyclone events. Some of this material would be directly from the river and some would have migrated to the area via natural coastal processes. The low content of fines shown from historical sediment sampling indicates that the area is a relatively high energy coastal environment in which fine sediments are transported away leaving a sandy inshore substrate. These sandy materials play an important role in the local coastal geomorphology which is reflected in the policies supporting the *Coastal Protection and Management Act 1995*.

Baseline water quality data collected indicates high natural variability at the Port of Cooktown. Due to this factor it is important to assess impacts associated with dredging and disposal works in context with the natural water quality conditions. Given the dredged sediment is primarily sand, water quality

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impacts are expected to be reduced given sandy material settles out of suspension much faster than finer sediment and hence has less potential for impact.

Although the majority of the Port itself is excluded from the GBRMP, part of the entrance channel and the proposed offshore placement area is within the GBRMP as are the surrounding waters. A range of marine habitats have been identified in the wider region.

### 3.5. Soft Sediment Environment

Subtidal and intertidal soft sediment habitats represent the largest biotope by area within the river estuary, the entrance, and nearshore environments. These areas are inhabited by benthic microalgae and they also contain mangroves, saltmarshes, and seagrasses.

Historical and recent mapping undertaken by GHD (2006) and FRC (2013) show significant seagrass and macroalgae communities throughout the study area. However no communities were identified within the proposed dredge channel and while some communities were identified within the existing offshore placement area these areas were small in comparison to the overall extent of the placement area.

### 3.6. Seagrasses

WMB (1995) undertook a baseline EIA which identified moderate density seagrass throughout the surrounding sub-tidal areas and fringing mangroves along the Cooktown foreshore). Many of these identified communities have been further characterised in subsequent surveys in 2003, 2006, 2007 and 2011 (McKenzie et al., 2007; GBRMPA, 2012). Benthic infauna assessments have been undertaken in the Port and surrounding subtidal areas. The composition of infauna in the Cooktown region is dominated by opportunistic species due to the seasonal instability of the region (WMB 1995), with temporal trends reflective similar patterns of diversity (FRC 2000). Additionally, it was suggested that the overall distribution of benthic infauna was likely to be driven by sediment grain size (FRC 2000).

Seagrasses at and adjacent to the study area have been extensively surveyed by WBM (1996), FRC (2000), GHD (2006), Cape York Marine Advisory Group (CYMAG, 2004, 2005 and 2007) and FRC (2013). Seagrass meadows showed great variation over time in terms of distribution, extent, species composition, and density.

As with other tropical Queensland rivers and nearshore areas, seagrass meadows commonly colonise intertidal or shallow subtidal areas at the river mouth during the dry season, but reduce in growth and/or distribution in the wet season. This seasonality is thought to be a result of cyclonic or floodwater influences (Coles et al., 2007). The wet season is associated with high rainfall, high sediment loads, and nutrients to nearshore marine waters which impact on seagrass.

Some meadows appeared to be relatively stable over time. In this regard, a bed of *Halodule uninervis* on Sachs Spit, and beds around the base of Grassy Hill were recorded in the majority of historical surveys, possibly because these meadows are less exposed to flood water and sediment impacts.

Historically no seagrass meadows were identified in the navigational channel however a survey by FRC (2013) found 141m<sup>2</sup> of low density cover of *Halophila ovalis* on the northern edge of the channel.

Seagrass plays an important role in marine ecosystem of the study area, and from historical mapping campaigns its spatial extent and density is variable based on seasonal conditions. Because a small area of seagrass is within the area disturbed by dredging a marine plant disturbance notification is required under self assessable code MP02. However no disturbance to seagrass is expected at the DMPA.

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### 3.7. Mangroves and Saltmarsh

Mangroves and saltmarsh communities dominate the riparian zones upstream of the dredging area in the Endeavour River and form a complex wetland habitat west of the Cooktown township as outlined in BMT WBM (2010).

### 3.8. Hard Substrate Environments

The hard substrate structures are made up of three elements in the study area. (1) Artificial structures such as rock walls, wharfs etc, (2) Subtidal reefs and (3) intertidal reefs/rocky shores.

