



PORT of TOWNSVILLE

North Queensland

Section 7 Matters of national environmental significance

Townsville Marine Precinct Project

Environmental Impact Statement





7. Matters of national environmental significance

7.1 Controlling provisions

The TMPP was determined to be a controlled action under the under the EPBC Act on 3 November 2008 (EPBC 2008/4497) the controlling provisions under the Act are:

- › Sections 12 and 15A (World heritage properties);
- › Sections 15B and 15C (National heritage place);
- › Sections 16 and 17B (Wetlands of international importance);
- › Sections 18 and 18A (Listed threatened species and communities); and
- › Sections 20 and 20A (Listed migratory species).

How the project relates to each of these matters is described following.

7.2 Impacts on world heritage properties

The operational areas of the port are excluded from the GBRMP, however, the World Heritage Area is more extensive and extends to mean low water mark along the coast. The TMPP will consequently occur wholly within the GBRWHA. Direct, indirect, permanent and temporary impacts on the benthic marine systems within the GBRWHA are expected from construction and operation of the TMPP. The majority of the impacts involve the removal of the intertidal sand/mud flat on the western bank of the Ross River that forms Lot 773 and the loss of seabed associated with the footprint of the breakwater. Temporary impacts expected as a result of construction activities include dredge plume impacts and noise impacts. Impacts to the natural beauty of the GBRMP are not expected as the development will blend within the existing industrial landscape. Potential impacts and appropriate mitigation measures associated with construction and operation of the Precinct include provision of new benthic habitat as a result of construction of the Precinct and use of dredge and waste management approaches to reduce potential for indirect impacts. Under the identified mitigation measures the Precinct is not expected to have significant impact on the marine ecological values of the Townsville region. Further detail regarding potential impacts on the World Heritage Properties is, however, provided following.

7.2.1 Impact to Habitats

Marine ecology information of relevance to the Precinct, including intertidal assemblages, has been collated through a focussed desktop assessment of available information (including Government agencies databases) and from the results of baseline ecological surveys. The surveys were designed to collect information that enhanced the existing knowledge of aquatic systems occurring within and adjacent to the Project Study Area and the communities they support.

The marine benthic survey findings come from a once off sampling event of 5 days in duration in October 2008 and may not reflect potential seasonality of marine fauna across the Study Area. However, the historical data and available information on the Project area and adjacent



habitats is thorough and provides a strong seasonal perspective within which the survey data is used in assessing the potential impacts of the TMPP on the benthic marine ecology.

The TMPP will have a number of permanent impacts on the marine ecological values of the area in which it is located. The majority of the impacts involve the removal of an area (approximately 34 ha) of intertidal sand/mud flat on the western bank of the Ross River that forms Lot 773. Further, the loss of seabed associated with the footprint of the breakwater (approximately 2 ha in total) will also occur. In addition, a range of temporary impacts are expected as a result of construction activities, including dredge plume impacts and noise impacts.

The Ross River south-eastern Bank, sand spit and mud flat area may be the subject of further studies in regard to potential siting of boat ramp facilities. Impacts associated with the loss of any marine environs and taxa associated with that activity, including cumulative impacts following on from development of the Precinct, would need to be considered at that time.

Lot 773 was found to support a subtidal benthic community of relatively low diversity, with 25 species present, however the intertidal area was more diverse with 28 species recorded (there are usually many more benthic species present in subtidal soft bottom communities compared with intertidal communities). The subtidal benthic communities were dominated by small marine molluscs, and to a lesser extent crustaceans (crabs and prawns). The intertidal benthic communities were, similar to the subtidal communities, dominated by small molluscs, mostly snails. Fiddler crabs, soldier crabs and marine worms (sipunculids) were also present.

Prior to the construction of the Precinct a road and rail link to the proposed port site will be constructed. This road and rail corridor will enter the port site from the east, passing through the land on the eastern side of the Ross River mouth and crossing Ross River to the south of Lot 773. The actual design and construction of this infrastructure is the subject of another approval process by the Department of Main Roads. A range of cumulative impacts may occur in regard to construction effects on marine megafauna species and removal of benthic species.

The impacts on marine ecological values expected to result from the TMPP, either during construction and/or operation, 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.

Potential 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.

Under these mitigation measures the Precinct is not expected to have significant impact on the marine habitat ecological values of the Townsville region.



