



PORT of TOWNSVILLE
Nexus North Queensland

Executive Summary

Townsville Marine Precinct Project
Environmental Impact Statement





Executive Summary

ES1 Introduction

The Port of Townsville (the Port) is a seaport located in Townsville, north Queensland. The Port is the third largest seaport in Queensland handling exports and imports including, but not limited to, mineral ores, fertiliser, sugar and motor vehicles. The Townsville region also supports a diverse marine fabrication industry and an expanding population base. The continued growth of residential development along Townsville's waterways has encroached upon existing industrial areas and restricted ability for expansion.

The proposed Townsville Marine Precinct Project (TMPP or the 'Precinct') seeks to provide a dedicated industrial marine precinct facility at the mouth of the Ross River in the Port of Townsville. The TMPP will address the existing and increasing demand for industrial marine facilities in the region by providing a sheltered, purpose-built precinct for the co-location of similar marine-dependant industries currently spread around Ross Creek and South Townsville.

The Precinct project has been discussed since the 1970's and in 2007 was identified as a key infrastructure component of the Townsville City-Port Strategic Plan (Department of Infrastructure, 2007). Ongoing expansion of this industry sector in Townsville provides a motivator for progression of the project to completion at this time. An additional catalyst for the development of the Precinct is the Department of Main Roads' Townsville Port Access Road (TPAR), which includes a low-level fixed bridge, 7 meters at Highest Astronomical Tide (HAT), across the Ross River. This bridge has a programmed date for closure of the last span of the bridge by 1 July 2011 and will impose height restricted access to existing upstream marine industrial facilities.

To facilitate construction of the dedicated marine precinct it is proposed to reclaim approximately 34 hectares of currently intertidal Strategic Port Land (SPL) located to the south-east of existing port operational facilities. Industrial facilities will then be constructed on this reclaimed land. A breakwater will be positioned offshore from the facility to protect it from incident wave activity (refer Figure ES1). In addition to land reclamation and breakwater construction, dredging activities will be required to realign the navigation channel and create an inner harbour and swing basin for the facility.

From the concept master plan and concept layout a Reference Design has been established for the TMPP. Desktop literature reviews, database searches and baseline field studies have been undertaken against this Reference Design to provide context to the assessment of impacts and identification of mitigation and management measures.

The Precinct Reference Design has been developed around a staged construction. The staged delivery allows for the progressive development of stages 2 and 3 of the Precinct as demand warrants, whilst allowing for the fast-tracked development of Stage 1 to cater for accommodation of required activities prior to the completion of the TPAR bridge construction. It is expected that Stage 2 will be completed by 30 June 2015 and stage 3 by December 2017.

The provision of a purpose-built facility with contemporary environmental controls will also provide an opportunity to remediate upstream lands that are vacated by industries relocating to the Precinct. These waterside sites would be proposed for redevelopment into mixed residential/commercial consistent with the Townsville City Plan.



ES2 Benefits of Undertaking the Project

Industrial land with direct marine access is currently only available in Townsville at the Port of Townsville or at the currently occupied sites on Ross River and Ross Creek. To meet market demand there is a pressing need for the expansion of Townsville's marine services industry sector by catering for marine activities including shipbuilding, ship repair and commercial fishing. With the development of the TPAR restricting access and continued business opportunities for industries currently located on the Ross River, the Precinct is considered essential to support industrial marine services in the Townsville region.

The existing Ross River marine industry is estimated to contribute \$113.0 million annually (\$2009, including direct and flow-on activity) in output to the regions economy and \$143.0 million annually to Queensland. During the construction phase it is estimated that the TMPP will result in the injection of approximately \$95.0 million into the region and \$109.1 million into the Queensland economy. The initial expenditure from the reclamation phase will primarily support construction and related professional service industries in the local and State economies, as well as the manufacturing sector through flow-on business activity.

The construction phase will also provide incomes in the form of wages and salaries that will encourage additional consumer expenditure and activity. Household income is estimated to increase by approximately \$30.6 million in the region over the course of the construction phase with approximately \$39.0 million additional income in Queensland. This expenditure is effectively all new expenditure in the economy that would not otherwise occur if the TMPP does not proceed.

