

DARWIN CITY WATERFRONT REDEVELOPMENT

Preliminary Draft Environmental Management Plan for Construction Works - Darwin City Waterfront Redevelopment

Prepared for

Department of Infrastructure, Planning and Environment

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URS

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1.1 Introduction

Redevelopment of the Darwin Harbour precinct, known as the Darwin City Waterfront Redevelopment (DCWR), represents a major change in land use at the site and presents the opportunity to expand the Darwin central business district (CBD). Construction of the DCWR comprises a number of sequential phases of development over the life of the precinct area. These development phases will be guided by the contents of the Master Plan and market demand for property, goods and services associated with the site. One of the development phases is the construction of infrastructure and facilities in the DCWR site. The construction phase includes both initial construction during the preliminary development of the site and also construction that is anticipated to occur throughout the lifetime of the DCWR site.

This document presents the Construction Environmental Management Plan (CEMP) for the construction phase of the DCWR to minimise disturbance to the site itself and surrounding environment.

The CEMP is intended to provide a framework for environmental management of the construction phase of the DCWR project for the purpose of preliminary approvals by the NT government regulators. The CEMP is also a basis for the site developer to prepare development specific environmental management procedures.

A series of environmental management plans (EMP) are to be developed to guide the Northern Territory Government (NTG), the preferred developer and contractors that may conduct works at the site. Separate demolition and site remediation plans will be developed to control land contamination impacts and operational EMPs will be developed for the on operation of the site.

The CEMP applies to a range of activities planned for the site, including development in both the terrestrial and marine environment. Construction at the site will possibly include, but not be limited to the following buildings:

- a convention and exhibition centre;
- hotel(s);
- buildings to accommodate commercial and retail activities such as cafes, restaurants, kiosks, etc;
- residential developments;
- serviced apartments;
- a marina for leisure craft including moorings and public transport connection facilities;
- open space areas for passive and active use;
- tourist attractions and a cultural/heritage centre;
- car parking facilities which may include open hardstand areas, underground and/or multi-level carpark development;

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- roads for vehicle access to the site, including connections between Darwin city and the provision of roads within the site area;
 - services including gas, electricity, water, telecommunications, stormwater, lighting, paving and footpaths, signage;
 - land reclamation along portions of the Kitchener Bay foreshore area;
 - a revetment structure along the coastal foreshore, comprising a sea wall; and
 - dredging of marine mud and sediments from Kitchener Bay during marina development.

The works described above are those anticipated by the DCWR concept plan (August 2003). Further detail of the exact types, nature and extent of construction planned for the site can only be gained after release of the final Masterplan for the site.

Before construction activities commence, demolition and remediation phases of development are required to prepare the site for development. The types of activities undertaken during the demolition and remediation phase include removing above and below ground infrastructure, the removal of remaining contaminated soils and groundwater, and materials and validation of the site prior to site preparation for the construction phase of the project.

Activities expected during the demolition and remediation phase of the project are broadly summarised to include the following:

- demolition and disposal of selected buildings (some may contain asbestos), disused subsurface infrastructure and asphalt pavements;
- demolition and disposal of concrete structures including building slabs, foundations, sumps and pavements;
- removal and disposal of asbestos cement sheeting if encountered;
- excavation and disposal (and possibly recycling) of buried inert waste including scrap metal and concrete rubble;
- excavation, stockpile and disposal of contaminated soils;
- importing and stockpiling clean fill material;
- covering of contaminated soils with clean fill;
- backfilling of excavations; and
- general grading of the site.

Full details of demolition and remediation activities will be made available in the Pre-Remediation Siteworks EMP, Remediation Action Plan (RAP). Details for managing residual contamination will be included in the Site Management Plan (SMP)

1.2 Background

The DCWR site is located to the immediate south of the Darwin City centre. Current and previous land uses across the project area have provided a spectrum of waterfront industrial, retail and tourism-related activities since European settlement in the late 1800's.

The NT's reliance on natural resources, agriculture and tourism for much of its economic activity has resulted in a range of land uses at the site, in particular, fuel supply, ore storage, bitumen manufacture, oil fired power generation and general port operations. However, a combination of effects has contributed to the reduction in the site's industrial activity and the formal decision to redevelop the site.

In recognition of increasing economic activity in the industrial and agricultural sectors and the need for specialised port facilities capable of accepting higher volumes of throughput, the NTG has constructed alternative port facilities in Darwin to satisfy the demand for port transfer and handling facilities. The most notable development is the East Arm Wharf with bulk fuel storage terminals. The net effect has been a gradual withdrawal of industrial activities from Darwin waterfront, as alternative port facilities have become available. In addition to the construction of more efficient port facilities, the effect of changing market conditions for commodities and services has also placed pressure on industrial sector companies to downsize, cease operations or relocate, depending on the commodity.

Another factor influencing the change in use of the site is the opportunity to develop a precinct with a convention and exhibition centre (DCEC), retail, residential and tourism facilities and the provision of public open space and community facilities – an extension of the Darwin central business district (CBD). The DCEC is to be used as the catalyst for the redevelopment of the area and will act as a centrepiece for the remaining mix of suitable uses identified within the Master Plan. It is intended that the DCEC be used as a marketing feature for the NTG to attract conferences and exhibitions to Darwin (and the NT) to boost economic activity and raise Darwin's international profile. The availability of the site for construction of the DCEC is a logical expansion of the CBD, providing a link between the city and the harbour, similar to the positioning of conference centres in other capital cities in Australia and internationally.

The DCWR represents opportunities to cater for increases in tourist activity, the construction of an internationally recognised convention centre, remediation of existing site contamination, the provision of landmark community, cultural and focal places for local and tourist gatherings and stimulation of business activities in Darwin. A vision of integrated planning concepts and compatible residential, tourist, retail and recreational objectives will ensure the waterfront evolves to be a central long-term asset to the Northern Territory.

However, before the site can be used a number of steps need to be taken to ensure that potential environmental impacts and risks to human safety are minimised. The DCWR site has been utilised for a

broad range of industrial purposes, resulting in known and potential contamination of soils, marine sediments and groundwater at the site.

An integrated schedule of environmental, heritage, socioeconomic, geotechnical and site contamination studies have been conducted to characterise the DCWR site, to enable assessment and assist the NTG in the approvals process. Of particular significance to the approvals process are the environmental site assessments that have identified areas of known and potential contaminated soil and groundwater at the site where demolition and construction activities are planned to be undertaken.

1.3 Framework for Environmental Management

The environmental framework for the DCWR is established by Northern Territory (NT) State legislation, guidelines and policies. The principal legislation related to the CEMP is the *Northern Territory Environmental Assessment Act 1982*. The principal guidelines relevant to the development of the DCWR environmental impact assessment (EIS) are those issued by the Department of Infrastructure, Planning and Environment (DIPE) in November 2003. The guidelines also apply to the CEMP. Decision-making within the NT Environmental Impact Assessment (EIA) process is conducted by the NT Office of the Environment and Heritage (OEH). A suite of Australian Standards, Codes of Practice and the National Environment Protection Measures (NEPM) also apply to environmental issues related to the project. Commonwealth legislation also applies to some aspects of the project.

The guidelines issued by DIPE provide the most detailed requirements for the content of the CEMP. The guidelines provide a suggested set of requirements for the CEMP including the establishment of an environmental management framework, specific management policies, practices and procedures at a strategic level. The guidelines are cognisant of the absence of detailed information on the exact composition of the type and extent of development expected at the DCWR site.

Section 5 of this CEMP explains the environmental management framework of the this CEMP in more detail, including its relationship with the EIS, the Pre-Remediation Site Works EMP and RAP, SMP and any type of operational EMP that may be developed in the future.

2.1 Objectives

The strategic objectives of the CEMP include the following:

- present mitigation strategies and actions for the prevention of pollution during construction activities in the redevelopment precinct;
- to establish a framework for environmental management for all construction activities conducted in the redevelopment precinct over the lifetime of the project; and
- identify the key environmental, heritage and socioeconomic issues that are relevant to construction activities in the precinct.

The specific construction-related objectives of the CEMP include the following:

- minimisation of mobilisation of contaminated soils and sediment during all forms of terrestrial and construction activities;
- minimisation of noise and vibration during construction activities;
- minimisation of odours, greenhouse gases, ozone-depleting gases and dust during construction activities;
- waste minimisation and management during construction activities;
- effective traffic management during construction activities;
- containing existing asbestos contamination in soil at the site and removing asbestos building materials;
- preserving Indigenous and European heritage items and places at the site; and
- protecting ecological habitats within and surrounding the DCWR site.

2.2 Ecologically Sustainable Development

The principles of ecologically sustainable development (ESD) have been considered and incorporated where possible into the planning and EIA process of the DCWR. Construction activities are to be conducted in accordance with principles of ESD, including the following:

- The precautionary principle: If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- Inter- and intra-generational equity: The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;

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- Conservation of biological diversity and ecological integrity; and
 - Improved valuation and pricing of environmental resources.

