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Department of Planning and Infrastructure

GPO Box 1680

Darwin NT 0801

Notice of Intent for the Proposed Expansion Works at East Arm

Final

AECOM

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Acronyms

AAPA	Aboriginal Areas Protection Authority
ANZECC	Australia and New Zealand Environment Conservation Council
AQIS	Australian Quarantine and Inspection Service (Cth)
ASS	Acid Sulfate Soil
DEWHA	Department of Environment, Water, Heritage and the Arts (Cth)
DHAC	Darwin Harbour Advisory Committee
DHF	Department of Health and Families (NT)
DHRMSF	Darwin Harbour Regional Management Strategic Framework 2009 – 2013
DIPE	Department of Infrastructure, Planning and Environment (NT) (now known as DPI)
DPC	Darwin Port Corporation
DPI	Department of Planning and Infrastructure (NT)
DV	Zoning under NT <i>Planning Act 2008</i> that allows for Development
EIS	Environmental Impact Statement
EPA	Environment Protection Authority (NT)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
LDC	Land Development Corporation
MARPOL	Maritime Pollution, refers to the International Convention for the Prevention of Pollution From Ships, 1973
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NES	National Environmental Significance, as defined in the EPBC Act
NOI	Notice of Intent
NRETAS	Department of Natural Resources, Environment, the Arts and Sport (NT)
PER	Public Environment Report
PWCNT	Parks and Wildlife Commission of the NT

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Executive Summary

This Notice of Intent (NOI) has been prepared on behalf of the proponent, the Northern Territory Department of Planning and Infrastructure (DPI) as formal notification of a proposal to provide the following elements at the East Arm Wharf and adjacent areas:

- a Department of Defence (Defence) hardstand, to be commenced by 2010, as there is a current requirement for this facility to be developed as soon as possible
- a marine supply base, to be commenced by 2010, as there is a current requirement for this facility to be developed as soon as possible
- filling of an area to provide land for an additional rail spur into the bulk stockpile area, to be commenced by 2010/2011
- development of the additional rail spur to the bulk stockpile area and filling of an area north of the existing East Arm Wharf ponds, to be commenced by 2014
- extension of the existing East Arm Wharf key line, as identified in the Port Masterplan 2030 and to be commenced by 2014
- Land Development Corporation (LDC) subdivisional works and filling adjacent to the new East Arm Boat Ramp and Muramats Road, to be commenced by 2014
- disposal of dredge spoil, with dredging to commence in the first quarter of 2012.

The NOI has been prepared based on existing available information, augmented by a brief site visit and discussion with stakeholders.

Key issues identified, some of which have a wider application than the current Project, include:

- integration of environmental studies, monitoring and management within the Project scope, project management methodology, staging, construction and operation
- agreed ambient air quality standards, studies, monitoring and management programs for the Project area of influence, to cover personnel OH&S, contaminated dust plumes accumulating as sediment in adjoining Harbour floor and its circulation
- agreed water quality standards, studies, monitoring and management programs for the Project area of influence to cover runoff and sediment control requirements for land based construction and operation, to manage its impact on the adjoining Harbour, its circulation and Bleasers Creek and Hudson Creek environments
- agreed water quality standards, studies, monitoring and management programs for the Project area of influence to cover dredging operations and dredge spoil disposal, to manage its impact on adjoining Harbour, its circulation and Bleasers Creek and Hudson Creek environments
- a need to undertake further Darwin Harbour hydrodynamic modelling studies, implement agreed standards, monitoring and management programs for the Project area of influence, to cover issues such as altered current and sediment movement and sustainment of remaining mangrove habitat (due to the extended wharf, constructed hardstand and backfill areas in the adjoining Harbour, Bleasers Creek, and Hudson Creek environments. The modelling will also dictate the shape of new additions to the wharf footprint to ensure no adverse effects (e.g. erosion, sedimentation)

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- a need to ensure impact assessment adequately covers Commonwealth and Northern Territory legislative requirements for whole-of-environment understanding, including geology, landform, flora and fauna (native and introduced) and Indigenous and European cultural heritage.

A range of additional studies have been identified to support the Project and are being undertaken currently (or planned to be undertaken in the near future), as follows:

- risk analysis, involving key stakeholders
- gap analysis of environmental and engineering information
- concept design for future wharf works
- hydrodynamics modelling for the proposed works
- investigation of current and future likely cyclone and storm surge levels
- geotechnical studies in the harbour
- a range of environmental studies, as identified in the gap analysis above, to support any future requirement for a Public Environment Report (PER) or Environmental Impact Statement (EIS)
- a Dredge Management Plan for the proposed East Arm Wharf expansion.

A summary of the key risks, data gaps and proposed management is as follows.

Environmental Component	Risk	Gap in Data	Proposed Management
Site selection	Nil – expanding existing infrastructure	Nil	Site already approved for development and zoned accordingly.
Climate	Runoff and sedimentation from heavy rains	Nil	Sediment and Erosion Control Plan Water sensitive urban design
	Winds generating dust	Nil	Operational Environmental Management Plan
	Cyclones and storm surge (this is also related to sea level rises)	Further investigation required (and planned)	Incorporate engineering controls for coastal and infrastructure protection
	Alterations to tidal movements	Hydrodynamic modelling	Incorporate outcomes into engineering controls
	Possible sea level rise	Further investigation required (and planned)	Incorporate controls into design

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Environmental Component	Risk	Gap in Data	Proposed Management
Geology and Landform	Inappropriate design due to subsidence of substrate	Geotechnical data for excavation/backfilling areas and dredging	Incorporate into design and construction practices and use outcomes to develop Dredging Management Plan
Hydrology	Sustainable use of and contamination of groundwater	Groundwater monitoring data	If necessary conduct additional groundwater monitoring
Land Capability	Nil	Nil	No change in existing land use type and services already planned for establishment in area to support proposed activities
Hydrodynamics	Impact on tide and sediment movement	Detailed tide and sediment movement data (modelling)	Data to inform design, structure, construction and long term management Dredging Management Plan
	Impact on remnant mangrove forests	Nil	Already zoned for development Mangrove Management Plan would be developed to protect remaining mangroves adjacent to site, including monitoring Ongoing protection of remainder incorporated into Operational Environmental Management Plan
Land Units	Nil	Nil	Incorporate opportunities and constraints in Project design

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Environmental Component	Risk	Gap in Data	Proposed Management
Flora	Clearing of mangroves in development footprint (already zoned for development)	Nil	Follow mangrove clearing guidelines A Mangrove Management Plan would be developed to protect remaining mangroves not zoned for development, including monitoring Ongoing protection of those mangrove areas not zoned for development incorporated into Operational Environmental Management Plan
	Impact on remnant mangroves (not zoned for development)	Nil	Mangrove Management Plan would be developed to protect mangroves not zoned for development, including monitoring Ongoing protection of those mangrove areas not zoned for development incorporated into Operational Environmental Management Plan
	Impact on any threatened species present	Current presence of any threatened species	Targeted field survey within areas to be cleared
	Introduction and/or spread of weeds	Nil	Weed Management Plan Clean fill used as available
Fauna	Impact on any threatened species present	Confirmation of presence of any threatened species	Targeted field survey within areas to be cleared
Marine Environment	Impact on harbour water quality	Water quality monitoring data	If necessary conduct additional water quality monitoring
	Surface water pollution	Nil	Stormwater Management Plan

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Environmental Component	Risk	Gap in Data	Proposed Management
Pest Species	Potential to introduce/exacerbate pest and quarantine threats	Nil	Construction and Operational Pest and Quarantine Management Plans
Biting Insects	Impact on human health	Baseline data to be collected	Baseline data to inform Biting Insect Monitoring and Management Plan Guidelines to Prevent Mosquito Breeding in Constructed Wetlands in the Northern Territory 2008
Areas of Environmental Significance	Impact on Darwin Harbour, listed as wetland of national significance	Marine habitat and flora/fauna assessments	Investigations, reporting, monitoring and management plans as required
Archaeology	Disturbance/destruction of any archaeological sites	Existence of any archaeological sites in areas to be disturbed	Investigations, reporting, monitoring and management plans as required
Sacred Sites	Disturbance/destruction of Sacred Sites	Existence of any Sacred Sites – AAPA Authority Certificates dated 1994 may not be applicable to the current Project	Investigations, reporting, monitoring and management plans as required
European Heritage	Disturbance/destruction of any heritage sites	Existence of any heritage sites	Investigations, reporting, monitoring and management plans as required
Native Title	Nil	Nil	Nil
Adjacent Marine and Land Uses	Nil	Nil	Consultation with stakeholders
Air Quality	Impacts from noise and lighting during construction and operation	Comprehensive studies to determine receiving environments	Additional studies Air Quality Management Plan
Water Quality, Stormwater, Runoff and Erosion	Surface water contamination	Nil	Stormwater Management Plan
	Erosion and sedimentation	Nil	Erosion and Sediment Control Management Plan
Waste Management and Pollution	Impact on Harbour water quality Acid sulphate soil contamination	Nil	Dredging Management Plan

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Environmental Component	Risk	Gap in Data	Proposed Management
	Liquid and solid wastes	Nil	Construction and Operational Waste Management Plan
Greenhouse Gas Emissions	Greenhouse gas emissions	Emissions measurements/ estimation and comparison with NEPM	Investigation and environmental assessment
Sustainability	Management of cumulative impacts	Full knowledge of end users of facilities	Staged development through implementation of the Port Masterplan 2030, supported by Construction and Operational Environmental Management Plans and integrated monitoring systems.

This document is the first stage of the environmental assessment process covering all the above expansion elements. It is recognised that the next stage may be either a PER or DEIS and that a substantial amount of work would need to be completed in a relatively short timeframe to meet critical construction completion dates.

The proponent is seeking to commence further studies as soon as possible to enable critical deadlines to be met and therefore wishes to progress from this nominal NOI to advice on the level of assessment required as soon as possible to facilitate this.

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1.0 Introduction

This Notice of Intent (NOI) has been prepared by ENSR Australia Pty Ltd (trading as AECOM and hereafter referred to as AECOM) on behalf of the proponent, the Northern Territory Department of Planning and Infrastructure as formal notification of a proposal to provide the following elements in the East Arm area:

- a Department of Defence (Defence) Hardstand
- a marine supply base
- filling of an area to provide an additional rail spur into the bulk stockpile area
- filling of an area north of the existing East Arm Wharf ponds
- extension of the existing East Arm Wharf key line
- Land Development Corporation (LDC) subdivisional works and filling adjacent to the new East Arm Boat Ramp and Muramats Road
- disposal of dredge spoil.

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2.0 Proponent

The proponent for The Project is the Northern Territory Department of Planning and Infrastructure (DPI).
Contact details are as follows:

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3.0 Location

The Project, comprising the elements described in **Table 1** (below), is situated on the East Arm Peninsula, within Darwin Harbour. The Peninsula has been developed to form the East Arm Wharf and associated wharf related industries, in accordance with the draft Environmental Impact Statement (EIS) for the East Arm Wharf Expansion (Acer Vaughn, 1993). The Wharf and surrounding infrastructure is designated the 'East Arm Port Development Zone' (Zone DV in the *East Arm Control Plan 1998*, Northern Territory *Planning Act 2008*). The Zone DV allows for development of major strategic industries including gas based, road, rail or ports industries, and provides land for major industrial development.

The Project elements fall within a number of tenures, which are listed at **Table 1**.

Table 1: Project Elements and Tenure

Area on Figure 1	Project Elements	Tenure
3	A Defence hardstand	Offshore in DV Hundred of Bagot Part Section 4444
2	A marine supply base	Offshore in DV Hundred of Bagot Part Section 4444
1	Filling an area to provide an additional rail spur into the bulk stockpile	Hundred of Bagot Section 5412 Section 5631 Offshore DV
1	Filling of an area north of the existing East Arm Wharf ponds (this may be staged over time)	Hundred of Bagot Section 4444 Section 5772
1	Extension of the existing East Arm Wharf key line	Offshore in DV NT Portion 5987
4	LDC subdivisional works and backfilling due west of the current Muramats allotments	Hundred of Bagot Section 4337 Offshore in DV
All (fill material)	Disposal of dredge spoil	Hundred of Bagot Section 4444 Section 5631 Section 4337 Offshore in DV

The East Arm Wharf extends into the Darwin Harbour and is bounded by Bleasers Creek to the north and Hudson Creek to the east. Two small islands lie directly south and east of The Project area; South Shell Island and Catalina Island.

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4.0 Description of Proposal

A description of each Project element follows and is shown at **Figure 1**.

4.1 Defence Hardstand (Area 3)

The Project is to establish a small barge ramp and subsequent Defence hardstand on the southern side of the Peninsula. It will be constructed by linking the land based hardstand with an offshore hardstand with a harbour facing sea wall and backfilled with suitable materials. It will be established on a combination of disturbed land, backfilled bunded ponds and Harbour foreshore.

The Defence hardstand is to be commenced by 2010, as there is a current requirement for this facility to be developed as soon as possible. As such, the preferred environmental approval approach is to allow this component to proceed upon acceptance of the NOI, noting that environmental assessment would be included in any further requirements as directed by the Department of Natural Resources, Environment, the Arts and Sport (NRETAS).

4.2 Marine Supply Base (Area 2)

The Project is to establish a marine supply base west of the Defence hardstand. It will be constructed by linking the land based hardstand with an offshore hardstand with a harbour facing sea wall, backfilled with a combination of dredged and excavated material sourced from off-site projects. It will be established on a combination of disturbed land, backfilled bunded ponds and Harbour foreshore.

The marine supply base is to be commenced by 2010, as there is a current requirement for this facility to be developed as soon as possible. As such, the preferred environmental approval approach is to allow this component to proceed upon acceptance of the NOI, noting that environmental assessment would be included in any further requirements as directed by the Department of Natural Resources, Environment, the Arts and Sport (NRETAS).

4.3 Fill and Reclamation to Provide an Additional Rail Loop Spur into the Bulk Stockpile Area (Area 1)

The Project is to establish additional rail loops (Loop 'A' and 'B') to the expanded bulk stockpile areas with a supporting rail dump facility and rail loading area. The area will be constructed by establishing a seawall, backfilled with a combination of dredged material and excavated material sourced from off-site projects, such as sand and gravel. This area comprises Harbour open water, with fringing mangrove forests and mud flats at the entrance to and along Bleasers Creek.

4.4 Fill and Reclamation North of the Existing East Arm Wharf Ponds (Area 1)

Further hardstanding to support open and covered dry bulk material stockpiles will be developed on shore in the current ponded areas. They will be filled with a combination of dredged material and excavated material sourced from off-site projects. The area to be filled comprises disturbed areas and bunded ponds.

Longer term development plans include a road/rail corridor constructed parallel to the above spur line extending to the wharf by constructing a harbour facing sea wall and backfilling the inner wharf environs to the outer limits of Section 5631 and the Zone DV and the ponds directly behind the Marine Supply Base, with a combination of dredged material and excavated material from off-site projects. This area comprises Harbour open water, fringing mangroves and mudflats along the southern side of Bleasers Creek.

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4.5 Extension of the Existing East Arm Wharf Key Line (Area 1)

The wharf is to be expanded from its current four berth to nine berth capacity in stages with a multiple tug berth capacity on the north side. The wharf extension along the existing key line will be supported by a sea / swell protection wall on the northern side of the wharf. The wharf extension may be constructed with similar design and materials to the current wharf (refer Acer Vaughn, 1993).

4.6 LDC Subdivisional Works West of the Current Muramats Road Allotments (Area 4)

Additional industrial lots will be established in stages on Land Development Corporation (LDC) land along the shoreline, extending west from the current industrial allotments at Muramats Road, by establishing a harbour facing sea wall, backfilled with a combination of dredged material and excavated material sourced from off-site projects. The planned subdivision will be established over coastal terrain, fringing mangrove forests and mud flats and Harbour foreshore.

4.7 Disposal of Dredge Spoil

Dredge spoil from elements of this Project and the planned channel deepening toward the East Arm Wharf (covered under a separate NOI), will be backfilled for the additional stockpile hardstanding, the additional rail spurs into the bulk stockpile area and wharf, Defence hardstand and marine supply base, and the Muramats Road west allotments.

4.8 Summary of Project Approach

The project would ensure all elements address the goals and utilise the guidelines outlined in the *Draft Darwin Harbour Regional Management Strategic Framework 2009 – 2013* (and subsequent revisions). The draft DHRMS replaces the previous *Darwin Harbour Regional Plan of Management 2003* and sets out five key goals supported by a series of guidelines, which should be considered when taking actions that may influence the health and sustainment of the Harbour. Of note for this Project, subjects include:

- water quality (including water sensitive urban design and water demand management)
- stormwater collection systems
- hydrodynamics
- leachates
- acid sulfate soils (ASS)
- pollution control
- biting insects
- protection of indigenous and non-indigenous culture
- climate change
- ecological sustainable development
- public engagement and partnerships.

The Project would ensure the design and documentation of the expanded wharf addresses both new and upgraded facilities, infrastructure and services requirements, including capacity and through life support. The multiple elements of the Project, potential stages and long-term timeframes would require the integration of environmental studies, monitoring and management within the Project scope, project management methodology, staging, construction and operational programs.

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5.0 Legislative Context and Licensing Requirements

5.1 Legislation

Legislative requirements relevant to this project include, but may not be limited to, those outlined in Table 2.