The TMPP will eventually offer additional space for marine industry to expand and may offer an enhanced operating environment dependent on the final design and features. It is estimated that following the completion of the TMPP in 2018 there will be potential to grow the value added contribution of the existing Ross River marine sector by \$9.0 million annually (\$2009, including direct and flow-on activity) in the regional economy and \$11.1 million annually in the Queensland economy. This would represent an increase of the existing Ross River marine industry's economic value-add in the region by 21% and employment by 24%.

Not undertaking the TMPP would see the State of Queensland and the regional economy forego these economic benefits. As a result of the TPAR restricting access to the Ross River, failure to develop an alternative industrial marine services facility could also result in loss of industry from Townsville and the region with resultant local impacts in the South Townsville community.

ES3 Reference Design Configuration

The Precinct facility Reference Design, adopted for EIS studies, includes an offshore breakwater, an inner harbour, vessel moorings and land area developed from reclamation on which sheds and other infrastructure are to be located, a dedicated trawler fleet base, pile moorings for recreational vessels and an offshore breakwater to protect the swing basin, pile moorings and quayline of the Precinct from waves (refer Figure ES1). The offshore breakwater allows future port expansion to the north and east of the existing Eastern Reclaim Area while providing protection from the predominant wave direction and minimising impacts on the mudflats to the east of Ross River.

The Reference Design caters for industries that are consistent with the requirements identified through demand analysis and consultation.

ES4 Construction Assessments

The required design configuration of the breakwater and quayline walls to enable reclamation works has been determined and preliminary design criteria have been established. The estimated volume of reclamation and protective rockworks for the Precinct development reference design is 922,000 m³. This estimate takes into consideration the required dredge depths for the Precinct berths, swing basin and departure channel for safe operation and manoeuvring of the vessels that are expected to occupy the Precinct. It also considers an appropriate reference level for safe performance of the Precinct and breakwater over a 100 year life span in the face of potential climate change and sea level rise.

Reclamation for construction of the Precinct may utilise both mechanical (backhoe dredge) and hydraulic (cutter suction dredge) approaches to achieve the necessary reclamation works. Geotechnical investigations have determined that some of the material targeted for dredging is suitable for re-use for construction of the Precinct and some of the material is Potential Acid Sulfate Soils requiring either management for re-use or offshore disposal. Management opportunities to maximise re-use of this material have been considered and include treatment with lime and/or capping with clean fill. Further assessment of material prior to reclamation works may facilitate additional opportunities to re-use material for reclamation. Some material importation from terrestrial fill is expected to be required and this will be transported to site from quarries within the Townsville region by road.

The Precinct is expected to require piles, quaylines, jetties and vessel work berths. It is anticipated these will be constructed using a combination of land based and floating marine plant. Buildings required by the operators of the precinct facilities are expected to consist of maintenance sheds up to 6 storeys in height constructed predominantly from steel frame and metal cladding, and supported on raft or piled foundations.

Internal roads, pavements and hardstand areas are expected to be constructed from concrete or asphaltic pavement. Construction will involve levelling, importation and compaction of sub base material and placing and construction of the pavement wearing surface.

Construction of the Stage 1, Stage 2 and Stage 3 reclamation, protective rockworks and inner harbour navigation dredging will be conducted adjacent to but off the line of existing navigation channels and are not expected to cause interference to other operations. The construction methodologies have determined the most appropriate approach for minimising potential impact to the environment. This includes minimising need for ocean disposal of dredge spoil and addresses requirements for management of acid sulfate potential of onsite materials. Construction works will be undertaken in conformance with a Construction Management Plan prepared by the Developer and Contractor and specific to the construction procedures to be adopted for the works.

ES5 Operational Infrastructure Requirements

The operational usage of the Precinct is expected to include a combination of relocation and expansion of existing marine industries. Site services including power, water, sewerage, stormwater drainage and telecommunications will be provided to the proposed development. Detailed design of the Precinct will be required to refine the configuration to provide each industry lot within the Precinct appropriate access to site services and facilities.



There will be a need to manage the collection and containment of wastes derived from vessels berthed in the Precinct or moored in Ross River. This will include regulated wastes that will be generated by the Precinct users such as waste oils, chemical containers and sewage sludges. Regulated wastes require special disposal arrangements due to their hazardous or toxic nature. The likely wastes generated from the TMPP and recommendations for appropriate disposal are detailed in the EIS.

