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PORT of TOWNSVILLE

Port of Townsville Limited

Report for Townsville Marine Precinct Project EIS

Supplementary Information Report

January 2010

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Acronyms

ARI	Average Return Interval
DEEDI	Department of Employment, Economic Development and Innovation
DERM	Department of Natural Resources and Environment
DIP	Department of Infrastructure and Planning
DTMR	Department of Transport and Main Roads
EPBCA	Environment Protection and Biodiversity Conservation Act 1999
EIA	Environmental Impact Assessment
EIL	Environmental Investigation Levels
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
POTL	Port of Townsville Limited
RHM	Regional Harbour Master
SIR	Supplementary Information Report
TCC	Townsville City Council
TMPP	Townsville Marine Precinct Project
ToR	Terms of Reference
TPAR	Townsville Port Access Road

1. Introduction

Port of Townsville Limited (POTL) is the proponent for a commercial marine precinct project known as the Townsville Marine Precinct Project. The Townsville Marine Precinct Project (TMPP or the 'Precinct') is proposed to be located to the south-east of existing Port operations to provide a dedicated industrial marine precinct facility at the mouth of the Ross River in the Port of Townsville.

The TMPP is intended to be built on reclaimed land with an offshore, disconnected, breakwater (Figure 1-1). Detailed design of this facility is currently underway and the most current concept design is provided as Figure 1-2 with additional details on the footprint layout provided as Appendix A of this Supplementary Information Report. A reference design consistent with the detailed design layout and of relevance to configuration and operational requirements for the Precinct was assessed under the Environmental Impact Assessment (EIA). The footprint of the final detailed design will vary little from the reference design assessed within the EIA.

The Project is both a *significant project* and a *controlled action*. In this regard assessment of potential environmental impacts from construction and operation of the TMPP under both the *State Development and Public Works Act 1971* (QLD) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth, EPBCA) is required. To this end GHD completed, on behalf of POTL, an EIA from 2008 through to 2009. This assessment was in accordance with a Terms of Reference (ToR) defined by the Department of Infrastructure and Planning (DIP) for the TMPP. The findings of those investigations were reported in the Environmental Impact Statement (EIS), which was provided for public display and comment during August 2009.

Comments received on the EIS from the public display identified some areas of clarification and/or supplementary information requirements to assist regulatory agencies in determining whether the project meets environmental approval criteria. This Supplementary Information Report (SIR) is provided, as requested by the DIP, to address those issues. Additional information and clarification from relevant parties regarding their submissions was also sought through one-on-one consultation as appropriate and has also been used in developing this report.

As this report is supplementary to the EIS it should be read in conjunction with the EIS for context. The EIS is available from POTL or from the DIP. To maintain consistency between the documents this report has been structured following the ToR for the EIS.

Figure 1-1 Location and Overview of Layout of the Townsville Marine Precinct

(aerial with breakwater in place)

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Figure 1-2 Current Concept Design Layout of the Townsville Marine Precinct

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2. Environmental Values and Management of Impacts

2.1 Land

2.1.1 Proposed Land Redevelopment Concerns

Concerns were raised in Submission 318 regarding the identification within the EIS about proposed land redevelopment options for upstream lands that will be vacated by industries relocating into the TMPP. It was noted that the fulfilment of future planning and zoning requirements is an extensive process requiring investigative study and that the inclusion of statements about what may occur on these lands in the EIS was pre-emptive.

2.1.2 Response to Land Redevelopment Concerns

The ToR for the EIS required that some information was provided regarding upstream land redevelopment opportunities to inform economic impact assessments amongst other assessments, for the EIS (see ToR Section 1.5 p18, Section 3.1 p30, Section 3.1.4.2 p 33 and Section 4.1 p56). The potential redevelopment options identified within the EIS were presented as conceptual under the EIS and were not intended to circumvent the appropriate planning and approvals processes required during rezoning applications.

Port master planning processes will consider what uses are plausible for upstream lands once vacated by existing industries and rehabilitated. Appropriate consultation with TCC and others will be undertaken by POTL during this process. Any future proposal for redevelopment of the upstream lands will be progressed in accordance with the relevant planning legislation.

2.2 Transport and Associated Infrastructure

2.2.1 Transport Matters of Concern

The EIS was considered to be lacking in information regarding how access to the TMPP will impact existing roads and the TPAR rail and infrastructure corridors. Key issues of concern from submissions 269, 315, 318 and 327 were as follows:

- Concern regarding impacts of increased vehicular traffic on Boundary Road was raised given that this provides the main access/egress for employees of the TMPP and for vehicles with long, wide or high loads. It was suggested that the assessment of traffic flows and volumes for road network access points at Archer St (at grade) and Boundary St (grade separated) in the EIS were not detailed enough;
- An identified Archer St intersection presented in the EIS was noted as potentially not being feasible due to the Townsville Port Access Road (TPAR) rail alignment (vertical and horizontal) and additional information was requested regarding redistributing traffic to Boundary St intersection;

- It was noted that the Boundary St intersection overpass maximum height would be 4.5m, limiting oversized vehicle access to the TMPP and that an alternative access route should be provided;
- Queue lengths at Archer St intersection were calculated for the EIS using average queue lengths. In one of the submissions it was suggested that 98th percentile queue lengths rather than average queue lengths should have been used to address probability of queuing across rail line and spillback to adjacent roads;
- It was suggested that further analysis of traffic patterns was required, including a greater understanding of the traffic patterns of the existing area. This should include analysis and forecasts for future traffic demand (trip generation, vehicle types etc) and peak times. Design solutions for identified intersection operational problems were requested to be detailed;
- Speed limits were requested to be reviewed at site access points;
- More detail about the proposed dredging operations was requested;
- It was indicated that no analysis had been undertaken of the potential for rail transport to be used for construction and operation of the TMPP (eg alternative methods to importing fill by road to be examined);
- Further detail was requested on road impacts (pavement life and maintenance) caused by various activities (dredging, fill, construction, operation) at various stages of development (construction, operation);
- The preferred offshore breakwater raised concerns about vessel manoeuvrability and safety related to cross currents, back eddies, channel chicane, approach visibility and increased tidal flow;
- Further information was requested on whether private moorings are to be provided and related requirements such as parking, access and connection to road network;
- Adequate parking (on street and off street) facilities were to be provided; and
- Provision for public transport facilities was to be provided.

2.2.2 Response to Transport Matters of Concern

The Traffic Impact Assessment completed for the TMPP EIS (refer Appendix M of the EIS) identified that the TMPP will not generate significant traffic growth. Full assessment of potential construction and operational traffic indicated that the TMPP is not expected to have a significant impact on the functionality and performance of the existing road network and infrastructure.

Detailed traffic flows and volumes for road network access points are contained within the Traffic Impact Assessment (Appendix M of the EIS). The assessment approach used by GHD (average queue lengths) is considered appropriate for the TMPP for informing the EIS. Solutions to intersections were provided under Appendix M to achieve appropriate traffic flow.

The TPAR rail and road corridor detailed design was not finalised at the time of the EIS submission and a proposed configuration, as provided to the TMPP by the TPAR

project, and as discussed during Whole-of-Government project meetings, was included in the EIS for assessment. The assessment is considered appropriate for the environmental approvals process as it demonstrates that it is feasible to achieve entry to the TMPP across the TPAR with appropriate design solutions and that significant impact to adjacent traffic flows and residential areas will not eventuate.

Site access alternatives to Boundary Street were assessed and included in the reference design. Two access points are included in the design for the TMPP and are the basis on which the transport assessments have been completed. The most northern access will provide a non-height restricted entry into the TMPP.

A meeting was held with Townsville Department of Transport and Main Roads (DTMR) representatives on 3 December 2009. Draft conditions that satisfy their concerns are being developed. These will be provided to DIP once finalised. These are expected to include (but are not limited to):

- Provision shall be made for turning opportunities for oversized vehicles not intending to access the Marine Precinct or the Port;
- Prior to development of the rail corridor adjacent to the Marine Precinct, a permanent, grade-separated access to the Marine Precinct shall be provided; and
- Contract/s for supply of fill material shall comply with DTMR requirements for pavement impact assessment.

Given that significant impacts from the construction or operation of the TMPP on transport corridors and traffic flow have not been identified further analysis of traffic patterns is not considered to be required.

The proposed dredging operations were detailed in Section 2 of the EIS and are also documented in Appendix G of the EIS. This included the type of dredge plant to be used (small cutter suction or backhoe dredger) and the duration of dredging works. A Dredge Management Plan will be provided and considered by DERM during the IDAS approvals phase.

Rail transport was examined as an option for fill transport during the EIS. It was deemed unfeasible because there are currently no rail lines adjacent to the TMPP for unloading and few quarries with rail access. If rail was available at a suitable quarry there would be a need for double-handling of fill - unloading of trains at the nearest siding and reloading into trucks for transport from there to the TMPP. This method of transport was, therefore, considered unfeasible for the TMPP.

A meeting was held with the Regional Harbour Master (RHM) on 3 December 2009. The following conditions were drafted which satisfy the RHM's concerns about safety and vessel manoeuvrability in the chicane:

- Final breakwater design must meet the following performance criteria to the satisfaction of the RHM:
  - A dredged safety basin shall be provided to widen the navigation area at internal and external entrances to the chicane. The purpose of the dredged safety basin is to provide a safety margin in the event that more than one vessel is in the channel and to allow for the swept path of tug and tow vessels;

- A minimum visibility distance of 225m is to be maintained to the greatest extent practicable from the Marine Precinct entrance through the breakwater opening. If unable to be applied for the full distance, other management strategies are to be implemented;
- A current monitoring facility is to be located at the entrance to the Marine Precinct harbor so appropriate advice can be provided to mariners.

