Ports North

VOLUME 1

Draft : Environmental Impact Statement

Project Technical Chapters Synopsis

Background

As detailed in the Executive Summary, Ports North has undertaken a comprehensive EIS in accordance with the Terms of Reference for the Cairns Shipping Development Project (the project), based on the shortlisted marine disposal site, Option 1A. This option is included in the Project Description in **Chapter A4** and is the basis of the technical chapters (**Part B**) and proposed Management Plans (**Part C**) in the EIS as summarised in this section.

There are a number of emerging issues related to port development and dredging that could lead to a change in the assessment processes for capital dredging. A number of key environmental reports, port project announcements, and environmental and cost considerations could change the options available for assessment for capital dredging disposal. Following completion of the draft EIS and prior to it's public release, the Federal Minister for the Environment announced in November 2014 that legislation would be put in place using the Great Barrier Reef Marine Park Act to ban all capital dredging disposal into the GBRMP.

As a consequence of this announcement, the project's nominated disposal option (Option 1A) could, in the future, be no longer available. The technical chapters detailing the impacts and assessment of Option 1A were completed prior to the announcement of the proposed change to legislation on capital dredging disposal in the GBRMP and have been retained in this EIS for completeness.

Part B of the EIS – Technical Chapters

Part B of the EIS has 18 chapters covering substantive issues outlined by the TOR and cross referencing where appropriate the requirements of the EIS Guidelines. Each chapter consists of standard headings and includes a description of the baseline for that issue, an assessment of impacts and application of mitigation to reduce impact levels and any residual impacts. All of these chapters are based on completing the project in accordance with the project description based on marine disposal.

Each chapter also has an assessment table at its conclusion which summarises the key impact issues, impact risk level, application of mitigation measures and the resultant residual risk.

Study Area

The EIS refers to the project area and study areas. The areas in the immediate footprint of the project, including the shipping channel and wharf upgrades is known as the 'project area'. The broader area beyond the immediate development footprint is known as the 'study area'.

The project area is described in detail in **A1, Project Introduction** and **A4, Project Description**.

Generally, the local study area encompasses:

- The township of Cairns in regard to consideration of socio-economic aspects of the project
- Surrounding land uses and residents (e.g. boat owners in Trinity Inlet, nearby accommodation) which may experience impacts to amenity, air quality or noise levels
- The marine environment of Trinity Inlet, Trinity Bay and surrounding waters including:
  - All waters of Trinity Bay
  - The tidal waters of Trinity Inlet, including landward areas to the boundary of the Fish Habitat Area
  - Double Island
  - The coastline and near shore waters of Cairns' Northern Beaches including the mouth of the Barron River
  - Mission Bay
  - The coastline extending to Cape Grafton.

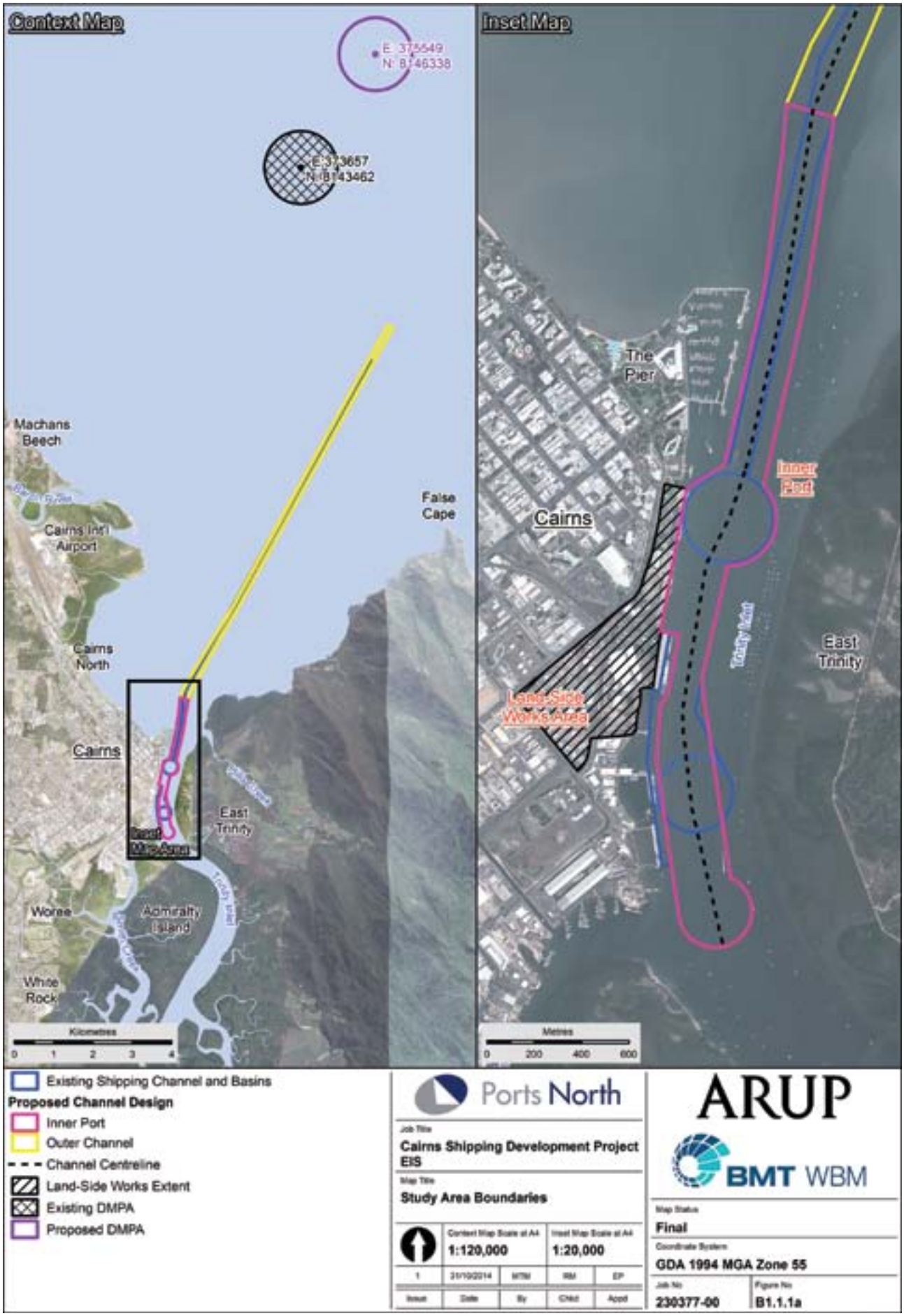
For some assessments, in particular nature conservation and cumulative impacts chapters, consideration of a wider study area was required.

The 'Whole of World Heritage Area' scale has been defined as the GBRWHA, including both near shore and offshore areas of the property.

The 'Regional Study Area' scale is defined as Wet Tropics region of the GBRWHA, extending north of Cairns to the Bloomfield River and south to Halifax Bay (to the south of Lucinda).

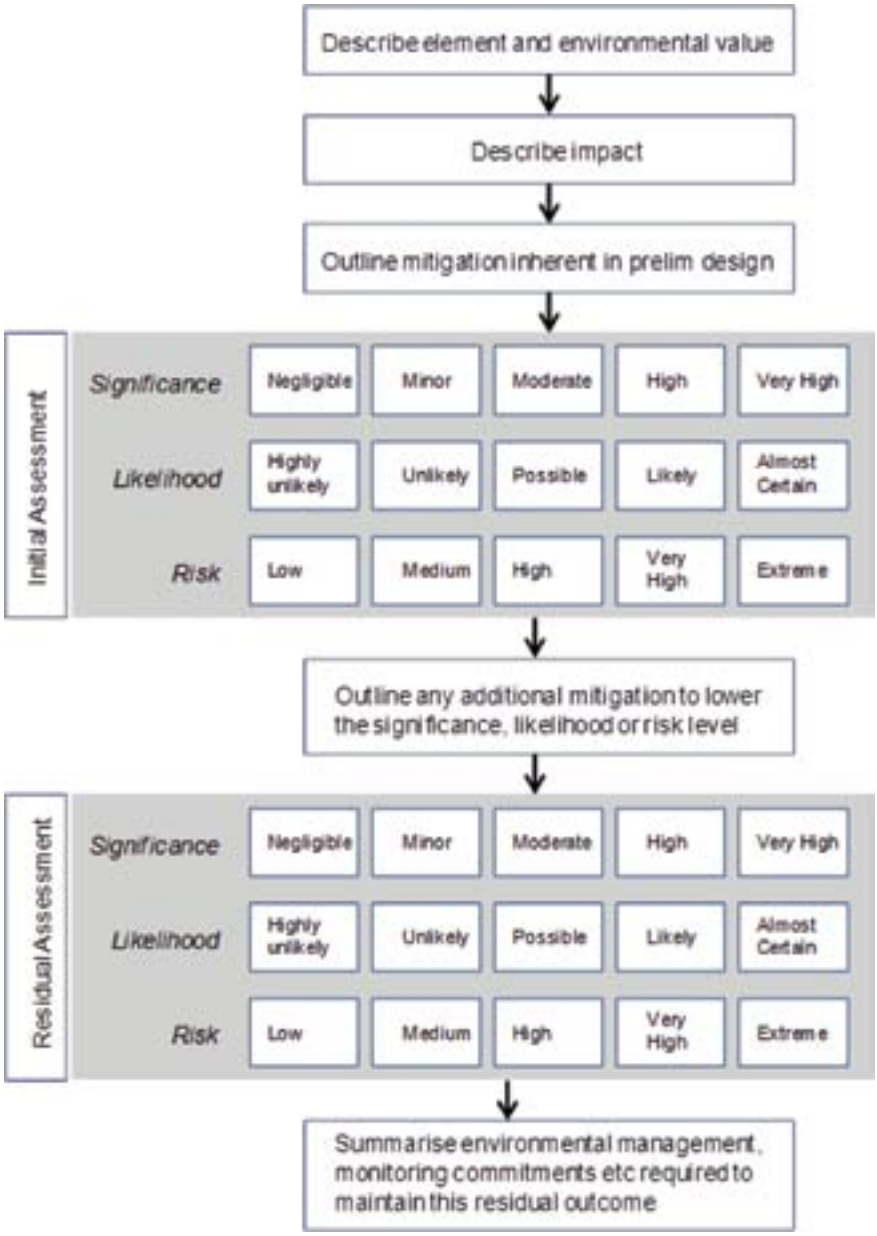
The study area may vary dependent on the technical investigation being undertaken. The study area for each technical discipline is defined in methodology section of the relevant chapter.

Figure ES-9 Project Area and Study Area.



The EIS has used a consistent approach to assessing impacts as illustrated in **Figure ES-10 EIS Methodology**.

Figure ES-10 EIS Methodology.



The EIS adopts a risk-based approach to assessing the significance of identified impacts, which considers the geographical extent, duration of the impact, sensitivity of the receiving environment to the impact and the likelihood of it occurring. Each technical assessment provided in **Part B Technical Chapters** utilises the same core assessment tables when defining impacts and considering the risk level of the impact. At the end of each chapter a summary table of impacts of mitigation measures is provided.

A risk rating has been generated for the key impacts to environmental values and is summarised at the end of each technical chapter. This has been done by assessing significance versus likelihood within a risk matrix with up to six levels of risk (Negligible, Low, Medium, High, Very High or Extreme) possible. In developing a risk rating for impacts, the matrix in **Table ES-2** has been used.