Existing access to the Project site is via Benwell Road, South Townville. It is expected that all road access to the Precinct for construction of Stage 1 will use this transport corridor. Following completion of the road link across the Ross River commercial and construction traffic access to the Precinct is expected to use the TPAR.

ES6 Environmental Values and Management of Impacts

ES6.1 Land Use, Landscape Character and Visual Amenity

The TMPP will be developed wholly within port limits and within the Ross River. The land based components of the project will be developed on reclaimed Strategic Port Land that has limited existing use other than for public recreation. The proposed works are consistent with the POTL Land Use Plan 1996. Redevelopment of vacated upstream industrial land will provide alternative opportunities for public access to the coast and other public facilities in addition to those being considered through the Precinct itself.

The project site is located within an area that has existing industrial development including both port and land based activities. The assessment of visual impacts to the landscape resulting from the TMPP construction is considered to be of moderate significance. While the ongoing industrial and port development diminishes the naturalness of the visual outlook in this sector of the visual landscape, this development also provides a unique landscape that combines the background of the mountains with the inter-tidal zone of Cleveland Bay and the Ross River.

ES6.2 Transport and Associated Infrastructure

The construction and operation of the Precinct and all other proposed developments in the vicinity of the Port of Townsville will result in an increase in traffic to and from this area of Townsville. The impact of traffic related directly to the construction and operation of the Precinct is not considered to be significant. Consideration does need to be given to upgrading a number of intersections in the area in future to enable continued acceptable access to the Precinct assuming an increased growth in background traffic in the area. This includes the Boundary Street / Saunders Street and Benwell Road / Archer Street intersections.

As Lot 773 is currently an intertidal marine sand/mud flat construction will not impact upon any existing infrastructure in this area. Infrastructure will need to be provided to the site across the Services Corridor. Detailed design of the Precinct will need to consider routing of this infrastructure within the footprint of the Precinct so as to not impact upon user access.

ES6.3 Climate and Climate Change

The Townsville region experiences a tropical climate with monsoonal rains and cyclones during summer months and dryer periods during winter months. The Precinct is not expected to contribute significantly to or impact upon predicted climate change for the region. Design of the Precinct

facilities will need to take into consideration opportunities to minimise risks to proposed infrastructure from potential sea level changes or increased frequency of severe storms.

ES6.4 Surface and Groundwater Resources

Water quality in the area has been monitored during periods that included heavy rainfall to achieve understanding across a range of conditions. Generally water from adjacent land flows through the Precinct site to the ocean. Groundwater impacts from the Marine Precinct during construction reclamation works may include an increase in levels and the direction of flow until an equilibrium is reached. Alteration of natural surface water flow directions may also occur if land built barriers are constructed. Contamination of the watertable is also possible if wastes are not managed appropriately. Design approaches for the TMPP and the TPAR should take these matters into consideration and develop appropriate construction and impact management strategies to address the potential cumulative impacts upon these systems.

ES6.5 Coastal Environment

The coastal processes in the vicinity of the Precinct comprise both onshore/offshore and longshore components, which are influenced by the proposed breakwater structures. However, the natural processes are only capable of moving sediment at 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. The projected impacts from the construction of the Precinct are restricted to an area around 500m south-east of the breakwater structures and the predicted effects on this area of coastline will not be compounded by parallel developments.

In addition, the existing Port development blocks any influence of coastal processes in the vicinity of the Precinct on the coastal areas north-west of the Port. The proposed Precinct will have no additional contributory effect causes of any existing coastal degradation to the west of the Port and hence will have no influence on the state of the beaches to the west in either the short or long term.

Hydrodynamic modelling shows little change in bed shear stresses for the proposed Precinct and navigation channels in the Ross River. With the development in place there is considered to be limited impacts on erosion or siltation in this region. Good flushing characteristics are maintained with only minor influences on existing circulation patterns.

The Ross River is highly regulated, with the Ross River Dam and several weirs in place. This provides a mitigated pattern of flood flows discharging from the Ross River past the Precinct into Cleveland Bay. Studies indicate that the combined influence of the TPAR and Precinct do not significantly affect the existing flood levels, with only minor impacts downstream of the Ross River Bridge (QDMR 2009). These predicted changes equate to only minor changes in erosional and depositional characteristics around the breakwater. These can be mitigated by design.