- If a wave screen is to be installed adjacent to the entrance to the inner harbour the following performance criteria must be met to the satisfaction of the RHM:
  - Navigation aids are to be provided;
  - Final design shall allow clear visibility for recreation vessels.

  Note: Inclusion of a wave screen has been discussed with the RHM but has not been adopted into the current concept design.

In the EIS provision for private moorings was made within the footprint of the Precinct in the lee of the breakwater. Pile moorings are, however, not expected to be constructed during Stage 1 of the TMPP and will only eventuate within the TMPP if a proponent wishes to pursue the implementation of these facilities. The detailed design will not exclude potential for these facilities, however, parking, access and safety for these facilities will be achieved when required.

Parking is a consideration for the detailed design of the TMPP, which is currently occurring taking into consideration the predicted workforce based on developed understanding of what businesses will occupy the TMPP. The detailed design will include adequate parking facilities on site.

POTL met with Townsville DTMR officers on 3 December 2009. The following condition was drafted to satisfy concerns related to public transport.

- At the completion of Stage 1, provision will be made for a bus stop within or adjacent to the Marine Precinct. At the completion of Stage 3 POTL will make provision for public transport facilities to the completed Precinct in accordance with DTMR guidelines and policies.

2.2.3 Boat Ramp Matters of Concern

A large number of submissions indicated a need to incorporate recreational boat ramps into the Precinct.

2.2.4 Response to Boat Ramp Concerns

Although the potential for recreational boat ramps was canvassed in early planning for the TMPP, the adopted concept design does not contain recreational boat ramps. The commercial viability of a marine precinct in this location would be compromised by the loss of valuable land under carparks and recreational boat ramps. Further, the combination of commercial marine industries with their associated heavy lift cranes, forklifts and other machinery, and passenger cars and boat trailers would introduce the potential for unacceptable safety risks. POTL has chosen not to include recreational boat ramps in the TMPP for these reasons.

However, there remains substantial public demand for additional recreational boat ramps in Ross River. If another proponent identifies an alternative location for recreational boat ramps in Ross River, the potential impacts associated with the loss of any marine habitat or risks to taxa associated with that activity, including cumulative impacts following from development of the Precinct, would need to be considered at that time.

POTL is aware of the need for additional boat ramp facilities in Townsville and will to continue to work with TCC and the Queensland Government to find a long term solution to the need for boat ramps in Townsville.

POTL will not decommission any boat ramps that currently exist on Port land until there are alternative ramps in place.

2.2.5 Infrastructure Matters of Concern

The following key issues were identified in submissions 318 and 327:

- Service provision requirements and impacts for stormwater, sewage, liquid waste and wastewater treatment to be provided in greater detail than in the EIS.
- Additional detail regarding on site infrastructure requirements is required.

2.2.6 Response to Infrastructure Concerns

Lot 773 is currently an intertidal marine sand/mud flat area. There is no existing infrastructure servicing it. As part of the project, services such as underground electricity, water and telecommunications will be provided.

No Sewerage Treatment Plant will be provided on site. Sewerage from the TMPP will connect to Townsville City Council (TCC) infrastructure. Infrastructure agreements will be negotiated with TCC once detailed design is further advanced. It is not anticipated there will be additional capacity required for Stage 1 because existing industries currently connect to TCC sewerage (and will be vacated). However, at a meeting with TCC on 22 December 2009, the following action was agreed:

- Prior to finalisation of design, POTL will provide TCC with likely flow volumes and trunk connection points for water and sewerage and undertake a network analysis to assess potential impacts on existing infrastructure.

Any Trade Waste will be removed by a licensed Trade Waste contractor to a licensed reception facility.

Stormwater management for the TMPP and surrounding lands is being considered during the detailed design phase, which is currently continuing. Consideration is being given to channelling all stormwater culverts through one discharge point into the Ross River. Consideration is also being given to the interaction of stormwater management options with the TPAR. A stormwater plan will be provided to support the final design however, at a meeting with TCC on 22 December 2009, the following action was agreed:

- POTL to discuss stormwater issues with TCC so that any potential future Council upgrades to their stormwater outflow down Archer St can be taken into account in design of outlets.

It has been identified that electricity demand will be substantial but that adequate infrastructure exists to achieve the required demands, as noted under Section 2.6.4 of the EIS. The likely electrical demand for the site is estimated as 840kVA based on 16800m^2 of light industrial facilities at approximately 50VA/m^2. An existing Ergon Energy substation located on Hubert Street is expected to meet demand supply needs and POTL is working with Ergon Energy to facilitate routing of this service into the TMPP. As industries will be vacating other sites to relocate into the Precinct, additive impacts are not expected and centralised location of like industries may act to release some loading on the local electricity grid.

Council records have indicated the presence of a 300mm diameter AC water main in the Benwell Rd corridor. It is considered feasible that this main has sufficient capacity to service the development. Demand requirements are expected to be the same as existing (upstream) facilities currently require. No impacts are expected.

The EIS has identified the presence of a 150 mm diameter sewer main on the southern side of Boundary Street. However, it is believed that in order to service the development, at least one pump station and rising main will be required to convey the sewage to the connection point with TCC infrastructure. Potential impacts of this additional infrastructure are being considered during the ongoing detailed design for the TMPP for each industry on site and will be discussed with TCC where plans involve connection to TCC infrastructure, as per the commitments made in the dot points above. There will be no on-site sewage treatment plant for domestic sewage generated from premises located in the Precinct. Trade Waste agreements will be negotiated with licensed contractors by individual tenants for removal of other wastes not able to be disposed of to the domestic sewerage infrastructure.

Final detail of on-site infrastructure will be developed during the process of negotiating tenancy agreements with prospective tenants of the facility. Requirements for power, water and sullage pump-out will vary depending upon what industries will be housed within the Precinct. It is considered appropriate to assess these during the detailed design and/or approval process for each industry's on-site structures. All buildings will need to be constructed to relevant Code standards.

2.3 Ground Water and Surface Water

2.3.1 Matters of Concern

In submission 318 it was noted that the direction of ground water flow of relevance to the TMPP was not well defined in the EIS and that the locations/supplies that may be impacted required additional assessment. The submission requested the following additional information:

- Hydraulic conductivity values should be calculated and provided; and

- The potential for soil erosion as a consequence of the TMPP should be assessed.

2.3.2 Response to Ground Water and Surface Water Concerns

During investigations for the EIS, historic groundwater monitoring data for the area was reviewed. To complement historical data and provide current information four groundwater bores of relevance to Lot 773 were monitored across a three month period, including conditions of extensive rainfall and flooding. This included two groundwater bores related to the Eastern Reclaim Area. The locations of these bores are presented in Figure 3-14 on page 3-68 of the EIS.

As a result of this monitoring the direction of flow into Lot 773 was able to be determined, however, the direction of flow across the Eastern Reclaim Area was only able to be inferred as the full coverage of this area was not achieved. As the EIS was concerned only with Lot 773, where flow direction and groundwater quality was able to be monitored with confidence, this was not considered to be of concern.

The quality of groundwater present and the direction of groundwater flow into Lot 773 was determined and reported in Section 3.7.2.4 of the EIS (page 3-69) and in Appendix P of the EIS. Hydraulic conductivity values were determined from this process and are reported under Section 3.7.2.4 of the EIS and in Table 5-1 of Appendix P of the EIS.

Lot 773 is intertidal and will be reclaimed. Soil erosion as a consequence of groundwater and surface water flows is not considered to be a relevant impact for the TMPP. Soil erosion during construction has been addressed under the Construction Assessment completed for the Project (refer Section 2.4 and Appendix G of the EIS) and is to be controlled in accordance with the Environmental Management Plan (EMP) developed for the TMPP and a sediment and soil erosion management plan for the construction process (refer Section 8 of the EIS for the EMP).

The following condition is nominated to address concerns related to monitoring for impacts on groundwater quality during construction of the TMPP:

- A reactive groundwater quality monitoring program shall be implemented for the duration of construction of the TMPP to detect potential for, and enable management of, impacts related to the construction of the TMPP.