The DCWR is consistent with the principles of ESD and the principles specific to the Australian National Strategy of Ecologically Sustainable Development (NSED). The DCWR project satisfies the principles as stated below:

- The precautionary principle – the EIA process has revealed that a significant proportion of terrestrial soils and marine sediments are contaminated with hydrocarbons and heavy metals and that acid sulphate soils exist across much of the site area. The accredited auditor sign-off process is ensuring that any shortfalls in site specific (scientific) information are not being used as a reason for postponing measures to prevent environmental degradation on the site. All measures necessary to prevent environmental degradation and pollution during the remediation, demolition and construction phases of the project will be implemented on a best practice basis. The DCWR project represents a step towards reducing the potential for adverse processes on the site that, if left untreated, could result in irreversible degradation of environmental, heritage and socio-economic qualities;
- Inter- and intra-generational equity – at present, the site's levels of contamination (and subsequent health risks), remnant industrial infrastructure and disused state are disincentives to use the site area and are denying the current generation opportunities for community gatherings, appreciation of cultural heritage, restaurant and café culture and the extension of the Darwin CBD resulting in increased economic activity. Leaving the site undeveloped would also deny future generations the same opportunities to enjoy the DCWR site as a place for education, gathering and social interaction, thereby preventing inter-generational equity;
- Conservation of ecological biodiversity – the DCWR will involve extensive remediation works of contaminated soils and marine sediments and demolition of existing facilities and infrastructure that are in a dilapidated state and surplus to Master Planning requirements. The remediation works will reduce contamination and improve the environmental quality of terrestrial and marine habitats. Construction activity will involve erection of buildings, installation of infrastructure, dredging works within Kitchener Bay and construction of a sea wall along the coastal foreshore. Where possible, existing terrestrial habitats will be conserved. Marine habitats are at risk of disturbance during dredging works (if conducted), however, removal of contaminated sediments Kitchener Bay will have a net positive effect on the health of the site's marine ecology, reducing the potential for exposure to humans and fauna; and
- Improved valuation and pricing of environmental resources – the mechanism for valuation and pricing of environmental resources within the site area will be improved as a feature of remediation and construction works. The value of the site's environmental resources is implicit in the cost of the remediation works to be undertaken to remove contamination and enable future site use.

3.1 Relevant Legislation

The range of environmental, heritage and socio-economic issues related to the DCWR project involves a wide range of applicable legislation. Legislation at Commonwealth and State level applies to the DCWR for remediation, demolition, construction and operational phases of the redevelopment.

3.1.1 Commonwealth Legislation

The following Commonwealth Government legislation have been considered:

- *Environment Protection and Biodiversity Conservation Act 1999*;
- *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), developments require assessment if they have the potential to affect any matters of National Environmental Significance (NES), namely:

- World Heritage properties;
- National Heritage places;
- Ramsar wetlands of international importance;
- listed threatened species and ecological communities;
- listed migratory species;
- Commonwealth marine areas; and
- Nuclear actions.

The EPBC Act's assessment and approval provisions also apply to actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land) and actions taken by the Commonwealth that will have a significant impact on the environment anywhere in the world. Commonwealth agencies, or employees, are required to obtain and consider advice from the Commonwealth Minister for the Environment and Heritage (Environment Minister) before authorising certain actions that will have or are likely to have a significant impact on the environment.

The DCWR project did not trigger any matters of NES, nor was any action to be taken on Commonwealth land. On 20 October 2003, DIPE submitted a referral under the EPBC Act to the Commonwealth Department of Environment and Heritage (DEH) (formerly Environment Australia) for DCWR redevelopment. A decision was made on 13 November 2003 that the proposed development is not a controlled action. Approval is therefore not needed under Part 9 of the EPBC Act before the action can proceed.

3.1.2 Northern Territory Legislation

The Northern Territory Government has jurisdiction over environmental and other legislation relating to the siting, construction and operation of the Macarthur River Mine Expansion. The *Environmental Assessment Act 1982* and its implications for the development are discussed in Section 1.3.1. The following is a list of the primary Northern Territory legislative requirements that may have a bearing on the proposed redevelopment.

- *Environmental Assessment Act 1982*
- *Water Act 1992*
- *Soil Conservation and Land Utilisation Act 1980*
- *Poisons and Dangerous Drugs Act 1980*
- *Dangerous Goods Act 1981*
- *Northern Territory Aboriginal Sacred Sites Act 1989*
- *Heritage Conservation Act 1991*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Aboriginal Land Rights (Northern Territory) Act 1976*
- *Waste Management and Pollution Control Act 1999*
- *Weeds Management Act 2001*
- *Environmental Offences and Penalties Act 1996*
- *Ozone Protection Act 1990*

Further detail of the key Northern Territory environmental protection legislation can be found at the NT DIPE website (<http://www.lpe.nt.gov.au/enviro/LEGISLAT/Legislat.htm>).

3.2 Relevant Guidelines

In November 2003, the “*Guidelines for Preparation of an Environmental Impact Statement on the proposed Darwin City Waterfront Redevelopment at the Darwin Wharf*” were issued by DIPE as a generic guide to assist in determining the extent and type of content of the EIS. Known as the EIS Guidelines, they are specific to the structure and content of the EIS document and are not intended to be strictly adhered to.

There are a number of other policy documents, at a Territory level, that could become relevant considerations for this project but the most important ones are those relating to the protection of the environment.

The general environment duties under the *Waste Management and Pollution Control Act 1998* (WM&PC Act) require that a person must not undertake an activity that pollutes or might pollute the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm. Section 4 of the Act defines 'Environmental Harm', 'Material Environmental Harm' and 'Serious Environmental Harm'. This, while not an approval *per se*, is a very powerful statutory tool that needs to be considered in the project.

The WM&PC Act provides for implementation of Commonwealth National Environmental Protection Measures (NEPMs) under the *National Environment Protection Council (Northern Territory) Act 1994*, including the National Environment Protection (Assessment of Site Contamination) Measure 1999.

The Northern Territory Government has recently tabled a proposal to prepare a draft Environment Protection Objective (EPO) for the management of site contamination. The proposed EPO would be developed in accordance with Part 4 of the WM&PC Act and would set the rules for prevention, identification, assessment and clean-up or management of site contamination. The EPO is intended to provide greater certainty to landowners and developers, consistency of approach by regulators and transparency of process to the general community.

The waters of Darwin Harbour were declared to have beneficial uses for the protection of aquatic ecosystems, recreational water quality and aesthetics under the Northern Territory *Water Act* in 1996, in accordance with the objectives and criteria defined in the Australia and New Zealand Environment Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Guidelines for Fresh and Marine Water Quality.

The Darwin Harbour Regional Plan of Management (DHRPM) was presented to the Minister in November 2003. The vision of the DHRPM is to provide a strategic framework for managing, protecting and enhancing the environmental values of the harbour and its catchment. A series of conflicting uses and pressures on natural resources are considered within the goals of the DHRPM, namely, to maintain a healthy environment, to support recreational use and enjoyment of the environment, to encourage ecologically sustainable development, to protect cultural values and heritage and community ownership and participation in management. The DHRPM provides a strategic platform from which to implement an integrated catchment management approach for the use of natural resources and to guide decision-making for all activities undertaken within the catchment areas.

4.1 Management Structure of Redevelopment Activities

The management structure of the site preparation phase of the project includes DIPE, the Developer, Site Superintendent, Environmental Consultant, the VICEPA CLA and the relevant Contractors.

The management structure and roles for the DCWR project is summarised in the table below:

DCWR Project Phase	Principal	Superintendent	Environmental Consultant	VICEPA CLA	Contractors
Pre-Remediation Works	DIPE	Appointed by DIPE	URS	Peter (GHD)	???
Remediation	DIPE	Appointed by DIPE	Appointed by DIPE	Appointed by DIPE	Appointed by DIPE
Construction	DIPE and/or Developer	Appointed by Principal	Appointed by Principal	Appointed by Principal	Appointed by Principal
Operation	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Documents that are relevant to environmental management for the project include:

- The Pre-Remediation EMP describes the environmental management of the Pre-Remediation phase activities at the site.
- The RAP describes the soil and groundwater remediation actions including occupational health and safety and environmental management for the Remediation phase activities at the site.
- The SMP describes the residual soil and groundwater contamination remaining remediation and the associated design, occupational health and safety and environmental management required during the construction and operation phase activities at the site.

4.1.1 Temporary Facilities Required During Construction Phase

Construction activities will require temporary facilities to be erected and installed on the site. Installation of these temporary facilities will enable various site functions to be achieved, including storage of construction materials, office administration and amenities and provision of site security. Temporary facilities required during construction works might include items such as a batch plant, bulk materials lay-down yard, vehicle wash bays, decontamination facilities for vehicles, fencing and security access control points, contamination control points, portable toilets, waste water utilities, bulk material stockpile areas, demountable offices and lighting.

4.1.2 Workforce Required During Construction Phase

The workforce in construction activities will be appropriately skilled, have appropriate experience and be trained in occupational health and safety. The size of the workforce will fluctuate depending on construction activity. All personnel employed on site during redevelopment works will be required to undergo environmental awareness training to educate them on their responsibilities, communications procedures and requirements, incident response procedures and integration of environmental management and occupational health and safety.

5.1 Construction EMP

The CEMP is required as a part of two processes for the DCWR project, namely:

- The NT Government preliminary approval process: The CEMP describes the environmental management framework requirements for construction phase activities at the site.
- A basis for the Developer and construction contractors to prepare specific environmental management procedures.

5.2 Contractors EMP

The construction contractors will prepare their own EMP based on the framework of the CEMP. The construction contractor's EMP will be reviewed and approved by the Superintendent and will form part of the Contractors Contract. The Contractors EMPs will be specific to their contracted services but will consider the impact of their services on other site activities that are or will be occurring at the site during their contracted services.

5.3 Contractors HASP and ERP

All contractors will be required to produce a Health and Safety Plan (HASP) and Emergency Response Plan (ERP) to protect their employees during the works they shall undertake. The CEMP shall be considered when preparing each contractor's HASP and ERP. Environmental controls and exposure levels associated with worker protection shall be included in the contractor's EMP. Work practices required by the EMP are not intended to compromise health and safety in any way. Each HASP and ERP will be approved by the Site Superintendent prior to the contractor commencing works. to ensure adequate health and safety controls and procedures have been developed, that are appropriate to the works to be undertaken. A copy of each HASP and ERP will be compiled on a central register held by the Site Superintendent.

