

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

APPENDIX B: Commonwealth Guidelines





Australian Government

**Department of Sustainability, Environment, Water, Population and Communities
Great Barrier Reef Marine Park Authority**

Environment Protection and Biodiversity Conservation Act 1999

Great Barrier Reef Marine Park Act 1975

**GUIDELINES FOR AN ENVIRONMENTAL IMPACT STATEMENT FOR THE CAIRNS SHIPPING
DEVELOPMENT (TRINITY INLET) PROJECT, IN PORT OF CAIRNS & GREAT BARRIER REEF
MARINE PARK, QUEENSLAND**

**FAR NORTH QUEENSLAND PORTS CORPORATION LTD (T/A PORTS NORTH)
(EPBC 2012/6538 / GBRMPA G35667.1)**

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1 PREAMBLE

Far North Queensland Ports Corporation Ltd (trading as Ports North) (hereafter referred to as the proponent) proposes to upgrade the existing shipping channel and associated infrastructure in the Port of Cairns and Great Barrier Reef Marine Park.

The major components of the proposed action include:

- Widening, deepening and lengthening of the existing outer shipping channel;
- Widening and deepening of the existing inner harbour channel;
- Widening of the existing Crystal Swing Basin;
- Establishment of a new shipping swing basin (Smith's Creek swing basin) to enable future expansion of the HMAS Cairns Navy base;
- Structural upgrade of the existing cruise shipping wharves (one to five);
- Installation and relocation of new and existing navigational aids, fuel supply, potable water, fire fighting services and other service utilities infrastructure;
- The proposed action will involve five million cubic metres of capital dredging during the construction phase of the project, and 580 000 cubic metres of annual maintenance dredging throughout the operation of the project;
- Expansion of the existing Dredge Material Placement Area boundaries or establishment of an alternative site to accommodate dredge material disposal; and
- Other project components as described in the referral EPBC 2012/6538.

The proposal was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) to the Minister for Sustainability, Environment, Water, Population and Communities. A delegate of the Minister determined on 4 October 2012 that approval is required, as the action has the potential to have a significant impact on the following matters of National Environmental Significance (NES) and the Commonwealth environment that are protected under Part 3 of the EPBC Act:

- a) World Heritage properties (sections 12 & 15A);
- b) National Heritage places (sections 15B & 15C);
- c) Listed threatened species and communities (sections 18 & 18A);
- d) Listed migratory species (sections 20 & 20A);
- e) Commonwealth marine areas (sections 23 & 24A);
- f) Great Barrier Reef Marine Park (sections 24B & 24C); and
- g) Commonwealth land (sections 26 & 27A).

On the same date, a delegate of the Minister determined that the proposed activity be assessed by an Environmental Impact Statement (EIS). The EIS Guidelines identify the issues that the Australian Government requires the proponent to address in the EIS.

As a component of the proposal involves an activity that requires a permission under the *Great Barrier Reef Marine Park Regulations 1983* (GBRMP Regulations), the referral under the EPBC Act is taken to be an application under the GBRMP Regulations. A single integrated

assessment will be undertaken to support decisions under both the EPBC Act and the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act).

Information about the action and its relevant impacts, as outlined below, is to be provided in the EIS. This information must be sufficient to allow the Minister to make an informed decision on whether or not to approve, under Part 9 of the EPBC Act, the taking of the action for the purposes of each controlling provision.

2 ENVIRONMENTAL ASSESSMENT AND APPROVAL PROCESS

2.1 PURPOSE OF GUIDELINES

This document is intended to set the scope of environmental, social, cultural, heritage and economic studies required in the EIS to allow for an assessment and decision of the appropriateness of the construction and operation of the Cairns Shipping Development (Trinity Inlet) Project. These Guidelines have been jointly developed by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) and the Great Barrier Reef Marine Park Authority (GBRMPA) to address assessment requirements specified in Section 102 of the EPBC Act, Schedule 4 of the *Environment Protection and Biodiversity Regulations 2000* (EPBC Regulations) (**Attachment 1**) and GBRMP Regulations 88Q and 88R (**Attachment 2**).

3 DESCRIPTION OF THE PROJECT

3.1 THE PROPOSED PROJECT AREA

The proposed development is located within the port limits of the Port of Cairns and within the boundary of the Great Barrier Reef Marine Park, in Queensland. The project footprint is located partially within the Great Barrier Reef World Heritage Area, the Great Barrier Reef National Heritage place, the Great Barrier Reef Marine Park (Commonwealth) and Great Barrier Reef Coast Marine Park (Queensland).

4 INFORMATION AND ADVICE RELATED TO THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

4.1 THE OBJECTIVES OF AN ENVIRONMENTAL IMPACT STATEMENT

Environmental impact assessment depends on adequately defining those elements of the environment that may be affected by a proposed development, and on identifying the significance, risks and consequences of the potential impacts of the proposal. The EIS will be a significant source of information on which the public and government decision-makers will assess the potential environmental impacts of the proposal.

It is expected that additional ecological and socio-economic investigations will be required to be undertaken to provide sufficient information for the EIS. The nature and level of investigations must be related to the likely extent and gravity of the potential impacts (likelihood, consequence, magnitude, extent and scale of impacts, including worst case scenarios). All potential impacts of the proposal on social, cultural, heritage and environmental values are to be investigated and analysed, and commitments to avoid, mitigate and offset (in priority order) any adverse impacts are to be detailed in the EIS.

This document provides Guidelines (or terms of reference) for the drafting of the EIS based on the formal requirements for the contents of an EIS provided in: Section 102 of the EPBC Act; Schedule 4 of the EPBC Regulations; and Sections 88Q and 88R of the GBRMP Regulations.

In preparing the EIS the proponent must consider the following aims of the EIS and public review process: to provide a source of information from which interested individuals and groups may gain an understanding of the proposal, the need for the proposal, the alternatives, the environment¹ which it could potentially affect, the impacts that may occur and the measures proposed to be taken to avoid or minimise these impacts; to provide a forum for public consultation and informed comment on the proposal; and to provide a framework in which decision-makers can consider the environmental aspects of the proposal including biophysical, cultural, social, heritage, economic, technical and other factors.

The proponent must ensure that the EIS discusses compliance with the objects of the EPBC Act and GBRMP Act, and the principles of ecologically sustainable development and use, as set out in the EPBC Act (**Attachment 3**) and GBRMP Act (**Attachment 3**).

The draft EIS prepared by the proponent must be approved for publication by the Minister prior to it being published in accordance with the EPBC Regulations. An invitation for anyone to provide comments relating to the draft report within the period specified must also be published. After the period for comment, the proponent must take account of the comments received in finalising the EIS, which is then provided to the Minister. A recommendation report for the controlled action is then prepared by DSEWPaC. GBRMPA will also prepare an assessment report for components of the proposal requiring a permission under the GBRMP Regulations. Following this, in accordance with Part 9, Division 1 of the EPBC Act, the Minister will decide whether to approve the proposal and attach any conditions required. GBRMPA cannot grant a permission for actions requiring a permission under the GBRMP Regulations if the Minister has not decided to approve the taking of that component of the proposal under the EPBC Act.

It is the responsibility of the proponent preparing the EIS to identify and address, as fully as possible, all matters relevant to this proposal and its potential impacts.

The EIS must provide a description of the existing environment in the area affected by the proposal and any decommissioning of existing infrastructure, construction, operations and future decommissioning proposed. All potential impacts on the environment are to be investigated and analysed. The EIS must present an evaluation of the potential environmental impacts using an accepted risk-based methodology and describe proposed measures to avoid, minimise or offset the expected, likely, or potential impacts. Particular attention must be given to potential impacts on the environment and listed values of the Great Barrier Reef World Heritage Area, National Heritage place and the Great Barrier Reef Marine Park, listed threatened species and communities, listed migratory species, the Commonwealth marine environment and Commonwealth land under the EPBC Act. Any prudent and feasible alternatives must be discussed in detail and the reasons for selection of the preferred option must be clearly given.

These EIS Guidelines are not necessarily exhaustive and must not be interpreted as excluding from consideration currently unforeseen matters that emerge as important from environmental studies or otherwise during the course of the preparation of the EIS.

The specific requirements to be addressed in the EIS are provided in Section 5. It is on these requirements that public comment is sought, with the earlier sections of this document providing the context.

¹ The definition for 'environment' is as stipulated under section 528 of the EPBC Act and should be considered when any reference to the 'environment' is made in the EIS.

4.2 GENERAL ADVICE

The EIS must be a stand-alone document. It must contain sufficient information from any studies or investigations undertaken to avoid the need to refer to previous or supplementary reports. The EIS is to address both the Australian Government Guidelines and the Queensland Government Terms of Reference. A cross referencing table should be provided in an Appendix to enable cross referencing of information provided in the EIS with Australian and State Government requirements. Headers and/or footers should be used on every page to denote which section the page relates to (i.e. based on the table of contents).

The EIS must enable interested stakeholders and the assessing agencies to understand the environmental consequences of the proposed development. Information provided in the EIS must be objective, clear, succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the EIS is to be written in a style that is easily understood by the general reader. Technical jargon must be avoided wherever possible and a full glossary included. Cross-referencing should be used to avoid unnecessary duplication of text.

If it is necessary to make use of material that is considered to be of a confidential nature, the proponent must consult with the Department on the preferred presentation of that material, before submitting it to the Minister for approval for publication.

Detailed technical information, studies or investigations necessary to support the main text must be included as appendices issued with the EIS. Any additional supporting documentation and relevant studies, reports or literature not normally available to the public from which information has been extracted must be made available at appropriate locations during the period of public display of the EIS.

An executive summary must be provided in the EIS and made available as a stand-alone document for public information.

The EIS must state the criteria adopted in assessing the proposal and its potential impacts, such as: compliance with relevant legislation, policies, standards and best practice; community views; maximisation of environmental benefits (if any); and minimisation of risks and harm.

Any and all unknown variables or assumptions made in the assessment must be clearly stated and qualified. The extent to which the limitations, if any, of available information may influence the conclusions of the environmental assessment must be discussed.

The proponent must ensure that the personnel providing information to address this EIS have the relevant qualifications and experience in their relevant fields.

The EIS must comprise three elements:

- a) The executive summary;
- b) The main text of the document, written in a clear and concise manner so as to be readily understood by general readers; and
- c) Appendices containing:
 - i. a table cross referencing Australian Government and if applicable State EIS requirements (by section number and page number(s)) with an EIS table of contents;
 - ii. a copy of these Guidelines; and
 - iii. detailed technical information.