7.2.2 Water quality

The TMPP is located in the tidally influenced river mouth of the Ross River. The Ross River discharges into Cleveland Bay, which forms part of the Great Barrier Reef World Heritage Area.

Potential influences on water and sediment quality from the urban areas and Port operations include stormwater run off, accidental spills of hydrocarbons and other products and dust and spillage of bulk commodities that are imported and exported through the Port. Other impacts on water and sediment quality within the Project Area include inputs of heavy metals, hydrocarbons, pesticides and herbicides from catchment activities such as urbanisation, agriculture, Ross River Dam and the presence of light industry.

A review of existing data and the collection of baseline water quality data was undertaken to provide a means of assessing the current state of the environment and to allow for the assessment of potential impacts from the development of the Precinct.

Results for turbidity (monthly and continuous data) and suspended solids indicate 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 and the seasonal trend shows 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.

Both the long term POTL monitoring data and the EIS vessel based monitoring data showed elevations of nutrients above the QWQG (2006) guidelines in many of the samples collected. Results from the vessel based water quality monitoring program showed substantially higher nutrient concentrations at sites in the vicinity of the existing boat moorings in Ross River, indicating that these moorings are having an impact on water quality.

There appear to be only very minor inputs of pesticides into the lower estuary of the Ross River, with one compound present above laboratory limits of reporting in the first monitoring event. Pesticides are likely to be sourced from the upstream rural and urban catchment. Inputs of other anthropogenic contaminants from urban areas and the Port operations also appear to be low, with the exception of some localised, minor elevations in oil and grease surrounding the existing boat moorings in the upper estuary.

The potential impacts of construction and operation of the Precinct on water quality are:

- » The generation and migration of turbid plumes from capital and maintenance dredging;
- » The mobilisation of contaminants into the water column (including nutrients and acid sulfate soils) during capital and maintenance dredging; and
- » The discharge of contaminants from various marine industries into Ross River.



The results of turbidity modelling outlined in this report suggest that it is unlikely that dredging will result in increases in turbidity above background levels at the sensitive sites that are of ecological significance and that any increase is likely to be over one tidal cycle only.

Overall, the quality of sediments in the Project Area is compliant to the NADG (2009) and the Environment Investigation Levels (EIL) of the Draft Guidelines for the Assessment and Management of Contaminated Land. Therefore it is not expected that dredging will result in the release of contaminants to the water column.

The existing boats moored in Ross River appear to have impacted on water quality in the immediate vicinity of the moorings, with elevated concentrations of nutrients and minor inputs of hydrocarbons. It is anticipated that water quality in the vicinity of the current boat moorings will improve if vessels currently positioned on these moorings relocate to the Precinct. However, water quality in the Precinct basin and Ross River has the potential to be impacted if adequate controls on discharges from berths and moorings as well as the industries and activities that establish at the Precinct are not implemented.

General measures for the management of water quality impacts from the operation of the Precinct include:

- › A condition of development on the Precinct will be that industries gain the appropriate environmental approvals and comply with the permit conditions and other relevant guidelines, standards and codes of practice for their industry;
- › All owners/operators of activities and industries that establish at the Precinct will be required to prepare and implement an EMP for their activities; and
- › Mooring leases will contain guidelines for boat owners in terms of waste disposal in particular and appropriate disposal facilities will be provided. Waste management impacts and mitigation measures appropriate for the Precinct facility have been considered under a separate report for the EIS studies.

7.2.3 Sediment quality

The sediment sampling undertaken for this EIS demonstrated the presence of minor concentrations a number of anthropogenic contaminants. PAHs were identified in low concentrations in the vicinity of WQ10 – 12. PAHs are commonly associated with incomplete combustion of fuels and oils and are likely to be present in the Ross River estuary as a result of the presence of boat traffic and moorings, particularly in the vicinity of WQ10 - 12. Nutrient concentrations in sediments (as for water quality findings) were also higher in the vicinity of the boat moorings, indicating an input from this source or other land based anthropogenic activities in this area.

Minor concentrations of TBT were identified in two sediment samples. TBT is an antifouling agent that was previously used on ships and boats to prevent growth of marine organisms on their hulls. The likely sources of TBT are boat maintenance activities that are currently based on the northern bank of the Ross River, west of the proposed Port Access Road and from boats and ships in both Ross River and the adjacent Port facilities. TBT is usually present in marine sediments heterogeneously.