Artificial structures exist along the southern side of the Endeavour River adjacent to the Cooktown township. These structures include rock and concrete retaining structures and wharfs to facilitate shipping access. These structures provide a range of complex micro- habitats for marine flora and fauna communities.

Detailed surveys of sub-tidal reef communities were undertaken in the area north of Grassy Hill in 1995 (WBM, 1996). These nearshore rocky reefs support extensive areas of brown algae. These areas were separated by areas of bare sand and some patches of seagrass. In water depths 1 to 3m. WBM (1996) recorded a variety of hard corals in deeper waters between 5 and 10m water depth on a reef approximately 500m from the shipping channel. All coral species encountered were encrusting, plating or massive forms. Branching forms of coral were not identified. Inshore areas 1-2m water depth supported extensive Sargassum beds on rock substrates. It was noted during these surveys high turbidity results occurred due to wave action.

Intertidal reefs were not surveyed however were expected to exist around the rocky headland of Grassy Hill as a continuation of the sub-tidal reef community.

From the long term strategy (BMT WBM, 2010), the primary sensitive habitats identified which have the potential for impact from the dredging and placement works are seagrass meadows. These are located in the vicinity of the dredging and offshore placement areas and the rocky reefs around Grassy Head.

Baseline monitoring results discussed in the long term strategy indicate that the aquatic habitats in the vicinity of the Port of Cooktown are accustomed to naturally high and variable turbidity levels.

### 3.9. 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 and operating procedures have been developed to mitigate potential impacts.

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## 4. Consultation and Key Issue

Consultation on the topic of maintenance dredging has been conducted at the Port of Cooktown on a number of occasions facilitated by TMR, especially the consultation to develop a long-term strategy in 2009-10, and in lead up to and delivery of the works in 2014/15. A presentation of the proposed 2014 works was provided to GBRMPA's Local Marine Advisory Committee (LMAC) (grouping of community stakeholders). Feedback from the group was received and included in the development of the EMP for that work. The approval process for the 2014-15 works included consultation and assessment of the project by the then DEHP, DAFF, Ports North, MSQ, Cook Shire Council, and GBRMPA. This indicates that applicable stakeholders have been consulted on past maintenance activities.

### 4.1. Interested and Affected Parties

Through past engagement and consultation process, the following entities are identified as having potential interests in present and future port maintenance activities;

Relevant stakeholders to include:

- Great Barrier Reef Marine Park Authority;
- Department of Environment and Heritage Protection;
- Maritime Safety, Transport and Main Roads;
- Department of Agriculture, Fisheries and Forestry ;
- Cook Shire Council; and
- Representatives from GBRMPA's Local Marine Advisory Committee (LMAC).

### 4.2. Technical Advisory Consultative Committee (TACC)

In the event that a maintenance campaign is contemplated, and or a requirement is put in place under a condition of either a Marine parks or Sea Dumping Permit, oversight and input on management of dredging and placement may be required and an approach outlined under the NAGD (CoA 2009) may be utilised. This guidance sets out the development of a Technical Advisory and Consultative Committee (TACC) being a necessary component to assist in the consultation process required for a Sea Dumping Permit applications. The NAGD states that:

"The TACC is intended to assist ports and other proponents and Determining Authority to access local knowledge and reconcile various stakeholder interests."

The TACC is intended to:

- provide continuity of direction and effort in protecting the local environment
- support communication between stakeholders
- assist in the establishment of longer term management arrangements, including reviewing the development and implementation of management plans and monitoring programs
- review dredging and dumping activities in accordance forecast plans and programs
- make recommendations to the port authority and regulators as necessary or appropriate.

There is no present TACC because there is no regular dredging of sufficient scope to trigger the requirements, nor a long- term permit in place.

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Consultation with a TACC would likely occur during the design phase of larger dredging activities, particularly those involving a hopper dredge, sea, or land disposal. The TACC should be consulted on:

- Proposed program specifics such as the location of dredging and disposal sites and the timing and duration of dredging and associated activities
- Results of the risk assessment of potential impacts to values and proposed mitigation and management controls
- Scope of program monitoring and reporting requirements.