ES6.6 Water and Sediment Quality

Six months of monitoring across the project area and in reference areas, including during monsoonal rains, has provided an understanding of the sediment and water quality associated with the TMPP. The project area is recognised to be a naturally turbid system with suspended sediment loads being affected by wind and waves and influx of freshwater runoff during rainy periods. Nutrients in the area were also often observed elevated above guideline values. This suggests an input to the system from anthropogenic sources. Elevations were typically observed in monitoring



locations up river of the Precinct site and a change in these observed levels may occur following relocation of industries to new facilities in the Precinct.

That values were observed above guidelines indicates that site specific parameters should be developed for any monitoring program implemented to provide the ability to manage potential construction water quality impacts. Ongoing monitoring of turbidity and nutrient levels during construction, and for a period post construction, provides opportunity to detect potential water quality declines related to dredging and other construction activities. Early detection may enable active management of these impacts prior to their affecting any sensitive ecosystem receptors, including seagrass meadows.

Other anthropogenic inputs to the system are considered minor. Some elevations of metals were detected during the monitoring program and dredging activities could result in remobilisation of any sediment bound contaminants compounding any increased turbidity impacts. Potential acid sulfate soils were also detected at over 70% of sites examined. This may affect the ability to re-use some of the material targeted for dredging for reclamation and construction activities. Management strategies to mitigate against potential impacts to water and sediment quality from disturbance of acid generating material include ocean disposal or treatment of potential acid generating material.

Given the naturally turbid state of the system and the approach of using a mechanical or cutter suction dredge, impacts on turbidity from dredging activities are expected to be minimal. Management of decant waters from any reclamation activities can be achieved to limit stresses on any sensitive ecosystem receptors including offshore seagrass meadows. Historical data indicates that offshore disposal has little direct or indirect impact upon adjacent sensitive habitats, which have persisted in Cleveland Bay during decades of dredge material disposal. Ocean disposal methods for the TMPP are not expected to affect seagrass or other benthic communities adjacent to the ocean disposal ground.

ES6.7 Terrestrial Ecology and Avifauna

The Precinct Project 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 on the northern precinct site within the proposed TPAR Service Corridor. Species present in this location are well represented in adjacent environs on the east bank of the Ross River, which is to be preserved as part of a conservation area. This removal is, therefore, not expected to impact the regional ecosystem values of the Townsville area.

The eastern bank of the Ross River supports a diverse set of terrestrial assemblages including mangroves, sclerophyll woodland and minor areas of foredune vegetation. The areas investigated had a high level of weed incursion, with five species declared pests detected. This area is reserved for conservation purposes and no impacts to the site are expected from the TMPP.

The mud flat and sand bank seaward of the mangroves on the eastern bank of the Ross River provide a critically important wading and migratory bird roosting area of regional significance. This area is highly utilised by species protected under international conservation agreements and under the Nature Conservation Act and EPBC Act. Measures to mitigate against potential disturbance of this area to protect these birds from disturbance include disconnection of the proposed breakwater from land. This decreases the risk of the roosting site being accessed by terrestrial predatory pests



(like cats) or experiencing increased disturbance from people. Adopting identified mitigation strategies should provide for no long term impacts upon these species.

A number of potential temporary impacts related to construction activities, such as dust and sedimentation impacts, are able to be mitigated using approaches including wetting and sealing of roads. These are not expected to impact upon the avifauna.

ES6.8 Aquatic Ecology including Megafauna

The Precinct project area supports a range of intertidal and subtidal soft sediment marine communities. Crabs, snails and worms were commonly found and no marine pests were detected. Seagrasses were found offshore of the Precinct and mangroves were also common fringing the waterways. Various commercially and recreationally targeted fish and crab species were found throughout the study area and none of these were restricted to the Lot 773 habitat. During seven months of monitoring turtles, dugongs, rays, sea snakes and dolphins were observed but none of these were shown to be exclusively using the Precinct footprint. By adopting proposed management measures, these species are not expected to be impacted by the construction or operation of the Precinct.

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 the intertidal sand/mud flat on the western bank of the Ross River that forms the bulk of Lot 773 and the loss of seabed associated with the footprint of the breakwater. Temporary impacts are expected as a result of construction activities, including dredge plume impacts and noise impacts. Decline in species diversity, removal of species or reduced use of the area by mobile marine fauna may occur as a consequence of these potential impacts. Detailed assessment conducted under this study indicates losses associated with the TMPP are not expected to have flow on effects for the value of the marine ecosystems within the Townsville region.