Part 5 of these Guidelines details the Australian Government requirements for the EIS and has been set out in a manner that may be adopted as the format for the EIS. This format need not be followed where the required information can be more effectively presented in an alternative way. However, all requirements set out in the EPBC Act and Regulations and GBRMP Act and Regulations must still be addressed.

The EIS must be written so that any conclusions reached can be independently assessed. To this end all sources must be appropriately referenced.

5 SPECIFIC CONTENT REQUIREMENTS

An extract of Schedule 4 of the EPBC Regulations, which sets out the matters that must be addressed in an EIS, is provided at **Attachment 1**. An extract of the GBRMP Regulations 88Q and 88R, which set out considerations for deciding whether or not to grant a permission, is provided at **Attachment 2**. The following content requirements are based on these matters and considerations, with the addition of directions specific to the proposed action and the receiving environment. Requirements on presentation and consultation, that have proven valuable in communicating with members of the public and specific interest groups, are also included.

5.1 EXECUTIVE SUMMARY

An executive summary that outlines the key findings of the EIS must be provided. The executive summary must briefly:

- a) State the background and the need for the proposal;
- b) Discuss alternatives and the reasons for selecting the preferred option and rejecting the alternatives;
- c) Summarise the pre-construction, construction, operational activities and any decommissioning associated with putting the proposal into practice;
- d) State the proposed schedule for each key component of the proposal, the relationships and interdependencies between each stage, the expected duration of each stage and the proposal as a whole;
- e) Provide an overview of the existing regional and local environments, summarising the features of the physical, biological, social, cultural and economic environment relating to the proposal and associated activities;
- f) Summarise stakeholder consultation undertaken in preparing the EIS;
- g) Describe the expected, likely and potential impacts of the proposal on matters of National Environmental Significance and Commonwealth land, the physical, biological, social, cultural and economic environment during pre-construction, construction, operational and post-operational phases;
- h) Summarise the environmental protection measures and safeguards, mitigation measures, offsets and monitoring to be implemented for the proposal; and
- i) Provide an outline of the environmental record of the proponent.

5.2 OBJECTIVE

The objectives of the EIS must be clearly stated and include specific reference to EPBC Act and GBRMP Act legislative requirements.

5.3 GENERAL INFORMATION

The EIS is to provide the background of the proposed development. This is to include:

- a) The title of the proposal;
- b) The full name and postal address of the designated proponent;
- c) A clear outline of the proposal;
- d) The location of the proposal;
- e) The background to the development of the proposal;
- f) How the proposal relates to/relies on any other developments (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region;
- g) The current status of the proposal;
- h) Prudent and feasible alternatives to the proposed action, including scale, configuration and staging options;
- i) The consequences (to the proponent and the environment) of not proceeding with the proposal or components of the proposal and/or the consequences of other projects (that this action relies upon) not proceeding;
- j) A brief explanation of the scope, structure and legislative basis of the EIS;
- k) The specific EPBC Act and GBRMP Act matters affected by the proposal; and
- l) A description of government planning policies, statutory controls and agreements which will influence the proposal. All applicable jurisdictions and areas of responsible authorities within the area (both terrestrial and marine) must be listed and shown on maps at appropriate scales.

5.4 THE PROPOSAL DESCRIPTION

This section must describe the proposal in sufficient detail to allow an understanding of all stages (including interdependencies between stages) and components of the proposal, and determine potential environmental impacts associated with the proposal. Those elements with potential implications for matters protected under Part 3 of the EPBC Act must be highlighted.

All pre-construction, construction, operational and decommissioning stages (short and long term) must be described in detail. This includes, but is not limited to, the date or time period over which construction will take place, details of the locations of each component of the proposal (i.e. the precise location (including GPS coordinates) of all works to be undertaken and/or the footprint area(s)), dimensions of structures/vessels to be built and materials, equipment to be used as well as construction access requirements, lay down/set down areas and elements of the action that may have impacts on matters of National Environmental Significance and Commonwealth land.

A discussion of the assumptions underlying the predicted operation of the proposal and associated changes in the activities undertaken in the surrounding environment must be provided. Details of proposed preventative measures including monitoring and enforcement programs to help limit the impacts of the ongoing operations on matters of National Environmental Significance and Commonwealth land must also be addressed.

5.5 PROJECT DETAILS

The description of the proposal must cover:

- a) The environmental principles on which the development will be managed;
- b) All the components of the proposal including:
 - i. Site selection including the choice of region for the project and site within that region, an analysis of prudent and feasible alternative sites and why this site is likely to have the least impact on matters of National Environmental Significance and Commonwealth land;
 - ii. Describe all feasible, environmental, economic alternative site options for the proposal (e.g. through a multi-criteria analysis);
 - iii. Development options, including an explanation of prudent and feasible alternatives;
 - iv. Associated permanent and temporary infrastructure, including transport networks/corridors (both land, estuarine and marine); anchoring and mooring structures, including any vessel cyclone moorings;
 - v. All construction activities, including dredging and dredged material disposal requirements and an explanation of required engineering processes;
 - vi. Any decommissioning activities, including an explanation of required engineering processes;
 - vii. Operation, including details of the expected vessel numbers for each stage of the proposed development;
 - viii. Related maintenance activities, both long and short term, including dredging and dredged material disposal requirements; and
 - ix. Decommissioning.
- c) Describe the local and regional economic, social and built context, including historical and future trends (e.g. Australian Bureau of Statistics and *Great Barrier Reef Outlook Report 2009*), in which this project is proposed;
- d) Future development areas that are currently “greenfield” in the region and the likely nature and timing of development, (including but not limited to strategic port development lands, state development areas);
- e) Describe the overall planning context in which the proponent’s decisions for this project have been made (including the overarching plan in which this project sits within);
- f) A detailed description of social and economic impacts and drivers for the proposal;
- g) The precise location of works to be undertaken (including specific footprint area(s)), structures to be built or other elements of the proposal that may have impacts on the environment. Aerial photographs, maps, figures and diagrams must be incorporated where appropriate;
- h) A general location map that includes the location of other known or potential future developments occurring in and around the Port of Cairns;
- i) The following maps and figures must be provided in relation to the Great Barrier Reef Marine Park and Great Barrier Reef World Heritage Area:
 - i. A detailed map showing the boundary of the Great Barrier Reef Marine Park and Great Barrier Reef Coast Marine Park, including the Great Barrier Reef Zoning for Cairns Zoning Map MPZ 5 in relation to the proposed development footprint of the project, including the dredge footprint, offshore

- dredged material disposal ground, and other components of the project. This map or figure must include an explanation of the basis for the zoning in this area²;
- ii. Detailed maps showing Fish Habitat Areas, areas described in the *Queensland Coastal Plan 2012*, seagrass areas, acid sulphate soil areas, storm surge and tidal inundation areas;
 - iii. Detailed maps showing wetlands, including wetlands of national importance;
 - iv. Detailed maps showing the presence of any at-risk habitats, species and groups of species as identified in the *Draft Great Barrier Reef Biodiversity Conservation Strategy 2012*;
 - v. A map showing the location of the proposal in relation to the Great Barrier Reef World Heritage Area and National Heritage place;
 - vi. A map showing shipping lanes within the Great Barrier Reef Marine Park and Great Barrier Reef World Heritage Area in relation to the project footprint as described in (i); and
 - vii. Simulated viewfields of the proposal (including Trinity Inlet infrastructure and operations within the Great Barrier Reef World Heritage Area) showing its visual impact from various aspects including the adjacent coastline, nearby inhabited islands, and offshore.
- j) Reference must be made to detailed technical information in appendices where relevant;
- k) How the works are to be undertaken and design parameters for all aspects of the structures or elements of the proposal. This must include:
- i. An explanation of the anticipated timetable for pre-construction activities, construction, operation and any decommissioning;
 - ii. Details of construction and operational equipment to be used;
 - iii. Details of the environmental parameters (incorporating predictions of climate change and 'worst case scenarios') the structures are designed to withstand, based on the expected life of assets; and
 - iv. A summary of the design aspects that will be employed to minimise impacts on environmental, social, cultural and heritage values.

5.6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE AND THE COMMONWEALTH ENVIRONMENT

In relation to matters of National Environmental Significance and Commonwealth land listed as controlling provisions for the proposal, an inventory of surveys, whether office-based or field-based, must be provided. These may be provided as appendices, but must at least be fully referenced and must be made publicly available. Any anticipated future surveys to be conducted in relation to matters of National Environmental Significance and Commonwealth land, whether office-based or field-based, must also be discussed.

Output from the protected matters search tool (accessible from DSEWPaC's website) must be also included as an appendix. The results, indicating the presence of matters of National Environmental Significance and Commonwealth land, must also be provided. Any species or

² http://www.gbrmpa.gov.au/__data/assets/pdf_file/0016/6172/gbrmpa_report_on_zoning.pdf

values considered likely or known to occur in areas impacted by the controlled action must be addressed. The description of matters of National Environmental Significance and Commonwealth land must focus on, but not be limited to the following controlling provisions:

- a) World Heritage Properties (sections 12 & 15A);
- b) National Heritage Places (sections 15B & 15C);
- c) Listed threatened species and ecological communities (sections 18 & 18A);
- d) Listed migratory species (sections 20 & 20A);
- e) Commonwealth marine areas (sections 23 & 24A);
- f) Great Barrier Reef Marine Park (sections 24B & 24C); and
- g) Commonwealth land (sections 26 & 27A).

5.7 ALTERNATIVES TO THE PROPOSAL

This section must describe, to the extent reasonably practicable, any prudent and feasible alternatives to the proposal. For each alternative listed the proponent should provide the project details, impacts (positive and negative), location, scale, configuration and staging options. Sufficient detail must be provided to make clear why any alternative is preferred to another. This section must describe, but not be limited to the following:

- a) The alternative of taking no action or not proceeding with components of the proposal;
- b) Potential alternative locations for all components of the proposal, as well as different components of the proposal;
- c) Potential alternative configuration or scale options for key components of the proposal;
- d) Describe options for integrating operations with existing infrastructure where they exist to mitigate impacts on the general environment, ecosystems and matters of National Environmental Significance and Commonwealth land;
- e) A comparative description of the adverse and beneficial impacts of the development as a whole, each component of the development, and location on the matters protected by the controlling provisions for the proposal;
- f) A description of how each stage would be affected if one or more of the stages does not occur or is significantly modified;
- g) A description of how each component would be affected if one or more of the components does not occur or is significantly modified;
- h) The reasons for choosing the preferred location and option for the development as a whole, and each key component of the proposal, must be explained. The explanation must include a comparison of the adverse and beneficial effects used for selecting the preferred location and option, and compliance with the objectives of the EPBC Act and GBRMP Act (including the principles of ecologically sustainable development and use);
- i) The advantages and disadvantages of alternatives when considered against relevant matters protected under the EPBC Act and GBRMP Act, including critical issues identified in the *Great Barrier Reef Outlook Report 2009*, must be specifically addressed; and
- j) Short, medium and long-term advantages and disadvantages of the options must be considered.

