North Queensland Bulk Ports Corporation




Abbot Point, Terminal 0, Terminal 2 and Terminal 3 Capital Dredging Public Environment Report (EPBC 2011/6213/GBRMPA G34897.1)




GHD

December 2012

This Public Environment Report has been prepared by GHD for North Queensland Bulk Ports Corporation Limited (NQBP) and *may only be used and relied on by NQBP for the purpose agreed between GHD and NQBP as set out in Section 1.1 of this report.*

GHD otherwise disclaims responsibility to any person other than NQBP arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by NQBP and others who provided information to GHD (including government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information. In addition, Section 3.4.4.8 (Multiple Dredging Campaign Considerations) and Section 5-3-2 (Increased Shipping) was not prepared by GHD. GHD takes no responsibility for incorrect information in this report.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of ecological values) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Contents

Table Index

Figure Index

Appendices

Glossary and Abbreviations

Term/abbreviation	Reference
%	percent
µg/kg	micrograms per kilogram
µm	micrometres
AAA	Advanced Analytical Australia
ACH Act	*Aboriginal Cultural Heritage Act 2003*
Action	As described in section 523 of the EPBC Act
Adani	Adani Abbot Point Coal Terminal Pty Ltd
ADCP	Acoustic doppler current profiler
Ag	Silver
AHD	Australian Height Datum
AHS	Australian Hydrographic Service
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ALS	Australian Laboratory Services
AMSA	Australian Maritime Safety Association
ANCBT	Acid Neutralising Capacity by Back-Titration
ANZECC	Australian and New Zealand Environment and Conservation Council
APR	Automated Position Reporting
APSDA	Abbot Point State Development Area
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
As	Arsenic
AS	Australian Standards
ASS	Acid Sulfate Soils
AUSREP	Australian Ship Reporting System
AVS	Acid Volatile Sulfide

Term/abbreviation	Reference
BHPB	BHP Billiton
BOM	Bureau of Meteorology
BP	Before Present
BTEX	Benzene, toluene, ethyl benzene and xylenes
CAMBA	China-Australia Migratory Bird Agreement
capital dredging	Works undertaken within the approved capital dredging Project footprint
Cd	Cadmium
Co	Cobalt
CPM Act	*Coastal Protection and Management Act 1995*
Cr	Chromium
Cu	Copper
DBT	Dibutyltin
DEHP	Department of Environment and Heritage Protection (formally a part of the Department of Environment and Resource Management)
DERM	(Former) Department of Environment and Resource Management
DEWHA	(Former) Department of the Environment, Water, Heritage and the Arts
DIWA	Directory of Important Wetlands in Australia
DO	Dissolved oxygen
DoE	(Queensland) Department of Environment
DPA	Dugong Protection Area
dredge area	The area which is proposed for dredging for T0, T2 and T3
dredged material	The material which is dredged
dredged material relocation	The action of disposing of dredged material (e.g. offshore disposal)
dredged material relocation area	The area within which the dredged material is proposed to be relocated.
DRET	Department of Energy, Resources and Tourism
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities

Term/abbreviation	Reference
Dudgeon Point Coal Terminals	Port of Hay Point (Dudgeon Point Coal Terminals) (EPBC 2012/6240)
DWT	Dry Weight Tonnes
EAM	Environmental Assessment and Management
EIL	Environmental Investigation Level
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ENSO	El Niño-Southern Oscillation
EP Act	*Environmental Protection Act 1994*
EP Regulations	Environmental Protection Regulation 2008
EPBC Act	*Environment Protection Biodiversity and Conservation Act 1999*
EPBC Regulations	Environment Protection and Biodiversity Regulations 2000
EPPs	Environmental Protection Policies
ERA	Environmentally Relevant Activity
ERLI	Environmental Risk and Likely Impact
FHA	Fish Habitat Area
Footprint	Actual defined area of dredging (refer to dredge area) or dredged material relocation (refer to dredged material relocation area)
GBR	Great Barrier Reef
GBR Coast MP	Great Barrier Reef Coast Marine Park
GBRMP	Great Barrier Reef Marine Park
GBRMP Act	*Great Barrier Reef Marine Park Act 1975*
GBRMP Regulations	Great Barrier Reef Marine Park Regulations 1983
GBRMPA	Great Barrier Reef Marine Park Authority
GBRMPA Dredging and Spoil Disposal Policy 2010	Great Barrier Reef Marine Park Authority Dredging and Spoil Disposal Policy 2010
GBRWHA	Great Barrier Reef World Heritage Area
Guidelines	Guidelines for a Public Environment Report for the Project, dated June 2012

Term/abbreviation	Reference
ha	hectare
HAT	Highest Astronomical Tide
HCIPL	Hancock Coal Infrastructure Proprietary Limited (a wholly owned subsidiary of GVK Group)
Hg	Mercury
HIL	Health-based Investigation Level
IDAS	Integrated Development Assessment System
ILUA	Indigenous Land Use Agreement
IMO	International Maritime Organisation
Impact	As described in section 527E of the EPBC Act
JAMBA	Japan-Australia Migratory Bird Agreement
JCU	James Cook University
JEMF	Joint Environmental Management Framework
km	kilometre
km^2	square kilometre
LAT	Lowest Astronomical Tide
LGA	Local Government Area
LNG	Liquefied Natural Gas
London protocol	*1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972*
LOR	limit of reporting
Ltd	Limited
m	metre
m/s	metres per second
m^2	square metres
m^3	cubic metre
mbss	metres below sea surface
MBT	Monobutyltin

Term/abbreviation	Reference
MCU	Material Change of Use
mg/kg	milligrams per kilogram
mm	millimetre
Mn	Manganese
MNES	matters of national environmental significance
MSQ	Maritime Safety Queensland
Mtpa	Million tonnes per annum
NAGD	National Assessment Guidelines for Dredging 2009
NEPM	National Environmental Protection Measure
NET	Northern Economic Triangle
NHP	National Heritage Place
Ni	Nickel
NODGDM	National Ocean Disposal Guidelines for Dredged Material
NQBP	North Queensland Bulk Ports Corporation Limited
NTU	Nephelometric turbidity units
OCPs	Organochlorine pesticides
OPPs	Organophosphorous pesticides
OUV	Outstanding Universal Value
PAHs	Polycyclic aromatic hydrocarbons
PAR	Photosynthetic Active Radiation
PASS	Potential Acid Sulfate Soil
Pb	Lead
PCBs	Polychlorinated biphenyls
PER	Public Environment Report
PMST	Protected Matters Search Tool
Port EMP	Port of Abbot Point Environmental Management Plan (2012)
ppt	parts per thousand
PQLs	Practical quantitation limits