Methodologies and risk matrixes used in other published EIS's or by state agencies were considered when determining the approach this EIS would use in assessing impact significance. The approach adopted by this EIS is consistent with a number of previously published EIS's and with other methodologies used for assessing marine and land-based impacts.

Table ES-2 Risk Matrix

Likelihood	Significance				
	Negligible	**Minor**	**Moderate**	**High**	**Very High**
Highly Unlikely/ Rare	Negligible	Negligible	Low	Medium	High
Unlikely	Negligible	Low	Low	Medium	High
Possible	Negligible	Low	Medium	Medium	High
Likely	Negligible	Medium	Medium	High	Extreme
Almost Certain	Low	Medium	High	Extreme	Extreme

Table ES-3 Risk Rating Legend

Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on a Matter of National or State Environmental Significance
High Risk	An issue requiring further detailed investigation and planning to manage and reduce risk; likely to result in a 'significant' impact on a Matter of National or State Environmental Significance
Medium Risk	An issue requiring project specific controls and procedures to manage
Low Risk	Manageable by standard mitigation and similar operating procedures
Negligible Risk	No additional management required

Overall Key Findings

B1 Key Findings Relevant to Land

Chapter B1 address land and associated planning matters relevant to the wharf and services upgrade components of the project. The chapter considers:

- Land use
- Land tenure
- Terrestrial topography, geology and soils
- Terrestrial land contamination/ASS.

Baseline Findings

The chapter describes the current land use and associated planning matters relevant to both the project and the land use in the project area. It also describes the land tenure around the site of the project. The chapter describes the areas topography, geology and soils and prescribes its status with regard to terrestrial land contamination and ASS.

Impact Findings (including Mitigation)

The key findings of the land assessment are:

- The project is compatible with local planning provisions
- The project is compatible with planned development of the port and surrounding uses
- There will be some temporary construction stage minor impacts
- There will be a positive impact during operation for port and marine uses
- There is no expected significant adverse impact on land and planning matters.

B2 Key Findings Relevant to Nature Conservation Areas

Baseline Findings

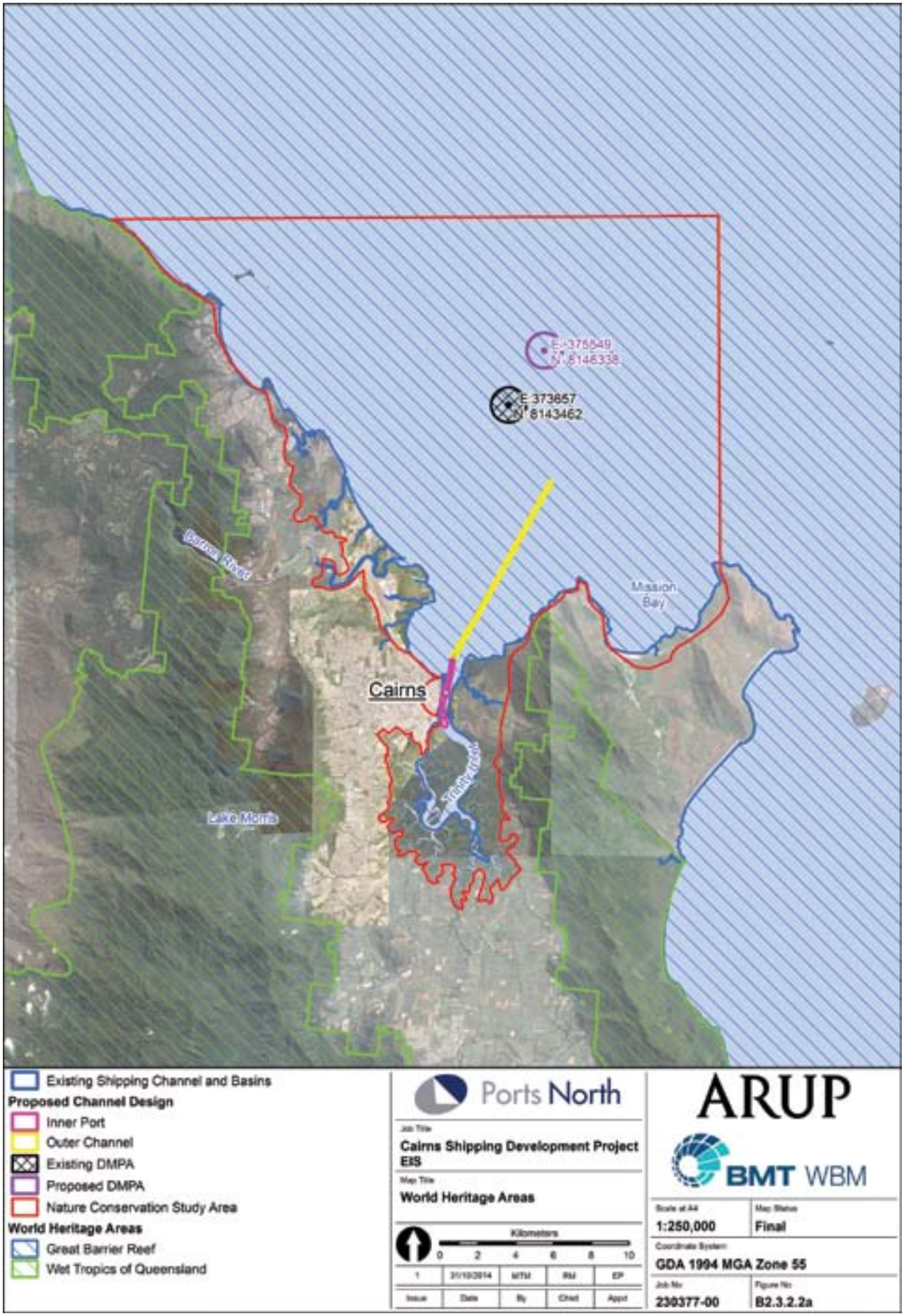
The GBRWHA covers the study area and comprises approximately 0.08 percent of the total area of the GBRWHA. The Wet Tropics World Heritage Area (WTWHA) also occurs in the region, though is not directly or indirectly impacted by the project so is not considered further in this chapter.

The Port's facilities and existing channels are located outside the GBRMP but the existing and preferred DMPA sites are located within it. The ***Great Barrier Reef Marine Park Act 1975*** (GBRMP Act) provides for the establishment, control, care and development of the GBRMP. The GBRMPA is responsible for the management of the GBRMP. GBRMPA issued a Marine Park Permit in 2010 to Ports North which allows for the placement of up to a maximum of 6.6 (wet load) million cubic metres (m^3) of dredge material associated with maintenance dredging at Cairns port within the existing DMPA.

The proposed DMPA is also located within the Commonwealth Marine Park which is considered a MNES protected under the EPBC Act.

The Trinity Inlet is designated as a Fish Habitat Area (FHA) under the ***Fisheries Act 1994*** (Qld) and it lies within the study area. During declaration of the Trinity Inlet FHA, an exclusion and buffer distance to allow for future expansion of the entrance channel was included. Preliminary phases of this project have been informed by this constraint and the channel design adjusted to avoid and minimise changes to the FHA.

Figure ES-12 World Heritage Areas (as defined by the Commonwealth Protected Matters Search Tool mapping layers)



Impact Findings (including Mitigation)

- The project will result in no significant impacts on GBRWHA and GBR Marine Park at regional or local scale
- The project will result in no significant impacts in the Commonwealth Marine Area
- There will be a medium residual local impact to benthic habitats in dredge footprint and DMPA. While these areas will recover progressively after disturbance, full recovery of the benthic environment is in time periods between six-24 months
- There will be a low to medium residual risk with respect to temporary water quality impacts to recovering seagrass areas in Trinity Bay
- The project will result in no significant impacts to wetland values within Trinity Inlet at the local scale
- The project will result in no significant impact to the FHA. The boundaries of the FHA will require minor amendment to accommodate the extension of the channel and a proposed swap of currently undesignated marine areas will seek to achieve a no-net loss of FHA in Trinity Bay and Inlet
- The project will result in minor impacts to the State Marine Park, noting that its boundaries will require minor amendment to accommodate the extension of the channel.

B3 Key Findings Relevant to Coastal Processes

Chapter B3 addresses physical hydrodynamic and sedimentation processes, including the hydrodynamic factors, particularly waves and currents, sediment transport forced by those factors and the resulting seabed and coastal morphology within the littoral and marine zone of Trinity Bay and Inlet at and adjacent to the project area.

Data Collection

Data and information have been sourced for this chapter from existing publications and databases as referenced and from field measurements undertaken by the proponent specifically in support of the investigations. These include:

- Hydrographic Survey
- Wind and Meteorological Data
- Water Level, Salinity and Temperature Data
- Current and Wave Data
- Turbidity and Total Suspended Solids Data
- Sediment Data
- Barron River Discharge Data

Numerical Modelling

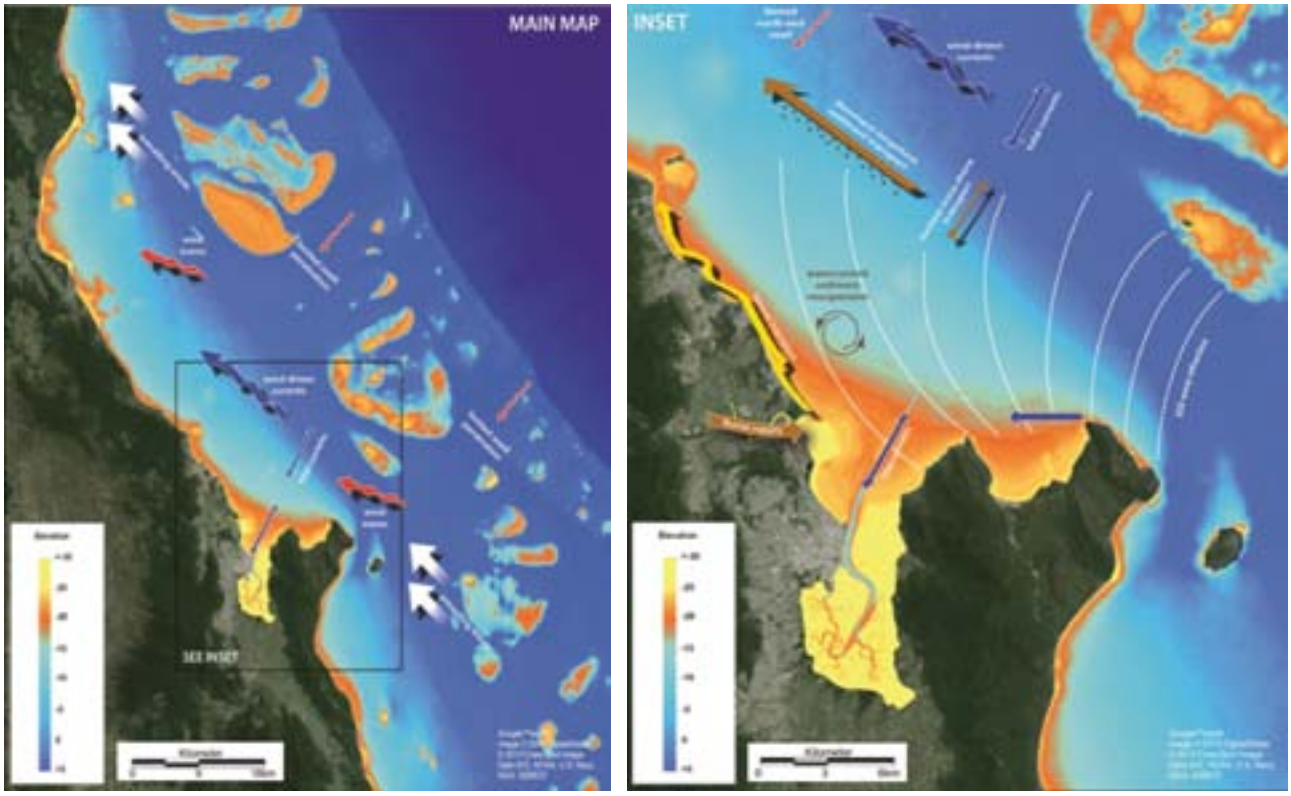
The measured data describing the hydrodynamics of the marine environment within Trinity Bay and Inlet have been supported and enhanced using validated numerical models. These models facilitate description of complex process interactions, including those not able to be measured directly for practical and logistical reasons. They were the key method used to assess the project impacts.