The benthos that will be directly affected by construction of the Precinct is known to occur in other locations within the Townsville region including in other locations within the Port, Rowes Bay, Pallarenda and Magnetic Island. It is not considered to be a community or ecosystem of high value either in its own right or as a critical feeding ground for other, higher order, species. Removal of this type of seabed community for the TMPP is not expected to have a negative effect on the importance of the benthic marine habitats of the Townsville region. Nor is it anticipated to reduce biodiversity of the region significantly or affect the habitat utilisation patterns of marine megafauna within the area.

Development of the inner harbour of the Marine Precinct will provide future opportunity for some of the Lot 773 area to be recolonised with benthic taxa from adjacent environs like the mud flat. This may partially offset some of the habitat losses associated with direct removal. Creation of interstitial rocky shore habitat both intertidally and subtidally through provision of rock revetment walls of the Precinct and development of the breakwater may also partially offset some of the habitat losses associated with direct removal.

Megafauna other than rays, including turtles, dugong or dolphins, were not noted using Lot 773. Investigations indicated a lack of key food groups for these megafauna within the area, including, but not limited to, seagrasses. Seagrasses were found offshore of the mouth of Ross River, a finding consistent with that reported by Rasheed and Taylor (2008). There is potential for degraded water quality to impact these offshore meadows particularly if dredging activities for the TPAP,



Berth 12 and Precinct coincide and produce a larger or more persistent plume than anticipated by any single activity. Mitigation and management strategies to address identified potential direct and indirect impacts include approaches for managing water quality impacts on seagrasses.

ES6.9 Air Quality and Greenhouse Gas Assessment

Modelling of air quality data of relevance to the TMPP indicates that construction related dust would not significantly impact on the amenity of sensitive receivers provided appropriate management procedures are implemented. These include, but are not limited to, watering of all exposed surfaces and sealing of access roads. Operational activities expected at the Precinct, including abrasive blasting and fuel storage, are not expected to have a significant impact on any nearby sensitive receivers. Developments on the site inconsistent with the Reference Design would need to go through individual assessment and planning approval on a case-by-case basis.

Greenhouse gas (GHG) sources from the existing site prior to development of the Precinct are primarily from dredging operations carried out by POTL for maintenance of the Ross River channel. Many of the facilities that will be located in the Precinct once completed are existing facilities currently located upstream of the Ross River. These facilities are, therefore, already contributing GHG emissions through their existing operations and, consequently, operational impacts on GHG emissions are expected to be minimal. Construction emissions may equate to approximately 0.01% of the annual emission profile for Queensland, however, mitigation opportunities to decrease this contribution include sourcing materials from nearby locations and maximising re-use potential.

ES6.10 Noise and Vibration Impacts

In situ monitoring and modelling of data have demonstrated that construction related noise and vibration from the TMPP will not significantly impact on the amenity of sensitive receivers provided appropriate management procedures are implemented. This includes adopting appropriate work hours for pile driving and management of potential for sleep disturbance of trawler occupants during staged construction. Potential for vibration impacts on marine fauna can be mitigated by using partial strikes as warning signals of pile driving activities.

ES6.11 Waste Management

The most significant wastes generated during the construction phase of the TMPP are likely to be excess spoil from earthworks and foundations, excess concrete and building material waste. Likely operational wastes include those directly associated with shipping and boating (e.g. wastes produced onboard) and those associated with the industrial operations of the marina (e.g. chemical wastes). Reuse of excess spoil, appropriate handling and discarding/recycling of solid and liquid wastes and other management options, including adoption of a waste minimisation strategy, is provided in the EIS.

ES6.12 Cultural Heritage

Indigenous and European heritage studies have been conducted for the footprint of the TMPP. Based on the available geomorphological, historical and environmental evidence the overall prehistoric archaeological potential of the development area is considered to be negligible. The project area does, however have significant Aboriginal cultural heritage values and is linked to adjacent European heritage sites of importance. Although direct impacts from the proposed development are unlikely there is potential for indirect impacts to identified places of cultural



importance. The environmental harm to Indigenous cultural heritage values in the vicinity of the project is to be managed under the cultural heritage management plan developed specifically for the project in consultation with relevant parties.