TMR have previously indicated that a TACC may be formed under a scenario where a long term strategy is approved and permits granted, that TACC is likely to be established and include the following stakeholders will to be represented on a TACC to guide future works. The TACC is likely to comprise representatives from the groups listed in Section 4.1.

## 5. Sediment Assessment

Outlined in this section is a description of the nature of the sediment and detail of how it interacts with port operations, in the past present and future. This demonstrates a thorough understanding of regional and local processes, understanding of properties (physical, chemical and biological) and informs the subsequent sections on the possible justification for sediment management solutions that may be considered for the Port in future, subject to TMR's processes.

### 5.1. Port Sediment

The physical sediment properties throughout the Endeavour river are typical of those to North Queensland. The key features across all sites surveyed include; non-cohesive fine and medium sands; coarser sand in shallow exposed areas; finer sand in deeper waters; and a minor component of very fine sand and silts, (WMB 1995). Sediment sampling and analysis of the Endeavour River found all contaminant levels to be below the Limit of Reporting (Coffey, 1999).

**Table 2 Relative importance of processes supplying sediment to the port (MDS, 2017)**

Port	Average Annual Siltation (m <sup>3</sup> / yr)	Wave Climate	Tidal Currents	Wind Induced Currents	River Inputs	Cyclones and Storms	Mean Dry and Wet Season Background TSS <sup>(1)</sup>	Key Sediment Supply Mechanisms
Port of Cooktown	5,000	1	1	1	1	3	not available	Cyclones

High Importance	3	Medium Importance	2	Low Importance	1
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The entrance to the Endeavour River at Cooktown progressively shoals at around 5,000m<sup>3</sup>/year (in the absence of a major cyclonic event) as a result of active coastal processes that operate in and around the mouth of the river. In the absence of a long-term strategy, various stakeholders have focused on having the past works undertaken to ensure short-term navigability of the channel.

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## 5.2. Coastal Process

Cyclones also play an important role in the input of new sediment to the inner shelf of the GBR Lagoon through: river flooding, seabed erosion in the mid-shelf and reef breakage (Larcombe & Carter, 2004). In particular, cyclone induced waves and currents play an important role in the supply of sediment to the inner shelf through the erosion and advection of sediments away from the mid-shelf. This demonstrates that catchment runoff is not the sole source of sediment to the inner shelf of the GBR Lagoon.

**Table 3 Port of Cooktown key coastal processes**

Coastal Process	Description
Tide Range	Semi-diurnal tides with a tidal range of 3.2 m. (MSQ 2015)
Wind Climate	Predominant south to east-south-easterly trade winds.
Wave Climate	Predominantly short period wind waves generated within the GBR lagoon.
Current Conditions	Current regimes at Cooktown are generated predominantly by both tidal and wind forcing's. The prevailing south easterly wind conditions can have a significant effect on currents and leads to net north westerly directed current in the region.
River Influences	The Port of Cooktown is located on the southern bank of the Endeavour River mouth.
Cyclone Influences	The Port of Cooktown is particularly susceptible to cyclonic activity and has seen 30 cyclones pass within 100km of the port between 1906 and 2007. Notable recent cyclones include TC Justine in 1999 and TC Ita in 2014 which both instigated the need for maintenance dredging at the port. (BoM 2015)
Port Configuration	The Port is located on the southern bank of the Endeavour River mouth and consists of one berth maintained to a depth of 4 m LAT and a navigational channel maintained to depth of 3.1 m LAT.
Background TSS Concentrations	Not Available
Sediment Transport Summary	Sedimentation at the Port of Cooktown is typically instigated by cyclones travelling nearby to the Port which generate flooding, significant waves and currents. Under these extreme processes sediment is mobilised into Ports channels and berths.

## 5.3. Minimization of Sediment Accumulation and Dredging Needs

As noted in the prior to sections, the key driver for dredging is cyclone activity, and hence the ability to influence such process that contributes to accumulation and subsequent maintenance dredging is minimal. Minimisation of dredging need could be addressed via use of bed levelling. Bed levelling moves the deposited material to a natural deep hole in the centre of the Harbour. Evidence to-date indicates that this practice has been successful at other locations and is a cost-effective alternative to dredging, and may have minimal environmental impacts for sands substrates due to the short term of operations typically being less than a few weeks of disturbance. Further evaluation of bed levelling outcomes could be conducted as part of future management evaluation for dredging need as an alternative to maintenance dredging if sufficient deep placement locations are able to be identified.