2.4 Coastal Environment

2.4.1 Flooding Matters of Concern

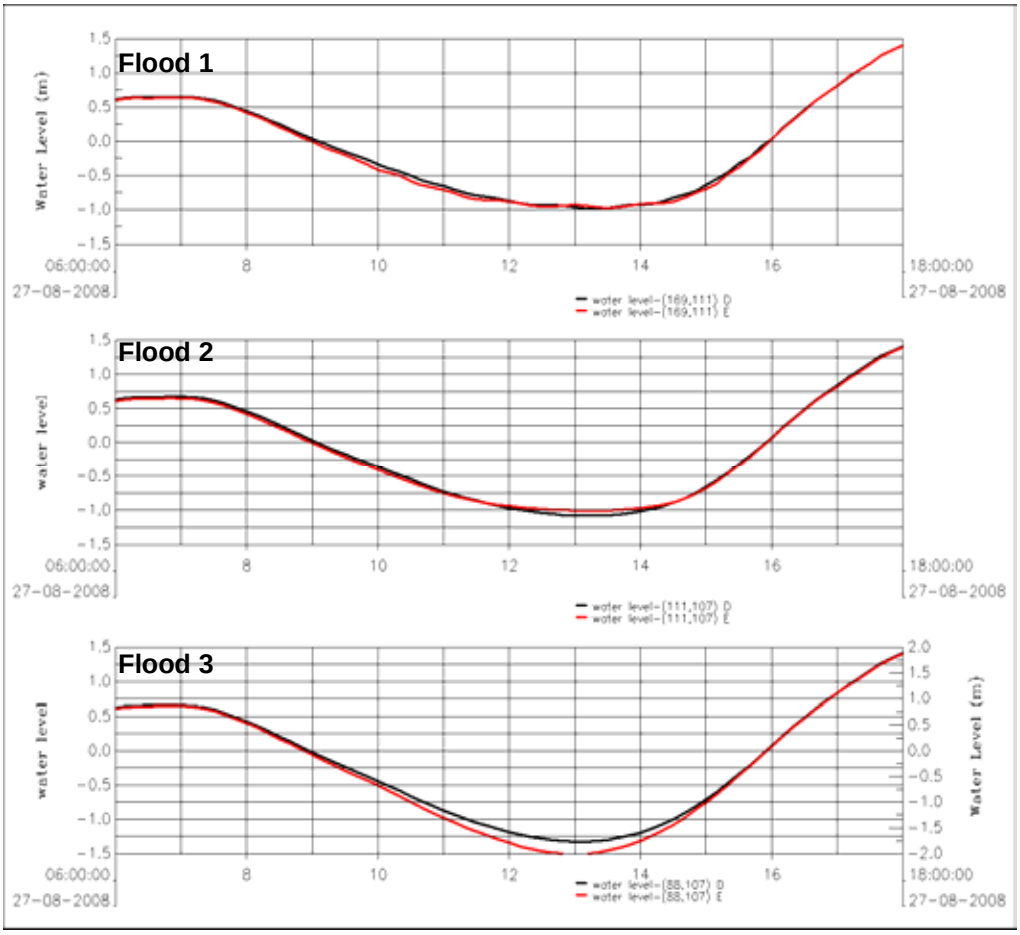
Submissions 5, 318, 327 and 328 raised concerns regarding flooding issues associated with the narrowing of the mouth of the Ross River from construction of the new bridge and reclamation of lands to build the TMPP. Queries regarding hydrodynamic modelling were raised with concern that a 1 in 1 year storm event without a 100 year Average Return Interval (ARI) had been used as basis for flooding assessment for the TMPP. It was suggested that cumulative impacts of a 1 in 100 year ARI event coinciding with storm tide conditions should be considered.

2.4.2 Response to Flooding Concerns

Flooding of the Ross River for the TMPP EIS was modelled under developed and undeveloped scenarios and impacts were identified in the EIS. Scenarios and the modelled processes are summarised in Table 3-35 (page 3-102) of the EIS and Table 6 of Appendix I of the EIS – Hydrodynamic Modelling Report. Existing conditions, developed conditions and a one in 100 year flood event were considered. A flood event with maximum flood discharge has been considered and is regarded as representative of the average recurrence interval (ARI 1 in 100 year) event.

Figure 2-1 provides predicted water levels as a result of the proposed development at three locations based on modelling that included the Precinct footprint and the TPAR. Given that the TPAR is expected to be in place by the time of Precinct construction it was important to understand if the Precinct would result in any afflux potential under this developed scenario.

Figure 2-1 Water level (m) under flood scenario for the Developed (D, black line) and Existing (E, red line) conditions at Ross River mouth/entrance (top panel), proposed marina site (middle panel) and breakwater entrance/channel (bottom panel).



The top panel in the figure represents conditions at the mouth of the Ross River from data extracted from a mid channel position under the proposed TPAR. This model output indicates no difference in water level between the existing and developed scenarios. This shows there are no upstream affects on afflux predicted from the construction of the Precinct within the Ross River. Adjacent to the proposed Marina site (refer middle panel of Figure 2-1) only small increases (0.10 m) are seen. Larger differences are observed in the region between the Precinct and the breakwater, with water level elevation differences of up to 0.25 m indicated adjacent to the breakwater entrance, though it is important to note that these occur at low tide, and hence do not affect the peak flood level. However, even though differences are seen downstream of the Precinct, the top panel in the figure demonstrates that these downstream affects do not result in any upstream affects.

Detailed design of the TPAR has occurred since completion of the draft Precinct EIS. In conjunction with this additional modelling has also been completed by Aecom incorporating both the TPAR and the Precinct configurations. These recent outputs confirm the EIS findings of no expected afflux upriver in the Ross River as a result of construction of the Precinct with the TPAR in place and are attached in Appendix B.

The offshore breakwater is envisaged to be required only if the external face of the rock wall is to be used for berthing vessels (refer Figure 1-1). This has raised concerns regarding navigational safety from vision and flooding impact perspectives as flood waters can create difficult vessel navigation conditions. The breakwater is not intended to be constructed as part of Stage 1 of the Precinct. To address concerns relating to the breakwater construction, final breakwater design must meet performance criteria outlined in Section 2.2.2 (this report) to the satisfaction of the RHM.

2.4.3 Dredging Matters of Concern

In submissions, 315, 318 and 327 clarification was sought on whether the offshore disposal of dredge spoil will be conducted under a new or the existing permit, what approvals would be required and what impacts might be generated.

Clarification was also sought about the final volumes of dredge material and reclamation and fill materials.

2.4.4 Response to Dredging Concerns

The construction approach considered for the TMPP under the EIS required rapid reclamation of land to facilitate relocation of industries to be affected by the TPAR. During the detailed design process (ongoing) and consultation with industries requiring relocation to the TMPP alternative construction approaches have been identified including the opportunity for re-use of dredge material through reclamation works and the allocation, by POTL, of some land at the southern end of the Eastern Reclaim Area to allow early construction of some facilities. Reclamation and material re-use, as opposed to ocean disposal, will therefore be implemented for the construction of the Precinct. This is in accordance with the principles of minimising environmental impacts

from dredging works and re-using or reclaiming material in preference to ocean disposal.

Significant offshore disposal, as outlined under the reference design for the TMPP in the EIS is now not expected to be required and, therefore, further information on the methods of dredge material removal or approvals processes for this activity are not provided. However, information for these activities was presented in Section 2.4 (Construction) and Section 1.8 (Project Approvals) of the EIS. These sections provide information on what dredging plants are able to be used at the site, what disposal approaches would be appropriate if offshore disposal was required and what permits are likely to be required for expected TMPP construction and operational works (including dredging works).

Disposal of any capital material in excess of reclamation needs would require appropriate permitting for the site to which disposal was to occur. Permitting and approvals processes to achieve such are identified under Section 1.8 of the EIS. It is not anticipated that any disposal of dredge material by road will be required, however, should that eventuality occur, concerns related to that issue have been addressed in conditions to be provided by DTMR (refer Section 2.2.2 above).

Volumes of dredge material and reclamation fill are being refined during the detailed design process (ongoing). These volumes will be finalised and provided for an Operational Works permit application for works in a tidal area and can be assessed by regulatory agencies at that time. Fill volume requirements were determined and assessed under the EIS. Volumes to be finalised through the detailed design process are unlikely to be significantly different from those presented in the EIS in Tables 2-2 and 2-3 (pages 2-15 and 2-16 respectively), Section 2.4.6.

2.5 Nature Conservation

2.5.1 Water and Sediment Quality Matters of Concern

Submissions 1, 318, 326 and 327 raised concerns relating to water quality impacts that may potentially occur as a result of the TMPP. The key issues requiring clarification and/or further information were:

- Further information relating to alteration of sedimentation rates in adjacent habitats;
- The impacts from dredging activities releasing heavy metals and/or fine sediments on surrounding habitats and fauna;
- Reclamation of Benwell Road mudflats and the resultant inability of this area to trap muds being flushed from the Ross River;
- Increased flushing of sediment from Ross River with potential for adverse impact on Cleveland Bay and Strand beaches;
- Risk of cumulative impact on seagrass meadows from dredging operations and construction activities (acid sulfate soils), depending on wind and wave conditions;
- Treatment of dredge material for acid sulfate soil potential; and

- Impact on seagrass beds if potential nutrient sources (pile moorings) are moved closer.

2.5.2 Response to Water and Sediment Quality Concerns

As a consequence of development of the Ross River Dam and Weirs there is little to no current sand movement from the Ross River into Cleveland Bay. Coastal processes, sediment transport and potential impacts on the supply of sand to the Strand and other areas of the Townsville region were assessed under the Coastal Processes assessment completed for the EIS (refer Appendix R of the EIS). This assessment determined that much of the sedimentary material that deposits on Lot 773 is sourced from the Cape Cleveland area and that a net north-west movement of material around the coastline of Townsville occurs.