Term/abbreviation	Reference
Previous dredged material relocation area	The area within which dredged material has previously been permitted to be relocated.
PRL	Primary Risk Level
Project	The scope of the Project in relation to the Abbot Point Terminal 0, Terminal 2 and Terminal 3, Capital Dredging (EPBC 2011/6213 / GBRMPA G34897.1) for the purpose of the Public Environment Report
project	Lower case p when referring to any other project
Project activities	Activities undertaken in order to construct/develop the Project to completion
Project area	The area of predicted direct and indirect impact from the Project
Proponent	North Queensland Bulk Ports Corporation Limited
PSD	Particle size distribution
PSSA	Particularly Sensitive Sea Area
Pty	Proprietary
QA/QC	Quality Assurance/Quality Control
QASSIT	Queensland Acid Sulfate Soil Investigation Team
QPWS	Queensland Parks and Wildlife Service
QSHIPS	Queensland Shipping Information Planning System
QWQ	Queensland Water Quality
RAN	Royal Australian Navy
REEFVTS	Great Barrier Reef and Torres Strait Vessel Traffic Service
relocation of dredged material	The action of transporting the dredged material to the offshore relocation area and the placement of the dredged material within the designated relocation area
RHM	Regional Harbour Master
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SAP	Sediment Sampling and Analysis Plan
Sb	Antimony
SDPWO Act	*State Development and Public Works Organisation Act 1971*
Se	Selenium

Term/abbreviation	Reference
Sea Dumping Act	*Environmental Protection (Sea Dumping) Act 1981*
Significant Impact Guidelines	Significant Impact Guidelines 1.1: Matters of National Environmental Significance
Sn	Tin
SP Act	*Sustainable Planning Act 2009*
SPL	Strategic Port Land
SPOCAS	Suspension peroxide oxidation combined acidity and sulfur
SPOS	Oxidised sulfur
SPP	State Planning Policy
SPRAT	Species Profile and Threats Database
T0	Abbot Point Terminal 0
T1	Abbot Point Terminal 1 (existing facilities)
T2	Abbot Point Terminal 2
T3	Abbot Point Terminal 3
TAA	Titratable actual acidity
TACC	Technical Advisory and Consultative Committee
TAG	Technical Advisory Group
TBT	Tributyltin
TED	Turtle Exclusion Device
TI Act	*Transport Infrastructure Act 1994*
TOC	Total organic carbon
TPA	Titratable peroxide acidity
TPH	Total petroleum hydrocarbons
TSA	Titratable sulfidic acidity
TSHD	Trailer Suction Hopper Dredger
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
UCL	Upper confidence limit

Term/abbreviation	Reference
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WHA	World Heritage Area
WHAM	Whitsunday Hinterland and Mackay
WHV	World Heritage Values
WQ	Water Quality
WRC	Whitsunday Regional Council
Zn	Zinc

Executive Summary

E1 Introduction

The proposed Action is the Abbot Point, Terminal 0, Terminal 2 and Terminal 3 Capital Dredging Project (the Project) (EPBC 2011/6213 and GBRMPA G34897.1). The Project Proponent is North Queensland Bulk Ports Corporation Limited (NQBP).

This Public Environment Report (PER) has been developed in response to the Guidelines for a PER dated June 2012 (Guidelines). The objective of this PER is to provide information for the assessment of potential impacts the Project is likely to have on the existing environment at Abbot Point. An assessment of the Project impacts in relation to the Significance Guidelines for Matters of National Environmental Significance (MNES) has been provided Section 4 and demonstrates that the proposed development is not expected to have a significant impact on any MNES as described by the *Environment Biodiversity and Conservation Act 1999* (the EBPC Act), nor the objectives of the *Great Barrier Reef Marine Park Act 1975* (the GBRMP Act). It is therefore considered that the Project is compliant with the objectives of the EPBC Act and the GBRMP Act.