ES6.13 Health and Safety

The main community values for public health and safety that may be affected by the construction, operations and decommissioning of the TMPP are air quality and noise levels. The implementation of workplace health and safety procedures and the management plans, which are identified in the EIS, will minimise the potential risks to acceptable levels.

ES6.14 Cumulative Impacts

The TMPP is not considered to make a significant contribution to cumulative impacts associated with wider strategic policy such as greenhouse gas emissions, regional resource consumption and waste disposal. The ability to upgrade some operational industrial facilities through relocation to the new Precinct in fact provides opportunity to achieve some reductions in existing cumulative impacts, such as to GHG emission or water quality impacts. A number of potential cumulative impacts have, however, been identified. The most significant area where cumulative impacts are likely from concurrent or successive project development within the port precinct in Townsville relate to the marine environment. The TPAR construction is expected to commence prior to the Precinct construction and there may be overlap in construction activities. These projects, and others that may undertake dredging and disposal activities and in water construction need to consider the potential cumulative impacts identified in this EIS and adopt appropriate mitigation strategies.

ES7 Social Values and Management of Impacts

The population and demographics of South Townsville is not expected to change significantly as a result of the construction or operation phases of the TMPP. The marine industries and businesses operating up river from the proposed TPAR that become untenable as a result of the restricted water access to the Ross River are expected to relocate to the TMPP. Consequently the TMPP is viewed positively by these industries and businesses. However, concern has been registered relating to the potential negative impacts to business resulting from development timing and relocation arrangements.

If the existing marine businesses do not relocate and are forced to close there is expected to be a flow on effect into South Townsville in relation to essential services such as schools and retail providers. A decrease in demand could lead to closure or relocation out of the suburb, to the detriment of the people currently using those services, especially the elderly.

Staged development of the Precinct provides opportunity to meet affected industry space needs prior to bridge closure impacting upon those businesses. The resultant construction workforce and employment opportunities in the TMPP will provide flow-on benefits to South Townsville, rather than negative impacts.

The other major concern beyond relocation timing for the Precinct and impacts to business relates to the development of the beach adjacent to Benwell Road and the perceived loss of public access to the coast and potential for environmental harm from the development. If redevelopment of vacated upstream land occurs, it is envisaged that it will be required to meet the planning

objectives for the South Townsville Precinct as identified in the Townsville City Plan. Specific recreation and public access opportunities are planned in the redeveloped upstream lands (e.g. boardwalks, fishing or viewing platforms, food outlets) that should enhance, rather than detract from, the character of the suburb and these will provide alternative recreation opportunities to those that currently exist for Lot 773.

Construction of the Precinct will not affect the existing use of Ross River by recreational boat users. It may in fact have a small beneficial effect by extending the calm water environment further seaward once the TMPP is constructed. Configuration of the Precinct, including the breakwater footprint, has considered the potential for environmental impact and been optimised to mitigate against potential impacts.

ES8 Economic Impacts

It is estimated that the TMPP will result in the injection of approximately \$95.0 million into the regional economy and \$109.1 million into the Queensland economy during the construction phase of the project. The operational phase of the development is predicted to contribute marine industry worth \$43.3 million in Gross Regional Product to the regional economy per year (in \$2009) and directly or indirectly account for preservation of 504 jobs. Additionally, there is potential for further expansion following the completion of Stage 3 with the potential to grow to an additional contribution of \$6.4 million to the regional economy per year and account for an additional 121 direct and indirect jobs. Whilst a significant portion of this business is expected to be redirected from elsewhere in Queensland, some may represent new business to the State, or business that may have otherwise been lost to other States or overseas.

The TMPP has the potential to provide better quality facilities for existing marine businesses if they relocate from the Ross River. Of the identified benefits of the new facility the potential to develop new services/access new markets has been assessed as potentially of high impact level.

It is unlikely that there would be a significant change in the level of Government expenditure due to the development during the construction phase. However, the loss of all the existing marine industry on Ross River would displace an estimated 504 direct and indirect FTE jobs.