Table 2: Legislation

Applicable Legislation	Relevance
<i>Australian Heritage Commission Act 1975 (Cth)</i>	Registration and protection of items and areas of heritage significance.
<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>	National framework for environmental and heritage protection. Focus on protecting matters of national environmental significance (NES) and conservation.
<i>Dangerous Goods (Road and Rail Transport) Act 2005 (NT)</i>	Regulate the transport of dangerous goods by road or rail in the Territory to promote public safety and protect property and the environment.
<i>Environmental Assessment Act 1994 (NT)</i>	Provides for the assessment of the potential environmental effects of development proposals prior to the determination of project consent through the preparation and review of an environmental report. Recommendations arising from environmental assessment are referred to the Minister responsible for project approvals for incorporation into the conditions of project approval.
<i>Fisheries Act 2005 (NT)</i>	Manage the aquatic resources of the Territory in accordance with the principles of Ecologically Sustainable Development (ESD), while managing a single fish or an ecosystem, promoting appropriate protection of fish and fish habitats. Maintain stewardship of aquatic resources with a flexible approach to management of aquatic resources and habitats.
<i>Heritage Conservation Act 2008 (NT)</i>	Principle object is to provide a system for identification, assessment, recording, conservation and protection of places and objects of, amongst other things, historic, social or aesthetic value. Includes (but not limited to) geological structure, ruins, buildings, gardens, landscapes and coastlines of the Northern Territory.
<i>Marine Pollution Act 2004 (NT)</i>	Protect the Territory's marine and coastal environment by minimising intentional and negligent discharge of ship-sourced pollutants into coastal waters. Follows MARPOL requirements.
<i>Native Title Act 1993 (Cth)</i>	Protects Native Title rights of indigenous people in relation to land or water and for related purposes.
<i>Northern Territory Aboriginal Sacred Sites Act 2006 (NT)</i>	Establishes procedures for the protection and registration of sacred sites in the development and use of land.
<i>Planning Act 2008 (NT)</i>	Provides a framework of controls, for the orderly use of land.
<i>Soil Conservation and Land Utilization Act 2008 (NT)</i>	Provide advice, information and treatment on soil conservation, soil erosion and land reclamation in the Northern Territory.

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Applicable Legislation	Relevance
<i>Territory Parks and Wildlife Conservation Act 2009 (NT)</i>	Make provision for and in relation to establishment of Territory Parks and other Parks and Reserves. The study, protection, conservation and sustainable utilisation of wildlife.
<i>Waste Management and Pollution Control Act 2009 (NT)</i>	Protect and where practicable restore and enhance the quality of the Northern Territory environment; encourage ecologically sustainable development; facilitate the implementation of National Environment Protection Measures (NEPM) established by the National Environment Protection Council (NEPC).
<i>Water Act 2008 (NT)</i>	Investigation, use, control, protection, management and administration of water resources in the Northern Territory. The Act prohibits the release of "restricted substances" into watercourses but not substances that have not yet been prescribed. Water quality standards are declared by notice in the Gazette.
<i>Weeds Management Act 2001 (NT)</i>	Prevent spread of weeds in, into and out of the Territory and to ensure that the management of weeds is an integral component of land management in accordance with the Northern Territory Weeds Management Strategy 1996 - 2005 or any other strategy adopted to control weeds in the Territory.
<i>Work Place Health and Safety Act 2008 (NT)</i>	Promote occupational health and safety in the Northern Territory to prevent workplace injuries and diseases, to protect the health and safety of the public in relation to work activities.

5.2 Policies and Guidelines

Polices and Guidelines relevant to this project include, but may not be limited to, those outlined in **Table 3**.

Table 3: Policies and Guidelines

Applicable Policies and Guidelines	Relevance
A Strategy for the Conservation of Marine Biodiversity in the Northern Territory of Australia, Parks and Wildlife Commission of the NT (PWCNT), 2000	Outlines strategies for the conservation of marine biodiversity.
Ambient Air Quality NEPM 1997 and Air Toxins, National Environment Protection Measure (NEPM) 2004, 1996	Provides air quality goals for maximum permissible levels of pollutants in ambient air.
Australia and New Zealand Environment Conservation Council (ANZECC) Guidelines for Fresh and Marine Water Quality (2000) National Water Quality Management Strategy (1992), (Department of Environment, Water, Heritage and the Arts (DEWHA)) The Framework for Marine and Estuarine Water Quality Protection (no date), DEWHA	An authoritative guide for setting water quality objectives to sustain environmental values. Provides specific water quality for each environmental value and the context in which it should be applied.

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Applicable Policies and Guidelines	Relevance
A Review of Environmental Monitoring of the Darwin Harbour Region and Recommendations for Integrated Monitoring, 2005, Darwin Harbour Advisory Committee (DHAC)	Facilitate the development of integrated environmental monitoring program for Darwin Harbour Region (in accordance with the Darwin Harbour Regional Plan of Management – now replaced by the Framework below).
AS 1289 Method for testing soils for engineering purposes series	Comprises over 60 methods for: soil sampling and preparation; soil moisture content tests; soil classification tests; soil chemical tests; soil strength and consolidation tests; and soil reactivity tests.
AS 2436-1981 Guide to Noise Control on Construction, maintenance and demolition sites	Guidance on noise control in respect of engineering construction, maintenance and demolition works, including guidance in investigation and identification of noise sources, measurement of sound, and its assessment, with a view to the planning of measures for noise control.
AS 3798 Guidelines on earthworks for commercial and residential developments	Guidance on the specification, execution, and control testing of earthworks and associated site preparation work s of commercial and residential developments. It does not in itself constitute a specification for earthworks. It also gives guidance on the interpretation and application of the relevant test methods specified in the AS 1289 series of Standards.
Australian Ballast Water Guidelines for Shipping, Australian Quarantine and Inspection Service (AQIS)	Sets ballast water standards.
Constructed Wetlands in the Northern Territory – Guidelines to Prevent Mosquito Breeding, Department of Health and Families (DHF), undated.	Guidelines for the siting and design of constructed wetlands to reduce potential for mosquito breeding. Wetlands include urban stormwater.
Erosion and Sediment Control Guidelines; built environment, service corridors, transport corridors, rehabilitated old infrastructure, (undated), Department of Natural Resources, Environment, the Arts and Sport (NRETAS)	Guidelines to inform activities that may impact on surface stability and sediment movement. Provides advice on developing Erosion and Sediment Control Plans (ESCP).
Guidelines for Preventing Mosquito Breeding Associated with Construction Practice Near Tidal Areas in the NT, DHF, 2005	Checklist for planners, engineers or any supervisory officers, responsible for the planning, impact assessment or implementation of any construction activity near tidal areas, in order to prevent the creation of mosquito breeding sites.
Darwin Harbour Regional Management Strategic Framework 2009 – 2013 (draft), DHAC	Policy framework and guidelines for management of environment, social, cultural and economic values and uses of the Darwin Harbour. Sets goals and guidelines for the Harbour waters.

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Applicable Policies and Guidelines	Relevance
Darwin Harbour Water Quality Protection Plan (in prep)	Plan to identify and address key water quality risks to values of Darwin Harbour and its catchments. Follows the Commonwealth <i>Framework for Marine and Estuarine Water Quality Protection</i> .
Darwin Port Corporation (DPC) Environmental Management System (EMS), Environment Policy and OH&S Policy	Basis on which DPC manages and operates the whole of the Port of Darwin with due regard to safety and the environment.
DPC Cyclone Procedures 2008-2009	Actions undertaken during cyclone warning and threat.
Mangrove Management in the Northern Territory, Department of Infrastructure, Planning and Environment (DIPE), 2002	Direction for the research and management of mangrove ecosystems.
Environmental Guidelines for Reclamation in Coastal Areas, NT Environment Protection Authority (EPA), 2006	Developed by the NT EPA to provide practical environmental advice to developers planning to undertake reclamation work in coastal regions of the Northern Territory. They apply to activities such as foreshore filling, in coastal areas and along rivers, marina and port developments, and development occurring on coastal floodplains. Includes management of acid sulphate soils and removal of mangroves.
Stormwater: Draft Management Strategy for the Darwin Harbour Catchment, EPA, 2006	Overarching guidelines for the management of stormwater in Darwin Harbour Catchment. Key steps for the development of Stormwater Management Plans.
Land Clearing Guidelines, NT Planning Scheme, 2006	Technical advice for planning and conduct of land clearing.
NEPM Diesel Vehicle Emissions	NEPM 29 June 2001. Aims to manage vehicle emissions by facilitating: <ul style="list-style-type: none"> • Specific emission standards for new vehicles. • Provision for appropriate clean fuel. • Specific emission standards for vehicles and the improvement of emissions performance of vehicles. • Overall reduction in vehicle use.

5.3 Approvals and Licensing Requirements

Approvals and licensing requirements relevant to this project include, but may not be limited to, the following:

- approval of the Project under the *Environment Protection and Biodiversity Conservation Act 1999*

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- approval of the Project under NT *Environmental Assessment Act 1994*, incorporating requirements of other relevant NT legislation, such as *Territory Parks and Wildlife Conservation Act 2009* and *Waste Management and Pollution Control Act 2009*
- Ministerial consent for any development covered by the East Arm Control Plan
- Darwin Port Authority consent for any coastal development below high tide in Darwin Harbour
- Marine Branch, DPI consent for any coastal development above low tide in NT Coastal Waters
- NRETAS and EPA consent for any dredging operations
- Aboriginal Areas Protection Authority (AAPA) Authority Certificate for Sacred Site clearance
- approval to disturb heritage items and archaeological artefacts, as located, through the Heritage Conservation Division of NRETAS.

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6.0 Site Description

6.1 Site Selection

The East Arm Wharf is part of an operating Port in the East Arm area zoned DV (Development) under the NT Planning Scheme. This proposal will, by stages, expand the capability of the East Arm Wharf by increasing rail and road access, wharf and hardstanding availability and capability, stockpile options, and offshore vessel servicing. It will also expand the industrial lots adjacent to the Muramats subdivision and along Bleasers Creek.

6.2 Physical Environment

6.2.1 Climate

The climate of Darwin is characterised by hot, humid, wet season (usually November to March), and hot, dry season (May to September) separated by relatively short transitional periods (usually April and October).

The mean annual rainfall of 1,700 mm is highly seasonal, varying from 1 mm in July to 400 mm in January. Relative humidity at 9.00 am varies from 62% in June to 84% in February, with respective monthly values of 30% to 71% at 3.00 pm. High precipitation rates are commonly experienced during storm events in the wet season. Temperatures remain in a relative narrow range through out the year, with mean daily minima varying from 19.2°C (July) to 25.2°C (November) and mean daily maxima for the same months varying from 30.3°C (July) to 33.1°C (November). Mean daily evaporation ranges from 5.7 mm (in February) to 8.0 mm (in October), with an average annual daily evaporation of 6.8 mm (Figure 2).

Management Measures:

The heavy downpours and quantity of rain during the wet season is relevant to runoff and sediment control design, water sensitive urban design, construction and management plans for all the hardstanding/backfill areas (re management of water and sediment runoff) and for the stockpiles through their operation. Sediment and Erosion Control Plans would be developed, identifying risk and impact mitigation measures. Water sensitive urban design will be addressed at the design stage.

Also refer to Table 6.

Synoptic winds during the dry season are dominated by the southeast trade winds, and light west to north-westerlies predominate during the wet season.

Management Measures:

This is relevant to the design and construction of the stockpile and hardstands/backfill areas due to the potential for dust mobilisation and for the ongoing operation of the stockpiles.

This is also relevant to the potential alteration of current movements, and sediment transfer and deposition (Harbour hydrodynamics) due to the prevailing winds impact on the new hardstanding/infill for the rail spur into the adjoining Harbour environment, and the extended berth.

Mitigation of the impact of synoptic winds on the Project would be included in an Operational Environmental Management Plan.

Also refer to Table 6.

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Tropical cyclones (low pressure systems) commonly form during the wet season. The timings of cyclones can link with high tides to develop storm surge along the coastline. The Project is within the storm surge zone for Darwin.

Management Measures:

This is relevant to the design height and construction standards for the bunds, hardstands/backfill areas and subdivision in relation to the standards for construction of the berths, and road and rail infrastructure. That is, breaching and subsequent pollution/contamination from stockpiles and hardstands.

Design of the proposed expansion will incorporate necessary controls relevant to current storm surge and cyclone protection.

Also refer to Table 6.

The tidal range in Darwin Harbour is -0.1 up to 8 m. The mean spring tide range is 5.5 m and the mean neap tide range is 1.8 m. Two high and low tides are experienced daily and the tidal range fluctuates over a lunar cycle. The daily inflow and outflow is 216 million m³ on a spring tide and 71 million m³ on a neap tide. These flows represent 69% and 29% of water flows in Darwin Harbour respectively (Russell and Hewitt, 2000; Darwin Harbour Advisory Committee, 2003).

Management Measures:

This is relevant to the hydrodynamics of the Harbour around East Arm, which is likely to be altered by the new structures planned under this project, such as the extended wharf, the hardstanding on the south side of the Peninsula and the staged filling of the north side of the Peninsula for the rail spur and additional lines to the wharf. The new subdivision at Muramats is also likely to alter currents and sediment movement at the entrance to Hudson Creek.

Detailed hydrodynamic modelling of the Darwin Harbour is currently being undertaken and the outcomes would be incorporated into engineering controls for the proposed expansion design.

Also refer to Table 6.

Predicated global mean sea level rise may be as high as 30 mm to 300 mm in 2040 and 90 mm to 880 mm in 2100. Sea level rise, while incremental will impact on the natural and built environments along the Peninsula (Walsh et al., 2002).

Management Measures:

The Project is to ensure design, structures, construction and operation of the expanded Wharf and adjacent infrastructure addresses local extreme seasonal weather conditions and tides, and the longer term potential rise in sea level.

Design of the proposed expansion will incorporate necessary controls relevant to sea level rise and severe weather.

Also refer to Table 6.

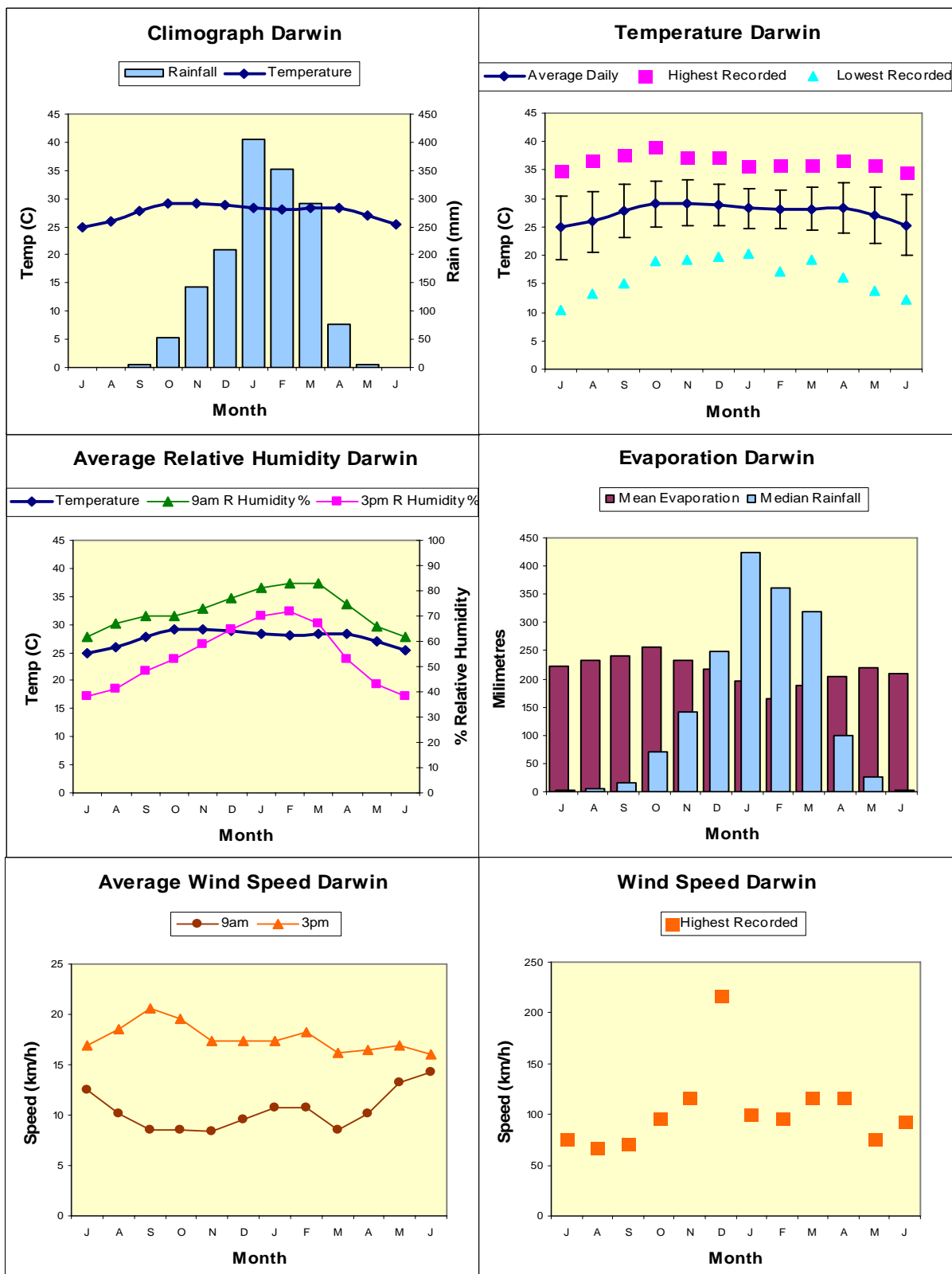


Figure 2: Climate Data for Darwin Airport

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6.2.2 Geology and Landform

The regional geology is shown on the 1:100 000 scale geological map of Darwin (Pietsch, 1983). The Peninsula is underlain by Quaternary intertidal marine alluvium consisting of clay and mud, and colluvial sediments deposited by unconcentrated surface runoff consisting of sand, silt and clay.

Unconsolidated and concretionary lateritic soils of Cainozoic age have been mapped in the area. Early Proterozoic metamorphic Burrell Creek Formation form isolated outcrops on the Peninsula.