5.4 Continuous Improvement

The CEMP is based on an environmental management system of continuous improvement that includes the following steps:

- planning;
- implementation and operation;
- checking and corrective action; and
- management review.

The planning stage of this system is based on describing:

- the activities to be undertaken and their associated potential impacts;
- the site conditions;
- the methodology for the activity, preventative measures, inspections, monitoring and auditing;
- the performance indicators and targets; and
- the actions to be undertaken if the targets are not met.

The implementation and operation stage of the system is based on:

- conducting the activity and preventative measures.

The checking and corrective action stage of the system is based on:

- conducting the inspections, monitoring and audits, and assessing corrective action when targets have not been met and reporting; and
- conducting and reporting corrective actions.

The management review is based on:

- review of checking and corrective actions; and
- implementing changes at the next planning stage.

6.1 Overview

Each of the environmental, heritage and socioeconomic issues discussed in this section are presented as key management plans (KMP). The KMPs were derived from the requirements outlined in the EIS guidelines and do not exclude additional issues as they may arise during the construction phase of the DCWR project. All KMPs include proposed measures to minimise adverse impacts, monitor effectiveness of safeguards and report the progress and effectiveness of each of the key management plans as part of an overall continuous improvement process over the life of the CEMP. Due to the somewhat conceptual nature of the EIS, the KMPs presented here are strategic in content, yet provide sufficient detail to enable monitoring and reporting procedures to be developed for each KMP.

It must also be noted that several criteria apply across a range of environmental issues. Contamination and meteorology are broad categories that each affects a number of the KMPs in various ways. Contamination may be present in soil on the terrestrial component of the project area as well as marine sediments and within groundwater. Meteorology has the potential to affect marine water quality, stormwater, erosion and sediment control, groundwater, erosion and so forth. Mention of each of these criteria will be made within each relevant KMP where relevant.

The management strategies for each of the KMPs are related to activities conducted during the overall construction and evolution of the DCWR and as such, each of the management strategies and subsequent monitoring and reporting are derived from the same criteria, even though some overlap between activities may occur throughout the KMPs.

6.1.1 Management Commitment

The management commitment of DIPE during the construction phase of the DCWR project is described for each of the KPMs.

6.1.2 Management Strategies

Management strategies that will if possible prevent, or minimise adverse environmental impacts have been prepared for each KMP for activities under the CEMP. The management strategies include, prohibition, moving or minimising certain activities to prevent or minimise impact as well as implementing control measures that are designed to prevent or minimise adverse environmental impacts from certain activities.

6.1.3 Monitoring Programs

Monitoring program requirements are summarised for each KPM to monitor adverse environmental impacts. The Contractor will also be required to confirm conformance with the performance indicator targets that will be required in their EMPs. Upon exceeding these performance indicator targets reactive

monitoring programs are to be activated as part of the response mechanism to minimise and manage any adverse environmental impacts.

6.1.4 Reporting

The reporting requirements for the monitoring programs for each KPM has been summarised.

6.2 Physical Environment

The following KMPs represent the spectrum of elements that comprise the natural physical environment of the project area. Where possible, reference has been made to the biological environment, the built environment and socioeconomic elements of the project area.

6.2.1 Air Quality

Atmospheric emissions from anticipated activities at the site include dust generation, odours, particulates, greenhouse gases (GHG) and ozone-depleting gases (ODS). Sources of these atmospheric emissions could include clean and contaminated soil, other sediments, vehicle emissions, materials (e.g. asphalt) and fugitive sources from remnant building and infrastructure materials.

Management Commitment
DIPE is committed to minimising and managing environmental impacts from atmospheric emissions during the construction phase of the DCWR project. This extends to persons at the site and residents near the site.
Management Strategies
Water will be applied by water cart/truck whenever unsealed surfaces have the potential to release excessive levels of dust. The exposed area vulnerable to dust generation should be no larger than the capacity of water cart/trucks.
Ensure construction machinery and vehicles are well maintained and in good working order.
Stockpiles of soil and vegetative materials prone to the release of dust will be covered or sprayed with water whenever conditions exist for the generation of excessive levels of dust.
During dredging operations, stockpiles of sediments destined for disposal (especially acid sulphate soils that may release odours) would be covered where possible to prevent dust and odour emissions.
Particulates derived from hazardous materials and fugitive traces in soils will be covered or contained where possible and sprayed if the potential exists for excessive releases of dust.
Vehicles must not be loaded above the height of the side and tailboards.

Vehicle emissions will be kept to a minimum by avoidance of unnecessary engine running time.

Access roads will be sealed and vehicle speeds on unsealed roads will be restricted to minimise dust generation.

The use of ozone-depleting substances will be avoided.

Complaints related to atmospheric emissions from stakeholders will be responded to within 48 hours.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of the dust control measures against the target

Dust monitoring will be conducted at the site boundary during drilling, excavation, dredging, stockpiling and building activities.

Dust collected from areas with surface contamination will be analysed for the contaminants of concern including hydrocarbons, zinc, lead and copper (and other heavy metals), tri-butyl tin and dioxins.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of atmospheric emission monitoring, dust monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.2.2 Noise and Vibration

There is potential for noise and vibration impacts to persons at the DCWR site and neighbouring residents are from most activities including site clearance, dredging, land reclamation and sea wall construction, excavation and earthworks, installation of underground services and roadways, construction of buildings and landscaping during the construction phase of the DCWR project. Potential noise and vibration sources include the operation of plant and machinery at the site and the use of heavy vehicles on and off site.

Management Commitment

DIPE is committed to minimising and managing environmental impacts from noise and vibration during

the construction phase of the DCWR project. This extends to persons at the site and residents near the site.
Management Strategies
<p>Work must be undertaken in the agreed working hours.</p> <p>Removal of noise sources from noise sensitive location.</p> <p>Construction activities within close proximity to sensitive receptors must only occur in limited and agreed hours.</p> <p>Ensure all construction plant, machinery and vehicles are well maintained and in good working order.</p> <p>Reducing noise where possible and appropriate by using low noise equipment, acoustic barriers and other noise abatement devices.</p> <p>Reducing the impact at receiver at sensitive locations where possible and appropriate by implementing noise insulation treatments such as suitable façade constructions, acoustic ventilation paths and minimisation of structure borne sound transmission paths.</p> <p>Vibrations must be minimised at any neighbouring premises. Residents of neighbouring premises must be warned of possible vibrations prior to the commencing the activity.</p> <p>Complaints will be responded to within 24 hours and mitigation measures checked and improved within 48 hours.</p>
Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before the relevant construction activity.</p> <p>The results of the monitoring program will be used to measure the effectiveness of the noise and vibration measures against the target</p> <p>Noise monitoring will include noise from plant, machinery and heavy vehicles, truck movements to/from site and within site boundaries and vibration sources.</p> <p>All noise complaints shall be recorded and forwarded so that remedial action can be undertaken.</p> <p>For construction periods of 4 weeks and under:</p> <p>L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 75 dB(A).</p> <p>For construction periods between 4 and 26 weeks and under:</p> <p>L10 level measured over a period of not less than 15 minutes when the construction site is in operation</p>

must not exceed 65 dB(A).

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of noise and vibration monitoring and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.2.3 Marine Waters

There are potential marine water quality impacts to the marine water quality adjoining the site and at any dredge disposal sites during the construction phase of the DCWR project. Sources of the impacts include dredging and land reclamation, oil spills and vessel discharges, acid sulphate soils and remnant contamination within sediments and stormwater discharges. These marine water quality impacts are also likely to have impacts on marine ecology.

Management Commitment

DIPE is committed to minimising and managing environmental impacts to marine water quality during the construction phase of the DCWR project. This extends to marine waters at the site and any dredge disposal sites.

Management Strategies

Where possible, activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments and generation of acidic leachate.

Land clearance will be minimised.

Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.

Constructed slopes with the potential for erosion will be minimised and surface cover will be retained where possible or added to disturbed land.

Works will be planned and conducted to maximise the opportunity to retain sediment on site.

Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and

nutrients during construction activities where possible and appropriate.

Gross pollutants, sediments, oils and other contaminants from industrial, hardstand, roadway and trafficked areas will be captured by specialised measures including oil, grit, and gross pollutant traps where possible and appropriate.

Roadways will be swept to remove dust, organic matter and pollutants.

The application of pesticides and nutrients to parks and gardens must be controlled during the construction phase of the DCWR project.

Dewatering and disposal to the marine environment will be minimised. Dewatering will be controlled by the ASS Management Plan (ASSMP) for the construction phase of the DCWR project.

Stockpiling of ASS will be minimised and will be banded, covered and treated with lime to prevent generating acidic leachate and/or dust. Stockpiling of ASS will be controlled by the ASSMP for the construction phase of the DCWR project.

Subsurface structures such as foundations, piles, basements and underground services at the site must be designed to be resistant to acid sulphate soils.

Areas of the site and adjoining marine environment with identified ASS will be revegetated with vegetation that will not be impacted by the presence of the ASS.

Dredging will be controlled by a Dredging Management Plan (DMP) for the construction phase of the DCWR project.

Sediments from dredging will be disposed of away from Kitchener Bay to minimise turbidity and deposition in Kitchener Bay.

A backhoe dredging method will be used where appropriate to minimise dispersion of sediments during dredging.

An impermeable barrier, extending from the waterline to the sea floor, will be used where appropriate to surround the dredging activity to minimise the area of turbidity around the dredging.

Where spoil is used for reclamation, a temporary impermeable barrier will be used to prevent the dispersion of sediment and minimise the area of turbidity around the reclamation.

During dredging, reclamation and seawall construction, any (oil) spills will be managed by adherence to the Darwin Port Corporation's Oil Spill Contingency Plan (OSCP). Actions within the OSCP include application of dispersants, the use of booms and skimmers, physical breakup of slicks, shoreline protection and monitoring of dispersion.