E2 Description of the Action

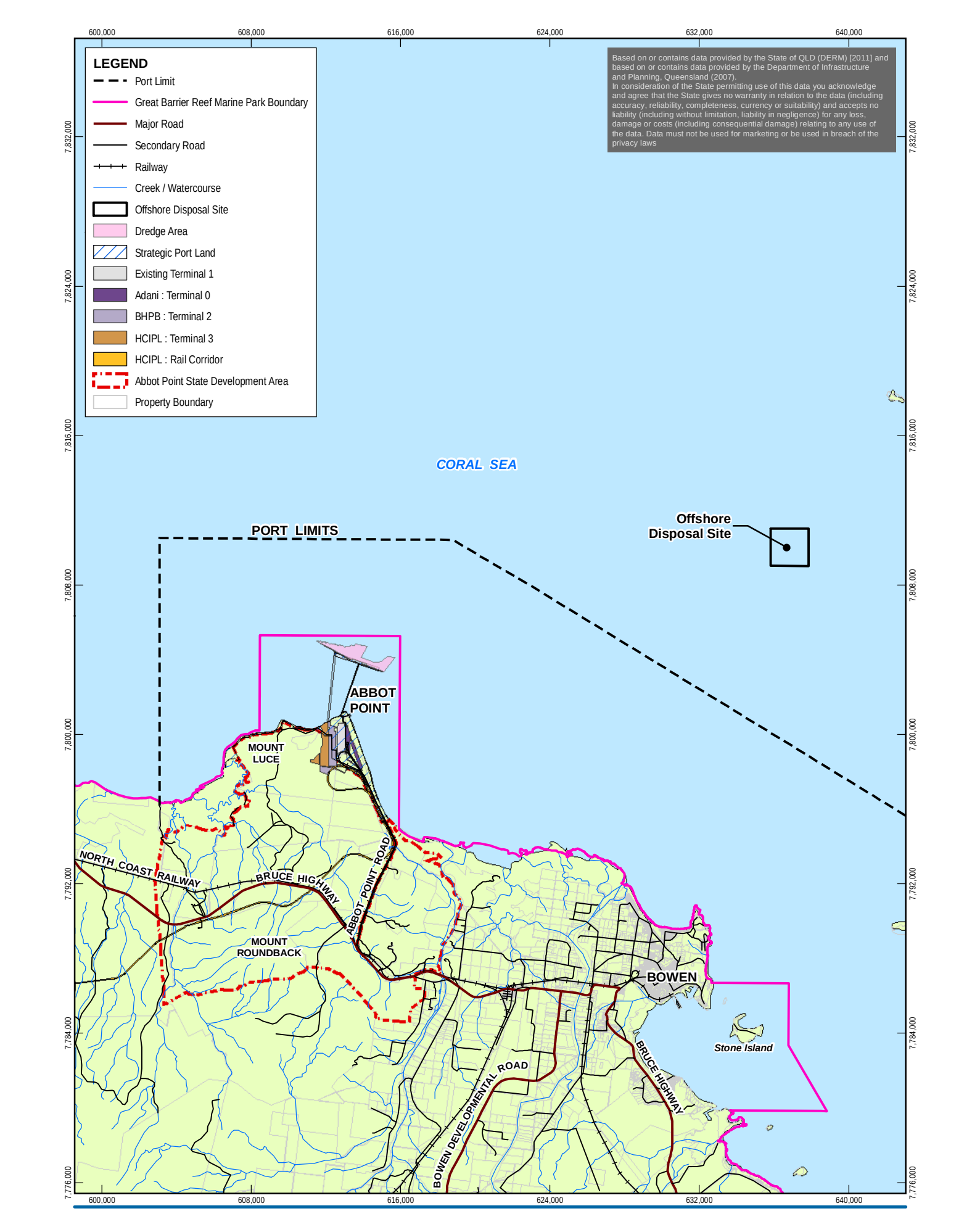
Overview

The Port of Abbot Point is an existing and long established port located approximately 25 kilometres (km) north-west of Bowen on the central Queensland coast.

The Project consists of the following two key components:

- Capital dredging works of berth pockets to facilitate the operation of Terminal 0 (T0), Terminal 2 (T2) and Terminal 3 (T3), which also includes an apron area and over-dredging to approximately 0.5 metres (m) below declared depths. The volume of capital dredging will be up to 3,000,000 cubic metres (m^3) over an area of approximately 184 hectares (ha).
- Relocation of dredged material to a new, deep offshore relocation area approximately 24 km from the dredge area.

Figure E-1 shows the location of the Project components.



1:250,000 at A4

0 2 4 6 8

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

North Queensland Bulk Ports Corporation Limited
T0, T2 and T3, Abbot Point, QLD,
Capital Dredging, Public Environment Report

Job Number 41-24541
Revision B
Date 12 Dec 2012

Location of Abbot Point Project Components

Figure E-1

G:\41\24541\Tech\GIS\Maps\PDFs_MXDs\CapitalDredgePublicEnviro\MXD\41-24541-104_ProjectsExecSumm_revB.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: GA: Road, Rail/2007; BHP Billiton, Hancock, Adani: Proposed Layouts/2011-2012; DERM: DCDB,State Development Area/2011; NQBP: Proposed Projects/2011 (Footprints subject to change). Created: JVC, AL, CA

Background and Need for the Project

The existing Terminal 1 (T1) at the Port commenced operations in 1984, with infrastructure developed to support the export of coal from the Bowen Basin. In 2011, T1 was expanded to increase export capacity to 50 million tonnes per annum (Mtpa). Further expansion is required to meet the increasing demand for coal export through the Port. This Project facilitates the development of the three coal terminals integral to the development of the Port and the continued development and expansion of the resource sector in Queensland.

The Project is required to facilitate the expansion of the Port to include T0, T2 and T3. Each of these proposed developments is being undertaken by different terminal operators as separate projects, all of which have been deemed controlled actions requiring environmental assessment under the EPBC Act. All capital dredging works across the three proposed terminal expansions are being assessed as one individual proposal (the Project), to enable a comprehensive assessment of all potential impacts associated with the capital dredging activity.

Assessment of Alternatives

A desktop assessment of alternative options for the Project (including alternative port locations, the creation of a new port and no action, meaning no dredging) was undertaken to justify the Project and selection of the Project site. It is concluded that the best environmental, social and economic outcome involves upgrading the existing and long established Port of Abbot Point to meet the increasing demand for coal export in the region. The selection of Abbot Point as the preferred option is due to a number of factors including:

- There are very few locations along Queensland's seaboard with water deeper than 15 m so close inshore.
- The Port is also located in close proximity to the Bowen Basin (coal resource), Galilee Basin (coal resource) and North West Minerals Province.
- The Port is adjacent to the Abbot Point State Development Area (APSDA), an area of land identified by the Queensland Government for the establishment of large scale industrial development.
- Expansion of other existing Ports such as Townsville would require significant capital works likely resulting in higher environmental and social impacts compared to an expansion of Abbot Point.
- Abbot Point is an existing Port. The creation of any new Port locations along the Northern Queensland coast would likely result in significant environmental impacts to a greenfield site.
- Bowen is located approximately 25 km from Abbot Point, with the nearest sensitive receptor more than 4.5 km from the exiting terminal, minimising potential anthropogenic impacts.

A comprehensive assessment of options for the relocation of dredged material was also undertaken for the Project through a dredged material relocation and reuse options assessment comprised of four phases. Phase 1 of the options assessment reviewed existing information relevant to the project while Phase 2 identified 'No Go' criteria to identify non-viable options to be excluded from further assessment. A Multi Criteria Analysis (MCA) was completed as Phase 3 of the assessment to examine potential impacts on MNES, other environmental and social values and engineering feasibility for each option. Phase 4 of the options assessment comprised further assessment of the options identified as feasible during the MCA.

Options assessed included various onshore and offshore disposal sites and methods, reclamation and beneficial re-uses for the material such as fill. A workshop was held as part of the MCA including representatives from NQBP, terminal customers, Commonwealth and State agency regulators, scientists and engineers to select the preferred option.

This process identified offshore relocation of dredged material as the preferred option. Significant treatment of dredged material would be required for onshore disposal and the use of dredged material as fill and the timeframes required to stabilise the material (approximately four years) would also result in significant delays to the project schedule. Additionally the onshore area would not accommodate the entire amount of dredged material requiring some material to be relocated further inland, which was not considered feasible.

Additional site selection studies were undertaken to determine the location of an offshore area based on hydrodynamic, physical, biological and socio-economic criteria. The assessment included an investigation of a site previously used for the disposal of maintenance dredged material in 2008. An area approximately 24 km north-east-east of Abbot Point has been determined to be most suitable for the disposal of the dredged material. This area could accommodate all of the dredged material and offered a greater distance from marine plant communities and coral reefs that could be impacted by turbid plumes than the previous relocation area. It is considered that the proposed new offshore relocation area presents a better environmental outcome than the previous relocation area and is the most suitable location within a 60 km radius of the Port. All references herein to an offshore dredged material relocation area refer to this preferred new relocation area, unless otherwise stated.