Minor concentrations of herbicides were also identified in the sediments of the study area. As was the case with water quality, this indicates minor inputs of these anthropogenic contaminants from the Ross River catchment. No long term build up of these contaminants was evident from this monitoring program.

Overall, the quality of sediments in the Project Area is compliant to the NADG (2009) and the EIL of the Draft Guidelines for the Assessment and Management of Contaminated Land. If ocean disposal of dredged material is required to complete the TMPP investigations for the required sediment sampling and analysis plan will address management of any detected contaminants to mitigate any impacts upon the ecological values of the marine environment.

7.2.4 Hydrodynamics and coastal processes

Coupled hydrodynamic, wave and sediment transport modelling was undertaken in order to describe the existing hydrodynamic characteristics of Cleveland Bay, and in order to assess potential impacts associated with the construction of the Precinct and associated breakwaters. The modelling exercise provides an understanding of general circulation patterns in Cleveland Bay (as driven by tide and waves) as well as informing details of circulation, sedimentation and flushing patterns in the vicinity of the proposed marina and breakwater development within the Precinct.

Predicted impacts are low, leading to a limited need for formal mitigation measures.

The following conclusions can be derived from this study.

- › There is no significant impact on water levels as a result of the proposed development under the driving forces of tide and wave (both prevailing and 1 year storm wave) conditions. However an increase in water level of up to 0.20 m is observed behind the proposed eastern breakwater during 100 year floods in the Ross River, albeit that this increase occurs at low tide;
- › Current magnitudes are expected to be reduced significantly at the proposed Marina site while an increase in current between the breakwaters is predicted. This will lead to an increased potential for sedimentation within the marina, which will need to be catered for in estimating ongoing maintenance requirements;
- › Absolute values of shear stress appear to remain relatively low (i.e. less than the 1 N/m² threshold for erosion) under the majority of conditions, with increases in bed shear typically less than 0.5 N/m². Hence, under the majority of conditions, changes to stresses appear unlikely to require mitigation;
- › Under flood conditions, bed shear stresses could potentially increase by 5 – 8 N/m² in the entrance and at the tail of the eastern breakwater. This imposes a risk of scour, which will need to be addressed during design;
- › The flushing time for contaminants increases by approximately 12 hours (i.e. an increase of 35%) over the existing conditions for most sites within the Precinct, including the proposed marina. This potential increase in flushing time is not like to have a high impact as most passive contaminants are flushed within 1.6 days, which is a relatively short time. No mitigation measures are recommended, other than ongoing monitoring of water quality; and



- » Dredge plume modelling was undertaken for a period of one month to assess the potential impacts of dredging in the navigation channel closest to the breakwater entrance. The sediment plume has maximum concentration of approximately 20 mg/l in the vicinity of the dredge source and extends a few hundred meters radially outwards. Management of the dredge program will require monitoring, as undertaken for similar programs. Given the low magnitude of predicted turbidity, the modelling suggests that measures such as silt curtains are unlikely, though use of one near the mouth of the Ross River should be considered.

Depths of sediment deposition are estimated to be of the order of 2 to 3mm per 2 month period. Actual values will depend on ambient wind and wave conditions, the dredge used, and the amount of material in suspension during natural turbidity events, which have been measured at an order of magnitude higher than those predicted for the dredging activity. If dredging were to continue for a period of 6 months, then 6 to 9mm of material is predicted to settle.

The Ross River and its current dredged channel form the boundary of longshore sediment movement from the beach and tidal flats to the south-east of the marina precinct. The sediment movement in this area is a mixture of onshore and alongshore at the outer margins of the tidal flat and predominantly along the beach towards the Ross River close to the river entrance. Further to the south-east away from the river, sediment movement is predominantly onshore.

The coastal processes in the vicinity of the Precinct are influenced by the proposed Option C breakwater structures in a number of ways. However, the processes are capable of moving sediment at only relatively slow rates due to the low wave climate and hence any changes will take time to develop and will be restricted to the local area.

It is unlikely that sedimentation will cause major changes at the main entrance to the marina, due to the depth of the dredged channel reducing the ability of the currents to mobilise the bed sediments and the very limited sediment transport around the outside of the breakwater.