Commercial vessels involved in the site preparation and construction phases will be subject to International, National and State policies and guidelines to restrict environmental impacts as a result of

spillages, anticorrosion products, wastewater products, solid wastes and the translocation of marine pests.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of stormwater, groundwater and marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.2.4 Erosion and Sediment Control

There are potential impacts due to erosion, sediment deposition within the site and to the marine waters and ecology and adjoining the site during the construction phase of the DCWR project. Sources of these impacts include oil spills, vehicle traffic and roads, disturbed soil, stockpiles, gross pollutants, surface pollutants and acid sulphate soils.

Management Commitment

DIPE is committed to minimising and managing environmental impacts at the site from erosion during the construction phase of the DCWR project. This also extends to impacts to marine waters adjoining the

site.

Management Strategies

Stockpiles must not be located in stormwater flows.

The size and area of stockpiles of soil will be minimised.

Land clearance will be minimised.

Where possible, activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments.

Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.

Constructed slopes with the potential for erosion will be minimised and surface cover will be retained where possible or added to disturbed land.

Erosion potential of stockpiles will be minimised by reducing batter slopes and including cut-off drains where appropriate.

Works will be planned and conducted to maximise the opportunity to retain sediment on site.

Stockpiles that may be susceptible to erosion must be covered or include suitable erosion control measures such as silt fences and hay bales.

Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and nutrients during construction activities where possible and appropriate.

Gross pollutants, sediments, oils and other contaminants from industrial, hardstand, roadway and trafficked areas will be captured by specialised measures including oil, grit, and gross pollutant traps where possible and appropriate.

Roadways will be swept to remove dust, organic matter and pollutants.

Access roads will be sealed and vehicle speed on unsealed roads will be restricted to minimise erosion.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of stormwater monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.2.5 Groundwater

There are potential groundwater quality impacts during the construction phase of the DCWR project. Sources of the impacts include oil spills, acid sulphate soils and remnant contamination within sediments and stormwater discharges. There is potential for groundwater quality impacts to also impact marine water quality and marine ecology.

Seawalls, a marina, and lock systems could have impacts on the groundwater regime at the site including:

- Causing the groundwater level to rise at the site particularly during recharge from the escarpment during the Wet Season. This could result in significant amounts of groundwater discharging through the ground surface at the site.
- Reducing the head difference across the site and thus impact the rate of groundwater discharge.
- A significant reduction in water level variation resulting stopping the existing tidal flushing effect on groundwater contamination that is occurring.

It is recommended that where development plans may significantly change the groundwater flow regime at the site are planned, such as described above, advice from specialists with hydrogeology and aquatic toxicology should be sought by the developer. Compliance with the NT Waste Management Control Act and Water Act may be required, with the ultimate aim of ensuring changes to the flow regime do not negatively influence the discharge of contaminants into the marine environment.

Management Commitment

DIPE is committed to minimising and managing environmental impacts to groundwater quality during the construction phase of the DCWR project. This extends to potential impacts to marine waters and marine ecology adjacent to the site.

Management Strategies

If there is a marina proposed for the site, then the Developer must provide an engineered program that satisfies the provisions of the Waste management Control Act and the Water Act that ensures that there is no hydrocarbon sheen in waters exiting marine structures. An assessment of the need for a barrier to prevent hydrocarbons in the groundwater migrating into the marina (e.g. underflow liner) will be required. If it is confirmed that there is no sheen in discharge, then no requirement for a barrier along shoreline, but this would need to be coupled with ongoing inspection and a contingency plan.

Dewatering and disposal to the marine environment will be minimised. Dewatering will be controlled by the ASS Management Plan (ASSMP) for the construction phase of the DCWR project.

Stockpiling of ASS will be minimised and will be banded, covered and treated with lime to prevent generating acidic leachate and/or dust. Stockpiling of ASS will be controlled by the ASSMP for the construction phase of the DCWR project.

Subsurface structures such as foundations, piles, basements and underground services at the site must be designed to be resistant to acid sulphate soils.

Areas of the site and adjoining marine environment with identified ASS will be revegetated with vegetation that will not be impacted by the presence of the ASS.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of groundwater and marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.2.6 Acid Sulphate Soils

Acid sulphate soils (ASS) have been identified in the natural marine sediments beneath the site. There are anticipated to be impacts associated with encountering ASS during the construction activities. ASS are most likely to be encountered during dredging, sea wall construction, dewatering and excavation activities.

Management Commitment
DIPE is committed to minimising and managing impacts from ASS during the construction phase of the DCWR project.
Management Strategies
Where possible, activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments and generation of acidic leachate.
Dewatering and disposal to the marine environment will be minimised. Dewatering will be controlled by the ASS Management Plan (ASSMP) for the construction phase of the DCWR project.
Dredging will be controlled by a Dredging Management Plan (DMP) for the construction phase of the DCWR project.
Stockpiling of ASS will be minimised and will be banded, covered and treated with lime to prevent generating acidic leachate and/or dust. Stockpiling of ASS will be controlled by the ASSMP for the construction phase of the DCWR project.
Acidic leachate must be neutralised with lime prior to disposal.
During site clearance, land reclamation and sea wall construction activities, dust suppression will be achieved by spraying water on soils and unconsolidated materials that may cause dust emissions. Water will be applied by water cart/truck whenever unsealed surfaces have the potential to release excessive levels of dust. The exposed area vulnerable to dust generation should be no larger than the capacity of water cart/trucks.
Stockpiles of soil and vegetative materials prone to the release of dust will be covered or sprayed with water whenever conditions exist for the generation of excessive levels of dust.
During dredging operations, stockpiles of sediments destined for disposal (especially acid sulphate soils that may release odours) would be covered where possible to prevent dust and odour emissions.
Subsurface structures such as foundations, piles, basements and underground services at the site must be designed to be resistant to acid sulphate soils.
Areas of the site and adjoining marine environment with identified ASS will be revegetated with vegetation that will not be impacted by the presence of the ASS.

Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before dewatering or stockpiling of ASS.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p> <p>Dust monitoring will be conducted at the site boundary during dewatering, stockpiling and dredging activities.</p> <p>Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.</p> <p>Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.</p> <p>Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.</p> <p>Marine water quality monitoring will be conducted during all construction activities, both at regular intervals and also at increased frequencies during dredging and construction during the wet season and storm events.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of stormwater, groundwater and marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.3 Biological Environment

6.3.1 Terrestrial and Intertidal Flora

Terrestrial and intertidal flora within and adjacent the DCWR site are characterised by large expanses of cleared land with pockets of cultivated native and introduced plant species and abundant weeds. The

landform of the site, distinguished by an escarpment and level, low-lying reclaimed and excavated areas, largely dictates the vegetation types across the site. Vegetation communities therefore include coastal vine forest, private gardens, regenerating native landscape, dense weed infestations, disturbed ground with scattered plantings and mangroves. Potential impacts associated with construction activity include loss of native vegetation (including trees of conservation significance), loss of habitat for existing fauna, loss of amenity, natural screening or recreational space, potential soil erosion and generation of dust and alterations to other vegetation communities due to changed runoff regimes, mobilisation of higher levels of contaminants and increased turbidity.

The interrelationship between various ecological systems and habitats need to be recognised and accounted for within management of construction activities to ensure the minimisation of direct impacts upon individual ecosystems and habitats and the cumulative effects upon interlinked ecosystems and habitats.

Management Commitment
DIPE is committed to minimising and managing impacts on terrestrial and intertidal flora from the construction phase at the DCWR site.
Management Strategies
Where clearing of vegetation is to occur within the coastal vine-forest habitat (for the proposed pedestrian access route to the CBD), it will be undertaken with a commitment to minimising any impact on the surrounding forest.
Clearing of large trees will be avoided to maintain the character of this landscape, to maintain shade and continuity of habitat.
Consideration is given to an elevated tree-top walkway as an option to improve pedestrian access and minimise clearing within the vine-forest.
The impact of erosion and sedimentation will be minimised by the management strategies described in the previous section.
The impact of dust on surrounding vegetation will be minimised by the air quality management strategies described in the previous section.
Identifying priority weeds and selecting priority control areas. For instance, attempts will be made to restrict the spread of weeds (especially Class B noxious weeds) into new areas or into adjacent relatively weed-free habitats (eg vine-forests, private gardens)
Control measures (eg spraying and revegetation works) will be implemented to prevent the spread of weeds into priority areas (eg weed-free areas and in susceptible areas such as recently disturbed ground).
Wash-down facilities must be provided and utilised for all vehicles leaving the site to limit the spread of weeds on and off-site.

<p>A weed management plan for the site will be developed to assist in the prevention of further weed introductions and to manage the long term control of weeds</p> <p>Where possible, rehabilitation of the previous mangrove shore should be undertaken. This could be combined with dredging adjacent to marine areas. Mud substrate for mangrove establishment could be sourced from clean dredge spoil.</p> <p>Contaminated dredge spoil must be removed and appropriately disposed off site.</p> <p>New gardens that are developed will be planted with native flora species to enhance the habitat values of the site.</p>
Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before construction activities.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p> <p>Monitoring of terrestrial and intertidal flora including management actions, weed control, changes in vegetation condition. Establishing consistent photo points is a simple method of monitoring changes in vegetation condition.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting management actions, weed control, monitoring of terrestrial and intertidal flora and complaints received from stakeholders will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.3.2 Terrestrial Fauna

The likelihood of encountering fauna of conservation significance during the construction or operation phases of the project is very low due to the lack of suitable habitat within the study area to support the specialized resource requirements of species. Any fauna of conservation significance that are likely to be encountered will probably be primarily transitory (eg birds).