Although most of the material moves from Cape Cleveland around the port to the north-west of the Precinct, during heavy rainfall periods fine silts may be washed from terrestrial sources into the Ross River and transported down the river towards Cleveland Bay. It has been suggested that Lot 773 acts as a trap for a proportion of this material and that construction of the Precinct would result in relocation of this material from Lot 773 to the Strand, degrading that habitat. Lambrechts *et al.* (unpublished paper, provided as Appendix C) suggest that approximately 40,000 tonnes of fine sediment was transported down Ross River to Cleveland Bay during the January/February 2007 flood event following cyclone Hamish. Personal communication with one of the authors of Lambrechts *et al.* (unpubl.) indicated that approximately 3,000 tonnes of this fine material was trapped on Lot 773. However, this represents an overestimate compared to previously reported long term average deposition of 250 tonnes per year (Belperio 1983 cited in Lambrechts *et al.*) suggesting a unique situation in response to a cyclonic impact.

In recent communications it was suggested by one of the authors of Lambrechts *et al.* (unpubl.) that, instead of the 1,000 tonnes reported in the submission, the mud flats of Lot 773 currently trap about 3,000 tonnes of fine sediments from the Ross River per year (E. Wolanski, personal communication, 2010). It was also suggested that those materials not deposited on Lot 773 (identified to be tens of thousands of tonnes annually) move into Cleveland Bay travelling longshore northwards through West Channel at a rate of hundreds of tonnes per day. However, an apparent small eddy offshore from The Strand results in some fine sediment being dropped out of suspension, which is subsequently available for resuspension and relocation onshore to the beaches along The Strand.

Under this scenario of fine sediments moving down Ross River into Cleveland Bay and potentially redepositing onto The Strand there is concern that if Lot 773 is reclaimed the fine sediment that might otherwise be trapped on Lot 773 would remain in suspension in the water column and would contribute to the sediments that may become available for resuspension and deposition onto the beaches of The Strand on windy days. This would result in an indirect impact of muddying The Strand.

The following information is provided to respond to this concern and to clarify why this movement of materials is not considered to be an impact resulting from the construction of the Precinct.

Sediment depositional data collected during studies to support the EIS found that over a three month monitoring period, including during a period of intense rainfall and flooding, an average of only 0.72 mg/cm^2 of fine sediments was deposited daily in the footprint of the project from the Ross River. The accumulated suspended (fine) sediment deposition maximum value recorded during the monitoring program was 38.47 mg/cm^2. This indicates that, at the most, kilos of material would deposit on Lot 773 annually and not tonnes of material.

Lot 773 is a shallow, tidal lot. Water flows in and out rapidly across the mud flat during tidal changes. Under flood conditions, when much of the fine materials are being moved out of Ross River, the water flow velocity from Ross River can be as great as 1090 m^3/s, as recorded in the 1968 Ross River flood, which is considered to be of greater magnitude than the 2007 flood and more representative of the 1 in 100 year flood event.

Sediment deposition and erosion potential for the Precinct was assessed for 100 year ARI flood conditions. An input of a sediment load of 500 mg/L and erosion threshold of 1 N/m^2 and deposition of 0.25 N/m^2 was used for the model simulation. A suspended sediment concentration of up to 531.44 mg/L, but on average 31.43 mg/L, was measured during the monitoring period for the EIS. This high value occurred during a period of intense rainfall which exceeded the average conditions for the Townsville region (refer Table 2-1) and did result in localised flooding. Use of a 500 mg/L input load was, therefore, was considered comparable to flood condition sediment loads for the Ross River under existing conditions.

Table 2-1 Comparison of the Average Rainfall Statistic to Total Rainfall During the Monitoring Program

Townsville Rainfall (mm)		
Month	**Rainfall average statistic**	**Monthly rainfall during the water quality monitoring period**
September	10	0.8
October	24.8	4.2
November	58.9	113.4
December	125.7	178.8
January	268.5	664
February	296.6	989

The modelled outputs indicate that currently sediment deposition of the order of 0.15 m occurs across the footprint of the Precinct (Figure 2-2). Comparison with the developed case scenario indicates there is little difference with similar potential for deposition on the banks of the Ross River and for slight scouring at the tail end of the eastern breakwater and in the channel between the breakwaters. Indication of sediment deposition at the mouth of the marina is also evident.

Given the findings of the sediment monitoring program and the flood model outputs Lot 773 is not considered, in its current state, to be a significant sink for fine sediments. As such, it is suggested that a significant proportion of fine materials moved down Ross River during flood events are directly deposited into Cleveland Bay. It is also suggested, based on lack of settlement of fine materials during the study, that limited material is sourced from Ross River under conditions other than flood conditions.

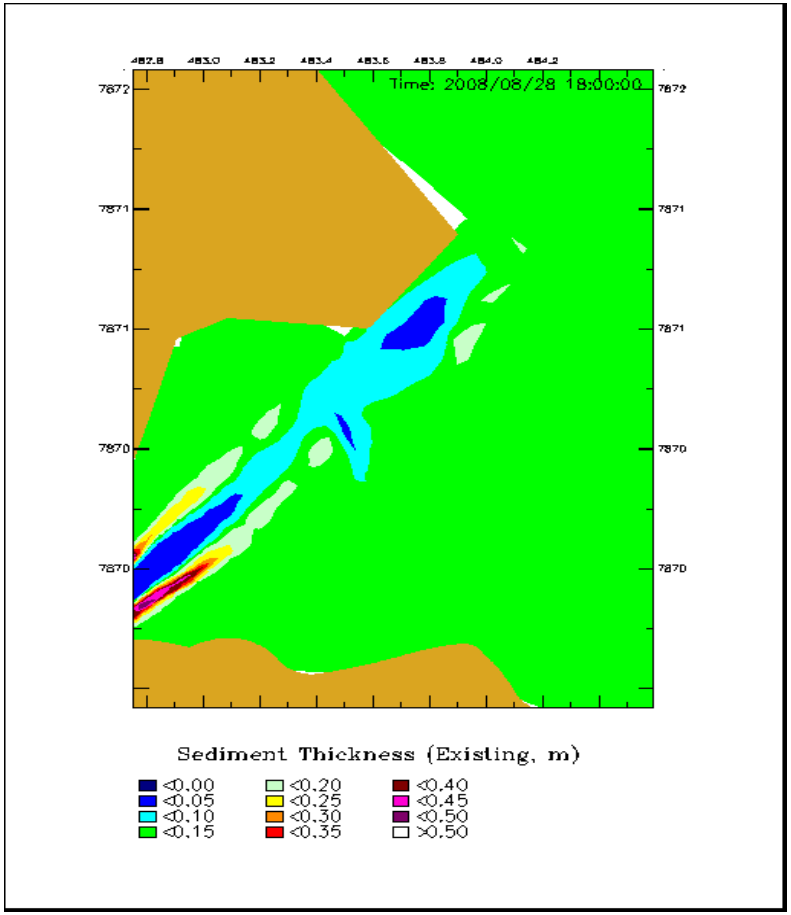
The existing Port infrastructure, including the dredged outer harbour and Platypus Channel provide a block for movement of material towards The Strand. This would include material sourced from the Ross River. This blocking effect will not be altered by development of Lot 773. The model used by Lambrechts *et al.* is coarse and does not include the dredged outer harbour or Platypus Channel (confirmed by Wolanski Pers. Comm., 13 January 2010). These structures currently act as sediment sinks for west-bound sediment, as evidenced by the need for POTL to dredge approximately 200,000 cubic metres of loose silt from these areas annually.

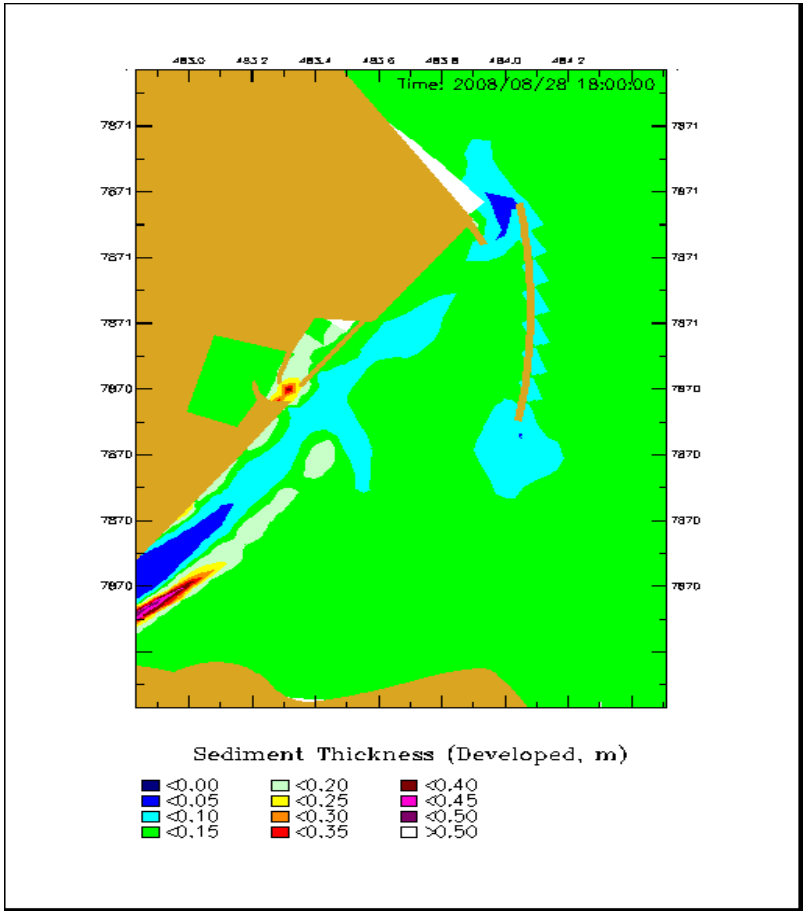
The suggested volume of sediment (between 1,000 and 3,000 tonnes) that may be trapped by Lot 773 is considered to be a significant overestimate given the monitoring data collected. However, assuming it is not and, under the developed Precinct scenario this material is no longer 'trapped' by Lot 773, it would be a very minor contribution to the volume of material currently being trapped by the channel and outer harbour. Given the blockage to the north by port infrastructure this Lot 773 material would also be expected to be trapped by these structures and would not be available to muddy The Strand.