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## 5.4. Maintenance Dredging and Disposal Requirements

The Port of Cooktown was initially subject to a campaign by TMR in 1997, then 1999 and then did not require any maintenance dredging between 2004 and 2014 as shown in Table 3. Even though the port is located at the mouth of the Endeavour River, no net sedimentation has been observed over this period. Maintenance dredging has been required on two occasions since capital dredging in 1997, which was undertaken to initiate commercial management of the harbour by Cook Shire Council. In 2015, a total of 44,141m<sup>3</sup> was removed following TC Nathan and in 1999 a total of 26,000m<sup>3</sup> was removed after the channel silted up due to a cyclone. This demonstrates that the sedimentation at the Port of Cooktown is driven by extreme cyclonic events and ambient sedimentation rates are negligible.

**Table 4 Historical Dredging Volumes**

Year	Total (m <sup>3</sup> )	Comments
1997	108,000	original harbour dredging
1999	26,000	harbour dredged again due to cyclone "Justine"
2014	60,000	harbour and entrance dredged due to cyclone "Ita" and material placed at Cook Shire foreshore reclamation project

The Port of Cooktown generally requires infrequent maintenance dredging. Maintenance dredging is typically instigated by cyclones travelling within 50km of the Port which generate flooding and significant waves and currents which cause sedimentation of the navigational channels. Typical seasonal events have not been shown to cause high sedimentation rates. Maintenance dredging was last undertaken at the Port of Cooktown in 1999. However, the condition of the channel can become significantly shallower than design depths and present a significant navigational hazard that requires instigation of a maintenance dredging campaigns. BMT WBM (2010) indicated that from cyclone statistics dredging is likely to be required about every 5 years to maintain reasonable operating depths, however a cyclone could occur close to the Port two weeks after any maintenance dredging event or may not occur for ten years. For this reason any future dredging strategy needs to allow for potential

**Table 5 Estimated future maintenance dredging volume and frequency.**

Port	Average Campaign (m <sup>3</sup> / campaign)	Typical Maintenance Dredging Frequency (years)
Cooktown	45,000	10

## 5.5. Examination of Reuse, Recycle and Disposal Options

One of the major constraints for implementation of beneficial reuse and on- land disposal options is the availability of suitable land for placement and/or processing of dredge material. In many cases, although permanent on-land disposal of material may not be proposed, dewatering, drying and treatment of dredge material is required before dredge material can be used in beneficial reuse applications. Sites for dewatering

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and drying of dredge material that is hydraulically pumped onshore comprise large bunded areas that are constructed over available land with the following characteristics:

- relatively flat land;
- close to existing drainage, creeks or waterbodies that can receive saline return water with a suspended sediment load;
- distant from areas subject to coastal erosion or storm surge;
- have limited adverse effects on environmental values of the area;
- within a reasonable distance from the dredging site to enable pumping of dredge material;
- secured by fencing to address public safety issues associated with large areas of soft sediments in the process of drying; and,
- ideally located close to the final beneficial reuse site to minimise transport logistics and associated costs.

Consideration of placement options was made with the QLD MDS and support Technical Appendices, and documents the annual mean future maintenance dredging volumes, and then uses these to estimate the potential land area requirements for on-land processing of this material over 5 year and 10 year planning horizons. These land areas have been determined for each port that has periodic maintenance dredging requirement and details for Cooktown are summarised in Table 6. The indicative land area requirements are based on placement of a 1m thick layer of settled silt/clay material with a bulking factor of 2 to 3 relative to its in- situ volume.

**Table 6 Estimated land area requirements for land disposal over 5 and 10 yr horizons**

Port	Annual Mean (m <sup>3</sup> / yr)	Typical Maintenance Dredging Frequency (years)	Indicative Land Area Requirement (ha)	
			5 years	10 years
Cairns	5,000	10	1	2

It is evident from Table 12 that Cooktown has a small dredging need, may be feasible for consideration for on-land receiving facilities. When the high environmental value associated with the GBRWHA coastal area are considered, the construction of large on-land receiving areas in close proximity to the coast would raise a wide range of environmental issues, however some inland areas may be suitable.