The site on which the TMPP will be established has little alternative economic uses. The opportunity cost of proceeding with the project is represented by the ecosystems services of the area, valued as approximately \$757,960 (in \$2009), and any social values of the area that may be lost (refer ES7). Current cost estimates for relocating a number of upstream industries to equivalent facilities within the Precinct, summed across all of these industries, totalled approximately \$AUD43 million.

There are three main opportunity costs identified in not proceeding with the TMPP given that the TPAR bridge will proceed. These are:

- An estimated \$113.0 million per annum (\$2009) in direct and indirect output from the existing Ross River marine industry. This would be the immediate opportunity cost of not proceeding with the TMPP and relocating the existing Ross River marine industry;
- An estimated up to \$140.8 million per annum (\$2009) in direct and indirect output from the TMPP once all three stages are completed (post 2018-19). This would be the long term annual opportunity cost of not proceeding with TMPP; and



- ▶ An estimated one-off \$128.7 million (\$2009) over 9 years (2009-2018) in direct and indirect output from the construction activities associated with the development of the TMPP and upstream residential redevelopment.

Key mitigatory strategies for the economic impacts resulting from the development of the TMPP relate to the management of impacts on the existing Ross River marine industry. POTL is in continued negotiations and planning for strategies to manage the impact on the Ross River marine industry.

ES9 Hazard and Risk Assessment

A detailed Hazard and Risk assessment has identified the nature and scale of hazards that may occur during the design and construction, operation and decommissioning of the Project. High risks identified for the TMPP include dredging impacts, strain on existing infrastructure, member/s of public entering the site intentionally to cause harm, increased traffic, disturbance of potential acid sulfate soils, vessel collision and tropical cyclone related hazards. Opportunities to manage these potential risks, and others identified, include development of a suitable Dredging Management Plan, liaison with local government regarding infrastructure upgrade requirements, development of an acid sulfate soil management plan and an Emergency Management Plan to deal with situations related to intruders, vessel collision and tropical cyclones.

Based on the assessments conducted it can be concluded that there are no hazards which have offsite impacts. The controls identified for the TMPP construction and operation will adequately safeguard against safety, asset and environmental consequences from hazards associated with the TMPP.

ES10 Matters of National Environmental Significance

ES10.1 Impacts on World Heritage Properties: Habitat Loss of the GBRWHA

The operational areas of the port are excluded from the Great Barrier Reef Marine Park, however, the World Heritage Area 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. 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.

ES10.2 Impacts on National Heritage Places

There are no places of national heritage significance within the project site or the immediate adjoining area. Nine places of state or regional heritage significance are adjacent to the project site but will not be negatively impacted by the TMPP.



ES10.3 Wetlands of International Importance

The Bowling Green Bay Ramsar wetland area is located approximately 10 km southeast of Townsville. Because of the considerable distance from the Ramsar wetland to the project area and the very localised nature of potential impacts from the TMPP it is not considered possible that the TMPP will impact this area.

ES10.4 Listed Threatened Species and Communities and Migratory Species

Avifauna

Five threatened terrestrial bird species listed as protected matters under the EPBC Act were identified as potentially occurring within the project area. However, none of these species were identified during the field survey. The TMPP is not expected to impact upon these listed threatened species.

Wading and migratory shorebirds are known to use the project area and the adjacent environs. The regionally important habitat for these species is considered to be adjacent to the footprint of the project area being the sand and mud banks to the east of Lot 773. This area is highly utilised by species protected under international conservation agreements and under the Nature Conservation Act and EPBC Act. Measures to mitigate against potential disturbance of the environs adjacent to Lot 773 to protect these species from disturbance include disconnection of the proposed breakwater from land. This decreases the risk of the roosting area being accessed by terrestrial predatory pest species or experiencing increased visitation, and hence disturbance, of the area by people. Adopting identified mitigation strategies should provide for no long term impacts upon these species.

Turtles and Reptiles

Terrestrial reptiles are not expected to be impacted by the TMPP. Studies have clearly shown that the habitat is unlikely to support Listed Threatened species and the identified Migratory species are highly mobile and are not likely to be effected by removal of the terrestrial habitat associated with this project.

The project area is not considered to be critical habitat for marine reptiles, however, it adjoins Cleveland Bay which is recognised as an important foraging habitat for green turtles. Potential direct and indirect impacts to marine turtles resulting from the TMPP include vessel strike, lighting concerns and decreased water quality. Mitigation measures against these potential impacts have been identified and are provided under this EIS. The TMPP is not expected to impact upon turtles in the Townsville region if these measures are adopted.