However, at the south eastern end of the breakwater, the water depths are much less and any currents generated by flood flows or tidal flows will have a much greater influence on sediment movement. In addition, it is here that the longshore sediment transport potential is the greatest. Due to the “shadowing” effect of the breakwater, the longshore sediment transport will tend to accumulate in the lee of the breakwater and extend out to the south east over time. The growth of this sedimentation towards the end of the breakwater will be limited by the flood and tidal flows between the end of the breakwater and the sand bank.

Flood flows and ebb tide flows will push sediment from shallow areas inside the marina and from the accumulated longshore transport deposition area, out of the marina onto the outer margins of the tidal flats to the south east. Flood tidal flows will cause sediment to move into the marina depositing sediment in the dredged areas adjacent to the end of the breakwater and areas where the current velocities are low.

It is concluded that it is unlikely that there will be any significant affects on coastal processes from the Option C breakwater structures forming the Precinct on the coastal areas beyond around 500m south-east of the breakwater structures.

The Port development blocks any influence of coastal processes in the vicinity of the Precinct on the coastal areas north-west of the Port. The establishment of a Precinct will not influence this fact. The Port development (including the Port areas beyond the original coastline,



breakwaters, other reclaimed areas, and the dredged entrance channel) effectively isolates the processes that occur south-east of the Port from the areas to the north-west. Changes to the river hydraulics (through the construction of weirs and dams affecting both the supply of sediments to the river and the flushing of these from the river) and sand mining of existing river resources have also influenced regional coastal processes.

Notwithstanding the reasons for the degradation of the coastline west of the Port area, the proposed Precinct will have no additional contributory effect on either of the causes of the degradation outlined above and hence will have no influence on the state of the beaches to the west in either the short or long term.

7.2.5 Introduced marine pests

The Project area was assessed for the presence of marine pests as part of the survey of subtidal and intertidal habitats. No marine pests of concern for the Townsville region were detected in any of the samples collected during this survey. Species of concern were determined based on information provided in Hayes *et al.* (2005b) and through the National System for the Prevention and Management of Introduced Marine Pests.

The Precinct will not be the first port of call for international vessels and, hence, will not act as an area for quarantine clearance of vessels. National and state biofouling and ballast water management guidelines and requirements for both domestic and international shipping traffic will be implemented to minimise the potential for future introduction of marine pest species.

7.3 Impacts on National Heritage Places

The GBRWHA is a place of national heritage significance within the project site and potential impacts to this have been addressed under Section 7.2 above. Kissing Point Fort is a National Heritage Place situated approximately 4.5 km to the north-west of the Precinct footprint (by line of sight across land, refer Figure 2-3). Significant infrastructure already exists between Lot 773 and Kissing Point which will buffer any off-site effects and this area is not expected to be impacted by the TMPP.

7.4 Wetlands of International Importance

The Bowling Green Bay Ramsar wetland area is located approximately 10 km southeast of Townsville (by line of site, refer Figure 2-3) and is listed on the Department of Environment, Water, Heritage and the Arts, '*Directory of Important Wetlands*'. Under this directory the Project area falls adjacent to the Ross River Reservoir (QLD008) and Bowling Green Bay (QLD002) (www.environment.gov).

Wetlands south of the Ross River are designated as being within an Area of State Significance (natural resources) by virtue of their listing within the Queensland chapter of the '*Directory of Important Wetlands*' in Australia. If a use or activity has the potential to adversely affect this area, it must demonstrate an overriding net benefit for the State as a whole. Findings from hydrodynamic, coastal processes and ecological assessments conducted during this study indicate no impacts to the Ramsar wetland will occur as a result of the TMPP.

7.5 Impact on a listed threatened species and ecological communities

7.5.1 Bird species

Five threatened terrestrial bird species listed as protected matters under the EPBC Act were identified as potentially occurring within the project area (see Table 7-1). However, none of these species were identified during the field survey. Habitat suitable for each of these species with the exception of the Star finch was found within the study area. Listed threatened wading and migratory avifauna are addressed in detail in the following section.