Management Commitment
DIPE is committed to limiting the impact on terrestrial fauna from the construction phase of the DCWR

project.
Management Strategies
<p>Installing temporary fencing adjacent to significant vegetation.</p> <p>Minimising land clearing during construction activities.</p> <p>A register of significant fauna that may periodically be encountered within the development site will be maintained. Construction staff will be notified of the importance of recording such fauna in the register.</p>
Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before construction activities.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p> <p>Recording the presence of resident or transitory terrestrial fauna on a central fauna register for the site. This register will be available to DIPE for monitoring and review.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of resident and transitory fauna will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.3.3 Marine Ecology

The DCWR site includes Kitchener Bay, Stokes Hill Wharf, Fort Hill wharf, which form a barrier around the Bay. Kitchener Bay is a dynamic marine environment, dominated by the semidiurnal macrotidal regime of the Darwin Harbour tidal environment. The marine ecology is characterised by several criteria including bathymetry, Darwin Harbour oceanography, water physico-chemistry, sediment composition and marine biota. The key criteria represented here is marine biota (and related criteria), which includes a series of wharf structures, intertidal flats, rocky reefs, seagrass beds, mangroves, fishes, reptiles, marine mammals and marine heritage, conservation and sensitive areas.

Potential impacts on the marine ecology from the construction phase of the DCWR project include degradation of marine water quality, loss of species biodiversity, loss of habitat, introduction of pest species and reduced recreational amenity.

Management Commitment
DIPE is committed to minimising and managing impacts on marine ecosystems during the construction phase of the DCWR.
Management Strategies
<p>Where possible, activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments and generation of acidic leachate.</p> <p>Land clearance will be minimised.</p> <p>Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.</p> <p>Constructed slopes with the potential for erosion will be minimised and surface cover will be retained where possible or added to disturbed land.</p> <p>Works will be planned and conducted to maximise the opportunity to retain sediment on site.</p> <p>Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and nutrients during construction activities where possible and appropriate.</p> <p>Gross pollutants, sediments, oils and other contaminants from industrial, hardstand, roadway and trafficked areas will be captured by specialised measures including oil, grit, and gross pollutant traps where possible and appropriate.</p> <p>Roadways will be swept to remove dust, organic matter and pollutants.</p> <p>The application of pesticides and nutrients to parks and gardens must be controlled during the construction phase of the DCWR project.</p> <p>Dewatering and disposal to the marine environment will be minimised. Dewatering will be controlled by the ASS Management Plan (ASSMP) for the construction phase of the DCWR project.</p> <p>Stockpiling of ASS will be minimised and will be bundled, covered and treated with lime to prevent generating acidic leachate and/or dust. Stockpiling of ASS will be controlled by the ASSMP for the construction phase of the DCWR project.</p> <p>Dredging will be controlled by a Dredging Management Plan (DMP) for the construction phase of the DCWR project.</p> <p>Sediments from dredging will be disposed of away from Kitchener Bay to minimise turbidity and deposition in Kitchener Bay.</p> <p>A backhoe dredging method will be used where appropriate to minimise dispersion of sediments during</p>

dredging.

An impermeable barrier, extending from the waterline to the sea floor, will be used where appropriate to surround the dredging activity to minimise the area of turbidity around the dredging.

Where spoil is used for reclamation, a temporary impermeable barrier will be used to prevent the dispersion of sediment and minimise the area of turbidity around the reclamation.

During dredging, reclamation and seawall construction, any (oil) spills will be managed by adherence to the Darwin Port Corporation's Oil Spill Contingency Plan (OSCP). Actions within the OSCP include application of dispersants, the use of booms and skimmers, physical breakup of slicks, shoreline protection and monitoring of dispersion.

Commercial vessels involved in the site preparation and construction phases will be subject to International, National and State policies and guidelines to restrict environmental impacts as a result of spillages, anticorrosion products, wastewater products, solid wastes and the translocation of marine pests.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Marine fauna and ecosystem surveys will be conducted prior to construction activities commencing and to provide baseline information. Annual marine fauna and ecosystem assessments will then be carried out during the construction phase of the DCWR project.

Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of marine fauna and ecosystems surveys, stormwater, groundwater and marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.3.4 Biting Insects

Biting insects in the DCWR site represent a potential threat to human health and the reduction in public amenity. In this situation, biting insect assessments concentrate on mosquitoes and biting midges, of which mosquitoes are capable of transferring potentially fatal diseases such as Murray Valley encephalitis virus (MVEV), diseases caused by Kunjin virus (KUNV), Ross River virus (RRV) and Barmah Forest virus (BFV). Their abundance at the site is highest after the wet season. The bite of a biting midge can cause a painful reaction to humans, as well as resulting in some secondary infection. There is also a threat of infection by exotic mosquitoes, introduced by vessels originating from outside Australia.

Management Commitment
DIPE is committed to minimising and managing biting insects at the site during the construction phase of the DCWP project through a program of preventative and protective measures.
Management Strategies
Draining, filling and grading current mosquito breeding sites, where possible.
Minimising ponding and poorly draining areas capable of holding water during construction activities.
Clearing existing stormwater drains of sediment where possible.
Where feasible, reengineering of existing drains to reduce the potential for ponding.
New stormwater drainage must be designed to minimise ponding at the site.
Removing artificial receptacles (including bamboo along Hughes Drive), capable of providing habitat for larvae after rainfall events before construction activities commence.
Landscaping plans for the site should include shrubs resistant to bifenthrin to enable insecticide barrier treatment to control adult biting mosquitoes and avoid plants capable of ponding water.
Monitoring
A standardised system of regular monitoring is to be developed and conducted.
Baseline monitoring is to commence before the relevant construction activity.
The results of the monitoring program will be used to measure the effectiveness of measures against the

target.

Biting insect surveys will be conducted prior to construction activities commencing and to provide baseline information. Six monthly assessments will then be carried out during the construction phase of the DCWR project.

Complaints by stakeholders related to biting insects at the site will be recorded.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of biting insect surveys and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.4 Built Environment

6.4.1 Existing Structures, Buildings and Infrastructure

Structures, buildings and infrastructure not removed during the remediation phase of the DCWR project will establish an architectural framework and fabric of the DCWR site throughout its development. These items, both aboveground and underground structures, are surplus to the developments, requirements and changes anticipated in the Master Plan.

Apart from providing ongoing value in terms of office space, industrial use and essential services, the existing items may also have heritage significance. Damage to or loss of these items may have an environmental or heritage impacts that has been unaccounted for and interrupt ongoing business activity, resulting in financial loss to local business.

Management Commitment

DIPE is committed to avoiding disturbance to existing structures, buildings and infrastructure during the construction phase of the DCWR project.

Management Strategies

The Master Plan will provide guidance on the proximity of proposed new structures to existing structures.

Existing underground services will be located and these will not be disturbed where possible.

Existing above ground services must not be disturbed. Defined buffer zones will be established around existing above ground infrastructure.

<p>Areas and items of heritage significance or conservation value must not be disturbed. Defined buffer zones will be established around items of heritage significance or conservation value.</p> <p>Remaining land uses of the DCWR site will not be interrupted by construction activities. These industrial, commercial, retail and tourist activities will continue with minimal impact from construction activities. These include the use of pipeline and refuelling facilities on Fort Hill Wharf, Deckchair Cinema, vehicle access, power, water and telecommunications connections.</p> <p>Construction activity will be staged to minimise interruptions to surrounding stakeholders (e.g. noise, air emissions, traffic congestion) and reduce the potential for environmental impacts. The Master Plan will provide guidance on the sequence of construction of the DCWR project.</p>
Monitoring
<p>A central register of existing facilities, areas of conservation and heritage significance and a survey of their condition will be established prior to commencing construction activities. Incidents of damage to will be recorded in the register. A survey of the existing facilities, areas of conservation and heritage significance and their condition will be conducted on an annual basis.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of the central register and complaints received from stakeholders will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.4.2 Roads and Public Transport Network

Traffic for construction activities at the DCWR site will include the use of heavy (and light) vehicles. These tasks will include the delivery or transport of soils and construction materials and the transfer of construction personnel to, from and within the site. The potential impacts related to the road and public transport networks include noise and vibrations, air emissions, traffic congestion, safety issues to the public accessing the site or neighbouring tourist attraction, limited access to tourist attractions and collision of traffic with vehicles, humans or fauna.

Management Commitment
<p>DIPE is committed to minimising and managing impacts related to traffic during the construction phase of the DCWR project.</p>
Management Strategies

Work must be undertaken in the agreed working hours.

Consideration will be given to all other site users, not involved in construction activity. Construction activities within close proximity to sensitive receptors must only occur in limited and agreed hours.

A memorandum of understanding will be developed with relevant stakeholders to ensure that management strategies are agreed and adhered to.

In the event that road closures are required for construction works, stakeholders will be given prior notice of closure times a minimum of 48 hours in advance.

Ensure construction machinery and vehicles are well maintained and in good working order.

Speed limits will be set and observed at the site to minimise dust generation. Access roads will be sealed and vehicle speed on unsealed roads will be restricted to minimise dust generation.

Heavy vehicles will obey speed limits already set in the Darwin City area.

Vehicles will not be loaded above the height of the side and tailboards.

All loads to and from the site will be covered to prevent the loss of materials.

Vehicle emissions will be kept to a minimum by avoidance of unnecessary engine running time.

All complaints involving vehicle movements relating to construction activity will be responded to within 24 hours and action taken within 48 hours.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of the noise and vibration measures against the target

Dust monitoring will be conducted at the site boundary during drilling, excavation, dredging, stockpiling and building activities.

Dust collected from areas with surface contamination will be analysed for the contaminants of concern including hydrocarbons, zinc, lead and copper (and other heavy metals), tri-butyl tin and dioxins

Noise monitoring will include noise from plant, machinery and heavy vehicles, truck movements to/from site and within site boundaries and vibration sources.