Proposed Operational Activities

Due to the nature and quantity of the material to be dredged, anticipated sea conditions, the offshore relocation area, maritime traffic in the area and the availability of dredging plant, a Trailer Suction Hopper Dredger (TSHD) is considered the most suitable equipment for undertaking the Project. It is envisaged that the dredging work could be carried out with a large TSHD (hopper capacity approximately 20,000 m^3).

Overflow dredging is the most commonly used form for dredging of non-cohesive (sand) and cohesive (silt and clay) materials. This method allows the dredger to continue dredging while the low-density mixture overflows, thus decreasing the water content ratio in the dredged material. This is done in order to increase the solids content in the hopper and make the dredging more efficient. Given the predominant fine sands and some silts and clays present in the dredge area, dredging with overflow will reduce the number of trips made to the relocation area and, as a consequence, reduce the overall timeframe and impacts of dredging.

Proposed Schedule

The Project is critical for the timely operation of the terminals. Dredging is proposed to commence in the second quarter of 2013 if a dredger is available. Dredging is estimated to take eight to ten weeks in total. However, dredging may be undertaken in consecutive campaigns over two or more years. Regardless of whether dredging is carried out in a single or multiple campaigns, the dredge area and volume will not change, nor will the dredging timing (i.e. will remain an eight to ten week period and will be undertaken between the second and third quarter of the year.

Stakeholder Consultation

A consultation plan has been prepared for the Project, and a Technical Advisory Consultative Committee (TACC) has been formed, in accordance with the National Assessment Guidelines for Dredging (NAGD; Commonwealth of Australia 2009) , which includes regulators and members of the public, including; representatives from conservation groups, non-government organisations, as well as recreational and commercial fishing groups. In addition to the aforementioned consultation on the Project, during the investigation of alternatives to offshore relocation, engagement with Commonwealth and State regulators was undertaken regarding various options with periodic briefings being carried out since that time.

The PER process has allowed for public comment on the draft Guidelines and will also enable the public to comment on the Draft PER, once publication and advertising of the document is approved for publication by the Minister for Sustainability, Environment, Water, Population and Communities.

Environmental Record of the Proponent

Section 6 of Schedule 4 of the EPBC Regulations requires the following information relating to the environmental record of the proponent, NQBP. No proceedings exist against NQBP in relation to any non-compliance with any Commonwealth, State or Territory approvals or permits. NQBP has in place an Environment Policy which covers all of its activities. The planning framework relevant to this Project is in accordance with the Port of Abbot Point Land Use Plan and Environmental Management Plan. In addition, NQBP has an Environment Management System that is externally certified as being compliant with the international standard AS/NZS ISO 14001: 2004.

E3 Environmental Values, Potential Impacts and Proposed Mitigation

Existing Environmental Values

Physical Environment

The Abbot Point area is subjected to climatic conditions typical of tropical monsoon areas, experiencing heavy rainfall during summer months and dry, mild winter months. The exposed nature of Abbot Point results in it being subjected to strong winds for much of the year.

The dredge area has a depth of -17 to -18.5 m Lowest Astronomical Tide (LAT), and is part of a natural bathymetry slope that occurs to the east and north-east of Abbot Point. The proposed new dredged material relocation area for the Project and identified through a MCA is situated approximately 24 km north-east-east of Abbot Point, in water depths between -39 m and -44 m LAT. The tides at Abbot Point are generally classified as mixed, mainly semidiurnal, with a maximum tidal range of 2.4 m. Currents offshore of Abbot Point are uniformly distributed over the water depth. Generally these tidal currents flow between 0.3 metres per second (m/s) to 0.35 m/s, but currents during peak spring tides can reach 0.4 m/s. The dominant tidal currents at Abbot Point flow in a north-west (ebb) and south-east (flood) direction. Relatively frequent significant wave heights up to 1.0 m affect the area, with wave heights exceeding 0.5 m approximately 50 % of the time.

The sediment composition of Abbot Point is relatively homogenous across the dredge area comprising predominantly fine sands, and silts and clays. The material to be dredged is suitable for unconfined disposal at sea in an approved offshore relocation area, on the basis that the 95 % upper confidence limits of analysed contaminant substances are less than their respective NAGD screening levels. Sediments are considered to be potential acid sulfate soil (PASS), based on an assessment against the

Queensland Acid Sulfate Soils Investigation Team (QASSIT) guidelines (Ahern et al. 1998). However, the potential acid neutralising capacity of the sediment is greater than the acid generating potential. The physical and chemical properties at the proposed dredged material relocation area are slightly different to the dredge area. The proposed dredged material relocation area has finer sediments, with generally greater concentrations of nutrients and heavy metals and metalloids. Though sediment characteristics do differ slightly in the proposed dredged material relocation area, this area is still considered the most suitable for several reasons including:

- It is inshore of the shipping lanes presenting less risk of vessel interaction during dredged material relocation campaigns.
- It is naturally depositional and would serve as a retentive disposal site.
- There are no high value fisheries values in the area.
- It is remote from significant breeding and foraging habitats for humpback whales, marine turtles and dugong.
- No high value benthic flora or fauna assemblages exist within or near the site.

The marine water quality environment at Abbot Point is influenced by coastal (currents and waves) and fluvial processes (discharges from coastal rivers and creeks), as well as weather conditions. These processes contribute to significant temporal, and particularly seasonal, variations in water quality. Monitoring has shown peaks in turbidity tended to coincide with months when heavy rainfall was recorded, although occasionally peaks in turbidity coincided with high wind speeds and the localised re-suspension of sediments. Similarly, higher records of total nitrogen and phosphorus were reported during the dry season, which, like turbidity, are often linked to periods of strong winds and localised re-suspension of nutrients. Abbot Point exhibits elevated levels of total suspended solids (TSS), nutrients and dissolved oxygen and, at a lesser frequency, chlorophyll *a* and pH during the wet season, particularly when high rainfall and runoff increase inputs of nutrients and terrigenous sediments, with implications for biological processes. This indicates that site specific guidelines would be more applicable for the Abbot Point area, in order to incorporate seasonality, coastal processes and fluvial influences specific to the area. The limited degree of spatial variation in water quality conditions at Abbot Point suggests that the coastal waters of Abbot Point are well mixed under non-flood conditions, which is consistent with other coastal waters of the Great Barrier Reef (GBR).