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. Although the project site does contain habitat appropriate for these species it is unlikely to serve as an important resource and it is considered highly unlikely that this project will impact on this species.

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. Similarly, killer whales are uncommon in the project area and unlikely to be impacted by the project.

Dugong, dolphin and turtle prevalence and habitat utilisation studies have been compared to previously collected data to provide an understanding of the spatial and temporal use of the Precinct area by migratory marine mammals. Based on the findings of that assessment the construction of the TMPP is not expected to impact 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 likely. Potential impacts and mitigation measures to marine mammals were assessed and are summarise above.

Sharks

The whale shark has been identified as potentially occurring within the region although no records of presence have been recorded. The project is not predicted to affect this species as they are widespread and migratory and the inshore location of the TMPP is not considered favourable habitat for this species.

ES11 Environmental Management Measures

An environmental management plan has been developed for the Project, which outlines specific actions and measures, designed to mitigate potential impacts identified through the environmental assessment process. The environmental management plan is implemented in addition to existing management policies and regulations. Several detailed monitoring studies are also proposed to be undertaken in order to assess potential impact and to provide an indication of the longer-term impacts associated with the Project and recovery of impacted areas. These studies will include (but are not limited to):

- ▶ Marine Water Quality Monitoring
 - Suspended sediment concentrations as part of a turbidity monitoring program;
 - At sensitive habitats for compliance to site specific water quality objectives;
 - Reclamation tailwater decant water quality;
 - Potential impacts of dredging on seagrass communities; and
 - The construction operations reporting incidents likely to cause environmental harm to the project location and surrounding areas.
- ▶ Marine Habitats and Megafauna
 - Monitor the health of adjacent seagrass communities as indicators of water quality impacts and to act as an indicator for potential impacts to marine megafauna;
 - Temporal and spatial persistence of meadows to existing baseline data should be assessed; and
 - Consideration be given to ongoing marine megafauna monitoring to assess any influence on habitat utilisation of threatened and listed species. If marine fauna are sighted during dredging activities the dredge should avoid moving into that area if capture or strike is likely.
- ▶ Noise
 - Log any received complaints regarding noise; and



- Upon receipt of a noise complaint where required undertake monitoring within 3 to 5 working days. If exceedances are detected, the source should be investigated and equipment and operational procedures reviewed to identify means of reducing noise to acceptable levels.
- ▶ Air Quality
 - Regularly undertake visual inspections of working areas and access tracks to monitor dust levels;
 - Note visible observations of dust moving off-site; especially during dry and/or windy weather;
 - Conduct daily audit of mitigation equipment and dryness of exposed surfaces;
 - Use dust deposition gauges in front of representative residences if construction activity is likely to be within 500 m for more than 30 days (considered unlikely); and.
 - Make available a free-call number for public complaints and information.

The principal impacts of concern associated with the proposed works are in relation to marine fauna and flora and water quality. Effective mechanisms are in place to manage potential impacts on marine fauna and the studies identified above will assist in the monitoring of predicted impacts on marine flora. However, the most effective mitigation measure identified to manage potential impacts is to minimise the period of works.

ES12 Conclusions

The TMPP involves the construction of an industrial marine precinct on intertidal land to the south-east of existing Port operations. This EIA study has investigated potential environmental impacts, including social, economic and cultural impacts that could result from the construction and operation of the Precinct. Consideration has been given to the need and alternatives of the project. Desktop literature reviews, database searches and baseline field studies have been undertaken to provide context to the assessment of impacts and identification of mitigation and management measures.

Within this study construction and operational impacts, including potential cumulative impacts, have been identified and mitigation and management strategies described for a range of environmental values including nature conservation, social, economic and cultural values.

No impacts considered to be significant were identified that could not be ameliorated. Some habitat losses are expected, however, these can be offset. Under the mitigation strategies identified for each of the environmental values assessed the TMPP is not expected to have any significant long term effects on the regional or local environmental values of the Townsville region or Ross River environ. Importantly the TMPP is not predicted to impact upon protected species including dolphins, dugongs, turtles and birds. Economic benefits to the region accrue if the project proceeds and the project mitigates potentially significant negative impact of other development in the region.