A technical modelling report is contained at **Appendix D** of the EIS which underpins the impact assessments presented for the EIS in this chapter (B3 Coastal Processes) as well as for **Chapter B7, Marine Ecology** and **Chapter B5, Marine Water Quality**. The calibration and validation processes used for the model and other detailed information about model outputs are contained in **Appendix D**, noting that the modelling used in the EIS has been independently peer reviewed and assessed as fully consistent with the GBRMPA's Hydrodynamic Modelling Guidelines.

Baseline Findings

A conceptual model of coastal processes in the study area is shown in **Figure ES-13**.

Figure ES-13 Conceptual Model of Coastal Processes



In accordance with this model, the baseline sections of the chapter contain an overview of the following coastal processes:

Hydrodynamics including:

- Water levels relating to tides and storm surges
- Wave climate
- Currents within the bay, generated predominantly by tidal and wind forcing
- Freshwater inflows from the Barron River and Trinity Inlet
- Tidal flows at the Barron River and Trinity Inlet
- Key influencing factors of cyclones and other severe weather events.

Marine sedimentation processes, including:

- Fluvial sediment supply from the rivers and streams, which may be fine wash load that extends out into the bay before settling to the seabed, or coarser sand that deposits near the stream mouths and which may be re-distributed along the coast by wave/currents action
- Trinity Bay seabed sediment re-suspension, transport and deposition, potentially changing the seabed morphology or sediment composition and/or infilling dredged areas.

Shoreline sedimentation processes, including

- Alongshore sand transport at the beach shorelines, driven by wave breaking
- Beach erosion and accretion along the adjacent beach system, including the northern beaches
- Factors affecting and required for beach stability.

Impact Findings (including Mitigation)

The various coastal processes assessments have shown that project impacts will not be of significance with respect to the adjacent shoreline areas. The impacts predicted using the calibrated numerical models show relatively small zones of influence, typically within the immediate vicinity of the shipping channel and proposed DMPA.

The wave propagation modelling for this investigation indicates there would be no changes in wave heights of any significance at adjacent shoreline areas associated with the proposed channel development. Under typical swell and sea state conditions, the absolute wave height levels along the adjacent shorelines within Trinity Bay are not affected.

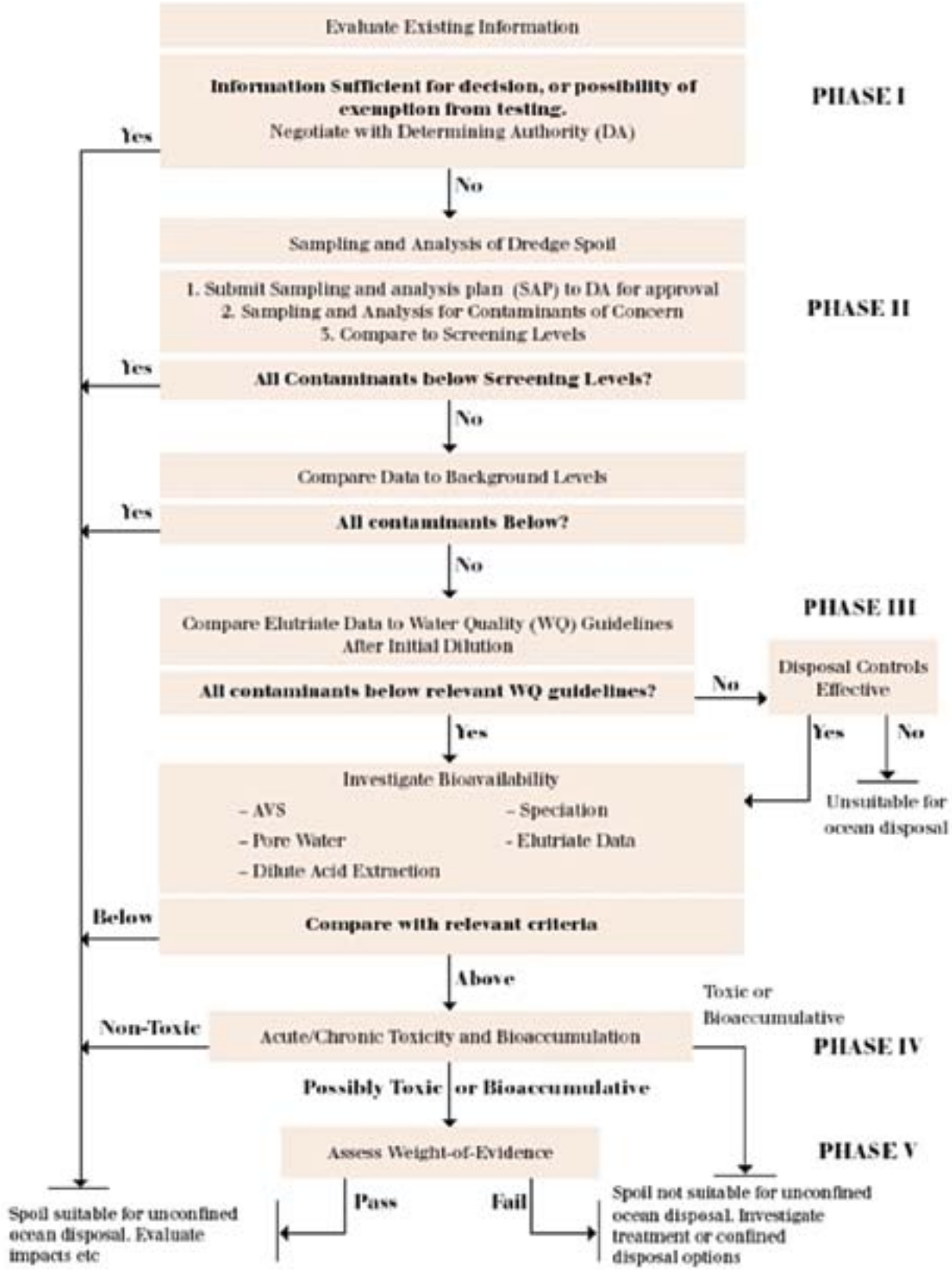
With respect to potential impacts to the Northern Beaches, the findings of the DMPA dispersion assessments are consistent with previous studies (e.g. Carter et al., 2002) that suggest no evidence of placed dredge material reaching far field shoreline locations. The proposed DMPA location is shown to be a highly retentive site under both prevailing and “worst case” conditions.

Based on the assessments, all risks to coastal processes and dredging-related water quality identified can be reduced to a low or medium residual risk through the application of controls inherent of the project design.

B4 Key Findings relevant to Marine Sediment Quality

The NAGD sets out the approach to determine the suitability of dredge material for unconfined ocean placement. NAGD provides a decision-tree approach for assessing potential contaminants, comprised of five phases as summarised in **Figure ES-14**.

Figure ES-14 NAGD Tiered Assessment Approach



Chapter B4 includes an assessment of dredge sediment quality, in accordance with Phase I of the NAGD assessment framework. Furthermore, a Phase II assessment of the current contamination status of the Port of Cairns sediments was undertaken. The Phase II process included:

- Preparation and submission of a Sampling and Analysis Plan (SAP) to the Determining Authority (in this case the GBRMPA)
- Sampling and Analysis for Contaminants of Concern (COCs) and Contaminants of Potential Concern (COPCs)
- Comparison of sediment data against screening levels and background levels.

Baseline Findings

The findings of the Phase II sediment testing is detailed in Appendix D2, Sediment Quality Report, and summarised in this chapter of the EIS.

This data supports findings from historic data which indicated that outer channel and inner port sediments were typically characterised by a large proportion of silts and clays and a low proportion of sands.

A combination of previous sediment quality data as well as additional laboratory analysis in accordance with the approved SAP as part of the Phase II sediment testing was undertaken to support the EIS.

Preliminary ASS investigations of the proposed dredge material was also undertaken by Golder (2012 and 2013 - Appendix D1), with further ASS testing also undertaken as part of Phase II assessments.

Impact Findings (including Mitigation)

The Phase II assessment concluded sediments are uncontaminated and are suitable for unconfined ocean disposal as per NAGD. As part of the future Sea Dumping Application and Queensland Government approvals for the dredging and dredge material disposal, the suitability of dredge material for unconfined ocean disposal will be confirmed as part of the approvals process.

Changes in pH due to disturbance and exposure of ASS to the atmosphere can lead to water quality impacts. PPASS is expected to be present in the very soft, to soft clay, and silt materials, which represent approximately 3.6M m^3 of the total 4.4M m^3 dredge volume.

PASS material (that is not self-neutralising) detected in sediments at depths below one metre will potentially release acidity if exposed to air for extended periods associated with land-based placement. However, as ocean disposal of the dredged material is proposed, oxidation will not occur assuming dredge material stays saturated with seawater.

Future maintenance dredging and dredge material placement during the operational phase of the project will be undertaken in accordance with NAGD, or future versions of these guidelines, and only acceptable maintenance dredge material will be placed at sea. Consequently, neither a build-up nor entrainment of contaminants at the DMPA would be expected to occur as a result of the placement of maintenance dredge material.

B5 Key Findings relevant to Marine Water Quality

Chapter B5 addresses environmental issues and impacts to marine water quality associated with the construction and operation of the project. Previous studies, monitoring campaigns and literature were used to characterise the existing water quality and determine baseline levels for impact assessment. This was supplemented by specific EIS water quality data collection campaigns undertaken in 2013-2014 consisting of:

1) Deployment of nephelometer (NTU) instruments for 12 months at six sites around Trinity Bay and Inlet to obtain baseline water quality conditions near sensitive ecological receptor sites and Cairns Northern Beaches
2) Deployment of PAR (light) loggers by James Cook University as part of light measurements in recovering seagrass beds in Trinity Bay.

Figure ES-15 Naturally Turbid Marine Environment of Trinity Inlet and Trinity Bay

Baseline Findings

The baseline assessment provides water quality results and information on heavy metals, turbidity, suspended sediment, dissolved oxygen, nutrients and oil in water. Where appropriate this assessment has compared baseline results with applicable guideline values set by GBRMPA and by the Queensland Government under the EPP Water and Queensland Water Quality Guidelines (QWQG) 2009.