5.8 CONSULTATION

The proponent is required to consult with all stakeholders including Traditional Owners, with a particular focus on individuals/sectors that may be affected by the proposal (affected parties), as part of the EIS process. Details of any consultation about the action must be provided. This is to include:

- a) Any consultation that has already taken place including details on the frequency, forum and timeframes provided for consultation;
- b) Identification of affected parties, including a statement mentioning any individuals/sectors/ communities that may be affected and a summary of their views;
- c) Proposed consultation about relevant impacts of the action;
- d) If there has been consultation about the proposed action, details of the issues discussed, including the views of the affected parties and any documented response to, or result of, the consultation;
- e) Details on how affected parties comments received during consultations have been addressed in the EIS; and
- f) Any further proposed consultation about potential impacts of the action.

5.9 THE EXISTING ENVIRONMENT

This section must provide a description of the project area including baseline condition and trends of coastal, terrestrial and marine environments, including hydrology, sediment characteristics, sediment flows, geography, flora and fauna, cultural and heritage values, and all relevant socio-economic considerations. This section must link to the proposal description, potential impacts, and proposed avoidance, mitigation, adaptive management framework and/or offset measures throughout the life of the project including pre-construction, construction, operation, and any decommissioning. This section is to also identify and reference any relevant (published and unpublished) studies undertaken in the area which will assist in describing patterns and trends in the environment.

The section must include a description of the environment of the proposal site and the surrounding areas that may be affected by the action. This must include the following information:

- a) Any listed threatened and/or migratory species and ecological communities that are likely to be present in the vicinity of the site (including but not limited to sawfish, marine turtles, inshore dolphins (including Australian Snubfin Dolphin, *Orcaella heinsohni*), cetaceans, dugong, migratory birds and shore birds, Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland, and Littoral Rainforest and Coastal Vine Thickets of Eastern Australia);
- b) At a minimum the following details must be included:
 - i. Details of the scope, timing (survey season/s) and methodology for studies or surveys used to provide information on the listed species/community/habitat at the site (and in areas that may be impacted by the project); and
 - ii. Include a summary of the location, size and breeding status of threatened and migratory species listed under the EPBC Act which are likely to occur in the area affected by the proposal.
- c) Information on listed ecological communities, threatened and migratory species, including foraging, roosting, resting and nesting habitats, must include but not be limited to:

- i. Describe and map critical habitat for threatened species, ecological communities and migratory species;
 - ii. The importance of habitat (including habitat utilisation) in a local, regional, national and international context;
 - iii. The status of the population (e.g. abundance) in the area likely to be affected by the proposed development relative to other areas outside the area likely to be affected;
 - iv. Genetic diversity;
 - v. The viability of the local, regional and overall populations;
 - vi. Local and regional representation;
 - vii. Conservation and biodiversity values;
 - viii. Economic, social and cultural values of species;
 - ix. The extent (in hectares) of any areas of important or unique habitat; and
 - x. Seasonal influences.
- d) Identify the desired conservation outcomes that the project has for matters of National Environmental Significance;
 - e) Describe the biophysical/regional conditions that are required for matters of National Environmental Significance and Commonwealth land to be maintained and that are required to reach articulated conservation objectives for matters of National Environmental Significance;
 - f) Identify factors that influence matters of National Environmental Significance and Commonwealth land including human-induced and natural factors (e.g. climate change, cyclones, flooding);
 - g) Describe and quantify natural variability of matters of National Environmental Significance and Commonwealth land where adequate data is available or can be sourced;
 - h) Describe the extent to which the general environment, ecosystems and matters of National Environmental Significance and Commonwealth land are already stressed by natural and anthropogenic effects;
 - i) A description of the World Heritage and National Heritage values of the Great Barrier Reef World Heritage Area and National Heritage place relevant to the action;
 - j) A description of the Commonwealth land environment and identification of those aspects of the Commonwealth land environment potentially affected by the proposal;
 - k) A description of the Commonwealth marine environment and identification of those aspects of the Commonwealth marine area potentially affected by the proposal, including but not limited to baseline data on listed threatened species, migratory species and marine species and any other species of conservation significance, including cetaceans;
 - l) Description of biota/biotic habitats, including a map of marine/intertidal habitats (including information on seasonal fluctuations e.g. seagrass prevalence), likely to be affected by the proposed development;
 - m) A description of important wetlands in the area, particularly Wetlands of National Importance;

- n) A description of the at-risk species, groups of species and/or habitats as identified by the *Draft Great Barrier Reef Biodiversity Conservation Strategy 2012* that are likely to be affected by the proposed development;
- o) Identify, describe and map environments important to the health of the Great Barrier Reef Marine Park, including terrestrial and intertidal habitats (including but not limited to interesting habitat of marine turtles and habitat for inshore dolphin species) that are likely to be affected by the proposed development;
- p) Identify, describe and map reef communities³ and those species supported by the reef communities in areas likely to be affected by the proposed development, including information on species diversity and abundance;
- q) Identify, describe and map seagrass communities in areas likely to be affected by the proposed development, including information on species diversity, seasonality and abundance;
- r) Identify, describe and map soft sediment fauna communities (e.g. infauna, benthic invertebrates) in areas likely to be affected by the proposed development, including information on species diversity, seasonality and abundance;
- s) Describe oceanographic conditions in the region, especially those which may have a bearing on the proposal. Include information on seasonal variation, waves, tides, currents, water salinity, clarity, temperature and depths. Discuss the frequency and severity of weather conditions such as storms and cyclones, for two, ten and 100 year conditions; and
- t) Identify and describe the existing uses of the area and nearby areas that may be affected by the proposed action (e.g. tourism, commercial and recreational fishing, research and traditional use activities), including any amenity issues.

All habitat maps must be produced at a sufficiently fine scale and as accurately as possible, considering their primary purpose and end use. (For example; to evaluate habitat loss and inform locations of monitoring and reference sites).

5.9.1 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

Discussion of the socio-economic and cultural environment must provide (however should not be limited to):

- a) Baseline demographic information of the affected communities (e.g. from Australian Bureau of Statistics, Queensland Office of Economic and Statistical Research, Bureau of Rural Sciences) and a detailed description of all stakeholders, together with key social, economic and cultural issues related to the proposal (from community and stakeholder perspectives);
- b) A description of all historical, current and projected types of use and users, including patterns and trends in use, of the development area and Great Barrier Reef Marine Park zones. Include a discussion of scientific research, commercial and non-commercial tourism, commercial, traditional and recreational fishing activities as well as non-fishing recreational activities;
- c) A description of local, State and Australian Government planning policies and statutory controls which will influence the project, surrounding areas of future, planned and current use. All applicable jurisdictions and areas of responsible authorities within the area must be listed and shown on maps at appropriate scales;

³ A reference to reef communities includes all Great Barrier Reef ecosystem components including corals, algae, mangroves, soft sediment habitats etc (as per the *Great Barrier Reef Outlook Report 2009*).

- d) A description of any places with known or anticipated heritage, social or cultural values (including any Traditional Use of Marine Resource Agreements), such that they have been recognised with listing or recording under relevant State or Commonwealth legislation or are anticipated to be listed under such legislation;
- e) Information on the location (past and present considering sea level rise) and importance of sites and features of cultural significance, including anthropological and archaeological sites or features of significance to the Traditional Owners in of the area. A description of how these sites and features were identified must be provided; and
- f) A description of the Native Title status of the area in relation to the land and surrounding waters.

5.10 RELEVANT IMPACTS OF THE PROPOSED ACTION

The EIS must include a description of all of the relevant impacts⁴ of the action. Relevant impacts (both direct and indirect) are impacts that the action will have or is likely to have on a matter protected by a controlling provision (as listed in the preamble of this document). This section must provide clear linkages with the existing environmental values described in section 5.9 and proposed avoidance, safeguards, management and mitigation measures described in section 5.11. Impacts during all phases of the project must be addressed. This section must include:

- a) A description of the framework used to assess impacts, including risk assessment processes based on an approved standard;
- b) A detailed assessment of the nature, extent, likelihood and consequence of the likely short-term and long-term impacts including but not limited to: description of the risks and potential impacts (acute and chronic) from geotechnical activities (such as blasting and pile driving), impacts of increased marine underwater noise on marine species, including the impacts from noise at varying distances from each project component (considering the environmental variables e.g. depth, wave height, bottom profile); impacts from the proposal on air quality impacts; dredging and dredged material disposal impacts and impacts from increased shipping;
- c) A statement whether any relevant impacts are likely to be unknown, unpredictable, irreversible or sub-lethal (reversible over time) and what confidence level is placed on the predictions of relevant impacts;
- d) Analysis of the significance of the impacts;
- e) Any technical data, including modelling, and other information used or needed to make a detailed assessment of the relevant impacts;
- f) A risk assessment of changing climate patterns that may affect the proposal and surrounding environment and a description of the preferred and alternative adaptation strategies to be implemented;
- g) In discussing potential impacts, consider how the interaction of extreme environmental events (e.g. cyclones, coral bleaching, flood events) and any related cumulative impacts may impact on the proposal and the environment (both independently and cumulatively);
- h) Consideration of potential impacts throughout the life of the proposal – from pre-construction, construction through to operation and any decommissioning;

⁴ Please refer to section 527E of the EPBC Act for the meaning of impact.