## 5.6. Selected Future Dredging and Disposal Strategy

For the volumes and rates of sedimentation that influence the demand for maintenance to the channel ramp and jetties, the past and present practice of small dredge campaigns or bed levelling is likely to be considered the most balanced approach to this requirement. It is adaptable to demand following and can be scheduled to fit with the availability of a suitable vessel on either its transit north or south to other Queensland ports each year, and the equipment may be of a scale and nature that it is very efficient for the type of material required to be moved.

TMR has responsibility for defining the preferred option for management of sediment over the 5 and 10-year horizons to remove material at key narrow sections or bars within the channel, ramp or berths. Through resolution with Cook Shire Council, TMR were able to identify a once off supplementary option of placement of dredged material to fill an existing approved reclamation site adjacent to the Webber Esplanade which provided a community benefit through construction of a parkland area, however not all material was suitable

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and for that reason TMR gained approval for the dredging works for placement to both the approved offshore site and to Cook Shire Council's reclamation area. In preparation for future dredging strategy, consideration of the volumes in 2014, (post Cyclone Ita) indicated dredging of about 50,000cu.m was required to achieve maximum dredge depths, but providing for an allowance for infill volume before dredging commenced, approval for 60,000cu.m was obtained for the 2014 dredging project.

In accordance with TMR's long-term dredge strategy, continued offshore placement of the primarily sandy dredge material may be considered the best management option given this material plays an important role in the geomorphological processes of this section of the coast.

## 6. Risk Assessment Framework

Depending on the scale and frequency, dredging and dredge material placement activities have the potential to adversely impact on sensitive environmental receptors, social or cultural values associated with the Port.

Impacts can occur over a short or long term and can be direct or indirect. Dredging related impacts can result from:

- the direct removal of benthic habitat in the vicinity of the dredged area
- smothering of benthic organisms in offshore dredge placement locations
- changes to marine water quality from increased turbidity and sedimentation
- mobilisation of contaminants released from dredged sediments
- collisions and disturbance from vessel movements
- increased noise and lighting from dredge vessel operations.

Evaluation of risks via a process depicted in Figure 6, was considered for Cooktown during development of the Queensland Maintenance Dredging Strategy, and these are summarised in Table 7.

This assessment will help TMR to determine the level of potential harm to environmental, social, or cultural values for future dredging programs, and this assessment will assist in refining where management measures to avoid, reduce, or mitigate impacts as needed. Identified measures can then be incorporated into revisions of the specific Maintenance Dredging Environmental Management Plans.

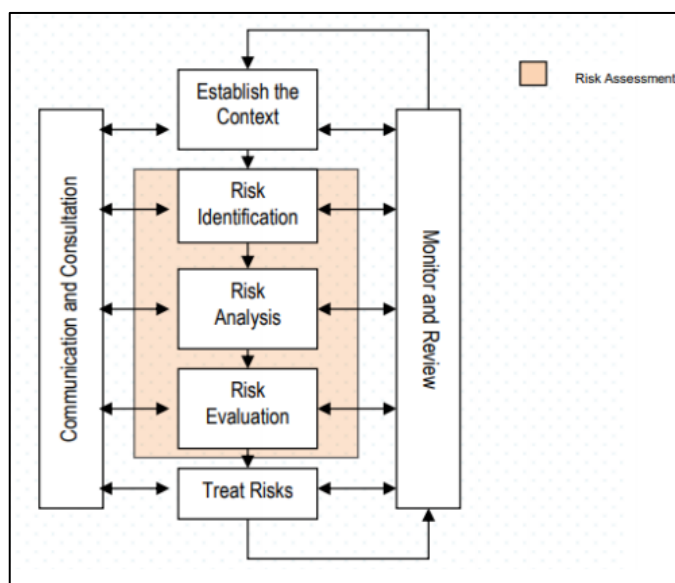


Figure 6 Risk Management Process (from MDS, 2017)