All noise complaints shall be recorded and forwarded so that remedial action can be undertaken.

For construction periods of 4 weeks and under:

L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 75 dB(A).

For construction periods between 4 and 26 weeks and under:

L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 65 dB(A).

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of atmospheric emission monitoring, dust monitoring analysis, noise and vibration monitoring and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.4.3 Residual Soil and Groundwater Contamination

Residual soil and groundwater contamination is anticipated to be encountered during subsurface activities during the construction phase of the DCWR project. The impacts are impact to human health from direct contact, ingestion and dermal contact and contamination of soils, surface waters, groundwater, marine waters and spreading of contamination. Discharge to marine waters could then impact on marine ecology.

The following is a summary of the contaminated land management issues, which when complete will be fully integrated into the SMP and RAP. This section has been included based on our current understanding of the site and the DCWR project. It will be required to be updated when plans for remediation, development and the site VICEPA CLA requirements for site management controls are fully developed.

Management Commitment

DIPE is committed to assure the protection of human health and minimising and managing impacts related to residual soil and groundwater contamination at the site during the construction phase of the DCWR project.

Management Strategies

Potential direct contact with contamination must be prevented by barriers between humans and the residual contamination.

The extent and rate of excavation must be controlled and minimised.

Excavation and storage of odorous soils will be minimised Stockpiling and transporting odorous loads

must be covered, include ventilation and may use of spray deodorants if appropriate and using appropriate tracking procedures.

Contaminated soils must be transported off site as soon as possible to a licensed facility using appropriate tracking procedures.

Diversion drains will be constructed to collect contaminated surface runoff, particularly from washdown areas.

Contaminated stormwater from stockpiles and wash down areas to be intercepted and treated prior to discharge. These will integrate with the natural drainage characteristics of the site where possible.

Excavation equipment will be washed down before entry and exit to the site to avoid the migration of contaminants. Designated wash down areas are to be constructed with appropriate drainage and treatment facilities.

Contaminated groundwater to be stored for treatment and analysis prior to discharge. There is the potential for acidic groundwater due to ASS.

Contaminated groundwater must not to be discharged to the marine environment without appropriate treatment. Treatment required may include separation, filtration or dilution as defined by groundwater quality and discharge requirements. Groundwater should be disposed using appropriate tracking procedures.

Hydrocarbons and solids collected during contaminated groundwater treatment will be disposed of to an appropriately licensed facility using appropriate tracking procedures.

A liner is required to underlie contaminated soil or contaminated debris in stockpiles.

Water applied to contaminated soils for the purposes of dust control must not generate surface water runoff.

The exposed area of contaminated soils vulnerable to dust generation must not exceed the capacity of water cart/trucks.

Vehicles exiting contaminated areas must be suitably cleaned (broom swept and wheel wash) to ensure that no residual soil contamination leaves the defined work areas.

Excavated odorous soils will be either removed from site as quickly as possible or buried at the same depth as removed.

Stockpiling and transporting odorous loads must be covered, include ventilation and may use of spray deodorants if appropriate.

Buildings in potentially odorous soil must be sealed below grade with a suitable synthetic barrier that will prevent ingress of odours, vapours and moisture.

Basement car parks in potentially odorous soils must have appropriate ventilation systems as required by the Australian Standard.

During sub-surface construction of basements, an increased level of appropriate ventilation and confined space management will be required to assure protection of the health of construction workers.

There is potential for vapours to accumulate at the base of the building and migrate through buildings and/or to discharge at the ground surface around the perimeter of the building. To prevent this occurring an external ventilation system may need to be included in the building design. This system could be passive or active and include forced ventilation. Based on present understanding of the contamination at the site, it is likely that passive systems may suffice at the site. The Developer will be required to confirm vapour exhaust design requirements. An external ventilation system is likely to include a layer of highly permeable material such as gravel underlying the liner and a collection system such as perforated pipes to collect accumulating vapours. It may be preferable to include a curtain barrier around the perimeter of the building that is contiguous with it to prevent the discharge of vapours at the surface around the perimeter of the building. This is likely to consist of a paved surface underlain by the liner. The vapour collection system could discharge to ventilation pipes attached to the building.

Subsurface conduits, pipelines, sumps and pits, in potentially odorous soils must be designed to prevent accumulation of odours and vapours.

Connections between below ground structures such as building footings, foundations, piles, basements and services must be designed so that that building vapour barriers are not compromised by utilities entering buildings.

Appropriate facilities including clean-up kit(s) and transport equipment to manage spills and leaks of liquid wastes.

Topsoil cover shall be provided to the root depth of the plant species proposed.

Screening and covering of potentially offending soil aesthetics with top soil.

A map must be prepared delineating Work Zones and describing where the risk of discovering asbestos is highest.

Appropriate Personal Protective Equipment (PPE) must be worn by all personnel operating in highest risk Work Zones.

Personnel working in highest risk Work Zones must be appropriately trained and licensed.

Physical inspection is required during operations and all potentially asbestos containing material detected shall be reported to the Site Superintendent.

Asbestos material must be disposed of appropriately by a licensed contractor to a licensed facility using appropriate tracking procedures.

A map must be prepared delineating Work Zones describing where the risk of discovering UXO is

highest.

Personnel working on site are to be trained and educated of the dangers of UXO, their potential locations and identification features.

Procedures for reporting and dealing with UXO must be prepared.

In the event that a UXO is discovered, work shall stop immediately at the site and the area sealed-off.

Qualified UXO technicians will make safe and dispose of any identified UXO.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Dust monitoring will be conducted at the site boundary during drilling, excavation, dredging, stockpiling and building activities. Dust collected from areas with surface contamination will be analysed for the contaminants of concern including hydrocarbons, zinc, lead and copper (and other heavy metals), tri-butyl tin and dioxins.

Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.

Odour monitoring will be conducted for drilling, excavation, dredging and stockpiling activities to ensure odour levels at the site boundary remain at an acceptable level.

Excavations will require validation testing at their extents for contaminants of concern including total petroleum hydrocarbons, polycyclic aromatic hydrocarbons and heavy metals to confirm that contamination has been removed and that the land is suitable for the intended land use.

Excavated soil will be assumed to be contaminated and require testing for contaminants of concern including total petroleum hydrocarbons, polycyclic aromatic hydrocarbons and heavy metals to confirm

the appropriate disposal method.

Imported fill will be required to be tested for a range of analytes, to an appropriate standard approved by DIPE and the VICEPA CLA to confirm that it is clean fill and appropriate for the intended land use prior to being brought onto site.

Liquid wastes must be removed by a licenced waste disposal contractor. Appropriate testing will be required to characterise the liquid waste and confirm acceptance criteria of the waste facility are met.

A dedicated liquid waste storage facility will be established on site with appropriate all weather cover and bunding arrangements to prevent discharge.

Air monitoring must be carried in highest risk Work Zones for the presence of asbestos fibres.

A UXO technician must conduct both visual and instrumental surveys of any area proposed for excavation, prior to excavation occurring.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of atmospheric emission monitoring, dust monitoring analysis, surface water, groundwater and marine water monitoring and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.5 Construction Activities

6.5.1 Drilling, Excavation and Stockpiling, and Dewatering

Drilling and excavation are anticipated during the construction phase of the DCWR project. These activities will be required during the construction of buildings, above ground and below ground services, sea walls and revetment structures, earthworks and landscaping. Potential issues associated with drilling and excavations include dust, noise and vibrations, erosion, mobilisation of contaminants to stormwater and groundwater.

Management Commitment

DIPE is committed to minimising and managing impacts from drilling, excavation and stockpiling, and dewatering activities during the construction phase of the DCWR project.

Management Strategies

Drilling

The drilling contractor will be made aware of the locations of all known heritage-related items and areas and must avoid disturbance to these areas.

Underground services will be cleared and drilling locations approved by Site Superintendent prior to commencing drilling activities.

Drilling will be undertaken within the agreed working hours.

Ensure all drilling equipment is well maintained and in good working order.

Drilling activities within close proximity to sensitive receptors must only occur in limited and agreed hours.

Where possible, drilling activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments.

Reducing noise where possible and appropriate by using low noise equipment, acoustic barriers and other noise abatement devices.

Reducing the impact at receiver at sensitive locations where possible and appropriate by implementing noise insulation treatments such as suitable façade constructions, acoustic ventilation paths and minimisation of structure borne sound transmission paths.

Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.

Drilling activities will be planned and conducted to maximise the opportunity to retain sediment on site.

During drilling activities, dust suppression will be achieved by spraying water on soils and other materials that may cause dust emissions.

Particulates from drilling in hazardous materials and fugitive traces from soils, where possible will be covered or contained and sprayed with water if the potential exists for dust generation.

Vibrations from drilling must be minimised at any neighbouring premises. Residents of neighbouring premises must be warned of possible vibrations prior to the commencing the activity.

Stockpiles that may be susceptible to erosion must be covered or include suitable erosion control measures such as silt fences and hay bales.

Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and nutrients during construction activities where possible and appropriate.

Noise complaints will be responded to within 24 hours and mitigation measures checked and improved

within 48 hours. Other complaints related to drilling activities received from stakeholders will be responded to within 48 hours.

Excavation and Stockpiling

The excavation contractor will be made aware of the locations of all known heritage-related items and areas and must avoid disturbance to these areas.

Underground services will be cleared and excavation locations approved by Site Superintendent prior to commencing excavation activities.

Excavation will be undertaken within the agreed working hours.

Vehicles must not be loaded during excavation activities above the height of the side and tailboards.

Ensure all excavation equipment is well maintained and in good working order.

Excavation activities within close proximity to sensitive receptors must only occur in limited and agreed hours.