The Peninsula landform comprises a combination of:

- lower intertidal areas of marine alluvium consisting of wet soft silt and clay with variable amounts of sand
- upper intertidal areas of mixed marine colluvium and alluvium consisting of soft/loose silty sand and gravely sand.

Geotechnical surveys in the vicinity of the Project area identified residual lateritic soil below the surface colluvium/alluvium, consisting of clayey sandy gravel and highly weathered metasedimentary rock (Davies, 2005). Part of the offshore marine supply base is to be located in a previously bunded area. Geotechnical information would be required to establish mud depths in this area, to allow remediation options of the area to be investigated.

Earthquake hazard maps produced by Geoscience Australia (AS 1170.4 1993) indicate the Darwin Area has an earthquake acceleration coefficient of 0.9 (10% probability of exceedence in 50 years).

Data Gap and Management Measures:

The Project would include further study to reassess available geotechnical data sets for the areas earmarked for excavation and backfilling, both in terms of the natural substrate, but also the areas currently covered by ponded material, so as to inform design and construction practices.

Also refer to Table 6.

6.2.3 Hydrology

Groundwater information is limited within the region. The available data indicates groundwater can be encountered within the Quaternary and Proterozoic lithologies, which are shallow. Aquifers are low yielding, with flows less than 0.5 litres per second. Higher yields with low storage may be available from sand lenses with Quaternary sediments and fractures in sandstone.

The quality of groundwater is typically saline to hyper saline and not suitable for drinking or irrigation (unless treated). The high salinity is likely due to the proximity to the landward salt water intrusion and dissolution of salts derived from marine sediments. The groundwater aquifers and marine environments are likely to be hydraulically connected.

Data Gap and Management Measures:

The Project would include assessment of groundwater monitoring occurring for other developments in the East Arm/Middle Arm area, with a view to determining whether additional groundwater monitoring is required.

Groundwater characteristics would be considered in the design stage, relevant to management of leachates and sustainable use of water resources.

Also refer to Table 6.

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6.2.4 Land Capability

The East Arm Peninsula would not be capable of supporting the current or future infrastructure without engineered solutions, including substantial filling as outlined in the previously approved Port Masterplan (2003). A revised Port Masterplan is currently being developed by the DPC which will include all the Project elements.

The East Arm Peninsula is now a highly modified built environment buffered by mangrove forests and intertidal mudflats. The Project elements will consolidate the built environment over the available land on the Peninsula and extend hardstanding and backfilling into the harbour either side of the Peninsula.

The development of a future sewage system has already been designed, for East Arm Wharf and the surrounding area and this would accommodate any additional requirements resulting from the proposed expansion (*East Arm Sewerage Zone – Masterplan Sewerage Infrastructure – 2002 to 2025*, DIPE).

Management Measures:

As the majority of land area affected by the Project would be reclaimed land and all sewage requirements would connect to existing sewerage systems, land capability is not considered to be a significant issue and would likely not be addressed further.

Also refer to Table 6.

6.2.5 Hydrodynamics

Darwin Harbour has semidiurnal macro-tides with a strong diurnal inequality. The highest astronomical tide is eight metres. The tides spread into the harbour as a progressive wave with a lag of approximately 1.5 hours between the mouth of the harbour and its upper reaches. The ebb tide within the upper reaches persists for approximately one hour longer than the flood tide. Modelling shows that the circulation near the headlands and embayments is complex and different at flood and ebb tides, including jets, eddies, separation points and stagnation zones (Williams et al., 2006).

The salinity of the harbour varies in different areas and is influenced by the tides and tropical climatic seasons. Salinity at the mouth of the harbour remains almost constant, indicating that most of the mixing of river/creek freshwater runoff and ocean saltwater occurs within the harbour, although mixing is inhibited between the arms and the harbour (Williams et al., 2006).

The waters of the harbour are moderately turbid and there is a distinct fluctuation of suspended sediment concentration values with tidal frequency and season. Freshwater runoff along channel banks and mangrove zones is the main contributor for the majority of the fine sediments dispersed into the upper arms of the harbour (Williams et al., 2006). This contribution of sediments varies greatly between seasons with maximum turbidity resulting from increased runoff during heavy wet season storms.

It is recognised that there is a current requirement to develop a Darwin Harbour Dredging Strategy that provides guidance to all future developments and activities within the Darwin Harbour. It is expected that development of this document will not fit within the current proposal timeframes. Therefore, it is proposed that a Dredging Management Plan specific to this development would be developed, but within a longer-term strategic approach that could be applied across the Harbour.

Data Gap and Management Measures:

The Project would include further studies to assess available current and sediment movement data for the Harbour in the area of Project influence, to inform the design, structure, construction and long term management of the hardstands and backfill areas for the Project.

The Project would include development of a Dredging Management Plan specific to the requirements for the expansion and proposed uses, which would take account of investigations into geotechnical and sediment movement components.

The Project is to scope the impact on remnant mangrove forests and their sustainment by including a Mangrove Management Plan, which includes monitoring requirements and would be incorporated into an Operational Environmental Management Plan for the Project.

Also refer to Table 6.

6.3 Terrestrial Environment

6.3.1 Land Units

Land unit mapping for the Darwin area, including assessment of the vegetation undertaken by Department of Infrastructure, Planning and Environment (DIPE, 2003), provides an overview of the expected land units in the Project area. Noting that the majority of the peninsula is a built and modified site, the land unit information will concentrate on the fringing environments that have not been disturbed.

Expected land units at East Arm Wharf and Muramats subdivision include:

- 6b: broad lowland plains; slopes negligible; moderately deep Siliceous sands; Grevillea/Melaleuca Tall Shrubland and Low Open Woodland
Project: Limited landward fringes along Port Road extending west from Muramats Road to the open stockpile.
- 9a: estuarine fringes; slopes negligible; tidal inundation; Saline muds and clays, usually bare with small areas of samphire and salt tolerant grasses
Project: Landward edges of Bleasers Creek mangrove forest adjoining Project elements.
- 9b: estuarine fringes; Low Closed Forest of mangrove species
Project: Tidal entrances to Bleasers Creek and Hudson Creek adjoining Project elements.

Management Measures:

The Project design would incorporate opportunities and constraints relating to land units and any modification to these as a result of the Project.

Also refer to Table 6.

6.3.2 Flora

Whilst it is recognised that vegetation clearing in the Northern Territory is subject to control, the area to be cleared as part of the current Project has previously been approved for development in the 2003 Port Masterplan and will again be reflected as such in the Port Masterplan currently being prepared for DPC. The following sections highlight specific components of the existing flora and vegetation and how these may be affected by the Project.

Mangrove Forest

Mangrove community mapping for Darwin Harbour (Brocklehurst and Eameades, 1996) suggest that the Project area is likely to consist of three mangrove communities:

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- *Sonneratia alba* woodland in the seaward zone
- *Rhizophora stylosa* / *Camptostemon schultzei* closed forest (Tidal creek), at the seaward fringe
- *Ceriops tagal* low closed forest (mid tidal flat), at the landward fringe.

A short field visit was conducted by AECOM on 26 May 2009, which confirmed that these were the dominant mangrove habitats.

The full extent of The Project elements will clear mangrove forest habitat at the Muramats subdivision site at the mouth of Hudson Creek (15 ha) and the mangrove forest along the southern arm of Bleasers Creek (205 ha).

Management Measures:

The Project would include development of a Mangrove Management Plan to inform the design and construction of hardstands and backfill areas, including mangrove clearing guidelines. It would include the monitoring and management requirements for Bleasers Creek and Hudson Creek remnant mangroves. The monitoring program would be developed in concert with DIPE (2002), 'Mangrove Management in the Northern Territory'.

Also refer to Table 6.

Threatened Species (Territory Parks and Wildlife Conservation Act 2000)

A database search for threatened flora was conducted through NRETAS on 22 May 2009. It revealed no record of plants of conservation significance in the Project area. There are two plants classified as data deficient under *Territory Parks and Wildlife Conservation Act 2000* recorded within the area; *Habenaria triplonema* (occurring in Open Eucalypt forest and woodland/grassy understory) and *Mitrasacme secedens* (associated with freshwater wet sites/swampy areas).

Management Measures:

The Project would include a targeted field survey for threatened species within the areas to be cleared to ensure that threatened species, if present, are managed appropriately.

Also refer to Table 6.

Weeds

The weed Mission Grass (*Pennisetum polystachion*) has been observed on the Peninsula. It is classed as a Noxious Weed under Schedule Class B/C (growth and spread to be controlled) of the *Weeds Management Act 2001*. Other weed species are likely to also be present in disturbed areas.

Management Measures:

The Project would include development of a Weed Management Plan applicable to construction and operational phases, incorporating monitoring and control measures and use of clean fill as available.

Also refer to Table 6.

6.3.3 Fauna

A field visit was undertaken on 26 May 2009 for the purpose of ascertaining the presence of habitat for threatened fauna species within the East Arm Peninsula and for general observation of fauna species present. Results of the field visit showed that the species identified were typical of disturbed and semi-urban areas around Darwin and are well represented elsewhere in the Darwin/Bynoe Harbour marine and terrestrial area (Acer Vaughan, 1993).

A database search for NT Listed Wildlife was conducted on 22 May 2009 (including a minimum 2 km buffer surrounding the Project area). It revealed that four species of significance and nine data deficient species as classified under the TPWC Act have previously been recorded within the study area (**Table 4**).

Pest fauna species are addressed in **Section 6.3.6** of this NOI.

Table 4: NT Listed Wildlife Species

Species	Classification	Preferred Habitat	Extent of Impact
<i>Dasyurus hallucatus</i> Northern Quoll	Critically Endangered	Wide range of habitats, including rocky areas and eucalypt open forests	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Varanus panoptes</i> Flood Plain Monitor	Vulnerable	Range of habitats from grassland and woodland to riverine flats	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour.
<i>Ardeotis australis</i> Australian Bustard	Vulnerable	Plains, grasslands and open woodlands	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

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Species	Classification	Preferred Habitat	Extent of Impact
<i>Amaurornis moluccana</i> Pale-vented Bush-hen	Near Threatened	Subtropical and tropical moist lowland forest	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Demansia olivacea</i> Olive Whip Snake	Data Deficient	Semi arid stony ranges, coastal dunes, savannah woodlands and monsoon forest	Nil: No suitable habitat on site.
<i>Dacelo leachii</i> Blue-winged Kookaburra	Data Deficient	Open woodland and wooded watercourses	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Litoria bicolor</i> Northern Dwarf Tree-frog	Data Deficient	Aquatic and border vegetation of permanent or temporary lagoons	Nil: No suitable habitat on site.
<i>Gallinago megala</i> Swinhoe's Snipe	Data Deficient	Freshwater wetland to wet grasslands	Nil: No suitable habitat on site.
<i>Varanus scalaris</i> Spotted Tree Monitor	Data Deficient	Believed to be rainforests and other wet forests	Nil: No suitable habitat on site.
<i>Antaresia childreni</i> Children's Python	Data Deficient	Wide range of habitats, including coastal woodlands and monsoon forests to the arid interior	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

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Species	Classification	Preferred Habitat	Extent of Impact
<i>Calidris melanotos</i> Pectoral Sandpiper	Data Deficient	Fresh and salt marshes, flooded pastures, saltworks and sewerage farms, possible on any suitable wetlands	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Litoria (Cyclorana) australis</i> Giant Frog	Data Deficient	Wide range of habitats from coastal floodplains to woodlands and monsoon forests	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Tiliqua scincoides</i> Common Blue-Tongued Lizard	Data Deficient	Wide range of habitats, including coastal heaths, forests and woodlands, montane forests and woodlands and grasslands of the less arid interior	Low: There is minimal suitable habitat likely to be affected by proposed clearing or reclamation. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

Management Measures:

The Project would include a targeted field survey for threatened species within the areas to be cleared, to ensure that threatened species, if present, are managed appropriately.

Also refer to Table 6.

6.3.4 EPBC Protected Matters

An *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters search for the Project area was undertaken on 18 May 2009 (including a minimum 2 km buffer surrounding the Project area). The report identified that:

- there are 16 Threatened Species which may occur or may have habitat which occurs within the Project area
- there are 41 Migratory Species which may occur or may have habitat which occurs within the Project area

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- there are 77 Listed Marine Species which may occur or may have habitat which occurs within the Project area, including one mammal species, 22 overfly bird species, 27 ray-finned fish and 27 reptiles
- there are 11 Whales and Other Cetaceans (namely dolphins) which may occur or may have habitat which occurs within the Project area.

Only one of the 16 EPBC threatened species (the Northern Quoll) has previously been recorded within the site according to the database search conducted through NRETAS. The extent of impact on this species is considered in **Table 5**.

A total of 18 of the species listed under EPBC as either Migratory (41 species) and/or Listed Marine (77 species) have been recorded within the Project area according to the database search conducted through NRETAS. The extent of impact on these 18 species is considered in **Table 5**. The remainder, which have not previously been recorded have been discounted, on the basis that the EPBC Protected Matters database is based on habitat type and potential availability of suitable habitat, not on actual records of species presence. It should also be noted that some records within the NRETAS database are over 30 years old and is a compilation of every record ever obtained, including from amateur groups.

Table 5: EPBC Act Listed Species

Species	EPBC Status	Comment	Preferred Habitat	Extent of Impact
<i>Dasyurus hallucatus</i> Northern Quoll	Endangered	Species or species habitat may occur within area	Wide range of habitats, including rocky areas and eucalypt open forests	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	Migratory Terrestrial Bird Listed Marine Bird	Species or species habitat likely to occur within area	Coastal, rivers, lakes and dams	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Merops ornatus</i> Rainbow Bee-eater	Migratory Terrestrial Bird Listed Marine Bird (Overfly)	Species or species habitat may occur within area	Woodland and timbered plain	Low: Not previously recorded and no suitable habitat in area to be developed.
<i>Actitis hypoleucos</i> Common Sandpiper	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Rocky shores, mudflats, rivers , lakes	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Arenaria interpres</i> Ruddy Turnstone	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Rocky platforms, tidal flats and beaches with pebbles, shells and debris	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

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Species	EPBC Status	Comment	Preferred Habitat	Extent of Impact
<i>Calidris alba</i> Sanderling	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Sandy beaches and coastal sand lagoons	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Calidris tenuirostris</i> Great Knot	Migratory Wetland Bird Listed Marine Bird (Overfly)	Species or species habitat likely to occur within area	Tidal flats and beaches	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Charadrius leschenaultii</i> Greater Sand Plover, Large Sand Plover	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Sandy beaches and coastal mudflats	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Charadrius mongolus</i> Lesser Sand Plover, Mongolian Plover	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Sandy beaches and coastal mudflats	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Limosa lapponica</i> Bar-tailed Godwit	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Mudflats, estuaries and islands	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

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Species	EPBC Status	Comment	Preferred Habitat	Extent of Impact
<i>Limosa limosa</i> Black-tailed Godwit	Migratory Wetland Bird Listed Marine Bird (Overfly)	Species or species habitat likely to occur within area	Tidal mudflats and estuaries, lakes and dams	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Numenius phaeopus</i> Whimbrel	Migratory Wetland Bird Listed Marine Bird	Species or species habitat likely to occur within area	Coastal mudflats estuaries and mangroves	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Pluvialis squatarola</i> Grey Plover	Migratory Wetland Bird Listed Marine Bird (Overfly)	Species or species habitat likely to occur within area	Mudflats, salt marshes and estuaries	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Apus pacificus</i> Fork-tailed Swift	Migratory Marine Bird Listed Marine Bird (Overfly)	Species or species habitat may occur within area	Wide variety of habitats	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Sterna albifrons</i> Little Tern	Migratory Marine Bird Listed Marine Bird	Species or species habitat may occur within area	Sandy beaches and salt marshes	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

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Species	EPBC Status	Comment	Preferred Habitat	Extent of Impact
<i>Charadrius veredus</i> Oriental Plover, Oriental Dotterel	Migratory Wetland Bird Listed Marine Bird (Overfly)	Species or species habitat may occur within area	Grasslands, salt fields and coastal areas	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Crocodylus johnstoni</i> Freshwater Crocodile	Listed Marine Reptile	Species or species habitat may occur within area	Estuaries and rivers	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Parahydrophis mertoni</i> Northern Mangrove Sea Snake	Listed Marine Reptile	Species or species habitat may occur within area	Coastal and estuarine mangroves and associated mudflats	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
<i>Crocodylus porosus</i> Estuarine Crocodile, Salt-water Crocodile	Migratory Marine Reptile Listed Marine Reptile	Species or species habitat likely to occur within area	Estuaries and rivers	Low: There is extensive suitable habitat throughout Darwin Harbour. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.

Management Measures:

The Project would include a targeted field survey for EPBC listed species previously recorded within the areas to be cleared to ensure that listed species, if present, are managed appropriately. This would inform a decision on referral to DEWHA.

Also refer to Table 6.

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6.3.5 Marine Environment

Water Quality

The water quality of Darwin Harbour varies greatly with the tides, season and location. Over each tidal cycle, and between neap and spring tides, the clarity of the Harbour can change dramatically. This is most noticeable in the upper reaches of the Harbour, where there is an almost hourly change in water quality as water carrying sediment flows into and out of the mangroves (Padovan, 2003).

The proposed development has the potential to produce site run-off, with impacts on water quality in the adjacent Harbour waters, Hudson Creek and Blesers Creek.

Data Gap and Management Measures:

The Project would include assessment of water quality monitoring occurring for other developments in the East Arm/Middle Arm area, with a view to determining whether additional data and/or monitoring is required.

Surface water pollution and water quality characteristics would be considered in the design stage and controls incorporated into a Stormwater Management Plan.

Also refer to Table 6.