- i) Impacts, including any downstream impacts of the proposed action on water quality, seagrass habitats, wetlands and Fish Habitat Areas and adjacent reef communities and island communities;
- j) Impacts to the sea floor through anchoring and/or direct placement of material/infrastructure, sediment disturbance. The GBRMP zone of likely seabed disturbance must be identified;
- k) Impacts of anticipated illumination on marine fauna particularly seabirds, marine turtles and other migratory species, including impacts on nesting and disorientation;
- l) Impacts on the existing use of the area and nearby areas that may be affected by the proposed action;
- m) Impacts on amenity (including from the mainland, air, vessels and surrounding islands);
- n) A description of anticipated positive and negative social, cultural and/or economic impacts of the proposal on key stakeholder groups and individuals. This should include a consideration of anticipated changes in the social, cultural and heritage values of the GBRMP;
- o) An assessment of all impacts to known and potential historic shipwrecks in accordance with the *Historic Shipwrecks Act 1976*;
- p) A description of how components of the project may impact upon listed threatened and/or migratory species and their habitat, as well as any listed ecological communities;
- q) Impacts on any at-risk species, groups of species and habitats as identified in the *Draft Great Barrier Reef Biodiversity Conservation Strategy 2012* that may be affected by the proposed action; and
- r) A risk assessment and description of potential impacts, including (but not limited to) spills, the construction and operation of the proposed Heavy Fuel Oil Storage tank and associated new fuel storage infrastructure and pipeline from the fuel storage area to the cruise wharf. The risk assessment must incorporate three-dimensional stochastic modelling of potential spills including likely and worst case scenarios.

5.10.1 IMPACTS TO LISTED VALUES OF THE GREAT BARRIER REEF WORLD HERITAGE PROPERTY

Provide an assessment of all potential and likely impacts to the World Heritage values of the Great Barrier Reef World Heritage Area that have been identified in the vicinity of the proposal. This assessment must include an analysis of the impacts at all stages of the proposal on the expression of the values at this location and how this in turn impacts on the overall values of the Great Barrier Reef World Heritage Area.

Provide an analysis of direct, indirect and relevant impacts of the proposal on the integrity and Outstanding Universal Value of the Great Barrier Reef World Heritage Area.

5.10.2 IMPACTS TO LISTED VALUES OF THE GREAT BARRIER REEF NATIONAL HERITAGE PLACE

Provide an assessment of all potential and likely impacts to the National Heritage values of the Great Barrier Reef National Heritage place that have been identified in the vicinity of the proposal. This assessment must include an analysis of the impacts at all stages of the proposal on the expression of the values at this location and how this in turn impacts on the overall values of the Great Barrier Reef National Heritage place.

5.10.3 IMPACTS TO LISTED MIGRATORY SPECIES, THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

Provide an assessment of all potential and likely impacts to listed migratory species, threatened species and ecological communities that have been identified in the vicinity of the proposal. This assessment must include an analysis of the impacts at all stages of the proposal.

5.10.4 IMPACTS TO THE COMMONWEALTH MARINE ENVIRONMENT

Provide an assessment and discussion of the potential direct, indirect and consequential impacts of the proposed action on the Commonwealth marine environment.

5.10.5 IMPACTS TO THE GREAT BARRIER REEF MARINE PARK

Provide an assessment and discussion of the potential direct, indirect and consequential impacts of the proposed development on the environment and values of the Great Barrier Reef Marine Park (with regards to **Attachments 2 and 3**).

5.10.6 IMPACTS TO THE COMMONWEALTH LAND ENVIRONMENT

Provide an assessment of all potential and likely impacts to the environment of Commonwealth land from the proposed action. This assessment must include an analysis of the impact of the action on existing and predicted future activities, including those undertaken by the Department of Defence operation, HMAS Cairns.

5.10.7 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

The EIS must identify and address cumulative impacts⁵, where potential project impacts are in addition to existing impacts of other activities (including known current and future expansions or developments by the proponent and other proponents in the region and vicinity).

The EIS must also address the potential cumulative impact of the proposal on ecosystem resilience. The cumulative effects of climate change impacts on the environment must also be considered in the assessment of ecosystem resilience. Where relevant to the potential impact, a risk assessment must be conducted and documented.

The risk assessment must include known future expansions or developments by the proponent and other proponents and known impacts on ecosystem resilience, matters of National Environmental Significance and Commonwealth land. Information on cumulative impacts may include as appropriate, but not be limited to:

- a) Description of existing, planned or potential developments (including construction status) of a similar type and scale to the proposed development, that have been approved within the last five years or are still under assessment with emphasis on those in the region that have, will have or are likely to have impacts on the same matters of National Environmental Significance and Commonwealth land;

⁵ Please refer to section 527E of the EPBC Act for the meaning of impact.

- b) Description of any current or likely development precincts or zones in the region, their relationship to the proposed development and the likely cumulative impacts on the general environment, ecosystems, matters of National Environmental Significance and Commonwealth land as all projects are developed to capacity;
- c) Discussion of the impacts of other tourism, residential, industrial and infrastructure projects both directly and indirectly related to the proposal in a regional context;
- d) Discussion of the range of developments which will be facilitated or impacted (either positively or negatively) by the proposal and if the project will result in an intensification of development in the region;
- e) Discussion of known impacts on ecosystem resilience, including reference to issues identified in the *Great Barrier Reef Outlook Report 2009* (e.g. rising sea temperatures, ocean acidification, Crown-of-thorns starfish and increasing severity of cyclone events);
- f) Discussion and analysis of the cumulative impacts of this proposal on the integrity and Outstanding Universal Value of the Great Barrier Reef World Heritage Area;
- g) Discussion of existing and known and/or predicted increases in shipping in the region, the relationship to the proposed development and the likely cumulative impacts on matters of National Environmental Significance and Commonwealth land;
- h) Discussion of any potential future changes to the development which are likely to change the nature or scale of environmental impacts;
- i) Outline if existing impacts on the environment in general and matters of National Environmental Significance and Commonwealth land will be amplified by the action in combination with impacts of other projects;
- j) Discussion of the developments and activities which are likely to be facilitated by the proposal;
- k) Identify if the resulting impacts on the general environment, ecosystems and matters of National Environmental Significance and Commonwealth land could be unacceptable;
- l) Identify if these impacts on the general environment, ecosystems, matters of National Environmental Significance and Commonwealth land could be permanent. If the impacts on matters of National Environmental Significance and Commonwealth land are not permanent, describe how long it will take before recovery from the effect;
- m) Describe how the cumulative impact of the proposed project will impact on the reproductive capacity and/or survival of listed threatened and migratory species;
- n) Explain how much recovery of matters of National Environmental Significance and Commonwealth land population, habitat, ecosystems, and the environment in general could occur, with and without mitigation (e.g. complete, partial, none);
- o) Describe how soon restoration of habitat could be achieved to reinstate ecosystem function for matters of National Environmental Significance;
- p) Where possible, identify how much likely change to matters of National Environmental Significance and Commonwealth land exceeds natural variability in the region;
- q) Describe how this project will contribute to the desired conservation objectives for matters of National Environmental Significance;
- r) Describe how housing, workforce and local and regional community changes as a result of the development; and
- s) In conducting the risk assessment, key information sources and indicators for assessing change and impact must be described.

5.10.8 CONSEQUENTIAL IMPACTS

Provide a detailed assessment of any likely impacts⁶ that this development may facilitate on the following (at the local, regional, state, national and international scale):

- a) The World Heritage values of the Great Barrier Reef World Heritage Area;
- b) The National Heritage values of the Great Barrier Reef National Heritage place;
- c) Listed threatened species and ecological communities;
- d) Listed migratory species;
- e) The Commonwealth marine environment;
- f) The environment and values of the Great Barrier Reef Marine Park, including coastal ecosystems that provide a function in maintaining the health of the Great Barrier Reef; and
- g) The environment of Commonwealth land.

5.10.9 DREDGING AND DREDGED MATERIAL DISPOSAL RELATED IMPACTS

The EIS must provide an assessment of all dredging and dredged material disposal related elements of the project and its impacts, including but not limited to the following:

- a) Review of the historical use of the dredge disposal ground/s to be used by the proponent, including but not limited to:
 - i. location, volume, timing, nature of material and equipment used;
 - ii. identification of direct and indirect impacts of dredge material disposal over time; and
 - iii. an assessment of alternatives to the current dredge disposal ground.
- b) Detailed evaluation of all potential disposal options in accordance with the *National Assessment Guidelines for Dredging 2009* (NAGD 2009) and Annex 2 of the *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, 1972* (as amended in 2006) (London Protocol), identification of the preferred disposal option(s) and explanation of how the preferred option was selected;
- c) The amount to be dredged and a map of the dredge footprint and locations for proposed disposal. The map must also indicate the proposed staging of dredging activities;
- d) The type and method of dredging proposed with the expected length and timing of the dredging activities;
- e) Discussion of proposed dredging equipment and methodology;
- f) Other uses of the dredged material including any re-use, recycling or possible future use;
- g) Assessment of sediment according to the NAGD 2009. This must include an assessment of the suitability of this material for land deposition and offshore disposal at any proposed dredged material disposal ground;
- h) Assessment of the risk and potential impacts of acid sulfate soils (ASS) and potential acid sulfate soils (PASS);

⁶ Please refer to section 527E of the EPBC Act for the meaning of impact.