Biological Environment

The majority of the marine environment at Abbot Point is characterised by open seabed habitat with highly variable water depths including shoals and channels. This habitat supports small biodiverse patches of benthic macroinvertebrate communities that are representative of those common to open sandy coastal areas of Queensland. Other habitats within the area include low diversity seagrass beds and rocky reefs. A decline in seagrass density and abundance was observed at Abbot Point during the seagrass monitoring event of September 2011, this was consistent with similar severe contractions of seagrasses in other areas along the Queensland coast associated with severe tropical cyclones.

To the east and west of the Port Limits, habitats with conservation and biodiversity significance are recognised and managed under the Great Barrier Reef Marine Park Authority (GBRMPA) Zoning Plan. No reef complexes of high biodiversity have been identified within the Port Limits or in association with the offshore dredged material relocation area.

Seagrasses at Abbot Point were observed to be highly dynamic with changes in density and distribution being influenced by seasonality and major weather events. *Halophila spinulosa* has been found to dominate deeper sub-tidal areas and *Halodule uninervis* dominates inshore areas. Recent ecological surveys undertaken at the Project area during the winter season confirmed the patchiness of seagrass species with cover estimated at 1 % or less in most areas where seagrass was observed (BMT WBM 2012). No seagrass was observed within the preferred dredged material relocation area or areas adjacent to it (BMT WBM 2012). Algal communities at Abbot Point have repeatedly been reported to be widespread but patchy in distribution and typically with low percentage cover. Twelve macroalgal taxa were observed within the broader Project area based on video transect surveys conducted by BMT WBM (2012). No marine flora was observed within the dredged material relocation area and areas adjacent to it (BMT WBM 2012).

Benthic macroinvertebrate assemblages in Abbot Point are low in both diversity and abundance. Overall, spatial and temporal heterogeneity is a consistent characteristic typical of these macroinvertebrate communities. A recent survey observed echinoderms (urchins, asteroids, sea cucumbers), sponges, molluscs, ascidians, polychaetes and crustaceans being consistent, although patchy, features of the benthic fauna within their wider survey area. Cnidarians have also been recorded throughout the Abbot Point area in very low densities (<10 % coverage when recorded). Within the dredged material relocation area, patches of macroinvertebrates (0.7 fauna per 100 m) comprised mostly of mud scallops, with occasional hermit crabs, gastropods, polychaetes and crinoids. Mud scallops are collected as by-catch from prawn trawlers and represent a minor contribution to the Queensland scallop fishery

Abbot Point provides locally important habitat to four species of dolphin (Indo-Pacific humpback, bottlenose, Australian snubfin and common dolphins), five species of turtle (green, flatback, loggerhead, olive ridley and hawksbill turtles), dugongs and humpback whales. Other marine fauna observed within the Project area included leopard and bull sharks, olive headed sea snakes and manta rays. The Abbot Point area appears to offer foraging and, to a lesser degree, nesting areas for different coastal species and acts as a transitory area for migratory marine species. Marine fauna survey observations indicate that there are seasonal influences regarding the presence or prevalence of some species. Other turtle species, dolphins and dugong have a more consistent presence and show a preference for areas to the east of the existing terminal. Despite this apparent habitat preference, species were sighted across the entire Project area and although less frequently, were observed adjacent to existing port infrastructure.

A number of the marine fauna species identified within the Abbot Point area are listed as threatened and/or marine and migratory under the EPBC Act, however they do not represent values that are specific to the Project area, although there remains uncertainty regarding the extent to which Australian snubfin dolphins at Abbot Point are endemic. The direct value of seagrass habitat for fisheries production in the Abbot Point region is reported to be significantly less than other areas in central and northern Queensland.

Socio-Economic and Cultural Environment

The Port adjoins the Whitsunday Regional Council. The region, particularly the Isaac Local Government Area, is strongly associated with the coal mining industry, the Bowen Basin coalfields contributing more than half of Australia's coal exports. In addition to coal, the region is supported by strong manufacturing industries, agriculture, retail and services, and a growing tourism industry.

The traditional owners (the Juru people) of Abbot Point consider this region to be culturally significant. While there are no specific sites of cultural heritage significance within the Project area, there are sites of Aboriginal cultural heritage significance within the broader Abbot Point region.

Potential Impacts of the Project

A risk based approach was used to assess potential impacts associated with the Project and a number of guidelines and methodologies were used to assist in the determination of significance of impact (sources of risk, the potential consequences and the likelihood).

Physical Environment

Hydrodynamic and sediment transport modelling identified that dredging works are not predicted to affect bed shear stress, re-suspension or longshore transport of sediments or prevailing current patterns. Hydrodynamic and sediment transport of the proposed dredging predict that the majority of the plume will be located north-west of the dredge area, pushed by prevailing wind conditions and related currents. Under varying wave climate scenarios, waters are subjected to some low suspended sediment loading (5 to 10 milligrams per litre (mg/L)), however deposition on beaches is not predicted to occur. Accordingly, coastal bathymetry is not predicted to be affected by the proposed action.

Effects on water quality are likely to be limited to impacts regarding the turbid plumes from dredging and material relocation. Testing of the material to be dredged indicates that the potential for impacts arising from the release of sediment contaminants and nutrients to the water column is low, given that sediment analysis indicates that contaminant and nutrients concentrations are less than NAGD screening levels.

The capital dredging will initially alter the surface sediment structure in the dredge area by slightly increasing the silt and clay content of surface sediment. The sediment composition of the relocation area will also be slightly altered with deposition of predominately coarser sediments, being fine sands, on top of currently predominately finer sediments, being silt and clay. The capital dredging will not oxidise PASS in sediments as the sediments will remain saturated in a slurry within the dredger hopper prior to release at the dredged material relocation area. As such, no significant impacts due to acid sulfate soils are anticipated as a result of the Project.

Biological Environment

Potential direct and indirect impacts to the marine environment are expected as a result of the dredging activity and relocation of dredged material. These activities are expected to result in a range of potential impacts on the marine sediment and water elements, which can in turn affect the biodiversity of the Project area. These include:

- Direct removal of benthic assemblages due to dredging activity - benthic assemblages occupying the dredge area (approximately 184 ha) will be directly removed during dredging activities, while those occupying the preferred offshore dredged material relocation area (400 ha) will be subject to burial in up to 800 mm of dredged material over the duration of the dredging campaign. Benthic communities within the dredge area are comprised of sparse epibenthic fauna and low density seagrass habitat, while those within the relocation area are comprised of relatively depauperate epibenthic communities with an absence of seagrass or algae. Impacts to benthic communities will be temporary as recolonisation of the disturbed areas (dredge and dredged material relocation area) will occur after a brief period of settling. Recolonising communities are not predicted to be materially different from current communities.