Flora, Fauna and Habitat

Mangrove habitats occur at the interface between marine and terrestrial environments and play an important role in the local ecosystem. The development at the site will result in the loss of approximately 220 ha of fringing mangroves and mangrove habitat.

The *EPBC Act* Protected Matters search report for the study site, undertaken on 18 May 2009 identified that:

- There are 77 Listed Marine Species which may occur or may have habitat which occurs within the study site. This includes:
 - 1 mammal species
 - 22 overfly bird species
 - 27 reptiles
 - 27 ray-finned fish.
- There are 11 Whales and other Cetaceans (namely dolphins) which may occur or may have habitat which occurs within the study site.

Of the 77 Listed Marine Species, the NRETAS database search indicated six species of overfly birds and one species of reptile that have been recorded at or in the vicinity of the site (**Table 5**).

No marine invertebrate fauna are listed as threatened in the NT under the TPWC Act.

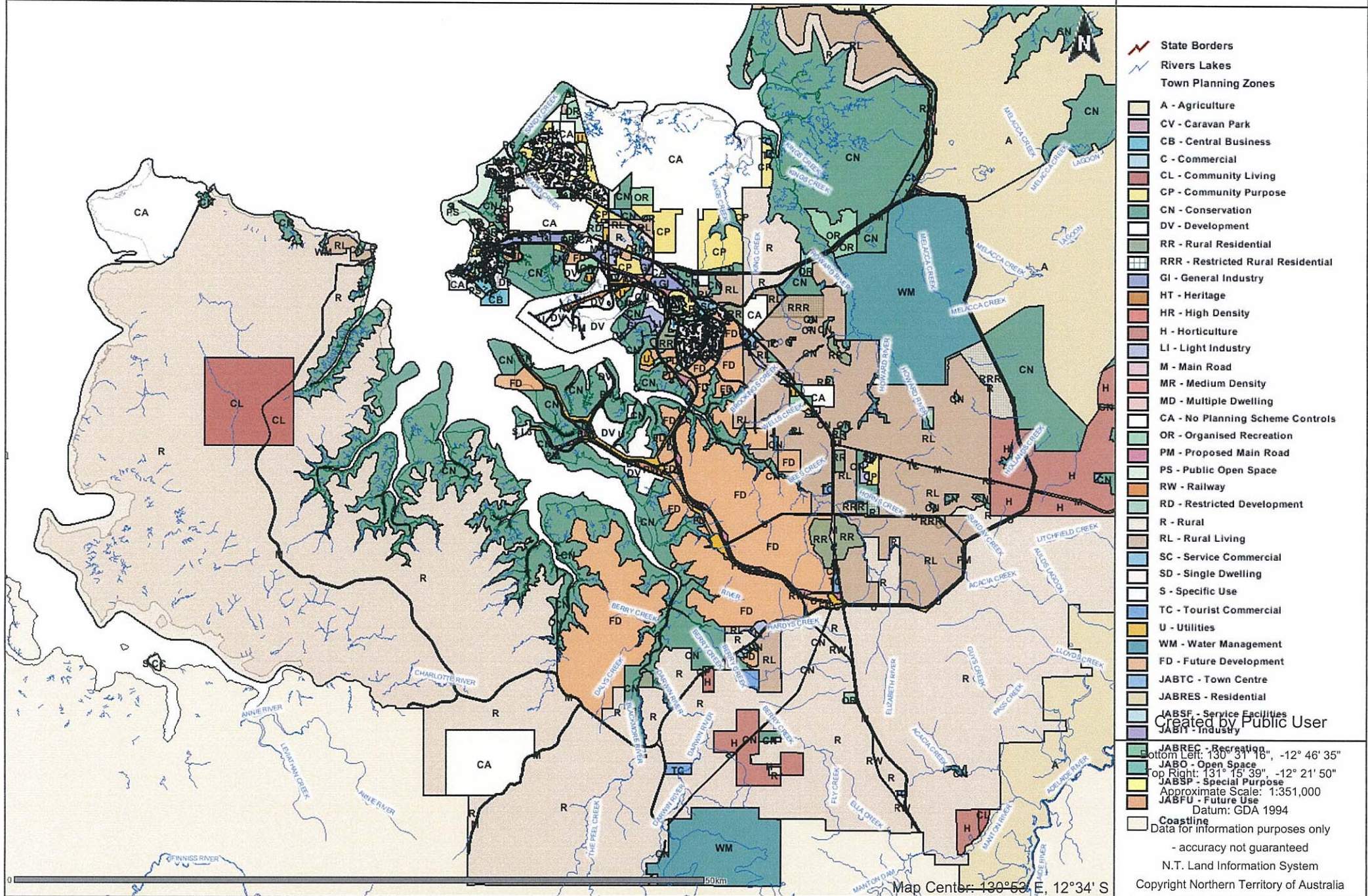
The placement of dredge spoil and backfill material at the Muramats west allotments and either side of the Peninsula will cause the direct loss of marine species living in the substrate directly beneath the filled area. These marine species are well represented within large extents of conservation zoned areas throughout most of Darwin Harbour.

Figure 3 demonstrates the range of marine conservation areas within Darwin Harbour.

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Marine conservation zoned areas of Darwin Harbour

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Data Gap and Management Measures:

Data on marine habitat are limited and additional studies, focussing on benthic communities and habitat usage by mobile marine fauna, would be incorporated into the Project.

Management of impacts to the marine environment would be included in the Project design as well as when developing the Project Dredging Management Plan, Erosion and Sediment Control Plan and Mangrove Management Plan.

Also refer to Table 6.

6.3.6 Pest Species

Elements of the Project have the potential to introduce/exacerbate pest and quarantine threats, both terrestrial and marine, through construction (import of contaminated plant and equipment and building materials) and through the expanded operation of the wharf, rail, road, Defence hardstand and marine supply base. Cane Toads are known to occur on the site already and it is likely that feral cats and wild dogs/dingoes also frequent the area.

Management Measures:

The Project would incorporate development of Construction and Operational Pest and Quarantine Management Plans (C/OPQMP), and amend and update any pest or quarantine monitoring and management plans currently in place for the operation of the Wharf and adjacent infrastructure.

The C/OQMPs would provide an integrated plan for all construction organisations and practices through the life of the development and through to operation, rather than separate plans for each user. It would focus on prevention of the importation of pests by personnel, plant and equipment and material delivered to site, and on first response measures.

Also refer to Table 6.

6.3.7 Biting Insects

The East Arm Peninsula is subject to high levels of biting insects such as midges and mosquitoes due to the proximity of the mudflat and mangrove breeding sites along Hudson Creek, Bleasers Creek and peninsula shoreline.

Breeding sites are also common on constructed surfaces, such as the stockpile hardstands and ponds along the peninsula.

Management Measures:

This is relevant for personal protection for personnel during construction, dredging and operation of the wharf. It is also relevant when developing the design and construction of hardstanding. The goal is to reduce the potential for increasing the area for biting insect breeding sites.

The Project would conduct a baseline study (linked to previous reporting) for the area of influence during the dry and wet seasons, to be developed in conjunction with DHF, and to inform a Biting Insect Monitoring and Management Plan. The Plan would align with the DHF 'Guidelines to Prevent Mosquito Breeding in Constructed Wetlands in the Northern Territory, 2008'.

Also refer to Table 6.

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6.3.8 Areas of Environmental Significance

Darwin Harbour is a working harbour that is listed as a wetland of national significance in the Directory of Important Wetlands in Australia and has international significance rating due to there being 15 threatened species reported as being found at the Harbour. Conservation initiatives, such as a Regional Plan of Management and ecosystem monitoring, have been developed and established (Harrison et al., 2009). In addition the DPC have an Environmental Management System (EMS) that is implemented and assists in identifying activities which create a threat to the natural values and how these may be managed.

Management Measures:

The Project would incorporate close liaison with the Biodiversity Conservation Unit in NRETAS during project impact assessment, on matters such as the scope and level of investigation, reporting, monitoring and management plans required.

Also refer to Table 6.

6.4 Cultural Environment

6.4.1 Archaeology

Within the Darwin Region archaeological sites are located sparsely across the landscape and are concentrated where there are topographic features, transitions in habitat and in the coastal regions.

The Project elements include disturbance and construction between the Harbours waters edge to mangroves and mudflats and limited woodland. The majority of the area onshore under the proposal is built or disturbed; however, some parts of the intertidal zone consists of relatively undisturbed mangrove forest and mudflats, which may reveal evidence of historical Indigenous activities.

A database search (EPBC Protected Matters Database and NT Heritage Register) or field survey for the presence of archaeological sites was not undertaken as part of this NOI but formed part of previous reports covering Stages 1 and 2 of the East Arm Wharf development.

Management Measures:

The Project would incorporate close liaison with the Heritage Branch in NRETAS during project impact assessment, such as the scope and level of investigation, reporting, monitoring and management plans required.

Also refer to Table 6.

6.4.2 Sacred Sites

A request to the AAPA for a Sacred Site database search was not undertaken as part of this NOI as a previous request is still valid for this site (**Appendix A**).

Management Measures:

The Project would incorporate close liaison with the AAPA during project impact assessment, such as the scope and level of investigation, reporting, monitoring, and management plans and Authority Certificate requirements.

Also refer to Table 6.

6.4.3 European Heritage

The Peninsula was occupied during WWII with the presence of Z Force on Catalina Island; however, a database search (EPBC Protected Matter database and NT Heritage Register) or field survey for the presence of European heritage was not undertaken as part of this NOI, as these activities were undertaken as part of Stage 1 and 2 development of the East Arm Wharf.

Management Measures:

The Project would incorporate close liaison with the Heritage Branch in NRETAS during project impact assessment, such as the scope and level of investigation, reporting, monitoring and management plans required.

Also refer to Table 6.

6.4.4 Native Title

All Native Title claims over the project area (land and water) were extinguished (Risk vs Northern Territory of Australia, Federal Court NTD6033/01). It is unlikely that any future claims will be made over the same area and if so, it is unlikely that the claim will be successful (Solicitor for the Northern Territory, 2009, refer **Appendix B**).

Management Measures:

No management measures are required.

6.5 Adjacent Marine and Land Uses

The Project elements occur within the East Arm Wharf precinct and adjacent Darwin Harbour environs. The East Arm Wharf comprises a purpose built multi-berth wharf, serviced by an intermodal container terminal (rail and road), hardstanding, open stockpile, bulk ship loading and conveyor infrastructure.

The Wharf supports export and import of dry bulk materials and liquids associated with the mining and petroleum industries, containerised/break bulk and specialised heavy lift cargoes, general cargoes and live cattle exports. The wharf also supports offshore rig tender services.

East Arm Wharf lies adjacent to Bleasers Creek to the north and Hudson Creek to the east. East Arm Wharf also marks the distant entrance to the Elizabeth River, to the southeast.

The Harbour proper and the two creeks are popular with people who fish for recreation, either privately or through organised charters. Recreational fishers have access to an existing boat ramp off Port Road as well as a new East Arm boat ramp off Hamauru Road, both within the industrial estate.

The land uses associated with East Arm and the wharf include liquid and bulk materials handling for the petroleum, mining, agricultural and construction industries. Supporting land uses include the haulage rail and road corridor into the wharf. Servicing industries to the wharf and wider Darwin community are located throughout the East Arm precinct in an industrial estate.

There are no residential suburbs in close proximity to the Project area.

There are a number of aquaculture ventures within the Darwin Harbour either existing (e.g. Darwin Aquaculture Centre on Channel Island), or previously proposed (e.g. Blackmore River (East) Aquaculture Project and Aussie Prawns Aquaculture Development at Middle Arm).

Management Measures:

The Project is consistent with the zoning for the site and existing land uses.

Consultation with stakeholders would occur during Project development.

Also refer to Table 6.

6.6 Air Quality

Current operation of the East Arm Wharf generates dust from areas such as the wharf, conveyers, gravel surfaces, rail and road transport, open stockpiles, drying sediment ponds, bottom dump station, ship and cattle loading.

Construction practices for the new Project elements, such as earthworks, vehicle use, vegetation clearing and wind erosion will contribute to the overall dust plumes. This has the potential to cause:

- Increased contaminated turbidity and sedimentation of Darwin Harbour and surrounding intertidal creeks and mangrove forests
- Further reduction in air quality
- Further reduction in visibility.

The Northern Territory participates in monitoring for ambient air in the Darwin Region following *NEPM Ambient Air Quality* (DLPE, 2001). It reports annually to NEPC (NTG, 2007). Results show that emissions of most air pollutants are low in the Northern Territory, with fine particles from bushfire smoke the exception.

Current activities at the East Arm Wharf and adjacent industry areas generate noise levels and night lighting. Construction and increased operation activities will increase these levels, with the potential to cause:

- disturbance to the community amenities of Darwin City and Palmerston
- disruption to wildlife behaviour.

Gaps and Management Measures:

Noise and lighting impacts would be determined through previous and additional studies, as required, so as to inform design for the Project.

The Project would incorporate development of an Air Quality Management Plan, focussing on meteorological data, design and construction practices, and monitoring and management of dust sources from the site during construction and operation, including contaminated dust deposited in the Harbour. This Plan would provide linkages with the Stormwater Management Plan and Erosion and Sediment Control Plan in terms of an integrated monitoring strategy and program. The Plan would also be integrated with and inform other site user plans.

Also refer to Table 6.

6.7 Water Quality, Stormwater, Runoff and Erosion

A key objective for the Project should be to maintain the quality and quantity of water during construction and operation of the facility, to support the sustainment of the environmental values in the area of influence.

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The Project will need to document the natural variables in water and sediment quality in the Project area of influence to understand the seasonal and tidal effects, particularly in the Bleasers Creek estuary to inform on the subsequent impacts (and monitoring and management programs) by harbour wall and hardstand construction and dredging programs.

Management Measures:

The Project would incorporate the development of a Stormwater Management Plan and Erosion and Sediment Control Management Plan. The Stormwater Management Plan would focus on surface water contamination and pollution pathways, and the capture / harvesting / separation / treatment / re-use of clean and waste or contaminated water.

The Stormwater Management Plan would address water quality standards and levels set for discharge into the Harbour waters, including the Objectives in the 'Draft Management Strategy for Stormwater 2006', such as Beneficial Uses. It would be integrated with the Air Quality Management Plan and Dredging Management Plan and follow the objectives and recommended programs outlined in the DHAC 'Review of Environmental Monitoring of the Darwin Harbour Region and Recommendations for Integrated Monitoring (IEMP), 2003'.

Also refer to Table 6.

6.8 Waste Management and Pollution

Elements of the Project will involve dredging or building seawalls on the Harbour floor and intertidal mangrove soils (such as Bleasers Creek). The Harbour floor muds and mangrove soils are commonly known as potential acid sulphate soils (PASS). They occur naturally; however, when disturbed they have the potential to produce concentrated sulphuric acid and other toxic substances that are associated with fish kills and damage to coastal infrastructure (Howe, 2007). Mangrove muds are more likely to contain acid sulfate soils, because of build-up of organic materials over time; however, marine sediments also have this potential. Understanding the subsurface mud morphology and chemistry is integral to designing for, construction and management of the wharf, hardstands and harbour facing walls, including the removal, containment and disposal of dredge spoil in manner that does not pollute the Harbour or impact on the undisturbed mangrove community.

Management Measures:

The Project is to develop a Dredging Management Plan that focuses on Harbour water quality standards and levels set for dredging activity and dredge spoil sediment standards for disposal, including identification, monitoring and management of potential acid sulphate soils (PASS).

Also refer to Table 6.

The options for managing PASS during mangrove removal and excavation are limited. The design and construction of harbour facing walls, hardstanding, and backfilling should be developed in regards to the EPA 'Environmental Guidelines for Reclamation in Coastal Areas, 2006'.

Liquid and solid wastes will be generated on site as a result of construction and eventual operation of the expanded Wharf.

Management Measures:

The Project would incorporate development of a Waste Management Plan addressing construction waste flows and their disposal, during construction. An Operational Waste Management Plan should be prepared prior to the new elements operating at the Wharf. The benefits of an integrated Operational Waste Management Plan for all Wharf users would be investigated. A PASS Management Plan would also be prepared to ensure these sediments are managed appropriately.

Also refer to Table 6.

6.9 Greenhouse Gas Emissions

The environmental objective for any development should be to minimise greenhouse gas emissions to the greatest extent practicable. The planning for this Project and its elements should also accommodate predicted sea level rises over the assessed life of the Wharf, ensuring design and construction provides a level of structural safety, longevity and modification options if rises do occur.

The design (and during construction and operation) is to assess the risks from natural disasters, such as cyclone, storm surge, earthquake and wild fire. A Port Natural Disasters Plan is currently being updated by DPC in concert with the existing Northern Territory All Hazards Emergency Management Arrangements 2009, to ensure the safety of personnel and integrity of the Port of Darwin (as much as practicable).

Gaps and Management Measures:

It is anticipated further investigation and environmental assessment of greenhouse gas emissions, climate change and natural disasters will occur during Project impact assessment, in regards with Northern Territory 'Environmental Impact Assessment Guidelines: Greenhouse Gases and Climate Change'.

The design, construction and long term management of the Project would incorporate ESD principles.

Also refer to Table 6.

6.10 Management of Cumulative Impacts

As the East Arm Wharf and surrounding area is progressively developed, there is the potential for environmental impacts to cumulatively increase. However, there are a number of environmental management strategies and frameworks in place currently to assist in reducing this risk. These include strategic planning documents such as the *Port Masterplan 2030* and the *East Arm Sewerage Zone – Masterplan Sewerage Infrastructure – 2002 to 2025*, as well as a range of documents providing guidance on environmental management (e.g. *Environmental Guidelines for Reclamation in Coastal Areas, 2006*, *Mangrove Management in the Northern Territory*, *Review of Environmental Monitoring of the Darwin Harbour Region* and *Recommendations for Integrated Monitoring*, *Northern Territory All Hazards Emergency Management Arrangements 2009* and *Draft Darwin Harbour Regional Management Strategic Framework 2009 – 2013*).