- i) Consideration of potential impacts of mobilised sediments (e.g. metal or contaminant release);
- j) Details of future maintenance dredging and disposal requirements over the life of the project;
- k) Details of any previous sea dumping permits applied for including dates and volumes and whether the permit was for capital dredging or maintenance dredging;
- l) Detailed descriptions of potential impacts on the marine habitats and species within the proposed dredge footprint and disposal areas, including but not limited to assessment of seagrass and species that depend on it, and those at-risk species, groups of species and habitats as identified by the *Draft Great Barrier Reef Biodiversity Conservation Strategy 2012*, including any marine flora and fauna protection measures proposed;
- m) The characteristics of the dredged material disposal area(s) proposed including the history of the site and the predicted fate of the material after disposal and over time and the potential zone of impact;
- n) Detailed descriptions of both the direct and indirect impacts along with an assessment of the reversibility of those impacts are to be included in predictions of impacts associated with the activity of dredging and disposal on marine habitats and species⁷;
- o) Predictive, fully three dimensional modelling of indirect impacts of dredge generated sediments within the Great Barrier Reef Marine Park must be undertaken in accordance with the *GBRMPA Guidelines for the Use of Hydrodynamic Numerical Modelling for Dredging Projects in the Great Barrier Reef Marine Park (Attachment 4)*.
- p) Predictive, fully three dimensional modelling of indirect impacts of dredge generated sediments must include:
 - i. Hydrodynamic modelling;
 - ii. Sediment transport modelling where the range of particle fractions (sand, silt and clay) are all modelled;
 - iii. Modelling must include all types of resuspension possibilities including currents and wave-induced bottom shear stresses as well as wave induced mud fluidisation. If not modelled a justification as to why this phenomena was not relevant for that site;
 - iv. Ecological impact predictions. Lethal and sub lethal thresholds used for the ecological impact predictions must be clearly indicated and substantiated with relevant scientific peer reviewed articles. This may be presented as zones of impact (high, moderate and influence);
 - v. Testing the sensitivity of ecological impact predictions to different pressure thresholds and considering seasonal effects must also be undertaken to understand the likely range of prediction outcomes;
 - vi. Proponent to provide results of modelling in a suitable electronic format (i.e. shapefiles);
 - vii. The modelling must represent the conditions at the time of year in which the dredging will actually occur. If this is not known then modelling must be undertaken for all seasons (i.e. wet season conditions, dry season

⁷ *The Environmental Assessment Guideline for Marine Dredging Proposals, September 2011*, prepared by the Environmental Protection Authority, Western Australia, is an example of a document that presents guidance on predicted impacts of dredging activities on benthic communities and habitats.

conditions and transitional conditions) depending on prevalent oceanographic conditions; and

- viii. The modelling should demonstrate total suspended solids (TSS) at the surface, mid depth and within one metres of the sea floor, and predicted sedimentation rates within the zones of impact.
- q) Modelling must include likely dispersion and re-suspension from both dredging operations and dredge material disposal during a range of probable hydrodynamic conditions, weather events (including cyclones) and expected dredge equipment scenarios;
- r) Site selection of dredge disposal site (even if a historic site) must be justified and compared to other possible sites with a prediction for re-suspension and possible direction and distance of the migration of the dredged material under different current conditions;
- s) Model outputs must use a spatially based scheme that provides for a clear and consistent way of describing and presenting the extent, severity and duration of predicted impacts of dredging and material disposal and must include likely "best case" and likely "worst case" scenarios;
- t) Modelling must be independently peer reviewed. Information relating to the peer review, including the Terms of Reference and the peer reviewer's report must be included as part of the EIS documentation; and
- u) Describe future maintenance dredging and disposal requirements over the life of the project, including:
 - i. Impacts to benthic habitat, in particular benthic primary producer habitat (BPPH), must be described. The benthic habitat must be mapped and the potential impacts must be described, taking into consideration the sediment plume modelling. Cumulative impacts of the entire dredge operation and likely maintenance dredging requirements must be described; and
 - ii. Identify the potential vectors and risks of introducing marine invasive species through vessels involved in dredging operations; and how these risks will be appropriately managed. Must include but not be limited to ballast water, entrainment of mud and sediment and biofouling in dredge equipment and ancillary fitting, niche areas, internal seawater systems, vessel history, previous work locations and maintenance history.

5.10.10 LAND BASED DISPOSAL

- a) Describe any prudent and feasible alternatives to any proposed land disposal (such as beneficial re-use). For each alternative listed the proponent must detail the impacts (positive and negative), location, scale, and configuration;
- b) A plan of the proposed land on which material is to be disposed, drawn to an appropriate scale, showing the following information:
 - i. the boundary of the disposal area, tied to real property boundaries;
 - ii. the location of the line of mean high water spring tide and highest astronomical tide in relation to the disposal area;
 - iii. location of marine and terrestrial plants and species habitat within and surrounding the disposal area;

- c) The method, location and issues associated with the disposal of dredged material must be described including:
- i. for land-based dredge material disposal, a detailed description of potential methods, location issues/risks must be presented.

Consideration must be given to:

- i. quantities and quality of tail water likely to be generated from dredging activities and the rate of their discharge;
- ii. the settling rate of fine sediments from all dredge material types;
- iii. the residence time within settling ponds prior to discharge (related to dredge pumping rate, ratio of solids to water in dredged material, settling rates, available capacity of the disposal and settling areas, potential bulking factor, intensity and duration of rainfall events with consideration given to the worst case scenario for these factors); and
- iv. source of material for bunds and bund wall stability.

5.10.11 INCREASED SHIPPING

- a) In relation to the projected increase in shipping, at a minimum, details of the following must be discussed:
- i. Describe current vessel numbers and type utilising the port, their size, speed, shipping movements, anchorages, access to/from the port and navigational arrangements;
 - ii. Describe projected total vessel movements (including any barges) at each stage of the project, including at the completion of the project. Include a comparison with total shipping movements through the Great Barrier Reef World Heritage Area and National Heritage place and Great Barrier Reef Marine Park; and
 - iii. Shipping routes to be used by vessels beyond the port in Commonwealth marine waters. These must be indicated on a map in relationship to the Great Barrier Reef World Heritage Area and National Heritage place and Great Barrier Reef Marine Park, and to the main shipping channels and any other navigational arrangements.
- b) In regard to increased shipping volumes, the following must be specifically addressed:
- i. Potential for introduction of marine invasive species from increased shipping rates;
 - ii. Potential increase in ship groundings and related impacts;
 - iii. Potential increased risk of vessel collisions and related impacts;
 - iv. Potential for increased vessel strike to marine species;
 - v. Ballast water management arrangements - including Australian Quarantine and Inspection Service (AQIS) mandatory arrangements and agency contingency planning;
 - vi. Management of ship waste, in particular quarantine waste, domestic garbage, oil and sewage;
 - vii. Potential risk of oil, chemical and other hazardous and noxious substance spills and their management, including three-dimensional stochastic modelling of likely

and potential worst case spill scenarios. Models must incorporate seasonal variations;

- viii. Potential impacts on existing shipping activity;
- ix. Impacts of increased marine underwater noise on marine species from all shipping activities;
- x. Additional marine transport issues that must be considered include the potential of the proposal to impact on domestic commercial and recreational vessels; and
- xi. The potential use of the Great Barrier Reef World Heritage Area and Great Barrier Reef Marine Park for the offshore anchorage of ships and the associated impacts of anchorages, including impacts on other users.

5.10.12 OTHER USES OF THE AREA AND NEARBY AREAS

The EIS must identify the potential impacts of the proposed action on other uses of the area, including but not limited to the following:

- a) Social, cultural and heritage values for each stage of the proposal;
- b) Current and projected commercial, recreational and scientific use, including any changes in visitation patterns;
- c) Heritage and social values, including sites of historic or archaeological significance;
- d) Commercial and recreation fishing;
- e) Tourism; and
- f) Traditional use activities.

5.11 PROPOSED AVOIDANCE, SAFEGUARDS, MANAGEMENT AND MITIGATION MEASURES

The EIS must provide information on proposed avoidance, safeguards and mitigation measures to deal with the impacts of the action. Specific and detailed descriptions of proposed measures must be provided and substantiated, based on best available practices/standards and must include the following elements.

- a) Identify the level of risk associated with potential impacts already identified and those that require mitigation, monitoring or management to avoid or reduce impacts to an acceptable level;
- b) A consolidated list of measures proposed to be undertaken to avoid, prevent, minimise or compensate (in priority order) for the impacts of the action (as specified in section 5.10), including:
 - i. A description of proposed avoidance, safeguards and mitigation measures to deal with impacts of the action, including measures proposed to be taken by State governments, local governments or the proponent;
 - ii. Assessment of the expected or predicted effectiveness of the measures;
 - iii. Any statutory or policy basis for the mitigation measures;
 - iv. The cost of the mitigation measures; and
 - v. The resulting risk level for that impact post- avoidance, mitigation and/or management.

c) Particular focus must be given to:

- i. Determining factors in the planning of the proposal so as to avoid damage to the environment;
- ii. Measures to avoid or minimise damage to the Great Barrier Reef World Heritage Area and estuary environment;
- iii. Measures to avoid or minimise damage to the National Heritage Values of the Great Barrier Reef;
- iv. Measures to avoid or minimise damage to the environment of the Great Barrier Reef Marine Park;
- v. Articulating conservation objectives for individual matters of National Environmental Significance and Commonwealth land with a focus on receptors;
- vi. Describing how this project is likely to contribute to protection of matters of National Environmental Significance;
- vii. Outline how any avoidance, safeguards, management and mitigation measures will increase resilience of the environment, ecosystems and matters of National Environmental Significance and Commonwealth land within the region;
- viii. Demonstrate how impact management and mitigation measures would ensure that matters of National Environmental Significance and Commonwealth land in the affected region are maintained or improved;
- ix. Characterise, quantify and address uncertainties that may affect the effectiveness of management measures and therefore on the confidence that biodiversity values would be maintained (or improved) during and after the project;
- x. Measures to avoid or minimise disturbance to fauna and flora found around and within the proposal area (particularly listed threatened species and communities and listed migratory species);
- xi. Management of the dredged material during the loading of the dredged material;
- xii. Management of the dredged material disposal area(s) during disposal operations;
- xiii. Management strategies for dredging, loading and dredged material disposal, including trigger levels for management actions linked to quantitative measurements of water quality and Benthic Primary Producer Habitat (BPPH) based on baseline data;
- xiv. Proposed monitoring before, during and after dumping including:
 - (i) Monitoring of disposal plumes, sedimentation, current strength and direction, turbidity, water quality parameters that are likely to be affected and BPPH monitoring. Water quality parameters being monitored must include but should not be restricted to dissolved oxygen, nutrients, pH, turbidity, light attenuation, metals and metalloids and toxicants. Baseline water quality data that includes values for these parameters needs to be included in the EIS. This section must also include the likely impacts on turbidity and water quality from dredging and dredged material disposal and establish the triggers for management actions and specify proposed management actions; and

- (ii) Location of monitoring stations and rationale for location of monitoring stations and frequency of monitoring (down load frequency or via telemetry).
 - xi. For ocean-based dredged material disposal, proposed management must be presented. This must include how water quality will be monitored and managed to ensure that water quality objectives for this area are achieved and the environmental values of the connected surface water and groundwater are maintained. Reference must be given to the National Water Quality Management Strategy including the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)*, *Queensland Water Quality Guidelines 2009*, *Water Quality Guidelines for the Great Barrier Reef 2010* and the *Australian Monitoring and Reporting Guidelines (2000)*. Any toxicants that may occur in the sediments must be identified and must be managed appropriately;
 - xii. Measures to limit channelling and sediment re-suspension in settling ponds;
 - xiii. Measures to limit erosion and sediment re-suspension in discharge channels;
 - xiv. Monitoring of water quality and operational performance monitoring;
 - xv. Disposal of tail waters or overflow due to climatic conditions (such as rain or flooding) to the receiving environment;
 - xvi. Contingency measures in the event that discharge limits are exceeded; and
 - xvii. Staff training, including training in relation to environmental issues.
- d) An outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;
- e) The name of the agency responsible for endorsing or approving each mitigation measure or monitoring program;
- f) Measures to ensure that increases in shipping and ship movements do not negatively impact on water quality objectives and environmental values of the Great Barrier Reef Marine Park and Great Barrier Reef World Heritage Area, including but not limited to:
- i. Provision of appropriate navigational and anchorage controls;
 - ii. Provision of best practice waste disposal facilities; and
 - iii. Adequate risk management procedures and response equipment in place to identify and address risks of marine pollution.
- g) The EIS must describe the proponent's capacity to satisfactorily develop and manage the project including the capacity to remove, clean up, rehabilitate and/or take preventative action for the entire proposal.