- Mobilisation of sediment resulting in turbidity plumes potentially indirectly affecting light dependent species, filter feeders and having potential flow on effects to higher trophic groups - sediment plumes will be generated from dredging, overflow and disposal in the dredged material relocation area. During prevailing wind conditions, TSS concentrations are expected to decrease to 10 to 25 mg/L above background within approximately 5 km of dredging activities returning to 5 to 10 mg/L above background approximately 11 km from dredging activities. TSS values near dredging operations are predicted to exceed dry season conditions but are comparable to those experienced during wet season conditions. Sediments within the plume will settle out predominately in a westerly direction during the campaign and the maximum predicted daily deposition rate above ambient levels within 5 km of dredging is 113 mg/cm^2. This daily deposition rate equates to an increase in bed thickness of 40 to 80 millimetres (mm) over the duration of all dredging. This deposition is predicted to occur across open seabed and the margins of potential seagrass habitat.
- Plume sediments have potential to indirectly impact benthic communities by blocking light availability. Variability in light within coastal waters at Abbot Point is observed as a result of seasonal variability in rainfall inputs. Under prevailing conditions, up to approximately 2,000 ha of potential seagrass habitat is predicted to be affected by plumes such that light availability will decrease to less than 1 % surface irradiance during the dredging campaign of eight to ten weeks, in total. No coastal seagrass meadows, or potential seagrass meadow habitat, are predicted to be affected by light losses. The area predicted to be affected by dredging related light loss of up to 2,000 ha occurs in deepwater and is substantially less than that affected from observed wet season conditions blocking light availability (6,700 ha). The duration of the impact is also considered to be less than that likely to occur during the wet season. As such, any impacts experienced from the Project, relating to reduced light availability, are considered comparable to the observed variability experienced at Abbot Point. Further, dredging works will occur during the dry season when seagrasses have senesced and will, therefore, have a reduced area which could be impacted. As such, no significant impacts to potential or actual seagrass habitat are predicted likely from the Project as a result of light depletion.
- Direct smothering of benthic ecology in areas adjacent to dredging (sediment plume drift) - sediments settling out of plumes have the potential to smother benthic communities, including seagrass or potential seagrass habitat. Increased sedimentation is predicted to occur as a result of dredge activities. The majority of deposition across areas affected by plumes is comparable to observed variability at Abbot Point and as such, the sparsely distributed benthic communities are expected to be resilient to this effect. The exception is the assemblages within the immediate vicinity of the dredging activity, which are predicted to be subject to sediment accumulation to a depth of 40 to 80 mm. The majority of potential seagrass habitats are, however, exposed to markedly less than this, with an area of 765 ha of potential seagrass habitat exposed to more than 10 mm of sediment deposition above ambient. Approximately 1 ha of potential benthic fauna habitat will experience sedimentation greater than the depth at which they may successfully migrate (15 cm).
- Direct injury/mortality of fauna due to dredging and dredged material relocation - the risk of vessel strike on megafauna of any species from dredging works is considered to be low at Abbot Point given the slow speed of the dredger and the deep offshore environment in which dredger will operate. The risk of turtle mortality from dredging activities is low and application of turtle exclusion devices and restriction of dredging windows are effective mitigation measures to avoid impacts on turtles from dredging works.

- Displacement of fauna from habitat – temporary shifts in baseline noise levels will occur as a result of the dredger operating. Noise generated by 24 hours continuous TSHD dredging over an extended period (of the order of six months) would not, however, pose a risk of temporary threshold shift (TTS) to marine fauna from cumulative sound energy exposure. An animal would need to remain exposed to this noise for an extended period (comparable to 24 hours) for TTS impacts to arise from this source. Given that the dredge campaign is expected to be completed within eight to ten weeks, regardless of whether dredging occurs in one or multiple campaigns, significantly less than the six month period after which shifts in baseline noise are predicted to result in displacement of megafauna, no displacement of marine megafauna due to dredging related underwater noise and vibrations is predicted to occur. The coexistence of megafauna, port operations and dredging at other Queensland Ports support this assessment. A megafauna exclusion zone of at least 100 m would be satisfactory to guard against potential TTS impacts.
- Introduction of marine pests and diseases - internationally sourced vessels have potential to introduce marine pest species through discharge of species carried in ballast water or sediments (for example from dredge hoppers) or from biofouling of vessel hull surfaces. Given that vessels currently adhere to legislative requirements and that no pest species have been introduced to date under these control measures the risk of introduction is considered to be low.
- Potential impact on fisheries product from degraded water quality - a review of fisheries information for Abbot Point identifies that the dominant fish species of Abbot Point are not species of importance for commercial operations. No commercial fishing occurs adjacent to the existing wharf and habitats identified (and species identified) at the dredged material relocation area are not considered to be of high fishery value. Direct dredging works and material relocation or any indirect (plume) effects on habitat are, therefore, not predicted to affect access to fisheries resources.

An assessment of differences in potential impacts from dredging in a single versus multiple campaigns was also carried out by NQBP in consultation with marine ecologist and coastal processes modellers from BMT WBM based on the assumption that a similar sized dredge would be used for all campaigns. This assessment identified that the types and extent of impacts will be similar whether dredging is carried out over a single or multiple campaigns. The main difference between the two scenarios would be that dredging over multiple campaigns has the potential to impede seagrass recovering from the initial dredge campaign, depending on the timeframe between dredge campaigns (i.e. consecutive years or a gap of several years).

In the event of multiple campaigns, additional management measures would be put in place to minimise the potential for further impacts. Measures may include limiting dredging so that it only occurs during seagrass senescence periods, carrying out additional plume dispersion modelling and seagrass surveys between dredging campaigns and modifying monitoring programs to reflect any changes in seagrass extent.

Socio-Economic and Cultural Environment

The Project will support 20 to 30 workers over a period of approximately eight to ten weeks in the Bowen region. Land based workers will be accommodated either in the existing NQBP facility at Merinda, or at alternative accommodation within Bowen. Little to no socio-economic impacts are anticipated as a result of the Project.