Table 7-1 Threatened bird species

Species name	Common name	EPBC Act status	Survey status	Habitat availability on site
<i>Erythrotriorchis radiatus</i>	Red goshawk	V	Not detected	Habitat suitable to this species was present within the study area.
<i>Geophaps scripta scripta</i>	Squatter pigeon (southern)	V	Not detected	Habitat suitable to this species was present within the study area.
<i>Neochmia ruficauda ruficauda</i>	Star finch (eastern), Star finch (southern)	E	Not detected	Habitat suitable to this species was not present within the study area.
<i>Poephila cincta cincta</i>	Black throated finch (southern)	E	Not detected	Marginal habitat represented within the study area.
<i>Rostratula australis</i>	Australian painted snipe	V	Not detected	Marginal habitat represented within the study area.

The TMPP is expected to have very limited impacts on the terrestrial ecological values of the area in which it is located. The majority of the impacts comprise the removal of a small area (approximately 1.5 ha) of low integrity marine vegetation adjacent to Benwell Road on Lot 773.

No removal of vegetation or disturbance of fauna habitats is proposed for the south-eastern bank of Ross River. POTL has given much of the land studied in this survey to the State, and it is now reserved for conservation purposes.

7.5.2 Turtles and reptiles

Cleveland Bay is not recognised as a major nesting area for marine turtles along the Queensland coast, however, low density nesting by green and flatbacks does occur. Cleveland Bay is recognised as an important foraging habitat for green turtles. In a regional context, Halifax, Cleveland and Bowling Green Bays are all important feeding sites where green turtles graze on the seagrass beds and flatback and loggerhead turtles forage for invertebrates (pers



comm. I. Bell, EPA 2008). Hawksbills are found on the inshore reefs and the olive ridley can be found in the deeper waters around Magnetic Island and along the coast. Leatherbacks are rarely sighted off Townsville, and then only in deeper waters. Collectively, these areas form an important part of Queensland's sea turtle habitat.

Potential impacts to marine turtles are summarised following.

- » Direct impacts (both potential and probable);
 - 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);
 - Damage/mortality to individual animals from direct contact related to construction activities;
 - Impact by boat strike;
 - 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;
 - Increased rubbish that may be ingested or entangle marine turtles;
 - Decreases in water quality from dredging, construction, spills of fuel or other hydrocarbons, paint, animal waste (pathogens), solvents and cleaners.
- » Indirect impacts (both potential and probable);
 - Decreased water quality from construction disturbance of sediments around the Precinct site;
 - An increase in sedimentation that may result in the smothering of adjacent benthic habitat communities;
 - Degradation of habitats through continual human usage (including inappropriate waste management, boat fuel spills);
 - Increased disturbance to habitats from increasing visitation/usage;
 - Decreased water quality resulting from inappropriate waste management or an increase in sediments and pollutants as a result of construction waste or land use changes; and
 - Noise and vibration impacts to marine turtles from in-water construction or ongoing operational activities.
 - Reduced use of the area by mobile marine turtles 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.

Potential mitigation measures include the following:

- » Use of fauna spotters and equipment soft starts to minimise potential impacts to marine megafauna;
- » Adoption of lighting appropriate to minimising impact upon marine fauna;
- » Use of designated channels to minimise disturbance;
- » 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.

Under these mitigation measures the Precinct is not expected to have significant impact on the marine turtles of the Townsville region.

Prime habitat for the yakka skink (*Egernia rugosa*) consists of dry sclerophyll forest or woodland with dense ground vegetation, log hollows, rocks and tree root systems (DEWHA, 2008c). The yakka skink has not been recorded in the project area previously and the habitat on the project site is considered to be unlikely to offer high quality habitat for this species. The yakka skink was not observed during the field investigation for this project, and it is considered highly unlikely that this species will be impacted by this project.

7.5.3 Mammals

Two threatened terrestrial mammal species, the spectacled flying fox and false water rat, are identified as potentially occurring within the study area. Neither species were observed during field surveys, however habitat suitable for each species is represented within the study area.

The spectacled flying fox is a specialist frugivore found primarily in rainforest habitats from Ingham to Cooktown, with a disjunct population in eastern Cape York Peninsula (TSSC, 2002). Although the project site does contain fruiting trees it is unlikely to serve as an important source for this species and it is considered highly unlikely that this project will impact on this species.