5.12 OTHER APPROVALS AND CONDITIONS

The EIS must include information on any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. This must include:

- a) Details of any local or State Government planning scheme, or plan or policy under any local or State Government planning system that deals with the proposed action, including:
 - i. What environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy; and

- ii. How the scheme provides for the prevention, minimisation and management of any relevant impacts.
- b) A description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the EPBC Act or the GBRMP Act), including any conditions that apply to the action;
- c) A statement identifying any additional approval that is required; and
- d) A description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

5.13 OFFSETS

Environmental offsets broadly mean measures to compensate for the adverse residual impacts of an action on the environment. More specifically, offsets are measures to compensate for environmental impacts that cannot be adequately reduced through avoidance or mitigation. Offsets do not reduce the impacts of an action. Instead they provide an environmental counterbalance to manage the impacts that remain after avoidance and mitigation measures. These remaining impacts are termed 'residual impacts'⁸.

Offsets are not intended to make proposals with unacceptable impacts acceptable. They simply provide an additional tool that can be used during project design and the Environmental Impact Assessment process.

This section of the EIS must outline plans to offset the residual potential impacts of the proposal. Environmental offsets may be appropriate when they:

- a) Are necessary to protect or repair impacts to a protected matter – i.e. a matter of national environmental significance or the environment more broadly;
- b) Relate specifically to the matter (for example, species) being impacted; and
- c) Seek to ensure that the health, diversity and productivity of the environment are maintained or enhanced.

Any proposed environmental offsets must comply with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, 2012*.

5.14 MONITORING AND REPORTING

Appropriate baseline data requirements are to be provided as part of the EIS to form the basis for baseline measurement and ongoing monitoring of environmental parameters. It must be demonstrated that the proposed methods for baseline measurements and subsequent monitoring are based on current best practice/standards, scientifically robust and statistically sound to enable diligent and systematic data collection that will deliver unbiased and sound responses to EIS Guideline requirements. This section must identify parameters to be monitored, the performance indicators to be used to evaluate accuracy of predicted impacts and effectiveness of mitigation measures and offsets, and management response trigger values and response activities.

⁸ Further information on offsets can be found in the Australian Government's framework on the use of environmental offsets ('offsets') under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Titled "Environmental Offsets Policy 2012".

This section is to also identify and describe monitoring programs, procedural and compliance audit programs and reporting requirements and arrangements which will demonstrate the effectiveness of proposed management measures and monitoring.

The proponent must, in addition to outlining proposed programs, clearly identify what is to be monitored and why. Monitoring programs must be designed to provide objective evidence regarding activities associated with the proposal and if these activities are adversely impacting on the environment in the short, medium and long term. Monitoring programs must demonstrate an understanding and consideration of:

- a) Ecosystems and habitats, climatic or seasonal variations, flora and fauna (particularly listed threatened species/ecological communities and listed migratory species), and those at-risk species, groups of species and habitats identified in the *Draft Great Barrier Reef Biodiversity Conservation Strategy 2012*, underwater noise issues, light and light horizon impacts and water quality issues as a result of the proposed development;
- b) Measuring the effectiveness of mitigation and/or rehabilitation and offset measures;
- c) Documenting the difference between predicted and actual impacts;
- d) Methods for identification of non-predicted impacts and appropriate reporting and remedial measures;
- e) Application and effectiveness of emergency and contingency plans;
- f) Review of consultation and management arrangements with regulatory authorities and the community. A diagram showing monitoring and reporting arrangements must be included in the EIS; and
- g) Trigger values must be outlined for use in management actions and response to adverse project impacts.

A diagram showing monitoring and reporting arrangements must be included in the EIS.

5.15 ENVIRONMENTAL RECORD

The EIS must include the environmental record of the proponent. This must include:

- a) Reference to the GBRMP Regulations 88R(j) which includes the applicant's history in relation to environmental matters (for example compliance with Marine Park permits and environmental management plans) and any outstanding charges; and
- b) Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the person proposing to take the action. If the person proposing to take the action is a corporation, details of the corporation's environmental policy and planning framework must be provided.

Information relating to the persons' environmental record must also include any accreditations (for example ISO 14001), environmental awards, and other recognition for environmental performance.

5.16 ADDITIONAL SOCIAL AND ECONOMIC MATTERS

Section 136(1)(b) of the EPBC Act requires the Minister to consider economic and social matters when deciding whether to grant approval to the proposed action under Part 9 of the EPBC Act. The requirements under s136(1)(b) encompass a broader range of matters that may be considered than those addressed during the assessment of the potential impacts of a

controlled action. Accordingly, information must be provided in the EIS on the broad social and economic impacts (positive or negative) of the proposal for the purposes of the Part 9 decision on approval.

As the matters protected by the controlling provisions for this action include "the environment", there is the potential for an overlap between the information provided in response to this, and the information requested in the main body of the Guidelines in relation to social, economic and cultural aspects within the definition of the environment. The latter set of information need not be repeated if it will be contained in the body of the EIS.

The mandatory considerations for applications under the GBRMP Regulations are outlined at **Attachment 2**.

A table cross-referencing information relevant to 5.16 and the mandatory considerations for applications under the GBRMP Regulations must be provided identifying relevant text in the body of the EIS.

5.17 CONCLUSION

An overall conclusion as to the environmental acceptability of the proposal must be provided, including discussion on compliance with the objectives and requirements of the EPBC Act and the GBRMP Act including the principles of ESD (**Attachment 3**). Reasons justifying undertaking the proposal in the manner proposed must also be outlined. The conclusion must highlight measures proposed or required to avoid, mitigate or offset any unavoidable impacts on the environment.

5.18 INFORMATION SOURCES

Information sources used in the formulation of the EIS are to be provided. This section will describe consultations and studies undertaken in the course of proposal formulation and preparation of the draft EIS, and sources of information and technical data. The following details must be provided for information used in developing the EIS:

- a) The source of the information;
- b) How recent the information is;
- c) How the reliability of the information was tested; and
- d) What uncertainties and/or gaps (if any) are in the information.

A copy of all data and the sampling methodologies must be made available to the DSEWPaC and GBRMPA for the purpose of peer review on receipt of a written request from the DSEWPaC or GBRMPA. In making this statement, the sampling methodology (including time samples were collected, replication, size of samples etc) should be specified in the relevant sections where data has been collected.

Any further or ongoing consultations or studies must be outlined here.

5.19 REFERENCE LIST AND BIBLIOGRAPHY

The reference list and bibliography provided in the EIS is to be accurate and concise and include the address and date accessed of any internet pages used as data sources.

5.20 APPENDICES AND GLOSSARY

Detailed technical information studies or investigations necessary to support the main text of the EIS, but not suitable for inclusion in the main text must be included as appendices; for example, detailed technical or statistical information, maps, risk assessment, baseline data, supplementary reports etc. A copy of the Guidelines must also be included. A glossary defining technical terms and abbreviations used in the text must be included to assist the general reader.

ATTACHMENT 1: Matters that must be addressed in an EIS (Schedule 4 of the ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION Regulations 2000)

1. General information

1.01 The background of the action including:

- (a) the title of the action;
- (b) the full name and postal address of the designated proponent;
- (c) a clear outline of the objective of the action;
- (d) the location of the action;
- (e) the background to the development of the action;
- (f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;
- (g) the current status of the action; and
- (h) the consequences of not proceeding with the action.

2. Description

2.01 A description of the action, including:

- (a) all the components of the action;
- (b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts;
- (c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts;
- (d) relevant impacts of the action;
- (e) proposed safeguards and mitigation measures to deal with relevant impacts of the action;
- (f) any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action;
- (g) to the extent reasonably practicable, any feasible alternatives to the action, including:
 - (i) if relevant, the alternative of taking no action;
 - (ii) a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action;
 - (iii) sufficient detail to make clear why any alternative is preferred to another;
- (h) any consultation about the action, including:
 - (i) any consultation that has already taken place;
 - (ii) proposed consultation about relevant impacts of the action;
 - (iii) if there has been consultation about the proposed action — any documented response to, or result of, the consultation;
- (i) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

3. Relevant impacts

3.01 Information given under paragraph 2.01 (c) must include:

- (a) a description of the relevant impacts of the action;
- (b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts;
- (c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;
- (d) analysis of the significance of the relevant impacts; and
- (e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

4. Proposed safeguards and mitigation measures

4.01 Information given under paragraph 2.01 (d) must include:

- (a) a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures;
- (b) any statutory or policy basis for the mitigation measures;
- (c) the cost of the mitigation measures;
- (d) an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;
- (e) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and
- (f) a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by State governments, local governments or the proponent.

5. Other Approvals and Conditions

5.01 Information given under paragraph 2.01 (e) must include:

- (a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:
 - (i) what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy;
 - (ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts;
- (b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;
- (c) a statement identifying any additional approval that is required; and
- (d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

6. Environmental record of person proposing to take the action

6.01 Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

- (a) the person proposing to take the action; and
- (b) for an action for which a person has applied for a permit, the person making the application.

6.02 If the person proposing to take the action is a corporation — details of the corporation's environmental policy and planning framework.

7. Information sources

7.01 For information given the EIS must state:

- (a) the source of the information; and
- (b) how recent the information is; and
- (c) how the reliability of the information was tested; and
- (d) what uncertainties (if any) are in the information.