Trinity Inlet and Trinity Bay are naturally turbid environments (as shown in the photo in **Figure ES-15**), especially following periods of high rainfall and sustained winds and currents which re-suspend seabed sediments. As a result, naturally occurring turbid plumes are a regular feature of the marine environment.

Sediment and nutrient fluxes into Trinity Inlet and Trinity Bay continuously occur due to tidal flushing and riverine discharge of catchment-related runoff associated with (sometimes cyclonic) rainfall events between November and May (Barron and Haynes 2009). The plumes can extend into the Great Barrier Reef lagoon, varying according to size and dynamics of the flood event (GBRMPA 2001). Catchment inflows and urban stormwater runoff also introduce metals and organic pollutants, such as pesticides, into the surrounding waterways (Mitchell et al 2006).

The analysis of the 12-month water quality dataset collected as part of the most recent monitoring campaign (2013-2014) showed:

- There was not a significant difference between wet season and dry season turbidity values. Some areas, such as Trinity Inlet, False Cape and Cape Grafton had higher turbidity during the wet season. This is likely due to these areas being more sheltered from predominant south-east winds and therefore more influenced by freshwater flows. Other areas, such as Yorkeys Knob and Palm Cove Beach, had higher turbidity during the dry season as these areas are more exposed to sustained south-easterly winds during the winter
- During the wet and dry seasons, turbidity levels generally increased from the Trinity Inlet out to near shore areas (False Cape, Cape Grafton and the Northern Beaches). Turbidity was relatively low (<10 NTU) at offshore areas during both seasons. The highest median turbidity was at False Cape during the wet season
- All monitoring locations demonstrated median turbidity levels in excess of the nominated water quality objective for both seasons, with the exception of Trinity Inlet during the dry season.

Impact Findings (including Mitigation)

Three levels of assessment were undertaken to support assessment of the potential impacts from the dredging works on water quality.

Firstly, median concentrations for the dredging campaign were assessed against water quality guideline values. This approach provides a high level 'screening' type assessment tool to allow rapid identification of potential impacts, worthy of subsequent rigorous assessment.

Secondly, percentile exceedance plots of dredging-related turbidity are presented. These percentile plots are direct outputs from the modelling and provide an indication of excess turbidity from dredging activities. Additionally, time series plots of modelled turbidity at particular locations are presented.

Thirdly, project-specific threshold values were developed to assess potential impacts to marine water quality and ecologically sensitive areas (refer to **Chapter B5, Marine Water Quality**). These impact predictions are 'zones of impact' as recommended by the Commonwealth EIS Guidelines and GBRMPA Modelling Guidelines, and are derived using the percentile exceedance plots described above.

As discussed previously, it is proposed that the dredge vessel operate in a mode where the overflow of fine sediments is constrained or avoided. In accordance with this and consistent with the EIS Guidelines, the modelling outputs that show the predicted impacts on water quality from the capital dredging and placement are presented in the context of a likely best case (where the channel is dredged without overflowing the hopper based on the presence of very soft clay material) and a likely worst case (where the channel is dredged under a constrained overflow scenario that could result from the presence of stiffer clay materials in the channel).

Dredging of Inner Port – Likely Best Case

The percentile contour plots indicated that median turbidity for inner port dredging is predicted to increase slightly (up to two NTU) within Trinity Inlet. The 95th percentile turbidity is predicted to increase by less than 10 NTU above background 95th percentile conditions in Trinity Inlet.

Based on the zone of impact methodology, only the zone of influence (detectable plumes but no predicted ecological impacts) is predicted to extend into the inner port and Trinity Inlet. Therefore, based on these assessments overall, minor impacts are expected from turbid plumes generated from the base case capital dredging in the inner port.

Modelling of an alternative dredging methodology in the inner port (e.g. dredging of soft material by a TSHD in tandem with a backhoe removing the stiffer material) did not produce additional or noteworthy water quality impacts when compared to the base case, noting the TSHD will be far more efficient or quicker than the mechanical dredge in these materials.

Dredging of Outer Channel – Likely Best Case

TSHD dredging of the outer channel without overflow is predicted to result in relatively minimal water quality impacts. Based upon the assessment against the QWQG, median turbidity levels are not expected to increase significantly at any locations in response to dredging of the outer channel.

Assessment of ambient turbidity from natural re-suspension versus dredge-related turbidity predicted most areas would receive a much larger proportion of natural sediment re-suspension compared to dredged sediment.

The percentile contour plots indicated that median turbidity is predicted to increase slightly (up to six NTU) due to dredging of the outer channel and 95th percentile turbidity is predicted to increase by approximately 10-20 NTU above background 95th percentile conditions.

Based on the zone of impact methodology, only the zone of influence is predicted to occur in the vicinity of the outer channel dredging.

Placement of Material at DMPA – Likely Best Case

As a result of dredging without overflow, the majority of fine material which would normally be released into the water column at the dredge site (e.g. the channel) is instead released at the DMPA. Furthermore, ambient water quality in offshore areas where the DMPA is located is generally of lower turbidity compared to near shore areas. As such, water quality impacts at the DMPA are predicted to be slightly higher compared to nearshore areas.

Based upon the high level assessment against the QWQG, median turbidity levels at the DMPA are predicted to approximately double from six NTU to 12 NTU. The percentile contour plots also indicated that median turbidity is predicted to increase up to six NTU at the DMPA, and increase by approximately 10-20 NTU under 95th percentile conditions.

Based on the zone of impact methodology, a zone of low to moderate impact is predicted to extend out from the DMPA approximately 2.5 km in a north-west and south-east direction, while a zone of high impact is predicted to occur within the DMPA itself.

Notwithstanding the above, the predicted impacts from placement of material at the DMPA have been considered in the context that the impacts are likely to be relatively localised to the vicinity of the DMPA. There are no sensitive ecological receptors in these zones and affected habitats would recover quickly (refer **Chapter B7, Marine Ecology**). Therefore, impacts from the turbid plumes would be minor.

Likely Worst Case Dredging Scenario (Constrained Overflow)

The model outputs suggest that under the likely worst case scenario, where some limited overflow from the dredge is permitted, turbid dredge plumes would be slightly increased in the nearshore environment along the coastline to the north of the dredging area (these plumes would be detectable with instrumentation but may not be visible to the naked eye). However, marine water quality is not predicted to change significantly.

In regard to zones of impact, the main difference between the likely best case scenario and likely worst case scenario is the latter would have a slightly increased extent of the zone of influence (detectable plumes but no ecological impacts) along the coastline. However, the larger zone of influence would not result in any change to predicted impacts. The zone of low to moderate impact and the zone of high impact are still restricted to the vicinity of the proposed DMPA.

Based on this assessment, impact conclusions are similar to the likely best case scenario above, that is, only minor impacts to water quality are predicted from dredging of the inner port and outer channel and the material placement at the DMPA.

Mitigation

Key mitigation and monitoring for water quality are outlined in this chapter and discussed further in the Dredge Management Plan in Part C2. These include, amongst other measures, constraining dredge overflow operations to no greater than those modelled as part of the 'likely worst-case scenario' and the uniform spreading of dredge material at the DMPA to limit the potential for re-suspension of the material.

B6 Key Findings Relevant to Water Resources

Chapter B6 addresses non-marine water resources. The assessment utilised GIS Mapping and available published information and included a review of the environmental values and water quality objectives for Trinity Inlet.

Baseline Findings

Trinity Inlet and Trinity Bay have been identified to be of high environmental value in a number of water quality planning documents. Previous studies have identified environmentally sensitive receptors within the catchment. The proximity of the inlet to the GBRMP and its designation as a Fish Habitat Area (FHA) further increases the sensitivity of this area. The Trinity Inlet catchment does not contain any major rivers and there is no recorded surface water extraction within the study area.

The project area is located within the Cairns CBD and environs which are low lying lands that are susceptible to short-term flooding in any substantial rainfall event and vulnerable to high tides and/or storm surges.

There is a draft groundwater management resource plan in place for the local groundwater catchment. There are no records of groundwater usage/licences recorded within the study area or the broader Cairns Coast sub-artesian area. Given the predominantly industrial and commercial nature of the study area, it is unlikely that there is any significant use of groundwater.

Impact Findings (including Mitigation)

- The project will have no significant impacts to surface water or groundwater
- During construction there is risk of release of contaminants into surface water or groundwater but this will be managed by implementation of the Construction Environmental Management Plan and implementation of emergency management response procedures
- During operation there is risk of release of contaminants from site infrastructure services into surface water or groundwater, but this will be managed by proper site management, implementation of the Operational Environmental Management Plan and implementation of emergency management response procedures.

B7 Key Findings Relevant to Marine Ecology

Chapter B7 describes the existing ecology of the marine environment in the vicinity of the project, and identifies potential impacts on these habitats, species and communities. Marine flora and fauna species, communities and habitats within the study area and surrounds were defined through relevant database searches, a review of previous studies, and where there was inadequate existing information, through supplementary field investigations, including:

- Soft sediment habitat types and epifauna communities
- Benthic infauna communities
- Shoreline assessment of rocky intertidal communities
- Coral surveys at Double Island and Rocky Island.

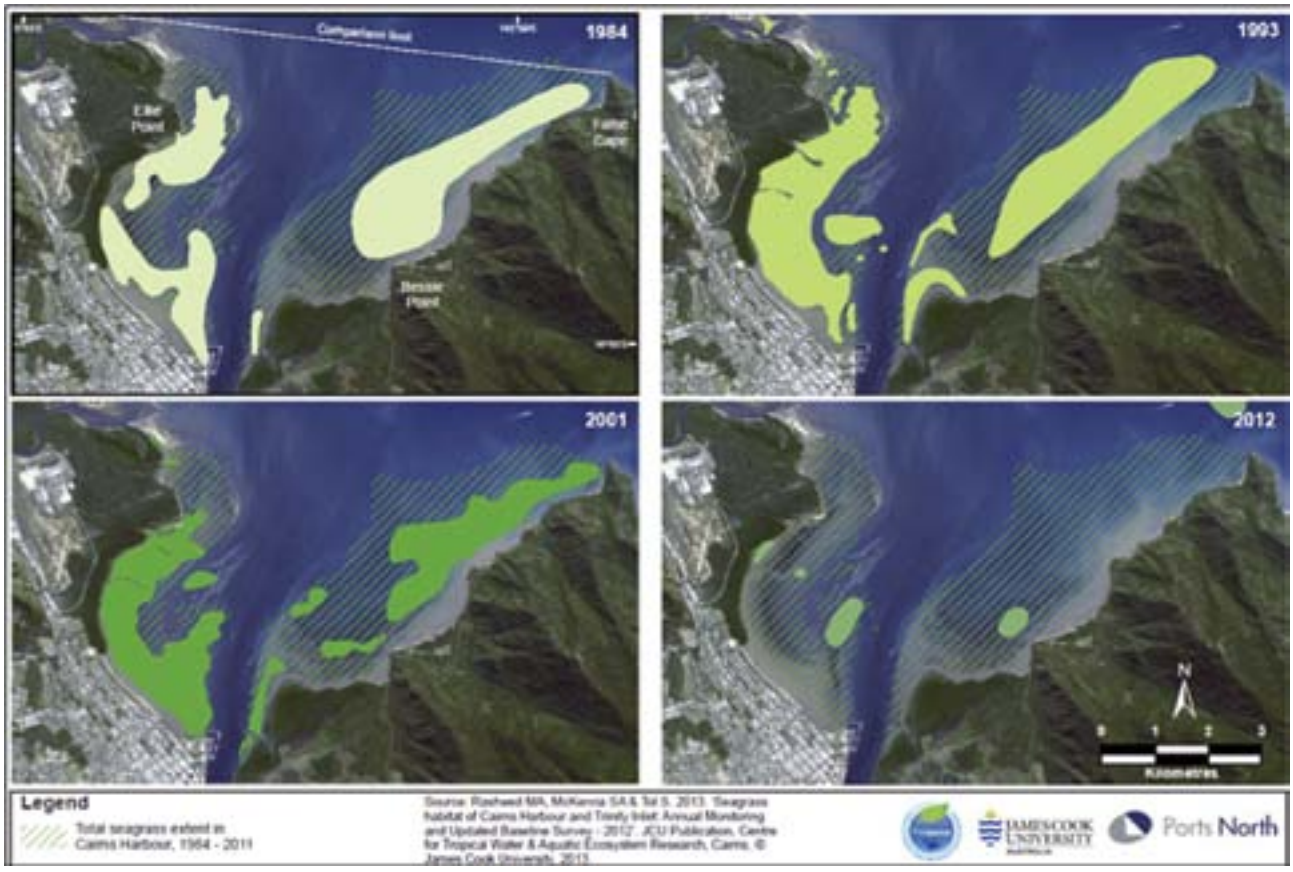
Baseline Findings

Trinity Bay and Trinity Inlet contain the following important marine and estuarine ecological values:

- A wide diversity of marine habitat types including sandy beaches, mangrove forests, saltmarshes, intertidal shoals, seagrass meadows, subtidal soft sediment habitats, rock walls and rocky shores
- An extensive area of mangroves exhibiting a range of species and community types, some of which are limited in their distribution elsewhere
- Seagrass beds that represent one of the only two major seagrass areas between Hinchinbrook Island and Cooktown (however, the meadow size is presently far smaller than previously mapped – see Figure ES-16);
- Mangroves, saltmarsh seagrass meadows and 'unvegetated' soft sediment habitats and other associated wetlands that have been recognised as important nursery areas for juvenile fish and prawns of commercial importance
- Habitats for a wide range of fish and shellfish species of direct economic significance
- A range of habitat types that significantly underpin the biodiversity values of the region
- Habitats that are important to migratory waders of international significance (see **Chapter B8, Terrestrial Ecology**)
- Potential feeding areas for marine turtles, dugongs, whales and dolphins, which are listed as threatened or migratory under Commonwealth and/or Queensland legislation.

This chapter describes each of these marine environmental values and the condition/integrity of underpinning marine habitats.

Figure ES-16 Comparison of Seagrass Meadows in Cairns Harbour between surveys in 1984, 1993, 2001 and 2012 (Source: Rasheed et al. 2013)



Impact Findings (including Mitigation)

Direct impacts – Capital Dredging

No reef communities or other features of high fauna biodiversity value occur in the existing channel or proposed dredge areas.

Notable beds of seagrass do not currently occur within the proposed dredge footprint, although past surveys in 1993 and 2001 have mapped seagrass at one outer harbour section of the dredge footprint (in the vicinity of sub-Area 3) (Rasheed et al. 2013). Smaller, isolated patches of seagrass may occur within the dredge footprint either currently, or from time to time throughout the life of the project. However, based on previous surveys it is assumed that any such patches of seagrass would be sparse and highly variable in their extent and density, in response to both seasonal growth patterns and inter-annual cyclic changes.

Initially, dredging will cause a temporary loss of the soft bottom benthic biota from within the dredge footprint, since benthic communities typically inhabit the surface sediments that will be extracted by dredging. Biota will soon recolonise the dredge footprint but will continue to be regularly subject to similar disturbance through the ongoing annual maintenance dredging regime.

While in this modified state, it would be expected that benthic communities within both the existing channel/harbour and proposed new dredge areas will support similar benthic communities and ecological functions as that currently found in the existing channels.

Initial passive recolonisation of dredged areas may occur immediately after dredging, followed shortly by the commencement of recolonisation through larval dispersal or active invasion (within hours to days) (WBM 2004). While initial recolonisation will occur in a short time frame, 'recovery' (a return to comparable numbers of species and total individuals) for areas not previously dredged would be in the order of months to years.

The change in habitat conditions in the dredge channel is predicted to have highly localised secondary effects to marine flora and fauna. Alterations in the composition and abundance of benthic fauna assemblages can be expected within the dredged area immediately after dredging, resulting in a temporary loss of prey items for fish and invertebrates. This is expected to result in temporary, localised impacts to fish feeding activities but overall, these changes are not expected to cause detectable flow-on effects to other ecosystem components or functions at broader scales.

Direct impacts – Marine Placement

Previous studies of the Cairns DMPA, as well as recent epibenthic surveys undertaken as part of this EIS, suggest the placement of dredged material has not caused detrimental effects to benthic communities in areas immediately adjoining the existing DMPA. McKenna et al. (2013) reported high and medium density epibenthic cover within and immediately adjoining the southern half of the existing DMPA (relative to subtidal soft sediment habitats in other parts of the study area). Surveys undertaken by BMT WBM in 2014 to target the existing DMPA and surrounds indicated similar findings with epifauna abundance at sites located in Sites 7a, 7b, and adjacent to Sites 8a, 8b. The existing DMPA rated medium to high, compared to other sites surveyed in the study area. For infauna communities at these sites disturbed by past dredged material placement activities, both fauna diversity and abundance was moderate, typically on average for all sites surveyed.

It is therefore expected that the placement of dredged material at the DMPA will not result in major changes to benthic communities outside the DMPA. Recolonisation will occur progressively following disturbance with full recovery expected over a period of six-24 months. Monitoring of benthic communities will be undertaken to quantify any changes in the vicinity of the DMPA.

Indirect Impacts – Fish habitat values

Given the opportunistic foraging behaviour of local fish species, together with the small proportion of habitat lost, it is not expected that permanent loss or modification of habitat would lead to a long-term reduction in populations of fish species. However, it would be expected that demersal fish, crabs and prawns will avoid areas that have depauperate benthic macroinvertebrate assemblages as a result of dredging and dredged material placement. This is expected to result in a redistribution of fauna, with animals foraging in other parts of the study area (adjacent to the project footprint) until such times as benthic communities recolonise the disturbed area.

Longer term changes in habitat conditions (e.g. sediment types, water depths) as a result of dredging and dredged material placement activities, and associated changes to benthic macroinvertebrate communities, are not expected and will not lead to significant impacts.

Indirect Impacts – Water Quality

Seagrasses and hard corals, as well as other photosynthetic biota (e.g. algae, some soft coral), are considered the key sensitive receptors most vulnerable to turbid plume effects. The zones of low to moderate or high impact as outlined in **Chapter B5, Marine Water Quality** are predominantly located over offshore soft sediment habitats in and around the DMPA, and do not coincide with any seagrass meadows, coral reefs or any known high density benthic fauna communities for any of the dredging scenarios.

The zone of influence (under any modelled dredge scenario) coincides with known (as mapped in 2013) seagrass meadows and coral reefs (e.g. Cairns harbour, Double Island). By definition, the zone of influence includes areas where detectable turbidity changes could occur, but major ecological effects are not expected based on known tolerances of sensitive receptors. There are some uncertainties regarding the sensitivities of 'new growth' seagrass (i.e. seagrass that has not been mapped in 2013 but may shoot prior to the dredging campaign) and seagrass that are at or near the limits of its tolerance range. These implications are proposed to be addressed as part of the Reactive Monitoring Program as outlined in **Part C2, Dredge Management Plans**.

Impacts to Marine Megafauna

The impact assessment has examined direct and indirect impacts from the project to key marine megafauna species including inshore dolphins, whales, dugongs and sea turtles.

The overall risk of impact to these species (most of which are MNES) is negligible to low; noting that key foraging habitats for these species (reefs, notable seagrass beds) generally do not coincide with the predicted extent of turbidity impact zones as outlined in **Chapter B5, Marine Water Quality**.

Mitigation

The Dredge Management Plan (Part C2, DMP) provides guidance on (i) the mitigation measures that will be adopted to minimise direct impacts to marine flora and fauna; (ii) monitoring that will be undertaken to validate impact predictions outlined in the EIS; and (iii) a reactive monitoring program comprising both physical chemical and biological monitoring components which is to be implemented before and during dredging and placement.

Of particular note is a commitment to undertaking the six-month capital dredging campaign outside of critical periods to minimise impacts on likely seagrass growing periods, coral spawning, periods of low coral community resilience and spawning periods for most fish species.

Specific measures are outlined in the DMP to minimise harmful interaction between the dredge and marine megafauna species through the imposition of turtle exclusion devices on drag heads and similar standard mitigation methods for megafauna. Likewise, mitigation measures are proposed in the Environmental Management Plan (Chapter C1, EMP) to control and monitor impacts to marine megafauna in the inner port for proposed piling operations.

B8 Key Findings Relevant to Terrestrial Ecology

Baseline Findings

Regional Terrestrial Ecology and Protected Areas.

Chapter B8 addresses terrestrial ecology in the study area. Field surveys of the study areas and a detailed assessment of Coastal Bird Habitat values was undertaken as part of the assessment. The study area exists within the Wet Tropics WHA and the GBRWHA (CRC 2012). Both areas are recognised as outstanding examples of biodiversity, habitat for threatened species, species endemism and intact ecological processes (SEWPaC 2013a, Wet Tropics Management Authority 2013). The area along the wharves, the area of estuarine wetlands and mangroves on the eastern side of Trinity Inlet and parkland around the Esplanade are located within the ***Port of Cairns and Trinity Inlet Wetland of National Importance***. There are no RAMSAR wetlands or GBR Wetland Protected Areas (GBRWPAs) within the study area. While Wetland Management Areas are mapped within Trinity Inlet, they do not cover terrestrial areas of the study area. Protected estates are located within the study areas and no essential habitat will be impacted by the project.

Terrestrial Flora

No mapped vegetation communities occur within the project area; however, scattered individual trees exist. The only vegetation communities of ecological significance located within the study area is on the eastern side of Trinity Inlet. This includes a large area of mangrove forests that are mapped as remnant and regrowth Regional Ecosystems.
No threatened ecological communities are likely to exist in the study area. There are two listed plant species that are considered threatened or new threatened that may occur in the study area:

- ***Dendrobium bigibbum*** (Cooktown Orchid), which is listed as vulnerable under the EPBC Act and NC Act. This species is also known as ***Vappodes bigibba***, though the Census of Queensland Flora (2013) lists the species as ***Dendrobium bigibbum***
- ***Steblus pendulinus*** (Siah's Backbone), which is listed as endangered under the EPBC Act.

An additional species, ***Myrmecodia beccarii*** (Ant Plant, vulnerable under the EPBC Act) was observed to be common in mangrove communities in Trinity Inlet.