Management Measures:

Development will be guided by the Port Masterplan 2030 and appropriate environmental management planning and integrated monitoring, so as to monitor and identify cumulative impacts.

Also refer to Table 6.

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7.0 Potential Environmental Impacts and Risks

A risk management workshop was held on 18 May 2009 with government stakeholders (Pitt Group Pty Ltd, 2009). The report of the workshop (Risk Report) is listed at **Appendix C** (Final 18 June 2009). The stakeholders are listed in Appendix 3 of the Risk Report.

Outcomes of the workshop have assisted in confirming and ranking potential impacts and risks that the proponent must fully understand and assess during any future impact assessment.

The workshop followed the standard risk assessment process of assessing likelihood of an impact occurring and its consequence, with participants working in three groups and assessing three types of risk: Strategic Risks, Project Risks and Environmental Risks. A card system was used to prompt discussion, assist in identifying risks, ranking those risks with and without safeguards or management solutions.

The following is a summary of the High and Medium rated risks relevant to this NOI that could impact on how the Project adequately covers all environmental components associated with the scope, design, structures, construction and operation of the East Arm Wharf facilities. Risk numbers correlate to those in the Risk Report and only risks relevant to environmental requirements have been included (refer to **Appendix C** for the full list of risks identified).

Strategic Risks:

3. Extent and impact of dredging required to extend the wharf and maintain its operations is unknown, which has the potential to significantly alter the timing, scope and environmental impact of the project (**High risk**).
6. Budget allocated to project is inadequate to complete all scope elements, deliverables (including environmental studies) and timing (**Medium risk**).

Project Risks:

14. Project timelines, costs or impact on the environment is negatively impacted as a result of a natural disaster and/or climate change (**High risk**).

Environmental Risks:

21. The current allocation of land for the wharf expansion is insufficient to support the proposed development without additional engineering work (bundled areas for future dredge spoil) being undertaken (which will take time and a substantial level of funding) (**High risk**).
22. If additional engineering measures required to expand the wharf are not accompanied by the appropriate environmental studies it could result in a significant negative impact on the local environment and also delay the work (**High risk**).
23. The site is found to contain a matter of National Environmental Significance (NES) that, if not identified early in the project, results in inadvertent breaches of relevant environmental legislation (as well as incurring additional project costs and delays) (**High risk**).
24. Project Team does not contain the appropriate environmental expertise to effectively identify, mitigate and manage environmental risks resulting from project construction (**High risk**).

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25. Construction and operation of expanded wharf negatively impacts upon harbour water quality and aquatic environments (includes the biota and substrate) (**High risk**).
26. Construction and operation of expanded wharf negatively impacts upon the hydro-dynamics of the harbour and surrounding estuaries (**High risk**).
27. Occurrence of a natural disaster results in wharf operations having an indirect negative impact upon the environment (**High risk**).
28. Inadvertent spillage of hazardous materials during construction or ongoing operations of the wharf negatively impacts upon the aquatic environment (**High risk**).
29. Project construction and expanded wharf operations increases air omissions, mosquito borne disease, and biting insect pests that could result in negative impact on human health, terrestrial and aquatic environments (**High risk**).
30. Design of expanded wharf does not provide adequate flexibility or control to ensure that new industries and activities do not inadvertently increase risks to the environment (**High risk**).
31. Buffers and corridors established for the project provide insufficient protection for the local environment (estuaries harbour) (**Medium risk**).
32. Construction and subsequent operation of the expanded wharf facilities permanently impacts upon the environmental sustainability of surrounding estuaries (**Medium risk**).
33. DPI does not adequately engage with stakeholders in relation to their environmental management issues and concerns during project planning and construction (**Medium risk**).
34. Adequate corridors are not reserved for future access and services throughout the East Arm Precinct which negatively impacts upon wharf operations and the local environment (**Medium risk**).

8.0 Timing of Proposed Action

Detailed stages and timings for the elements of the Project are yet to be developed. Current broad stages and timings for commencement of the elements of the Project are as follows:

- 2010: Marine Supply Base and Defence Hardstand – noting the requirement to fast-track these projects because of current use requirements
- 2010/2011: Filling an area to provide an additional rail loop spur into the bulk stockpile
- 2014: Additional rail loop spur to bulk stockpile and continue filling area north of existing ponds
- 2014: Extension of the Muramats allotments west
- 2014: Extension of the existing East Arm Wharf key line and continue filling the area north of the existing East Arm Wharf ponds out to the extent of Section 5631 and East Arm DV for rail and road access to the wharf.
- 2014: Land Development Corporation (LDC) subdivisional works and filling adjacent to the new East Arm Boat Ramp and Muramats Road
- 2010/2011: Disposal of dredge spoil.

The current requirement for the Defence hardstand and marine supply base will require an earlier than initially anticipated start to this aspect of the project. Therefore, permission is sought to have these elements of the project approved on approval of this NOI, with a view to undertake further environmental assessment, as may be required, incorporating associated environmental safeguards.

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9.0 Proposed Environmental Commitments, Safeguards and Monitoring

The Project will manage its impacts on the environment through implementation of the Proponent commitments indicated in **Table 6**.

Table 6: Environmental Commitments, Safeguards and Monitoring

Serial	Issue	Commitment	Linkage to Risk Report	Risk Workshop Risk Level	Expected Mitigated Risk Level
			(Risk Number)		
1	Environmental requirements in project scope	Integration of environmental studies, monitoring and management requirements within Project scope, design, project management methodology, staging, construction and operation.	6	Medium	Medium
			22	High	Medium
			24	High	Low
2	Climate and weather	The Project will ensure design, structures, construction and operation of the expanded wharf and adjacent infrastructure address local extreme seasonal weather conditions and tides, and the longer term potential rise in sea level.	14	High	Low
			27	High	Medium
3	Geology and landform	The Project will re-assess available geotechnical data sets for the areas earmarked for excavation and backfilling, both in terms of the natural substrate, but also the areas currently covered by ponded material, to inform design and construction practices.	21	High	Low
4	Hydrodynamics	The Project will assess available current and sediment movement data for the Harbour in the area of Project influence, to inform the design, structure, construction and long term management of the hardstands and backfill areas for the Project. The plan will scope the impact on remnant mangrove forests and their sustainment by including a monitoring program. This plan will be linked with the Mangrove Management Plan.	26	High	Low
5	Vegetation clearing	The Project will develop a remnant mangrove management plan during impact assessment to inform the design and construction of hardstands and backfill areas, including mangrove clearing	31	Medium	Low

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Serial	Issue	Commitment	Linkage to Risk Report (Risk Number)	Risk Workshop Risk Level	Expected Mitigated Risk Level
		guidelines. It will include the monitoring and management requirements for Bleasers Creek and Hudson Creek remnant mangroves. The monitoring program will be developed in concert with DIPE (2002), 'Mangrove Management in the Northern Territory'.			
6	Flora – endangered	The Project would include a targeted field survey for threatened species within the areas to be cleared to ensure that threatened species, if present, are managed appropriately.	23	High	Low
7	Flora – weeds	The Project will develop a Weed Management Plan for construction and operation of The Project area.	Not addressed	Not addressed	Low
8	Fauna - endangered	The Project would include a targeted field survey for threatened species within the areas to be cleared to ensure that threatened species, if present, are managed appropriately.	23	High	Low
9	EPBC Protected Matters	The Project would include a targeted field survey for threatened species within the areas to be cleared to ensure that threatened species, if present, are managed appropriately.	23	High	Low
10	Pests species	The Project will develop Construction and Operational Pest and Quarantine Management Plans (C/OPQMP), and amend and update any pest or quarantine monitoring and management plans currently in place for the operation of the wharf.	29	High	Low
11	Biting insects	The Project will conduct a baseline study (linked to previous reporting) for the area of influence during the dry and wet seasons, to inform a Biting Insect Management Plan. The design for the study, monitoring and management program will follow NTDHAF 'Guidelines to Prevent Mosquito Breeding in Constructed Wetlands in the Northern Territory, 2008'.	29	High	Low
12	Cultural environment	The Project will discuss Indigenous archaeological and non-indigenous heritage requirements with the Heritage Branch in NRETAS during impact assessment, such as the scope and level of	Not addressed	Not addressed	Low

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Serial	Issue	Commitment	Linkage to Risk Report (Risk Number)	Risk Workshop Risk Level	Expected Mitigated Risk Level
		<p>investigation, reporting, monitoring and management plans required. A number of clearances have been undertaken previously as part of Stage 1 and 2 of the development of the East Arm Wharf.</p> <p>The Project will discuss sacred sites requirements with the AAPA during impact assessment, such as the scope and level of investigation, reporting, monitoring, and management plans and new Authority Certificate requirements (Appendix A contains the AAPA Certificate issued in 1994).</p>			
13	Air quality	<p>Development of an Air Quality Management plan, focussing on meteorological data, design and construction practices, and monitoring and management of dust sources from the site during construction and operation, including contaminated dust deposited in the Harbour. This plan is to link with the Stormwater Management Plan and Erosion and Sediment Control Plan in terms of an integrated monitoring strategy and program. The plan is to be integrated with and inform other site user plans. The development of the plan would incorporate existing air monitoring and reporting undertaken at the site, including that undertaken by NRETAS, as available.</p>	29	High	Low
14	Water quality, stormwater, runoff and erosion	<p>Development of a Stormwater Management Plan and an Erosion and Sediment Control Plan. The Stormwater Management Plan will focus on surface water contamination and pollution pathways, and the capture / harvesting / separation / treatment / re-use of clean and waste or contaminated water. An aquatic biota survey will need to be conducted.</p> <p>The Stormwater Management Plan will address water quality standards and levels set for discharge into the Harbour waters, including the Objectives in the 'Draft Management Strategy for Stormwater 2006', such as Beneficial Uses.</p> <p>It will be an integrated monitoring plan with air quality (dust plumes), dredging and dredge spoil disposal plans, and follow the objectives</p>	25	High	Medium

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Serial	Issue	Commitment	Linkage to Risk Report (Risk Number)	Risk Workshop Risk Level	Expected Mitigated Risk Level
		and recommended programs outlined in the DHAC 'Review of Environmental Monitoring of the Darwin Harbour Region and Recommendations for Integrated Monitoring (IEMP), 2003'.			
15	Waste management and pollution	Development of a Dredging Management Plan, focussing on Harbour water quality standards and levels set for dredging activity and dredge spoil sediment standards for disposal, including identification, monitoring and management of acid sulphate soils (ASS). Application for a Waste Discharge License would also be made for any component of dredge spoil not used elsewhere and required to be released to the harbour. Preparation of a Waste Management Plan addressing construction waste flows and their disposal. An Operational Waste Management Plan would be prepared prior to the new elements operating at the wharf. The benefits of an integrated Operational Waste Management plan for all wharf users would be investigated.	3	High	Medium
			28	High	Low
16	Greenhouse, climate change, and natural disasters	Further investigation and environmental assessment of greenhouse gas emissions, climate change and natural disasters during Project formal impact assessment, with regard to the Northern Territory 'Environmental Impact Assessment Guidelines: Greenhouse Gases and Climate Change'.	14	High	Low
17	Sustainability and cumulative impacts	The project includes requirements for Construction and Operational Management Plans to guide all components of development in a sustainable manner. The Project sits within the framework of the original Port Masterplan and the current draft Port Masterplan 2030, which will provide overall guidance for staged development.	30	Medium	Low
			32	Medium	Low
			33	Medium	Low
			34	Medium	Low

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10.0 Rehabilitation and Decommissioning

It is anticipated that the East Arm Wharf will remain in active use into the long term, with upgrades and modifications to suite changes in technology, shipping and liquid and solid bulk handling requirements. Expansions and alterations to Wharf functions will be canvassed by the proponent with the Northern Territory Government to assess any legislative requirements required for approvals and sustainment of the surrounding environment.

Rehabilitation or decommissioning or remnant or disused sites and facilities will follow guidelines and standards set by the Northern Territory Government.

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Notice of Intent for the Proposed
Expansion Works at East Arm

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11.0 Conclusions and Summary

This document is the first stage of the environmental assessment process covering all the above elements. It is recognised that the next stage will be either a PER or an EIS and that a substantial amount of work will need to be completed in a relatively short timeframe to meet construction completion dates. The proponent is seeking guidance from NRETAS in order to commence further studies as soon as possible to enable critical deadlines to be met. **Table 7** provides a summary of the issues identified, whether there is currently existing data available and the proposed management.

Table 7: Project Summary

Environmental Component	Risk	Gap in Data	Proposed Management
Site selection	Nil – expanding existing infrastructure	Nil	Site already approved for development and zoned accordingly.
Climate	Runoff and sedimentation from heavy rains	Nil	Sediment and Erosion Control Plan Water sensitive urban design
	Winds generating dust	Nil	Operational Environmental Management Plan
	Cyclones and storm surge (this is also related to sea level rises)	Further investigation required (and planned)	Incorporate engineering controls for coastal and infrastructure protection
	Alterations to tidal movements	Hydrodynamic modelling	Incorporate outcomes into engineering controls
	Possible sea level rise	Further investigation required (and planned)	Incorporate controls into design
Geology and Landform	Inappropriate design due to subsidence of substrate	Geotechnical data for excavation/backfilling areas and dredging	Incorporate into design and construction practices and use outcomes to develop Dredging Management Plan
Hydrology	Sustainable use of and contamination of groundwater	Groundwater monitoring data	If necessary conduct additional groundwater monitoring
Land Capability	Nil	Nil	No change in existing land use type and services already planned for establishment in area to support proposed activities

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Environmental Component	Risk	Gap in Data	Proposed Management
Hydrodynamics	Impact on tide and sediment movement	Detailed tide and sediment movement data (modelling)	Data to inform design, structure, construction and long term management Dredging Management Plan
	Impact on remnant mangrove forests	Nil	Already zoned for development Mangrove Management Plan would be developed to protect remaining mangroves adjacent to site, including monitoring Ongoing protection of remainder incorporated into Operational Environmental Management Plan
Land Units	Nil	Nil	Incorporate opportunities and constraints in Project design
Flora	Clearing of mangroves	Nil	Follow mangrove clearing guidelines Already zoned for development Mangrove Management Plan would be developed to protect remaining mangroves adjacent to site, including monitoring Ongoing protection of remainder incorporated into Operational Environmental Management Plan

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Environmental Component	Risk	Gap in Data	Proposed Management
	Impact on remnant mangroves	Nil	Mangrove Management Plan would be developed to protect remaining mangroves adjacent to site, including monitoring Ongoing protection of remainder incorporated into Operational Environmental Management Plan
	Impact on any threatened species present	Current presence of any threatened species	Targeted field survey within areas to be cleared
	Introduction and/or spread of weeds	Nil	Weed Management Plan Clean fill used as available
Fauna	Impact on any threatened species present	Confirmation of presence of any threatened species	Targeted field survey within areas to be cleared
Marine Environment	Impact on harbour water quality	Water quality monitoring data	If necessary conduct additional water quality monitoring
	Surface water pollution	Nil	Stormwater Management Plan
Pest Species	Potential to introduce/exacerbate pest and quarantine threats	Nil	Construction and Operational Pest and Quarantine Management Plans
Biting Insects	Impact on human health	Baseline data to be collected	Baseline data to inform Biting Insect Monitoring and Management Plan Guidelines to Prevent Mosquito Breeding in Constructed Wetlands in the Northern Territory 2008
Areas of Environmental Significance	Impact on Darwin Harbour, listed as wetland of national significance	Marine habitat and flora/fauna assessments	Investigations, reporting, monitoring and management plans as required
Archaeology	Disturbance/destruction of any archaeological sites	Existence of any archaeological sites in areas to be disturbed	Investigations, reporting, monitoring and management plans as required

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Environmental Component	Risk	Gap in Data	Proposed Management
Sacred Sites	Disturbance/destruction of Sacred Sites	Existence of any Sacred Sites – AAPA Authority Certificates dated 1994 may not be applicable to the current Project	Investigations, reporting, monitoring and management plans as required
European Heritage	Disturbance/destruction of any heritage sites	Existence of any heritage sites	Investigations, reporting, monitoring and management plans as required
Native Title	Nil – already cleared	Nil	Nil
Adjacent Marine and Land Uses	Nil	Nil	Consultation with stakeholders
Air Quality	Impacts from noise and lighting during construction and operation	Comprehensive studies to determine receiving environments	Additional studies Air Quality Management Plan
Water Quality, Stormwater, Runoff and Erosion	Surface water contamination	Nil	Stormwater Management Plan
	Erosion and sedimentation	Nil	Erosion and Sediment Control Management Plan
Waste Management and Pollution	Impact on Harbour water quality Acid sulphate soil contamination	Nil	Dredging Management Plan
	Liquid and solid wastes	Nil	Construction and Operational Waste Management Plan
Greenhouse Gas Emissions	Greenhouse gas emissions	Emissions measurements/ estimation and comparison with NEPM	Investigation and environmental assessment
Sustainability	Management of cumulative impacts	Full knowledge of end users of facilities	Staged development through implementation of the Port Masterplan 2030, supported by Construction and Operational Environmental Management Plans and integrated monitoring systems.