It is, in fact, countered that if there is a stagnation zone offshore from The Strand that contains a proportion of the fine silts, why isn't there a mud problem on The Strand already given the very large volume of fine materials being dredged from the Channel annually?

Reclamation of Lot 773 is, therefore, not predicted to result in the loss of a significant sediment trap for material exiting the Ross River and is not predicted to result in a large increase in sedimentation of The Strand or decline in the water quality of Cleveland Bay.

Figure 2-2 Existing (left) and Developed sediment deposition measurements following flood events in Ross River.





Contaminant testing of sediments in Lot 773 indicates that the quality of sediments in the Project Area is compliant with the National Assessment Guidelines for Dredging (NAGD, 2009) and the environmental investigation limits (EIL) of the Draft Guidelines for the Assessment and Management of Contaminated Land. This data is provided in Section 3.9.6 of the EIS and Appendix J.

Cumulative impacts to seagrasses and other benthic communities were assessed under the EIS, including the impacts upon water quality from dredging operations of multiple projects occurring in parallel (refer Sections 3.10 and 3.17 of the EIS). Sedimentation predicted from the hydrodynamic modelling and potential for sediment deposition across sensitive habitats as a consequence of the development was assessed under the EIS (refer Sections 3.8 through 3.10 of the EIS). This was achieved by modelling dredge plumes and determining sediment deposition.

Data recorded during monitoring to support the EIS demonstrated that suspended sediment concentrations (SSC) near the seagrass meadows at the mouth of the Ross River reached 1,489.74 mg/L and had an average concentration of 119.74 mg/L (refer Water and Sediment Quality Report for the TMPP EIS). These high values were achieved during a period of very intense rainfall and localised flooding in Townsville which occurred during the monitoring period. A direct positive relationship was observed between SSC and turbidity.

Model parameters were estimated given the expected construction scenario of using a backhoe dredge with a bucket size of 2 m^3, operating at 40 second cycles, without interruption. Assuming a sediment loss rate of 2% and that 75% of the dredged sediments consist of fine particles of less than 0.075 mm diameter, with an “in-solution” density of 1600 kg/m^3, the predicted sediment loading rate was therefore set at 1.2 kg/s. This loading rate is considered to be appropriate as an indicator of the impactive activity.

Sediment transport (plume) modelling was undertaken, coupled with tides and prevailing wave conditions for a period of two months. Monitoring/observation stations were set up in the model to cover the entire area of interest, particularly areas where coastal and deep water seagrasses grow. The model did not account for all likely resuspension, in particular that from wind driven conditions, and as such, sediment deposition outputs from the model are likely to be over-predicted adopting a conservative assessment approach.

Given extreme fluctuation in SSC values was observed from water quality monitoring it was determined that reference of the modelled plume against median and 90th percentile values of the water quality data collected from the Project footprint was appropriate to examine potential impacts from dredge plumes. Local conditions had a median SSC of 80 mg/L, and a 90th percentile value significantly higher than this (i.e. greater than 100 NTU or 350 mg//L). In this case, the purpose of the plume modelling was to demonstrate:

- Whether the 90th percentile values were likely to be exceeded, and if so
- Over what frequency and duration this might occur.

The key findings from modelling where that:

- The dredge site naturally indicates the highest concentration of suspended sediments with an indicated peak of the order of close to 20 mg/l. Higher values were observed during spring and lower values were observed during neap tides. This is suggested to be because during spring tides, less sediment is allowed to settle owing to larger bed shear stresses in the vicinity of the dredge location;
- Sediment concentrations arising from the dredge plume within the river and at the proposed marina site appear relatively low at less than 10 mg/l;
- The sediment plume tends to flow towards the Marine Precinct and the Ross River during flood tide, whilst during ebb tide the plume exhibits a "tongue" that extends a few hundred meters to the northwest; and
- Modelled results indicate SSC at sensitive habitats being lower than those in the river. The plume does not appear to extend over any environmentally sensitive areas, other than at low concentrations, which lie well within the natural variation in turbidity.

These findings were used to support assessment of potential impacts to sensitive habitats under the baseline ecology risk assessment process where all potential impacts were assessed. Given the proposed construction and operation activities for the TMPP, potential impacts on the marine ecological values, including the sensitive seagrass meadows, could include:

- Direct impacts (both potential and probable);
  - Removal of individual organisms;
  - Damage to individual organisms from direct contact related to construction activities;
  - Removal of individual organisms as a result of Precinct user activities;
  - Damage to individual organisms as a result of Precinct user activities;
  - Impact to fauna by boat strike;
  - Increased rubbish that may smother or damage individual organisms;
  - Impacts on biodiversity from dredging, construction, spills of fuel or other hydrocarbons, paint, solvents, cleaners or other pollutants;
  - Removal of potential foraging habitat for some marine turtle species; loggerhead and olive ridley (neither species recorded on survey (turtles not identified to species level on aerial surveys) though identified as potentially occurring from desktop survey);
  - Lighting impacts to nesting turtles and hatchlings in the area (November – April);
  - Disturbance and displacement from increased noise and/or activity on the local area; and
  - Increased rubbish that may be ingested or entangle marine fauna.
- Indirect impacts (both potential and probable);

- Decreased biodiversity from construction disturbance of sediments around the Precinct site;
- An increase in sedimentation that may result in the smothering of adjacent benthic communities;
- Degradation of habitats through continual human usage (including inappropriate waste management, boat fuel spills);
- Increased disturbance to habitats from increasing visitation/usage;
- Decreased biodiversity resulting from inappropriate waste management or an increase in sediments and pollutants as a result of construction waste or land use changes;
- Noise and vibration impacts to marine reptiles and mammals from in-water construction or ongoing operational activities; and
- Increased bioturbation from propeller activity reducing water quality and disturbing marine assemblages; and
- An increase in sedimentation that may result in the smothering of adjacent benthic habitat communities**.**

Decline in species diversity, removal of species or reduced use of the area by marine fauna may occur as a consequence of these potential impacts. This may have flow on effects for the value of the marine ecosystems within the Townsville region, however, the level of effect will depend on the type of community that is present. Some species may be better adapted to variable light regimes and therefore tolerate high levels of suspended sediment and turbidity.

Variable turbidity regimes in the Project Area (as noted above and as described in the Water and Sediment Quality Report for the TMPP for the EIS), including in relation to existing channel maintenance dredging activities, suggest that existing seagrass species distributions are adapted to temporal changes in turbidity. Rasheed and Taylor (2008) note that seagrasses in the vicinity of the Townsville port are likely adapted to high levels of turbidity both as a result of naturally occurring high turbidity for the area and also in response to existing levels of maintenance dredging and shipping activities. These compounding influences on turbidity are, however, recognised to be short-lived to which the meadows have resilience.

Significant impacts may occur to the presence, taxonomic composition or biomass of meadows when the severity or duration of any particular impact exceeds levels of natural variation (Carruthers *et al.,* 2002, Erftemeijer and Lewis, 2006 and Orpin *et al*. 2004). Rasheed and Taylor (2008) and Collier and Waycott (2009) both note considerable risk of impact to seagrass meadow prevalence in the Townsville region from prolonged periods of reduced water quality resulting from compounding influences. Given that seagrasses are a key habitat supporting many species of NES and key fishery species, this is of concern for this project.

Seagrasses and other sensitive habitats established within the near-shore coastal waters surrounding the Project Area may be vulnerable to impacts from dredging resulting in the smothering of substrates by sediments settling from the water column. Smothering of seagrass can weigh down leaves, restrict light penetration and cause

stress on the plants. These habitats currently experience fluctuations in physical extremes, including variable salinity, light penetration, turbidity and sediment deposition regimes. Significant episodic elevations in turbidity occur naturally during wet season storm events and the passage of catastrophic events such as tropical cyclones. This is evidenced by water quality monitoring data collected to support EIS investigations.

The area to be dredged and reclaimed is a shallow water environment which does not support seagrasses; adjacent meadows are approximately 1 km from the project site. The dredging and construction plant able to be used in the shallow water environment include either a small cutter suction dredger or a backhoe dredger on a floating platform. A cutter suction dredger will pump material directly from the dredge head via a pipe into the reclamation area for dewatering. A backhoe dredger will handle material either directly into a reclamation area or into a barge, from which material will then be rehandled into the reclamation area.

Both of the dredging plant that may be used for the project are stationary and neither of the proposed dredging and material handling approaches produce extensive plumes as there is little escape or mobilisation of material from the dredge head. This is evidenced by the dredge plume findings described above. The design being adopted forwards for the TMPP will utilise reclamation of dredged materials to minimise environmental impacts and will not require extensive ocean disposal of spoil material.