Terrestrial Fauna

Given the project area is located within an urban setting, there will be limited opportunity for faunal diversity and would likely be limited to mostly common species that have adapted well to urban settings. Despite this, there are some threatened and near threatened species that can occasionally utilise urban areas for foraging, feeding and roosting (e.g. flying foxes and some birds). Threatened species are more likely to occur in the areas of remnant vegetation associated with the coastal environments in the study area. The coastal setting in which the project area is situated provides a suitable environment for a variety of breeding, roosting and feeding water birds, shorebirds and other wildlife. Raptors are also dependant on the population of shorebirds. The detailed assessment of coastal bird habitat identified a number of locations within the study areas of important habitat. These are:

- Cairns Esplanade mud flats
- Barron River Delta intertidal sand flats
- Nearby saltmarshes, saltpans and wetlands, Double Island, Haycock Island and the sand and reef flat that lies between them.

There is only one EPBC Act threatened species of fauna recorded in the study area and 10 near threatened species under the Nature Conservation Act have been recorded. However, the project area is unlikely to provide core foraging, roosting or breeding habitat value for any of these species recorded:

- *Accipiter novaehollandiae* (Grey Goshawk) (near threatened under the NC Act)
- *Aerodramus terraereginae* (Australian Swiflet), (near threatened under the NC Act)
- *Cyclopsitta diophthalma macleayana* (Macleay's Fig-parrot). (vulnerable under the NC Act)
- *Ephippiorhynchus asiaticus* (Black-necked Stork), (near threatened under the NC Act)
- *Esacus magnirostris* (Beach Stone-curlew), (vulnerable under the NC Act)
- *Haematopus fulignosus* (Sooty Oystercatcher), (near threatened under the NC Act)
- *Melithreptus gularis* (Black-chinned Honeyeater), (near threatened under the NC Act)
- *Numenius madagascariensis* (Eastern Curlew), (near threatened under the NC Act)
- *Pteropus conspicillatus* (Spectacled Flying-fox), (vulnerable under the NC Act)
- *Stenula albifrons* (Little Tern), (endangered under the NC Act)
- *Tadorna radjah* (Radjah Shelduck), (near threatened under the NC Act)

There are a large number of EPBC Act migratory marine, terrestrial or wetland species as well as marine species that may potentially occur in the study area. The majority are shorebirds, waders or raptors that would have a preference for the intertidal zone across from the Cairns Esplanade, the estuarine wetland area on the eastern side of Trinity Inlet or surrounding marine and non-marine areas. These species may occasionally occur within the project area, though it is not considered to be core foraging, roosting or breeding habitat. These species are protected under the EPBC Act, but are not necessarily considered to be threatened or near threatened. The most commonly observed EPBC bird species within the study area are recorded in various databases. All these species are listed as both migratory and marine under the EPBC Act:

- *Actitis hypoleucos* (Common Sandpiper)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris ruficollis* (Red-necked Stint)
- *Calidris tenuirostris* (Great Knot)
- *Charadrius mongolus* (Lesser Sand Plover)
- *Limosa lapponica* (Bar-tailed Godwit)
- *Numenius phaeopus* (Whimbrel)
- *Pluvialis fulva* (Pacific Golden Plover)
- *Rhipidura rufifrons* (Rufous Fantail)
- *Sterna albifrons* (Little Tern)
- *Symposiachrus trivirgatus* (Monarcha trivirgatus) (Spectacled Monarch)
- *Tringa brevipes* (Grey-tailed Tatler)
- *Tringa nebularia* (Common Greenshank)
- **Xenus cinereus** (Terek Sandpiper)

Impact Assessment

The assessment of potential impacts to terrestrial ecology focused on seven components of the project. These included:

- Direct impacts to terrestrial habitat values due to land-side construction works
- Predicted sedimentation impact to shorebird foraging habitat values within intertidal areas due to capital and maintenance dredging
- Impacts to avifauna due to the potential for contaminants to be mobilised by dredging
- Impacts to shorebird foraging habitat within intertidal areas due to vessel wash during construction and operations
- Noise impacts to terrestrial ecology values due to construction (land-side works and capital dredging) and operations (including maintenance dredging)
- Light impacts to terrestrial ecology values due to construction (land-side works and capital dredging) and operations (including maintenance dredging)
- Impacts to terrestrial ecology due to decommissioning of the project.

Impact Findings (including Mitigation)

- The project will result in no significant construction impacts on terrestrial ecology
- There will be temporary low impact to shorebirds foraging habitat within intertidal areas due to vessel wash
- No operational impacts have been identified
- Management plans will provide mitigation measures and protection to avoid or minimise impacts to terrestrial ecology.

B9 Key Findings Relevant to the Socio Economic Environment

Baseline Findings

Chapter B9 of the EIS addresses the socio-economic aspects of the project. The socio-economic impact assessment (SEIA) was carried out to assess the potential social impacts and benefits associated with the construction and operation of the project at the Port of Cairns. To complete the SEIA, the authors drew on existing data and reports as well as information gathered from stakeholders and the community through an engagement process.

The project is expected to bring significant social and economic benefits in terms of economic input and jobs and is not expected to have any significant negative impacts on the socio-economic environment during its construction and operation.

Community consultation and research conducted during the EIS has confirmed that the project has strong local support, driven largely by support for the economic benefits it will bring the region, while acknowledging that reef environment needs to be protected at the same time.

Impact Findings (including Mitigation)

- There will be no significant impacts on the community during construction
- There is potential community concern about the impact of dredge and material placement activities which will be managed through PN active communications and consultations
- There will be significant economic and employment beneficial impacts during construction and operations as outlined in the Economics Chapter including:
    - Add $673m to the regional economy over 25 years (in 2016 AU$)
    - Add average of $27m per annum (in 2016 AU$)
    - Create 467 new jobs by 2026
    - Create 680 new jobs by 2040
    - Create 135 construction (FTE) jobs
- Home porting will generate additional economic benefit per voyage
- There will be operational savings for cargo companies
- The project will result in significantly improved cruise ship passenger experiences during operation.

B10 Key Findings Relevant to Noise and Vibration

Baseline Findings

Chapter B10 provides an assessment of potential impacts from airborne noise, underwater noise or vibration to the identified sensitive receptors from the construction and operation of the project. The assessment was completed through a desk top study supported by a baseline noise survey of the project area and identification of noise sensitive receptors both human and species.

Existing noise sources within the study derive from noise from cruise ships when in port, and associated vehicular traffic during visits. Noise is also generated from other ships entering, exiting and berthing in the port. Other noise sources include industrial noise from machinery operations, vessel and vehicular traffic, waves, aircraft, seaplane and helicopter noise. During the measurement period, no perceptible vibration from existing sources was observed.

Impact Findings (including Mitigation)

- There will be no significant noise impacts during construction or operation
- There is the potential for medium noise impact during construction from land-based infrastructure
- There is the potential for medium noise impact during construction from dredging
- There is the potential for minor noise impacts predicted during operation at night time from shipping and terminal

In order to mitigate any potential noise impacts:

- Land side construction works will be limited to normal hours
- Backhoe dredging near sensitive receptors may be sequenced to minimise impact.

B11 Key Findings Relevant to Air Quality

Baseline Findings

Chapter B11 Air Quality provides an assessment of potential impacts on air quality from the construction and operation of the project. Air quality in the Cairns region is considered to be good. Regional air quality monitoring is not required as pollutant levels are 'reasonably expected' to be consistently below the relevant National Environment Pollution Measure (NEPM) standards.

Impact Findings (including Mitigation)

- There are no significant impacts on air quality during construction and operation of the project.
- There is good existing air quality in Cairns region
- There will be temporary low impacts during construction due to combustion and dust emissions
- During operation predicted low impact on local air quality due to increased vessel stack emissions
- Management plans will provide mitigation measures and protection to avoid or minimise impacts to air quality during construction and operation.

B12 Key Findings Relevant to Landscape and Visual

Baseline Findings

Chapter B12 identifies the potential impact of the project on the landscape and visual amenity of the project site and surrounding areas. The study uses a viewpoint based approach of the local scale environment, which identifies the existing landscape and visual conditions, and assesses the potential impact of the project during daytime and night time. A site inspection and survey of the study area was undertaken in order to determine suitable viewpoints for assessment.

The visual components of the project include elements that will be visible in the marine environment and at the existing Cairns Cruise Liner Terminal (CCLT). The visual components that will be visible will differ from construction to operation.

During Construction

- Dredging equipment
- A turbidity plume from dredging and placement of capital dredge material
- Structural upgrade of the existing cruise shipping wharves 1-5 including berthing dolphins, fenders and bollards
- Construction machinery and equipment including a piling rig and crane to install the proposed piles, concrete pump trucks, a site office and power generators
- Construction plant and materials associated with the construction of Intermittent Fuel Oil (IFO) facilities, including a minor building on the wharf (approximately 3x3 m) with flow meter; cast iron pipeline running along wharves 4, 5, 6, 7, 8 and 10 and into the existing fuel farm area, set within an approximately six metre cleared area; and a IFO storage tank (covering an area of approximately 1,670 m^2 and 6 m high).

During Operations

- A turbidity plume from the dredging and placement of maintenance dredged material at the preferred DMPA.
- Additional large cruise ships using the shipping channel
- Larger cruise ships will be seen at the wharf more frequently.

One of the key criteria for the GBR's listing on the World Heritage in recognition of its Outstanding Universal Value (OUV) relates to its aesthetic quality:

(vii) to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

The GBR is considered to meet this criterion by:

"The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.

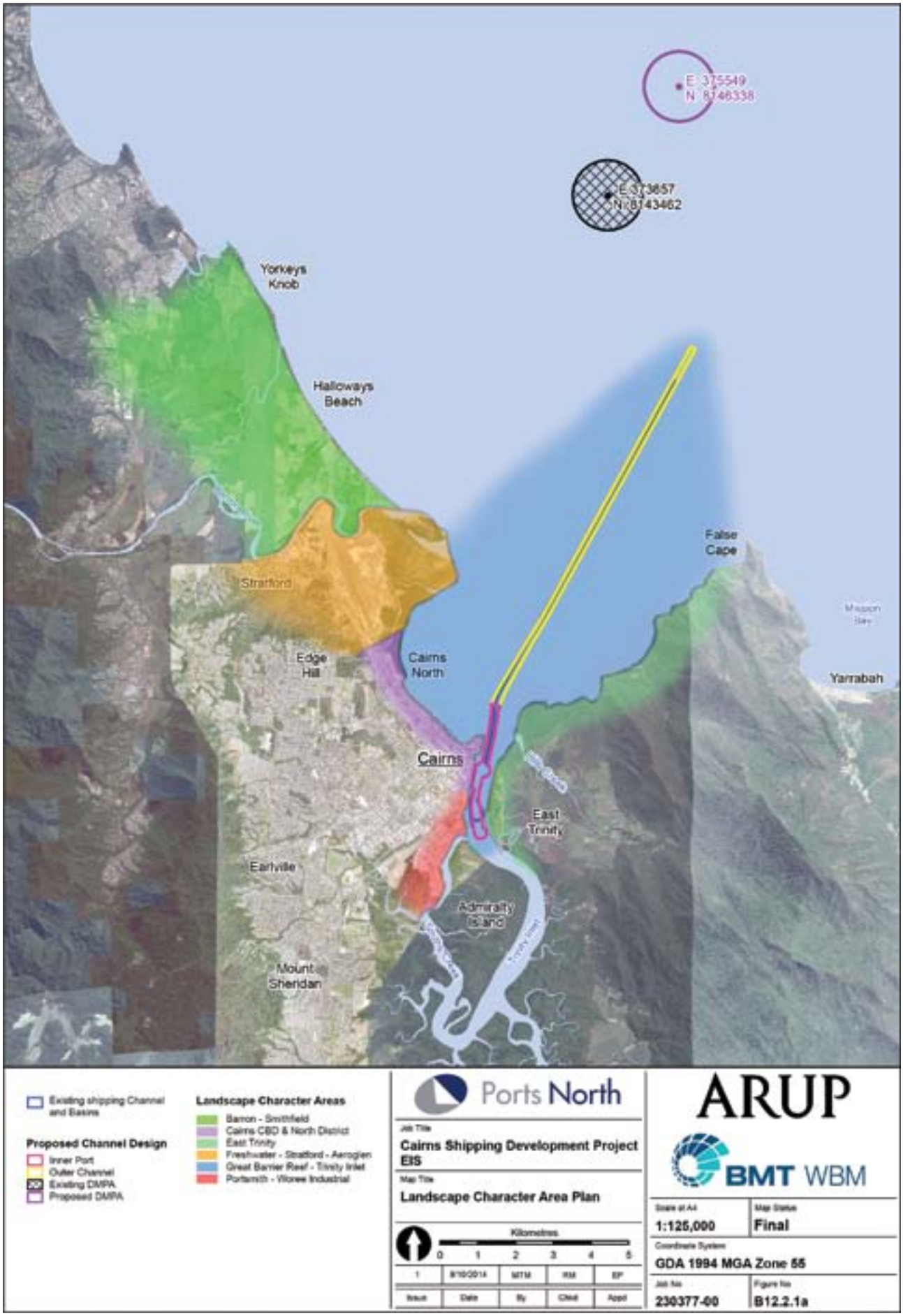
From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes."