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12.0 References

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Appendix A

AAPA Authority Certificates (1994)

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Environment

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Environment

ABORIGINAL AREAS PROTECTION AUTHORITY

GPO BOX 1890
DARWIN NT 0801
Telephone: (089) 81 4700
Facsimile: (089) 81 4169

093/07

File: D89/199; 90/310
Ref: 4825

28th January 1993

Department of Transport and Works
NT Construction Agency
Post Office Box 427
PALMERSTON NT 0831

Attn: Graham Clarke

Dear Sir

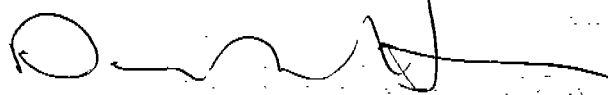
**RE: ISSUE OF AUTHORITY CERTIFICATE FOR EAST ARM PENINSULA
- IN FILL OF MANGROVE AREA 1B FROM MATERIAL CUT FROM
AREA 2A. WORK INCLUDES DRILLING AND BACKHOE PITTING IN
AREA 2A AND MUD PROBING AREA 1B.**

I refer to your application for an Authority Certificate received on the 11th December 1992 for the above works.

Accordingly, under the powers delegated to me under Section 19 of the Aboriginal Sacred Sites Act 1989, I am pleased to issue the attached Authority Certificate.

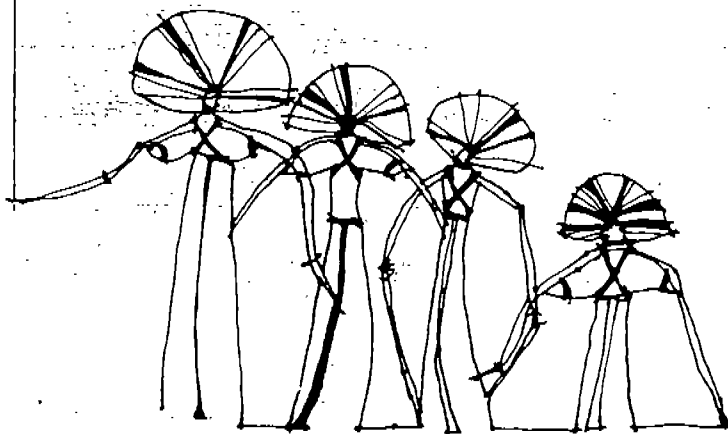
Please carefully read the conditions included on the Certificate. If you require any further information regarding the Certificate then please contact Andrew McWilliam at this office.

Yours sincerely



DAVID RITCHIE
Chief Executive Officer

encl.



DEBIT NOTE

NORTHERN TERRITORY
COMMONWEALTH OF AUSTRALIA
PROTECTION AUTHORITY
DEPARTMENT OF
GPO BOX 1890
DARWIN NT 0801

138556

DATE

CAT. No. 764.0100

FN 9/1

28.1 19 93

NAME IN FULL (USE BLOCK CAPITALS)

MR./MRS./MISS

Construction Agency

ADDRESS

TRANSPORT & WORKS.

BOX NUMBER

P.O Box 61 Palmerston POST CODE 0831

GOODS SUPPLIED OR SERVICES RENDERED

\$

c

Costs associated with issue of
Authenticity Certificate — East Arm
PENINSULA STUDY

Application fee C93/07

50 00

Payment to consultant

1020 00.

Payment to custodians

90 00.

Mileage 62 km @ 5 cents.

35 34

Promotions

11 80.

Digitized Mapping

70 00

ABORIGINAL AREAS

Payment of this account made to PROTECTION AUTHORITY OF TERRITORY MONIES

Department of

GPO BOX 1890
DARWIN NT 0801

\$

1277

14

FOR
OFFICE
USE
ONLY

EMPLOYEE AUTHORISED TO SIGN

ORIGINATING BRANCH

LOCALITY

FILE OR REFERENCE

CREDIT

HEAD OF REVENUE

ORIGINAL — DEBTOR
DUPLICATE — ACCOUNTS
TRIPLICATE — BOOK

5-69

Government Printer of the Northern Territory

Andrew McWilliam
12 Sanders St
Jingili, NT 0810

18 Jan 1993

Mr David Ritchie
CEO
Aboriginal Areas Protection Authority
Darwin NT

RE: Payment for Consultancies- 1. Larrakeyah Barracks, variation to Cert. 92/52
2. East Arm land fill feasibility study clearance
3. Kakdu Highway intersection & gravel pit

Dear David

I request payment for the above site clearance work as follows:

a. Consultancy fees

1. Larrakeyah Barracks Clearance work

2 days * \$340.00 per day \$ 680.00

2. East Arm Land fill study clearance

3 days * \$340 per day \$1020.00

3. Kakadu Hwy intersection & Gravel pit ch80.8km

2 hrs * \$340 per day \$ 85.00

Total 1. \$1785.00

b. Fieldwork expenses

a. Food and Drinks ~~\$1180.7~~

b. Use of vehicle 62km * \$0.44 \$ 27.28

Total 2. \$ 39.08

Total 1 & 2 \$1824.08

Yours faithfully

has Tax
PAID

624.00
\$1200.08
clw 270199
clw 270198

Andrew McWilliam

Andrew

Cheque No. *see above* Date *22/1/93*

Certified Correct *[Signature]*

Authorised *[Signature]*

Account Code *42-03*

ORIGINAL COPY

DATE: 8/1/93

RECEIVED FROM

34

THE SUM OF Barkley Inn DOLLARS

CENTS BEING FOR

Food & Drinks

\$11.80

SIGNATURE

ABORIGINAL AREAS PROTECTION AUTHORITY AUTHORITY CERTIFICATE

Issued in accordance with Section 22 of the Aboriginal Sacred Sites Act

REFERENCE: D89/199; 90/301 (Doc. No. 4825)

C93/07

APPLYING TO: East Arm Peninsula.

**PROPOSED
WORK OR USE:**

In fill of mangrove area 1b from material cut from area 2a. Work includes drilling and backhoe pitting in area 2a and mud probing area 1b.

ISSUED TO:

Department of Transport and Works
Construction Agency
Post Office Box 427
PALMERSTON NT 0831

CONDITIONS:

1. It is the responsibility of the recipient of this Certificate to:
 - (i) Include the conditions of this Certificate in any subsequent contract or tender document commissioning works described in this Certificate and,
 - (ii) Otherwise inform agents and employees of the conditions of this Certificate and obligations under the Aboriginal Sacred Sites (N.T.) Act 1989.
2. Accompanying map forms part of this Certificate.





The COMMON SEAL of the
ABORIGINAL AREAS PROTECTION AUTHORITY
was hereto affixed on the 28th day
of January 1993;




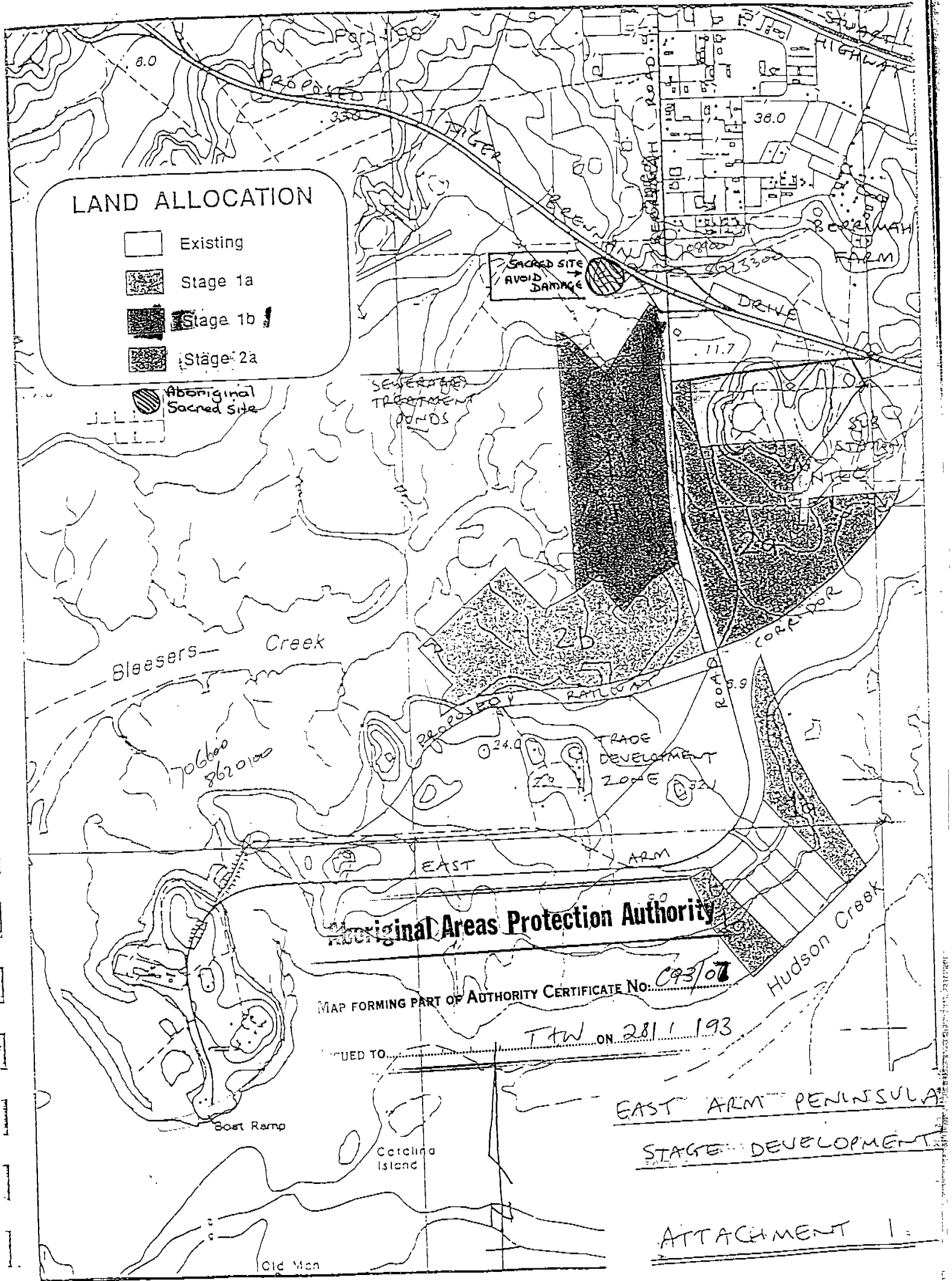
D.J. RITCHIE
Chief Executive Officer



LAND ALLOCATION

-  Existing
-  Stage 1a
-  Stage 1b
-  Stage 2a

 Aboriginal Sacred Site



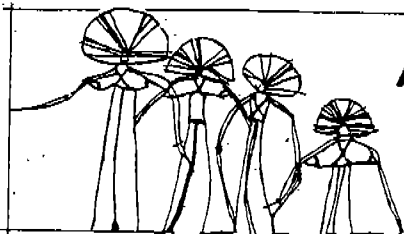
Aboriginal Areas Protection Authority

MAP FORMING PART OF AUTHORITY CERTIFICATE No. C93/07

ISSUED TO: TFW ON 28/1/93

EAST ARM PENINSULA
STAGE DEVELOPMENT

ATTACHMENT 1



ABORIGINAL AREAS PROTECTION AUTHORITY

GPO BOX 1890
DARWIN NT 0801
TELEPHONE: (089) 81 4700
FACSIMILE: (089) 81 4169

File: D89/199;90/310

Ref: 7053

17 June, 1994

DOC No: 10365

NT Construction Agency
Department Transport and Works
Post Office Box 61
PALMERSTON NT 0831

Dear Sir

**RE: ISSUE OF AUTHORITY CERTIFICATE FOR PROPOSED NEW PORT AT
EAST ARM, DARWIN BEING A VARIATION OF C93/027 AND C93/079**

I refer to your application for an Authority Certificate, received on the 11th August 1993, for the above location.

Accordingly, under the powers delegated to me under Section 19 of the *Aboriginal Sacred Sites Act 1989* I am pleased to issue the attached Authority Certificate.

Please note the conditions outlined in the Certificate. If you have any further queries please contact Mrs Lesley Mearns at this office.

Yours faithfully

DAVID RITCHIE
Chief Executive Officer

encl.

DEBIT NOTE

NORTHERN TERRITORY OF AUSTRALIA

172684

DEPARTMENT OF

DATE

172684

CAT No. 640-0001

FN 9/1

20/6/1994

NAME IN FULL (USE BLOCK CAPITALS)

MR./MRS./MISS

N.T. CONSTRUCTION AGENCY

ADDRESS

TRANSPORT WORKS.

BOX NUMBER

P.O. Box 61 PALMERSTON NT POST CODE 0831

GOODS SUPPLIED OR SERVICES RENDERED

\$

c

Costs associated with issue of
Authenticity Certificate. — Proposed new
point at East Arm — Variation
of C93/027 & C93/079.

Application fee C94/92

50 00

Custodian fee

50 00

ABORIGINAL AREAS

Payment of this account to PROTECTION ABORIGINAL AFFAIRS, OF TERRITORY MONIES

Department of

GPO BOX 1890

DARWIN NT 0801

\$

100 00

FOR
OFFICE
USE
ONLY

EMPLOYEE AUTHORISED TO SIGN

ORIGINATING BRANCH

LOCALITY

FILE OR REFERENCE

CREDIT

HEAD OF REVENUE

ORIGINAL — DEBTOR
DUPLICATE — ACCOUNTS
TRIPPLICATE — BOOK

ABORIGINAL AREAS PROTECTION AUTHORITY

AUTHORITY CERTIFICATE

Issued in accordance with Section 22 of the Aboriginal Sacred Sites Act

REFERENCE: D89/199;90/310 (Doc:7053)

C94/92

Variation of C93/27 & C93/79

APPLYING TO: Proposed new port at East Arm, Darwin

PROPOSED WORK OR USE: Development of port facilities as identified on plan 1 attached.

ISSUED TO: NT Construction Agency
Department Transport and Works
Post Office Box 61
PALMERSTON NT 0831

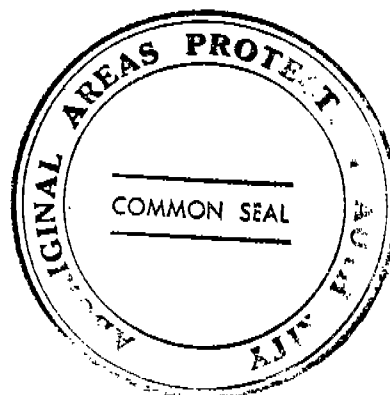
CONDITIONS:

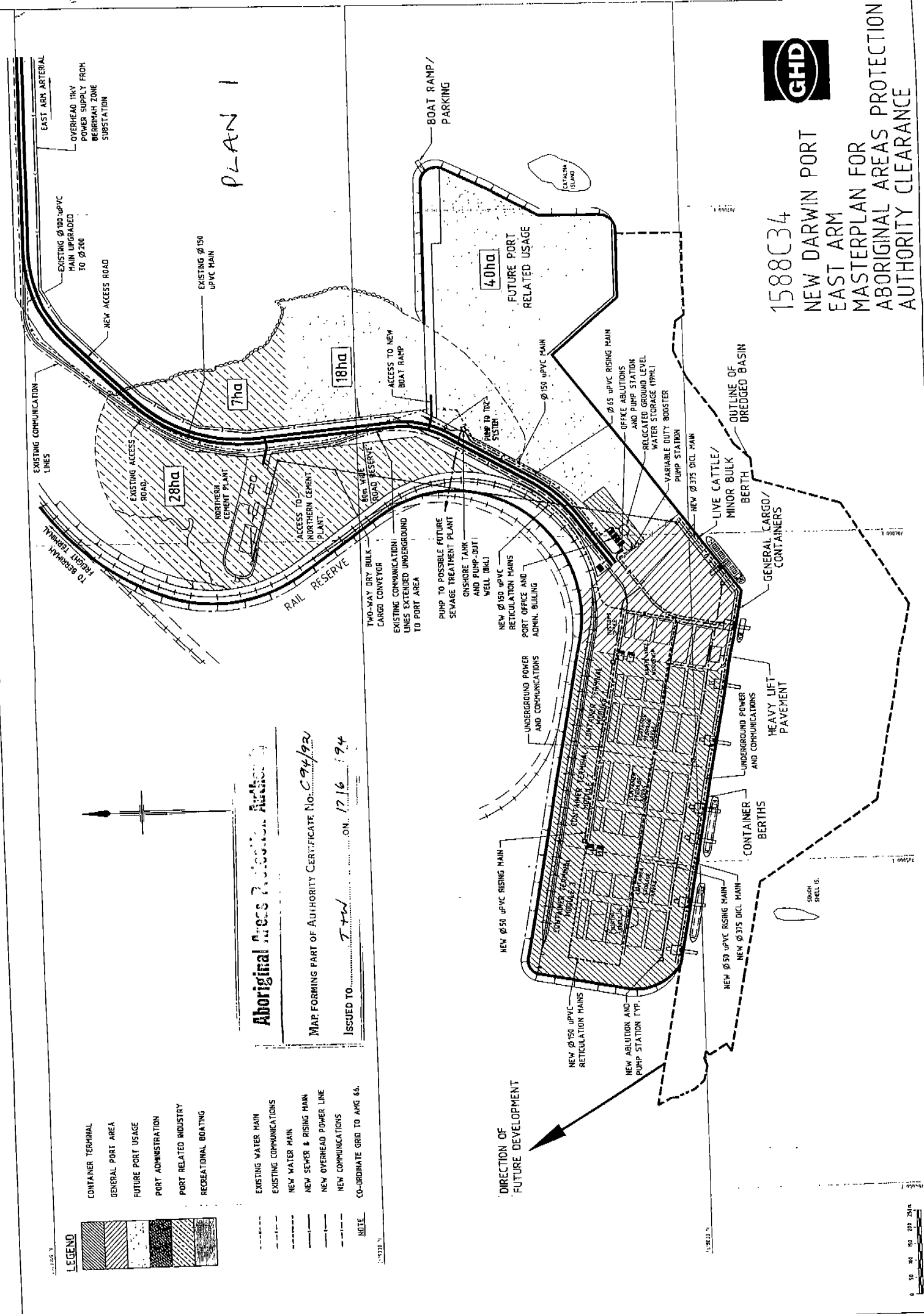
1. It is the responsibility of the recipient of this Certificate to:
 - (i) Include the conditions of this Certificate in any subsequent contract or tender document commissioning works described in this Certificate.
 - (ii) Otherwise inform agents and employees of the conditions of this Certificate and obligations under the *Aboriginal Sacred Sites (NT) Act 1989*.
2. The proposed use or works covered by this Certificate must commence within 25 years of the date of issue.
3. The information on the plans relate specifically to the areas of the Certificate as marked and the fact that no sites are shown in other areas should not be taken as a definitive indication of the existence or lack of existence of sites in these areas.
4. The Plans 1 & 2 attached to the Certificate form part of the Certificate.
5. No damage to sacred site, Yirra, 5073-0066 as marked on plan 2 in cross-hatching, including no scouring or excavation of the mud on the sea bed within those boundaries.
6. A groyne shall be constructed from the port facilities shown on plan 1 to Catalina Island (Yirra) to prevent scouring as a result of tidal movements.
7. Any port facilities identified on plan 1 as encroaching within the boundaries of Yirra, as shown on plan 2, are to be built on fill and must be completed without excavation of the existing sea bed.