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**Table 7 Port of Cooktown Risk Assessment Summary (MDS, 2017)**

Threat	Activity	Spatial Commentary	Risk Commentary	Likelihood of Consequence Occurring	Consequences of Maintenance Dredging	Risk Score	Confidence Level
Maintenance dredging leads to loss of marine flora and habitat caused by elevated turbidity, reduction in benthic light and sedimentation	Maintenance dredging of Port of Cooktown Channels (i.e. not all areas, just those that require maintenance)	Cooktown is composed of two different intertidal communities of seagrass located near Archer Point, Sachs Spit and the base of Grassy Hill. Cooktown has a number of inshore reefs (starting ~15km from the Cooktown) which are primarily composed of hard coral (40.4%) and algae (41.5%), with a ~5% soft corals.	The need for maintenance dredging in the Port of Cooktown is intermittent, and over the past 20 years there have been only 2 occasions (1999 and 2014/15) and volume have been relatively small (25,000 and 45,000m <sup>3</sup> respectively). The material that is removed from the port channel and swing basin is largely sand and is expected to create short lived low turbidity plumes. During the 2014/15 maintenance dredging works automated water quality monitoring equipment was deployed, capable of autonomously measuring sediment deposition, turbidity, temperature, water depth, RMS water depth and light (PAR). One site was located adjacent to the Port of Cooktown channel (WQ3) and the other further afield offshore (2km). Importantly, during the extended intermittent dredging works (i.e. due to weather delays) the primary driver for observed changes in water quality conditions was related to natural weather event, and in particular Tropical Cyclone Marcia (18-20th February 2015) and TC Nathan (10-24th March 2015). The monitoring data generated during the 12 month period is very useful for placing the dredging works in context with natural events and highlights the insignificant nature of the maintenance dredging and the significance of weather (cyclone) events on suspended solids concentrations. However, there is not data available during dredging at known environmental value sites (i.e. seagrass meadows) and the risk assessment would benefit from these data.	Possible	Insignificant	Low	Medium
	Offshore disposal at Spoil Disposal Area.	Maintenance dredge spoil is placed within the approved Dredge Material Placement Area approximately 3 km north- east of the harbour entrance, within a Conservation Park Zone of the Great Barrier Reef Marine Park. Seagrass communities observed by GHD (2006) in the north-eastern corner of the DMPA were found to be of moderate density, composed of <i>Zostera capricorni</i> and <i>Halodule uninervis</i> in an area of approximately 10m <sup>2</sup> (BMT WBM, 2010). Seagrass communities observed by GHD (2006) in the north-eastern corner of the DMPA were found to be of moderate density, composed of <i>Zostera capricorni</i> and <i>Halodule uninervis</i> in an area of approximately 10m <sup>2</sup> (BMT WBM, 2010).		Possible	Insignificant	Low	Medium

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Threat	Activity	Spatial Commentary	Risk Commentary	Likelihood of Consequence Occurring	Consequences of Maintenance Dredging	Risk Score	Confidence Level
Maintenance dredging leads to loss of important coastal fauna caused by elevated turbidity, sedimentation, burial during disposal operations and direct interaction with the dredge.	Maintenance dredging of Port of Cooktown Channels (i.e. not all areas, just those that require maintenance)	Sea Turtle are known to frequent the Cooktown area, and Hawksbill are regularly found in the Howick reef group to the north of Cooktown. The extensive seagrass meadows north of Cooktown and lack of anthropogenic influences in the region are suggested to allow dugong populations to persist in strong numbers. A number of inshore dolphins have been recorded in the Cooktown area including: Australian snubfin ( <i>Orcaella heinsohn</i> i), Indo-Pacific humpback ( <i>Sousa chinensis</i> ) and Bottlenose dolphin ( <i>Tursiops truncatus</i> / <i>aduncus</i> ). The dwarf minke whale, Balaenoptera acutorostrata is a migratory whale species that is also known to frequent the offshore area off Cooktown, particularly Lizard Island. There is a commercial fishery that operates off Cooktown, primarily targets mackerels and barramundi through commercial netting operations. No significant sites for shore birds are present within the Endeavour River, however, three conservation significant species use the estuary.	There is no scientific evidence to demonstrate that maintenance dredging vessel strike has impacted on marine mega fauna in Port Cooktown. Advice from the operators of the TSHD Brisbane (Pers. Comm Michel Willemen, Nov 2015) suggested that over the last 10 years there have been no occasions when an animal has been captured by the dredge. A review of the contamination status of maintenance dredging material has confirmed that all material has been classified as uncontaminated and fit for unconfined offshore disposal. Therefore, the action of maintenance dredging does not introduce a risk of contaminant exposure for marine megafauna.	Unlikely	Insignificant	Low	Medium
	Offshore disposal at Spoil Disposal Area.	Benthic fauna investigations have demonstrated a lack of sponges and soft coral. The benthic infauna surrounding the Port of Cooktown and spoil ground are dominated by opportunistic species such as polychaete's and amphipods.	The Port of Cooktown is characterised by unstable, highly turbid waters that are driven by the seasonal monsoon rains which are reflective of benthic fauna identified. The limited available evidence does suggest that recolonisation of the disposal site is likely to occur (i.e. opportunistic species such as polychaete's and amphipods have a strong ability to recolonise disturbed seabeds).	Unlikely	Insignificant	Low	Medium