This false water rat is an intertidal zone specialist and is found in coastal areas in Queensland. Its primary habitat is the intertidal zone in mangrove forests, salt marshes, and sedge/reed-lined lakes near foredunes. Suitable habitat is present in the project area for this species. The project proposal will mostly impact on the western edge of the foreshore, with some degraded mangrove areas to be cleared. However, permanent removal of habitat for this species will be minimal (<1.5ha), and if it is present (there are no known records for the water mouse in the project area), impacts are unlikely to be significant.

Humpback whales (*Megaptera novaengliae*) generally occur in offshore areas and are observed off Magnetic Island. Given the inshore location of the TMPP and the shallow waters of the area (<10m) it is unlikely that the project will have any affect on this species.

7.5.4 Shark

The whale shark (*Rhincodon typus*) has been identified as potentially occurring within or adjacent to the Project site. No whale sharks have previously been recorded in the Port limits and their presence is highly unlikely. Whale sharks are filter feeders and generally prefer clearer, offshore waters. The project is unlikely to affect this species as they are widespread and migratory.

7.6 Impact on a listed migratory species

7.6.1 Migratory bird species

Wading and migratory bird usage of the project area and surrounding environment was assessed during October and November 2008. Existing literature regarding avifauna for the



Townsville region is substantial and provides seasonal and regional perspective within which the survey data is used in assessing the potential impacts of the TMPP on the intertidal avifauna assemblages associated with the Precinct.

The south-east Bank of the Ross River, directly across the river from the Precinct, is heavily utilised by marine wading and migratory birds with over 1000 individual birds using this area during low tide. This equates to an average of 49 shorebirds per hectare. Studies indicate this area is clearly an important habitat for species protected under international conservation agreements between Australia and three countries (China, Japan and Republic of Korea: CAMBA, JAMBA and ROKAMBA) and protected under the Nature Conservation Act and EPBC Act. Species of relevance found to be using the area include the Lesser Sandplover, Eastern Curlew, Beach Stone Curlew, Whimbrel, Great Knot, Red-necked Stint and Little Tern. These species were not found to commonly occur on Lot 773.

Within Lot 773 shorebirds are much less common with an average usage of only 3 birds per hectare (60 shorebirds per low tide on average). The different utilisation relates to Lot 773 already being a disturbed habitat that provides recreational activities including dog walking. The East Bank area is not accessed by dog walkers and provides adequate habitat to accommodate any shorebirds displaced by removal of Lot 773 habitat.

No removal of seabed or disturbance of marine habitats is proposed for the eastern bank area of the Ross River. No impact from construction or operation of the Precinct is, therefore, predicted to effect wading and migratory birds in the project area. However, given the significance of the environs of the Ross River mouth for birdlife the following measures are recommended to ameliorate against adverse impacts from the Marine Precinct project and other developments in the area:

- › Changes to intertidal bird feeding habitat should be restricted to Lot 773. There should be no direct or indirect consequences of the development on the nature of, or level of interference with other intertidal flats in the area;
- › Mangroves on the southeast bank of the Ross River are in good condition with an intact mangrove bird community and should be protected as an important adjunct to neighbouring estuarine habitat;
- › Breakwater placement and design should be such that there are no medium or long term threats to the integrity of the offshore sand bank, its extent or its height. A breakwater should not compromise the condition of the sand bank as being separate from the mainland as an island refuge at high tide for roosting shorebirds. Visitation rates by people should not increase;
- › If there is to be any interim access to the sand bank during construction of a breakwater then that access needs to be subject to stringent conditions under an Environmental Management Plan to minimise disturbance to birds at the site;
- › The roost site needs to be carefully monitored in the future to ensure that its integrity does not come under threat from unpredicted changes in sedimentation patterns etc from new marine structures including the Marine Precinct and any breakwater;



- » Much is already known about important, typical features of high tide roost sites for shorebirds and it is possible to engineer, or artificially create many of these features. This knowledge should be put to use if detrimental changes to the roost site do start to occur;
- » The cumulative consequences of the Port Access Corridor, the Marine Precinct and other developments in the area should be acknowledged through cooperative planning by all parties involved to protect bird habitat at the mouth Ross River. Appropriate management of access by people to this area should be put in place;
- » The community should be informed of the significance of the area for shorebirds with appropriate signage and community consultation, including a cooperative approach to continued monitoring of birdlife at the site using organisations such as Townsville Regional Bird Observation and Conservation Australia, Queensland Wader Study Group and Australasian Wader Studies Group; and
- » Recognition of the area for shorebirds should be made through its listing with the *Shorebird Site Network* under the *Asia Pacific Migratory Waterbird Strategy* as noted in the *Commonwealth Wildlife Conservation Plan for Migratory Shorebirds*.