Based on the dredging plant to be used and the approach of direct reclamation there is reduced potential for mobilisation of sediments or contaminants into the water column and, hence, reduced potential for smothering effects to adjacent sensitive habitats. This has been demonstrated by modelling undertaken for the Project, which indicates that when the dredge is positioned in the mouth of Ross River, sedimentation should not exceed ~1mm at the deepwater seagrass bed located offshore of the Ross River mouth over two months of dredging (Figure 2-3).

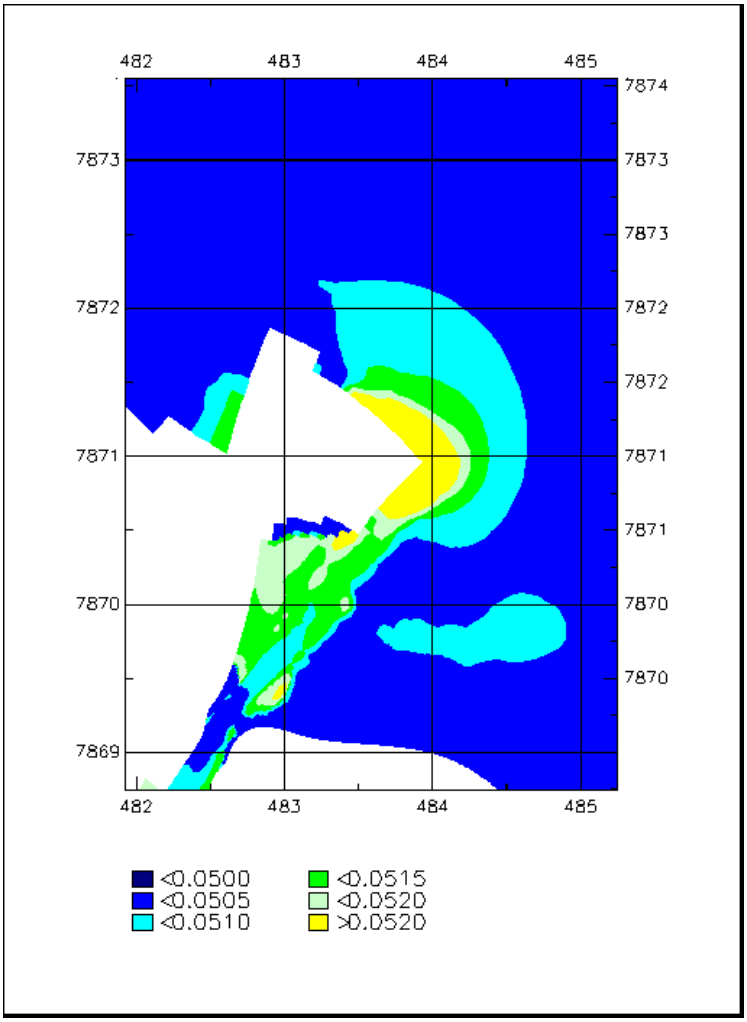
Results noted above and described in detail in the EIS for turbidity (monthly and continuous data) and suspended solids demonstrate that the Ross River estuary and the area immediately offshore from the river mouth is a naturally turbid system (average 35 NTU) and that turbidity is fairly uniform across the water column. The spatial trend shows that turbidity is generally higher in the Ross River sites than the offshore sites, which is also seen from model outputs. Seasonal trends show slowly decreasing turbidity leading up to December with a rapid increase post December during the heavy rain period. Two environmental variables appear to influence sediment concentrations in the water column in the Project Area; wave induced resuspension of bottom sediments and the inflow of sediments from the Ross River estuary during rainfall events. Both of these are natural events, although clearing for agriculture and housing estates in the catchment will have increased the input of sediment in runoff into the estuary from rainfall since development of the catchment began.

Despite seasonal, annual and episodic influences on turbidity, and the history of dredging (including adjacent to the project site), ocean disposal and reclamation at the Port, seagrass communities continue to be present within 1 km of the Port and

adjacent to the disposal ground. QPIF have monitored key meadows in recent history and will continue to do so under an ongoing monitoring program being supported by POTL.

Similar to potential for impact on seagrasses, impacts on sensitive mangrove communities adjacent to the Precinct could also result from dredging and marine construction from elevated turbidity and sedimentation. Mangrove communities in the vicinity of the Precinct are adapted to the turbid near shore environments and currently persist under sediment loads from flood events and maintenance dredging. Modelling indicates that when the dredge is positioned in the mouth of Ross River sedimentation in mangrove habitats adjacent to the Precinct should not exceed ~1 mm over two months of dredging (Figure 2-3). As for seagrasses, impacts to these mangrove habitats are not predicted to occur.

Figure 2-3 Plot of Indicative Sediment Depths (m) after Two Months of Dredging in the Ross River mouth (seaward corner of current reclamation). Yellow >2 mm, dark blue <1 mm



Short term increases in turbidity associated with dredging, any required reclamation or disposal and marine construction are therefore considered unlikely to impact significantly on the broader distribution of sensitive habitats adjacent to the Project Area for the following reasons:

- The limited influence of dredge plumes in the vicinity of sensitive habitats, as evidenced by plume modelling;
- The documented survivorship of these sensitive communities in reduced light environments under existing, fluctuating, conditions;
- The pulsed nature of turbidity impact over the dredging period resulting from broken cycles of dredging and the physical influence of wave and tidal action on predicted/observed turbidity;
- The documented persistence of established assemblages and meadows under existing, similar, levels of dredging and reclamation works; and
- Natural variability of the existing turbidity regime within the near-shore waters surrounding the Project Area.

Although impacts to sensitive habitats are not predicted to occur it is recognised that some direct and indirect impacts to other habitats will occur. Accordingly mitigation measures associated with potential impacts that may result from construction and operation of the Precinct have been assessed and established. These include the following measures:

- Creation of habitat to offset habitat losses;
- Use of fauna spotters and equipment soft starts to minimise potential impacts to marine megafauna;
- Appropriate management of any reclamation tailwater through settlement ponds to minimise water quality impacts from reclamation activities;
- Adoption of lighting appropriate to minimising impact upon marine fauna;
- Use of designated channels to minimise disturbance to marine fauna and adjacent benthic habitats;
- Implementation of dredging, spoil disposal and construction management plans considering avoidance of marine habitats used frequently by marine fauna; and
- Implementation of appropriate onsite waste management practices to mitigate potential for offsite impacts on water and sediment quality and to avoid ingestion by marine fauna.

These mitigation measures have been identified and included in the project's EMP.

Water quality assessments and sediment quality assessments determined the level of contaminants present across a range of environmental conditions, including flooding events. Water quality of the area is not predicted to be negatively impacted as a consequence of mobilisation of heavy metals and contaminants from construction or operational activities associated with the TMPP.

A draft acid sulfate soil management plan has been developed for the TMPP and was provided under the EIS and in Appendix H of the EIS. This document will be finalised following completion of the detailed design phase when final dredging and reclamation volumes will be calculated and will inform what sediment sampling and management requirements will be needed to satisfy the Queensland Acid Sulfate Soil Investigation Team Guidelines (QASSMAC, 2002) and the NADG (2009).

As noted under Section 2.2.2 above, pile moorings have been conceptually provided in the lee of the breakwater in the TMPP concept design that has been assessed. These are not expected to be constructed during Stage 1 of the TMPP and will only eventuate if a proponent wishes to pursue the implementation of these facilities. The detailed design will not exclude potential for these facilities, however, assessment of environmental impacts, including to seagrasses, associated with these facilities will need to be achieved as and when installation of the facilities is required through the development application approval for installation.

2.5.3 Aquatic Fauna Matters of Concern (refer Section 5 for Megafauna and Avifauna)

In submissions 318 and 326 concern was raised that:

- The TMPP development would result in the loss of fish and benthic habitats and create ongoing disturbance within and adjacent to the development from dredging of navigational channels, construction of breakwaters and resulting turbidity and sedimentation. These disturbances and impacts may require offset; and
- Construction activity may trap marine fauna and increased turbidity and mobilisation of contaminants from sediments may lead to fish kills.

2.5.4 Response to Aquatic Fauna Concerns

Expected marine benthic habitat losses from direct and indirect impacts were identified within the EIS (Section 3.10.6, page 3-194 onwards). The EIS investigations determined that during construction direct losses will result from reclamation and dredging works and indirect losses may result from increased sedimentation loads. Indirect impacts are not, however, expected to sensitive habitats, as noted above. Following construction ongoing disturbance to the area from maintenance dredging and from traversing vessel traffic will be comparable to existing conditions. Communities that currently occupy the regularly dredged and utilised Ross River channel, as observed under the EIS and during prior studies, are considered to be indicative of future communities (post construction). These assemblages are expected to return to current state after construction.

The biodiversity and prevalence of fishery and other communities within the Townsville area is not expected to be impacted by the minor (spatially and ecologically) habitat losses that will occur from the proposed TMPP. Seagrasses are not predicted to be impacted by the project and do not occur in any of the areas targeted for dredging or reclamation. Indirect impacts on open seabed areas from increased turbidity may occur, however, the waters of Cleveland Bay are already highly turbid and the dredging

plant to be used (Cutter Suction or Backhoe) do not generate large dredge plumes and, hence, plumes are not predicted to extend into Cleveland Bay to impact upon sensitive seagrass meadows.