Where possible, excavation activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments.

Reducing noise where possible and appropriate by using low noise equipment, acoustic barriers and other noise abatement devices.

Reducing the impact at receiver at sensitive locations where possible and appropriate by implementing noise insulation treatments such as suitable façade constructions, acoustic ventilation paths and minimisation of structure borne sound transmission paths.

Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.

Excavation activities will be planned and conducted to maximise the opportunity to retain sediment on site.

Stockpiles of excavated soil and vegetative materials that may generate dust should be covered or sprayed with water whenever conditions exist for dust generation.

During excavation activities, dust suppression will be achieved by spraying water on soils and other materials that may cause dust emissions.

Access roads will be sealed and vehicle speed on unsealed roads will be restricted to minimise dust generation

Particulates from excavation in hazardous materials and fugitive traces from soils, where possible will be

covered or contained and sprayed with water if the potential exists for dust generation.

Vibrations from excavation must be minimised at any neighbouring premises. Residents of neighbouring premises must be warned of possible vibrations prior to the commencing the activity.

Stockpiling of ASS will be minimised and will be banded, covered and treated with lime to prevent generating acidic leachate and/or dust. Stockpiling of ASS will be controlled by the ASSMP for the construction phase of the DCWR project.

Stockpiles that may be susceptible to erosion must be covered or include suitable erosion control measures such as silt fences and hay bales.

Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and nutrients during construction activities where possible and appropriate.

Noise complaints will be responded to within 24 hours and mitigation measures checked and improved within 48 hours. Other complaints related to excavation activities received from stakeholders will be responded to within 48 hours.

Dewatering

Where possible, dewatering at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments and generation of acidic leachate.

Dewatering and disposal to the marine environment will be minimised. Dewatering will be controlled by the ASS Management Plan (ASSMP) for the construction phase of the DCWR project.

Acidic leachate must be neutralised with lime prior to disposal.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before commencing activities.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Dust monitoring will be conducted at the site boundary during drilling, excavation, dredging, stockpiling and building activities.

Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Groundwater quality monitoring will be conducted for dewatering activities and at the boundary with the marine environment for identified contaminants of concern at the site including pH, salinity, suspended

solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.

Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.

Noise monitoring will include noise from plant, machinery and heavy vehicles, truck movements to/from site and within site boundaries and vibration sources.

All noise complaints shall be recorded and forwarded so that remedial action can be undertaken.

For activity periods of 4 weeks and under:

L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 75 dB(A).

For activity periods between 4 and 26 weeks and under:

L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 65 dB(A).

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting atmospheric emission monitoring, dust monitoring, noise, stormwater, groundwater and marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.5.2 Dredging and Reclamation

Dredging and reclamation activities are anticipated during the construction phase of the DCWR project. Dredging is expected during marina development within Kitchener Bay and involves disposal of dredging spoil both on land and at designated sea-dumping locations outside of Darwin Harbour. The main environmental management issues anticipated from dredging activities are the unsuitability of contaminated sediments for use in land reclamation, treatment and disposal options for contaminated sediments and the ramifications for the receiving environment. Reclamation is anticipated to involve construction of sea walls and in-filling with suitable fill material to develop the coastal revetment structure. The main environmental management issues associated with land reclamation is the loss of marine habitat, marine water quality impacts around the reclamation, tail water overflow or groundwater seepage.

Seawalls, a marina, and lock systems could have impacts on the groundwater regime at the site including:

- Causing the groundwater level to rise at the site particularly during recharge from the escarpment during the Wet Season. This could result in significant amounts of groundwater discharging through the ground surface at the site.
- Reducing the head difference across the site and thus impact the rate of groundwater discharge.
- A significant reduction in water level variation resulting stopping the existing tidal flushing effect on groundwater contamination that is occurring.

It is recommended that where development plans may significantly change the groundwater flow regime at the site are planned, such as described above, advice from specialists with hydrogeology and aquatic toxicology should be sought by the developer. Compliance with the NT Waste Management Control Act and Water Act may be required, with the ultimate aim of ensuring changes to the flow regime do not negatively influence the discharge of contaminants into the marine environment.

Management Commitment
DIPE is committed to minimising and managing impacts from dredging and reclamation activities during the construction phase of the DCWR project.
Management Strategies
<p><i>Dredging</i></p> <p>Dredging will be controlled by a Dredging Management Plan (DMP) for the construction phase of the DCWR project.</p> <p>Sediments from dredging will be disposed of away from Kitchener Bay to minimise turbidity and deposition in Kitchener Bay.</p> <p>A backhoe dredging method will be used where appropriate to minimise dispersion of sediments during dredging.</p> <p>An impermeable barrier, extending from the waterline to the sea floor, will be used where appropriate to surround the dredging activity to minimise the area of turbidity around the dredging.</p> <p>Where spoil is used for reclamation, temporary impermeable barriers will be used to prevent the loss of sediment and reduce turbidity.</p> <p>Commercial vessels involved in dredging activity will be subject to International, National and State policies and guidelines to restrict environmental impacts as a result of spillages, anticorrosion products, wastewater products, solid wastes and the translocation of marine pests.</p> <p><i>Reclamation</i></p> <p>If there is a marina proposed for the site, then the Developer must provide an engineered program that</p>

satisfies the provisions of the Waste management Control Act and the Water Act that ensures that there is no hydrocarbon sheen in waters exiting marine structures. An assessment of the need for a barrier to prevent hydrocarbons in the groundwater migrating into the marina (e.g. underflow liner) will be required. If it is confirmed that there is no sheen in discharge, then no requirement for a barrier along shoreline, but this would need to be coupled with ongoing inspection and a contingency plan.

Where spoil is used for reclamation, a temporary impermeable barrier will be used to prevent the dispersion of sediment and minimise the area of turbidity around the reclamation.

During dredging, reclamation and seawall construction, any (oil) spills will be managed by adherence to the Darwin Port Corporation's Oil Spill Contingency Plan (OSCP). Actions within the OSCP include application of dispersants, the use of booms and skimmers, physical breakup of slicks, shoreline protection and monitoring of dispersion.

Commercial vessels involved in the site preparation and construction phases will be subject to International, National and State policies and guidelines to restrict environmental impacts as a result of spillages, anticorrosion products, wastewater products, solid wastes and the translocation of marine pests.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Dust monitoring will be conducted at the site boundary during dredging and stockpiling activities.

Marine water quality monitoring will be conducted during dredging and reclamation activities in the marine environment around the activity for contaminants of concern including suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, heavy metals and organo-tins.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of marine waters monitoring analysis results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.5.3 New Building Construction and Infrastructure

There are numerous new buildings and infrastructure anticipated during the DCWR project as listed in Section 1.1 of this document. Possible impacts from new buildings and infrastructure include air quality, noise, erosion and sediment control and marine waters.

Management Commitment
DIPE is committed to minimising and managing impacts from dredging and reclamation activities during the construction phase of the DCWR project.
Management Strategies
<p>Water will be applied by water cart/truck whenever unsealed surfaces have the potential to release excessive levels of dust. The exposed area vulnerable to dust generation should be no larger than the capacity of water cart/trucks.</p> <p>Stockpiles of soils vegetative material or building materials prone to the release of dust will be covered or sprayed with water whenever conditions exist for the generation of excessive levels of dust.</p> <p>Particulates derived from hazardous materials and fugitive traces in soils will be covered or contained where possible and sprayed if the potential exists for excessive releases of dust.</p> <p>Vehicles must not be loaded above the height of the side and tailboards.</p> <p>Vehicle emissions will be kept to a minimum by avoidance of unnecessary engine running time.</p> <p>Access roads will be sealed and vehicle speeds on unsealed roads will be restricted to minimise dust generation.</p> <p>The use of ozone-depleting substances will be avoided.</p> <p>Complaints will be responded to within 24 hours and mitigation measures checked and improved within 48 hours.</p> <p>Work must be undertaken in the agreed working hours.</p> <p>Removal of noise sources from noise sensitive location.</p> <p>Ensure construction machinery and vehicles are well maintained and in good working order.</p> <p>Reducing noise where possible and appropriate by using low noise equipment, acoustic barriers and other noise abatement devices.</p> <p>Reducing the impact at receiver at sensitive locations where possible and appropriate by implementing noise insulation treatments such as suitable façade constructions, acoustic ventilation paths and minimisation of structure borne sound transmission paths.</p>

Vibrations must be minimised at any neighbouring premises. Residents of neighbouring premises must be warned of possible vibrations prior to the commencing the activity.

Stockpiles must not be located in stormwater flows.

The size and area of stockpiles of soil will be minimised.

Land clearance will be minimised.

Where possible, activities at the site are to be undertaken during the dry season to reduce the potential for erosion, off site transport of sediments.

Stormwater management including erosion control and sedimentation measures at the site will be controlled by an Erosion and Sedimentation Control Plan (E&SCP) for the construction phase of the DCWR project.

Constructed slopes with the potential for erosion will be minimised and surface cover will be retained where possible or added to disturbed land.

Erosion potential of stockpiles will be minimised by reducing batter slopes and including cut-off drains where appropriate.

Works will be planned and conducted to maximise the opportunity to retain sediment on site.

Stockpiles that may be susceptible to erosion must be covered or include suitable erosion control measures such as silt fences and hay bales.

Temporary cut off drains, bunding, and other sediment control measures such as sediment traps, hay bales, silt fences and sediment basins, grass swales and buffer strips will be used to capture sediments and nutrients during construction activities where possible and appropriate.

Gross pollutants, sediments, oils and other contaminants from industrial, hardstand, roadway and trafficked areas will be captured by specialised measures including oil, grit, and gross pollutant traps where possible and appropriate.

Roadways will be swept to remove dust, organic matter and pollutants.