7.6.2 Migratory mammals

The project area is located within a Species Conservation (Dugong Protection) Special Management Area (“Dugong Protection Area”). Marine megafauna survey findings occurred over a 7 month period from September 2008 to May 2009 and included boat based and aerial survey techniques. Available literature regarding seasonal use of Cleveland Bay by marine megafauna supported assessment of potential impacts of the TMPP on marine megafauna.

Marine mammal species identified on boat-based and aerial surveys include:

- » Dugong (*Dugong dugon*); N = 32
- » Australian snubfin dolphin (*Orcaella heinsohni*) N = 2 (adult and calf);
- » Indo-Pacific humpback dolphins (*Sousa chinensis*) N = 6;
- » Bottlenose dolphins (*Tursiops* sp.) N = 2; and
- » Unknown dolphin species N = 1.

N = maximum number of individuals recorded for each species in one sampling effort (aerial or boatbased)

None of the key marine fauna species surveyed were observed within the immediate footprint of the Precinct, although they were in close proximity (< 2 km). This was expected as the Precinct is a shallow tidal sand/mud flat which does not support preferential feeding or nesting habitat. Parra (2006) observed snubfin dolphins concentrating their activity around two areas northwest of Cape Pallarenda, and south around Townsville’s Port and Ross River mouth. Humpback dolphins show a similar distribution concentrating their activities mainly around the dredged channels and breakwaters close to the Port of Townsville, without a clear seasonal pattern.

It is expected that these key marine fauna species have a higher presence in areas of important habitat i.e. in close proximity to the port and seagrass meadows, though the requirement to transit between habitat patches needs to be acknowledged. As the whole bay is representative



of important habitat it is necessary to consider movements when assessing potential impacts on migratory species (Grech and Marsh, 2007).

Seagrass distribution in the bay is broadly similar between seasons and covers the majority of port limits with 14,338 and 14,004 ha mapped in the wet and dry season respectively (Rasheed and Taylor, 2008). This suggests that given the dependence of dugong and green turtles on seagrass as a resource, their presence in Cleveland Bay would remain relatively unchanged throughout the year.

With respect to species distribution recorded on this survey and in previous years, the construction of the TMPP is not expected to have a significant impact on the key marine megafauna species, either in terms of direct impacts to important habitat, or disruption of transit routes between patches. The operational phase of the Precinct may alter vessel traffic at the Ross River mouth, however, significant increases in traffic are not anticipated and an increased potential for vessel strike is not anticipated. Potential impacts and mitigation measures to marine mammals were assessed and are summarised in Section 3 and above.

As discussed in Section 7.5.3 the humpback whale is uncommon within the project area and is unlikely to be impacted.

The killer whale (*Orcinus orca*) is found in all oceans and most seas; however, they prefer cooler temperate and polar regions. Although sometimes spotted in deep water, coastal areas are generally preferred to pelagic environments. The killer whale is uncommon in the Project area and is not likely to be impacted by the proposed development.

7.6.3 Reptiles

The potential impact of the project on species of marine turtles is discussed in Section 7.5.2.

The estuarine crocodile (*Crocodylus porosus*) inhabits tidal estuaries, beaches and offshore islands, and freshwater swamps, rivers and lagoons as far south as Gladstone (and possibly further south in historical times). Suitable habitat for this species is present within the mouth of the Ross River and along the foreshore. This species was not detected during terrestrial fauna survey, nor was it recorded in the project area by previous surveys reviewed for this report but it is expected to occur in the Ross River. However, given the highly mobile nature of the species, and the very small area of habitat to be affected, it is considered to be very unlikely that this project will present any significant impact to the estuarine crocodile.

A sea snake was observed at the mouth of the Ross River; sea snakes are listed as other protected matter species in the EPBC Act. Given the highly mobile nature of sea snakes, and the very small area of habitat to be affected, it is considered to be very unlikely that this project will present any significant impact to sea snakes in the region.

7.6.4 Sharks

As detailed in Section 7.5.4 the whale shark (*Rhincodon typus*) has not previously been observed within the project area and is therefore unlikely to be impacted by the Project.