Potential turbidity plumes from dredging and relocation of dredged material are not predicted to impact any culturally significant sites located along the coast. No significant impacts on cultural heritage values are anticipated as a result of the Project.

Proposed Mitigation Measures

No potential impacts to hydrodynamic or coastal processes at Abbot Point are predicted to occur as a result of the proposed action and, as such, no mitigation measures are proposed.

No potential impacts are predicted to occur from mobilisation of any PASS and as such, the risk of this occurring is deemed low. No mitigation measures are therefore proposed.

Sediment testing undertaken within the Project area confirmed the sediments are not contaminated, and that nutrient levels are well below guideline levels. Sediments at Abbot Point are therefore not expected to result in the release of contaminants and excessive nutrient loads into the water column when disturbed by dredging activities. As such, no mitigation measures are proposed.

There is the potential for impacts to the water quality of the area as a consequence of the accidental release of waste or pollution materials into the marine environment via waste/chemical spills from dredge or tender vessels. These risks can be addressed by strict adherence to waste and pollution management plans to be documented in the Dredging Environmental Management Plan (EMP). Under appropriate controls with adherence to the Dredging EMP, the risk of impacts occurring as a result of release of contaminants is considered to be low.

Based on a review of peer reviewed literature and observations of recolonisation at the previous dredged material relocation area at Abbot Point, the impacts of dredging on benthic communities (from their direct removal) are expected to be temporary, as benthic flora and fauna will recolonise the disturbed areas. Impacts on water quality, marine flora and fauna as a result of a localised increase in turbidity and an increase in sedimentation will be minimised via management measures targeted at minimising dredging plumes. TSHD dredge plumes can be minimised through managing the duration of dredging; that is, once a dredging campaign commences it should be completed as quickly as possible (and at the best time of year i.e. not wet season) to allow natural recovery mechanisms to commence and to minimise the duration of degraded water quality conditions. Environmental valves may also be fitted to the dredger.

Baseline monitoring assessment of seagrasses present prior to construction would be carried out to provide information regarding seagrass habitat extent which may be affected by construction works, species present that may be affected and, therefore, light loss thresholds of relevance to management of impacts.. Data would also inform areas appropriate for monitoring during dredging works to detect any impacts to seagrass. Monitoring during dredging works using the above mentioned baseline data would enable reactive dredge management intervention to minimise impacts to seagrass. Dredge management measures could include increasing dredge cycle times to decrease site specific impacts, relocating the dredger if any one sensitive habitat was demonstrating stress or halting dredging works. Monitoring during and post dredging would clarify actual seagrass losses and recovery enabling intervention to be actioned if required.

To avoid direct harm to turtles, TSHDs will be required to be fitted with turtle deflectors to disturb and deflect turtles away from the dredge head. In addition, to avoid potential entrainment of mobile fauna suction pumps should only be operated when drag heads are on the seabed. A megafauna exclusion zone of 100 m would be satisfactory to guard against potential temporary threshold shift impacts. TSHDs will not be undertaken during turtle nesting season (1 November to 30 March). Fauna spotters could also

be utilised during dredge steaming to the relocation area, to minimise the risk of collision of the dredger with marine fauna. Speed reduction of vessels is recognised to be a principal mechanism for management of potential negative interactions between vessels and megafauna.

All vessels are required to adhere to the measures described by the National System to minimise risk of introducing pests to Queensland waters. National System measures currently prohibit the discharge of any ballast water at high risk of carrying marine pests in Australian waters.

Direct dredging works and material relocation or any indirect (plume) effects on habitat are not predicted to affect access to fisheries resources and no mitigation measures are proposed, with the exception of a notice to mariners, informing the public of the proposed Action.

E4 Matters of National Environmental Significance

Great Barrier Reef World Heritage Area

The Project area is within the Great Barrier Reef World Heritage Area (GBRWHA), which unlike the GBRMP includes port operational areas. The Project area is not recognised as a notable or significant biodiversity site, nor does it contain prime examples of any of the particular values for which the GBRWHA was inscribed. However, the area does support protected species such as cetaceans, dugong and turtles, which utilise the local and regional marine ecosystems for breeding, nesting, foraging and resting.

The dredging will be undertaken within the operational Port Limits of Abbot Point which has been subject to similar activities in recent years, with habitats recorded to recover from similar events. Dredged material disposal will occur outside the Port limits in open waters within both the GBRWHA and the GBRMP. The area of potential impact (inclusive of temporary potential impacts associated with the dredge and disposal plumes) is restricted to approximately 113 km² (0.3 %) of the wider 348,000 km² area of the GBRWHA. World Heritage Area (WHA) values were included as selection criteria in the Dredged Material Relocation and Reuse Options Assessment in order to minimise potential impacts on these values.

The Project will not result in significant impacts on geomorphic or physiographic features, ecological or biological processes, areas of exceptional natural beauty, or the most important natural habitats for biodiversity conservation, such that those values would be lost, degraded or damaged, or notably altered, modified, obscured or diminished. Neither will the Project significantly impact on the integrity of the GBRWHA.

Great Barrier Reef National Heritage Place

The GBR is one of 15 Australian WHA sites that were automatically transcribed from the WHA list to the National Heritage Places (NHP) list in May 2007. As such, the assessment of potential impacts on WHA values directly applies to, and is consistent with, the likely impact to the National Heritage listing values. No other National Heritage places are located in the vicinity of the Project area.

The Project will not notably alter, modify, obscure, diminish, degrade or damage the national heritage values of the Great Barrier Reef National Heritage Place.

Listed Threatened Species

Six listed threatened species are known to occur within the Project area: humpback whale, loggerhead turtle, green turtle, hawksbill turtle, olive ridley turtle and flatback turtle. In addition, potential habitat for

the leatherback turtle is available within the Project area although the species has not previously been recorded. The Project area does not support important populations of any of these species and does not contain habitat critical to the survival of these species.

There have been no reported cases of marine megafauna mortality from dredging at Abbot Point during previous dredge campaigns that have utilised turtle exclusion devices and management of the dredge head and pumps to mitigate potential impacts on marine turtles. Management measures to be implemented to reduce project impacts include temporal exclusions such as no dredging during marine turtle nesting season, the fitting of a turtle exclusion device to the dredger head to minimise turtle interactions with the dredger and adhering to Commonwealth legislation pertaining to invasive pest management.

The Project is therefore not likely to result in a significant impact on a listed threatened species.