The COMMON SEAL of the
ABORIGINAL AREAS PROTECTION AUTHORITY
was hereto affixed on the 17th day of
June 1994



DAVID RITCHIE
Chief Executive Officer





- LEGEND**
- CONTAINER TERMINAL
 - GENERAL PORT AREA
 - FUTURE PORT USAGE
 - PORT ADMINISTRATION
 - PORT RELATED INDUSTRY
 - RECREATIONAL BOATING

- EXISTING WATER MAIN
- EXISTING COMMUNICATIONS
- NEW WATER MAIN
- NEW SEWER & RISING MAIN
- NEW OVERHEAD POWER LINE
- NEW COMMUNICATIONS

NOTE: CO-ORDINATE GRID TO AMG 66.

Aboriginal Areas Protection Authority

MAP FORMING PART OF AUTHORITY CERTIFICATE No. C94/92

ISSUED TO: T & W ON: 17/6/94



1588C34
NEW DARWIN PORT
EAST ARM
MASTERPLAN FOR
ABORIGINAL AREAS PROTECTION
AUTHORITY CLEARANCE

PLAN 2

OUTDATED PLAN OF
HARBOR AREA
SHOWING CURRENT
SEA DEPTHS AND
THUS MUD BANKS

Aboriginal Areas Protection Act

MAP FORMING PART OF AUTHORITY CERTIFICATE No. 594/92

ISSUED TO T.W. ON 17/6/94

WARE ARTERIAL ROAD
ALTERNATIVE RAIL RESERVE

OFFSHORE SUPPLY BASE
36 Ha

PRIVATE OPERATOR
10 Ha

BERTHS

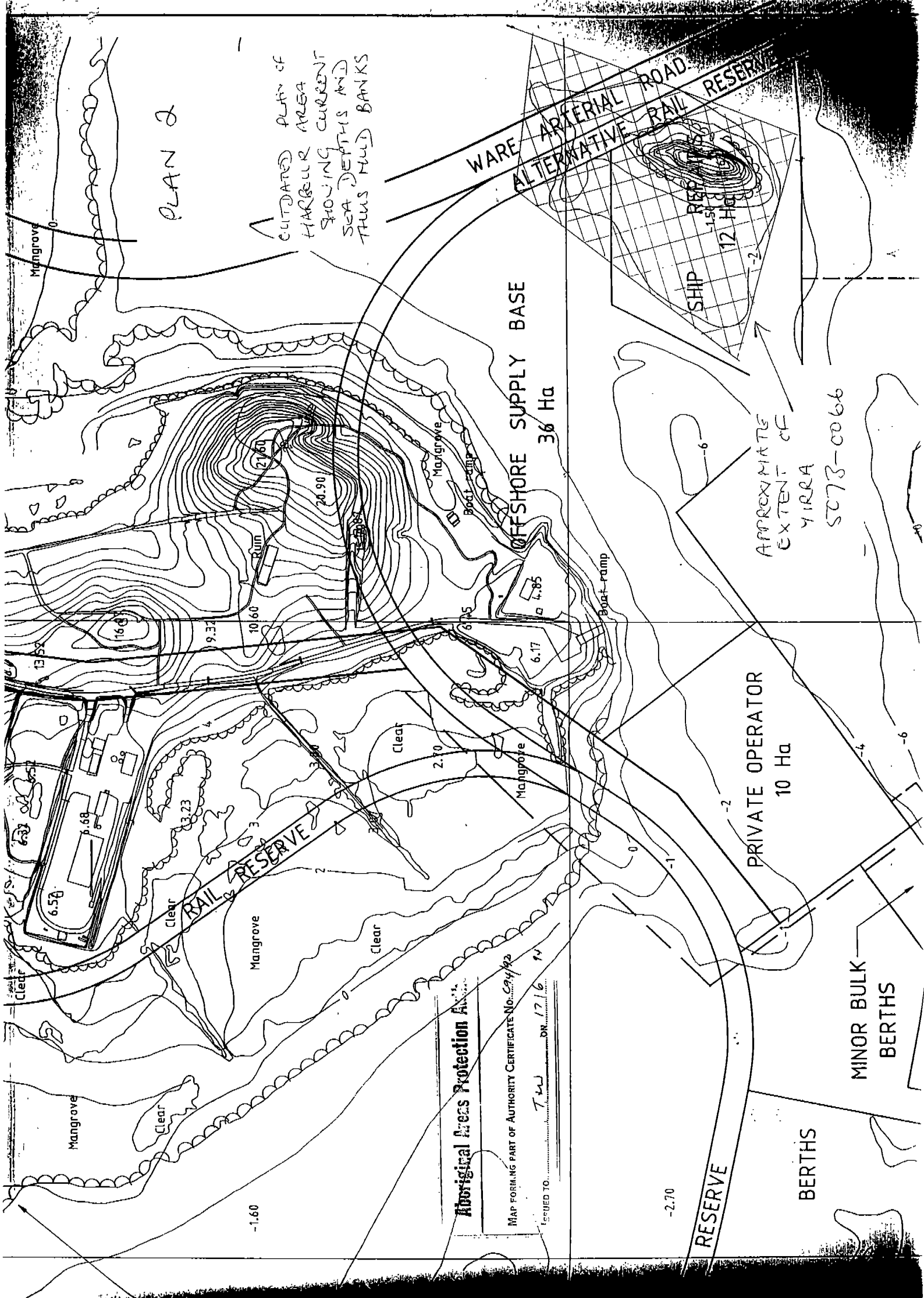
MINOR BULK
BERTHS

RESERVE

SHIP

REPT
12 Ha

APPROXIMATE
EXTENT OF
YIRRRA
SC73-0066



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Environment

Appendix B

Native Title Advice Letter

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Environment

Appendix C

Risk Report, Final 9 June 2009 (Pitt Group Pty Ltd, 2009)

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Expansion Works at East Arm

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Environment



Pitt Group Pty Ltd
107 Greythorn Rd Balwyn Nth Vic 3104
PO Box 194 Canterbury Vic 3126

(03) 9857 7919
pitt@pittgroup.com.au

ABN: 27 081 265 572

Risk Assessment

for

Expansion of East Arm Port Project

(DPI Major Projects Unit – Land Services
Division, Department of Planning and
Infrastructure)

May 2009

Introduction

This report is the result of a risk assessment workshop conducted with a range of NT Government stakeholders and external consultants (see attendance list in appendix) in relation to the proposed expansion of the East Arm Wharf facilities. Specifically, the new facilities and works are an offshore marine supply base, rock load out facility, reclamation of existing ponds for storage of ore, construction of new ponds for dredge materials, construction of a hardstand and ramp for the Defence Department, East Arm boat ramp land reclamation, and the extension of the existing Muramats Road industrial sub-division.

The objective of the risk assessment workshop was to identify and assess a wide range of risks to the proposed project, including risks to the achievement of the government's strategic objectives for the port, the environmental risks associated with the construction of expanded port facilities and the LDC work, and the management of the design and construction of the expanded facilities.

The risks, and potential mitigation treatments, identified during the workshop will be used by DPI Major Projects Unit to assist in the forthcoming project planning, including the preparation of the Notice of Intent to be submitted to the Department of Natural Resources, Environment, The Arts and Sport.

To adequately cover the breadth of potential risks associated with the project, workshop attendees were divided into three groups focussing on the following types of risks:

- **Strategic risks** that have the potential to impact upon the ability of the NT Government to achieve the commercial and community benefits that an expanded port facility would offer the Northern Territory
- **Project management risks** that have the potential to impact upon the effectiveness and efficiency of the planning and construction of the expanded port facilities
- **Environmental risks** that have the potential to impact upon the local environment, including the broader Darwin Harbour ecosystem.

The risk assessment was conducted on Monday 18th May 2009 at the Darwin Port Corporation offices at East Arm.

It is important to note that the following key risks are potential risks that if not controlled may be realised and negatively impact upon the project, environment and local community. The listing of a risk in this report does not suggest that it has been realised at this point in time.

All references to the 'environment' in this report are intended to be inclusive of all aspects of the environment unless otherwise stated. With respect to the term 'aquatic environment', this document defines it as *"the physical, chemical, sedimentological and biological components, processes, conditions and factors which interact and determine the productivity, state, condition and quality of the estuarine and marine ecosystems (including the waters, the airspace above those waters as well as the seabed)"*¹.

Strategic Risks

Current 'High' rated risks:

1. Infrastructure facilities to be included in the project scope are not clearly defined and communicated at commencement
2. Project does not deliver the port facilities within the timeframes required by industry (e.g. Inpex)

¹ Definition for aquatic environment provided by Neil Smit, Department of Natural Resources, Environment The Arts and Sports.

3. Extent and impact of dredging required to extend the port, and maintain its operations, is unknown which has the potential to significantly alter the timing, scope and environmental impact of the project
4. NT Government does not allocate (provide) a project team or highly experienced resources (with port experience) to the project

Current 'Medium' rated risks:

5. Project commences and operates without appropriate project management systems, resources and controls
6. Budget allocated to project is inadequate to complete all scope elements, deliverables (including environmental studies) and timing
7. Project fails to achieve all of the possible strategic opportunities and benefits for the NT
8. The design and construction of the expanded port does not sufficiently take into account whole of life cost optimization which negatively impacts upon the cost and efficiency of its future operations
9. The procurement strategy adopted for the project negatively impacts upon the costs, timeline and deliverables of the project
10. Project fails to establish and maintain engagement with key stakeholders
11. Project is delayed as a result of insufficient time being allocated to meet government compliance requirements and / or Departments taking longer than advertised to respond

Project Risks

Current 'High' rated risks:

12. Additional Project Team focus and resources will need to be directed toward managing stakeholder interest throughout the project
13. A lack of internal and (local) external experience with port related projects may negatively impact upon project costs, timelines, deliverables and outcomes
14. Project timelines, costs or impact on the environment is negatively impacted as a result of a natural disaster and / or climate change
15. Turnover within the Project Team during the project negatively impacts upon the timeliness and quality of its operations

Current 'Medium' rated risks:

16. The facilities of the expanded port do not fully meet all of the requirements of all current and known prospective clients
17. Lack of organisational (NTG) experience with port development projects may increase the management costs and impact overall cost, timelines and deliverables
18. At some point during the project, the ongoing operation of the port will result in additional costs being incurred and / or delays to the projects critical path timeline
19. Project governance is not established and sufficiently resourced to ensure that the project is delivered within time, budget and scope (fit for purpose)
20. Project management methodology for the project is not established in time to ensure the efficient and effective planning and delivery of the project

Environment Risks

Current 'High' rated risks:

21. The current allocation of land for the port expansion is insufficient to support the proposed development without additional engineering work (bundled areas for future dredge spoil) being undertaken (which will take time and a substantial level of funding)
22. If additional engineering measures required to expand the port are not accompanied by the appropriate environmental studies it could result in a significant negative impact on the local environment and also delay the work
23. The site is found to contain a matter of National Environmental Significance (NES) that, if not identified early in the project, results in inadvertent breaches of relevant environmental legislation (as well as incurring additional project costs and delays)
24. Project Team does not contain the appropriate environmental expertise to effectively identify, mitigate and manage environmental risks resulting from project construction
25. Construction and operation of expanded port negatively impacts upon harbour water quality and aquatic environments (includes the biota and substrate)
26. Construction and operation of expanded port negatively impacts upon the hydro-dynamics of the harbour and surrounding estuaries
27. Occurrence of a natural disaster results in port operations having an indirect negative impact upon the environment
28. Inadvertent spillage of hazardous materials during construction or ongoing operations of the port negatively impacts upon the aquatic environment
29. Project construction and expanded port operations increases air omissions, mosquito borne disease, and biting insect pests that could result in negative impact on human health, terrestrial and aquatic environments
30. Design of expanded port does not provide adequate flexibility or control to ensure that new industries and activities do not inadvertently increase risks to the environment

Current 'Medium' rated risks:

31. Buffers and corridors established for the project provide insufficient protection for the local environment (estuaries, harbour)
32. Construction and subsequent operation of the expanded port facilities permanently impacts upon the environmental sustainability of surrounding estuaries
33. DPI does not adequately engage with stakeholders in relation to their environmental management issues and concerns during project planning and construction
34. Adequate corridors are not reserved for future access and services throughout the East Arm Precinct which negatively impacts upon port operations and the local environment

Risk Management Plan – Strategic and Project Management Risks

			<i>Addresses following risks</i>																			
Treatments	Resp. Officer	Due	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Develop Communications Strategy that: <ul style="list-style-type: none"> - Establishes communication channels with key NTG decision makers - Establishes systems and processes for cross-agency information sharing - Promotes awareness in NTG about the key project elements, deliverables and required timelines - Communicates the project objectives, deliverables, timelines and progress to relevant stakeholders - Identifies people within the NTG to champion the importance and value of the project within their respective departments and agencies - Identifies all stakeholders, their interest / position on the project, and how to best engage with each stakeholder - Utilises professional and personal networks to promote the project benefits 	DPI Major Projects Unit	TBD	√	√				√	√			√	√	√				√		√	√	
Undertake baseline studies Baseline studies are undertaken to establish preconstruction levels. Monitoring during and after construction establishes a comparison between pre, during and post construction levels. If baseline studies are not completed there will be no basis for comparison. No one will know when unacceptable levels have been reached and when mitigation measures are required	DPI Major Projects Unit	TBD	√																			

Risk Management Plan – Strategic and Project Management Risks

Treatments	Resp. Officer	Due	Addresses following risks																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Establish a critical path timeline for the project including: <ul style="list-style-type: none"> - Identify the key project milestones - Assess feasibility of completing each project element within currently known expectations - Identify current project elements (if any) that may not be completed by the expected / required date - Fallback strategies in the event that NTG Departments are unable to respond in required timeframes (especially with respect to compliance with environmental legislation) - [Government sign-off on the critical path timeline] - Maintain and adjust the project program timeline throughout the planning, concept, final design and construction phases of the project 	DPI Major Projects Unit	Done for initial critical studies only		√		√							√								√	
Establish a Project Monitoring and Reporting Framework	DPI Major Projects Unit	Monthly		√																		
Establish Project Governance structures (e.g. WoG committees, PCG, Taskforce Group) which may include: <ul style="list-style-type: none"> - Define roles and responsibilities of key internal stakeholders (i.e. Departments and divisions) - A Project Control Management Group with cross agency representation, defined meeting schedule and agenda - Independent audit function to monitor conduct of the project 	Project Control Group	TBD											√				√			√		

Risk Management Plan – Strategic and Project Management Risks

			<i>Addresses following risks</i>																			
<i>Treatments</i>	<i>Resp. Officer</i>	<i>Due</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Establish a Project Team / Taskforce to do the following: - Fully scope the project - A number of the other actions listed in this plan - [Role and membership of the Project Team to evolve as the project progresses]	Project Control Group	TBD				√	√						√				√		√			
Supplement Project Team with training and outside resources as appropriate	DPI Major Projects Unit	TBD				√							√		√							
Identify key people within the NTG that could be seconded to the Project Team for specific roles, or provide mentoring roles for team members	Completed					√											√		√			
Recruit / appoint a Project Manager for the project	Completed					√											√					√
Establish a Project Methodology for the planning and conduct of the project, including: - Initiating the project correctly and with necessary approvals - Staging project and receiving approval at the end of each stage prior to progressing to the next - Prepare and get approval on key project documents (e.g. feasibility study, business case)	Completed ²						√	√													√	√

² Treatment undertaken via the Monthly Report by DPI Major Projects Unit

Risk Management Plan – Strategic and Project Management Risks

Treatments	Resp. Officer	Due	Addresses following risks																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Develop a detailed Project Plan that includes: <ul style="list-style-type: none"> - Standard project information such as objectives, scope, timelines, deliverables, benefits, costs, stakeholders - Allowance for additional time / resources for an independent QA of the project plan (to mitigate against errors) 	DPI Major Projects Unit													√			√		√	√		
Identify and engage with stakeholders in relation to the project including: <ul style="list-style-type: none"> - With Minister/s, DCM, Treasury in the budget development process - As early as possible in the project - Assign responsibility to a person / business unit for managing promotion of project to stakeholders 	Project Control Group ³					√				√							√					
Explore potential for private partnerships with Inpex (cost sharing options for project components specifically targeted at meeting Inpex needs)	DPI Major Projects Unit					√	√															
Undertake high level Strategic Opportunity Assessment	DPI Major Projects Unit	TBD							√													
Develop and implement a Dredge Management Plan (repeated in Environmental Risks table)	DPI Major Projects Unit / DPC	TBD			√																	

³ Treatment undertaken through monitoring via the Monthly Report by DPI Major Projects Unit

Risk Management Plan – Strategic and Project Management Risks

Treatments	Resp. Officer	Due	Addresses following risks																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Develop a Whole of Darwin Harbour Strategic Plan that takes into account the impact and future operations of an expanded port facility	DPC ⁴	TBD			√																	
Develop a Reclamation Strategy that includes geotechnical, environmental approval, and contract issues [identified as a critical study to be completed]	DPI Major Projects Unit	TBD			√	√																
Develop and implement a Natural Disaster Plan and Climate Change Plan for the construction and operation of the expanded port facilities, including: <ul style="list-style-type: none"> - Ensure potential for natural disasters is adequately factored into project design - Ensure input from the review of current cyclone surge studies is included to establish development levels that accommodate sea level rise etc. - Review DPI and external contractor OH&S plans for adequate contingencies to minimize impact of a natural disaster during construction and operation 	DPC ⁵	TBD				√										√					√	
Identify project linkages and inter-dependencies between the project and other projects, government services, and private sector activities	Completed																					√
Identify resources required (\$, people, consultancies) to plan and implement project	DPI Major Projects Unit	1 st stage done																			√	

⁴ DPI Major Projects Unit and DHAC to assist DPC in implementing treatment

⁵ DPI Major Projects Unit to assist DPC in implementing treatment

Risk Management Plan – Strategic and Project Management Risks

			<i>Addresses following risks</i>																			
Treatments	Resp. Officer	Due	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Develop project performance framework with indicators and measures to measure performance of the project, project team, contractors	DPI Major Projects Unit ⁶	TBD																			√	

Risk Management Plan – Environment Risks

			Addresses following risks													
Treatments	Resp. Officer	Due	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Conduct baseline studies on local ecology (environment) prior to the commencement of construction, including a gap analysis of environmental information on the harbour and area surrounding the port, and site specific ecological studies in context to proposed project (as currently known)	DPI Major Projects Unit ⁷	TBD	√	√	√								√	√		
Undertake specific studies in relation to hydro-dynamics, potential contamination / contaminants, geo-technical (and potentially others will be required)	DPI Major Projects Unit ⁸	TBD	√	√									√	√		
Prepare Water Quality Protection Plan for Darwin Harbour	Draft plan completed												√			

⁶ Monthly Report to be used to achieve this treatment

⁷ Part of the critical studies commissioned by DPI Major Projects Unit. Baseline studies prior to, during and post dredging will be completed at the appropriate times.