This assessment has taken into consideration that existing offshore seagrass meadows and the communities they support are already adapted to persist under the likely turbidity loads and have demonstrable resilience to any short term water quality impacts resulting from construction if they were to occur. Maintenance dredging works using similar dredging plant (cutter suction) already occur in the Ross River for channel maintenance and no impacts to adjacent seagrass meadows have been observed as a consequence of this activity (from monitoring completed by DEEDI annually and from monitoring completed for the EIS).

Offset commitments for habitat losses that are expected to occur have been the subject of discussion with DEEDI officers. A separate letter from POTL has been provided to DIP detailing POTL's offset commitment (attached here as Appendix D). In summary, POTL considers that the offset it provided for the TPAR road (>200 hectares) was far in excess of that actually required for the TPAR project. POTL is seeking to claim a credit for marine habitat already provided for this related project as offset for any habitat loss as calculated by DEEDI for the TMPP.

Lot 773 is an intertidal plot, exposed at low tide. If wet construction is to occur (i.e. backhoe dredging at high tide or with an enclosed 'pond'), fish and any other mobile marine fauna using the site can vacate Lot 773 during dredging and reclamation works. If the construction method is to be dry construction, a bund can be placed across the mouth of the harbour at low tide when the site is virtually dry, therefore avoiding trapping any mobile marine fauna. Accordingly, capture or trapping is not considered a risk for species from this project from either construction method.

2.6 Air Quality

2.6.1 Matters of Concern

In submissions 1, 202 and 272, it was suggested that:

- The air quality models used as the basis for the EIS over-predict the settling rate of dust and under-predict the atmospheric pollution plume that may potentially be generated from the TMPP;
- Lead (Pb) should be used as a tracer; and
- The findings from the air quality investigations for the EIS were invalid as a result of the above concerns.

2.6.2 Response to Air Quality Concerns

As reported in Appendix L of the EIS, the Queensland Environmental Protection Agency (now DERM) has a monitoring network of five sites in Townsville. Results from this monitoring, along with additional industry monitoring from the Townsville Port Authority and Sun Metals Corporation, are reported on monthly and annually. The

2007 annual report of this data indicates that lead (Pb) is not required to be monitored because “pollutant levels are reasonably expected to be consistently below the relevant [National Environmental Pollution Monitoring] standard”. Further, lead is unlikely to be a contaminant of concern during operation of the Marine Precinct. Activities that may generate airborne contaminants, such as abrasive blasting, will be required, under legislation, to contain their emissions. Accordingly, particulate matter (as assessed under the EIS) is considered to be a more relevant measure than lead, especially during the construction phase of the project.

Additional details provided by the respondents in their comments indicated that dust deposition at the Strand was a concern for this project. While the Strand may be downwind of the Port operational area, it is not directly downwind of Lot 773. The air quality assessment completed for the Precinct EIS used the sensitive receiving environment directly downwind of the proposed project area (Lot 773) as the modelling area, being residential areas in South Townsville.

Air quality monitoring data collected in and around this environment was used for development and assessment of the air quality model documented in the EIS. This model is a standard industry model that is considered acceptable for port development impact assessment and is widely used by GHD for these types of projects. The model, its parameters, and the weather conditions on which it was based are presented in the Air Quality Assessment Report (Appendix L of the EIS).

During construction and ongoing maintenance of the Precinct, dust will be generated principally via the following mechanisms:

- Mechanical disturbance: dust emissions brought about by construction and maintenance vehicles/equipment; and
- Wind erosion: dust emissions from exposed, disturbed soil surfaces under high wind speeds.

The results of the air quality assessment suggest that construction-related dust from the TMPP would not significantly impact on the amenity of sensitive receivers provided appropriate management procedures are implemented. The following commonly used dust mitigation actions were considered to reduce the estimated dust impact from the development:

- Level 1 watering on all exposed surfaces (2 litres/m^2/h). This control method achieves a 50% emission reduction (NPI Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals Version 2.0, 2000); and
- Access road to be surfaced (an asphalt seal results in near zero dust emissions) from site entry until at least 50 m north, beyond the coordinate (482810 East, 7869676 North).

These mitigation measures were identified under the EIS (Section 3.11.2.3, page 3-248 and Appendix L) and within the EMP (Section 8).

Air emissions from proposed operational activities within the Precinct have been assessed against relevant criteria. Modelling results indicate that the operational

activities assessed consisting of abrasive blasting, fuel storage and moored fishing trawlers will not have a significant impact on any nearby sensitive receivers.

The required conditions to control any air quality impacts have been identified and monitoring will need to occur in accordance with actions outlined in the EMP proposed for the project.

2.7 Noise and Vibration

2.7.1 Matters of Concern

In submissions 272, 318 and 327 concerns were raised regarding construction and dredging noise impacts from the TMPP on the surrounding environment/suburbs.

2.7.2 Response to Concerns

Maintenance dredging of Ross River is currently occurring and occurs approximately every two years. POTL has received only one public complaint about noise from dredging activities in the last seven years. That complaint related to a booster pump located adjacent to residential areas at the end of Seventh Avenue and the problem was quickly rectified. A small cutter suction dredger was operating in Ross River during the time of the EIS public display (August 2009). As noted under Section 2.4.6 of the EIS the significant draft restrictions for the proposed development area only enable a small dredging plant to be used and a small cutter suction similar to that which is currently used for maintenance dredging or a backhoe dredge on floating platform are likely required. POTL did not receive any noise complaints in relation to the 2009 dredge operations in the vicinity of the Ross River adjacent to the Precinct site.

Potential noise impacts on sensitive receptors, including the suburbs adjacent to the development, were assessed for both construction and operational phases of the TMPP under the EIS (refer Appendix K of the EIS). This included monitoring activities at the sensitive receptors over a period when construction and port traffic movements were occurring.

Performance criteria for the EIS assessment were based on government criteria designed to protect sensitive receptors. Typical noise levels expected to be produced under construction and operational activities were sourced from AS2436 – 1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites and GHD's internal database. These are considered to be appropriate for the works and activities intended. The assessment noted that construction and operational activities have the potential to impact upon sensitive receptors without mitigation measures in place. Mitigation measures deemed to be appropriate were nominated.

The EMP to be applied to the project identifies the appropriate mitigation and management measures to reduce the construction and dredging noise impacts to acceptable levels. In order to reduce noise impacts, particularly on the surrounding residential suburbs, the EMP specifies working hours, transport activity hours and installation of noise silencers where appropriate. In addition, it states that any equipment that is producing excessive levels of noise will be removed and replaced by

alternative equipment. Residents surrounding the Port will be notified of the construction timetable and all complaints will be taken into consideration and investigated accordingly.

Noise associated with boat and trailer traffic was not assessed as boat ramps are not proposed for inclusion in the final TMPP as assessed under the EIS. Any installation of boat ramps to this area would require a separate noise assessment by the proposing entity to ensure they do not create an unfavourable noise environment for surrounding residents.

2.8 Health and Safety

2.8.1 Matters of Concern

In submission 328, a query was raised whether design of the buildings/structure would include acceptable fire safety systems. It was also suggested that the possibility of marine craft incidents should be assessed in further detail.

2.8.2 Response to Concerns

As noted in Section 2.1 (this report), all infrastructure to be constructed as part of the TMPP will need to meet applicable Code standards. This will include relevant fire safety standards. Specific design requirements such as inclusion of a fire safety system are required under the Building Code of Australia, against which development applications are assessed.

Appropriate design of structures to Code standards will be achieved during the detailed design of the TMPP and information will be included to support all relevant building approval applications.

The possibility of marine craft incidents as a consequence of navigability of the inner harbour of the marina or channel outside the TMPP will be assessed during detailed design of the TMPP and will be added to the final risk and hazard assessment documents. Navigation safety will need to be achieved to the satisfaction of the RHM.

3. Social Values and Management of Impacts

3.1 Social Amenity Matters of Concern

Submissions 266 and 326 noted that the TMPP will result in the loss of mudflats, which have been used by recreational fishers for collection of bait (yabbies, crabs and worms) and by the broader community as an off leash dog area.

3.1.1 Response to Social Amenity Concerns

The Social Impact Assessment and Marine Ecology studies completed for the TMPP EIS acknowledged the loss of public access to the coast as well as the loss of mudflats, which are currently used for recreational purposes. The recreational uses of those mudflat and coastal areas were identified during the social impact assessment activities for the EIS and documented in Section 4 and Appendix AA of the EIS.

While it will not be possible to replace the beach environment lost to the development, POTL has sought to identify alternative potential coastal recreation opportunities. The EIS identified the possibility that upstream industrial lands vacated by industries relocating to the Precinct may provide opportunities for incorporation of alternative recreation opportunities. The desired planning outcome of the redevelopment of these upstream lands would be to provide enhanced public access to the coast to offset losses experienced through development of the Precinct. When this land is vacated rehabilitation and potential for redevelopment will be possible but will need to be in accordance with the current City Plan for the area.

Given the intended staged delivery of the Precinct public access to the sand and mud flat that comprises the Stage 3 of the Precinct will continue to be available for between 5 to 10 years from commencement of construction. Access may also be available beyond this timeframe given that it will only be resumed when construction on this four hectare area of Lot 773 is required, which will be demand driven.