Access roads will be sealed and vehicle speed on unsealed roads will be restricted to minimise erosion.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the relevant construction activity.

The results of the monitoring program will be used to measure the effectiveness of the dust control measures against the target

<p>Dust monitoring will be conducted at the site boundary during building activities.</p> <p>Dust collected from areas with surface contamination will be analysed for the contaminants of concern including hydrocarbons, zinc, lead and copper (and other heavy metals), tri-butyl tin and dioxins.</p> <p>Noise monitoring will include noise from plant, machinery and heavy vehicles, truck movements to/from site and within site boundaries and vibration sources.</p> <p>All noise complaints shall be recorded and forwarded so that remedial action can be undertaken.</p> <p>For construction periods of 4 weeks and under:</p> <p>L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 75 dB(A).</p> <p>For construction periods between 4 and 26 weeks and under:</p> <p>L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed 65 dB(A).</p> <p>Stormwater quality monitoring will be conducted for stockpiling activities and at the marine discharge points for identified contaminants of concern at the site including pH, salinity, suspended solids, turbidity, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, nutrients and heavy metals.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of odour, dust, noise and stormwater monitoring results and complaints received from stakeholders will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.6 Waste Management and Minimisation

Management Commitment
DIPE is committed to managing and minimising wastes originating from construction activities, during the construction phase of the DCWR project.
Management Strategies
Building waste will be stockpiled and must be prevented from coming into contact with contaminated soil and groundwater. Dust control measures including water or covering may be required. Disposal of

building waste will be to a licensed facility using appropriate tracking procedures.

The extent and rate of excavation must be controlled and minimised.

Excavation and storage of odorous soils will be minimised. Stockpiling and transporting odorous loads must be covered, include ventilation and may use of spray deodorants if appropriate and using appropriate tracking procedures.

Contaminated soils must be transported off site as soon as possible to a licensed facility using appropriate tracking procedures.

Diversion drains will be constructed to collect contaminated surface runoff, particularly from washdown areas.

Contaminated stormwater from stockpiles and wash down areas to be intercepted and treated prior to discharge. These will integrate with the natural drainage characteristics of the site where possible.

Excavation equipment will be washed down before entry and exit to the site to avoid the migration of contaminants. Designated wash down areas are to be constructed with appropriate drainage and treatment facilities.

Contaminated groundwater to be stored for treatment and analysis prior to discharge. There is the potential for acidic groundwater due to ASS.

Contaminated groundwater must not be discharged to the marine environment without appropriate treatment. Treatment required may include separation, filtration or dilution as defined by groundwater quality and discharge requirements. Groundwater should be disposed using appropriate tracking procedures.

Hydrocarbons and solids collected during contaminated groundwater treatment will be disposed of to an appropriately licensed facility using appropriate tracking procedures.

Water applied to contaminated soils for the purposes of dust control must not generate surface water runoff.

Vehicles exiting contaminated areas must be suitably cleaned (broom swept and wheel wash) to ensure that no residual soil contamination leaves the defined work areas.

Appropriate facilities including clean-up kit(s) and transport equipment to manage spills and leaks of liquid wastes.

Asbestos material must be disposed of appropriately by a licensed contractor to a licensed facility using appropriate tracking procedures.

Monitoring

A standardised system of regular monitoring is to be developed and conducted.

Baseline monitoring is to commence before the construction activities.

The results of the monitoring program will be used to measure the effectiveness of measures against the target.

Monitoring will include weights and appropriate waste tracking documentation.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of weight of building waste clean soil, contaminated soil, contaminated water, treated water transported or discharged off site must be reported every month and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

6.7 Cultural Environment**6.7.1 Aboriginal Cultural Heritage, Archaeology and Native Title****Management commitment**

DIPE is committed to assure the protection of aboriginal cultural heritage at the site during the construction phase of the DCWR project.

Management Strategies

The restricted works area within the Sacred Site on Stokes Hill will be clearly marked. Contractors will be educated of its location and cultural significance. A buffer zone will be maintained around the Sacred Site.

Ongoing consultation with local Aboriginal community will be undertaken throughout the DCWR project. Native Title matters will be incorporated into the master plan and environmental management documentation.

A detailed Aboriginal cultural heritage survey of the development area will be undertaken upon release of the Master Plan.

Disturbance to the base of the escarpment used by Aboriginal people will be avoided. Contractors will be educated of its location and Cultural Significance. A buffer zone will be maintained around the escarpment base.

Historic and contemporary Aboriginal cultural significance will be acknowledged via construction of a

<p>cultural centre as part of the DCWR.</p> <p>Contactors will be educated of relevant Aboriginal heritage issues to the DCWR site including disturbance avoidance measures to be adopted during construction activities. In the event that unknown Aboriginal Sacred Sites or significant artefacts are discovered during construction activities, Contractors will also undergo additional education as deemed necessary by the local Aboriginal community.</p>
<p>Monitoring</p>
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before the construction activities.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p> <p>Known Sacred Sites and sites of cultural significance will be inspected to ensure buffer zones have not been breached and confirm disturbance has not occurred.</p>
<p>Reporting</p>
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of Sacred Site inspections will be finalised every 6 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Report upon disturbance of Sacred Site or discovery of suspected significant artefact to Site Superintendent and NT Heritage Commission (or other relevant authority).</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.7.2 European Cultural Heritage

European cultural heritage within and near the DCWR site is derived from European occupation and use since the late 1800's. The site's history is derived from port uses and industrial activities. Items of European cultural significance within and near the DCWR have been assessed according to their heritage significance. A number of precincts have been identified that relate to past and present activities undertaken within each precinct area. Items of European cultural heritage significance include the Wharf precinct, Stokes Hill, the Goyder Camp site, Damoe-ra Park and spring, Kitchener Drive, the Warrego wreck, Knight's Folly, the Tamarind trees, the Steam Pump House, the Number 6 Oil Tank shell, the Boom Maintenance Shed, the remains of the MV Neptuna, Hughes Avenue, Oil Storage Tunnels, Travellers (Chinamans) Walk and the Burnett 'G' Type Residence. Potential impacts to European heritage items and places from the construction phase of the DCWR project include loss of and/or damage to heritage items and the loss of significance.

Management commitment
DIPE is committed to assure the protection of European heritage items and places at the site during the construction phase of the DCWR project.
Management Strategies
<p>Site surveys and detailed archaeological investigations of potential and existing European heritage sites will be undertaken where necessary to enable heritage conservation.</p> <p>Detailed assessments of significant European heritage sites that may or may not be considered viable to incorporate into the Masterplan will be undertaken.</p> <p>European heritage sites will be incorporated into the Masterplan for the appreciation and enjoyment of visitors.</p> <p>Disturbance to European heritage sites will be avoided. Contractors will be educated of their location and significance. Buffer zones will be maintained around the European heritage sites.</p>
Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before the construction activities.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p> <p>Heritage items will be inspected to ensure buffer zones have not been breached and confirm disturbance has not occurred.</p>
Reporting
<p>A standardised reporting format will be developed and agreed with DIPE.</p> <p>Reporting of Heritage items will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.</p> <p>Report upon disturbance to Heritage item to Site Superintendent and NT Heritage Commission (or other relevant authority).</p> <p>Reporting will consistent with the continuous improvement goals for environmental management for the project.</p>

6.7.3 Cultural Values

Management of cultural values of the DCWR site involves documentation, reporting and central coordination of information relating to changes expected to the site over its evolution. Cultural values of the past, present and future will enable future generations to appreciate and understand the maturation of the DCWR site and the wider context of Darwin's development. Perpetuation of cultural 'knowledge' will act as an element of ESD in the pursuit of intergenerational equity. The initial Masterplan will provide an outline of future development within the site; historic evolution of the site can be monitored throughout the site's history.

The forums for recording and monitoring information related to cultural values include the Register of the National Estate (RNE), identified Heritage Places and Historical Sites, Marine Archaeological items, Special Values/Areas of Significance, the Register of Sacred Sites and the Aboriginal Areas Protection Authority.

Management commitment
DIPE is committed to ensuring that cultural values of the site are maintained, monitored and recorded.
Management Strategies
<p>As new cultural values are identified, they will be added to existing registers or recommended for inclusion on relevant registers.</p> <p>A central register of cultural values at the site will be established to provide a central point of reference for all cultural values that may be recorded in National and State registers.</p> <p>Independent heritage specialists will verify proposed cultural values where appropriate.</p> <p>A mechanism for reporting changes in cultural values will be established.</p> <p>Any further studies undertaken to assess cultural values on or near the site will be incorporated into the central register of cultural values. The results and recommendations will be made available to DIPE for inclusion in decision-making and to support guidance within the Master Plan.</p> <p>Changes to heritage legislation and associated requirements will be monitored and integrated into existing cultural values registers.</p>
Monitoring
<p>A standardised system of regular monitoring is to be developed and conducted.</p> <p>Baseline monitoring is to commence before the construction activities.</p> <p>The results of the monitoring program will be used to measure the effectiveness of measures against the target.</p>

Appropriately qualified heritage specialists will monitor cultural values for physical integrity and disturbance during construction activity.

Reporting

A standardised reporting format will be developed and agreed with DIPE.

Reporting of cultural values will be finalised every 12 months and forwarded to DIPE as part of the reporting program for the site.

Reporting will consistent with the continuous improvement goals for environmental management for the project.

URS Australia Pty Ltd (URS) has prepared this EMP for the use of the Department of Infrastructure, Planning and Environment in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this EMP. It is prepared in accordance with the scope of work and for the purpose outlined in the ??? proposal dated ???.

The methodology adopted and sources of information used by URS are outlined in this EMP. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this EMP as provided to URS was false.

This EMP was prepared between 30 April and 18 May 2004 and is based on the information reviewed and received at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report (report) does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.