ATTACHMENT 2: CONSIDERATION OF APPLICATIONS UNDER THE GREAT BARRIER REEF MARINE PARK REGULATIONS 1983

Division 2A.4 Consideration of applications

88Q Consideration of applications — mandatory considerations

In deciding whether or not to grant a permission in relation to an application, and whether or not to impose any conditions on the permission, the Authority must consider the following:

- (a) the potential impacts of the conduct proposed to be permitted by the permission (the ***proposed conduct***) on the environment and on the social, cultural and heritage values of the Marine Park or a part of the Marine Park;
- (b) options for monitoring, managing and mitigating the potential impacts of the proposed conduct;
- (c) if the proposed conduct will take place in an area to which a zoning plan applies — the objectives of the zone as set out in the zoning plan;
- (d) if the proposed conduct also requires an approval or permit under the *Environment Protection and Biodiversity Conservation Act 1999*:
 - (i) whether the approval or permit has been, or is likely to be, granted and, if granted, the terms and conditions of it being granted; and
 - (ii) any relevant assessment documentation (within the meaning given by subsection 133 (8) of that Act) in relation to the approval or permit;
- (e) any written comments received about the application in response to the public advertisement published in accordance with regulation 88D;
- (f) any other matters relevant to the orderly and proper management of the Marine Park.

Note Subsection 7 (3) of the *Great Barrier Reef Marine Park Act 1975* provides that the Authority must, in managing the Marine Park and performing its other functions, have regard to, and seek to act in a way that is consistent with, the objects of the Act, the principles of ecologically sustainable use and the protection of the world heritage values of the Great Barrier Reef World Heritage Area.

88R Consideration of applications — discretionary considerations

In deciding whether or not to grant a permission in relation to an application, and whether or not to impose any conditions on the permission, the Authority may consider the following:

- (a) the requirement in section 37AA of the Act for users of the Marine Park to take all reasonable steps to prevent or minimise harm to the environment in the Marine Park that might or will be caused by the user's use or entry;
- (b) the effect that the grant of the permission will have on public appreciation, understanding and enjoyment of the Marine Park;
- (c) the impact of the conduct proposed to be permitted under the permission in the context of other conduct in the relevant area or nearby areas, or in the Marine Park, that is being undertaken, is planned, is in progress, or is reasonably foreseeable at the time of the Authority's consideration of the application, whether or not related to or a consequence of the proposed conduct;
- (d) any policies or guidelines issued by the Authority about the management of the Marine Park or the performance of the Authority's functions under the Act and these Regulations;
- (e) if the application for the permission relates to an undeveloped project the cost of which will be large — the capacity of the applicant to satisfactorily develop and manage the project;

- (f) if the proposed conduct also requires an approval or a permission under a law of Queensland — whether the approval or permission has been, or is likely to be, granted and, if granted, the terms and conditions of it being granted; and
- (g) any international Convention to which Australia is a signatory, or any agreement between the Commonwealth and a State or Territory, that is relevant to the application;
- (h) any relevant law of the Commonwealth, or a relevant law of Queensland as in force from time to time, or a relevant plan made under such a law, relating to the management of the environment, or an area in the Marine Park;
- (i) any relevant recovery plan, wildlife conservation plan, threat abatement plan or approved conservation advice, under the *Environment Protection and Biodiversity Conservation Act 1999*;
- (j) whether the applicant for the permission is a suitable person to hold such a permission, having regard to:
 - (i) the applicant's history in relation to environmental matters; and
 - (ii) if the applicant is a body corporate — the history of its executive officers in relation to environmental matters; and
 - (iii) if the applicant is a company that is a subsidiary of another company (the **parent body**) — the history of the parent body and its executive officers in relation to environmental matters; and
 - (iv) any charge, collected amount or penalty amount that is overdue for payment by the applicant as the holder of a chargeable permission (whether or not the permission is in force); and
 - (v) any late payment penalty that is payable by the applicant as the holder of a chargeable permission (whether or not the permission is in force); and
 - (vi) any unpaid fines or civil penalties required to be paid by the applicant in relation to a contravention of the Act or of these Regulations;
- (k) any other matters relevant to achieving the objects of the Act.

ATTACHMENT 3: OBJECTS of the EPBC ACT and GBRMP ACT

OBJECTS OF THE *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999*

3. Objects of the Act

- (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of National Environmental Significance
- (b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources
- (c) to promote the conservation of biodiversity
- (d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples
- (e) to assist in the co-operative implementation of Australia's international environmental responsibilities
- (f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- (g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

3A. Principles of Ecologically Sustainable Development

The following principles are principles of ecologically sustainable development:

- (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
- (b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- (c) the principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- (d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;
- (e) improved valuation, pricing and incentive mechanisms should be promoted.

OBJECTS OF THE *GREAT BARRIER REEF MARINE PARK ACT 1975*

2A Objects of this Act

- (1) The main object of this Act is to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.
- (2) The other objects of this Act are to do the following, so far as is consistent with the main object:
 - (a) allow ecologically sustainable use of the Great Barrier Reef Region for purposes including the following:
 - (i) public enjoyment and appreciation;
 - (ii) public education about and understanding of the Region;

- (iii) recreational, economic and cultural activities;
- (iv) research in relation to the natural, social, economic and cultural systems and value of the Great Barrier Reef Region;
- (b) encourage engagement in the protection and management of the Great Barrier Reef Region by interested persons and groups, including Queensland and local governments, communities, Indigenous persons, business and industry;
- (c) assist in meeting Australia's international responsibilities in relation to the environment and protection of world heritage (especially Australia's responsibilities under the World Heritage Convention).

**ATTACHMENT 4: GREAT BARRIER REEF MARINE PARK AUTHORITY
GUIDELINES FOR THE USE OF HYDRODYNAMIC NUMERICAL MODELLING FOR
DREDGING PROJECTS IN THE GREAT BARRIER REEF MARINE PARK**

The use of Hydrodynamic Numerical Modelling for Dredging Projects in the Great Barrier Reef Marine Park

August 2012

To provide guidance on the use of three-dimensional (3D) hydrodynamic numerical models in the Great Barrier Reef Marine Park. Deviations from these guidelines require prior written approval from GBRMPA.

General Principles

1. These guidelines, prepared by the Great Barrier Reef Marine Park Authority (GBRMPA), are used to inform proponents and interested stakeholders about the specific procedures, methodologies and frameworks associated with hydrodynamic modelling and dredge plume modelling that GBRMPA expects for projects in the Great Barrier Reef Marine Park (Marine Park).
2. Three-dimensional (3D) hydrodynamic numerical modelling of sediment plumes underpins the assessment of potential impacts from dredging and sediment disposal activities in the Marine Park.
3. Actions to avoid, mitigate, and/or offset and adaptively manage potential impacts from dredging and disposal activities will be based on the model outputs.
4. Modelling is used to predict the extent, intensity and persistence of dredge-generated sediment plumes and the extent, severity and duration of resultant indirect impacts to benthic habitats, which can range in severity and duration from irreversible to readily reversible.
5. The use of 3D hydrodynamic and sediment plume modelling is considered international best practice.
6. The hydrodynamic model should take into account the tides, the wind, the waves and the mean prevailing circulation (oceanic currents) and potential stratification from river discharges.
7. The model must be calibrated and validated against collected baseline information.
8. 3D modelling must include all types of potential re-suspension including current and wave-induced bottom shear stress and wave-induced mud fluidization.
9. GBRMPA supports the use of the Western Australia's Environmental Protection Authority 'Environmental Assessment Guideline for Marine Dredging Proposals'¹ and the use of a zonation scheme in describing impact predictions (i.e. zone of impact, zone of influence).

Baseline information

10. For dredging campaigns less than one month duration, a minimum of one month of baseline data collection is required. For wind data collection, 3 to 4 months of baseline data is required.



11. For dredging campaigns that are predicted to last longer than one month, then a minimum of twice the duration of the dredging campaign worth of baseline data is required to account for seasonal variation. For example, if the dredging campaign is 2 months, then at least 4 months of baseline data is required. For wind data collection, six to eight months of baseline data is required.
12. Baseline data must be measured in close proximity to the dredging and disposal sites and include metocean parameters such as tidal range, wave height, water current, wind direction and intensity and sediment dynamics.

Sediment transport

13. Sediment transport modelling must consider the a range of particle sizes. The size of the particle will determine its behaviour in the marine environment and thus how it is numerically modelled. For example:
 - a. Sand is generally modelled as bed load;
 - b. Silt is modelled using a fixed settling velocity. Due to the range of silt fractions a silt particle may behave similar to a sand particle or a mud particle;
 - c. Mud (clay) is modelled with a settling velocity which is determined as a function of the suspended sediment concentration in order to take into account the process of flocculation.

Model resolution

14. Predictive modelling of dredge plumes must:
 - a. Describe whether the model uses a z or σ coordinate in the mesh.
 - b. Adequately resolve how the model deals with sudden changes in bathymetry. For example: a dredge channel or coral reef as percentage error in the prediction.
 - c. It is recommended that the minimum resolution as a function of mesh size to pick up changes in hydrodynamic flow associated with a dredge channel is two cells within the width of a dredged channel.

- d. Describe the physical characteristics of the sediment being transported. These characteristics should be informed by sampling undertaken in accordance with the *National Assessment of Guidelines for Dredging 2009* (NAGD).
- e. Accurately represent the ambient conditions at the time of year in which the dredging occurs. If this is not known, then modelling should be undertaken for all seasons (i.e. summer conditions, winter conditions, transitional conditions) using the corresponding prevalent oceanographic conditions.
- f. Include additional dispersion and re-suspension from both dredging operations and dredge disposal activities. This must be completed for a range of probable hydrodynamic conditions, weather events and expected dredge equipment scenarios. The amount of material liberated by the dredging and dispersed in the environment around the dredge site must also be stated.
- g. Numerical modelling must be performed for a duration of time that is long enough to establish the re-suspension associated with different weather conditions that occurs after dumping and initial settling.
- h. If dredging is to occur near coral sand islands, modelling of particles must be undertaken using coralline sand characteristics. The use of sand particles in this scenario is not supported.

Model outputs

15. GBRMPA expects that direct, indirect and sublethal impacts of sediment plumes are considered.
16. Numerical models must use a spatially based scheme that provides for a clear and consistent way of describing and presenting the extent, severity and duration of predicted impacts of dredging and dredge disposal and must include likely "best case" and likely "worst case" scenarios.