4. Impacts on State and Local Economies and Management of Those Impacts

4.1 Economic Impacts of Concern

In submissions 239, 244, 267, 268, 269, 315 and 326 the following concerns were raised:

- The economic impacts described in the EIS for existing marine businesses were not accurate as full relocation costs for upstream industries to the TMPP site were not documented;
- The full economic impacts of proceeding with a no breakwater option were not documented in the EIS as the breakwater options assessment did not account for economically adverse impacts (under a no breakwater scenario) to:
  - Businesses to be located in the TMPP (as a consequence of wave action);
  - Those affected by the inability to provide new pile moorings and swing moorings downstream of the TPAR;
  - Any high masted vessels that would be unprotected from cyclones; and
- The existing economic environment affected by the project and potential impacts and mitigation measures were not described accurately and in detail as the majority of vessels from upstream industries would be unable to pass under the TPAR bridge and would be adversely impacted.

4.2 Response to Economic Impact Concerns

The economic impact of relocating the upstream businesses was assessed as a confidential component of the EIS given that it contained confidential business information for affected industries. This report was not released for general review and comment during the EIS display process. This aspect of the project is not considered to be incomplete against the terms of reference, but is not presented entirely within the public display document. A summary statement containing aggregated costs was included in the EIS.

Subsequent to the EIS public display period POTL commenced negotiations with individual upstream business owners with the intent of resolving the majority of their concerns relating to economic impacts from the TMPP. The progress of those negotiations is being communicated with senior DIP and Treasury officers and has been taken into account in Government funding allocated for the TMPP. The most recent concept design plans for the TMPP attached to this response (refer Figure 1-2 and Appendix A, this document) indicate the potential locations of each of the affected upstream businesses in the TMPP.

A breakwater is envisaged to be required only if the external face of the rock wall is to be used for berthing vessels later in the development stages. The breakwater is unlikely to be constructed as part of Stage 1 of the Precinct because a protected

berthing environment has been provided within an inner harbour. Private moorings are unlikely to be provided in the Marine Precinct.

5. Matters of National Environmental Significance

5.1 Avifaunal Impacts from Habitat Loss

5.1.1 Matters of Concern

Submission 121 raised concern regarding threats to shorebirds feeding and roosting habitat on the bank of the Ross River opposite the TMPP due to increased ability to access this area by dog walkers and beach picnickers, and overfishing of bait species

5.1.2 Response to Avifaunal Concerns

The Wading and Migratory Bird Report (Appendix V of the EIS) and EMP of the EIS recognise the significance of the existing shorebird feeding and roosting habitat on the bank of the Ross River opposite Lot 773. Both the EMP and the Wading and Migratory Bird Report identified that by disconnecting the proposed breakwater from land, the design adopted under the EIS, the risk of the roosting area being accessed by terrestrial predatory pest species or by increased visitation and hence disturbance by people, is greatly reduced.

The final breakwater configuration, an offshore breakwater design, was selected as it provided opportunity to avoid impacting the area utilised by migratory birds. Adoption of this design for the EIS demonstrates POTL's commitment to avoiding impact on this important habitat area. Additional impact mitigation measures were also identified and proposed.

By adopting the offshore design and other identified mitigation strategies there should be no increased impacts upon these species or the feeding and roosting habitat from the construction or operation of the TMPP.

5.2 Megafauna

5.2.1 Matters of Concern

Matters relating to marine megafauna impacts that may potentially occur were raised in submissions 197, 271, 318 and 327 as follows:

- Direct (reclamation) and indirect (increased sedimentation / disturbance) loss of marine megafauna migratory, feeding and nesting habitat, including snubfin and indo-Pacific dolphin habitats in Cleveland Bay;
- Impacts on marine faunal habitats and usage of habitats resulting from hydrological change in both the Ross River mouth and inshore estuarine area as a result of the development;
- Light pollution during construction and operation resulting in flatback and green turtle hatchling disorientation; and

- Increased potential for boat strike of megafauna resulting from increased vessel traffic.

5.2.2 Response to Megafauna Concerns

The TMPP site is on intertidal land nested against the bank of the Ross River. This area is a very shallow (<2m depth) mud / sand flat which is exposed on most tides and does not support any seagrass or algal meadows. Small gastropod snails, crabs and worms were noted to occur in this area in varying densities, which were related to sediment type (sand vs mud composition) and location on the beach in relation to tidal height. Investigations during the EIS did not find evidence of turtles, dugongs or dolphins of any species or age class using either this intertidal habitat or the adjacent Ross River channel.

The intertidal sand / mud flat will be reclaimed to enable construction of the TMPP. Maintenance dredging will be required on a schedule and scale similar to that which currently exists to maintain the existing Ross River channel. Vessel traffic movements in the Ross River will be comparable to those that currently exist given that upstream industries already use the Ross River channel and will be relocating to the TMPP. The direct loss of benthic habitat in Lot 773 and indirect ongoing impact to benthic habitats (through maintenance dredging) was acknowledged in the EIS. However the EIS concluded it would not impact marine megafauna given these species were not noted to use these habitats.

Fauna are expected to temporarily vacate the surrounding habitats during dredging and reclamation works, therefore trapping and fatalities are unlikely. Further, Lot 773 is an intertidal plot. If construction occurs in the wet species will have opportunity to move out of the area or swim away from the stationary dredger. If dry construction occurs, the mouth of the bund can be closed at low tide after fauna have vacated the area. Accordingly, capture is not considered a risk for species from this project. However, marine megafauna spotters and conditions relating to dredging and construction activities have been identified in the EMP as desirable precautions to further reduce the potential for impact to occur.

Sedimentation predicted from the hydrodynamic modelling and potential for sediment deposition on critical marine megafauna habitat, including seagrass meadows in Cleveland Bay, as a consequence of the development was assessed. The assessment was considered to be conservative as sediment loads used for the model inputs were considered to be proportionately high given the current lack of sediment input from the Ross River. This impact to important megafauna habitats was considered under the megafauna risk assessment process. Potential sensitive habitat loss is not considered likely and, hence, is not considered to be a risk or threat to megafauna from construction or operation of the TMPP.

The project area is not a transit route or area of high utilisation for megafauna. No turtles, dolphins or dugongs were seen to move through or within the Precinct / Ross River area during the field studies. No records of turtles nesting on Lot 773 or coming close to the Ross River en-route to nesting beaches have been made. Independent specialists, who have conducted extensive research on marine megafauna species in

Cleveland Bay previously, were consulted during the EIS to provide their knowledge of usage patterns of Cleveland Bay. The marine megafauna report (Section 3.10 of the EIS and Appendix U) details the known historical usage of the project area by megafauna and has been developed in consultation with Drs Parra and Hodgson. From the information available, both recent and historical data, no interruption to transit pathways is expected. Further, impacts to migratory or nesting turtles, including impacts to migratory pathways, have been assessed in detail and are not anticipated from the TMPP.

The existing port facilities are well lit and have not, to date, recorded any trapping of turtle hatchlings. The TMPP is not expected to provide any greater risk in this regard because the marine industries already exist and the vessels already use Ross River. Nevertheless, potential for impact to these species was assessed in detail under the EIS using field and desktop assessments. Mitigation of potential lighting impacts on the surrounding environment and suburbs has been identified in the EMP. Key measures include appropriate lighting design to ensure the site is not over-lit as well as restricting the potential light spill on surrounding environment through sensitive light placement and specification of lighting.

Although considered unlikely, potential lighting impacts on hatchlings leaving beaches have been included in the assessment and mitigation measures have been provided to remove potential for this impact to occur. These EIS sections have been reviewed and agreed by independent specialists.

Vessel traffic likely to be housed within the Precinct currently utilises the Ross River from upstream industry areas. It is mostly slow moving commercial vessel traffic, travelling in a designated channel in Ross River. Other than normal growth in vessel traffic that would occur irrespective of the Marine Precinct, vessel traffic for the Precinct is not expected to increase in volume from that currently accessing upstream industry areas. Vessel strike in the footprint of the TMPP has not occurred to date, based on government records (stranding database) and anecdotal evidence (JCU), demonstrating that vessel strike is a low risk for this environment.

Although a number of impacts to megafauna are considered unlikely and marine megafauna were not noted to utilise Lot 773 or immediate tidal waters, potential impacts to these species carry a high consequence given their conservation status. Accordingly, adopting a precautionary approach, mitigation measures have been recommended for a range of construction and operational activities in order to decrease the potential impacts on megafauna. These include:

- Use of designated shipping channels and go slow zones, which currently exist in the Ross River, to avoid impacting upon benthic habitats and mobile species, including mega fauna;
- Use of appropriate facility design to minimise ongoing pollution potential, including from light spill and slipways;
- Implementation of waste management plans and provision of waste facilities to avoid flow on affects to megafauna;

- Implementation of hazardous material handling requirements and provision of access to appropriate emergency response kits to avoid flow on affects to megafauna;
- Development and implementation of a dredge management plan to mitigate impacts on water quality having flow on affects to megafauna; and
- A construction and operational phase Environmental Management Plan (EMP) has been recommended to address the potential impacts on marine megafauna from the TMPP.

These mitigation and management strategies are provided with knowledge of other regional Project impacts and in consultation with regulatory agencies to address potential impacts to marine mega fauna in context of regional impact potential.

All potential threats to megafauna have been extensively studied under the EIS. Independent megafauna specialists agree with the identified risks and mitigation measures as being appropriate to the TMPP.

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