In 2012 a monitoring mission, supported by the World Heritage Committee, assessed and reported on the conservation value of the GBRWH. In response to the Committee's findings, the Commonwealth Government commissioned a study *'Defining the Aesthetic Value of the Great Barrier Reef'* published in February 2013. The study analysed the risk of different potential activities on the aesthetic values of the reef and concluded that the overall risk associated with marine tourism is estimated as High-Medium) with the potential scale mainly local, but ranging to regional in some cases. The overall consequence of marine tourism impacts are considered to be minor. The experiential attributes of *'beauty'* and *'naturalness'* can potentially be impacted, and the attributes of *'tranquillity', 'solitude', 'remoteness'*, and *'discovery'* can be impacted through increasing intensity of use.

Impact Findings (including Mitigation)

- There will be no significant visual impacts predicted during construction or operation
- During construction there are possible low visual impacts at
  - Cairns Wharf
  - Cairns High Rise Apartments
  - Trinity Inlet
- During operation there are possible low visual impacts at
  - Cairns High Rise Apartments

Figure ES-17 Viewpoint Location Plan.



B13 Key Findings Relevant to Cultural Heritage

Baseline Findings

Chapter B13 describes the indigenous and non-indigenous cultural heritage, and native title conditions of the study area. Further, it identifies and rates risk of impacts from the project on such matters. The baseline investigations took the form of desktop based research. Authors utilised government databases and searches as well as previous reports written on the area. Field investigations were used in the impact assessment phase to verify desktop-based findings and further investigate the study area. Consultation with the indigenous parties to the area was also undertaken, along with formal notification under the Aboriginal Cultural Heritage Act 2003.

Impact Findings (including Mitigation)

The impact assessment section identified impacts in terms of Indigenous Cultural Heritage, the Cairns Wharf Complex Area, Marine Historic Sites, WWII sites, and Unknown Cultural Heritage Sites.

In terms of impact and mitigation on Indigenous Cultural Heritage, the following has been determined:

- Mitigation of impacts to known cultural heritage sites will firstly be managed through the development of at least two Cultural Heritage Management Plans (CHMPs). One between Ports North and the Gimuy Walubara Yidinji People, and another between Ports North and any Aboriginal Parties identified through the public notification process. A further management measures for known cultural heritage sites will be Cultural Heritage Awareness training for people involved in the project.

In terms of impact and mitigation on the Cairns Wharf Complex, the following has been determined:

- A potential impact to the Cairns wharf complex is vibration impacts associated with piling rigs. In order to mitigate any impacts an upper limit has been set for vibration and will be enforced. Ongoing monitoring of vibration will ensure no adverse impacts.

In terms of impact and mitigation on Marine Historic sites, the following has been determined:

- Impacts to marine historic sites have been identified as a low risk. In order to ensure this risk remains low, Ports North will undertake magnetometer (or the like) surveys of the proposed new dredged areas prior to works commencing.

In terms of impact and mitigation on WWII sites, the following has been determined:

- Three sites of WWII significance have been identified in proximity to the dredged areas, these being Submarine Boom Net Foundations (CSD01), Catalina Slipway (CSD03) and Tramway (CSD07). These areas will be considered no go areas and clearly identified to the crews operating dredging equipment.

In terms of impact and mitigation on Unknown Cultural Heritage Sites, the following has been determined:

- In order to reduce the impact of the project on unknown cultural heritage sites Ports North will develop both Indigenous and non-Indigenous cultural heritage induction material. The induction material will cover such items as procedures to avoid impact, reduce impact and manage items that are uncovered. Ports North will engage with a suitably qualified person to produce and deliver this induction material. It will ensure compliance with the ACH Act. These mitigation measures will ensure the risk remains as a low impact risk rating.

B14 Key Findings Relevant to Transport

Baseline Findings

Chapter B14 Transport describes the existing traffic and transport conditions in the study areas and assesses the potential impacts of the project on the existing road network and transport infrastructure. This chapter focuses on vehicular and pedestrian traffic that will be generated by the project. Shipping traffic and operations are addressed in **C4 Maritime Operations Management Plan**.

Impact Findings (including Mitigation)

The transport assessment results demonstrate that the surrounding road network and critical intersection can accommodate the expected design traffic volumes, with the intersection capacity analyses showing significant spare capacity is available to cater for potential background traffic future growth at the Wharf Street, Lake Street and Port Access Road intersection.

The assessment and site investigation of current infrastructure undertaken while a cruise ship was docked, indicates that the land-side infrastructure is sufficient to cater for the existing demand (both current and projected) and no upgrades are required. The project will assist in improving parking and potential safety issues at Yorkeys Knob docking facility, as this facility will only be used for extremely large ships unable to access the upgraded channel.

- There will be no significant traffic impacts predicted during construction or operation
- There is the potential that bus and taxi provisions will not be sufficient to cater with the larger cruise ships, however, operational strategies will be adopted to streamline operations and manage demand
- There will be increased pedestrian traffic emanating from docked cruise ships. There may be a requirement to provide a traffic controller on days where mega ships are in port.
- There will be a beneficial impact around the Yorkeys Knob area as ship visits will decrease resulting in less demand on the current inappropriate traffic infrastructure.

B15 Key Findings Relevant to Waste Management

Baseline Findings

Chapter B15 describes the current and proposed waste generation activities and outlines the regulatory frameworks associate with waste management at the port. The chapter describes the generation and potential impact of increased solid waste, grey water and sewage.

Impact Findings (including Mitigation)

Due to the extent of land-side works required, waste generation during construction will be minimal. Works will generate wastes typical of a construction site, and a waste management plan will be implemented to minimise waste generation and the associated impacts.

During the operational phase, waste generated at the terminal building itself will be minimal and will continue to be collected by licenced waste contractors.

Waste from ships docked at the port is currently the largest source of waste handled at the port. Ships require offloading of a variety of wastes, including general waste, quarantined waste, liquid and hazardous wastes, as well as sewage and grey water. During the operational phase of the project, shipping waste volumes will increase due to a greater number and size of ships visiting the port. There is limited scope for Ports North to manage waste generation on board ships; though ships are required to carry Garbage Management Plans under MARPOL. Current systems of waste handling at the port will be capable of meeting the increased demand.

- Solid waste generation during construction will be minimal.
- Construction and demolition waste will be managed in accordance with the construction environmental management plan (EMP)
- There will be minor increases in waste generation during operation
- During operation solid waste generated on ships will be managed by the ship operators and garbage management plans required under MARPOL
- Regulated wastes and liquid wastes will be controlled and regulated in accordance with Queensland and Federal Government requirements

B16 Key Findings Relevant to Climate Change and GHG's

Baseline Findings

Chapter B16 describes the potential effects of climate change on the project and also determines the magnitude of Greenhouse Gases (GHG) the project is likely to generate. The chapter includes a carbon footprint calculation for both construction and operation.

Impact Findings (including Mitigation)

- The will be short term moderate levels of carbon emissions during dredging due to fuel usage
- Potential increase in storm surges, cyclones and weather impacts may increase deterioration or damage of berthing infrastructure or services
- All infrastructure will be designed to cyclone requirements under Australian Standards.
- Existing emergency response procedures are in place for extreme weather events and would be updated to reflect the latest climate change data.

B17 Key Findings Relevant to Hazard and Risk

Baseline Findings

Chapter B17 provides an assessment of the key health and safety risks associated with the project on the public (particularly cruise ship visitors) and workforce during both construction and operational phases. Safety risks associated with movement of cruise ships and navigational hazards are detailed in the Maritime Operational Management Plan and Vessel Traffic Management Plans.

The chapter details hazards and risks within Port Limits and which the Port of Cairns has operational jurisdiction; it does not address any hazards or risks that are the responsibility of cruise ship operators nor other operational vessels. Any hazards and risks that may reasonably be anticipated to occur beyond the Port Limits (e.g. within the GBRMPA boundary) as a result of the project are addressed in **Chapter B18, Cumulative Impacts Assessment**.

Ports North currently safely manages operational hazards and risk through its operational management practices, protocols and plans. Therefore current practices, protocols and plans will be built on if necessary to manage any newly identified operational hazard and risk generated by the project.

Impact Findings (including Mitigation)

- Construction hazards and risks have been identified as having low to medium residual risk rating
- There are no new operational hazards or risks identified during operation different to those currently managed by Ports North.

B18 Cumulative Impacts Assessment

Cumulative Impacts

Chapter B18 contains the assessment of cumulative and consequential impacts from the project. It also examines the prospective resilience of the GBR WHA (and its constituent components of OUV to potential impacts from the project, and outlines proposals for environmental offsets.

From a cumulative impact perspective, the project has been assessed in the context of other port expansion projects at a World Heritage Area scale, regional development projects in the northern section of the Wet Tropics region and projects occurring at the local scale (Trinity Bay/Cairns CBD).

The most significant local project currently proposed in the Cairns region during the lifetime of the project is the Aquis integrated resort development. The draft EIS for the Aquis project was on public display in 2014 and included extensive commentary on prospective impacts on MNES and environmental values of state significance downstream of the proposed resort development. Based on the key findings of both Draft EIS documents, the combined, cumulative impacts from the project and Aquis are not considered to be placing an unacceptable risk on coastal and marine resources of Trinity Bay.

Consequential Impacts

Consequential impacts from the project include the requirement for increased maintenance dredging to maintain the wider and deeper channel and increased cruise shipping. It should be noted that the project will result in a small increase in overall ship movements as is many of the current transiting vessels transferring their operations from Yorkeys Knob to Trinity Wharves. Neither of these consequential activities presents unacceptable impacts to environmental values including MNES.