Guidelines on Hydrodynamic Modelling

17. The lethal and sublethal thresholds used for the ecological response modelling must be clearly indicated and supported by peer reviewed scientific published papers and compared against model outputs.
18. The output from the model should be overlaid upon maps of the sensitive habitats and ecological receptors in order to visualise and interpret what the impact of the sediment plume might be.
19. GBRMPA expects all modelling results (maps) to be provided in a suitable GIS compatible format (i.e. shapefiles in geographic coordinates and GDA94 datum) to GBRMPA.
20. Outputs should at a minimum requirement include maps showing the predicted maximum suspended solid concentration at mid-depth and near the seafloor, the predicted median suspended solid concentration at mid-depth and near the seafloor, and the predicted sedimentation rate (g/cm^2) over the duration of the project, as well as time-series predictions of these three parameters at key sites over the duration of the project.
21. GBRMPA encourages consistency when using sediment loading units (NTU's, mg/L or kg/m^3). Do not use the units interchangeably.
22. Selection of dredge disposal site (even if a historic site) must be fully justified and compared to other possible sites with a prediction for sediment re-suspension and possible direction and distance of the migration of the dredge material under different water current conditions.
23. If GBRMPA is uncertain about the methodology used in the modeling, then the methodology and the model outputs will be independently peer reviewed at the cost of the proponent.

Background

Justification

1. The Great Barrier Reef Marine Park (Marine Park) is widely recognised as one of the best managed marine areas in the world. It is a multiple-use Marine Park that supports a range of activities, industries, communities and businesses. However, it faces challenges from a range of threats including climate change, declining water quality, increased coastal development and the growth in ports and shipping activities.
2. The economy of Queensland continues to grow and some industries are developing rapidly, such as coal and mining, which is fuelling growth in ports in the Great Barrier Reef Region and increasing the number of ships travelling through Reef waters. This growth results in the construction of new shipping berths, dredging of shipping channels and the dumping of dredge material. All of these have the potential to impact on the marine environment.
3. The Great Barrier Reef Marine Park Authority (GBRMPA) is committed to protecting the Great Barrier Reef from the impacts of ports and shipping on the Marine Park through a range of management initiatives and partnerships with other government agencies.
4. Numerical models are used to quantify the predicted impact of dredging and disposal on marine ecosystems. The hydrodynamic model predicts the physics of water, sediment dynamics and oceanographic behaviour.
5. The Guidelines provide for a transparent and acceptable standard to assist in the development of predictive numerical models associated with dredge related sediment plumes in and adjacent to the Marine Park. They allow for the understanding of the fate of suspended sediments within the marine environment and potential for impacts to sensitive marine receptors.

Background

6. Dredging activities can have adverse effects on marine ecosystem (see figure 1). Dredging and dredge disposal at sea can result in environmental impacts such as:
 - a. Increased concentrations of suspended sediments²
 - b. Changes to hydrodynamics
 - c. Smothering of benthic fauna and flora
 - d. Introduction of contaminants
 - e. Alteration of coastal processes
 - f. Damage to marine wildlife
 - g. Translocation of pest species
 - h. Removal of habitat.

Increased concentrations of suspended sediments

7. Dredging involves the removal of sediments from the seafloor. This disturbance creates sediment plumes, which decreases water clarity and quality. The plume reduces light penetration to the seafloor; it affects fish behaviour and other benthic life³. Coarser-grain sediments such as sands will sink to the substrate quickly, but finer-grain sediments such as silt and clay will remain suspended in the water column for an extended period of time⁴ because of the low settling velocity⁵.

Background: Guidelines on Hydrodynamic Modelling

- Sediment plumes can also liberate nutrients⁶ and once the nutrients are dispersed into neighbouring areas by the effect of currents and waves, they have the potential to be detrimental to the surrounding marine life⁷. Sediments, once settled, can adversely affect the seagrasses, bottom-dwelling organisms and their eggs through smothering and burial⁸.
- The reduction in light also prevents pelagic and benthic organisms from seeing and sensing their food, preys, predators, mates and offspring. Suspended sediments can clog fish gills and reduce their resistance to disease⁹.

Changes to Hydrodynamics

- The creation of an artificial channel and reclamation of the seafloor causes a change in hydrodynamics which in turn causes turbulent flow. The water circulation pattern changes once currents are influenced by the structures. It is therefore imperative that 3D turbulent flow over the structures must be considered in the model in order to ascertain the momentum and intensity of the turbidity currents.

Smothering of benthic fauna and flora

- The increase in turbidity can retard the growth of flora and fauna. It also suffocates the newly hatched larvae. The resettled sediments can cover the spaces between the rocks thus displacing the habitats of bottom-dwelling organisms¹⁰.

3D Hydrodynamic Model as Best Practice

- Hydrodynamic models are generated by computer softwares. A two-dimensional hydrodynamic model, though useful in many situations, is limited to its depth-averaged equations and thereby unable to resolve stratification or vertical gradients¹¹. However, a three-dimensional model, though complex but made easy by the power of modern computers, can determine the vertical distribution of currents.¹² It provides the most complete solution for any hydrodynamic system¹³ including the formulation for the effects of bottom shear stress and surface wind shear stress¹⁴. A 3D hydrodynamic model is highly recommended as best practice because it provides realistic simulation of the marine environment.
- The World Heritage Report on the Great Barrier Reef highlighted that any developments or associated activities are to be carried out with the highest international standards of best practice commensurate with status of an iconic World Heritage Property¹⁵.

Legislation governing dredging and dredge disposal

- International protocols and Commonwealth legislation requires the protection and preservation of the marine environment from pollution related to spoil disposal at sea. The *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972*, which Australia is a party to, recognises ocean disposal as the least favoured method of dredge material disposal. The *Environment Protection (Sea Dumping) Act 1981* is the domestic legislation through which Australia regulates sea dumping and meets its international obligations under the protocol.
- Dredge disposal in the Marine Park or in the World Heritage Area is subject to rigorous environmental assessment. Dumping in the Marine Park requires a permit under the *Great Barrier Reef Marine Park Act 1975*; and dumping in the World Heritage Area requires consideration against the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and approval under the *Environment Protection (Sea Dumping) Act 1981*.
- For loading or dumping within the Marine Park, GBRMPA holds the delegation for the assessment and granting of Sea Dumping permits under the Sea Dumping Act, notwithstanding that one or more of the activities associated with the dumping, such as dredging, may occur outside the Marine Park.

17. Most ports are located outside the Marine Park, but are within the World Heritage Area. This means that the majority of a port's activities are outside of GBRMPA's direct jurisdiction and are mostly managed by the Federal Department of Sustainability, Environment, Water, Population and Communities.

18. The *Great Barrier Reef Marine Park Act 1975 (Marine Park Act 1975)*

18.1. The main object of the Marine Park Act 1975 is to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.

18.2. Regulations may be made under the Marine Park Act 1975 to regulate or prohibit activities in the Marine Park (Section 66).

18.3. Under section 38AA of the Marine Park Act 1975, it is an offence to carry out an operation for the recovery of minerals in the Marine Park, which may include some dredging operations. There is also the *Great Barrier Reef Region (Prohibition of Mining) Regulations 1999* which was gazetted on the 23 December 1999. These regulations identify 'mining operations' which include 'operations for the recovery of minerals' as a prohibited activity in the Great Barrier Reef Region, adjoining the Marine Park.

19. The *Great Barrier Reef Marine Park Regulations 1983*

In deciding whether or not to grant an application, GBRMPA must consider matters outlined in Regulation 88Q (mandatory considerations) and may consider matters outlined in Regulation 88R (discretionary considerations). Mandatory considerations include: the potential impacts of the proposal on the environment and on the social, cultural and heritage values of the Marine Park; options for monitoring, managing and mitigating the potential impacts; the objectives of the Great Barrier Reef Marine Park zone in which the proposal will take place; whether the proposal requires an approval under the EPBC Act; written submissions from the public about the proposal; and matters relevant to the proper and orderly management of the Marine Park.

20. The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

20.1. On 25 November 2009, legislative changes came into effect to better integrate the Marine Park Act 1975 with the national environment law – the EPBC Act, so that a single environmental impact assessment system applies to development proposals in the Marine Park. If a development proposal is referred under the EPBC Act, and the action or a component of that action requires a permission under the Marine Park Act 1975, the EPBC Act referral is deemed to be a Marine Park application.

20.2. The legislative changes also established the Marine Park as a 'matter of national environmental significance' (known as a NES matter) under the EPBC Act. This means that development proposals outside the Marine Park that are likely to have a significant impact on the environment of the Marine Park, or other NES matters, must be assessed under the EPBC Act.

Relationship to other GBRMPA Policies or Position Statements

21. This Policy relates to the following GBRMPA Policies and Position Statements at the time of review:

21.1. **Environmental Impact Management Policy** - sets the framework for assessment, mitigation and management of environmental impacts associated with development activities in the Marine Park and World Heritage Area.

21.2. **Dredging and Spoil Disposal Policy** - sets out the guidelines as to what is to be done with contaminated dredge material, where to dispose the dredge material in the Marine Park, the limitation of maintenance dredging volume and the environmentally levy that may be charged.

21.3. **Ports and Shipping Information Sheet** – describes the current dredging activities and the proposed port expansion in the Marine Park and World Heritage Area. Facts and figures are listed to show the magnitude of dredging and port expansion.

Definitions

22. *Dredge Disposal*

The relocation of dredge material from the dredging site to a designated disposal site. Disposal sites may include marine or land based receiving facilities.

23. *Wave-induced Bottom Shear Stress*

A wave-induced bottom shear stress is a stress that is generated by ocean waves as they propagate over the sea floor. It is an important parameter for understanding sediment dynamics and bottom properties¹⁶ and for calculating erosion, storm surge, wave height attenuation and coastal structural stability¹⁷. In coastal zones where the ocean depths are shallower than 4 m, the bottom shear stresses are greater¹⁸.

24. *Mud Fluidisation*

Mud fluidisation is a process or condition in which the contact stresses between particles in the mud reduce to zero. The mud is thus converted from a solid-like state to a dynamic fluid-like state as the granular material loses its shear strength¹⁹. This process occurs as the fluid passes through mud particles. The waves could fluidise the mud, but they do not transport the sediment. As soon as the mud has been fluidised, the currents erode it away²⁰.

25. *Flocculation*

Flocculation is the process of sediments forming naturally or by the addition of flocculants larger aggregates, agglomeration or clusters of sediment particles.

GREAT Barrier Reef Marine Park Authority (GBRMPA) Decision(s)

Approved by:	General Manager, Marine Park Management Branch, Great Barrier Reef Marine Park Authority 14 August 2012
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Further information

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