Marine Migratory Species

Four migratory marine species are known to occur within the Project area: dugong, Australian snubfin dolphin, Indo-Pacific humpback dolphin and estuarine crocodile. Two marine migratory birds are considered likely to occur within the Project area (bridled tern and black-naped tern) with an additional migratory marine bird potentially occurring (fork-tailed swift).

There is currently insufficient information regarding population dynamics to determine whether the Abbot Point area supports important populations of the Australian snubfin or Indo-Pacific humpback dolphin. Accordingly, the conservation importance of these species in the context of the proposed dredging at Abbot Point should be considered high. The Project area does not support important populations of any of the other species identified and does not contain habitat critical to the survival of these species.

These marine species have been recorded in the Project area undertaking behaviours that include feeding, resting and playing. The foraging preferences for these species range from seagrass (dugong) to fishes (inshore dolphins). Habitats utilised by these migratory species will be temporarily impacted within a limited spatial footprint (dredge, relocation area and plume area) at Abbot Point. The resilience of habitats in this region suggests that there is unlikely to be a significant impact to these habitats that may have flow-on affects to migratory species.

The Project is not likely to result in a significant impact on a marine migratory species.

Commonwealth Marine Area

The Commonwealth marine area will be directly impacted by temporary changes in water quality such as reduced light levels in the water column, increased turbidity and sedimentation. However, this impact is temporary, occurring outside of the peak marine turtle nesting period. The level of turbidity in the water column is expected to return to background levels within days of the cessation of dredging, although this is influenced by wind, tide and wave conditions.

A total of approximately 184 ha of potential seagrass habitat within the dredged area will be temporarily affected as a result of Project activities. An additional conservative estimate of 765 ha of potential seagrass habitat may also be impacted as a result of sediment plume deposition. The area of potential seagrass habitat conservatively estimated to be impacted by the Project is substantially less than that affected during natural wet season conditions both with regard to area and duration of influence. As such, any Project influences are considered within the bounds of natural variability. As such, any Project

influences are considered within the bounds of natural variability. Hence, no significant impacts to potential or actual seagrass habitat are predicted.

The removal of the benthic habitat, seagrass communities or potential seagrass habitat within the Project dredge area will result in a temporary loss of habitat which is not likely to significantly impact the values of the Commonwealth marine area.

Great Barrier Reef Marine Park

The Project dredging will occur within the operational Port Limits, which are excised from but adjacent to the GBRMP. Dredging and relocation activities are likely to result in temporary impacts to the values of the GBRMP. The proposed dredged material relocation area is located within the General Use Zone of the GBRMP and as such, zones of high value will not be affected by Project activities.

E5 Cumulative and Consequential Impact Assessment

The Project proponents have undertaken a voluntary Cumulative Impact Assessment (CIA) to identify, manage and mitigate the cumulative and consequential impacts associated with current and future activities at Abbot Point.

Cumulative impacts are deemed as those occurring from activities that collectively contribute to progressive environmental degradation. Consequential impacts have been identified as those potentially occurring as a result of dredging. Dredging for the development of T0, T2 and T3 will incur cumulative and consequential impacts during both the construction and operational phases of the Project. The potential impacts identified in this PER have been based under the assumption that dredging and relocation of dredge material will occur prior to the subsequent jetty and wharf construction associated with other projects.

The function of the CIA is to assist the Commonwealth government in the decision-making process by providing a collective set of information on impacts (both on-shore and off-shore) and their associated management strategies. Specifically, it focusses on the potential impacts on MNES listed under the EPBC Act; this includes threatened ecological communities and species, migratory species and World Heritage Values. The CIA will particularly address the actions required to mitigate the Project's potential cumulative impacts, with an overall result of the maintenance or improvement of MNES at Abbot Point.

As each proposed project at Abbot Point is being evaluated separately, the CIA will encompass a holistic assessment of the total, cumulative impacts of both the proposed and existing developments. The projects included in the CIA are the:

- T0 including stockyards, offshore trestle and associated rail loop
- T1 (existing operation)
- T2 including stockyards, offshore trestle and associated rail loop
- T3 including stockyards, offshore trestle and associated rail loop
- T0, T2 and T3 capital dredging

Several key areas associated with dredging (e.g. marine water quality, shipping and fisheries) have been identified for study to provide a collective quantification of the Project impacts. The key areas that have been identified in this assessment as having the potential for cumulative impacts in relation to dredging include potential impact on seagrass habitat, underwater noise and marine water quality. In addition, potential consequential cumulative impacts from port development include increased shipping traffic

through the Port and the broader GBR. Overall, these studies will form the basis of the CIA for Abbot Point. Management of residual cumulative impacts will occur via the proposed joint environmental management framework.

E6 Environmental Management Plan

NQBP is committed to providing and managing the Port facilities and services in an environmentally responsible manner. The potential environmental impacts caused by the Project are to be managed by NQBP through the use of a Dredging EMP, which manages, mitigates and monitors the associated impacts.

The Dredging EMP will sit within a Joint Environmental Management Framework (JEMF), with the overall purpose being to identify and deliver specific environmental objectives applicable to all projects across the life of the Port. Importantly, the JEMF will address the outcomes of the CIA, will aim to retain existing environmental values, and will be flexible and adaptable to encompass development as it progresses at the Port as well as any future development. Key components of the JEMF are anticipated to include:

- Governance Arrangements
- Technical Advisory Group
- Commercial Arrangements
- Compliance Arrangements
- Environmental Management System

The Dredging EMP will be a practical document detailing the management strategy for both cumulative and individual impacts associated with the dredging activities. It will be developed to meet the principles and objectives of the JEMF in consultation with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) and GBRMPA and provided to them, and other relevant agencies for approval prior to commencement of dredging. At a minimum the following environment management elements (assessed in this PER and in the CIA) will be addressed by the Dredging EMP:

- Marine water quality
- Marine ecology
- Noise and vibration
- Air quality emissions
- Waste

The Dredging EMP will be presented to the Commonwealth government for approval prior to the action commencing, with additional proponent and contractor input.

E7 Conclusion

The PER has identified a number of potential impacts to the local environment at Abbot Point. These impacts will be predominantly localised and can be effectively managed through the implementation of management measures, which will be developed in the Dredging EMP. An assessment of the Project impacts in relation to the Significance Guidelines for MNES has demonstrated that the proposed development is not expected to have a significant impact on any MNES as described by the EBPC Act,

nor the objectives of the GBRMP Act. It is therefore considered that the Project is compliant with the objectives of the EPBC Act and the GBRMP Act.