⁸ Part of the critical studies commissioned by DPI Major Projects Unit

Risk Management Plan – Environment Risks

			<i>Addresses following risks</i>													
Treatments	Resp. Officer	Due	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Make a Beneficial Uses Declaration under the Water Act (ensure proposed works address and complement Beneficial Uses for Darwin Harbour)	Completed												√			
Incorporate potential for storm surge and estimates on future sea level rises in the project design	DPI Major Projects Unit ⁹	TBD	√	√										√		
Develop a Weed Management Plan to support the DEIS	Project Control Group	TBD	√	√										√		
Undertake an Environmental Impact Assessment as part of the development process, including: <ul style="list-style-type: none"> - Adhere to air quality standards during construction and operation - Will need substantial funding commitment from the NTG – circa \$750,000 + supporting studies (extra \$500,000) 	PER / DEIS to be undertaken in due course				√						√			√		
Early lodgment of the NOI to enable the NRETAS response to be built into the project plan and costings	DPI Major Projects Unit	TBD			√									√		
Adequately resource the EIA process (for both DPI and NREATAS)	TBD	TBD			√											
Identify type and quantity of 'environment related' expertise required by the Project Team at the early stages of project planning	Completed					√										
Ensure that the Critical Path Timeline includes 'environment related' tasks, and factors sufficient time for those tasks to be completed	Project Control Group ¹⁰	TBD				√										

⁹ Part of the critical studies commissioned by DPI Major Projects Unit

¹⁰ Treatment undertaken through reporting on critical path timeline in DPI Major Projects Unit Monthly Report

Risk Management Plan – Environment Risks

Treatments	Resp. Officer	Due	Addresses following risks															
			21	22	23	24	25	26	27	28	29	30	31	32	33	34		
Contract consultant with project experience in port development to act as technical advisor to DPI and to undertake the concept design and order of costs	DPI Major Projects Unit	Underway				√												
Establish project governance structures for the project (as a matter of priority)	DPI Major Projects Unit	TBD				√												
Develop a Communications Strategy that includes: <ul style="list-style-type: none"> - Conduct public forums to raise and discuss environmental concerns - Engages public and other stakeholders in the EIA process - Consider potential of a pre-EIS engagement with stakeholders 	DPI Major Projects Unit / DPC	After NOI / next stage of project														√		
Identify stakeholders and their particular interests in relation to the project (including industry, TO's, local govt, etc)	DPI Major Projects Unit / DPC	TBD														√		
Undertake a Sediment Transport study to identify and address sediment transport issues in Darwin Harbour	DPI Major Projects Unit ¹¹	TBD					√	√										
Undertake studies on impact on surrounding environments	DPI Major Projects Unit ¹²	TBD					√	√										
Secure a Waste Discharge licence for the project	DPC	TBD					√	√										
Ensure that project complies with relevant environmental legislation (e.g. Water Act, WMPC Act) as part of the PER / DEIS documentation	DPI Major Projects Unit	In PER / DEIS process					√	√										

¹¹ Part of the critical studies commissioned by DPI Major Projects Unit

¹² Part of the critical studies commissioned by DPI Major Projects Unit

Risk Management Plan – Environment Risks

			<i>Addresses following risks</i>													
Treatments	Resp. Officer	Due	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Prepare Strategic Stormwater Management Plan	DPI Major Projects Unit	During stage 2 studies					√	√								
Address conditions in NREATAS report at each point of the government's assessment / approval process. - NOI - PER / DEIS followed by public exhibition and comments if DEIS - Supplementary report by proponent addressing concerns - Final NREATAS report containing recommendations	DPI Major Projects Unit	TBD					√									
Undertake hydrodynamic modeling during the project concept design stage	DPI Major Projects Unit ¹³	TBD						√								
Review adequacy of current DPC emergency response plans (environmental management system for port precinct)	DPC	TBD							√							
Develop contingency plans to mitigate against the risk of natural disasters and climate change	Project Control Group	TBD								√						
Develop a Biting Insect Management Plan with developer during construction	Project Control Group	During stage 2 studies									√					
Establish dialogue with quarantine with respect to controlling the introduction of foreign species from ships using expanded port facilities	DPC	TBD									√					
Individual businesses to develop an Operations Biting Insect Management Plan	DPC	TBD								√						
Existing mosquito breeding sites at East Arm Port to be eliminated as much as possible with interim treatment using a suitable insecticide	DPC	TBD								√						

¹³ Part of the critical studies commissioned by DPI Major Projects Unit

Risk Management Plan – Environment Risks

			<i>Addresses following risks</i>													
Treatments	Resp. Officer	Due	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Identify all types of hazardous materials that will be used during construction, and subsequently processes and controls to mitigate against the risk of spillage (i.e. reducing the likelihood as well as the impact)	Project Control Group	In DEIS / PER process								√						
In operation, identify all types of hazardous materials transported through the port and establish processes and controls to mitigate against the risk of spillage	DPC	TBD								√						
Develop and implement for a staged Dredge Management Plan (repeated in Strategic and Project Management Risks table) <ul style="list-style-type: none"> - including management of erosion and sediment during project construction and port operations - providing locations for port to accommodate future capital and maintenance dredging – the 	DPI Major Projects Unit	TBD					√	√		√						
Develop and implement Air and Water Quality Monitoring / Management Plan	Project Control Group ¹⁴	TBD									√					
Identify potential new industries / activities that could use port and take into account their operations, and potential environmental impacts when designing port expansion	DPC ¹⁵	TBD										√				
Design controls from an environmental perspective rather than industry perspective	Project Control Group ¹⁶	TBD										√				
Built environment to meet objectives of Water Act and WMPC Act	Project Control Group ¹⁷	TBD										√				

¹⁴ To be one of the supplementary studies for the PER / DEIS documents

¹⁵ The environmental considerations for each of these new industries established at East Arm would be the responsibility of each proponent at the time

¹⁶ To be included in PER / DEIS documents

¹⁷ To be included in PER / DEIS documents

Context

The following section outlines the context that will impact upon how DPI, DPC, LDC and the NT Government undertake the planning, construction and operation of the expanded port.

Our Environment

The following environmental factors are external to, and beyond the direct control, of DPI, DPC, LDC and the NT Government. Their existence was recognised by workshop participants as likely to impact upon the planning and implementation of the port expansion within Northern Territory, and the priority and level of risks.

- The level of demand for the expanded port facilities has not (and cannot) been quantified, however there are a number of identified potential customers (e.g. Inpex) that are likely to utilise the expanded facilities. In the case of Inpex, significant delays to the completion of the expanded port facilities could result in the NT missing the Inpex opportunity
- The required demand to make the expanded facilities economically viable is more likely to be generated from a larger number of small customers than one or two large customers
- It is anticipated that Inpex will require the use of planned expanded port facilities by mid 2012 to meet their business timelines (rock load out area and offshore Marine Supply base)
- The Global Financial Crisis is likely to impact upon the short term business case of prospective clients developments (and hence requirement to use port facilities), however the mid to longer term demand for the port is unlikely to be impacted
- Generating future demand for the expanded port facilities will be inter-related with the confidence in which prospective customers have that the NTG will complete the facilities within the publicised deadline (when set)
- There are a significant number of inter-dependent projects (or sub-projects) that will impact upon the scope, timing, cost and viability of the expanded port facilities. At present, these inter-dependent projects are not clearly defined
- Completion of the project offers significant benefits for the NT community and there will be significant Cabinet, Ministerial, Departmental, Industry and general community interest in all aspects of the project
- Commonwealth financial support for the project, if received, will come from the Build Australia Fund and will have a number of additional administrative requirements that will need to be taken into account
- Current and future LDC projects that have the potential to impact upon the construction of the expanded port facilities, as well as the future demand (i.e. business case) for the port services.

Our People

There are a range of factors that impact upon the ability of DPI, DPC, LDC and the NT Government to develop and maintain capability and capacity in the staff needed to undertake a major project such as the port expansion. These factors include:

- NTG will not have staff with all of the necessary qualifications, experience and technical expertise to undertake the project (due to size, scope and speciality of a port expansion project). There will be a need to identify knowledge gaps, contract in specialists, and manage the outputs of those specialists throughout the project
- For outsourced construction, there may not be the local capability and capacity to do some components of the work, eg dredge will probably be international

- The length of the project is likely to mean that there will be a turnover of key persons within the Project Team, and within the various NTG Departments that will have an ongoing role in the planning, implementation and monitoring of the project
- The project will substantially increase the demand on staff within the regulatory agencies (e.g. NRETAS) that may not necessarily be additionally resourced to do the required work.

Our Organisation

The organisational context relate to issues that impact, or have the potential to impact, upon the planning and construction of the expanded port facilities including governance arrangements, processes, policies, procedures, IT systems and culture.

- At the time of the risk assessment, the exact scope of the project has yet to be established
- At the time of the risk assessment, a budget has not been allocated by Government for the project (or for the next stage of project planning and design)
- A number of initial studies have been commissioned by DPI Major Projects, including:
 - A gap analysis (environmental and engineering)
 - Concept design for future port works
 - Modelling of proposed works
 - Investigation of surge levels – RL of hardstand areas
 - Geotechnical studies
 - Environmental studies to support PER or DEIS
 - NOI to cover all proposed works (excluding channel deepening exercise)
 - This risk assessment.

Appendix 1: Likelihood and Consequence Tables Used for Risk Assessment

Rating	Likelihood of risk occurring	Indicative frequency
Almost certain	It is expected to occur during the project. An extremely regular event.	Multiple times during planning and / or implementation of project.
Likely	Expected to occur at some time. A reasonably regular event.	1 to 5 times during the project.
Possible	Could occur at some time. Not a regular event. Major policy implementation / construction exercises conducted by the NTG in the recent past have realized this risk (or have had to actively control the risk).	If uncontrolled, likely to occur at some point during the project.
Unlikely	May occur in some circumstances, especially if risk is left uncontrolled.	If it occurred, it would only be once during the project.
Rare	Very unlikely to occur and, if so, only would occur once.	If it occurred, would be the first time for a while that it would have occurred in NT.

A rating of ...	Means the occurrence of this risk would impact ...			
	Cost / Time	Scope / Quality	Reputation	Environment
Severe	50%+ over approved estimates for project / Multiple key deadlines missed; 4+ month delay	Key project objective/s not achieved	Major negative publicity occurs (front page) / Embarrassment to Govt / Minister / CEO	Wide ranging impact on environment, cannot be satisfactorily rehabilitated
Major	25 – 50% over approved estimates for project / Key deadline missed, 3 – 4 month delay	Key outputs / outcomes of project not achieved	Some negative publicity occurs / Ministerials required / CM briefed	Environmental impact in a specific area, cannot be satisfactorily rehabilitated
Moderate	15 - 25% over approved estimates for project / Key deadline adjusted, 1 – 2 month delay	Key scope element of project changed / quality reduced	Concerns about project raised with Minister / Ministerial on issues required	Additional resources / effort outside project required to rehabilitate environment
Minor	5 - 15% over approved estimates for project / Project timeline adjusted / 2 – 4 week delay	Minor scope element of project changed / quality reduced	Concerns about project raised internally within DPI	Additional resources / effort required to rehabilitate environment (within budget)
Insignificant	Less than 5% over approved estimates for project / No deadline missed, less than 2 week delay	Small change to scope / quality required. No impact on achieving objectives.	No impact on project team / DPI	Environment able to be fully rehabilitated after the event

Appendix 2: Matrix for Calculating Risk Ratings

LIKELIHOOD	RISK LEVEL					
	Almost Certain	Medium	Medium	High	High	High
	Likely	Medium	Medium	Medium	High	High
	Possible	Low	Medium	Medium	Medium	High
	Unlikely	Low	Low	Medium	Medium	Medium
	Rare	Low	Low	Low	Medium	Medium
		Insignificant	Minor	Moderate	Major	Severe
CONSEQUENCES						

Appendix 3: Attendees

Strategic Risks Group

Phill Piper	Department of Planning and Infrastructure
David West	Land Development Corporation
Brian Cann	Department of Chief Minister
David Williams	AIMS
Ian Charman	Department of Planning and Infrastructure
Barry Berwick	Aurecon
Cameron Wilson	NT Treasury
David Rolland	GHD
David McMaster	Darwin Port Corporation

Project Management Risks Group

Geoff Horni	Department of Planning and Infrastructure
Melissa Reiter	Darwin Port Corporation
Bruce Wilson	Darwin Port Corporation
Maria Duchateau	Department of the Chief Minister
Tony Simons	Department of Planning and Infrastructure
John Pudney	Power and Water Corporation
Sri Srinivas	Department of Planning and Infrastructure

Environmental Risks Group

Ken Gardner	Department of Planning and Infrastructure
Susan Hickey	AECOM
Lakeshman Rajaratnam	Department of Natural Resources, Environment The Arts and Sports
Annie Andrews	Department of Natural Resources, Environment The Arts and Sports
Todd Sinclair	Darwin Port Corporation
Allan Walchot	Department of Health and Families
Huy Nguyen	Department of Health and Families
Graham Clarke	Department of Planning and Infrastructure
Bill Cumberland	Department of Natural Resources, Environment The Arts and Sports
Greg Neate	Land Development Corporation
Trevor Durling	Power and Water Corporation

Note* Neil Smit, Department of Natural Resources, Environment The Arts and Sports provided comments on the draft risk assessment report.

Appendix 4: Deferred Potential Treatments

The following tables record the potential treatments captured during the risk management workshop that may be used in latter stages of the project.

Risk Management Plan – Strategic and Project Management Risks																						
			<i>Addresses following risks</i>																			
Potential Treatments	Resp. Officer	Due	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Develop a strategic alliance with CDU / Industry to train people with required skills (longer term plan)	Deferred																√					
Develop a staff performance system for the Project Team	Deferred																√					√
Develop detailed contract specifications for outsourced / contracted components of the project including: - Allowing for additional review time on components where NTG doesn't have the in-house expertise	Deferred, consultancies only required at this stage of project														√							
Assess the viability of a PPP (public private partnership) as a potential option for procurement of part of or all of the facilities	Deferred										√											
Prioritise and cost scope elements (project deliverables) in the event that a scope reduction is needed	Deferred							√														
Develop high level Procurement Strategy including: - An assessment of the benefits and drawbacks of different procurement models - Recognise where economies of scale may be achieved, impact of geographic location on procurement, and capability / capacity of local service providers to participate in project design and construction - Provides flexibility to access interstate / international expertise when required (and not available locally) - Present procurement strategy to Government for approval	Deferred									√	√				√							

Risk Management Plan – Strategic and Project Management Risks

			<i>Addresses following risks</i>																			
Potential Treatments	Resp. Officer	Due	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Conduct a whole of life assessment of the project elements (facilities) for the expanded port	Deferred									√												
Identify and establish IT requirements for project	Deferred																				√	
Identify legal and compliance requirement for conduct of the project	Deferred																				√	

Risk Management Plan – Environment Risks

			<i>Addresses following risks</i>													
Potential Treatments	Resp. Officer	Due	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Identify and engage with recreational user representative groups in designing buffers and corridors (and more broadly as a key stakeholder for the project)	Deferred												√			
Provide the Project Team with sufficient resources to access required 'environment related' expertise (through secondment, access to NRETAS specialists, and/or consultants)	Deferred					√										
Development should be designed in Accordance with WSUD	Deferred						√	√								
Factor in stormwater infrastructure into project plan to prevent emissions from site into harbour	Deferred						√	√								