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## 7. Identification and Treatment of Key Risk

From the above Section 6 and where potential risks are identified, it is evident that a range of adaptive management strategies, including details environmental monitoring, setting of reactive triggers, and ultimately the project specific EMP will likely be the core ongoing mechanisms for identification and treatment of the risks identified above for maintenance works. Such risk treatment will follow the approach outlined in the strategy to be developed and implemented by TMR and the works specific EMP's developed once the scope of each lot of dredging works is known. This will provide certainty for regulators around how works activities will be planned and managed. This will also be key to ensuring long-term permits are able to be maintained. Stakeholder consultation will be a portion of the strategy to be developed by TMR, and will ensure any emerging risks are considered throughout planning including during any works program design, execution and ongoing monitoring and management.



Figure 7 Dredge Management and Monitoring Schematic to treat risks

## 8. Environmental Management

Environmental management of maintenance works will follow the approach outlined in the strategy to be developed and implemented by TMR and the works specific EMP's developed once the scope of each lot of dredging works is known. A general depiction of this is shown in Figure 7.

This process provides certainty for staff, and regulators around how works activities will be planned and managed. This will also be key to supporting long-term permit applications for operation and maintenance of the facility. Stakeholder consultation will occur throughout planning including during any works program design, execution and ongoing monitoring and management.

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## 9. Monitoring Framework

An environmental monitoring framework has previously been considered and established for past Cooktown project EMPs. The implementation of the monitoring program will ensure that the requirements of the EMP are being met. All monitoring will be undertaken by suitably qualified persons in accordance with the monitoring requirements. TMR will submit a report of the monitoring outcomes at the conclusion of the dredging campaign or at the conclusion of the specified monitoring period to GBRMPA and or DES and present this to the TACC for discussion in support of future works proposals.

An example of such EMP is provided in way of the monitoring framework for the 2014 works developed and implanted by TMR. Future similar documents would likely be required to address a number of components for which environmental monitoring, including:

- Sediment characteristics;
- water quality;
- flora and fauna;
- access arrangements;
- noise;
- air quality;
- waste management;
- hazardous substances; and
- community consultation.

From the above evaluation of potential aspects and impacts, and proposed subsequent management options, a range of monitoring elements will be considered for implementation by TMR to ensure the condition of the environment in and around the port facilities is understood and checked periodically.

## 10. Performance Review

Responsibilities for processes to ensure measure that address performance of EMP, environmental monitoring and dredging management, as well as the campaign performance or reporting for compliance as well as reviews to address stakeholder input will likely be addressed by TMR under the respective conditions that prevail for the relevant approvals issued for dredging under the Department's control. On that basis actions to ensure continuous improvement such as third party review, record keeping, reporting or auditing, or review of content in respect to specific dredging activity will continue to rest with TMR.

Ports North may conduct an environmental audit or review of component of this LMDMP, or may review works through its approval role as the Port Authority, at any time to ensure all commitments are been implemented.

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