Resilience

The resilience of the constituent habitats and species of the GBR WHA that contribute to its OUV at a local scale have also been assessed in this chapter of the EIS, drawing on assessment conclusions from elsewhere in Part B. The risk of cumulative impact on these habitats and species are likewise considered to be low to negligible.

Potential Residual Impacts and Offsets

Environmental offsets are required for residual impacts which, after the application of mitigation measures, have significant residual impacts to matters of National or State significance.

Such significant impacts have not been predicted by the EIS; and, therefore, offsets are not strictly required under the provisions of the relevant Federal or State offset policies.

However, offset initiatives and/or compensatory measures may be required:

- As a contingency if impacts that were not predicted by the EIS eventuate as part of construction or operation of the project
- In order to address the uncertainty and risks associated with the low environmental resilience of receptors such as the World Heritage Area to additional impacts (e.g. to approach a net environmental benefit for the project).

To this end, the following initiatives have been identified on the basis that they seek to address key issues of resilience and information gaps related to the GBRMP and the GBRWHA:

- Investment in programs related to reef health, management and tourism (Crown of Thorns Starfish (COTS) eradication program and other initiatives)
- Investment in reef-related research and education
- Increased investment in programs that improve water quality coming out of the GBR catchments and in particular the Barron and Mulgrave Rivers in order to improve resilience of inshore habitats in Trinity Bay
- Investment in further rehabilitation of the East Trinity site to improve outgoing water quality and quality of fish habitats in order to improve resilience of inshore habitats in Trinity Inlet
- Maintained and increasing investment in monitoring of long-term ecosystem health in Trinity Bay and Trinity Inlet related to water quality, seagrass and corals.

Ports North has been investigating these initiatives for some time and provides funding and support for the COTS eradication program, as well as various monitoring programs such as annual seagrass monitoring within Port Limits. If applicable and where practicable, the approach will be to invest and/or leverage support for existing initiatives including programs under the joint Reef Water Quality Protection Plan.

Part C of the EIS – Project Management Plans

Part C of the EIS contains four management plans that summarise and describe the environment management, mitigation and monitoring measures that will be applied during the construction, operational and decommissioning phases of the project. Each plan provides a framework for future management and monitoring activities and is structured around a standard management plan template as follows:

Element	Description
Element	Aspect of construction or operation to be managed (as it affects environmental values).
Objective	The operational policy or management objectives that applies to the element.
Performance Criteria	Measurable performance criteria (outcomes) for each element of the operation.
Implementation Strategy	The strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria and also include the implementation agency for each element of the EMP.
Monitoring	The monitoring requirements to measure actual performance (for example, specified limits to pre-selected indicators of change).
Reporting	Format, timing and responsibility for reporting and auditing of monitoring results.
Corrective Action	The action (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for action (including staff authority and responsibility management structure).
Responsibility	The person(s) responsible for action.
Timing	When certain actions should be undertaken.

The four plans include:

C1, Construction and Operational Environmental Management Plan. This plan addresses construction aspects of the project not related to dredging or placement of dredge material and operation of the port following the completion of the CSD construction stage including the management of the provision of bunker fuel.

The broad aims of the Environmental Management Plan include:

- Provide practical and achievable plans for complying with environmental requirements
- Demonstrate compliance with relevant legislative obligations
- Outline performance criteria to be met by the project
- Provide evidence to stakeholders and the community that construction and operation of the project will be managed in an environmentally sensitive manner
- Specify roles and responsibilities, monitoring regimes and corrective actions.

The EIS identified the environmental values excluding dredging and disposal, which are potentially at risk and require consideration in the EMP. These are

- Earthworks and erosion and sediment control
- Terrestrial fauna
- Terrestrial flora
- Water Quality
- Noise and vibration
- Air quality
- Visual amenity and lighting
- Waste management
- Cultural heritage
- Transport
- Greenhouse Gases

For each value identified, an environmental management strategy and actions have been developed to address potential risks that may arise. Each value has a stated environmental objective, performance criteria and management actions, monitoring, reporting and corrective actions. The structure used for the strategy and actions, as recommended in the TOR.

C2, Dredge Management Plan. This plan addresses all aspects of the dredging and placement as well as environmental management issues associated with dredge vessel mobilisation and operation.

Key aspects of the dredge management plan include:

- Identification of the likely dredge methodologies and plant that would be used to deliver the project
- Identification of dredging and placement-related mitigation commitments to minimise impacts to environmental values. For the project, specific measures proposed include:
    - Constraining hopper overflow during TSHD operations to reduce sediment plumes generated during dredging
    - Placement at the proposed highly retentive DMPA for both capital dredge material and for future maintenance dredge material to limit the amount of sediment available for re-suspension
    - Ensure the capital dredging of the channel by the TSHD is undertaken to minimise impacts on seagrass, corals, fish spawning periods and other marine environmental values
    - Developing a reactive monitoring program to be implemented during the dredging campaign. It would involve the collection of further baseline data and the formation of an expert advisory committee of scientists to oversee the design and implementation of the monitoring program.

Specific management plans are also provided in the DMP for the following issues:

- Marine Megafauna Management
- Sediment Quality
- Vessel wastewater management (including wash-down of plant and equipment)
- Ballast water and marine pest incursion management
- Vessel waste management
- Fuel management
- Noise quality
- Air quality
- Emergency planning and procedures.

C3, Vessel Transport Management Plan This plan addresses potential marine traffic and safety issues identified in relation to vessel operations associated with the construction phases of the project. During the preparation of this plan Cairns Regional Harbour Master (RHM) was consulted and his requirements and comments have been incorporated into this document.

This plan describes the measures to be implemented during the construction of the project for monitoring and controlling vessel operations to achieve the following objectives:

- Provide practical and achievable plans for the management of construction vessel operations such that vessel safety is maintained and obstruction of navigation of other traffic is eliminated/minimised
- Provide Ports North and regulatory authorities with a framework to confirm compliance with requirements
- Provide a framework for the development of contractor specific VTMP(C) to be developed by the appointed contractors
- Provide the community with evidence and assurance that the management of construction vessels will be conducted in a manner that supports safe navigation for recreation vessels at all times.

The VTMP(C) is structured to address the vessel operation requirements for the project construction as follows:

- Description of the expected vessels and marine plants that will be used for the project construction
- Vessel management measures to be addressed during the construction of the project
- Overview of legislative requirements associated with construction vessel operations
- Description of the roles and responsibilities for implementation of the VTMP(C)
- A framework for the development of contractor specific VTMP(C).

C4, Maritime Operations Management Plan. This plan addresses vessel management and navigation issues during the operational phase of the project. This MOMP has been prepared for the project in accordance with the MSQ Guidelines for Major Development Proposals (DTMR, 2013). During the preparation of this plan RHM was consulted and his requirements and comments have been incorporated into this document.

The MOMP:

- Describes Ports North's existing management arrangements for maritime activity management, environmental performance and the reduction of potential adverse impacts
- Specifies the management actions that would be taken to achieve the performance objectives
- Identifies corrective actions to rectify any deviation from performance criteria's
- Provides an action program to ensure the environmental commitments are implemented and achieved
- Provides mechanisms for complaints management, community engagement and on-going improvement.

Part D of the EIS – East Trinity Environmental Factors

As outlined in **Part A**, as a result of the outcomes of the appropriateness assessment, a full environmental impact assessment was not undertaken on the East Trinity land placement site as key indicators of appropriateness, human health and cost disproportionality as outlined under NAGD were not met by the site.

If East Trinity is subsequently deemed appropriate for further investigation more extensive assessments would need to be undertaken. **Part D** of the EIS has been prepared to provide a more detailed Review of Environmental Factors (REF) for the East Trinity site and to guide these future assessments should they be required.

Site location and description

The 940ha East Trinity site lies to the east of the Cairns CBD (and Cairns port), across Trinity Inlet and is currently held by the State as an Environmental Reserve. Historically, the East Trinity site was a small tidal wetland dominated by mangroves and samphire flats with fringing melaleucas (Smith et al: 2003). It was largely cleared in the 1970s to grow sugar cane, which led to the exposure of ASS. As a result, discharges of sulphuric acid and heavy metals occurred, degrading the site and its environmental values. In 2000, the Queensland Government purchased the site with the intent of preserving the scenic rim of Cairns and to remediate the ASS problems. Rehabilitation has been ongoing since 2000 and has substantially improved the water, soil, vegetation and wildlife on site. The site includes four creek systems that form part of the Trinity Inlet catchment. The majority of the site occurs below 1.5m Australian Height Datum (AHD).

Placement methodology

The majority of dredge material would be delivered to East Trinity in a pumped slurry form from a dredge via Trinity Inlet. The slurry would be placed within a bunded area of approximately 520 ha, and filled to an initial level of 3.2 m AHD, Treatment for acid sulphate soils and to dewater the material would then occur over a number of years before the site would be sufficiently stable so that it could be further developed. The finished ground level following dewatering and consolidation will be on average around 1.6 m – 1.7 m AHD. Regular ongoing management of the site would be required including maintenance of the bund wall, site security, groundwater and surface management, ASS monitoring and vegetation/weed management.

Environmental Values

Despite previous disturbance, the site does have considerable environmental and cultural values, which, due to the success of the rehabilitation process, now include:

- Protection of Hills Creek as part of the GBRWHA
- Listing as a Nationally Important Wetland
- A Wetland which is protected under Queensland Legislation
- Wetlands and waterways of East Trinity support the adjacent Trinity Inlet Fish Habitat Area
- Contains small areas of remnant regional ecosystems and larger areas of regrowth ecosystems, particularly mangrove and melaleuca forests
- Provision of habitat for a number of protected species including the Ant Plant (*Myrmedcodia beccarii*) crocodiles and migratory birds
- Presence of a number of sites of Indigenous cultural heritage

Site Zoning and land tenure

The site is currently zoned for rural purposes and is held as an Environmental Reserve. Planning strategies at both the local and state levels do not support use of East Trinity for alternative purposes (e.g. urban development) in the short- to medium-term. In addition, native title has been granted over land to the immediate west of the material placement area which would substantially restrict access to the site unless an Indigenous Land Use Agreement can be developed with traditional owners.

Review of Environmental Factors

The potential impacts of placement of material at East Trinity would potentially include:

- Removal of 200ha of remnant, regrowth and regenerating native vegetation communities including marine plants
- Loss of habitat for threatened species
- Loss of waterways and marine environments that support the Trinity Inlet Fish Habitat Area
- Placement in an areas susceptible to coastal hazards could lead to a loss of placed material should the bund wall fail in a storm event
- Changes to local water quality and hydrodynamics as a result of the release of tailwater to Trinity Inlet
- Adverse changes to groundwater resources and reliant ecosystems
- Release of acidic material to Trinity Inlet resulting in a decline in its health from the disturbance of existing acidity on site and unsuccessful treatment of the placed material
- Disturbance of aboriginal cultural heritage
- Loss of amenity (noise, air quality, odour and visual) for local residents of East Trinity, particularly as a result of significant vehicle movements to and from site
- Increase in traffic congestion and hazards along site access roads

There is insufficient information available about the existing environment at East Trinity upon which to make an accurate assessment of the potential impacts of the project. The Review of Environmental Factors highlights additional studies that would be required to understand the scale of the potential impacts highlighted above.

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